Stantec

B.1 STAGE 1 ARCHAEOLOGICAL ASSESSMENT

Ministry of Tourism, Culture and Sport

Archaeology Programs Unit
Programs and Services Branch
Culture Division
401 Bay Street, Suite 1700
Toronto ON M7A 0A7
Tel.: (416) 212-5107
Email: jenna.down@ontario.ca

Ministère du Tourisme, de la Culture et du Sport

Unité des programmes d'archéologie
Direction des programmes et des services
Division de culture
401, rue Bay, bureau 1700
Toronto ON M7A 0A7
Tél. : (416) 212-5107
Email: jenna.down@ontario.ca

Nov 4, 2016

Parker S. Dickson (P256)
Stantec Consulting
171 Queens London ON N6A 5J7

RE: Review and Entry into the Ontario Public Register of Archaeological Reports: Archaeological Assessment Report Entitled, "Stage 1 Archaeological Assessment: Glendon Drive Streetscape Improvements, Schedule C Municipal Class Environmental Assessment, Various Lots and Concessions, Geographic Township of Lobo, now Municipality of Middlesex Centre, and Geographic Township of Caradoc, now Township of Strathroy-Caradoc, Middlesex County, Ontario", Dated Oct 3, 2016, Filed with MTCS Toronto Office on Nov 4, 2016, MTCS Project Information Form Number P256-0367-2015, MTCS File Number 0003702

Dear Mr. Dickson:

This office has reviewed 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.[1] This review has been carried out in order to determine whether the licensed professional consultant archaeologist has met the terms and conditions of their licence, that the licensee assessed the property and documented archaeological resources using a process that accords with the 2011 Standards and Guidelines for Consultant Archaeologists set by the ministry, and that the archaeological fieldwork and report recommendations are consistent with the conservation, protection and preservation of the cultural heritage of Ontario.

The report documents the assessment/mitigation of the study area as depicted in Map 1 and Map 4-11 of the above titled report and recommends the following:

The Stage 1 archaeological assessment, involving background research and a property inspection, resulted in the determination that much of the study area, approximately 75%, retains no archaeological potential as it includes: extensive land disturbance, steep slope, a low and wet area, and previously assessed areas. However, the remaining portion of the study area, approximately 25%, retains potential for the identification and documentation of archaeological resources. **Thus, in accordance with Section 1.3 and Section 7.7.4 of the MTCS' 2011 Standards and Guidelines for Consultant Archaeologists (Government of Ontario 2011), portions of the study area which retain archaeological potential and any area of archaeological potential that will be subject to construction disturbance must be subject to a Stage 2 archaeological assessment prior to construction.** It has also been determined that portions of the study area do not retain archaeological potential and no further archaeological assessment is recommended for those areas.

The objective of the Stage 2 archaeological assessment will be to document archaeological resources within the study area and to determine whether these archaeological resources require further assessment. The Stage 2 archaeological assessment of the study area will consist of a combination of pedestrian survey and test pit survey. The pedestrian survey of agricultural fields will entail the systematic walking of open ploughed fields at five metre intervals as outlined in Section 2.1.1 of the 2011 Standards and Guidelines for Consultant Archaeologists (Government of Ontario 2011). Areas to be subjected to test pit survey that are within woodlots, scrubland, pasture, or areas that cannot be ploughed will be assessed according to Section 2.1.2 of the MTCS' 2011 Standards and Guidelines for Consultant Archaeologists (Government of Ontario 2011). If the archaeological field team judges any lands to be low and wet, steeply sloped, or disturbed during the course of the Stage 2 field work, those areas will not require assessment, but will be photographically documented instead in accordance with Section 2.1 of the MTCS' 2011 Standards and Guidelines for Consultant Archaeologists (Government of Ontario 2011).

Based on the information contained in the report, the ministry is satisfied that the fieldwork and reporting for the archaeological assessment are consistent with the ministry's 2011 Standards and Guidelines for Consultant Archaeologists and the terms and conditions for archaeological licences. This report has been entered into the Ontario Public Register of Archaeological Reports. 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 any further information regarding this matter, please feel free to contact me.

Sincerely,

Jenna Down
Archaeology Review Officer

cc. Archaeology Licensing Officer
Brian Lima,Municipality of Middlesex Centre
Sarah Paul,Ministry of Environment and Climate Change

[1] 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.

Stage 1 Archaeological Assessment: Glendon Drive Streetscape Improvements, Schedule C Municipal Class Environmental Assessment

Various Lots and Concessions,
Geographic Township of Lobo, now
Municipality of Middlesex Centre, and
Geographic Township of Caradoc,
now Township of Strathroy-Caradoc,
Middlesex County, Ontario

Prepared for:
Brian Lima
Municipality of Middlesex Centre
10227 Ilderton Road, R.R. 2
Ilderton, ON N0M 2AO
Tel: 519-666-0190
Email: lima@middlesexcentre.on.ca

Prepared by:
Stantec Consulting Ltd.
171 Queens Avenue, 6th Floor
London, ON N6A 5J7
Tel: (519) 645-2007
Fax: (519) 645-6575

Licensee: Parker Dickson, MA
License Number: P256
PIF Number : P256-0330-2015
Project Number: 122450156

ORIGINAL REPORT

December 11, 2015

Table of Contents

LIST OF TABLES

LIST OF FIGURES

Executive Summary

Stantec Consulting Ltd. (Stantec) was retained by the Municipality of Middlesex Centre (Middlesex Centre) to complete a Stage 1 archaeological assessment, to be included as part of the Environmental Study Report (ESR), for the Municipal Class Environmental Assessment (Class EA) of the Glendon Drive Streetscape Improvements Project. The Stage 1 assessment conducted by Stantec was undertaken in the preliminary planning and design process for a Schedule C Municipal Class EA under the Ontario *Environmental Assessment Act* (Government of Ontario 1990a). The study area involves a stretch of Glendon Drive, extending from the Thames River Bridge through the communities of Kilworth and Komoka to the Highway 402 interchange, and includes parts of various Lots and Concessions, Geographic Township of Lobo, now Municipality of Middlesex Centre, and Geographic Township of Caradoc, now Township of Strathroy-Caradoc, Middlesex County, Ontario. Generally, the study area includes the existing Glendon Drive (County Road 14) municipal right-of-way (ROW) and a 10 metre buffer on either side of the ROW limits.

Approximately 37 hectares of agricultural, residential, commercial/retail, and existing municipal road infrastructure were evaluated as part of the study area. The Stage 1 archaeological assessment, involving background research and a property inspection, resulted in the determination that much of the study area, approximately 75%, retains no archaeological potential as it includes: extensive land disturbance, steep slope, a low and wet area, and previously assessed areas. However, the remaining portion of the study area, approximately 25%, retains potential for the identification and documentation of archaeological resources. Thus, in accordance with Section 1.3 and Section 7.7.4 of the MTCS' 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011), **portions of the study area which retain archaeological potential and any area of archaeological potential that will be subject to construction disturbance must be subject to a Stage 2 archaeological assessment prior to construction. It has also been determined that portions of the study area do not retain archaeological potential and no further archaeological assessment is recommended for those areas.**

The objective of the Stage 2 archaeological assessment will be to document archaeological resources within the study area and to determine whether these archaeological resources require further assessment. The Stage 2 archaeological assessment of the study area will consist of a combination of pedestrian survey and test pit survey. The pedestrian survey of agricultural fields will entail the systematic walking of open ploughed fields at five metre intervals as outlined in Section 2.1.1 of the 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011). Areas to be subjected to test pit survey that are within woodlots, scrubland, pasture, or areas that cannot be ploughed will be assessed according to Section 2.1.2 of the MTCS' 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011). If the archaeological field team judges any lands to be low and wet, steeply sloped, or disturbed during the course of the Stage 2 field work, those areas will not require assessment, but will be photographically documented instead in accordance with Section 2.1 of the MTCS' 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011).

The MTCS is asked to review the results presented and to accept this report into the Ontario Public Register of Archaeological Reports. Additional archaeological assessment is still required for portions of the study area and so these portions recommended for further archaeological fieldwork remain subject to Section 48(1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed, except by a person holding an archaeological license.

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

Project Personnel

Licensed Archaeologist:	Parker Dickson, MA (P256)
Project Manager:	Corri Marr, Senior Planner
Field Directors:	Parker Dickson, MA (P256)
Report Writer:	Parker Dickson, MA (P256)
GIS Specialist:	Alexander Brown
Quality Review:	Tracie Carmichael, BA, B.Ed. (R140)
Independent Review:	Jim Wilson, MA (P001)

Acknowledgements

Proponent Contact:	Brian Lima – Municipality of Middlesex Centre
Ministry of Tourism, Culture and Sport:	Mr. Robert von Bitter

1.0 PROJECT CONTEXT

1.1 DEVELOPMENT CONTEXT

Stantec Consulting Ltd. (Stantec) was retained by the Municipality of Middlesex Centre (Middlesex Centre) to complete a Stage 1 archaeological assessment, to be included as part of the Environmental Study Report (ESR), for the Municipal Class Environmental Assessment (Class EA) of the Glendon Drive Streetscape Improvements Project. Middlesex Centre has initiated the Class EA to identify potential streetscape improvements to Glendon Drive (County Road 14). Glendon Drive has the potential to function not only as a gateway into and out of the Komoka-Kilworth community, but operate as a traditional village main street, support commercial, village centre, and residential land uses. Potential improvements to Glendon Drive to be evaluated in the ESR may include: traffic improvements including safe turning movements and appropriate right of way requirements; upgrades to the linear infrastructure system including storm and sanitary sewers, and watermains; active transportation including pedestrian and cyclist infrastructure; and urban design and streetscape elements. The study area extends from the Thames River Bridge through the communities of Kilworth and Komoka to the Highway 402 interchange (Figure 1).

The Stage 1 assessment conducted by Stantec was undertaken in the preliminary planning and design process for a Schedule C Municipal Class EA under the Ontario *Environmental Assessment Act* (Government of Ontario 1990a). Approximately 37 hectares of agricultural, residential, commercial/retail, and existing municipal road infrastructure were evaluated as part of the study area. As noted above, the study area involves a stretch of Glendon Drive, extending from the Thames River Bridge through the communities of Kilworth and Komoka to the Highway 402 interchange, and includes parts of various Lots and Concessions, Geographic Township of Lobo, now Municipality of Middlesex Centre, and Geographic Township of Caradoc, now Township of Strathroy-Caradoc, Middlesex County, Ontario. Generally, the study area includes the existing Glendon Drive (County Road 14) municipal right-of-way (ROW) and a 10 metre buffer on either side of the ROW limits. The various Lots and Concessions are detailed in Table 1.

Table 1: Lots and Concessions within Study Area

Lots	Concession	Geographic Township	Current Municipality
1 to 9	2	Lobo	Municipality of Middlesex Centre, Middlesex County
1 to 11	1	Lobo	Municipality of Middlesex Centre, Middlesex County
23 and 24	2	Caradoc	Township of Strathroy-Caradoc, Middlesex County

Permission to enter the study area to identify features of archaeological potential was provided by Middlesex Centre.

1.1.1 Objectives

The objectives of the Stage 1 assessment are to compile available information about the known and potential archaeological 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 Ministry of Tourism, Culture and Sport's (MTCS) 2011 *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 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, Stantec 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 such as the original township plans provided by the Ministry of Natural Resources and Forestry (MNRF) and historical atlases;
- An examination of the Ontario Archaeological Sites Database (ASDB) to determine the presence of known archaeological sites in and around the study area; and
- A property inspection of the study area.

1.2 HISTORICAL CONTEXT

The study area involves a stretch of Glendon Drive, extending from the Thames River Bridge through the communities of Kilworth and Komoka to the Highway 402 interchange, and includes parts of various Lots and Concessions, Geographic Township of Lobo, now Municipality of Middlesex Centre, and Geographic Township of Caradoc, now Township of Strathroy-Caradoc, Middlesex County, Ontario. Generally, the study area includes the existing Glendon Drive (County Road 14) municipal ROW and a 10 metre buffer on either side of the ROW limits.

1.2.1 Post-contact Aboriginal Resources

The post-contact Aboriginal occupation of Southern Ontario was heavily influenced by the dispersal of various Iroquoian-speaking communities by the New York State Iroquois and the subsequent arrival of Algonkian-speaking groups from northern Ontario at the end of the 17th century and beginning of the 18th century (Konrad 1981; Schmalz 1991). By 1690, Algonkian speakers from the north appear to have begun to repopulate Bruce County (Rogers 1978:761). This is the period in which the Mississaugas are known to have moved into southern Ontario and the lower Great Lakes watersheds (Konrad 1981). In southwestern Ontario, however, members of the Three Fires Confederacy (Chippewa, Ottawa, and Potawatomi) were immigrating from Ohio and Michigan in the late 1700s (Feest and Feest 1978:778-779).

The nature of Aboriginal settlement size, population distribution, and material culture shifted as European settlers encroached upon their territory. However, despite this shift, "written accounts of material life and livelihood, the correlation of historically recorded villages to their archaeological manifestations, and the similarities of those sites to more ancient sites have revealed an antiquity to documented cultural expressions that confirms a deep historical continuity to Iroquoian systems of ideology and thought" (Ferris 2009:114). As a result, First Nations peoples of Southern Ontario have left behind archaeologically significant resources throughout Southern Ontario which show continuity with past peoples, even if they have not been recorded in Euro-Canadian documentation.

The study area is situated near the boundaries of three historic treaty areas: Treaty Number 2, Treaty Number 6, and Treaty Number 21. The study are first enters the Euro-Canadian historic record on May 19th, 1790 as Treaty Number 2 between the Crown and the Odawa, Chippewa, Pottawatomi, and Huron. Treaty Number 2:

> *... was made with the O[dawa], Chippew[a], Pottawatom[i] and Huro[n] May 19th, 1790, portions of which nations had established themselves on the Detroit River all of whom had been driven by the Iroquois from the northern and eastern parts of the Province, from the Detroit River easterly to Catfish Creek and south of the river La Tranche [Thames River] and Chenail Ecarte, and contains Essex County except Anderdon Township and Part of West Sandwich; Kent County except Zone Township, and Gores of Camden and Chatham; Elgin County except Bayham Township and parts of South Dorchester and Malahide. In Middlesex County, Del[a]ware and Westminster Townships and part of North Dorchester [are included].*
>
> (Morris 1943:17)

Later, on September 7th, 1796, Treaty Number 6 was enacted between the Crown and the Chippewa. Treaty Number 6 was:

> *…conveyed by the Principal Chiefs, Warriors and People of the Chippewa Nation of Indians to the Crown, of that tract of land situate lying and being on the north side of the River Thames or River La Tranche and known by the Indian name Escunnisabe, on the 7th of September, 1796, and comprising part of the Township of North Dorchester in Middlesex County and of North Oxford in Oxford County.*
>
> (Morris 1931:21)

The study area is also associated with Treaty Number 21, which was:

Later, on September 7th, 1796, Treaty Number 6 was enacted between the Crown and the Chippewa. Treaty Number 6 was:

> *…a provisional agreement, entered into on the 9th day of March, 1819, between John Aiken, Esquire, on behalf of His Majesty, and the Principal Men of the Chippewa Nation of Indians, inhabiting a tract of land, whereas the said John Aikens for His Majesty was to pay the said Indians 600 pounds yearly for the said tract….*
>
> (Morris 1943:24)

While it is difficult to exactly delineate treaty boundaries today, Figure 2 provides an approximate outline of Treaty Number 2, Treaty Number 6, and Treaty Number 21 (identified by the letters “C”, “I”, and “R”, respectively).

1.2.2 Euro-Canadian Resources

In 1791, the Provinces of Upper Canada and Lower Canada were created from the former Province of Quebec by an act of British Parliament. At this time, Colonel John Graves Simcoe was appointed as the Lieutenant Governor of Upper Canada and was tasked with governing the new province, directing its settlement and establishing a constitutional government modelled after that of Britain’s (Coyne 1895). In 1792, Simcoe divided Upper Canada into 19 counties consisting of previously-settled lands, new lands opened for settlement, and lands not yet acquired by Crown. These new counties stretched from Essex in the west, to Glengarry in the east.

Middlesex County was first settled in 1793 after Lieutenant Simcoe passed through the area on his way to visit Detroit (Page & Co.1878) and was initially comprised of ten townships: Aldborough, Dunwich, Southwold, Yarmouth, Malahide, Bayham, Delaware, Westminster, Dorchester, and London. By 1842, the population of Middlesex County had reached over 31,000 inhabitants. The area developed quickly and over the next two years roughly 7,300 hectares of land became cleared for agricultural purposes and by 1844, the county’s agricultural lands exceeded 52,000 hectares (Smith 1846). Middlesex County was known for its many good roads at this time, including Talbot Road in Westminster Township (now Colonel Talbot Road). Between 1846 and 1849, Middlesex County comprised the Townships of Adelaide, Aldborough, Bayham, Caradoc, Delaware, Dorchester, Dunwich, Ekfrid, Lobo, London, Metcalfe, Mosa, Malahide, Southwold, Westminster, Williams, Yarmouth, and the Town of London. The Townships of Yarmouth, London, Lobo, Westminster, Southwold, and Malahide were the best settled, and on the whole, the county contained many good farms with large clearings and expansive orchards (Smith 1846).

Colonel Burwell began the survey of Lobo Township in 1819-1821. Lots were divided into 200 acre parcels and arranged in 13 concessions. The township was named Lobo ("wolf" in Latin) by the British general Peregrine Maitland who was appointed lieutenant governor of Upper Canada between 1818 and 1828. Shortly after the survey, the first settlers, many from Argyllshire in Scotland, arrived in the Lobo Township (Goodspeed 1889). The principal settlements were the villages of Komoka, Lobo, Coldstream, and Poplar Hill. The township's population was growing slowly and reached 2,680 in 1888 (Goodspeed 1889). In 1998, Lobo Township together with the London and Delaware Townships was amalgamated to form the Municipality of Middlesex Centre.

The village of Komoka became was originally defined by three official surveys: the Wellington Survey of 1853 which established the west side; the Geddes Survey of 1854 which established the east side; and the Komoka Survey of 1855. Over time, Komoka village became a crossing point of several railway lines, including the Great Western Railway and the Sarnia Branch, and featured several hotels, general stores and a post office. In fact, Komoka was considered a potential candidate as the capital of Middlesex County.

A settlement at Kilworth began in 1798 by the Woodhull family who fled New York State during the American Revolution (Goodspeed 1889). A post office was opened in 1851 and in the same year the population of the hamlet approached 200 (Goodspeed 1889).

Caradoc Township was surveyed in 1821 and 1822 by Colonel Burwell and was named after a King of Wales, who was killed in a battle between the Welsh and Saxons in 1795 (Page & Co. 1878; Rayburn 1997). Glendon Drive (County Road 14) continues southwest beyond the study area to meet with the village of Mount Brydges. Mount Brydges was settled in the early to mid-1850s and by 1857, had a population of 180 (Goodspeed 1889). In 2001, the Town of Strathroy and the Township of Caradoc were amalgamated to form the Township of Strathroy-Caradoc.

The late 19th century settlement pattern of the study area is depicted by the 1878 historic maps of Lobo Township and Caradoc Township in the *Illustrated Historical Atlas of the County of Middlesex* (Page & Co. 1878). Figure 3 illustrates a portion of the 1878 maps of Lobo and Caradoc Township. The landowner information for the applicable portion of each lot is summarized in Table 2 below.

Table 2: Applicable Landowner Information from the 1878 Historic Maps

Township	Concession	Lot	Landowner	Parcel	Comment
Lobo	1	1	Josh Harris	Northern portion	Multiple structures illustrated south of road
		2	Mrs. Alex M^{c}Dougall	Irregular parcel	No structures illustrated
		3	Jno M^{c}Kellar	Irregular parcel	No structures illustrated
			David S. Smith	Northeastern block	No structures illustrated
		4	David S. Smith	Northern block	Structure with associated orchard illustrated south of road
		5	John Shipley	Northern block	Structure illustrated south of road
		6	John Shipley	Northern block	No structures illustrated
		7	Walter Parson	Entire lot	No structures illustrated
		8	Kilvert Parsons	Entire lot	No structures illustrated near road
		9	R. Ferguson	Portion north of road	No structures illustrated
			E. Gordon	Portion south of road	No structures illustrated
		10	R. Ferguson	Portion north of road	No structures illustrated near road; possible grist mill north of road
			E. Gordon	Portion south of road	No structures illustrated
		11	Illegible	Small portion north and south of road	Multiple structures illustrated and possible grist mill
	2	1	J. Cassidy	Southeastern parcel	Structure illustrated north of road
			W. Dunn	Southwestern parcel	Structure illustrated north of road
		2	James M^{c}Intosh	Entire lot	Structure with associated orchard illustrated north of road
		3	Jas. Barber	Eastern half	Structure illustrated north of road
			Jno. M^{c}Gilvray	Western half	Two structures illustrated north of road
		4	J.C.	Small road fronting parcel	Structure illustrated north of road
			M. Graham	Southern parcel	Multiple structures illustrated in parcel
		5	N/A	Entire lot	Town plots

Township	Concession	Lot	Landowner	Parcel	Comment
		6	A. Gray	Southern parcel	Structure illustrated north of road
		7	T.T. Turnball	Southern half	No structures illustrated near road
		8	T.T. Turnball	Southern half	No structures illustrated near road
		9	G. Westbrook	Portion between road and rail line	Structure illustrated north of road
Caradoc	2	23	Wm Dunn	Eastern half	Structure illustrated south of road
			Wm Kerstead	Western half	Structure illustrated north of road
		24	C.N.D. Tildon	Entire lot	Structure illustrated north of road

Historical county atlases were produced primarily to identify factories, offices, residences and landholdings of subscribers and were funded by subscription fees. Landowners who did not subscribe were not always listed on the maps (Caston 1997:100). As such, all structures were not necessarily depicted or placed accurately (Gentilcore and Head 1984).

The majority of the region surrounding the study area has been subject to European-style agricultural practices for over 100 years, having been settled by Euro-Canadian farmers by the late 19th century. Much of the region today continues to be used for agricultural purposes.

1.3 ARCHAEOLOGICAL CONTEXT

1.3.1 The Natural Environment

The study area is situated within the Caradoc Sand Plan physiographic region, as defined by (Chapman and Putnam 1986). This region is described as:

> *In the neighbourhood of London there is a series of small plains which differ from the adjacent moraines and clay plains in that they are covered with sand or other light-textured, waterlaid deposits. Together they comprise about 300 square miles or 192,000 acres in which the soils are conducive to specialized agriculture.*
>
> (Chapman and Putnam 1984:146)

The region consists of a series of small, light-textured sandy plans that are waterlain deposits associated with former glacial spillways and deltas (Chapman and Putnam 1984). Notwithstanding the disturbance and construction fill associated with Glendon Drive, soils associated with the region would have been suitable for Aboriginal agriculture.

The study area is bounded on the east side by the Thames River, and an unnamed tributary of the Thames River crosses the study area on the western end. In addition to these, numerous other primary and secondary water sources are within close proximity to the study area, including: Oxbow Creek, other unnamed tributaries of the Thames River, and portions of the Thames River itself.

1.3.2 Pre-contact Aboriginal Resources

This portion of southwestern Ontario has been occupied by First Nations peoples since the retreat of the Wisconsin glacier approximately 11,000 years ago. Local environmental conditions were significantly different from what they are today. Ontario's first peoples would have crossed the landscape in small groups in search of food, particularly migratory game species. In this area, caribou may have been a Paleo-Indian diet staple, supplemented by wild plants, small game, birds, and fish. Given the low density of populations on the landscape at this time and their mobile nature, Paleo-Indian sites are small and ephemeral. They are sometimes identified by the presence of fluted points. Sites are frequently located adjacent to the shorelines of large glacial lakes.

Archaeological records indicate subsistence changes around 8000 B.C. at the start of the Archaic Period in southwestern Ontario. Since the large mammal species that formed the basis of the Paleo-Indian diet became extinct or moved north with the warming of the climate, Archaic populations had a more varied diet, exploiting a range of plants and bird, mammal, and fish species. Reliance on specific food resources like fish, deer, and several nut species became more noticeable through the Archaic Period and the presence of warmer, more hospitable environs led to expansion of group and family sizes. In the archaeological record, this is evident in the presence of larger sites. The coniferous forests of earlier times were replaced by stands of mixed coniferous and deciduous trees by about 4000 B.C. The transition to more productive environmental circumstances led to a rise in population density. As a result, Archaic sites become more abundant over time. Artifacts typical of these occupations include a variety of stemmed and notched projectile points; chipped stone scrapers; ground stone tools (e.g., celts, adzes) and ornaments (e.g., bannerstones, gorgets); bifaces or tool blanks; animal bone; and chert waste flakes, a byproduct of the tool making process.

Significant changes in cultural and environmental patterns occurred in the Early and Middle Woodland periods (*circa* 950 B.C. to A.D. 800). Occupations became increasingly more permanent in this period, culminating in major semi-permanent villages by roughly 1,000 years ago. Archaeologically, the most significant changes by Woodland peoples were the appearance of artifacts manufactured from modeled clay and the emergence of more sedentary villages. The earliest pottery was crudely made by the coiling method and early house structures were simple oval enclosures. The Early and Middle Woodland periods are also characterized by extensive trade in raw materials, objects and finished tools, with sites in Ontario containing trade items with origins in the Mississippi and Ohio River valleys. By the Late Woodland period (*circa* A.D. 1000 – 1550), large villages were constructed and habitation within these villages was largely year-round.

Over time, the general trend saw early Aboriginal peoples practicing hunter-gatherer lifestyles with a gradual move towards more extensive farming and sedentary practices. Table 3 provides a general outline of the cultural chronology of Middlesex County, based on Ellis and Ferris (1990).

Table 3: Cultural Chronology of Middlesex County

Period	Characteristics	Time Period	Comments
Early Paleo-Indian	Fluted Projectiles	9,000 – 8,400 B.C.	spruce parkland/caribou hunters
Late Paleo-Indian	Hi-Lo Projectiles	8,400 – 8,000B.C.	smaller but more numerous sites
Early Archaic	Kirk and Bifurcate Base Points	8,000 – 6,000 B.C.	slow population growth
Middle Archaic	Brewerton-like points	6,000 – 2,500 B.C.	environment similar to present
Late Archaic	Lamoka (narrow points)	2,000 – 1,800 B.C.	increasing site size
	Broad Points	1,800 – 1,500 B.C.	large chipped lithic tools
	Small Points	1,500 – 1,100 B.C.	introduction of bow hunting
Terminal Archaic	Hind Points	1,100 - 950 B.C.	emergence of true cemeteries
Early Woodland	Meadowood Points	950 - 400 B.C.	introduction of pottery
Middle Woodland	Couture Corded Pottery	400 B.C. - A.D.600	increased sedentism
	Riviere au Vase Corded Pottery	A.D. 600 - 1000	Seasonal hunting and gathering
Late Woodland	Younge Phase Pottery	A.D. 1000 - 1200	Incipient agriculture
	Springwells Phase Pottery	A.D. 1200 - 1400	Agricultural villages
	Wolf Phase Pottery	A.D. 1400 - 1550	Earthworked villages, warfare
Contact Aboriginal	Various Algonkian Groups	A.D. 1550 – present	early written records and treaties
Late Historic	French/Euro-Canadian	A.D. 1749 - present	European settlement

1.3.3 Previously Identified Archaeological Sites and Surveys

In order to compile an inventory of archaeological resources, the registered archaeological site records kept by the MTCS were consulted. In Ontario, information concerning archaeological sites stored in the ASDB is maintained by the MTCS. This database contains archaeological sites registered according to the Borden system. Under the Borden system, Canada is divided into grid blocks based on latitude and longitude. A Borden Block is approximately 13 kilometres east to west and approximately 18.5 kilometres north to south. Each Borden Block is referenced by a four-letter designator and sites within a block are numbered sequentially as they are found. The study area under review is located within Borden Block AfHi.

Information concerning specific site locations is protected by provincial policy, and is not fully subject to the *Freedom of Information and Protection of Privacy 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 MTCS 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.

An examination of the ASDB has shown that there are 36 registered archaeological sites within a one-kilometre radius of the study area, and five previous archaeological assessments have been conducted within 50 metres of the study area (Government of Ontario n.d.). Table 4 provides a listing of the previously registered archaeological sites within one kilometre of the study area.

Table 4: Registered Sites within One Kilometre of the Study Area

Borden Number	Site Name	Site Type	Cultural Affiliation
AfHi-18	n/a	Indeterminate	Early Woodland
AfHi-25	Cornell	Burial	Late Woodland
AfHi-26	Wishing Well	Camp	Late Archaic / Late Woodland
AfHi-44	Varley	Camp	Late Archaic
AfHi-58	Huron Rye	Camp	Late Archaic / Middle Woodland
AfHi-59	Vandenburgt	Camp	Late Archaic
AfHi-136	Old Barn	Indeterminate	Early Woodland
AfHi-167	Laural Kay	Camp	Woodland
AfHi-168	Rob's Toss	Burial	Pre-contact Aboriginal
AfHi-169	Spool	Indeterminate	Late Woodland
AfHi-180	Dave Thody	Lithic scatter	Pre-contact Aboriginal
AfHi-182	Lobo House	Homestead	19th century Euro-Canadian
AfHi-183	Parsons House	Homestead	19th century Euro-Canadian
AfHi-184	Ruins 3	Outbuilding	19th century Euro-Canadian
AfHi-185	Windy Site	Indeterminate	Archaic to Woodland
AfHi-186	Doan Barn	Camp	Pre-contact Aboriginal
AfHi-187	Doan Field	Isolated find	Pre-contact Aboriginal
AfHi-188	Bilmar	Isolated find	Pre-contact Aboriginal
AfHi-231	Kilworth Heights 1	Isolated find	Paleo-Indian
AfHi-232	Kilworth Heights 2	Lithic scatter	Pre-contact Aboriginal
AfHi-233	Kilworth Heights 3	Lithic scatter	Pre-contact Aboriginal
AfHi-234	Kilworth Heights 4	Lithic scatter	Pre-contact Aboriginal
AfHi-235	Kilworth Heights 5	Lithic scatter	Pre-contact Aboriginal

Borden Number	Site Name	Site Type	Cultural Affiliation
AfHi-236	Kilworth Heights 6	Lithic scatter	Pre-contact Aboriginal
AfHi-250	Keith Wales	Indeterminate	Pre-contact Aboriginal / 19th century Euro-Canadian
AfHi-289	Location 1	Camp	Woodland
AfHi-290	Location 3	Camp	Woodland
AfHi-291	Location 5	Camp	Pre-contact Aboriginal
AfHi-292	Location 6	Camp	Late Woodland
AfHi-298	Location 13	Camp	Pre-contact Aboriginal
AfHi-299	Location 14	Camp	Pre-contact Aboriginal
AfHi-300	Location 15	Isolated find	Late Archaic
AfHi-301	Location 16	Camp	Late Archaic
AfHi-335	n/a	Camp	Early Woodland / Middle Woodland
AfHi-372	Location 1	Indeterminate	Archaic / Woodland
AfHi-373	Location 2	Indeterminate	Pre-contact Aboriginal

As noted above, five previous archaeological assessments document work within 50 metres of the current study area. The earliest systematic archaeological investigation in close proximity to the study area was conducted by Jim Wilson as part of *The Middle Thames River Settlement/Subsistence Project* in 1992 and 1993 (Wilson 1997). Wilson assessed several fields west of Komoka on south side of Glendon Drive. No archaeological sites were located within 100 metres of Glendon Drive during Wilson's survey.

An assessment conducted by Golder Associates Inc. (Golder) in 2009 was conducted for the Komoka Wellness Centre, now the Middlesex Centre Wellness & Recreation Complex (Golder 2009). A southern portion of the study area for the Middlesex Centre Wellness & Recreation Complex overlaps with the current study area along Glendon Drive, west of Tunks Lane. No archaeological resources were registered with the MTCS as a result of the Golder (2009) assessment and no further work is required.

An archaeological assessment for the proposed Lehouiller Subdivision on part of Lot 9, Concession 1, Geographic Township of Lobo was conducted by Archaeologix Inc. (Archaeologix). A northern portion of the study area for the proposed subdivision overlaps with the current study area along Glendon Drive, east of Jefferies Road. No archaeological resources were registered with the MTCS as a result of the Archaeologix (2003) assessment and no further work is required.

In 2012, Timmins Martelle Heritage Consultants Inc. (TMHC) conducted an archaeological assessment for a proposed residential subdivision on part of Lots 7 and 8, Concession 1, Geographic Township of Lobo (TMHC 2013). A northern portion of the study area for the proposed subdivision overlaps with the current study area along Glendon Drive, between Springfield Way and Queen Street. The results of this assessment identified a portion of one previously registered archaeological site, the Windy Site (AfHi-185) and one new site, represented by two loci separated by a built laneway. The new archaeological site was registered with the MTCS by loci as Location 1 (AfHi-372) and Location 2 (AfHi-373). The Stage 2 polygon for Location 1 (AfHi-372) overlaps with the Glendon Drive study area and abuts with the municipal ROW. A Stage 3 archaeological assessment was recommended for all three sites by TMHC (2013).

The three sites, Location 1 (AfHi-372), Location 2 (AfHi-373), and the Windy Site (AfHi-185), were subject to Stage 3 archaeological assessment by TMHC in 2015 (TMHC 2015). Of particular note, the site limits defined by the Stage 3 archaeological assessment of Location 1 (AfHi-372) continue to illustrate the northern portion of the site as encroaching upon the Glendon Drive study area. A Stage 4 mitigation of development impacts has been recommended for Location 1 (AfHi-372), as well as Location 2 (AfHi-373) and the Windy Site (AfHi-185) (TMHC 2015).

1.3.4 Existing Conditions

The study area involves a stretch of Glendon Drive, extending from the Thames River Bridge through the communities of Kilworth and Komoka to the Highway 402 interchange, and includes parts of various Lots and Concessions, Geographic Township of Lobo, now Municipality of Middlesex Centre, and Geographic Township of Caradoc, now Township of Strathroy-Caradoc, Middlesex County, Ontario (see Table 2). Generally, the study area includes the existing Glendon Drive (County Road 14) municipal ROW and a 10 metre buffer on either side of the ROW limits.

2.0 FIELD METHODS

Initial background research compiled the available information concerning any known and/or potential archaeological resources within the study area. A property inspection was conducted under archaeological consulting license P256 issued to Parker Dickson, MA, of Stantec by the MTCS. The property inspection was completed on October 27, 2015, under PIF P256-0367-2015 in accordance with Section 1.2 of the MTCS' 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011). The property inspection involved examining the entirety of the study area to identify the presence or absence of any features of archaeological potential. During the property inspection the weather was partly cloudy and mild, and visibility of land features was excellent. At no time were field, lighting, or weather conditions detrimental to the identification of features of archaeological potential.

As noted elsewhere, the study area involves a stretch of Glendon Drive, extending from the Thames River Bridge through the communities of Kilworth and Komoka to the Highway 402 interchange, and includes the existing Glendon Drive (County Road 14) municipal ROW and a 10 metre buffer on either side of the ROW limits. Approximately 72% of the study area consists of modern disturbances from the existing paved road, raised roadbeds with gravel shoulders, culverts and ditching alongside of the roadway, areas of previous disturbance within the ROW from the installation of buried and overhead utilities and infrastructure (e.g. sewers), as well as disturbance from existing commercial frontages. This includes a small portion of the ROW, approximately 1%, adjacent to a previously registered archaeological site (AfHi-372) which may retain archaeological potential.

Smaller portions of the study area consist of manicured lawn, sparse woodlot and non-agricultural scrubland/pasture (approximately 14%), agricultural field (approximately 9%), areas of steep slope (approximately 1%), and a low and permanently wet area (approximately 1%). The remaining portion of the study area, approximately 3%, consists of areas which were previously assessed (Archaeologix 2003; Golder 2009; TMHC 2012; TMHC 2015).

The photography from the property inspection conducted on October 27, 2015 is presented in Section 7.1 and confirm that the requirements for a Stage 1 property inspection were met, as per Section 1.2 and Section 7.7.2 Standard 1 of the MTCS' 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011). Figures 4 to 11 illustrate photo locations and the archaeological potential of the study area.

As noted above, a large portion of the study area consists of the existing Glendon Drive ROW which has been extensively disturbed. Photos 1 – 3, 5, 7, 10, 11, 13 – 20, 22 – 28, 30 – 33, 35 – 37, 40 – 44, 46 – 49, and 50 – 52 illustrate portions of the municipal ROW which have been extensively modified by road construction. Photo 45 illustrates a portion of the municipal ROW in proximity to previously registered archaeological site AfHi-372. Portions of the study area which were assessed as part of previous archaeological assessments are illustrated in Photos 18, 42 – 44, 47, and 48.

Other disturbances, including residential laneways, commercial complexes, buried and above ground utilities, and other construction related activities are illustrated in Photos 8, 15, 16, 20, 21, 27, 32, 35 – 39, 41, 46, and 48 – 50. Portions of manicured lawn which may retain archaeological potential associated with existing residential areas can be seen in the background of Photos 15, 20, 27, 32 and 35.

Typical agricultural field along the study area corridor is illustrated in Photos 7, 12, 14, 24, 25, 28, 30, and 31; while typical woodlot, scrubland, and pasture are illustrated by Photos 4, 6, 9, 19, 23, 29, 33, and 40. Photo 34 depicts a low and permanently wet area, and Photos 1 and 2 illustrate areas of steep slope.

3.0 ANALYSIS AND CONCLUSIONS

Archaeological potential is established by determining the likelihood that archaeological resources may be present on a subject property. Stantec applied archaeological potential criteria commonly used by the MTCS (Government of Ontario 2011) to determine areas of archaeological potential within the region under study. These variables include proximity to previously identified archaeological sites, distance to various types of water sources, soil texture and drainage, glacial geomorphology, elevated topography and the general topographic variability of the area. However, it is worth noting that extensive land disturbance can eradicate archaeological potential (Wilson and Horne 1995).

Potable water is the single most important resource for any extended human occupation or settlement and since water sources in the Ontario have remained relatively stable over time, proximity to drinkable water is regard 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 locations. 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.

As discussed above, distance to water is an essential factor in archaeological potential modeling. When evaluating distance to water it is important to distinguish between water and shoreline, as well as natural and artificial water sources, as these features affect site location and type to varying degrees. The MTCS categorizes water sources in the following manner:

- Primary water sources: lakes, rivers, streams, creeks;
- Secondary water sources: intermittent streams and creeks, springs, marshes and swamps;
- Past water sources: glacial lake shorelines, relic river or stream channels, cobble beaches, shorelines of drained lakes or marshes; and
- Accessible or inaccessible shorelines: high bluffs, swamp or marshy lake edges, sandbars stretching into marsh.

The closest source of potable water is the Thames River, located to the east of the study area, and an unnamed tributary of the Thames River which crosses the study area on the western end. In addition to these, numerous other primary and secondary water sources are within close proximity to the study area, including: Oxbow Creek, other unnamed tributaries of the Thames River, and portions of the Thames River itself. Additional ancient and/or relic tributaries of other primary and secondary water sources may have existed but are not identifiable today and are not indicated on historic mapping. Further examination of the study area's natural environment identified soil conditions suitable for Aboriginal and Euro-Canadian agriculture and areas of elevated topography. Storck (1982) notes that archaeological sites, particularly Paleo-Indian sites, tend to be in situated in areas of elevated topography as these areas would possess better drainage and would provide a broad view of the surrounding terrain for game watching. Moreover, there are 33 previously registered Aboriginal archaeological sites within one kilometre of the study area, including one (AfHi-372) that overlaps the study area and abuts the municipal ROW.

For Euro-Canadian sites, archaeological potential can be extended to areas of early Euro-Canadian settlement, including places of military or pioneer settlements; early transportation routes; and properties listed on the municipal register or designated under the *Ontario Heritage Act* or property that local histories or informants have identified with possible historical events, activities or occupations. Historical mapping demonstrates that the study area includes the historic road network and numerous properties along the historic road, now Glendon Drive, were occupied by Euro-Canadian inhabitants in the 19th century. Much of the established road and rail networks and agricultural settlement from that time is still visible today. Moreover, there are three previously registered Euro-Canadian archaeological sites within one kilometre of the study area.

Considering the above, the pre-contact Aboriginal, post-contact Aboriginal, and Euro-Canadian archaeological potential of the study area is judged to be moderate to high. However, as noted above, extensive and deep land alteration can eradicate archaeological potential. The Stage 1 property inspection has determined that a large portion of the study area has been subject to extensive land disturbance which has eradicated all archaeological potential. Nearly all of the municipal ROW for Glendon Drive includes modern disturbance such as existing asphalt roadways, gravel embankments for roadway shoulders, culverts and ditching alongside of the roadway, buried and overhead utilities and infrastructure installations, and gravel and asphalt disturbances from existing commercial frontages. Many of these disturbances extend into the 10 metre buffer on either side of the municipal ROW and also include additional disturbance from existing construction activities and grading. Low to no archaeological potential has also been determined for steeply sloped and low and permanently wet areas.

Smaller portions of the study area have been previously subject to archaeological assessment and retain no further cultural heritage value or interest. Thus, these areas retain no further archaeological potential (Golder 2009, Archaeologix 2003). Figures 4 to 11 illustrate the areas of low to no potential for the study area.

The Stage 1 property inspection has also determined that areas of archaeological potential remain within the study area. These areas include: agricultural field, manicured residential lawn, non-agricultural scrubland and woodlot. Moreover, as Wilson's early survey (Wilson 1997) was conducted using methodology which pre-dates the current MTCS' 2011 *Standards and*

Guidelines for Consultant Archaeologists (Government of Ontario 2011); thus, these areas are considered to still retain archaeological potential. Further, a small portion of the municipal ROW retains archaeological potential as it is adjacent to a previously registered archaeological site (AfHi-372), documented by TMHC (2013). Figures 4 to 11 illustrate the areas of moderate to high potential within the study area.

In summary, while the archaeological potential for pre-contact Aboriginal, post-contact Aboriginal, and Euro-Canadian sites is deemed to be moderate to high within the study area based on historical documentation, the Stage 1 property inspection has determined that much of the study area, approximately 75%, retains no archaeological potential as it includes: extensive land disturbance, steep slope, a low and wet area, and previously assessed areas. However, the remaining portion of the study area, approximately 25%, retains potential for the identification and documentation of archaeological resources. All areas of potential are illustrated on Figures 4 to 11.

4.0 RECOMMENDATIONS

Stantec was retained by Middlesex Centre to complete a Stage 1 archaeological assessment, to be included as part of the ESR for the Class EA of the Glendon Drive Streetscape Improvements Project. The Stage 1 study area includes the existing Glendon Drive (County Road 14) municipal ROW and a 10 metre buffer on either side of the ROW limits. The Stage 1 archaeological assessment, involving background research and a property inspection, resulted in the determination that much of the study area, approximately 75%, retains no archaeological potential as it includes: extensive land disturbance, steep slope, a low and wet area, and previously assessed areas. However, the remaining portion of the study area, approximately 25%, retains potential for the identification and documentation of archaeological resources. Thus, in accordance with Section 1.3 and Section 7.7.4 of the MTCS' 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011), **portions of the study area which retain archaeological potential and any area of archaeological potential that will be subject to construction disturbance must be subject to a Stage 2 archaeological assessment prior to construction. It has also been determined that portions of the study area do not retain archaeological potential and no further archaeological assessment is recommended for those areas.**

The objective of the Stage 2 archaeological assessment will be to document archaeological resources within the study area and to determine whether these archaeological resources require further assessment. The Stage 2 archaeological assessment of the study area will consist of a combination of pedestrian survey and test pit survey. The pedestrian survey of agricultural fields will entail the systematic walking of open ploughed fields at five metre intervals as outlined in Section 2.1.1 of the 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011). Areas to be subjected to test pit survey that are within woodlots, scrubland, pasture, or areas that cannot be ploughed will be assessed according to Section 2.1.2 of the MTCS' 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011). If the archaeological field team judges any lands to be low and wet, steeply sloped, or disturbed during the course of the Stage 2 field work, those areas will not require assessment, but will be photographically documented instead in accordance with Section 2.1 of the MTCS' 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011).

The MTCS is asked to review the results presented and to accept this report into the Ontario Public Register of Archaeological Reports. Additional archaeological assessment is still required for portions of the study area and so these portions recommended for further archaeological fieldwork remain subject to Section 48(1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed, except by a person holding an archaeological license.

5.0 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 study 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 regard to alterations to archaeological sites by the proposed development.

It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration 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 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 Government and Consumer Services.

Additional archaeological assessment is still required for portions of the study area and so these portions recommended for further archaeological fieldwork remain subject to Section 48(1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed, except by a person holding an archaeological license.

6.0 BIBLIOGRAPHY AND SOURCES

Archaeologix Inc. 2003. *Archaeological Assessment (Stages 1 & 2) the Lehouiller Subdivision, Part of Lot 9, Conc. 1, Geographic Township of Lobo, City of London, County of Middlesex, Ontario*. On file, Toronto: Ministry of Tourism, Culture and Sport.

Belden, H. & Co. 1881. *Simcoe Supplement in Illustrated Atlas of the Dominion of Canada*. Toronto: H. Belden.

Bohaker, Heidi Rosemary. 2006. *Nindoodemag: Anishinaabe Identities in the Eastern Great Lakes Region, 1600 to 1900*. Unpublished Ph.D. dissertation. Toronto: University of Toronto.

Burwasser, G.J. *Quaternary Geology of the Collingwood-Nottawasaga Area, Southern Ontario.* Preliminary Map P. 919, Geology Series. Toronto: Ontario Division of Mines.

Chapman, Lyman John and Donald F. Putnam. 1984. *The Physiography of Southern Ontario*. 3rd ed. Ontario Geological Survey Special Volume 2. Toronto: Ontario Ministry of Natural Resources.

Cooper, Charles. 2001. *Hamilton's Other Railway*. Ottawa: Bytown Railway Society.

Ellis, Chris J. and Neal Ferris (editors). 1990. *The Archaeology of Southern Ontario to A.D. 1650.* Occasional Publication of the London Chapter, Ontario Archaeological Society, Number 5.

Eschman, D.F. and P.F. Karrow. 1985. Huron Basin Glacial Lakes: A Review. In. *Quaternary Evolution of the Great Lakes*, edited by P.F. Karrow and P.E. Calkin, pp. 79-94. Special Paper 30. St. John's, Newfoundland: Geological Association of Canada.

Environmental Office. 2011. *Conducting Archaeology within the Traditional Territory of the Saugeen Ojibway Nation: Process and Standards for Approval Authorities, Development Proponents and Consultant Archaeologists*. Wiarton: Environment Office, Saugeen Ojibway Nation.

Feest, Johanna and Christian Feest. 1978. Ottawa. In *Handbook of North American Indians. Volume 15, Northeast,* edited by Bruce Trigger, pp. 772-786. Washington: Smithsonian Institute Press.

Finlayson, William David. 1977. *The Saugeen Culture: A Middle Woodland Manifestation in Southwestern Ontario*. Archaeological Survey of Canada, Paper No.61. Ottawa: National Museums of Canada.

Gentilcore, R. Louis and C. Grant Head. 1984. *Ontario's History in Maps*. University of Toronto Press, Toronto.

Golder Associates Inc. 2009. *The Stage 1 and 2 Archaeological Assessment Komoka Wellness Centre Part of Lot 6, Concession 2, Geographic Township of Lobo, Municipality of Middlesex Centre, Ontario.* On file, Toronto: Ministry of Tourism, Culture and Sport.

Goodspeed Publishers. 1889. *History of the County of Middlesex, Canada*. Toronto and London: W.A. & C.L. Goodspeed, Publishers.

Government of Ontario. 1990. *Ontario Heritage Act*, R.S.O. 1990, CHAPTER O.18. Last amendment: 2009, c. 33, Sched. 11, s. 6. Electronic document: 129-144 http://www.ontario.ca/laws/statute/90o18. Last accessed May 27, 2015.

Government of Ontario. 2011. *Standards and Guidelines for Consultant Archaeologists*. Toronto: Ministry of Tourism, Culture and Sport.

Government of Ontario. n.d. *Archaeological Sites Database Files*. Toronto: Archaeology Programs Unit, Ministry of Tourism, Culture and Sport.

Hoffman, D.W., R.E. Wicklund, and N.R. Richards. 1962. *Soils Survey of Simcoe County*. Report No. 29 of the Ontario Soil Survey. Guelph: Canada Department of Agriculture and the Ontario Agricultural College.

Hunter, Andrew. 1909. *A History of Simcoe County*. Barrie: The County Council.

Konrad, Victor. 1981. An Iroquois Frontier: The North Shore of Lake Ontario during the Late Seventieth Century. *Journal of Historical Geography* 7(2).

Lennox, Paul. 1989. *Archaeological Survey of Hwy 26 Bypass Wasaga Beach to Collingwood, Simcoe County (W.P. 209-85-00)*. Report on file with the Ministry of Tourism, Culture and Sport, Toronto.

Lennox, Paul. 2000. The Rentner and McKean Sites: 10,000 Years of Settlement on the Shores of Lake Huron, Simcoe County, Ontario. *Ontario Archaeology* 70:16-65.

Morris, J.L. 1943. *Indians of Ontario*. 1964 reprint. Toronto: Department of Lands and Forests, Government of Ontario.

Ontario Energy Board. 2011. *Environmental Guidelines for the Location, Construction and Operation of Hydrocarbon Pipelines and Facilities in Ontario*. 6th Edition. Electronic document: http://www.ontarioenergyboard.ca/oeb/_Documents/Regulatory/Enviro_Guidelines_HydrocarbonPipelines_2011.pdf. Last accessed May 27, 2015.

Rankin, Charles. 1833a. *Diary: Completion of Survey of the Township of Nottawasaga*. Field Book Number 554. Unpublished manuscript on file with the Ministry of Natural Resources and Forestry Crown Land Survey Records Office, Peterborough, Ontario.

Rankin, Charles. 1833b. *Nottawasaga*. Plan C9. Field Book Number 554. Unpublished map on file with the Ministry of Natural Resources and Forestry Crown Land Survey Records Office, Peterborough, Ontario.

Rayburn, Alan. 1997. *Place Names of Ontario*. Toronto: University of Toronto Press.

Rogers, Edward S. 1978. Southeastern Ojibwa. In *Handbook of North American Indians, Volume 15, Northeast*, edited by Bruce G. Trigger pp.760-771. Washington: Smithsonian Institute Press.

Schmalz, Peter S. 1991. *The Ojibwa of Southern Ontario*. Toronto: University of Toronto Press.

Spence, Michael W., Robert H. Pihl, and Carl R. Murphy. 1990. Cultural Complexes of the Early and Middle Woodland Periods. In Ellis and Ferris 1990, pp. 125-169.

Timmins Martelle Heritage Consultants Inc. 2012. *Stage 1 & 2 Archaeological Assessment, Proposed Residential Development Part of Lots 7 & 8, Concession 1 Geographic Township of Lobo (now Township of Middlesex Centre) Middlesex County, Ontario*. On file, Toronto: Ministry of Tourism, Culture and Sport.

Timmins Martelle Heritage Consultants Inc. 2015. *Stage 3 Archaeological Assessment – AfHi-372, AfHi-373, and AfHi-185 (Windy Site) Draft Plan of Subdivision 39T-MC1301 Part of Lots 7 & 8, Concession 1 Geographic Township of Lobo 10293 Glendon Road, Kilworth Middlesex County, Ontario*. Report on file, Toronto: Ministry of Tourism, Culture and Sport.

Wilson, Jim. 1997. *The Middle Thames River Settlement/Subsistence Project, Middlesex County, Ontario, Archaeological Licence Numbers 92-060 and 93-053*. Report on File with the Ontario Heritage Foundation and the Ontario Ministry of Citizenship, Culture and Recreation.

Wilson, J.A. and M. Horne. 1995. *City of London Archaeological Master Plan.* London: City of London, Department of Planning and Development.

7.0 IMAGES

7.1 PHOTOGRAPHS

Photo 1: Area of Steep Slope and Disturbed ROW, facing west

Photo 2: Area of Steep Slope and Disturbed ROW, facing west

Photo 3: General View of Disturbed ROW, facing east

Photo 4: General View of Typical Woodlot within Study Area, facing northwest

Photo 5: General View of Disturbed ROW, facing east

Photo 6: General View of Typical Woodlot within Study Area, facing west

Photo 7: General View of Disturbed ROW with Typical Agricultural Field in Background, facing west

Photo 8: General View of Other Disturbances, e.g. Gas Line/Meter, facing northwest

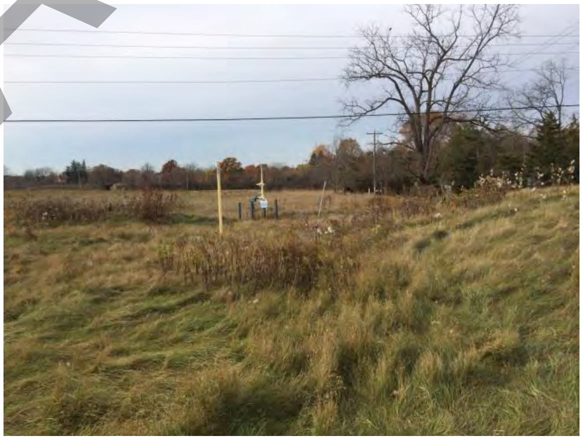


Photo 9: General View of Typical Woodlot/Scrubland within Study Area, facing northwest

Photo 10: General View of Disturbed ROW, facing northeast

Photo 11: General View of Disturbed ROW, facing northeast

Photo 12: General View of Typical Agricultural Field within Study Area, facing northeast

Photo 13: General View of Disturbed ROW, facing northeast

Photo 14: General View of Disturbed ROW with Typical Agricultural Field in Background, facing northeast

Photo 15: General View of Existing Residential Disturbances and Typical Manicured Lawn, facing southwest

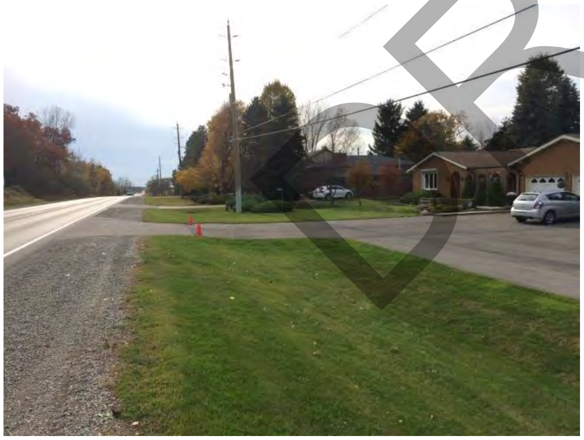


Photo 16: General View of Disturbed ROW and Existing Commercial Complexes, facing northeast

Photo 17: General View of Disturbed ROW and Existing Commercial Complexes, facing southwest

Photo 18: General View of Disturbed ROW and Area of Previous Assessment, facing southwest

Photo 19: General View of Disturbed ROW and Typical Scrubland in Background, facing southwest

Photo 20: General View of Existing Residential Disturbances and Manicured Lawn, facing southwest

Photo 21: General View of Disturbance from Existing Commercial Complexes, facing northeast

Photo 22: General View of Disturbed ROW, facing northeast

Photo 23: General View of Disturbed ROW and Existing Building, facing northeast

Photo 24: General View of Disturbed ROW and Typical Agricultural Field in Background, facing northeast

Photo 25: General View of Disturbed ROW and Typical Agricultural Field in Background, facing northeast

Photo 26: General View of Disturbed ROW, facing northwest

Photo 27: General View of Existing Residential Disturbances and Typical Manicured Lawn, facing northeast

Photo 28: General View of Disturbed ROW and Typical Agricultural Field in Background, facing northeast

Photo 29: General View of Typical Woodlot within Study Area, facing south

Photo 30: General View of Disturbed ROW and Typical Agricultural Field in Background, facing northeast

Photo 31: General View of Disturbed ROW and Typical Agricultural Field in Background, facing southwest

Photo 32: General View of Existing Residential Disturbances and Typical Manicured Lawn, facing northeast

Photo 33: General View of Disturbed ROW and Typical Pasture in Background, facing northeast

Photo 34: General View of Low and Permanently Wet Area, facing south

Photo 35: General View of Existing Residential Disturbances and Typical Manicured Lawn, facing southwest

Photo 36: General View of Disturbed ROW and Additional Construction Disturbance, facing northeast

Photo 37: General View of Disturbed ROW and Additional Construction Disturbance, facing northeast

Photo 38: General View of Disturbed ROW and Additional Construction Disturbance, facing south

Photo 39: General View of Disturbance from Existing Commercial Complexes, facing northeast

Photo 40: General View of Disturbed ROW and Typical Scrubland in Background, facing northeast

Photo 41: General View of Disturbed ROW and Existing Commercial Complexes, facing northeast

Photo 42: General View of Disturbed ROW and Area of Previous Assessment, facing northeast

Photo 43: General View of Disturbed ROW and Area of Previous Assessment, facing southwest

Photo 44: General View of Disturbed ROW and Area of Previous Assessment, facing northeast

Photo 45: General View of Area with Archaeological Potential within ROW, facing northeast

Photo 46: General View of Disturbed ROW and Additional Buried Utilities, facing northeast

Photo 47: General View of Disturbed ROW and Area of Previous Assessment, facing northeast

Photo 48: General View of Disturbed ROW and Area of Previous Assessment (now Existing Residential), facing east

Photo 49: General View of Disturbed ROW and Additional Disturbance, facing west

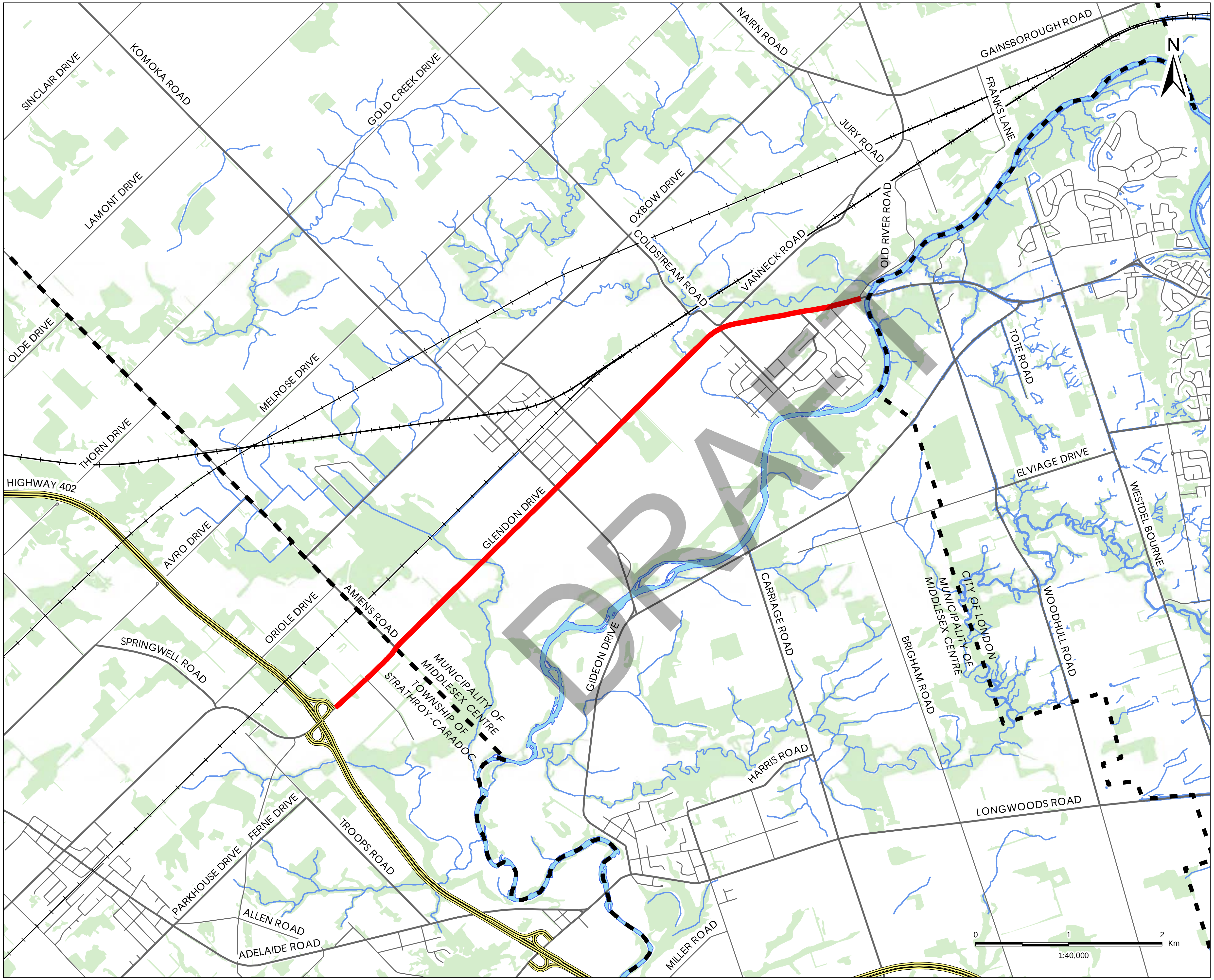
Photo 50: General View of Disturbed ROW and Existing Commercial Complexes, facing east

Photo 51: General View of Disturbed ROW and Existing Residential, facing east

Photo 52: General View of Disturbed ROW Leading to Area of Steep Slope, facing east

8.0 MAPS

All mapping will follow on succeeding pages.

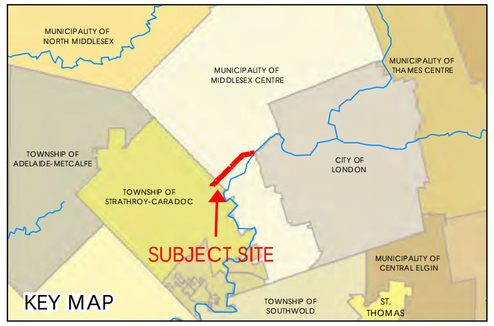


V:\01614\active\161413164\design\drawing\GIS\MXD\Archeology\13164_FIG1_Location.mxd
Revised: 2015-11-05 By: albrown

Stantec

Legend

- 🟥 Subject Site
- ▬ ▬ Municipal Boundary
- ┼ Railway Line
- ─ Local Road
- ━ Major Road
- ═ Highway
- ─ Watercourses
- ▨ Waterbody
- ▨ Wooded Area



KEY MAP

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.

November 2015
161413164

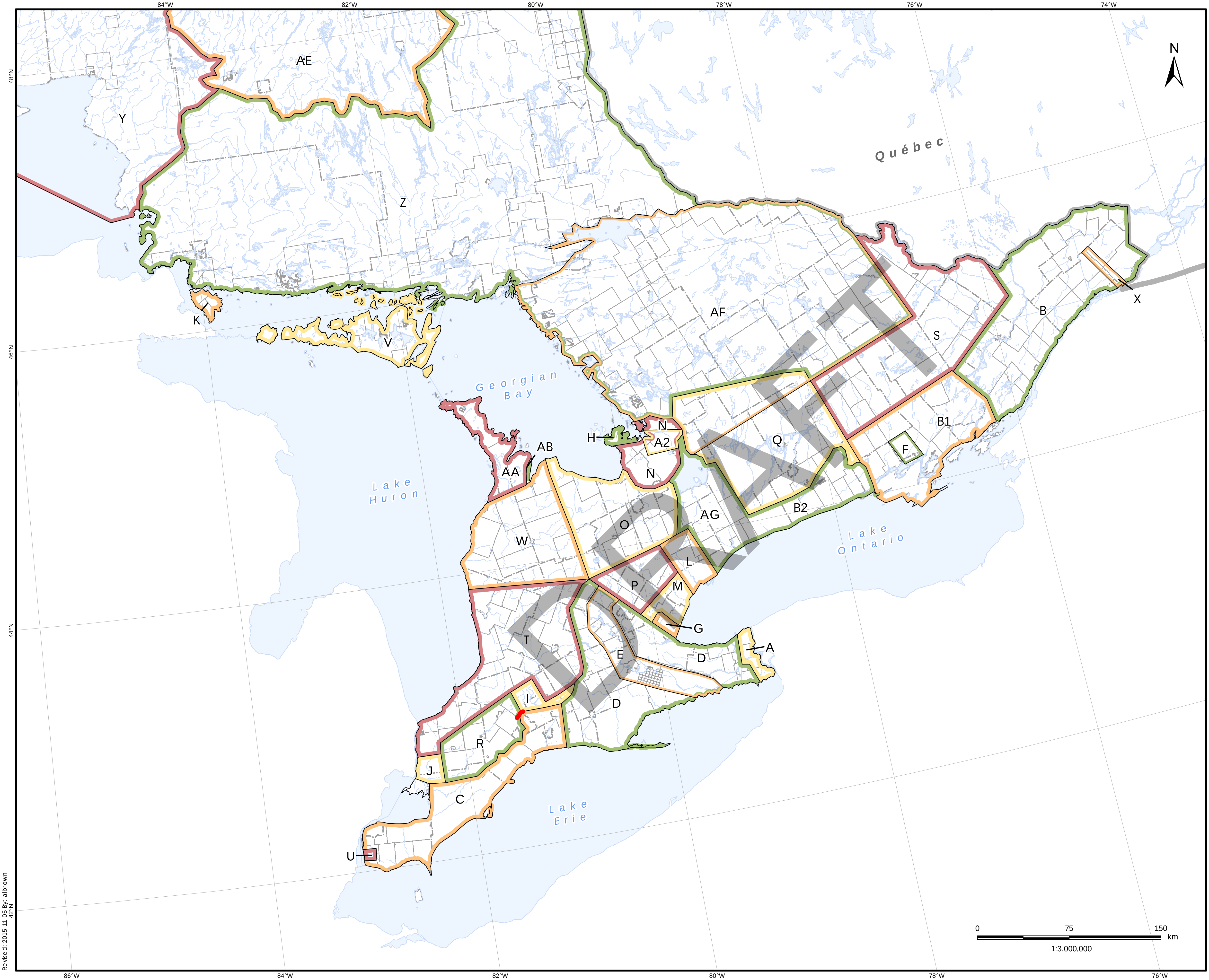
Client/Project

Middlesex Centre/Middlesex County
Stage 1 Archaeological Assessment
Glendon Drive Streetscape Class EA

Figure No.
1

Title

Location of Study Area



Stantec

Legend

🟥 Study Area

Municipal Boundary - Upper Tier

Municipal Boundary - Lower or Single Tier

Watercourse

Waterbody

A	Treaty No. 381, May 9th, 1781 (Mississauga and Chippewa)
B	Crawford's Purchase, October 9th, 1783 (Algonquin and Iroquois)
B1	Crawford's Purchase, October 9th, 1783 (Mississauga)
B2	Crawford's Purchases, 1784, 1787 And 1788 (Mississauga)
A2	John Collins' Purchase, 1785 (Chippewa)
C	Treaty No. 2, May 19th, 1790 (Odawa, Chippewa, Pottawatomi, and Huron)
D	Treaty No. 3, December 2nd, 1792 (Mississauga)
E	Haldimand Tract:from the Crown to the Mohawk, 1793
F	Tyendinaga:from the Crown to the Mohawk, 1793
G	Treaty No. 3 3/4:from the Crown to Joseph Brant, October 24th, 1795
H	Treaty No. 5, May 22nd, 1798 (Chippewa)
I	Treaty No. 6, September 7th, 1796 (Chippewa)
J	Treaty No. 7, September 7th, 1796 (Chippewa)
L	Treaty No. 13, August 1st, 1805 (Mississauga)
M	Treaty No. 13A, August 2nd, 1805 (Mississauga)
N	Treaty No.16, November 18th, 1815 (Chippewa)
O	Treaty No. 18, October 17th, 1818 (Chippewa)
P	Treaty No. 19, October 28th 1818 (Chippewa)
Q	Treaty No. 20, November 5th, 1818 (Chippewa)
R	Treaty No. 21, March 9th, 1819 (Chippewa)
S	Treaty No. 27, May 31st, 1819 (Mississauga)
T	Treaty No. 27½, April 25th, 1825 (Ojibwa and Chippewa)
U	Treaty No. 35, August 13th, 1833 (Wyandot or Huron)
V	Treaty No. 45, August 9th, 1836 (Chippewa and Odawa, "For All Indians To Reside Thereon")
W	Treaty No. 45½, August 9th, 1836 (Saugeen)
X	Treaty No. 57, June 1st, 1847 (Iroquois of St. Regis)
Z	Treaty No. 61, September 9th, 1850 (Robinson Treaty:Ojibwa)
AA	Treaty No. 72, October 30th, 1854 (Chippewa)
AB	Treaty No. 82, February 9th, 1857 (Chippewa)
AF	Williams Treaty, October 31st and November 15th, 1923 (Chippewa and Mississauga)
AG	Williams Treaty, October 31st, 1923 (Chippewa)

Notes

1. Coordinate System: NAD 1983 Statistics Canada Lambert
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2014.
3. Treaty boundaries adapted from Morris 1943 (1964 reprint). For cartographic representation only.

November 2015
161413164

Client/Project

Middlesex Centre/Middlesex County
Stage 1 Archaeological Assessment
Glendon Drive Streetscape Class EA

Figure No.

2

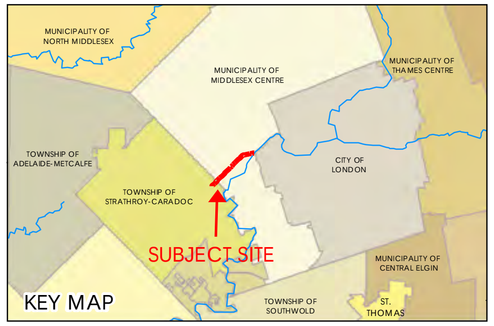
Title

Treaties and Purchases
(Adapted from Morris 1943)

Stantec

Legend

🟥 Subject Site



Notes

1. Not to scale
2. Page & Co. 1878. Illustrated Historical Atlas of the County of Middlesex, Ont. Toronto: H.R. Page & Co.

November 2015
161413164

Client/Project

Middlesex Centre/Middlesex County
Stage 1 Archaeological Assessment
Glendon Drive Streetscape Class EA

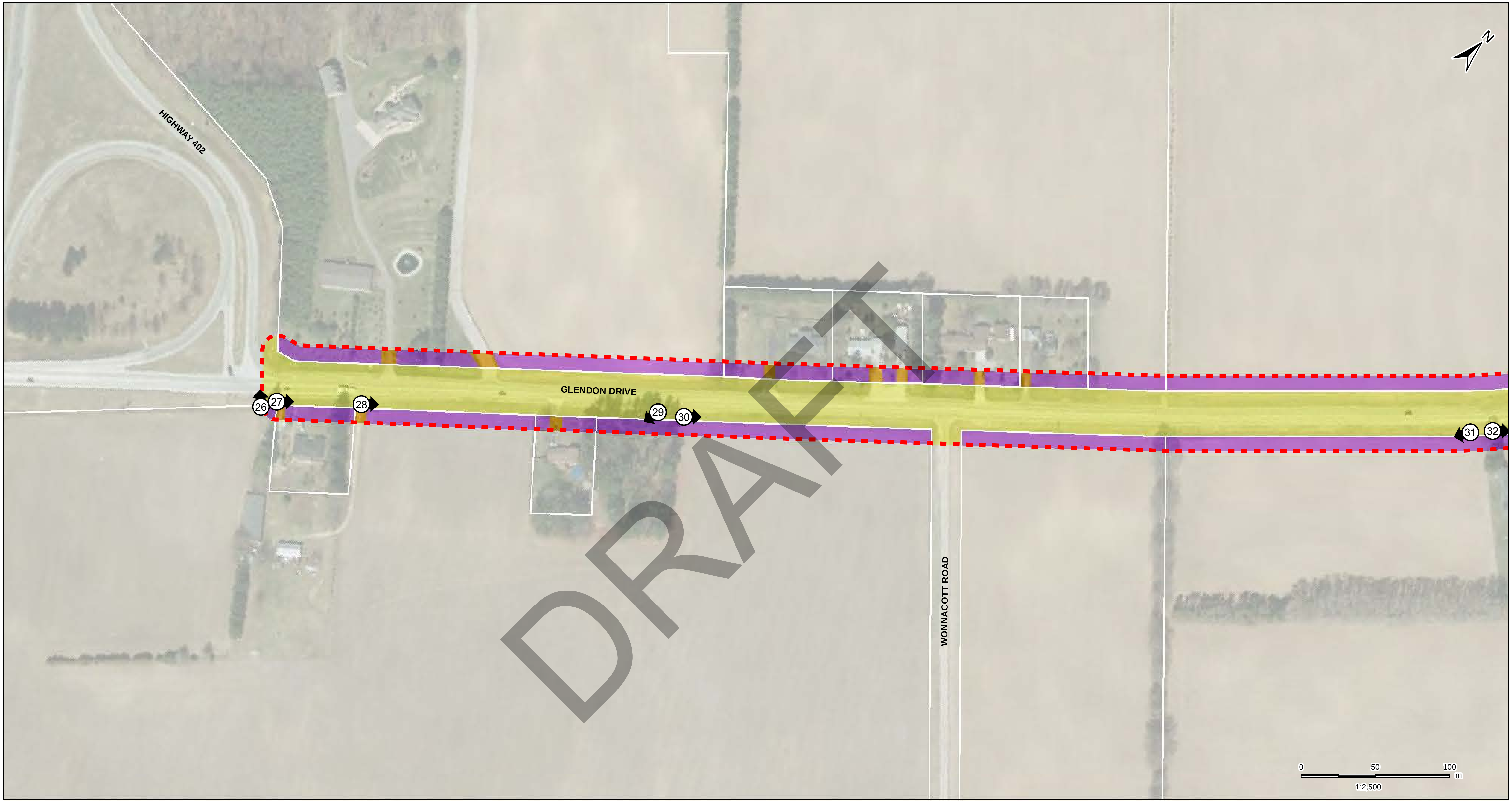
Figure No.

3

Title

Portions of the 1878 Historic Maps of Lobo and Caradoc Township

V:\01614\active\161413164\design\drawing\GIS\MXD\Archeology\13164_FIG3_HistoricMap.mxd
Revised: 2015-11-05 By: albrown



V:\01614\active\161413164\design\drawing\GIS\MXD\Archeology\13164_FIG4-11.mxd
Revised: 2015-11-20 By: albrown

November 2015
161413164

Stantec

Legend

▭ Study Area

○ Photo Location and Direction

Archaeological Potential

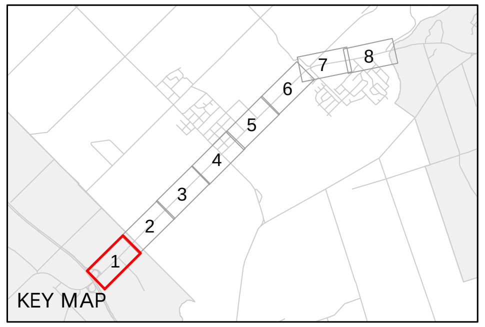
🟨 Existing Glendon Drive ROW - Disturbed, Low to No Archaeological Potential

🟧 Existing Residential/Commercial/Retail Infrastructure - Disturbed, Low to No Archaeological Potential

🟪 Moderate to High Archaeological Potential - Stage 2 Required

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.



Client/Project

Middlesex Centre/Middlesex County
Stage 1 Archaeological Assessment
Glendon Drive Streetscape Class EA

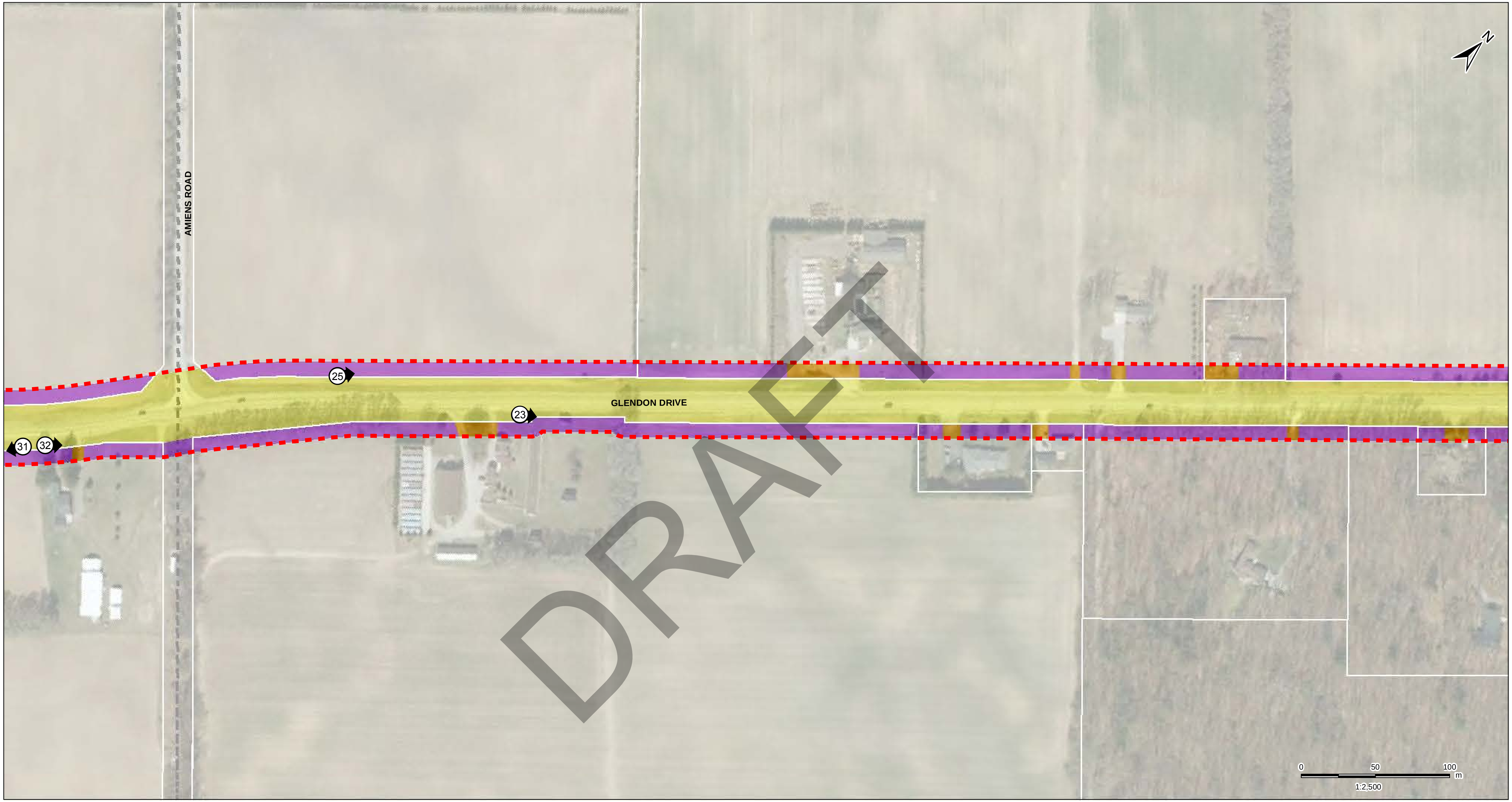
Figure No.

4

Title

Archaeological Potential

V:\01614\active\161413164\design\drawing\GIS\MXD\Archeology\13164_FIG4-11.mxd
Revised: 2015-11-20 By: albrown



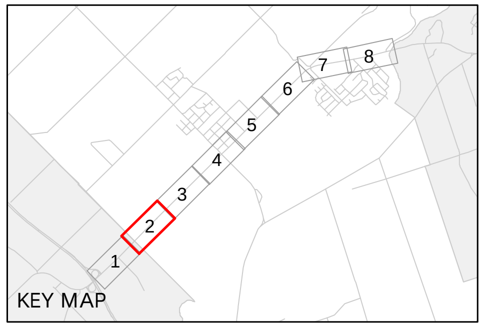
November 2015
161413164

Stantec

Legend
🟥 Study Area
○ Photo Location and Direction

Archaeological Potential
- 🟨 Existing Glendon Drive ROW - Disturbed, Low to No Archaeological Potential
- 🟧 Existing Residential/Commercial/Retail Infrastructure - Disturbed, Low to No Archaeological Potential
- 🟪 Moderate to High Archaeological Potential - Stage 2 Required

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

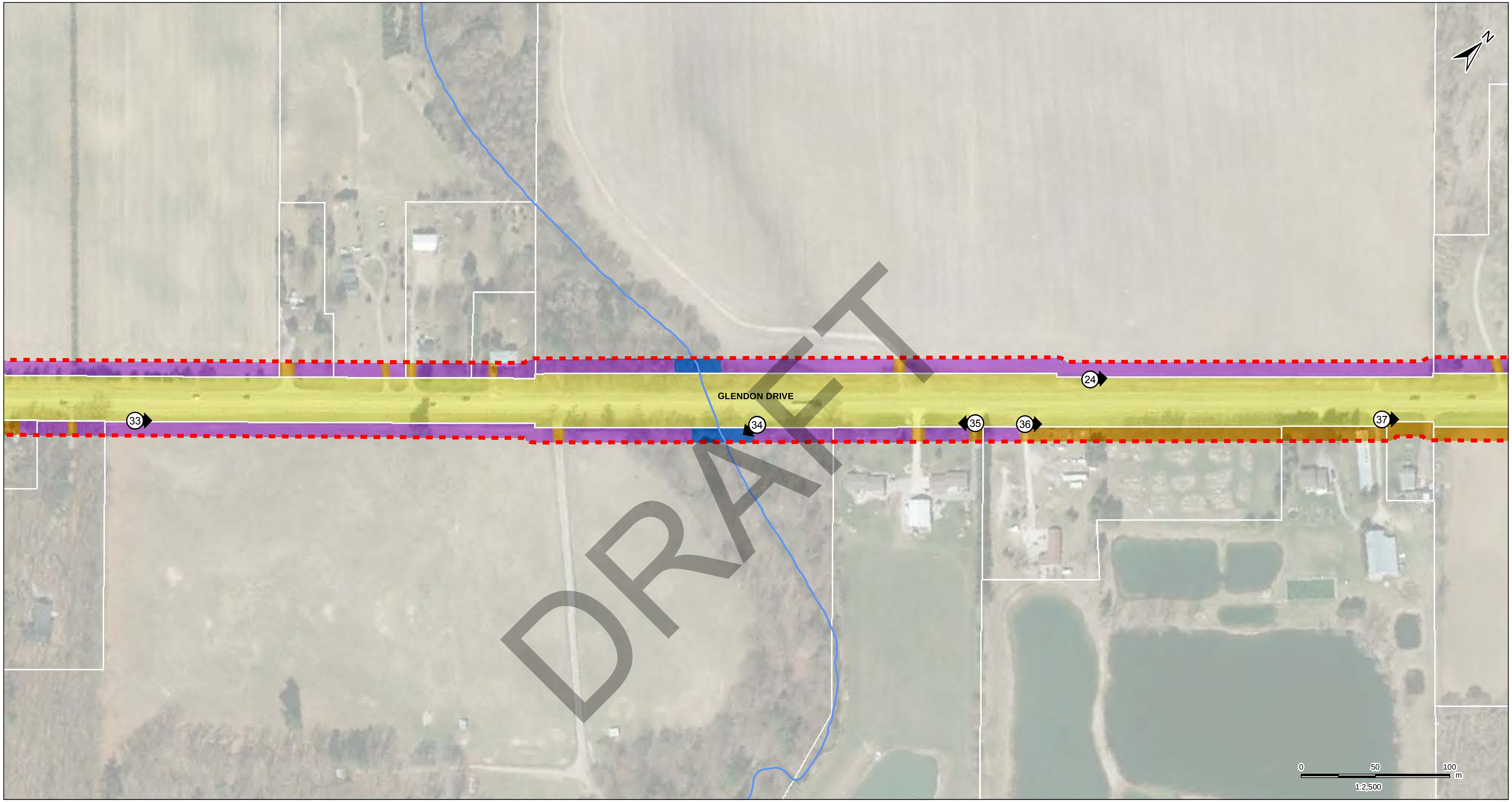


Client/Project
Middlesex Centre/Middlesex County
Stage 1 Archaeological Assessment
Glendon Drive Streetscape Class EA

Figure No.
5

Title
Archaeological Potential

V:\01614\active\161413164\design\drawing\GIS\MXD\Archeology\13164_FIG4-11.mxd
Revised: 2015-11-20 By: albrown



November 2015
161413164

Stantec

Legend

🟥 Study Area

○ Photo Location and Direction

Archaeological Potential

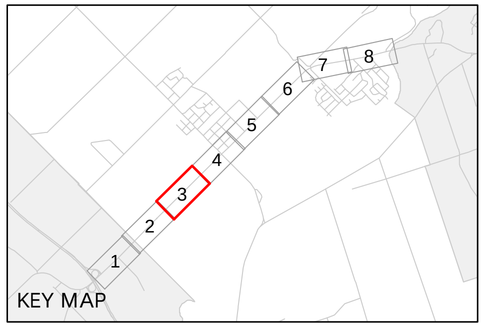
🟨 Existing Glendon Drive ROW - Disturbed, Low to No Archaeological Potential

🟧 Existing Residential/Commercial/Retail Infrastructure - Disturbed, Low to No Archaeological Potential

🟪 Moderate to High Archaeological Potential - Stage 2 Required

🟦 Low and Permanently Wet - Low to No Archaeological Potential

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.



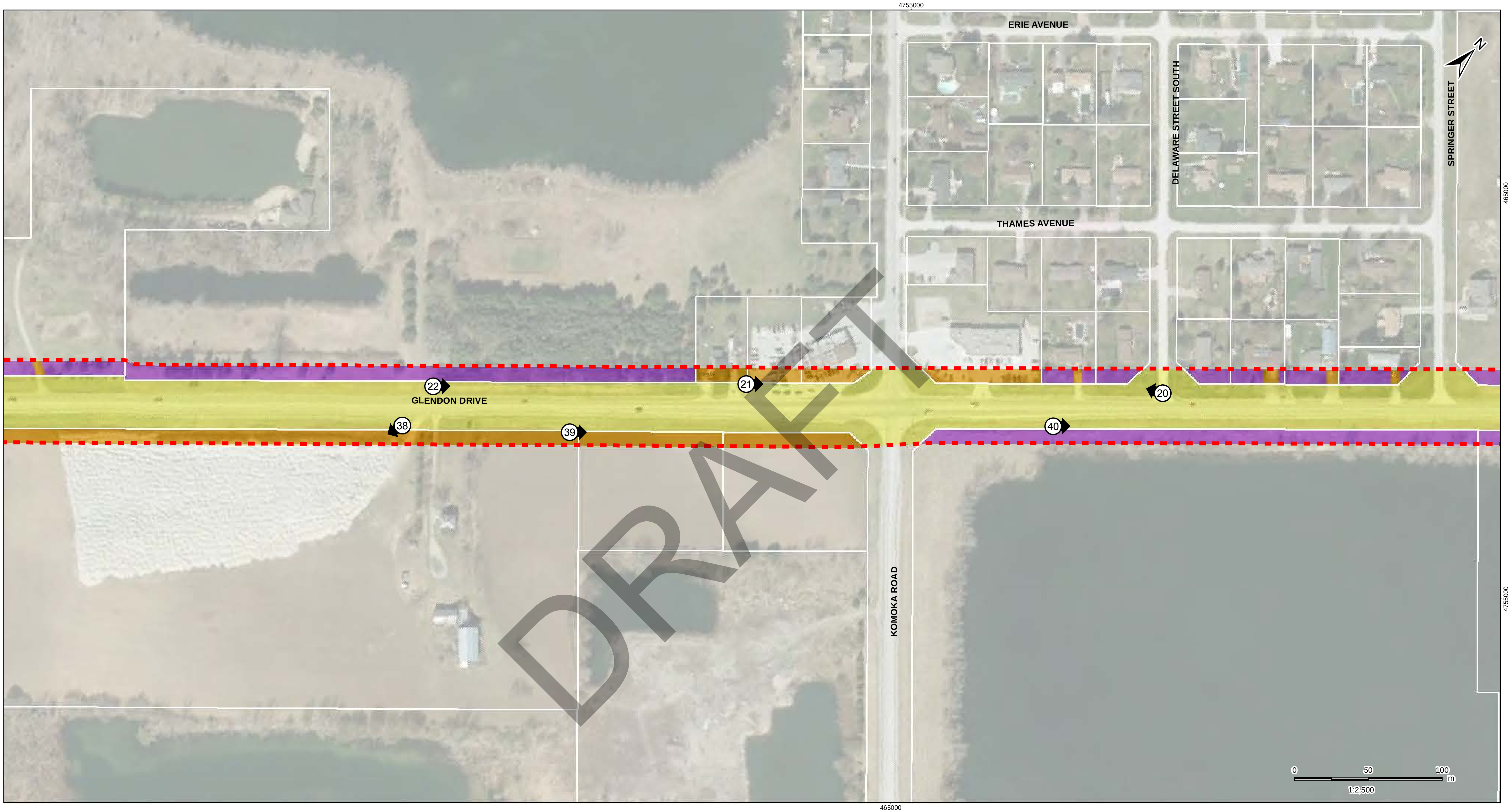
Client/Project

Middlesex Centre/Middlesex County
Stage 1 Archaeological Assessment
Glendon Drive Streetscape Class EA

Figure No.
6

Title

Archaeological Potential



V:\01614\active\161413164\design\drawing\GIS\MXD\Archaeology\13164_FIG4-11.mxd
Revised: 2015-11-20 By: albrown

November 2015
161413164

Legend

⬚ Study Area

○ Photo Location and Direction

Archaeological Potential

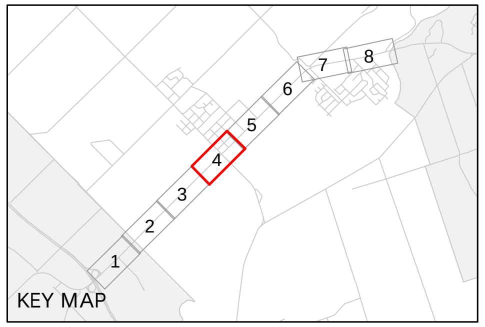
🟨 Existing Glendon Drive ROW - Disturbed, Low to No Archaeological Potential

🟧 Existing Residential/Commercial/Retail Infrastructure - Disturbed, Low to No Archaeological Potential

🟪 Moderate to High Archaeological Potential - Stage 2 Required

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.



Client/Project

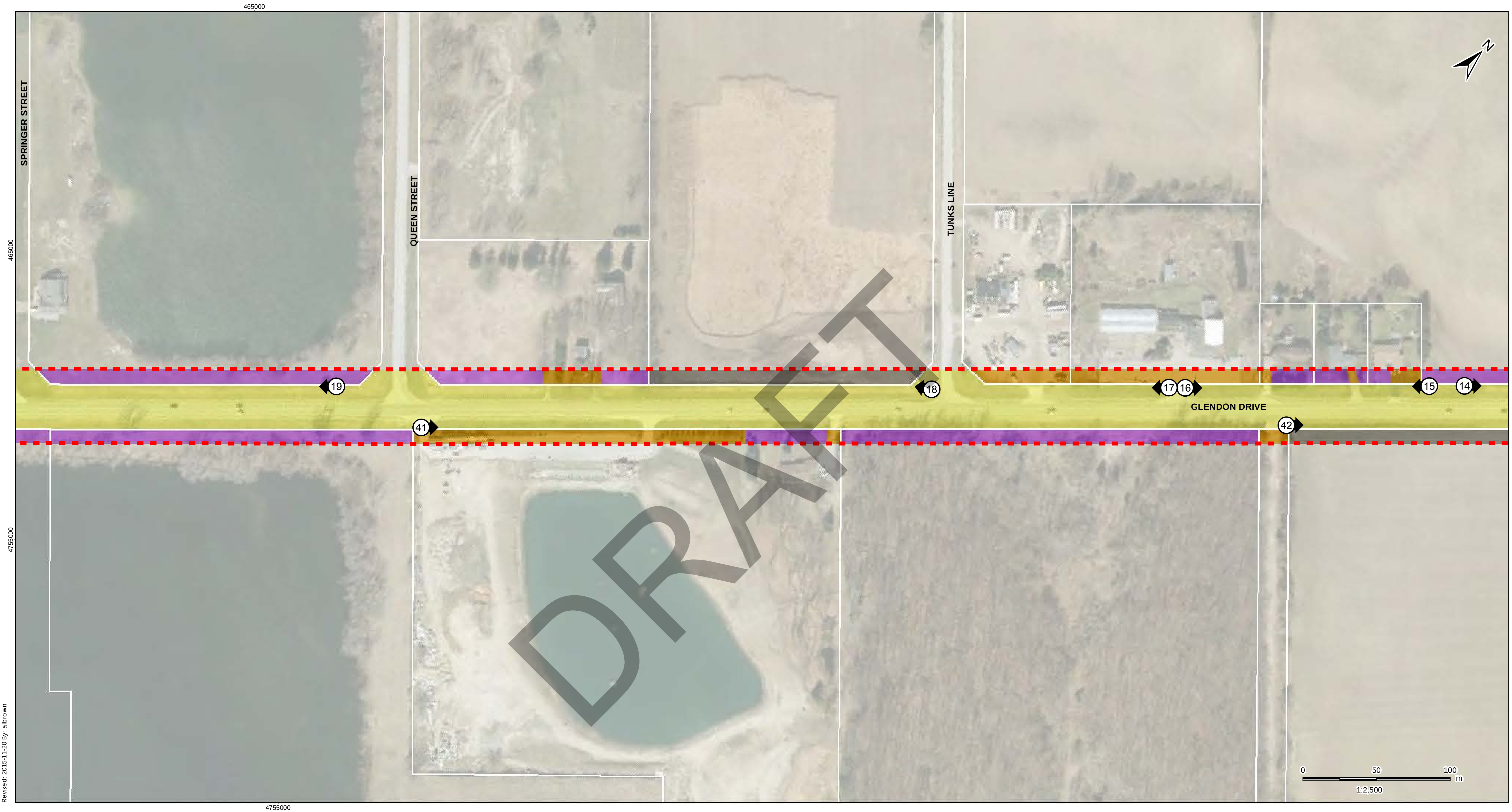
Middlesex Centre/Middlesex County
Stage 1 Archaeological Assessment
Glendon Drive Streetscape Class EA

Figure No.

7

Title

Archaeological Potential



V:\01614\active\161413164\design\drawing\GIS\MXD\Archeology\13164_FIG4-11.mxd
Revised: 2015-11-20 By: albrown

November 2015
161413164

Stantec

Legend

🟥 Study Area

○ Photo Location and Direction

Archaeological Potential

🟨 Existing Glendon Drive ROW - Disturbed, Low to No Archaeological Potential

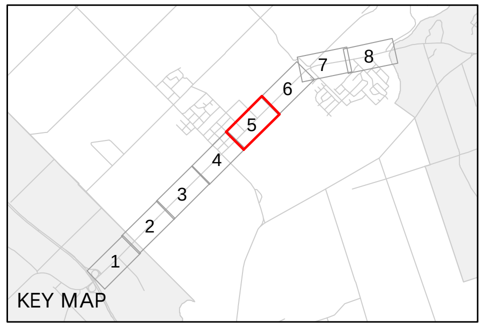
🟧 Existing Residential/Commercial/Retail Infrastructure - Disturbed, Low to No Archaeological Potential

🟪 Moderate to High Archaeological Potential - Stage 2 Required

⬜ Previously Assessed - No Further Work Required

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.



Client/Project

Middlesex Centre/Middlesex County
Stage 1 Archaeological Assessment
Glendon Drive Streetscape Class EA

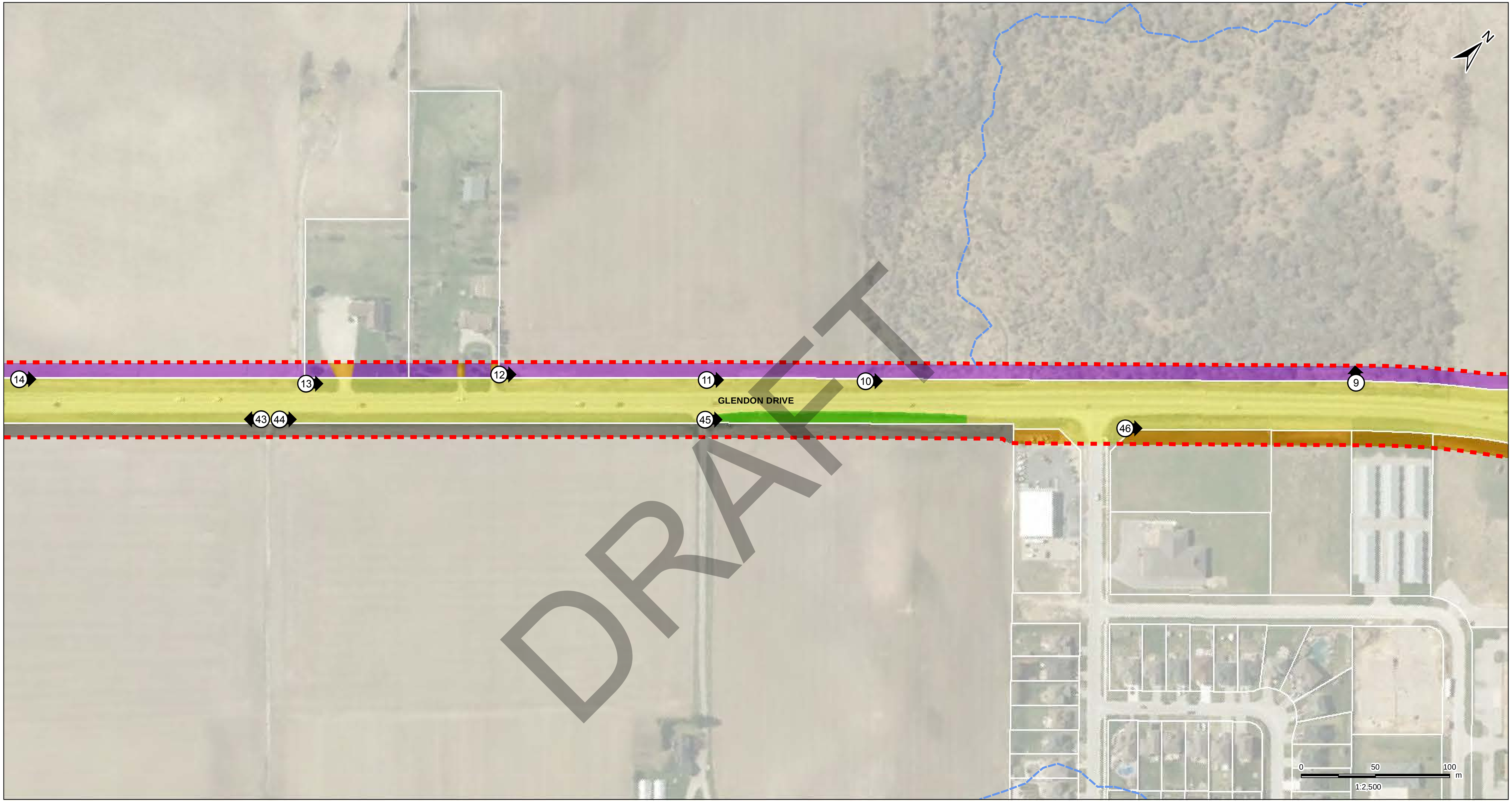
Figure No.

8

Title

Archaeological Potential

V:\01614\active\161413164\design\drawing\GIS\MXD\Archeology\13164_FIG4-11.mxd
Revised: 2015-11-20 By: albrown



November 2015
161413164

Stantec

Legend

⬚ Study Area

○ Photo Location and Direction

Archaeological Potential

🟨 Existing Glendon Drive ROW - Disturbed, Low to No Archaeological Potential

🟧 Existing Residential/Commercial/Retail Infrastructure - Disturbed, Low to No Archaeological Potential

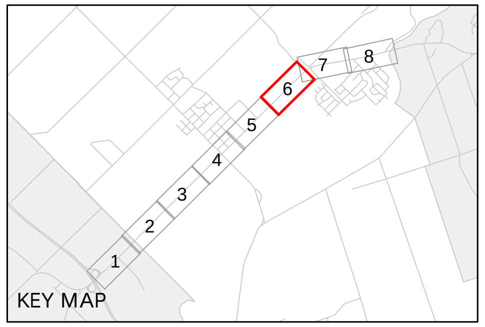
🟪 Moderate to High Archaeological Potential - Stage 2 Required

▨ Previously Assessed - No Further Work Required

🟩 Moderate to High Archaeological Potential within Municipal ROW - Stage 2 Required

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.



Client/Project

Middlesex Centre/Middlesex County
Stage 1 Archaeological Assessment
Glendon Drive Streetscape Class EA

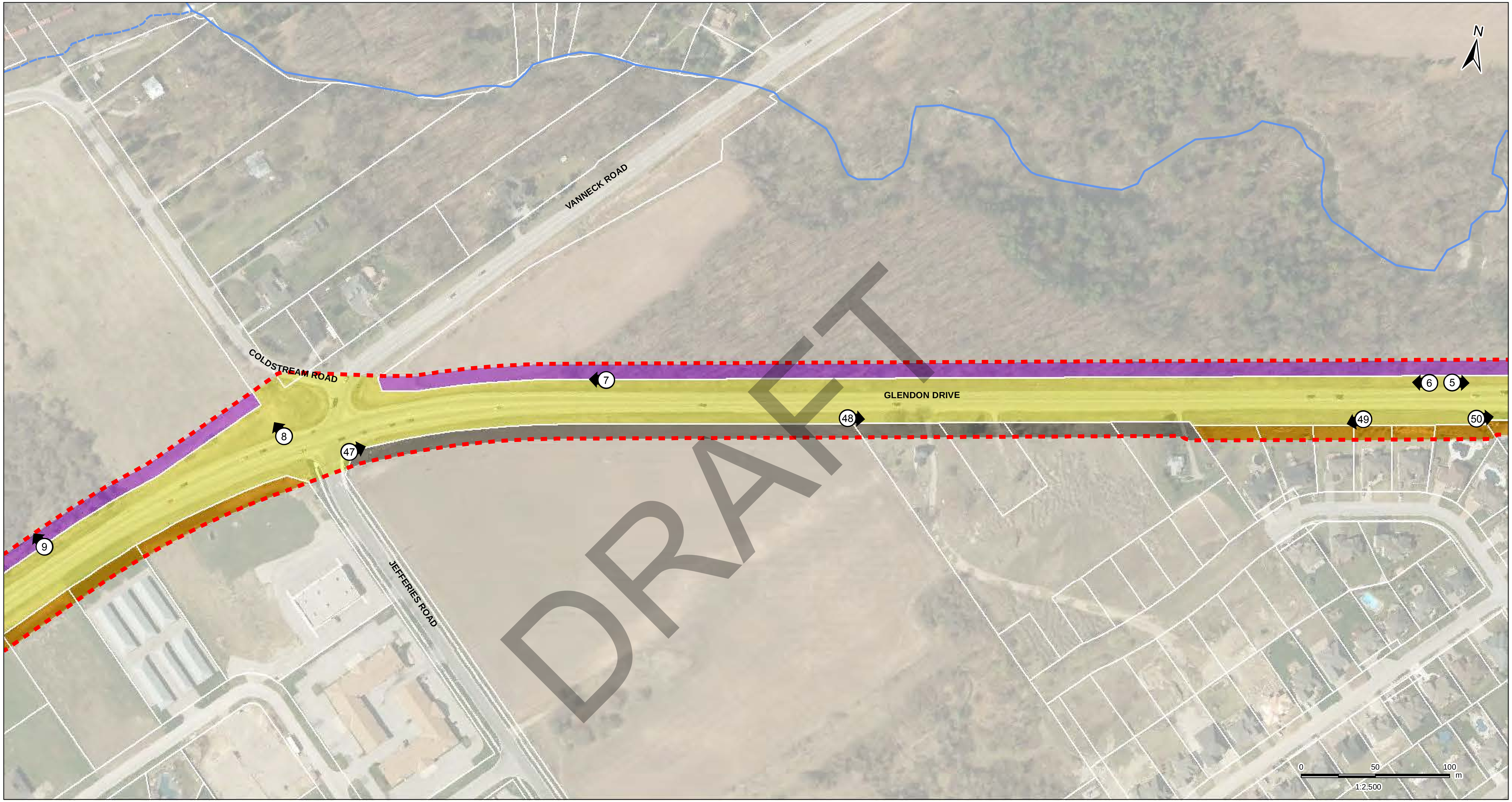
Figure No.

9

Title

Archaeological Potential

V:\01614\active\161413164\design\drawing\GIS\MXD\Archeology\13164_FIG4-11.mxd
Revised: 2015-11-20 By: albrown



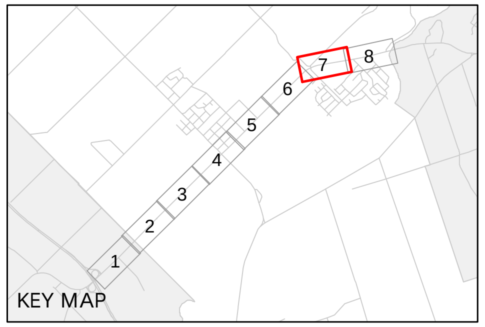
November 2015
161413164

Stantec

Legend
🟥 Study Area
○ Photo Location and Direction

Archaeological Potential
🟨 Existing Glendon Drive ROW - Disturbed, Low to No Archaeological Potential
🟧 Existing Residential/Commercial/Retail Infrastructure - Disturbed, Low to No Archaeological Potential
🟪 Moderate to High Archaeological Potential - Stage 2 Required
⬜ Previously Assessed - No Further Work Required

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

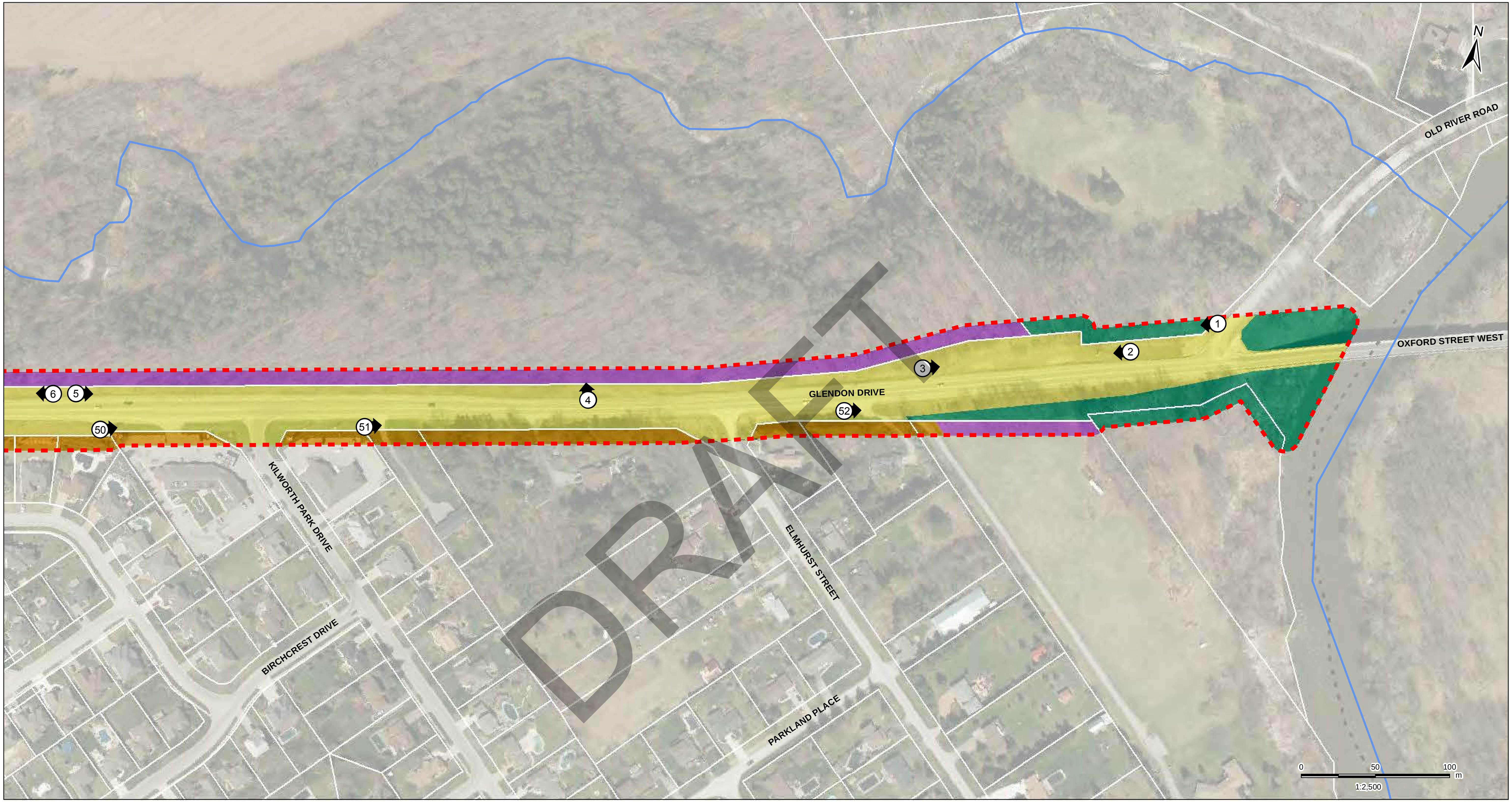


Client/Project
Middlesex Centre/Middlesex County
Stage 1 Archaeological Assessment
Glendon Drive Streetscape Class EA

Figure No.
10

Title
Archaeological Potential

V:\01614\active\161413164\design\drawing\GIS\MXD\Archeology\13164_FIG4-11.mxd
Revised: 2015-11-20 By: albrown



November 2015
161413164

Legend

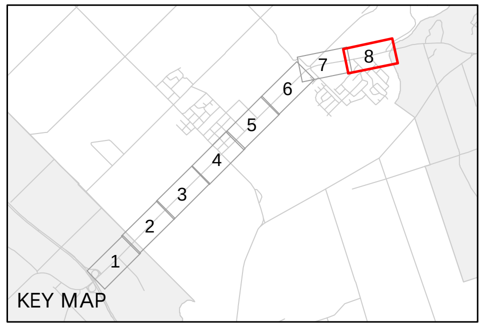
🟥 Study Area

Photo Location and Direction

Archaeological Potential

🟨	Existing Glendon Drive ROW - Disturbed, Low to No Archaeological Potential
🟧	Existing Residential/Commercial/Retail Infrastructure - Disturbed, Low to No Archaeological Potential
🟪	Moderate to High Archaeological Potential - Stage 2 Required
🟩	Steep Slope - No Archaeological Potential

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.



Client/Project

Middlesex Centre/Middlesex County
Stage 1 Archaeological Assessment
Glendon Drive Streetscape Class EA

Figure No.
11

Title
Archaeological Potential

9.0 CLOSURE

This report documents work that was performed in accordance with generally accepted professional standards at the time and location in which the services were provided. No other representations, warranties, or guarantees are made concerning the accuracy or completeness of the data or conclusions contained within this report, including no assurance that this work has uncovered all potential archaeological resources associated with the identified property.

All information received from the client or third parties in the preparation of this report has been assumed by Stantec to be correct. Stantec assumes no responsibility for any deficiency or inaccuracy in information received from others.

Conclusions made within this report consist of Stantec's professional opinion as of the time of the writing of this report, and are based solely on the scope of work described in the report, the limited data available, and the results of the work.

The conclusions are based on the conditions encountered by Stantec at the time the work was performed. Due to the nature of archaeological assessment, which consists of systematic sampling, Stantec does not warrant against undiscovered environmental liabilities nor that the sampling results are indicative of the condition of the entire property.

This report has been prepared for the exclusive use of the client identified herein and any use by any third party is prohibited. Stantec assumes no responsibility for losses, damages, liabilities or claims, howsoever arising, from third party use of this report. We trust this report meets your current requirements. Please do not hesitate to contact us should you require further information or have additional questions about any facet of this report.

Quality Reviewer ______________________________
(signature)

Tracie Carmichael, BA, B.Ed.

Independent Reviewer ________________________
(signature)

Jim Wilson, MA

B.2 BUILT CULTURAL HERITAGE MTCS CHECKLISTS

Ministry of Tourism, Culture and Sport
Culture Services Unit
Programs and Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7
Tel.   416 212-7420
Fax: 416 212-1802

Ministère du Tourisme, de la Culture et du Sport
Unité des services culturels
Direction des programmes et des services
401, rue Bay, Bureau 1700
Toronto ON M7A 0A7
Tél. :   416 212-7420
Téléc. : 416 212-1802

Ontario

October 26, 2015 (EMAIL ONLY)

Corri Marr
Project Manager
Stantec
600-171 Queens Avenue
London, ON N6A 5J7
E: Corri.Marr@Stantec.com

MTCS File #: **0003702**
Proponent: **Middlesex County and Municipality of Middlesex Centre**
Subject: **Glendon Drive Streetscape – Schedule 'C' Class Environmental Assessment**

Dear Corri Marr:

Thank you for the information provided regarding the above noted Class EA project. With respect to this undertaking, it is the mandate of Ministry of Tourism, Culture and Sport (MTCS), under the ***Ontario Heritage Act*** (OHA), to conserve, protect and preserve Ontario's cultural heritage, including:

- Archaeological resources (land and marine);
- Built heritage (including bridges and monuments); and,
- Cultural heritage landscapes.

Under the EA process, a determination of the project's potential impact on these cultural heritage resources is required.

While some cultural heritage resources may have already been formally identified, others may be identified through screening and evaluation. Aboriginal communities may have knowledge that can contribute to the identification of cultural heritage resources, and we suggest that any engagement with Aboriginal communities includes a discussion about known or potential cultural heritage resources that are of value to these communities. Municipal Heritage Committees, historical societies and other local heritage organizations may also have knowledge that contributes to the identification of cultural heritage resources.

Archaeology

Streetscape Improvement activities may have the potential to impact archaeological resources and therefore, prior to any development or land impacts please review MTCS's ***Criteria for Evaluating Archaeological Potential*** for your undertaking. The hiring of an archaeologist to conduct an archaeological assessment by an archaeologist licensed under the ***Ontario Heritage Act*** will be necessary for areas with archaeological potential. In addition, MTCS archaeological sites data are available at ***archaeology@ontario.ca***. Archaeological assessment reports must conform to the MTCS's Standards and Guidelines for Consultant Archaeologists. The licensed archaeologist is to submit all completed archaeological assessment reports to the MTCS for review.

Built Heritage and Cultural Heritage Landscapes
The MTCS ***Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes*** checklist determines whether your EA project may impact these cultural heritage resources. The Clerk for the municipality can provide information on property registered or designated under the ***Ontario Heritage Act***. Municipal Heritage Planners can also provide information that will assist you in completing the checklist. 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. An HIA demonstrates how cultural heritage resources are recommended to be conserved in the context of redevelopment or site alteration.

MTCS has ***Info Sheet #5: Heritage Impact Assessments and Conservation Plans*** which 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
All technical heritage studies and their recommendations are to be addressed and incorporated into EA projects. Please advise MTCS whether any technical heritage studies will be completed for your EA project, and provide them to MTCS before issuing a Notice of Completion. If your screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists and supporting documentation in the EA report or file.

Thank-you for circulating MTCS on this project: please continue to do so through the EA process, and contact me for any questions or clarification.

Sincerely,

Penny Young, Heritage Planner
Ministry of Tourism, Culture and Sport
Culture Division | Programs and Services Branch | Culture Services Unit

401 Bay Street, Suite 1700
Toronto, Ontario M7A 0A7

Penny.Young@Ontario.ca | Tel. 416.212.7420 | Fax. 416.212.1802

cc: Brian Lima, Director – Public Works and Engineering, Municipality of Middlesex Centre
Chris Traini, County Engineer, County Engineer, Middlesex County

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. MTCS makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MTCS be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Please notify MTCS if archaeological resources are impacted by EA project work. All activities impacting archaeological resources must cease immediately, and a licensed archaeologist is required to carry out an archaeological assessment in accordance with the Ontario Heritage Act and the Standards and Guidelines for Consultant Archaeologists.

If human remains are encountered, all activities must cease immediately and the local police as well as the Cemeteries Regulation Unit of the Ministry of Government and Consumer Services must be contacted. In situations where human remains are associated with archaeological resources, MTCS should also be notified to ensure that the site is not subject to unlicensed alterations which would be a contravention of the Ontario Heritage Act.

Ontario

Ministry of Tourism, Culture and Sport

Programs & Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes

A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area:
  - is a recognized heritage property
  - may be of cultural heritage value
- it includes all areas that may be impacted by project activities, including – but not limited to:
  - the main project area
  - temporary storage
  - staging and working areas
  - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Cultural Heritage Evaluation Report (CHER)

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a qualified person(s) (see page 5 for definitions) to undertake a cultural heritage evaluation report (CHER).

The CHER will help you:

- identify, evaluate and protect cultural heritage resources on your property or project area
- reduce potential delays and risks to a project

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages for more detailed information and when completing this form.

Disponible en français

Project or Property Name
Glendon Drive Streetscape Environmental Assessment

Project or Property Location (upper and lower or single tier municipality)
Middlesex Centre

Proponent Name
Municipality of Middlesex Centre/Middlesex County

Proponent Contact Information
Stephanie Bergman, Stantec Consulting; Brian Lima, Middlesex Centre; Chris Traini, Middlesex County

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	☐	☑

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

Part A: Screening for known (or recognized) Cultural Heritage Value

	Yes	No
2. Has the property (or project area) been evaluated before and found **not** to be of cultural heritage value?	☐	☑

If Yes, do **not** complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Is the property (or project area):		
a. identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value?	☐	☑
b. a National Historic Site (or part of)?	☐	☑
c. designated under the *Heritage Railway Stations Protection Act*?	☐	☑
d. designated under the *Heritage Lighthouse Protection Act*?	☐	☑
e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)?	☐	☑
f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?	☐	☑

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.

Part B: Screening for Potential Cultural Heritage Value

4. Does the property (or project area) contain a parcel of land that:

	Yes	No
a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?	☐	☑
b. has or is adjacent to a known burial site and/or cemetery?	☐	☑
c. is in a Canadian Heritage River watershed?	☐	☑
d. contains buildings or structures that are 40 or more years old?	☐	☑

Part C: Other Considerations

5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):

	Yes	No
a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?	☐	☑
b. has a special association with a community, person or historical event?	☐	☑
c. contains or is part of a cultural heritage landscape?	☐	☑

If Yes to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
  - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

For more information, see the Ministry of Tourism, Culture and Sport's Ontario Heritage Toolkit or Standards and Guidelines for Conservation of Provincial Heritage Properties.

In this context, the following definitions apply:

- **qualified person(s)** means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may already be in place for identifying potential cultural heritage resources, including:

- one endorsed by a municipality
- an environmental assessment process e.g. screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport (MTCS) under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s.B.2.]

Part A: Screening for known (or recognized) Cultural Heritage Value

2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

Respond 'yes' to this question, if all of the following are true:

A property can be considered not to be of cultural heritage value if:

- a Cultural Heritage Evaluation Report (CHER) - or equivalent - has been prepared for the property with the advice of a qualified person and it has been determined not to be of cultural heritage value and/or
- the municipal heritage committee has evaluated the property for its cultural heritage value or interest and determined that the property is not of cultural heritage value or interest

A property may need to be re-evaluated, if:

- there is evidence that its heritage attributes may have changed
- new information is available
- the existing Statement of Cultural Heritage Value does not provide the information necessary to manage the property
- the evaluation took place after 2005 and did not use the criteria in Regulations 9/06 and 10/06

Note: Ontario government ministries and public bodies [prescribed under Regulation 157/10] may continue to use their existing evaluation processes, until the evaluation process required under section B.2 of the Standards & Guidelines for Conservation of Provincial Heritage Properties has been developed and approved by MTCS.

To determine if your property or project area has been evaluated, contact:

- the approval authority
- the proponent
- the Ministry of Tourism, Culture and Sport

3a. Is the property (or project area) identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value e.g.:

i. designated under the *Ontario Heritage Act*

- individual designation (Part IV)
- part of a heritage conservation district (Part V)

Individual Designation – Part IV

A property that is designated:

- by a municipal by-law as being of cultural heritage value or interest [s.29 of the *Ontario Heritage Act*]
- by order of the Minister of Tourism, Culture and Sport as being of cultural heritage value or interest of provincial significance [s.34.5]. **Note**: To date, no properties have been designated by the Minister.

Heritage Conservation District – Part V

A property or project area that is located within an area designated by a municipal by-law as a heritage conservation district [s. 41 of the *Ontario Heritage Act*].

For more information on Parts IV and V, contact:

- municipal clerk
- Ontario Heritage Trust
- local land registry office (for a title search)

---

ii. subject of an agreement, covenant or easement entered into under Parts II or IV of the *Ontario Heritage Act*

An agreement, covenant or easement is usually between the owner of a property and a conservation body or level of government. It is usually registered on title.

The primary purpose of the agreement is to:

- preserve, conserve, and maintain a cultural heritage resource
- prevent its destruction, demolition or loss

For more information, contact:

- Ontario Heritage Trust - for an agreement, covenant or easement [clause 10 (1) (c) of the *Ontario Heritage Act*]
- municipal clerk – for a property that is the subject of an easement or a covenant [s.37 of the *Ontario Heritage Act*]
- local land registry office (for a title search)

---

iii. listed on a register of heritage properties maintained by the municipality

Municipal registers are the official lists - or record - of cultural heritage properties identified as being important to the community.

Registers include:

- all properties that are designated under the *Ontario Heritage Act* (Part IV or V)
- properties that have not been formally designated, but have been identified as having cultural heritage value or interest to the community

For more information, contact:

- municipal clerk
- municipal heritage planning staff
- municipal heritage committee

---

iv. subject to a notice of:

- intention to designate (under Part IV of the *Ontario Heritage Act*)
- a Heritage Conservation District study area bylaw (under Part V of the *Ontario Heritage Act*)

A property that is subject to a **notice of intention to designate** as a property of cultural heritage value or interest and the notice is in accordance with:

- section 29 of the *Ontario Heritage Act*
- section 34.6 of the *Ontario Heritage Act*. **Note**: To date, the only applicable property is Meldrum Bay Inn, Manitoulin Island. [s.34.6]

An area designated by a municipal by-law made under section 40.1 of the *Ontario Heritage Act* as a **heritage conservation district study area**.

For more information, contact:

- municipal clerk – for a property that is the subject of notice of intention [s. 29 and s. 40.1]
- Ontario Heritage Trust

v. included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties

Provincial heritage properties are properties the Government of Ontario owns or controls that have cultural heritage value or interest.

The Ministry of Tourism, Culture and Sport (MTCS) maintains a list of all provincial heritage properties based on information provided by ministries and prescribed public bodies. As they are identified, MTCS adds properties to the list of provincial heritage properties.

For more information, contact the MTCS Registrar at registrar@mtc.gov.on.ca.

3b. Is the property (or project area) a National Historic Site (or part of)?

National Historic Sites are properties or districts of national historic significance that are designated by the Federal Minister of the Environment, under the *Canada National Parks Act*, based on the advice of the Historic Sites and Monuments Board of Canada.

For more information, see the National Historic Sites website.

3c. Is the property (or project area) designated under the *Heritage Railway Stations Protection Act*?

The *Heritage Railway Stations Protection Act* protects heritage railway stations that are owned by a railway company under federal jurisdiction. Designated railway stations that pass from federal ownership may continue to have cultural heritage value.

For more information, see the Directory of Designated Heritage Railway Stations.

3d. Is the property (or project area) designated under the *Heritage Lighthouse Protection Act*?

The *Heritage Lighthouse Protection Act* helps preserve historically significant Canadian lighthouses. The Act sets up a public nomination process and includes heritage building conservation standards for lighthouses which are officially designated.

For more information, see the Heritage Lighthouses of Canada website.

3e. Is the property (or project area) identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office?

The role of the Federal Heritage Buildings Review Office (FHBRO) is to help the federal government protect the heritage buildings it owns. The policy applies to all federal government departments that administer real property, but not to federal Crown Corporations.

For more information, contact the Federal Heritage Buildings Review Office.

See a directory of all federal heritage designations.

3f. Is the property (or project area) located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?

A UNESCO World Heritage Site is a place listed by UNESCO as having outstanding universal value to humanity under the Convention Concerning the Protection of the World Cultural and Natural Heritage. In order to retain the status of a World Heritage Site, each site must maintain its character defining features.

Currently, the Rideau Canal is the only World Heritage Site in Ontario.

For more information, see Parks Canada – World Heritage Site website.

Part B: Screening for potential Cultural Heritage Value

4a. Does the property (or project area) contain a parcel of land that has a municipal, provincial or federal commemorative or interpretive plaque?

Heritage resources are often recognized with formal plaques or markers.

Plaques are prepared by:

- municipalities
- provincial ministries or agencies
- federal ministries or agencies
- local non-government or non-profit organizations

For more information, contact:

- municipal heritage committees or local heritage organizations – for information on the location of plaques in their community
- Ontario Historical Society's Heritage directory – for a list of historical societies and heritage organizations
- Ontario Heritage Trust – for a list of plaques commemorating Ontario's history
- Historic Sites and Monuments Board of Canada – for a list of plaques commemorating Canada's history

4b. Does the property (or project area) contain a parcel of land that has or is adjacent to a known burial site and/or cemetery?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulations, Ontario Ministry of Consumer Services – for a database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, adjacent means contiguous or as otherwise defined in a municipal official plan.

4c. Does the property (or project area) contain a parcel of land that is in a Canadian Heritage River watershed?

The Canadian Heritage River System is a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage.

Canadian Heritage Rivers must have, and maintain, outstanding natural, cultural and/or recreational values, and a high level of public support.

For more information, contact the Canadian Heritage River System.

If you have questions regarding the boundaries of a watershed, please contact:

- your conservation authority
- municipal staff

4d. Does the property (or project area) contain a parcel of land that contains buildings or structures that are 40 or more years old?

A 40 year 'rule of thumb' is typically used to indicate the potential of a site to be of cultural heritage value. The approximate age of buildings and/or structures may be estimated based on:

- history of the development of the area
- fire insurance maps
- architectural style
- building methods

Property owners may have information on the age of any buildings or structures on their property. The municipality, local land registry office or library may also have background information on the property.

Note: 40+ year old buildings or structure do not necessarily hold cultural heritage value or interest; their age simply indicates a higher potential.

A building or structure can include:

- residential structure
- farm building or outbuilding
- industrial, commercial, or institutional building
- remnant or ruin
- engineering work such as a bridge, canal, dams, etc.

For more information on researching the age of buildings or properties, see the Ontario Heritage Tool Kit Guide Heritage Property Evaluation.

Part C: Other Considerations

5a. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has potential landmarks or defining structures and sites, for instance:

- buildings or landscape features accessible to the public or readily noticeable and widely known
- complexes of buildings
- monuments
- ruins

5b. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) has a special association with a community, person or historical event?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has a special association with a community, person or event of historic interest, for instance:

- Aboriginal sacred site
- traditional-use area
- battlefield
- birthplace of an individual of importance to the community

5c. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) contains or is part of a cultural heritage landscape?

Landscapes (which may include a combination of archaeological resources, built heritage resources and landscape elements) may be of cultural heritage value or interest to a community.

For example, an Aboriginal trail, historic road or rail corridor may have been established as a key transportation or trade route and may have been important to the early settlement of an area. Parks, designed gardens or unique landforms such as waterfalls, rock faces, caverns, or mounds are areas that may have connections to a particular event, group or belief.

For more information on Questions 5.a., 5.b. and 5.c., contact:

- Elders in Aboriginal Communities or community researchers who may have information on potential cultural heritage resources. Please note that Aboriginal traditional knowledge may be considered sensitive.
- municipal heritage committees or local heritage organizations
- Ontario Historical Society's "Heritage Directory" - for a list of historical societies and heritage organizations in the province

An internet search may find helpful resources, including:

- historical maps
- historical walking tours
- municipal heritage management plans
- cultural heritage landscape studies
- municipal cultural plans

Information specific to trails may be obtained through Ontario Trails.

Middlesex County Heritage Trails

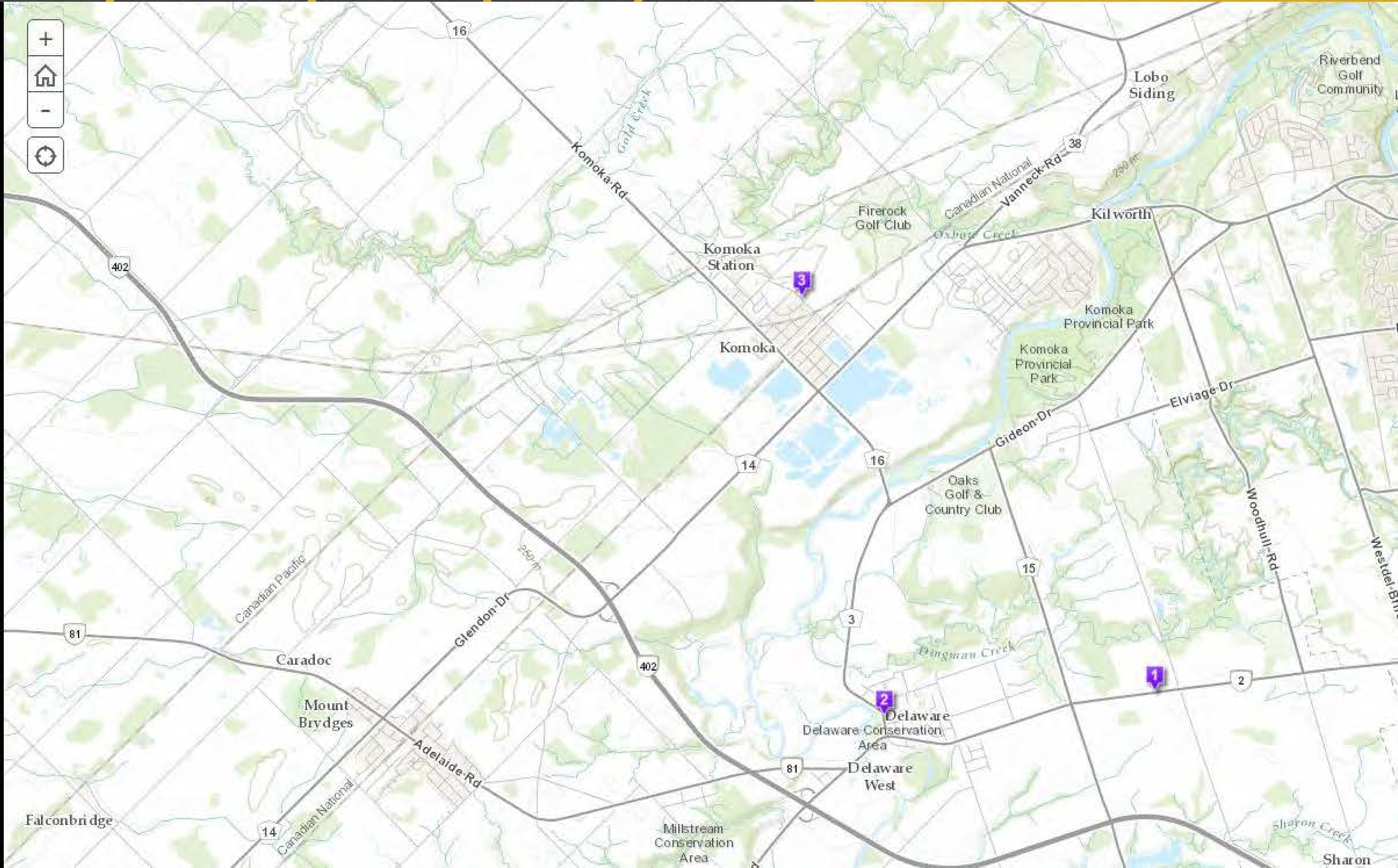
Discover the Heritage Trails

- Adelaide Metcalfe
- Lucan-Biddulph
- **Middlesex Centre**
- North Middlesex
- Southwest Middlesex
- Strathroy Caradoc
- Thames Centre
- Village of Newbury

1 Delaware (Patrick) Sawmill

2 Christ Church Anglican Church

3 Komoka Railway Station



APPENDIX C: SERVICING

C.1 SWM SERVICING

Memo

To:	Corri Marr London ON Office	From:	Nick Emery London ON Office
File:	1614-13164	Date:	October 28, 2015

Reference: **Glendon Drive Streetscape EA**
Existing Conditions Drainage

INTRODUCTION

An existing conditions drainage assessment was completed to characterize the existing Glendon Drive Drainage, identify drainage concerns, and provide recommendations for future drainage servicing. The drainage assessment was performed based on the following background information:

- Field Survey from Komoka Road to the Thames River, the remaining survey from Highway 402 to Komoka Road was not available;
- Glendon Drive plan and profile drawings provided by Middlesex County;
- 2010 aerial photography; and
- Topographic mapping with 1-m contour intervals developed from elevation information from the 2010 aerial photography; and
- Municipal drain drawings.

DRAINAGE CATCHMENT DESCRIPTIONS

Glendon Drive from Highway 402 to the Thames River has a rural cross section and runoff is typically conveyed by roadside ditches and culverts. The drainage areas presented on the attached existing conditions drainage figures were delineated based on the available survey data and plan and profile drawings. A brief description of each catchment is presented below:

Catchment 101 – Runoff from the north side of the Glendon Drive right-of-way is collected and conveyed by the existing roadside ditch to the Highway 402 interchange. The interchange drainage infrastructure conveys the runoff to the Highway 402 roadside ditch.

Catchment 102 – Runoff from the south side of the Glendon Drive right-of-way is collected and conveyed to the existing Station 10+100 low point by the existing roadside ditches. The runoff is conveyed southward by the existing 9325 Glendon Drive ditch.

Catchment 103 – Runoff from the south side of the Glendon Drive right-of-way is collected and conveyed to the existing Station 10+350 low point by the existing roadside ditches. The runoff travels southward as shallow overland flow, across the adjacent agricultural lands.

Catchment 104 – Runoff from the north side of the Glendon Drive right-of-way is collected and conveyed to the existing Station 10+350 low point by the existing roadside ditches. Based on the available topographic mapping, there does not appear to be a surface water outlet at this location.

Catchment 105 – Runoff from Catchment 118 is collected and conveyed to the existing Station 10+590 culvert by the existing roadside ditches. The runoff travels southward as shallow overland flow, across the adjacent agricultural lands.

Catchment 106 – Runoff from Catchment 117 is collected and conveyed to the existing Station 10+850 culvert by the existing roadside ditches. The runoff travels southward as shallow overland flow, across the adjacent agricultural lands.

Catchment 107 – Runoff is conveyed westward from the south side of the right-of-way by the existing roadside ditch and appears to outlet to the woodlot on the south side of Glendon Drive near Station 11+600.

Catchment 108 – Runoff from Catchment 115 is collected and conveyed to the existing Station 11+300 culvert by the existing roadside ditches. The runoff travels southward as shallow overland flow, across the adjacent agricultural lands.

Catchment 109 – Runoff from Catchment 114 is collected and conveyed to Komoka Creek by the existing roadside ditches.

Catchment 110 – Based on the available plan and profile drawings, runoff from Catchment 113 is collected and conveyed by the existing roadside ditches and the culvert located at Station 12+680 to the Munten Agreement Drain on the south side of the Glendon Drive right-of-way.

Catchment 111 – Runoff from the north side of the Glendon Drive right-of-way is collected by the existing roadside ditch and travels northward as overland flow to the existing pond.

Catchment 112 – Runoff from the south side of the Glendon Drive right-of-way is collected by the existing roadside ditch and spills into the existing pond located southeast of the Glendon Drive/Komoka Road intersection.

Catchment 113 – Runoff from the north side of the Glendon Drive right-of-way is collected by the existing roadside ditches and conveyed by Komoka Drain No. 1 to the existing pond located at 22447 Komoka Road.

Catchment 114 – Based on the available plan and profile drawings, runoff from the south side of the Glendon Drive right-of way is conveyed by the roadside ditch to an existing catchbasin located at station 14+270. Based on the Tunks Drain design drawings, the catchbasin discharges to a private drain that conveys the Glendon Drive runoff to the pond located at 10095 Glendon Drive. Additionally, the design drawings suggest that an existing 600 mm diameter culvert conveys runoff from the north side of the Glendon Drive right-of-way to the existing catchbasin. However, the presence of the culvert must be field verified.

Catchment 115 – Runoff from Catchment 108 is collected and conveyed by Tunks Drain to the existing pond located at the southeast corner of the Glendon Drive/Komoka Road intersection. Additionally, a portion of the runoff from this catchment may be conveyed to a private drain located on the south side of the Glendon Drive right-of-way by an existing 600 mm diameter culvert. However, the presence of the culvert must be field verified.

Catchment 116 – Runoff is conveyed westward from the south side of the right-of-way by the existing roadside ditch and appears to outlet to the woodlot immediately east of 10121 Glendon Drive.

Catchment 117 – Runoff from Catchment 106 is conveyed by the existing roadside ditches to the culvert at Station 14+760. The culvert discharges to the north site of the right of way, and the Glendon Drive runoff is conveyed northward by the Tunks Drain.

Catchment 118 – Runoff from Catchment 105 is conveyed by the existing roadside ditches to the culvert at Station 15+420. The culvert discharges to the north site of the right of way, and the Glendon Drive runoff is conveyed downstream by an unnamed tributary to Oxbow Creek.

Catchment 119 – Runoff from Catchment 104 is conveyed by the existing roadside ditches to the culvert at Station 16+030. The culvert discharges to the north site of the right of way, and the Glendon Drive runoff is conveyed northward to Oxbow Creek by an existing overland flow route. Additionally, Doan Drain, a closed Municipal Drain, crosses the Glendon Drive right-of-way near the existing culvert and conveys agricultural drainage to the Vanneck Road ditch from the farmland on the south side of Glendon Drive.

Catchment 120 – Based on the available plan and profile drawings, runoff from Catchment 103 is conveyed to an existing culvert located at Station 16+590. The culvert discharges to the north site of the right of way, and the Glendon Drive runoff is conveyed northward to Oxbow Creek by an existing overland flow route. The culvert was not located in the survey and a field check should be completed to verify its presence and dimensions.

Catchment 121 – Runoff from Catchment 102 is conveyed to the Thames River by the downstream Kilworth Settlement Area drainage infrastructure. Drainage servicing is provided in the downstream residential area by culverts and roadside ditches.

Catchment 122 – Runoff from Catchment 101 travels eastward to Thames River. An existing culvert conveys the runoff from the north side of the right-of-way across Old River Road.

CULVERT INVENTORY

The culvert inventory summarized in the following table was developed based on the available plan and profile drawings and survey information. Culvert capacities were calculated based on the available pipe information. Where inverts were unavailable, pipe slopes of 0.5% were used to estimate the culvert capacities.

Table 1 - Existing Culvert Inventory

Station	Diameter (mm)	Material	Length (m)	U.S. Invert (m)	D.S. Invert (m)	Calculated Capacity (cms)	Notes
10+600	450	CSP	20.1	NA	NA	0.13	To be Verified
10+850	450	CSP	20.1	NA	NA	0.13	To be Verified
11+300	450	CSP	20.1	NA	NA	0.13	To be Verified
12+300	3.9m x 2.5m Arch	CSP	25.9	NA	NA	17	To be Verified
12+680	450	CSP	20.1	NA	NA	0.13	To be Verified
14+270	600	CSP	25.7	NA	NA	0.27	CBs At Ends
14+760	500	CSP	20.7	248.37	248.24	0.17	
15+420	400	CSP	25.8	247.59	247.27	0.11	
16+030	600	CSP	22.9	248.90	248.41	0.31	
16+590	600	CSP	27.4	NA	NA	0.27	To be Verified

DRAINAGE CONCERNS/CONSTRAINTS

Drainage concerns/constraints were identified at the catchments summarized in the following table.

Table 2 – Drainage Concerns/Constraints

Catchment	Concern
102	This catchment does not discharge to an existing watercourse or identified drainage works.
103	This catchment does not discharge to an existing watercourse or identified drainage works.
104	This catchment does not discharge to an existing watercourse or identified drainage works. Furthermore, there does not appear to be a surface water outlet at this location.
105	This catchment does not discharge to an existing watercourse or identified drainage works.
106	This catchment does not discharge to an existing watercourse or identified drainage works.
107	This catchment does not discharge to an existing watercourse or identified drainage works.
108	This catchment does not discharge to an existing watercourse or identified drainage works.
109	Based on the information presented in the UTRCA report cards, Komoka Creek supports a coldwater fishery. Thus, appropriate mitigation measures should be implemented provide water quality and thermal treatment to the Glendon Drive runoff.
110	This catchment discharges to the Munten Agreement Drain. The condition, alignment, and receiving waterbody are unknown.
111	This catchment does not discharge to an existing watercourse or identified drainage works.
112	This catchment does not discharge to an existing watercourse or identified drainage works.

Table 2 – Drainage Concerns/Constraints (Continued)

113	Runoff from this area is collected by Komoka Drain No. 1, which is likely not designed in accordance with current municipal storm sewer design standards. The Municipal Drain discharges to a private pond. Drainage from this catchment could be affected by the downstream pond water levels.
114	This catchment discharges to a private drain whose status and condition are uncertain. Drainage from this catchment could be affected by the downstream pond water levels.
115	Runoff from this area is collected by Tunks Drain, which is likely not designed in accordance with current municipal storm sewer design standards. This catchment discharges to a private drain whose status and condition are uncertain. Drainage from this catchment could be affected by the downstream pond water levels.
116	This catchment does not discharge to an existing watercourse or identified drainage works.
118	Based on the information presented in the UTRCA report cards, Oxbow Creek supports a coldwater fishery. Thus, appropriate mitigation measures should be implemented provide water quality and thermal treatment to the Glendon Drive runoff.
119	This catchment does not discharge to an existing watercourse or identified drainage works. Based on the information presented in the UTRCA report cards, Oxbow Creek supports a coldwater fishery. Thus, appropriate mitigation measures should be implemented provide water quality and thermal treatment to the Glendon Drive runoff.
120	The Station 16+590 culvert was not located in the site survey and its presence must be verified. This catchment does not discharge to an existing watercourse or identified drainage works. Based on the information presented in the UTRCA report cards, Oxbow Creek supports a coldwater fishery. Thus, appropriate mitigation measures should be implemented provide water quality and thermal treatment to the Glendon Drive runoff.
121	Runoff from the Glendon Drive is conveyed through existing downstream residential area. Care will be required to prevent negative impacts from future drainage on downstream properties.
122	Runoff from Glendon Drive must be safely conveyed across Old River Road culvert.

DATA GAPS

The following data gaps were identified through the background information review:

- Survey data for Glendon Drive from Highway 402 to Komoka Road were not available. This information is forthcoming.
- The culvert at station 16+590 was not identified in the survey. Its presence/absence should be field verified.
- Connections from the Station 14+270 culvert to the Tunks Drain and the downstream private drain should be field verified.
- Any available information for the Munten Agreement Drain should be located, if possible.

- Any available flooding complaint information within the Glendon Drive right-of-way should be obtained from the Municipality.
- Any available plan and profile drawings for Glendon Drive from Komoka Road to Queens Street should be obtained.

DRAINAGE IMPROVEMENT RECOMMENDATIONS

The following drainage recommendations were developed based on the results of the existing conditions drainage review:

- All proposed drainage infrastructure should be designed in accordance with the January 2008 MTO Highway Drainage Design Standards.
- All runoff from the Glendon Drive right-of-way should be conveyed to an appropriate outlet. Where necessary, downstream drainage works should be constructed in accordance with the Drainage Act to convey runoff from Glendon Drive to an appropriate outlet.
- A stormwater management plan should be developed for Glendon Drive in accordance with the following control criteria:
  1. Sufficient quantity control must be provided to mitigate flood risks on downstream properties caused by runoff from the proposed Glendon Drive right-of-way.
  2. Water quality treatment must be provided to reduce the impact of the Glendon Drive runoff on downstream water quality. MOECC "Enhanced" Protection Level water quality treatment should be provided to the runoff from the portions of the right-of-way that discharge to Komoka Creek and Oxbow Creek. MOECC "Normal" Protection Level water quality treatment should be provided elsewhere.
  3. Thermal mitigation measures should be implemented to reduce the possibility of temperature impacts on Komoka Creek and Oxbow Creek.
- The proposed highway drainage and stormwater management servicing should be integrated with the future development servicing where feasible.
- The proposed highway drainage and stormwater management servicing should accommodate the runoff from future development.
- The proposed highway drainage and stormwater management servicing must accommodate the runoff from external drainage areas.

Reference: **Glendon Drive Streetscape EA**
Existing Conditions Drainage

STANTEC CONSULTING LTD.

Nicholas Emery

Nick Emery, P.Eng.
Water Resources Engineer
Phone: 519-675-6619
Fax: 519-645-6575
nick.emery@stantec.com

Attachment: Figures 1-8 Existing Conditions Drainage

Stantec

Memo

To: Corri Marr
London ON Office

From: Nick Emery
London ON Office

File: 161413164

Date: January 10, 2017

Reference: Glendon Drive Streetscape EA
Preliminary SWM Strategy

INTRODUCTION

A preliminary stormwater management (SWM) strategy was developed for the proposed Glendon Drive streetscape in accordance with the recommendations presented in the October 28, 2015 and the March 3, 2016 technical memoranda, and discussions with the Municipality of Middlesex Centre.

PROPOSED SWM STRATEGY

The proposed SWM strategy is shown on Figures 1 to 8 and described in further detail below.

CATCHMENT 201

Similar to existing conditions, runoff from the Glendon Drive right-of-way is collected and conveyed by proposed roadside ditches to the Highway 402 interchange. The interchange drainage infrastructure conveys the runoff to the Highway 402 roadside ditch.

The proposed roadside ditches provide passive water quality treatment to the Glendon Drive runoff. Given the small drainage area of this catchment, the relatively small increase in impervious area compared to existing conditions, and the presence of downstream ditches to convey the runoff, no water quantity controls are proposed.

CATCHMENT 202

A widened rural cross section is proposed for this portion of Glendon Drive located west of Komoka. Under existing conditions, there are no watercourses or drainage works that provide an outlet from the right-of-way. Instead, runoff from Glendon Drive infiltrates into the local sandy soils from the existing roadside ditches and travels as shallow surface flow across the neighboring agricultural fields.

Similar to the existing drainage conditions, stormwater from the proposed widened cross section is managed using infiltration measures incorporated into the roadside ditches. The ditches provide sufficient storage to attenuate the post-development peak discharges to existing condition magnitudes. Furthermore, the proposed infiltration measures will be designed in accordance with MOECC guidelines to provide “Enhanced” protection level water quality treatment. Pre-treatment is provided to the runoff from the paved surface and gravel shoulders by narrow vegetated filter strips, or other similar linear best management practice (BMP). The proposed infiltration measures must include appropriate soil media and vegetation to remove potential contaminants that are typically present in road runoff.

Runoff from external drainage areas should continue to be directed to the existing culverts, rather than the proposed infiltration measures. The existing culverts will be either extended or replaced at their current locations to allow runoff from external drainage areas to cross the right-of-way, similar to existing conditions.

CATCHMENT 203

Similar to Catchment 201, a widened rural cross section is proposed for this portion of Glendon Drive. Runoff from this catchment is conveyed to Komoka Creek by improved roadside ditches. The proposed ditches will be designed in accordance with MOECC criteria for enhanced grassed swales to provide water quality treatment to the Glendon Drive runoff. Check dams located in the proposed roadside ditches provide temporary stormwater detention to achieve the necessary water quantity control targets. Pre-treatment is provided to the runoff from the paved surface by narrow vegetated filter strips, or other similar linear BMP.

CATCHMENT 204

Under existing conditions, runoff from this portion of Glendon Drive flows to existing privately owned ponds located south of right-of-way. While there is limited available information regarding the pond outlets, discharges from these ponds are likely conveyed across downstream privately owned lands. Downstream landowners are not obligated to accept runoff from upstream lands unless it is conveyed within a watercourse. Thus, the existing ponds should not be used as outlets for the Glendon Drive improvement since downstream landowners could potentially alter their lands to prevent flows from entering their properties.

An urban cross section is proposed for this portion of the Glendon Drive right-of-way. A proposed local storm sewer collects the minor flows from both Glendon Drive and external drainage areas EXT6 and EXT7. The proposed storm sewer conveys the minor flows southward from the Glendon Drive/Komoka Road intersection. A proposed ditch on the east side of Komoka Road conveys runoff from Glendon Drive to the Thames River.

A proposed SWM pond provides all necessary stormwater treatment to the runoff from the proposed Glendon Drive improvements. Two possible locations for the proposed SWM pond are:

1. Southeast of the Glendon Drive/Komoka Road intersection – A berm is constructed to isolate the proposed SWM pond from the rest of the existing pond. The proposed SWM pond discharges to the proposed Komoka Road ditch, which conveys the treated stormwater to the Thames River. This proposed pond location utilizes land which is likely otherwise undevelopable. The feasibility of this location is limited by the depth of the existing pond, the maximum design water surface elevation of the existing pond, and the possibility of constructing an impermeable berm without dewatering the existing pond.
2. Near the existing wastewater treatment plant – The proposed Komoka Road ditch conveys stormwater from the proposed storm sewer outfall to the proposed SWM pond located near the existing wastewater treatment plant. The proposed ditch provides water quality pre-treatment to the Glendon Drive runoff and infiltration opportunities.

The MoMC Official Plan and available aerial photography suggests that lands designated for residential and commercial purposes near Queen Street and Tunks Lane are not yet developed. The proposed SWM pond could be sized to provide treatment to these future development areas.

The location and service area of the proposed SWM pond should be evaluated as detailed design progresses.

Major flows from the proposed Glendon Drive right-of-way will continue to follow existing overland flow routes. The proposed condition major event peak flows are expected to be less than existing condition magnitudes since the proposed storm sewer diverts a significant portion of the Glendon Drive runoff to the Thames River. Consequently, additional quantity control for major flows is likely unnecessary.

CATCHMENT 205

An urban cross section is proposed for this portion of the Glendon Drive right-of-way. A proposed local storm sewer collects the minor flows from Glendon Drive. Stormwater from the proposed Glendon Drive improvements could be discharged to either the Thames River or Oxbow Creek. The following strategies describe the benefits and challenges associated with each option:

1. Discharge to future subdivision – The proposed Glendon Drive storm sewer discharges to the future local storm sewer that services the proposed subdivision located south of Glendon Drive. Water quality treatment is provided by the future downstream regional SWM pond which discharges to the Thames River. This option utilizes infrastructure that must be constructed to service future development. While the proposed regional SWM pond is not designed to accommodate runoff from the proposed Glendon Drive improvements, the additional drainage area is small relative to the proposed pond design service area and is consequently unlikely to have a significant effect on the pond design water surface elevations and discharges. However, this should be verified as detailed design progresses. Major flows from the proposed Glendon Drive right-of-way continue to follow existing overland flow routes. The proposed condition major event peak flows are expected to be less than existing condition magnitudes since the proposed storm sewer diverts a significant portion of the Glendon Drive runoff. Consequently, additional quantity control for major flows is likely unnecessary.
2. Discharge to Oxbow Creek tributary – The proposed Glendon Drive storm sewer discharges to a dry SWM pond located on the north side of the right-of-way which provides water quantity control to the runoff from the proposed road improvements. An oil/grit separator (OGS) provides water quality pre-treatment to the Glendon Drive runoff, and acts in series with the proposed dry SWM pond to provide all necessary water quality treatment. The proposed SWM pond discharges to a tributary of Oxbow Creek. Providing sufficient cover over the proposed storm sewer may prove challenging since, based on the available as-built drawings, the existing top of road elevations appear to be only approximately 2 m higher than the Oxbow Creek tributary invert.
3. Discharge to existing subdivision – The existing Kilworth Heights Subdivision design drawings and stormwater management report suggest that the existing drainage works have capacity to accommodate the runoff from the proposed Glendon Drive improvements. Water quality treatment is provided by the existing downstream regional SWM pond which discharges to the Thames River. A new 130 m long storm sewer on Springfield Way is required to convey minor flows from the proposed Glendon Drive improvements to the existing storm sewer at Doan Drive. Furthermore, approximately 530 m^3 of quantity control storage is required to attenuate the Glendon Drive 2-year peak discharge to the existing storm sewer design capacity. Major flows

from the proposed Glendon Drive right-of-way continue to follow existing overland flow routes. The proposed condition major event peak flows are expected to be less than existing condition magnitudes since the proposed storm sewer diverts a significant portion of the Glendon Drive runoff. Consequently, additional quantity control for major flows is likely unnecessary.

CATCHMENT 206

A semi-urban cross section is proposed for this portion of Glendon Drive. Runoff from this catchment is collected and conveyed by an improved roadside ditch on the north side of the right-of-way. The proposed ditch will be designed in accordance with MOECC criteria for enhanced grassed swales to provide water quality treatment to the Glendon Drive runoff. Check dams located in the proposed roadside ditch provide temporary stormwater detention to achieve the necessary water quantity control targets. Pre-treatment is provided to the runoff from the paved surface by narrow vegetated filter strips, or other similar linear BMP. Similar to existing conditions, the Glendon Drive runoff is conveyed northward to Oxbow Creek by the existing overland flow route.

CATCHMENT 207

A widened rural cross section is proposed for this portion of Glendon Drive. Runoff from this catchment is conveyed to the Thames River by an improved roadside ditch on the north side of the right-of-way. The proposed ditch will be designed in accordance with MOECC criteria for enhanced grassed swales to provide water quality treatment to the Glendon Drive runoff. Check dams located in the proposed roadside ditch provide temporary stormwater detention to achieve the necessary water quantity control targets. Pre-treatment is provided to the runoff from the paved surface by narrow vegetated filter strips, or other similar linear BMP.

SOURCEWATER PROTECTION

Drinking water threats associated with the proposed drainage strategy were identified based on the information presented in the Tables of Drinking Water Threats (2013). Preliminary mitigation measures were identified to reduce the negative impacts of each threat on water quality and quantity in vulnerable areas:

- The application of road salt (Reference Nos. 92, 93) – Based on the information presented in the Tables of Drinking Water Threats the threat associated with this activity is Low. However, a road salt management plan should be developed for the proposed Glendon Drive improvements to minimize the amount of sodium and chloride entering local groundwater and surface waters.

CONCLUSIONS

The preliminary SWM strategy described above was developed to manage the runoff from the proposed Glendon Drive improvements. The proposed SWM strategy should be reviewed as design proceeds.

STANTEC CONSULTING LTD.

Nicholas Emery

Nick Emery, P.Eng.
Water Resources Engineer
Phone: 519-675-6619
Fax: 519-645-6575
nick.emery@stantec.com

Attachment: Figures 1-8 Proposed Drainage

c. Isaac Bartlett (Stantec)
Stephanie Bergman (Stantec)

V:\01614\active\161413164\design\drawing\GIS\MXD\Storm\161413164_Fig2_ProposedDrainage.mxd
Revised: 2017-01-09 By: kbuchanan

January 2017
161412164

Stantec

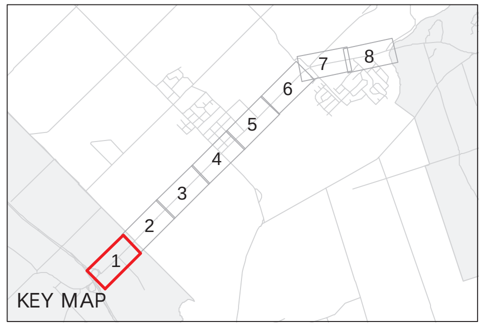
Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2016.
3. 2015 orthoimagery used under license with Middlesex Centre, 2016.

Legend

NOTE

Retained Existing Culvert
Proposed Culvert
Retained Existing Pipe
Proposed Storm Sewer
Proposed Enhanced Ditch
Proposed Infiltration Measures
Flow Direction
Drainage Catchment
Drainage Catchment ID
Area (ha)
Watercourse (Permanent)
Watercourse (Intermittent)
Municipal Boundary



Client/Project

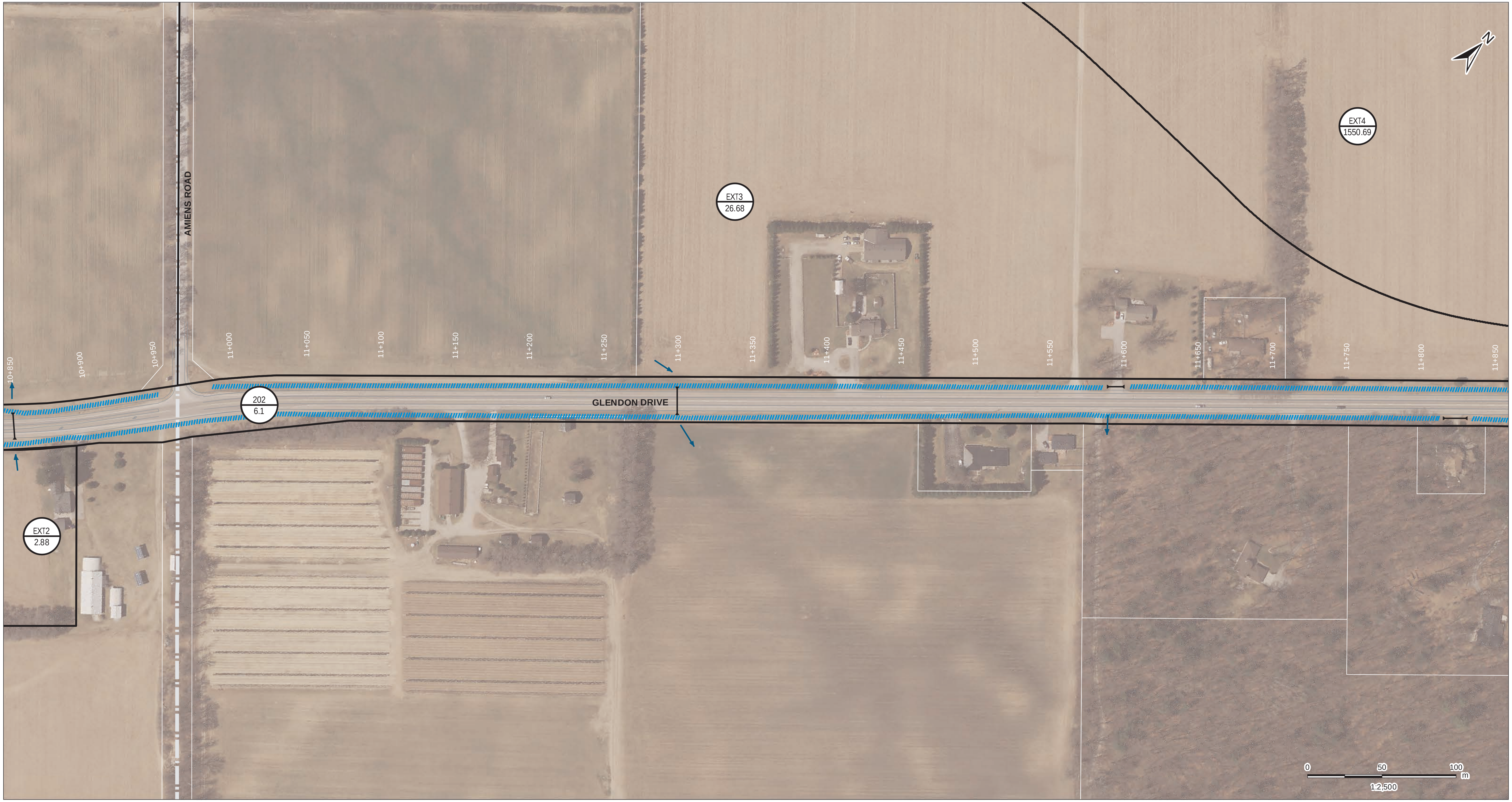
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.

1

Title

Proposed Drainage



V:\01614\active\161413164\design\drawing\GIS\MXD\Storm\161413164_Fig2_ProposedDrainage.mxd
Revised: 2017-01-09 By: kbuchanan

January 2017
161412164

Stantec

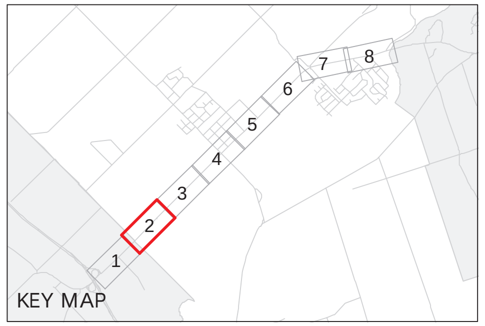
Legend

NOTE

- Retained Existing Culvert
- Proposed Culvert
- Retained Existing Pipe
- Proposed Storm Sewer
- Proposed Enhanced Ditch
- Proposed Infiltration Measures
- Flow Direction
- Drainage Catchment
- Drainage Catchment ID Area (ha)
- Watercourse (Permanent)
- Watercourse (Intermittent)
- Municipal Boundary

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2016.
3. 2015 orthoimagery used under license with Middlesex Centre, 2016.



KEY MAP

Client/Project

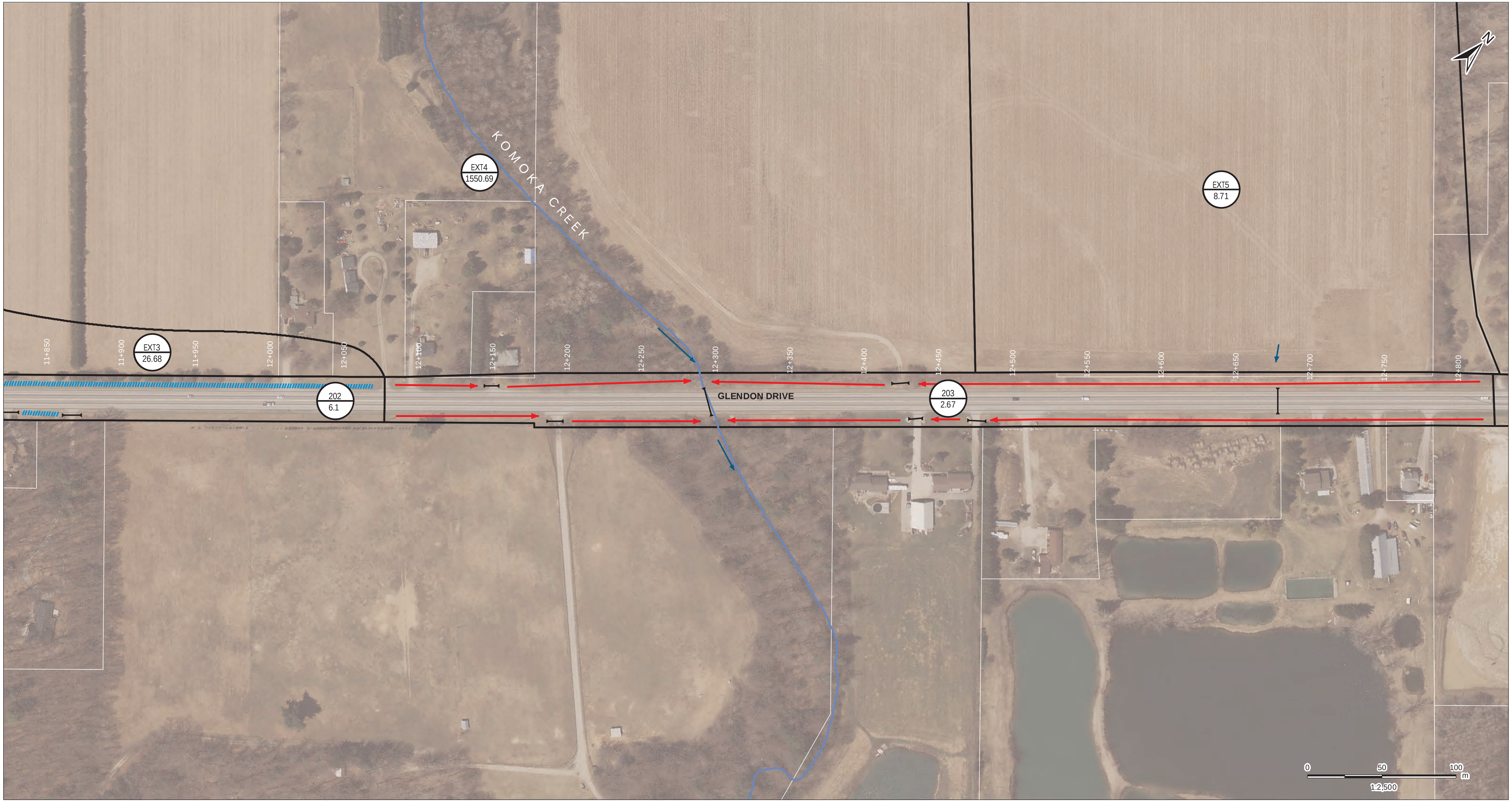
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.

2

Title

Proposed Drainage



V:\01614\active\161413164\design\drawing\GIS\MXD\Storm\161413164_Fig2_ProposedDrainage.mxd
Revised: 2017-01-09 By: kbuchanan

January 2017
161412164

Stantec

Legend

NOTE

Retained Existing Culvert

Proposed Culvert

Retained Existing Pipe

Proposed Storm Sewer

Proposed Enhanced Ditch

Proposed Infiltration Measures

Flow Direction

Drainage Catchment

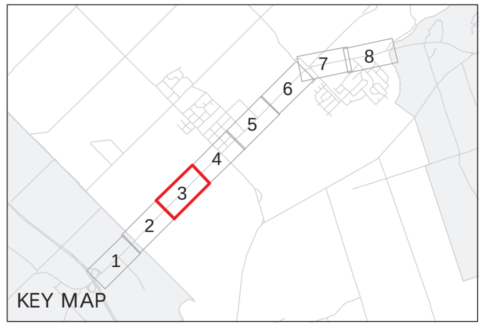
Drainage Catchment ID
Area (ha)

Watercourse (Permanent)

Watercourse (Intermittent)

Municipal Boundary

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2016.
3. 2015 orthoimagery used under license with Middlesex Centre, 2016.



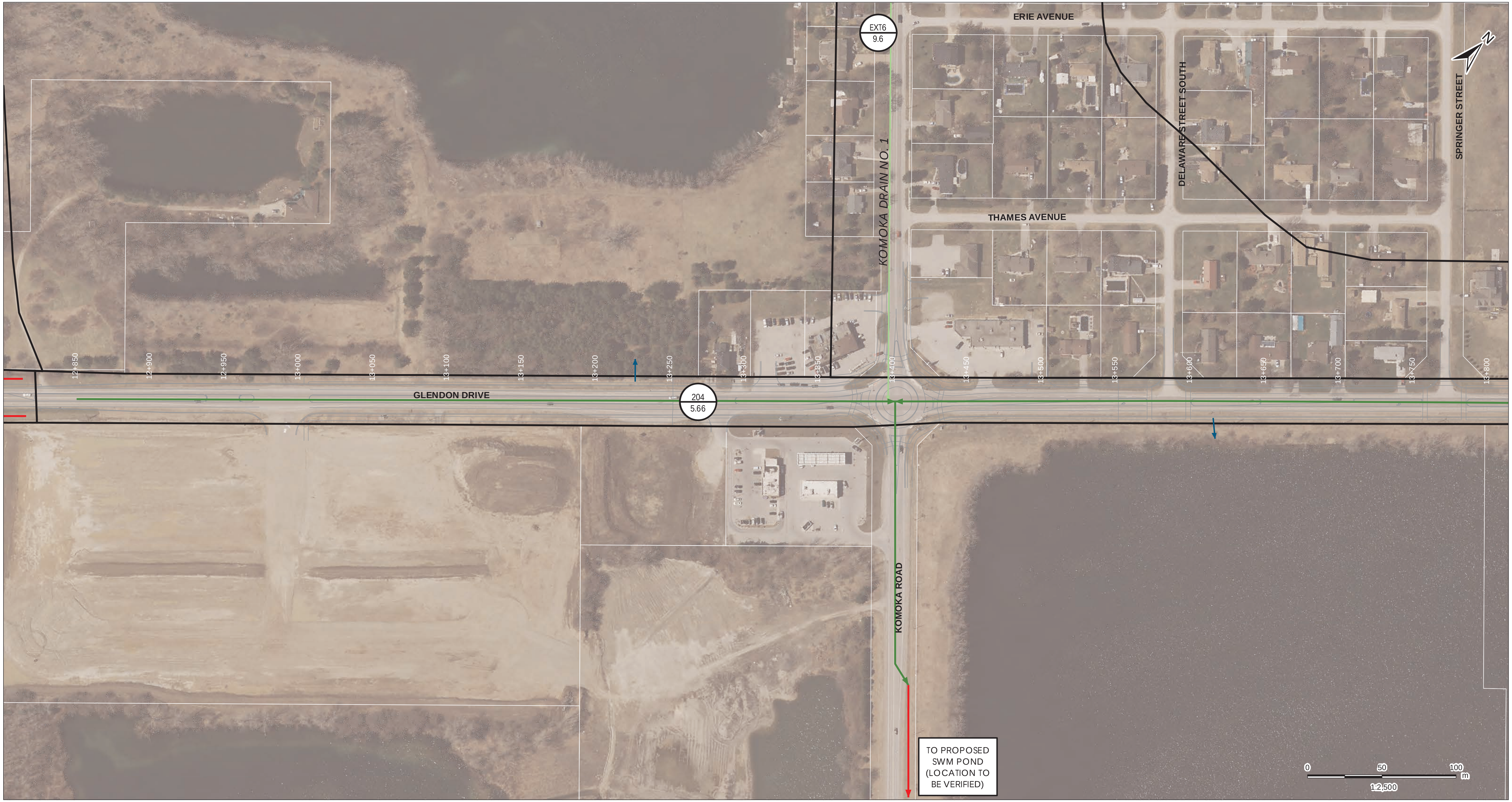
Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
3

Title
Proposed Drainage

V:\01614\active\161413164\design\drawing\GIS\MXD\Storm\161413164_Fig2_ProposedDrainage.mxd
Revised: 2017-01-09 By: kbuchanan



January 2017
161412164

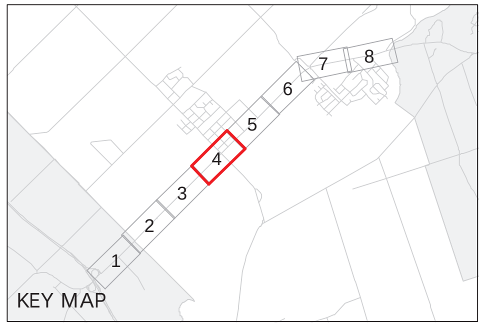
Stantec

Legend

NOTE

Retained Existing Culvert	Flow Direction	Watercourse (Permanent)
Proposed Culvert	Drainage Catchment	Watercourse (Intermittent)
Retained Existing Pipe	⊖ Drainage Catchment ID Area (ha)	Municipal Boundary
Proposed Storm Sewer		
Proposed Enhanced Ditch		
Proposed Infiltration Measures		

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2016.
3. 2015 orthoimagery used under license with Middlesex Centre, 2016.



Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.

4

Title

Proposed Drainage

V:\01614\active\161413164\design\drawing\GIS\MXD\Storm\161413164_Fig2_ProposedDrainage.mxd
Revised: 2017-01-09 By: kbuchanan

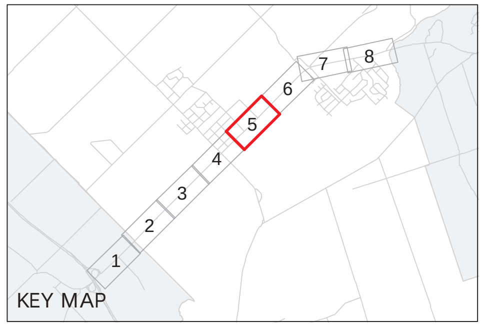
January 2017
161412164

Legend

NOTE

- Retained Existing Culvert
- Proposed Culvert
- Retained Existing Pipe
- Proposed Storm Sewer
- Proposed Enhanced Ditch
- Proposed Infiltration Measures
- Flow Direction
- Drainage Catchment
- Drainage Catchment ID Area (ha)
- Watercourse (Permanent)
- Watercourse (Intermittent)
- Municipal Boundary

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2016.
3. 2015 orthoimagery used under license with Middlesex Centre, 2016.



KEY MAP

Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.

5

Title

Proposed Drainage

V:\01614\active\161413164\design\drawing\GIS\MXD\Storm\161413164_Fig2_ProposedDrainage.mxd
Revised: 2017-01-09 By: kbuchanan

January 2017
161412164

Legend

NOTE

Retained Existing Culvert

Proposed Culvert

Retained Existing Pipe

Proposed Storm Sewer

Proposed Enhanced Ditch

Proposed Infiltration Measures

Flow Direction

Drainage Catchment

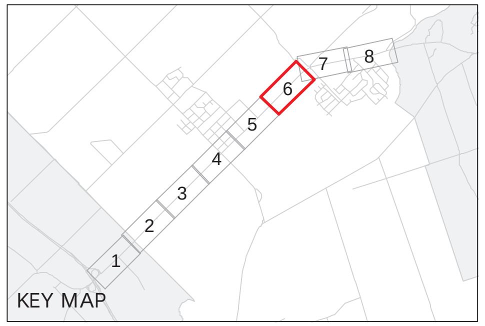
Drainage Catchment ID
Area (ha)

Watercourse (Permanent)

Watercourse (Intermittent)

Municipal Boundary

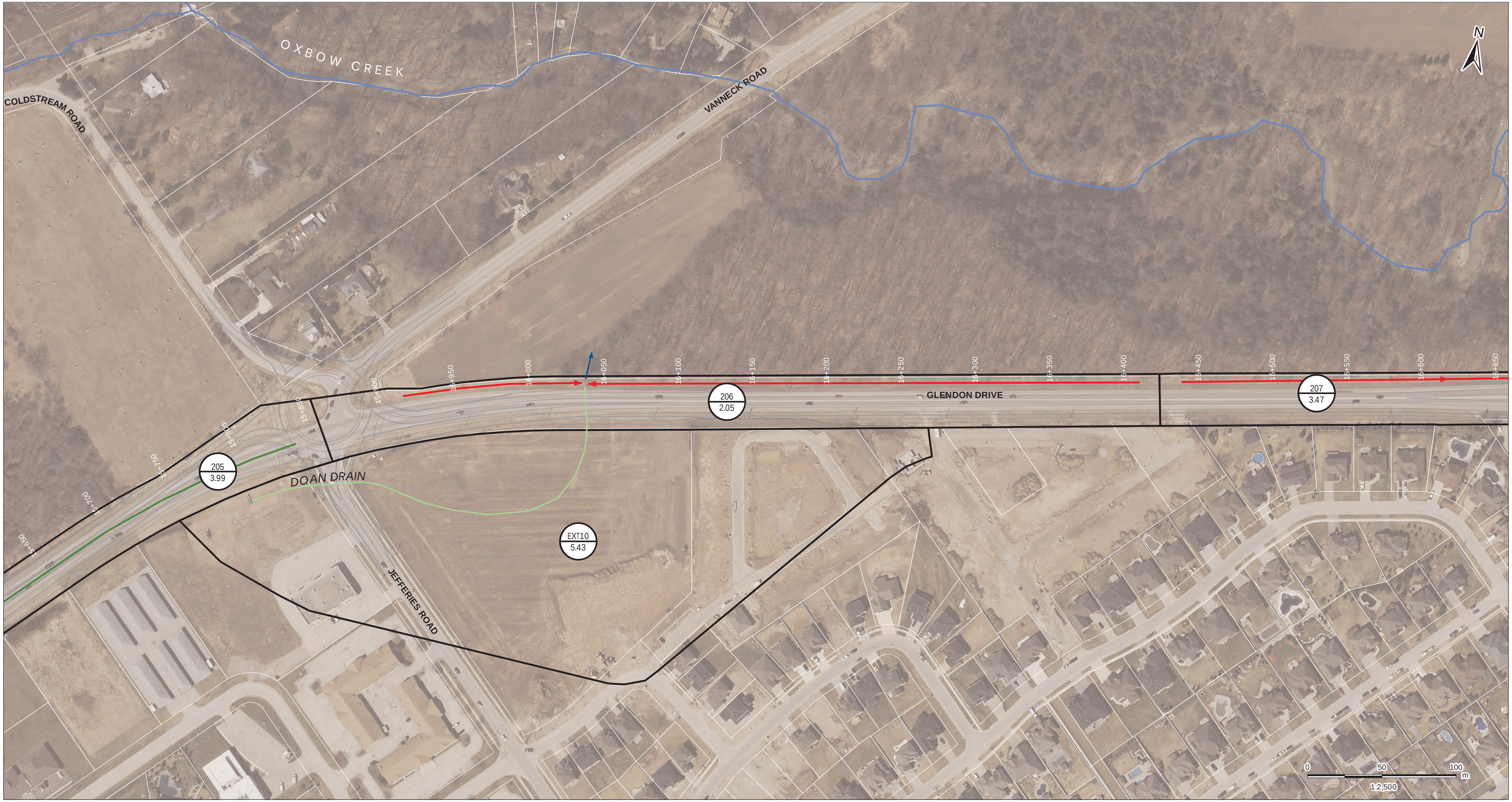
Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2016.
3. 2015 orthoimagery used under license with Middlesex Centre, 2016.



Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
6

Title
Proposed Drainage



V:\01614\active\161413164\design\drawing\GIS\MXD\Storm\161413164_Fig2_ProposedDrainage.mxd
Revised: 2017-01-09 By: kbuchanan

January 2017
161412164

Stantec

Legend

NOTE

— Retained Existing Culvert

— Proposed Culvert

→ Retained Existing Pipe

→ Proposed Storm Sewer

→ Proposed Enhanced Ditch

//////// Proposed Infiltration Measures

→ Flow Direction

▭ Drainage Catchment

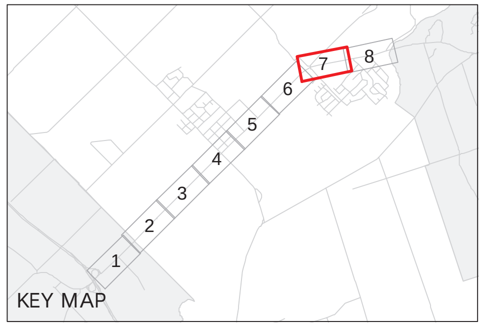
⊖ Drainage Catchment ID Area (ha)

— Watercourse (Permanent)

- - Watercourse (Intermittent)

▭ Municipal Boundary

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2016.
3. 2015 orthoimagery used under license with Middlesex Centre, 2016.



Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.

7

Title

Proposed Drainage

V:\01614\active\161413164\design\drawing\GIS\MXD\Storm\161413164_Fig2_ProposedDrainage.mxd
Revised: 2017-01-09 By: kbuchanan

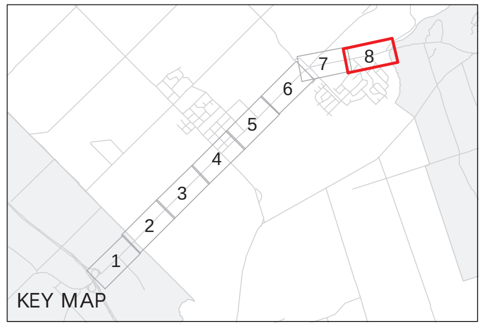
January 2017
161412164

Stantec

Legend

NOTE
- Retained Existing Culvert
- Proposed Culvert
- Retained Existing Pipe
- Proposed Storm Sewer
- Proposed Enhanced Ditch
- Proposed Infiltration Measures
- Flow Direction
- Drainage Catchment
- Drainage Catchment ID
  Area (ha)
- Watercourse (Permanent)
- Watercourse (Intermittent)
- Municipal Boundary

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2016.
3. 2015 orthoimagery used under license with Middlesex Centre, 2016.



Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.

8

Title

Proposed Drainage

C.3 MUNICIPAL MAINTENANCE REPORT

To: Nelson Oliveira
London ON Office

From: Dan Vucetic
London ON Office

File: 161413164

Date: September 6, 2016

Reference: Glendon Drive Streetscape EA
Servicing Infrastructure Requirements

INTRODUCTION

A preliminary investigation of existing and future servicing infrastructure requirements along the corridor was undertaken to identify any additional corridor impacts with respect to land acquisition and easements. Future servicing requirements were identified conceptually based on existing services, adjacent land uses and future development potential based on Official Plan land use. Infrastructure design guidelines for both Middlesex County and Middlesex Centre were reviewed, and alternate recommendations were developed to balance corridor impacts with respect to land requirements, maintenance of infrastructure, road reconstruction, and impacts to the transportation network. These recommendations are intended to provide a general framework for municipal servicing along the corridor to meet future development needs and should be considered as general information only based on the information available at the time of this assessment. Further review and refinement of servicing options, including confirmation of system sizing should be undertaken during future detailed design phases.

CORRIDOR CROSS-SECTIONS

Future improvements along Glendon Drive will consist of multiple cross-sections based on the transportation needs identified along the corridor. The corridor will consist of 4 typical cross-sections as identified below:

1. A three(3) lane rural cross-section between Highway 402 and Komoka Road;

2. A four (4) lane plus turn lane with sidewalks and median urban cross-section west of Komoka Road easterly to Jeffries Road;

3. A four (4) lane urban cross-section without median and with a single multi-use path between Jeffries Road and Kilworth Park Drive; and

4. A three (3) lane cross rural cross section between Kilworth Park Drive and the Thames River Bridge.

Typical cross-sections for Glendon are shown on Figures 1 to 3 and described in further detail below as they apply to servicing infrastructure.

3-LANE RURAL

A widened rural cross section is proposed for this portion of Glendon Drive located west of Komoka Road between Highway 402 and the Bella Lago future residential development.

Similar to existing conditions, runoff from the Glendon Drive right-of-way (ROW) is collected and conveyed by proposed roadside ditches to the Highway 402 interchange. The interchange drainage infrastructure conveys the runoff to the Highway 402 roadside ditch. Therefore there will be no future requirements to have storm sewers within the corridor for this portion of Glendon Drive. However, water and sanitary servicing infrastructure will be required in order to service 75 ha of future Employment Lands west of Komoka Road. The watermain will be located on the north side of Glendon Drive at standard location and depth. The proposed location would ensure that future watermain maintenance results in a minimized corridor restoration cost and disturbance to traffic.

Sanitary servicing infrastructure within the Glendon right-of-way is likely to include both a sanitary trunk sewer as well as a forcemain as existing sanitary infrastructure and topography at Glendon Drive West of Komoka Road makes it difficult to service the entire area via a gravity sewer due to the required depth. It is likely that the area west of Komoka Road will require pump station(s) to split flows in order to minimize the depth of the sanitary trunk sewer. Without a pumping station, the sanitary trunk sewer would be more than 10 m deep spanning approximately 500 m due to a highpoint 1.5 km west of Komoka Road. Therefore, for conceptual design purposes, a shallower trunk sewer with a separate forcemain is shown within the ROW as a preliminary worst case condition. The location of the sanitary sewer trunk and forcemain has been selected based on the maximum depth of sanitary sewer such that the open cut trench limits do not result in multiple lane closures during future maintenance.

As previously noted, the intent of this review is to assess potential servicing options, as they relate to the corridor. The preferred method for servicing will be subject to further detailed information being made available and preference by the Municipality with respect to overall servicing strategies and objectives. Review of the Guiding Principles developed as part of the Master Servicing Plan, which seeks as much as practical to simplify operations, will need to be considered as part of future planning and design activities. Should a deep gravity sewer be preferred (with corresponding downstream system improvements), placement of the sewer should allow for maintenance by means of trench box to mitigate lane closures as much as practical.

4-LANE PLUS TURN LANE URBAN - WEST OF KOMOKA ROAD EASTERLY TO JEFFRIES ROAD

An urban cross section is proposed for this portion of the Glendon Drive right-of-way. A proposed local storm sewer collects the minor flows from both Glendon Drive and external drainage areas.

Based on the existing infrastructure and future infrastructure requirements this urban cross-section is broken down into further sub-sections as noted below.

Section A

A widened urban cross section is proposed for this portion of Glendon Drive located approximately 425m west of Komoka Road extending easterly to Komoka Road. This section contains an existing 200mm diameter sanitary sewer and 150mm diameter watermain in the north side of the right-of-way. It is presumed that the watermain would be upsized in the future and extended throughout the corridor to the west to service the future developments, subject to further review to confirm servicing pressure and fire flow requirements. As discussed in the previous section future sanitary servicing infrastructure is accounted for herein by means of a gravity sewer with additional sanitary forcemain. Additionally, a storm sewer will be required to service the approximately 2 ha of corridor section. The location of the forcemain, sanitary and storm sewer has been preliminarily selected based on the maximum depth supported by the proposed right-of-way before disturbing the median surface infrastructure and closing east and westbound traffic lanes in the event of future maintenance and repair.

Section B

East of Komoka Road towards Springer Road there is existing sanitary infrastructure and water infrastructure in the north side of the right-of-way that will remain and for which future maintenance will not likely result in full road closure as the open cut trench limits should be maintained within a single lane. From Springer Road extending easterly towards Queen Street only an existing watermain will be present in the north side of the corridor which will likely not impact the Glendon Drive paved surface. Further east from Queen Street to Jeffries Road the existing watermain in the north side of the right-of-way may be twinned at some future time. As a result, provisions have been made in selecting the location of this future watermain to minimize open trench impact to a single traffic lane during construction or for maintenance works.

East of Komoka Road to Queen Street the proposed urban cross section will likely have a storm sewer on the south side of the corridor, the depth and size of which will likely be significant. This is due to the need to convey a portion of approximately 45 ha of external drainage area north of Glendon Drive along the corridor, to outlet to a future SWM pond south of Glendon Drive in the general vicinity of Komoka Road. The depth of this storm sewer and location has been selected such that the trench open cut limits are maximized utilizing full width of right-of-way while limiting road restoration costs by reducing impact to median surface infrastructure during future maintenance requirements. The location selected is anticipated to only impact the two eastbound traffic lanes, and therefore traffic flow could be maintained in the remaining two westbound lanes.

Similarly the location and depth of a proposed future sewer east of Queen Street towards Jefferies Road was selected to mitigate long-term maintenance related impacts to traffic. This storm sewer would be in the south-side of the ROW servicing an approximate 4 ha drainage area of the Glendon Drive corridor, conveying flows to a future storm sewer within the Black development property south of Glendon Drive.

3-LANE RURAL CROSS SECTION WITH MULTI-USE TRAIL (SOUTH) BETWEEN JEFFERIES ROAD AND KILWORTH PARK DRIVE; 3-LANE RURAL CROSS SECTION (WITHOUT MULTI-USE TRAIL) EAST OF KILWORTH PARK DRIVE

A rural road cross section is proposed for this section of Glendon Drive. There are no water or sanitary services, or piped stormwater infrastructure anticipated within this section of the corridor. See the proposed drainage conditions memorandum in Appendix C.1 for information on the storm drainage servicing strategy.

Reference: Glendon Drive Streetscape EA
Servicing Infrastructure Requirements

CONCLUSIONS

The preliminary servicing infrastructure locations as described above were developed to illustrate that the Glendon Drive ROW has sufficient width to accommodate the anticipated future infrastructure requirements.

As previously noted, the typical infrastructure locations have been selected with long-term maintenance in mind such that corridor restoration costs and traffic disturbances may be minimized. The proposed corridor cross-sections should be reviewed as design proceeds and updated based on actual design depth and sizes.

STANTEC CONSULTING LTD.

Dan Vucetic, MESc., EIT
Engineering Intern, Community Development
Phone: 519-675-6655
Dan.Vucetic@stantec.com

Attachment: Figures 1-3 Servicing Infrastructure Glendon Drive Corridor

c.

APPENDIX D: NATURAL ENVIRONMENT

Glendon Drive Corridor

Old River Road

Terrestrial Ecosystems Existing Conditions Report for Glendon Drive Streetscape Improvements in Middlesex Centre

Prepared for:
Municipality of Middlesex Centre
10277 Ilderton Rd,
Ilderton, ON N0M 2A0

Prepared by:
Stantec Consulting Ltd.
49 Frederick St.
Kitchener, Ontario N2H 6M7

September 10, 2015

Sign-off Sheet

This document entitled *Terrestrial Ecosystems Existing Conditions Report for Glendon Drive Streetscape Improvements in Middlesex Centre* was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Municipality of Middlesex Centre (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by ____
(signature)

Janice Ball, B.Sc., Terrestrial Ecologist

Reviewed by ____
(signature)

Nicole Kopysh, Project Manager/Regional Technical Leader (Central Canada), Terrestrial Ecosystems - Wildlife

Reviewed by ____
(signature)

Sean Spisani, B.Sc., ERGC, Senior Ecologist

Table of Contents

LIST OF TABLES

LIST OF FIGURES (APPENDIX A)

LIST OF APPENDICES

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by the Municipality of Middlesex Centre to complete this Terrestrial Ecosystems Existing Conditions Report to guide future streetscape improvements along Glendon Drive in Middlesex Centre, Ontario. For this report, the Study Area includes the area within 120 m of the Glendon Drive right-of-way (ROW), extending from Highway 402 to the Thames River (**Figures 1-8, Appendix A**).

The objectives of this report were to:

- conduct a background review of the Study Area to identify species at risk, provincially rare species and provincially designated natural heritage and aquatic features that may be present;
- document existing vegetation communities, aquatic features, and wildlife habitat; and
- describe the sensitivities of vegetation communities and wildlife habitats, including an assessment of habitat suitability for potential species at risk (SAR) and provincially rare species.

2.0 METHODS

2.1 BACKGROUND REVIEW

The following information sources were accessed to obtain information about known natural heritage and aquatic features as well as species at risk and species of conservation concern occurrences:

- Natural Heritage Information Centre (NHIC) database (last updated February 18, 2015);
- Ontario Ministry of Natural Resources and Forestry's (MNRF) Land Information Ontario (LIO) digital mapping (LIO, 2014);
- Fisheries and Ocean's Canada (DFO) aquatic species at risk (SAR) mapping (DFO, 2014);
- Middlesex County Official Plan (2006) and Middlesex Natural Heritage Systems Study (2014)
- The Ontario Reptile and Amphibian Atlas (ORAA; Ontario Nature, 2015);
- Ontario Breeding Bird Atlas (OBBA; Cadman et al, 2007); and
- Atlas of the Mammals of Ontario (AMO; Dobbyn, 1994).

The Project is located in MNRF's Aylmer District. A data request was submitted to the Aylmer District MNRF on September 23, 2015. The data request is included in **Appendix B**.

2.2 FIELD DATA COLLECTION

Natural heritage features examined for this report included vegetation communities, vegetation species, areas of potential candidate significant wildlife habitat and aquatic habitat. All surveys were conducted from the edge of the ROW.

2.2.1 Vegetation Communities

Vegetation communities were classified according to the Ecological Land Classification (ELC) for Southern Ontario field guide (Lee et al., 1998), with 2008 updates. Classification was completed to the finest level of resolution possible (Vegetation Type). Vegetation communities were first identified on aerial imagery and then checked in the field.

A roadside assessment of vegetation communities was conducted on September 22, 2015 by a qualified Stantec ecologist. Field investigations took place within the ROW due to property access limitations. All plant species observed during field investigation were recorded.

Flora nomenclature was based on the Ontario Plant List (Newmaster et al. 1998); however, many updates to genera, specific epithets and family names have been made to reflect recent taxonomic revisions. The primary source of these updates is Michigan Flora Online (2011). For Ontario species not present in the Michigan Flora, the NHIC (2010) was consulted to obtain an updated name if applicable.

The provincial status of all plant species is based on Newmaster et. al (1998), with updates from NHIC (2010). Identification of potentially sensitive native plant species is based on their assigned coefficient of conservatism (CC) value, as determined by Oldham et al. (1995). This CC value, ranging from 0 (low) to 10 (high), is based on a species' tolerance of disturbance and fidelity to a specific natural habitat. Species with a CC value of 9 or 10 generally exhibit a high degree of fidelity to a narrow range of habitat parameters.

Provincial significance of vegetation communities was based on the rankings assigned by the Natural Heritage Information Centre (NHIC, 2010).

2.2.2 Wildlife Habitat Assessment

A wildlife habitat assessment was conducted during the vegetation survey. Targeted habitat features included, but were not limited to snake hibernacula, stick nests, vernal pooling, seepage areas and turtle habitat.

Results of the vegetation community assessment and wildlife habitat assessment were used to evaluate the potential for candidate significant wildlife habitat to occur in the Study Area in accordance with the categories and criteria outlined in the Significant Wildlife Habitat (SWH) Technical Guide (MNR, 2000) and the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNR, 2015). A Geographic Information Systems (GIS) analysis was also used to assess SWH criteria that contain minimum size or distance thresholds.

Categories include: seasonal concentration areas, rare vegetation communities or specialized habitat for wildlife, habitat for species of conservation concern, and animal movement corridors. Candidate significant wildlife habitat types within each of these categories and the habitat requirements for each type are provided in **Appendix E.**

2.2.3 Aquatic Assessment

The aquatic habitat assessment conducted on September 17, 2015, assessed the watercourses identified by LIO (LIO, 2015) within the Study Area. Field investigations took place within the road ROW due to property access limitations. Habitat data consisted of a general description of the watercourse, (i.e., dimensions, bank stability, morphology) and identification of features that typically contribute to fish habitat (i.e., in-water and riparian cover, substrate). The data were used to characterize aquatic habitat within the Study Area and to identify potential fisheries and aquatic habitat constraints. Fish collections were not completed as part of the assessment.

Watercourses were photographed and *in situ* water quality parameters (dissolved oxygen, conductivity, pH and temperature) were measured and recorded.

A short section of the Thames River is within the 120 m buffer of the proposed streetscape improvement boundary; however it is outside of the Project Limits. Due to the availability of background data and that the river is not within the Project Limits, the Thames River was not assessed as part of this survey.

3.0 EXISTING ECOLOGICAL CONDITIONS

3.1 BACKGROUND DATA

3.1.1 Physiography

The Study Area is located in Ecodistrict 7E-6, a physiographic unit that extends from the Horseshoe Moraines west of London, Ontario to the Mount Elgin Ridges south of Cambridge, Ontario (Henson and Brodribb, 2005). The Ecodistrict is characterized by till plains, till moraines and spillways (Henson and Brodribb, 2005).

3.1.2 Vegetation

Agricultural lands comprised 79% of the ecodistrict (Henson and Brodribb, 2005). Approximately 13% of the Ecodistrict is natural cover, comprised of 60% deciduous forest and 27% wetland (mainly swamps) (Henson and Brodribb, 2005). Other land uses include gravel pits and quarries, settlement and other developed lands (Henson and Brodribb, 2005).

3.1.3 Significant Natural Areas

A review of NHIC and LIO databases indicates that the Komoka/South Strathroy Creek Provincially Significant Wetland (PSW), the Komoka Park Reserve Area of Natural and Scientific Interest (ANSI), the Komoka Park PSW Complex and Komoka Provincial Park are all within the Study Area boundary (**Figures 1-8, Appendix A**). Stantec is currently awaiting a response from the Ministry of Natural Resources and Forestry (MNRF) to determine if there are any addition significant natural areas present within the Study Area (**Appendix B**).

3.1.4 Species at Risk and Provincially Rare Species

A review of the available background information identified the following records of provincial species at risk (endangered, threatened or special concern) and provincially rare (S1-S3) species that may occur within the Study Area.

3.1.4.1 Wildlife Species

The Ontario Reptile and Amphibian Atlas (ORAA; Ontario Nature, 2015), Ontario Breeding Bird Atlas (OBBA; Cadman et al, 2007) and the Atlas of the Mammals of Ontario (AMO; Dobbyn, 1994) were accessed to compile a list of all wildlife species with ranges that overlap with the Study Area (**Appendix C**), including provincial species at risk (endangered, threatened or special concern) and provincially rare (S1-S3) species. The wildlife atlas range maps are relatively coarse in nature and do not offer precise locations or information on concentrations/densities of records; e.g., the OBBA records are provided in 10 km by 10 km square grids.

The NHIC database provides more precise mapping for wildlife species at risk and provincially rare wildlife species than the atlases (1 km by 1 km squares), and is a better indicator of occurrence of significant species, particularly when used in combination with MNRF correspondence (pending). A complete list of wildlife species at risk and provincially rare wildlife species identified within the range of the Study Area through the NHIC background review is also included in **Appendix C**.

A total of 2 butterflies, 12 amphibians, 10 reptiles, 109 birds, 42 mammals were identified.

Of these species records, 7 are provincially endangered and 9 are threatened species and therefore receive species and habitat protection under the Endangered Species Act of Ontario (ESA), 2007. Threatened and endangered species include: Spiny Softshell, Blanding's Turtle, Queen Snake, Eastern Hog-nosed Snake, Least Bittern, Chimney Swift, Bank Swallow, Barn Swallow, Yellow-breasted Chat, Henslow's Sparrow, Bobolink, Eastern Meadowlark, Small-footed Myotis, Little Brown Myotis, Northern Myotis and American Badger. Species at risk designated as special concern and/or provincially rare species are not afforded protection under the ESA.

An additional 13 are species of conservation concern (i.e. those that are ranked S1-S3 or are provincial species of special concern). This includes 2 butterflies, 3 reptiles, 7 birds and 1 mammal as detailed in **Appendix C**. Habitat for species of conservation concern is a category of significant wildlife habitat, and presence of these species and their habitat is assessed in **Section 3.2.3**.

3.1.4.2 Vascular Plant Species

A complete list of vascular plant species at risk and provincially rare wildlife species identified within the range of the Study Area through the NHIC background review is provided below.

- Green Dragon (Arisaema dracontium) – S3
- Tuberous Indian-plantain (Arnoglossum plantagineum) – S3
- Schweinitz's Sedge (Carex schweinitzii) – S3
- Rigid Sedge (Carex tetanica) – S3
- Hairy-fruited Sedge (Carex trichocarpa) – S3
- **American Chestnut (Castanea dentata) – endangered**
- **Eastern Flowering Dogwood (Cornus florida) – endangered**
- Middlesex Frosted Hawthorn (Crataegus perjucunda) – S1?
- Lowland Brittle Fern (Cystopteris protrusa) – S2
- Blue Ash (Fraxinus quadrangulata) – S2?
- Eastern Green-violet (Hybanthus concolor) – S2
- Yellow Stargrass (Hypoxis hirsuta) – S3
- Sharp-fruited Rush (Juncus acuminatus) – S3
- Purple Twayblade (Liparis liliifolia) – S2
- Hoary Puccoon (Lithospermum canescens) – S3
- Soft-hairy False Gromwell (Lithospermum parviflorum) – S2
- Scarlet Beebalm (Monarda didyma) – S3
- Spotted Beebalm (Monarda punctata) – S1
- Slim-flowered Muhly (Muhlenbergia tenuiflora) – S2

- Cleland's Evening Primrose (Oenothera clelandii) – S1
- False Tomentose Balsam Groundsel (Packera paupercula var. pseudotomentosa) – S2S3
- Bristly Buttercup (Ranunculus hispidus var. hispidus) – S3
- Great Plains Ladies'-tresses (Spiranthes magnicamporum) – S3?

Two of these species, American Chestnut and Eastern Flowering Dogwood, are endangered and therefore protected by the ESA (2007). The remaining species are not afforded protection under the ESA; i.e., they are species at risk designated as special concern and/or provincially rare species and are addressed under the assessment of significant wildlife habitat in **Section 3.2.3**.

Endangered tree species whose geographic range overlaps with the Study Area that were not identified in the NHIC database include Butternut (*Juglans cinerea*) and Red Mulberry (Morus rubra) (Farrar, 1995).

3.1.4.3 Aquatic Species

LIO digital mapping (LIO, 2015) indicates the presence of four watercourses within the Study Area (Oxbow Creek, Unnamed Tributary to Oxbow Creek, Komoka Creek and the Thames River (**Figure 9, Appendix A**)). Details for each watercourse are summarized below, including the presence of aquatic species at risk according to DFO aquatic SAR mapping (DFO, 2014). A summary table for all aquatic SAR is included in **Table 3.1**, below the watercourse summaries.

Oxbow Creek

According to DFO aquatic SAR mapping (DFO, 2015), the upper reaches of Oxbow Creek (upstream of the Study Area) are mapped for listed mussel species and may be one or more of Rainbow (*Villosa iris*), Kidneyshell (*Ptychobranchus fasciolaris*), Mapleleaf (*Quadrula quadrula*), Rayed Bean (*Villosa fabalis*), Round Pigtoe (*Pleurobema sintoxia*) and Salamander Mussel (*Simpsonaias ambigua*). MNRF's Natural Heritage Information Centre (NHIC) online database (NHIC, 2015) only showed Rainbow (*Villosa iris*) as being a potential SAR in Oxbow Creek. Spotted Sucker (*Minytema melanops*) is identified as occurring in Oxbow Creek however it is not a protected species. The provincial and federal status of species listed on the DFO's mapping for the UTRCA is provided in Table 1.

The majority of Oxbow Creek is classified as a coldwater system. LIO (2015) data suggests that Oxbow Creek serves as habitat for White Sucker (*Catostomus commersonii*), Brook Stickleback (*Culaea inconstans*), Northern Hog Sucker (*Hypentelium nigricans*), Hornyhead Chub (*Nocomis biguttatus*), Common Shiner (*Luxilus cornutus*), Rainbow Trout (*Oncorhynchus mykiss*), and Largemouth Bass (*Micropterus salmoides*).

Unnamed Tributary to Oxbow Creek

There were no SAR records found for the Unnamed Tributary to Oxbow Creek. This tributary is a Constructed Drain and is classified as a Type F Drain (Intermittent) starting at Glendon Drive and flowing north.

Komoka Creek

According to DFO's SAR mapping (DFO, 2015) Pugnose Minnow (*Opsopoeodus emiliae*) and/or Silver Shiner (*Notropis photogenis*) may occur in Komoka Creek. MNRF's NHIC online database did not show either of these species as potential SAR at this location (NHIC, 2015). Holm et al., (2009) states that Pugnose Minnow prefer warmwater, vegetated, slow-moving flows with bottoms of silt sand or gravel; however, the species is considered extirpated from the Thames River (COSSARO, 2012 and COSWEIC 2012) Silver Shiner prefer cool to warm, clear waters of streams, over bottoms of clean gravel, cobble and boulders (Holm et al., 2009).

The majority of Komoka Creek is a coldwater system (UTRCA, 2012a and 2012b) and within the Study Area, LIO data indicate it is a constructed drain (Crow Creek Drain) and with a DFO Class D designation (permanent flow with coldwater thermal regime and sensitive species or communities). LIO (2015) data suggests that Komoka Creek serves as habitat for White Sucker (*Catostomus commersonii*), Brook Stickleback (*Culaea inconstans*), Pearl Dace (*Margariscus margarita*), Common Shiner (*Luxilus cornutus*), Rainbow Trout (*Oncorhynchus mykiss*), Bluntnose Minnow (*Pimephales notatus*), Brown Trout (*Salmo trutta*), Brook Trout (*Salvelinus fontinalis*) and Smallmouth Bass (*Micropterus dolomieu*).

Thames River

According to DFO's mapping (DFO, 2015) and the MNRF's NHIC online database, the Thames River supports Eastern Sand Darter (*Ammocrypta pellucida*) and is also mapped as critical habitat (NHIC, 2015). Kidneyshell (*Ptychobranchus fasciolaris*), Mapleleaf (*Quadrula quadrula*), Rainbow (*Villosa iris*), Rayed Bean (*Villosa fabalis*), Round Pigtoe (*Pleurobema sintoxia*) and Salamander Mussel (*Simpsonaias ambigua*) may occur in the Thames River, which is also mapped as critical habitat for mussels.

The Thames River is a warmwater system and supports a diversity of large and small-bodied fish species including Yellow Perch (*Perca flavescens*), Largemouth Bass (*Micropterus salmoides*), Smallmouth Bass (*Micropterus dolomieu*), Bullhead species (*Ictaluridae),* Sunfish species (*Centrarchidae*), Longnose Gar (*Lepiososteus osseus*), Emerald Shiner (*Notropis atherinoides*), Ghost Shiner (*Notropis buchanani*), Gizzard Shad (*Dorosoma cepedianum*) and Redhorse species (*Moxostoma*).

Table 3.1 : Aquatic SAR Status Summary

Fish Species	**COSSARO Status**	**SARA[α] Status and Schedule**	**COSEWIC Status**
Spotted Sucker (*Minytema melanops*)	Special Concern	Schedule 1 Special Concern	Special Concern
Eastern Sand Darter (Ammocrypta pellucida)	Endangered	Schedule 1 Threatened	Threatened
Pugnose Minnow (*Opsopoeodus emiliae*)	Threatened	Schedule 1 Special Concern	Threatened
Silver Shiner (*Notropis photogenis*)*	Threatened	Schedule 3 Special Concern	Threatened
Mussel Species	**COSSARO Status**	**SARA[α] Status and Schedule**	**COSEWIC Status**
Kidneyshell (*Ptychobranchus fasciolaris*)	Endangered	Schedule 1 Endangered	Endangered
Mapleleaf (*Quadrula quadrula*)	Threatened	Schedule 1 Endangered	Endangered
Rainbow (*Villosa iris*)	Threatened	Schedule1 Endangered	Endangered
Rayed Bean (*Villosa fabalis*)	Endangered	Schedule 1 Endangered	Endangered
Round Pigtoe (*Pleurobema sintoxia*)	Endangered	Schedule 1 Endangered	Endangered
Salamander Mussel (*Simpsonaias ambigua*)	Endangered	Schedule 1 Endangered	Endangered

* under consideration for listing on SARA Schedule 1

Stantec is awaiting a response from the MNRF to determine whether there are any additional species at risk or provincially rare species that are of concern in proximity to the Study Area (**Appendix B**).

3.2 FIELD INVESTIGATION RESULTS

3.2.1 Vegetation Communities

The majority of the Study Area was agricultural with residences and commercial developments occurring along Glendon Road. The area also consisted of scattered isolated woodlands as well as some larger tracts of vegetation, predominately associated with the Komoka/South Strathroy Creek PSW and the Komoka Park Reserve ANSI.

Vegetation communities identified within the Study Area during the assessment, included forest, woodland, thicket, meadow and open water community classes. All vegetation communities, agricultural lands and developments are summarized in **Table 3.2** and mapped on **Figures 1-8, Appendix A**. A list of all plant species observed during the roadside field investigation is included in **Appendix D**.

Table 3.2 Summary of Vegetation Communities

CODE	DESCRIPTION	Vegetation Characteristics
Forest		
FOCM6-1	Dry – Fresh White Pine Naturalized Coniferous Plantation	• This community was a very small naturalized White Pine plantation associated with a residential property.
FOM	Mixed Forest	• The largest of the two FOM communities was located on the north side of Glendon Drive, at the east end of the Study Area. The community was setback from the roadside, and it was therefore only assessed via aerial photo interpretation. • The smaller FOM community was also at the east end of the Study Area on the south side of Glendon Drive. Tree species consisted of White Pine, Black Walnut, Red Pine and Norway Spruce; likely planted.
FOD	Deciduous Forest	• The FOD communities were setback from the roadside, and individual species could not be easily identified. Aerial photo interpretation was used to delineate this community. • The FOD communities along the Thames River were comprised of lowland tree species including Willow, Poplar and Black Walnut.
FODM1-1	Dry – Fresh Red Oak Deciduous Forest	• Most abundant natural community within the Study Area, varying from mid-aged to mature. • Dominated by Red Oak in the canopy with

CODE	DESCRIPTION	Vegetation Characteristics
		varying abundances of White Oak, Bur Oak, Sugar Maple and Black Cherry as associates. • Sugar Maple was most abundant as an associate at the eastern edge of the Study Area. • Sub-canopy varied between FODM1-1 communities with Black Cherry or Sugar Maple dominating.
FODM7-7	Fresh – Moist Manitoba Maple Lowland Deciduous Forest	• Part of the Komoka/South Strathroy Creek PSW. • Riparian community dominated by Manitoba Maple in the canopy with Bur Oak, Willow and Poplar species as associates, varying in dominance. • Understory also dominated by Manitoba Maple, with Black Walnut and Basswood as associates. • Oak species began to dominate the upland edges of this community. • Garlic Mustard has become established south of Glendon Drive, west of Komoka Creek.
FODM11	Naturalized Deciduous Hedgerow	• Naturalized deciduous hedgerows occurred throughout the Study Area. They varied in composition from native species (Hackberry, Manitoba Maple, Eastern Cottonwood, Sugar Maple and Oak) to non-native species (Siberian Elm).
Woodland		
WOD	Deciduous Woodland	• This linear community consisted of Black Locust. • It was located along the south side of Glendon Drive, near the Thames River.
WODM4-4	Dry – Fresh Black Walnut Deciduous Woodland	• Canopy of both WODM4-4 communities in the Study Area was dominated exclusively by young to mid-aged Black Walnut. • Understory of the larger WODM4-4 community was also dominated by Black Walnut with occasional Large-fruited Hawthorn and an abundance of Riverbank Grape. Canada Goldenrod dominated the dense ground layer, along with grasses and vines.
WODM5-1	Fresh – Moist Poplar Deciduous Woodland	• This community was located within lands that have been acquired by the government and are designated to be part of Komoka Provincial Park (MNR, 2010). • It was a successional community that varied between meadow, thicket and woodland. • Woodland cover was comprised of Eastern Cottonwood and Trembling Aspen in the canopy. • Thicket cover was comprised of Trembling Aspen saplings and invasive Autumn Olive and

CODE	DESCRIPTION	Vegetation Characteristics
		Common Buckthorn. • Meadow cover was relatively dense with Canada Goldenrod and grass species dominating. • A small Narrow-leaved Cattail inclusion was located at the roadside within this community; no standing water was observed.
Thicket		
THDM2-11	Hawthorn Deciduous Shrub Thicket	• This community was dominated by Hawthorn with occasional American Elm. The ground layer was comprised of asters, goldenrod and grasses. The tributary to Oxbow Creek was located in the center of this community, however it was dry at the time of survey.
Meadow		
ME	Meadow	• This community is a cultural meadow associated with two dug ponds. The majority of the community could not be observed from the roadside, therefore this general meadow classification was used.
MEG	Graminoid Meadow	• Several areas of graminoid meadow of varying sizes were located in the Study Area. • Meadows were dominated by grasses with varying abundances of forb species. Forb species were comprised of typical cultural meadow species including goldenrods, Queen Ann's Lace and asters.
Open Aquatic		
OA	Open Aquatic Community Series	• Several open aquatic features of varying sizes occurred within the Study Area; all appeared to be constructed ponds, some of which were surrounded by planted Cottonwood. • The largest pond was approximately 15 m from the roadside. Only one other pond (directly across the road) occurred within proximity to the road (approximately 30 m away). • Komoka Park Wetland complex is located south of the largest pond. • The Former OA community refers to a decommissioned golf driving range pond that has been filled in.
Agricultural		
AG	Agriculture	• Aerial photo interpretation showed lands that appeared to agricultural, however some areas could not be viewed from the roadside. These communities were designated as AG. • One small hay field was present within the Study

CODE	DESCRIPTION	Vegetation Characteristics
		Area labelled Ag – Hay.
OAGM1	Annual Row Crops	• Agriculture consisted mainly of soy and corn. There was one large field with cabbage and potatoes.
OAGM4	Open Pasture	• One field of open pasture was present on the south side of Glendon Drive, west of the Komoka/South Strathroy Creek Provincially Significant Wetland.
TAGM1	Coniferous Plantation	• Three coniferous plantations were located in the Study Area. A Scotch Pine plantation and two smaller White Pine plantations.
Constructed		
CVR	Residential	• Residential housing with manicured lawns, often with ornamental/non-native tree species
CVC	Commercial and Institutional	• Commercial properties with or without buildings, often with manicured lawns
CVI_1	Transportation	• Consists of Glendon Drive and all sideroads.
Non-ELC Communities		
HR	Hedgerow	• Consisted of un-naturalized hedgerows comprised of either deciduous or coniferous species; mainly non-native in origin.
?	Unknown	• This community could not be assessed from the roadside and aerial images could not easily be interpreted.

No rare or highly sensitive communities or plant species were encountered during field surveys.

3.2.2 Significant Natural Features

Forest (FOD) and woodland (WOD) communities were associated with the Komoka Park Reserve ANSI, Komoka Provincial Park, Komoka Park PSW Complex and the Komoka/South Strathroy Creek PSW (**Figures 1-8, Appendix A**).

Field investigations identified a fresh-moist lowland Manitoba Maple community (FODM7-7) within Komoka/South Strathroy Creek PSW. This community includes wetland indicator species and is expected to qualify as wetland according to the Ontario Wetland Evaluation System (OMNR, 2014). Vegetation investigations confirmed the presence of PSW in this area.

A deciduous forest community was also identified within the Komoka Park PSW Complex along the Thames River. This community was comprised of lowland tree species including willow, poplar and Black Walnut. Willow and poplar both have an affinity for moist soils and this community is expected to qualify as wetland according to the Ontario Wetland Evaluation System (OMNR, 2014). Vegetation investigations confirmed the presence of PSW in this area.

The Middlesex County Official Plan (2006; the OP) was reviewed to identify Significant Woodlands. Schedule C of the OP identifies Significant Woodlands in the Study Area (**Figures 1-8, Appendix A**). The identification and limits of Significant Woodlands can be refined through site specific study. The Natural Heritage Reference Manual (NHRM, 2010) provides guidance for identifying Significant Woodlands. Based on the NHRM, all woodland ELC units 4 ha in size or larger are expected to qualify as Significant Woodland. ELC types in the Study Area that may qualify as woodlands include: mixed forest (FOM), deciduous forest (FOD), deciduous woodland (WOD), thicket (THD) and plantation (TAG) types. Other factors such as community composition, diversity, age and function may also be considered when identifying Significant Woodlands.

The Middlesex Natural Heritage Systems Study (2014) identifies Significant Vegetation Patches and provides guidance for identifying preservation priorities. The Study Area is assessed using this criteria under separate cover (Tree Inventory and Preservation Report; Stantec, 2015).

3.2.3 Candidate Significant Wildlife Habitat

Candidate significant wildlife habitat (CSWH) pursuant to the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNR, 2015) was assessed using the ELC vegetation community and wildlife habitat assessment results and GIS analysis. Criteria include; (a) seasonal concentration areas, (b) rare or specialized habitat, (c) habitat for species of conservation concern, and (d) animal migration corridors. A description of the CSWH criteria and an assessment of the potential presence within the Study Area is provided in **Appendix E**. A summary of all candidate wildlife habitat identified through this assessment is provided in the text below.

The following candidate wildlife habitats may occur in the Study Area:

- <u>Bat Maternity Colonies:</u> Mature deciduous and mixed forest communities identified throughout the Study Area may provide habitat for bat maternity colonies.

- <u>Turtle Wintering Areas:</u> Any deep water pool areas within the Thames River may provide overwintering habitat for turtles.

- <u>Amphibian Breeding Habitat (Woodlands/Wetlands):</u> Open aquatic ponds may provide amphibian breeding habitat. Some of these occur within proximity to woodlands.

- <u>Habitat for Special Concern and Rare Wildlife Species:</u> Wildlife species habitat that may occur within the Study Area includes habitat for Common Nighthawk, Wood Thrush, Eastern Wood-Pewee, Golden-winged Warbler, Map Turtle, Snapping Turtle, Woodland Vole, Hackberry Emperor and Tawny Emperor.

3.2.4 Aquatic Habitat Assessment

Oxbow Creek

Oxbow Creek meanders just inside the northeast end of the Study Area through the Komoka Park Reserve ANSI. Oxbow Creek was assessed at Old River Road (northeast end of the Study Area) and at Vanneck Road (upstream of the Study Area). Oxbow Creek is a natural watercourse and is surrounded by forest.

The Old River Road Bridge is immediately upstream of the confluence with the Thames River. At this location, Oxbow Creek was dominated by riffle morphology. The substrate was comprised of cobble, boulder, gravel and sand. The mean watercourse wetted width was approximately 9 m and bankfull width was approximately 12 m. The maximum pool depth was 25 cm and mean water depth within in the vicinity of the bridge was 15 cm. The banks in this section of Oxbow Creek appeared to be stable as they are supported by vegetation and boulders. The riparian area of this reach was dominated by sycamore (*Platanus sp*.), Manitoba maple (*Acer negundo*) and staghorn sumac (*Rhus typhina*). In-water cover consisted of boulders. No fish were observed at this reach during field investigations; however, this section of the creek may provide spawning habitat for fish entering the creek from the Thames River.

At the Vanneck Road bridge Oxbow Creek was dominated by run morphology with some pools. Substrate was comprised of cobble, boulder, sand, gravel and clay. The mean watercourse wetted width was approximately 9 m and bankfull width was approximately 11 m. The maximum pool depth was 40 cm and mean water depth in the vicinity of the bridge was 25 cm. The majority of the creek banks in this reach were vegetated and stable. Throughout this reach, the riparian area was dominated by sycamore (*Platanus sp*.), staghorn sumac (*Rhus typhina*), virginia creeper (*Parthenocissus quinquefolia*) and river bank grape (*Vitis riparia*). In-water cover consisted of deep pools, overhanging vegetation, undercut banks and boulders. Cyprinids, Common Carp and darter species were observed from the bridge and creek banks during the field investigation. Based on field investigations, this section of Oxbow Creek most likely provides spawning, nursery and rearing habitat for some of the coldwater fish species known to occur in Oxbow Creek.

In situ water quality data recorded at Vanneck Road are provided in **Table 3.3**.

Unnamed Tributary to Oxbow Creek

An Unnamed Tributary to Oxbow Creek crosses Glendon Drive southwest of the Vanneck Road intersection (Figure 1). There was no channelized feature at the location mapped as a watercourse and the area was a meadow thicket. Within the Study Area, the unnamed Tributary to Oxbow Creek does not contain fish habitat.

Komoka Creek

Komoka Creek flows in a southerly direction within the Study Area (approximately 1.1 km west of Komoka Road) and then converges with the Thames River approximately 2.3 km downstream of Glendon Drive. At Glendon Drive Komoka Creek is dominated by run morphology. The substrates are comprised of gravel, sand and cobble. The mean watercourse wetted width was approximately 4.5 m and bankfull width was approximately 7 m. The maximum pool depth was 25 cm and mean water depth was 15 cm. The majority of the banks in this reach were vegetated and stable. Throughout this reach, the riparian area was dominated by linden (*Tilia sp.*), Manitoba maple (*Acer negundo*) and river bank grape (*Vitis riparia*). In-water cover consisted of undercut banks, overhanging vegetation and woody debris. No fish were observed during the field investigation; however this reach of Komoka Creek most likely provides spawning, nursery and rearing habitat for fish species known to occur in the watercourse. Habitat in Komoka Creek may be suitable for Silver Shiner.

In situ water quality data recorded at Glendon Drive are provided in **Table 3.3**.

Table 3.3: Water Quality Results at Oxbow Creek and Komoka Creek; September 17, 2015

Station	Water Temperature (°C)	Dissolved Oxygen (mg/L)	pH	Conductivity (µS/cm)
Oxbow Creek – Vanneck Road Crossing	16.9	8.6	8.16	491
Komoka Creek	13.9	6.4	8.36	453

3.2.5 Species at Risk

Species at risk identified through the background review are provided in **Section 3.1.4** and **Appendix C**.

The potential for these species to occur within the Study Area will be limited by the habitats that are available. Vegetation communities that have been identified in **Table 3.2** and shown on **Figures 1-8**, **Appendix A** provide an assessment of the habitat suitability for endangered and threatened species that were identified through the background review.

An assessment of habitat availability for endangered and threatened wildlife species is provided in **Appendix F**. Species for which suitable habitat may occur within the Study Area based on this assessment include; American Chestnut, Eastern Flowering Dogwood, Butternut, Red Mulberry, Barn Swallow, Eastern Meadowlark, Wood Thrush, Yellow-Breasted Chat, Eastern Spiny Softshell (Thames River), Queen Snake (Thames River), American Badger, Small-footed Myotis, Little Brown Myotis and Northern Myotis. Site investigations conducted for the Tree Inventory and Preservation Report (Stantec, 2015) identified one Butternut tree on the north side of Glendon Drive, opposite Elmhurst Street. Implications of Butternut are discussed in the Tree Inventory and Preservation Report.

An assessment of habitat availability for wildlife species of provincial concern is provided in **Appendix E** under the Special Concern and Rare Wildlife Species heading. Species potentially present in the Study Area based on this assessment include; Common Nighthawk, Eastern Wood-Pewee, Golden-winged Warbler, Wood Thrush, Map Turtle, Snapping Turtle, Woodland Vole, Hackberry Emperor and Tawny Emperor

4.0 SUMMARY

This Terrestrial Ecosystems Existing Conditions Report provides a general assessment of the natural features present in the Study Area, including identification of the various vegetation community types and potential significant wildlife habitat features, an aquatic habitat assessment and a review of species at risk and provincially rare species that may be present in the Study Area.

The Study Area is comprised primarily of commercial, residential and agricultural lands. Natural heritage features including forest, woodland, thicket, meadow and open aquatic communities, also occur. Designated natural areas include the Komoka/South Strathroy Creek PSW, the Komoka Park Wetland and the Komoka Park Reserve ANSI. Candidate significant wildlife habitat may occur in the Study Area for bat maternity colonies, turtle overwintering, amphibian breeding and species of conservation concern.

Oxbow Creek is a permanently flowing watercourse and supports a diversity of coolwater and coldwater fish species. Within the Study Area Oxbow Creek likely provides fish spawning, nursery and rearing habitat. Although the creek is within the Study Area, proposed streetscape improvements along Glendon Drive would not extend to Oxbow Creek since it is located within the Komoka Park Reserve ANSI. Within the Study Area, the Unnamed Tributary to Oxbow Creek does not provide fish habitat.

Komoka Creek is classified as a coldwater system with permanent flow. Although no fish were observed during field investigations at Komoka Creek, it likely supports a diverse fish community within the Study Area and may be suitable for Silver Shiner.

Although the Thames River is within the Study Area, streetscape improvements along Glendon Drive are not expected to extend to the Thames River.

5.0 REFERENCES

Cadman, M.D., D.A. Sutherland, G.G. Beck, D. Lepage, A.R. Couturier. 2007. Atlas of the Breeding Birds of Ontario, 2001-2005. (eds) Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of natural resources, and Ontario Nature, Toronto, xxii +706pp.

Canadian Wildlife Service (Ontario Region). 2012. Explanation for the Core Nesting Periods Table. July 2012.

COSEWIC 2002. COSEWIC assessment and status report on the northern map turtle Graptemys geogrphica in Canada. Committee on the Status of Endangere Wildlife in Canada. Ottawa. vi + 34 pp.

COSEWIC 2006. COSEWIC assessment and status report on the Golden-winged Warbler Vermivora chrysoptera in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 30 pp.

COSEWIC 2006. COSEWIC assessment and update status report on the Louisiana Waterthrush Seiurus motacilla in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 26 pp

COSEWIC. 2007. Canadian Species at Risk. Committee on the Status of Endangered Wildlife in Canada.

COSEWIC 2007. COSEWIC assessment and status report on the Common Nighthawk Chordeiles minor in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 25 pp

COSEWIC. 2007. COSEWIC assessment and status report on the eastern flowering dogwood Cornus florida in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa vi + 22pp. (www.sararegistry.gc.ca/status/status_e.cfm)

COSEWIC. 2007. COSEWIC assessment and update status report on the Eastern Hog-nosed Snake Heterodon platirhinos in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. viii + 36 pp

Department of Justice. 1994. Migratory Bird Convention Act. Available: http://laws-lois.justice.gc.ca/eng/acts/M-7.01/

Dobbyn, J. 1994. Atlas of the Mammals of Ontario. Federation of Ontario Naturalists.

Endangered Species Act, 2007 (Bill 184). Species at Risk in Ontario List.

Farrar, J.L. 1995. Trees in Canada. Fitzhenry & Whiteside Limited and the Canadian Forest Service. Canada. 198 pp.

Holmes, A.M., Q.F. Hess, R.R. Tasker, A.J. Hanks. 1991. The Ontario Butterfly Atlas. 1991. Toronto Entomologists' Association, Toronto. 167pp.

Land Information Ontario (LIO). 2014. http://www.giscoeapp.lrc.gov.on.ca/web/MNR/NHLUPS/NaturalHeritage/Viewer/Viewer.html

Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray. 1998. Ecological land classification for Southwestern Ontario: first approximation and its application. (Updated 2008) Ontario Ministry of Natural Resources, South Central Region, Science Development and Transfer Branch. Technical Manual ELC-005.

MacCulloch, R.D. 2002. The ROM field guide to Amphibians and Reptiles of Ontario. McClelland & Steward Ltd. Toronto, Ontario. 168pp.

Natural Heritage Information Centre (NHIC)/Land Information Ontario, Ministry of Natural Resources (LIO). 2015. Online natural heritage databases.

Natural Heritage Information Centre (NHIC), Ministry of Natural Resources. 2015. Biodiversity database, including provincial species rankings (S-ranks).

Newmaster, S.G., A. Lehela, P.W.C. Uhlig, S. McMurray and M.J. Oldham. 1998. Ontario plant list. Ontario Ministry of Natural Resources, Ontario Forest Research Institute, Sault Ste. Marie, ON, Forest Research Information Paper No. 123. 550 pp. + appendices.

Ontario Nature. 2015. Ontario Reptile and Amphibian Atlas [web application]. Toronto, Ontario. Available: www.ontarionature.org/atlas

Ontario Ministry of Natural Resources and Forestry (MNRF). 2015. Significant Wildlife Habitat Criteria Schedule for Ecoregion 7E. January 2015.

Ontario Ministry of Natural Resources (MNR). 2000. Significant Wildlife Habitat Technical Guide. 151 pp.

Ontario Ministry of Natural Resources (MNR). 2009. Ecosites of Ontario Operational Draft.

Ontario Ministry of Natural Resources (MNR). 2010. Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005 Second Edition. Queen's Printer for Ontario. March 18, 2010. 144 pp + appendices.

Ontario Ministry of Natural Resources (MNR). 2010. Komoka Provincial Park Management Plan. 34 pp.

Ontario Ministry of Natural Resources (MNR). 2014. Ontario Wetland Evaluation System, Southern Manual. 3^{rd} Ed., Version 3.3.

Ontario Ministry of Transportation (MTO). 2013. Environmental Reference for Highway Design.

Ontario Partners in Flight. 2006. Ontario Landbird Conservation Plan: Lower Great Lakes/St. Lawrence Plain (North American Bird Conservation Region 13), Priorities, Objectives and Recommended Actions. Environment Canada (Ontario Region) and Ontario Ministry of Natural Resources. Final Draft, February 15, 2006.

Reid, F. 2006. The Peterson Field Guide Series: A field guide to mammals of North America, 4th ed. Houghton Mifflin Company, New York, New York. 579 pp.

Ross et. al. 1998. The Butterflies of Canada. University of Toronto Press. 1998.

Rowe, J.S. 1972. Forest Regions of Canada. Department of the Environment. Canadian Forestry Service Publication No. 1300.

Sandilands. A. 2005. Birds of Ontario. Habitat Requirements, Limiting Factors and Status. UBC Press.

Schueler, F.W. and F.R. Cook. 1992. The status of the Eastern Hognose Snake, Heterodon platirhinos, in Canada. Prepared for The Committee on the Status of Endangered Wildlife in Canada. Unpublished report. 34 pp. + supplement.

Wood, J.T. 1949. Observations on Natrix septemvittata (Say) in southwestern Ohio. The American Midland Naturalist 42(3): 744-750.

APPENDIX A
FIGURES

V:\01614\active\161413164\design\drawing\GIS\MXD\Terrestrial\161413164_ELC.mxd
Revised: 2015-10-29 By: kbuchanan

October 2015
161412164

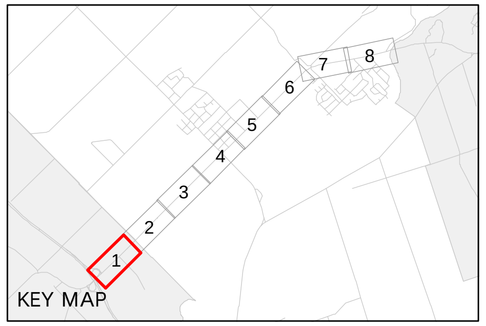
Stantec

Legend

- Watercourse (Permanent)
- Watercourse (Intermittent)
- 🟨 ELC Boundary
- 🟩 Significant Woodland (OP)
- 🟦 Provincially Significant Wetland
- ▨ Provincially Significant Life Science ANSI
- 🟧 Provincial Park

AG	Agriculture
CVC	Commercial
CVI_1	Transportation
CVR	Residential
FOCM6-1	Dry-Fresh White Pine Naturalized Coniferous Plantation
FOD	Deciduous Forest
FODM1-1	Dry-Fresh Red Oak Deciduous Forest
FODM7-7	Fresh-Moist Manitoba Maple Lowland Deciduous Forest
FODM11	Naturalized Deciduous Hedgerow
FOM	Mixed Forest
HR	Hedgerow
ME	Meadow
MEG	Graminoid Meadow
OA	Open Water
OAGM1	Annual Row Crops
OAGM4	Open Pasture
SWT	Thicket Swamp
TAGM1	Coniferous Plantation
THDM2-11	Hawthorn Deciduous Shrub Thicket
WOD	Deciduous Woodland
WODM4-4	Dry-Fresh Black Walnut Deciduous Woodland
WODM5-1	Fresh-Moist Poplar Deciduous Woodland

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

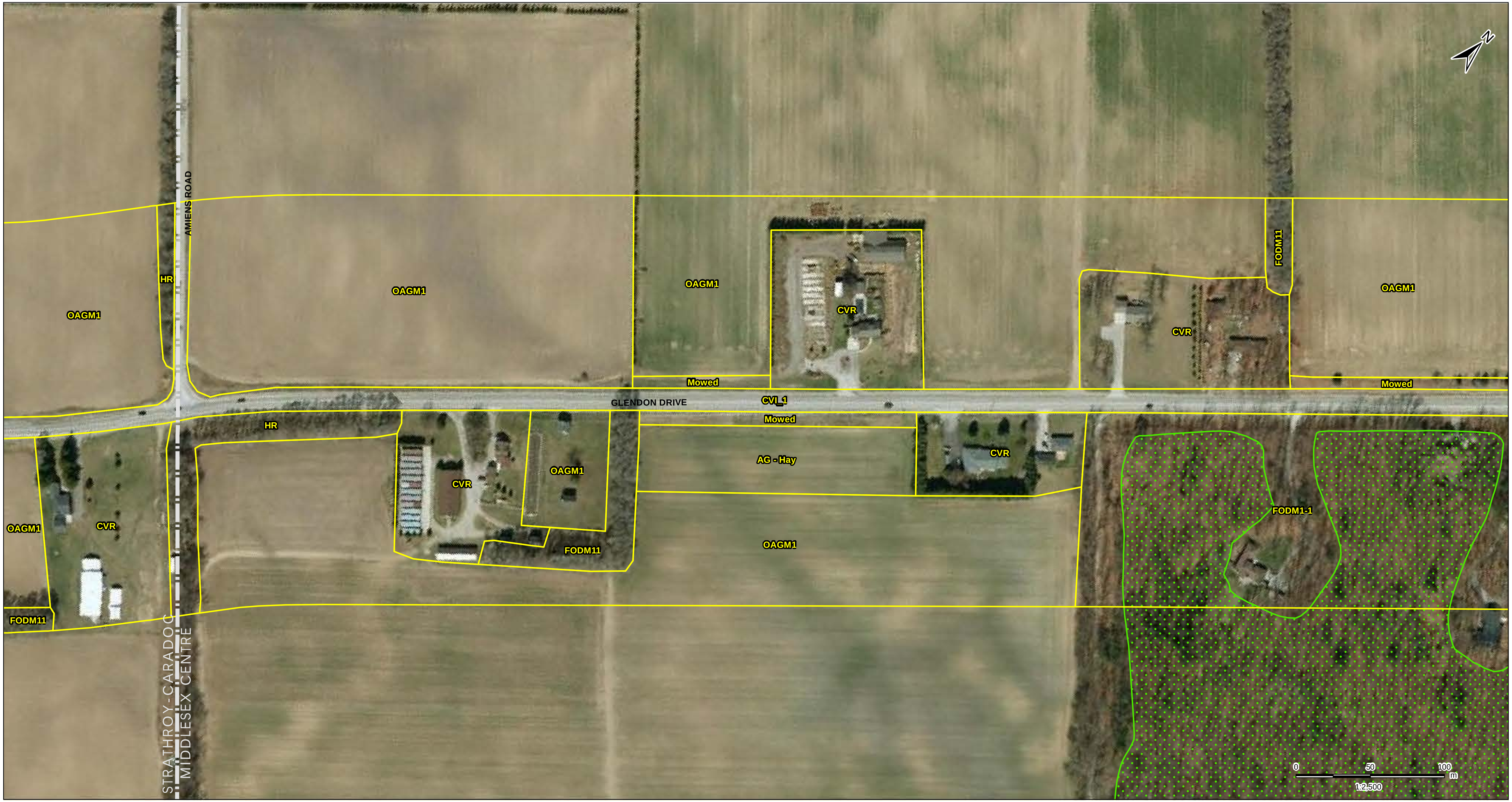


Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
1

Title
Preliminary Ecological Land Classification

V:\01614\active\161413164\design\drawing\GIS\MXD\Terrestrial\161413164_ELC.mxd
Revised: 2015-10-29 By: kbuchanan



October 2015
161412164

Stantec

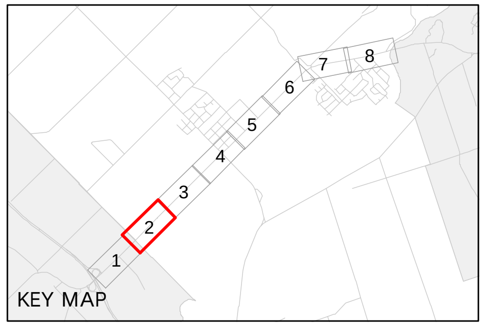
Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

Legend

- Watercourse (Permanent)
- Watercourse (Intermittent)
- ELC Boundary
- Significant Woodland (OP)
- Provincially Significant Wetland
- Provincially Significant Life Science ANSI
- Provincial Park

AG	Agriculture
CVC	Commercial
CVI_1	Transportation
CVR	Residential
FOCM6-1	Dry-Fresh White Pine Naturalized Coniferous Plantation
FOD	Deciduous Forest
FODM1-1	Dry-Fresh Red Oak Deciduous Forest
FODM7-7	Fresh-Moist Manitoba Maple Lowland Deciduous Forest
FODM11	Naturalized Deciduous Hedgerow
FOM	Mixed Forest
HR	Hedgerow

ME	Meadow
MEG	Graminoid Meadow
OA	Open Water
OAGM1	Annual Row Crops
OAGM4	Open Pasture
SWT	Thicket Swamp
TAGM1	Coniferous Plantation
THDM2-11	Hawthorn Deciduous Shrub Thicket
WOD	Deciduous Woodland
WODM4-4	Dry-Fresh Black Walnut Deciduous Woodland
WODM5-1	Fresh-Moist Poplar Deciduous Woodland



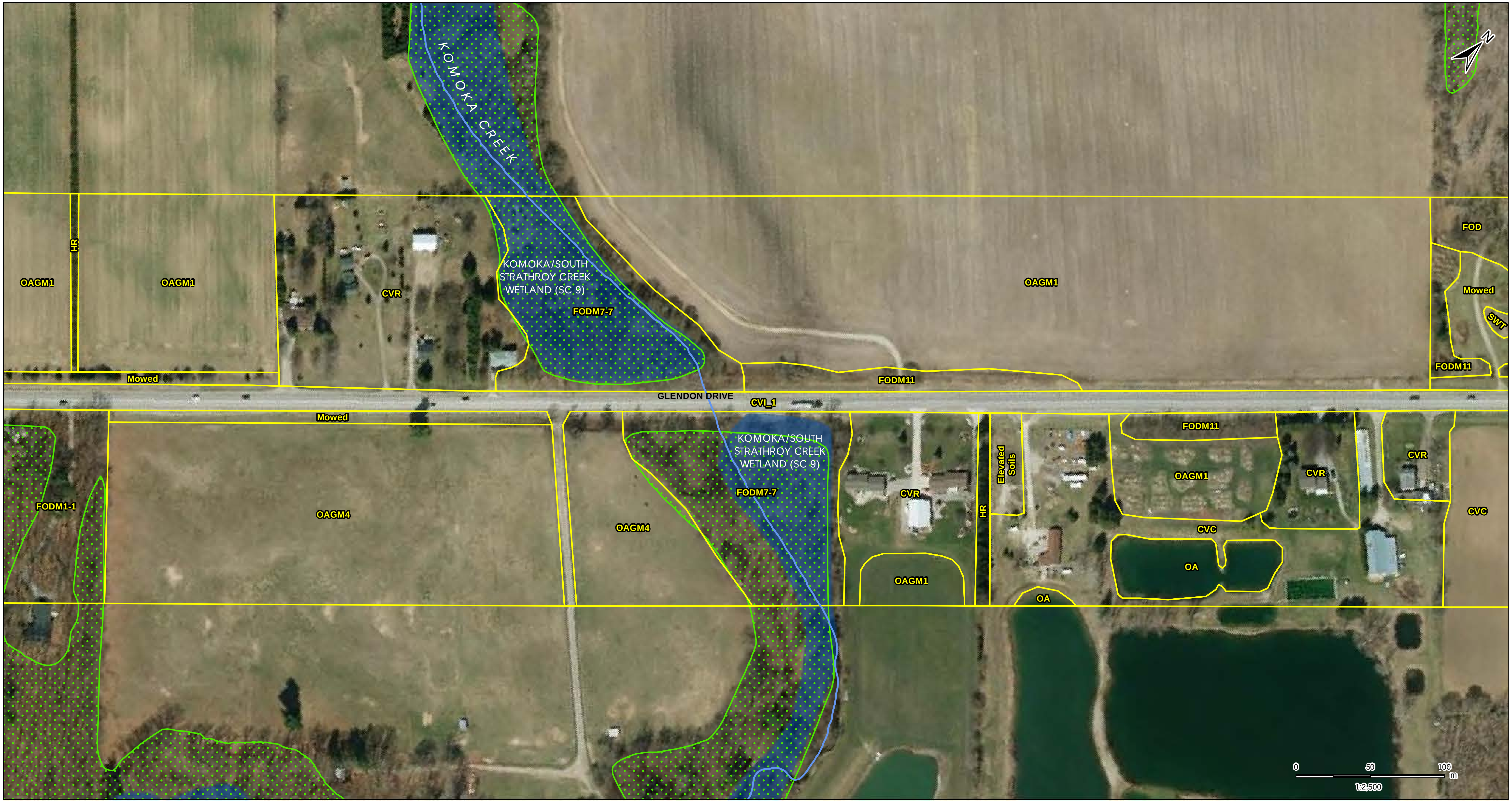
Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
2

Title

Preliminary Ecological Land Classification



V:\01614\active\161413164\design\drawing\GIS\MXD\Terrestrial\161413164_ELC.mxd
Revised: 2015-10-29 By: kbuchanan

October 2015
161412164

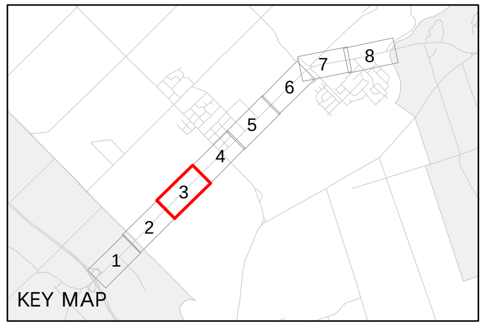
Legend

- Watercourse (Permanent)
- Watercourse (Intermittent)
- 🟨 ELC Boundary
- 🟩 Significant Woodland (OP)
- 🟦 Provincially Significant Wetland
- ▨ Provincially Significant Life Science ANSI
- 🟧 Provincial Park

AG	Agriculture
CVC	Commercial
CVI_1	Transportation
CVR	Residential
FOCM6-1	Dry-Fresh White Pine Naturalized Coniferous Plantation
FOD	Deciduous Forest
FODM1-1	Dry-Fresh Red Oak Deciduous Forest
FODM7-7	Fresh-Moist Manitoba Maple Lowland Deciduous Forest
FODM11	Naturalized Deciduous Hedgerow
FOM	Mixed Forest
HR	Hedgerow
ME	Meadow
MEG	Graminoid Meadow
OA	Open Water
OAGM1	Annual Row Crops
OAGM4	Open Pasture
SWT	Thicket Swamp
TAGM1	Coniferous Plantation
THDM2-11	Hawthorn Deciduous Shrub Thicket
WOD	Deciduous Woodland
WODM4-4	Dry-Fresh Black Walnut Deciduous Woodland
WODM5-1	Fresh-Moist Poplar Deciduous Woodland

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.



Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
3

Title

Preliminary Ecological Land Classification

V:\01614\active\161413164\design\drawing\GIS\MXD\Terrestrial\161413164_ELC.mxd
Revised: 2015-10-29 By: kbuchanan

October 2015
161412164

Stantec

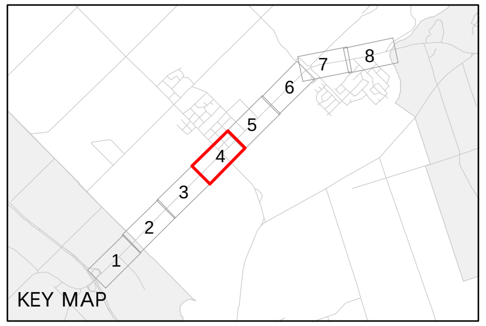
Legend

—	Watercourse (Permanent)
- - -	Watercourse (Intermittent)
🟨	ELC Boundary
🟩	Significant Woodland (OP)
🟦	Provincially Significant Wetland
▨	Provincially Significant Life Science ANSI
🟧	Provincial Park

AG	Agriculture
CVC	Commercial
CVI_1	Transportation
CVR	Residential
FOCM6-1	Dry-Fresh White Pine Naturalized Coniferous Plantation
FOD	Deciduous Forest
FODM1-1	Dry-Fresh Red Oak Deciduous Forest
FODM7-7	Fresh-Moist Manitoba Maple Lowland Deciduous Forest
FODM11	Naturalized Deciduous Hedgerow
FOM	Mixed Forest
HR	Hedgerow
ME	Meadow
MEG	Graminoid Meadow
OA	Open Water
OAGM1	Annual Row Crops
OAGM4	Open Pasture
SWT	Thicket Swamp
TAGM1	Coniferous Plantation
THDM2-11	Hawthorn Deciduous Shrub Thicket
WOD	Deciduous Woodland
WODM4-4	Dry-Fresh Black Walnut Deciduous Woodland
WODM5-1	Fresh-Moist Poplar Deciduous Woodland

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.



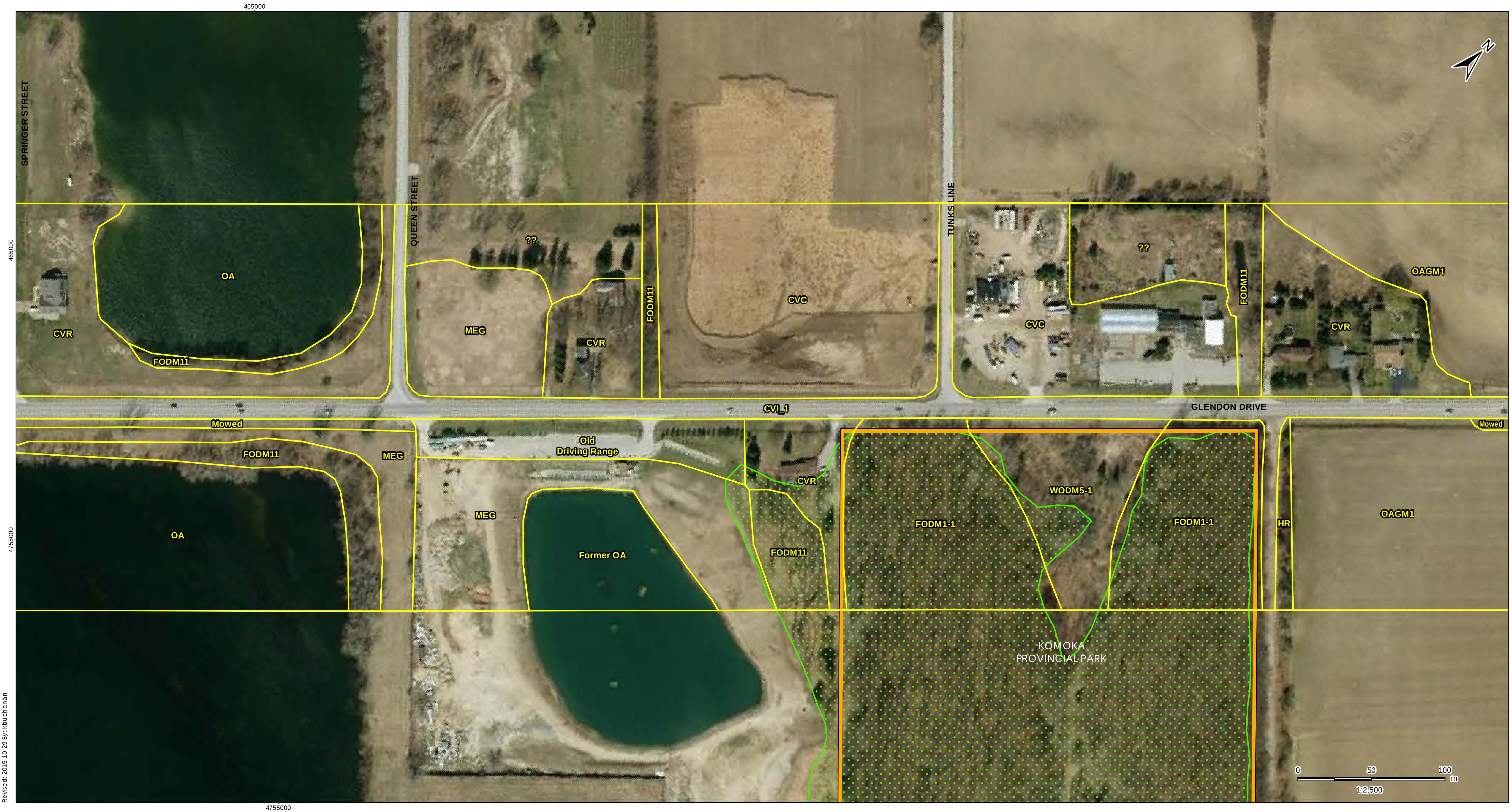
Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
4

Title

Preliminary Ecological Land Classification



V:\01614\active\161413164\design\drawing\GIS\MXD\Terrestrial\161413164_ELC.mxd
Revised: 2015-10-29 By: kbuchanan

October 2015
161412164

Stantec

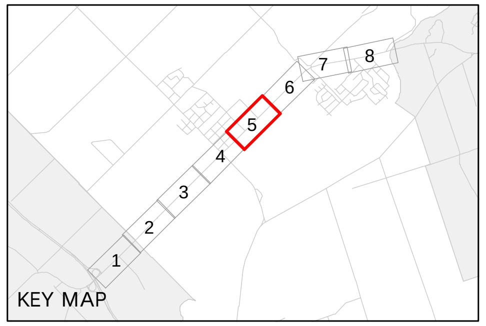
Legend

—	Watercourse (Permanent)
- -	Watercourse (Intermittent)
☐	ELC Boundary
⁙	Significant Woodland (OP)
■	Provincially Significant Wetland
■	Provincially Significant Life Science ANSI
▭	Provincial Park

AG	Agriculture
CVC	Commercial
CVI_1	Transportation
CVR	Residential
FOCM6-1	Dry-Fresh White Pine Naturalized Coniferous Plantation
FOD	Deciduous Forest
FODM1-1	Dry-Fresh Red Oak Deciduous Forest
FODM7-7	Fresh-Moist Manitoba Maple Lowland Deciduous Forest
FODM11	Naturalized Deciduous Hedgerow
FOM	Mixed Forest
HR	Hedgerow
ME	Meadow
MEG	Graminoid Meadow
OA	Open Water
OAGM1	Annual Row Crops
OAGM4	Open Pasture
SWT	Thicket Swamp
TAGM1	Coniferous Plantation
THDM2-11	Hawthorn Deciduous Shrub Thicket
WOD	Deciduous Woodland
WODM4-4	Dry-Fresh Black Walnut Deciduous Woodland
WODM5-1	Fresh-Moist Poplar Deciduous Woodland

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.



Client/Project

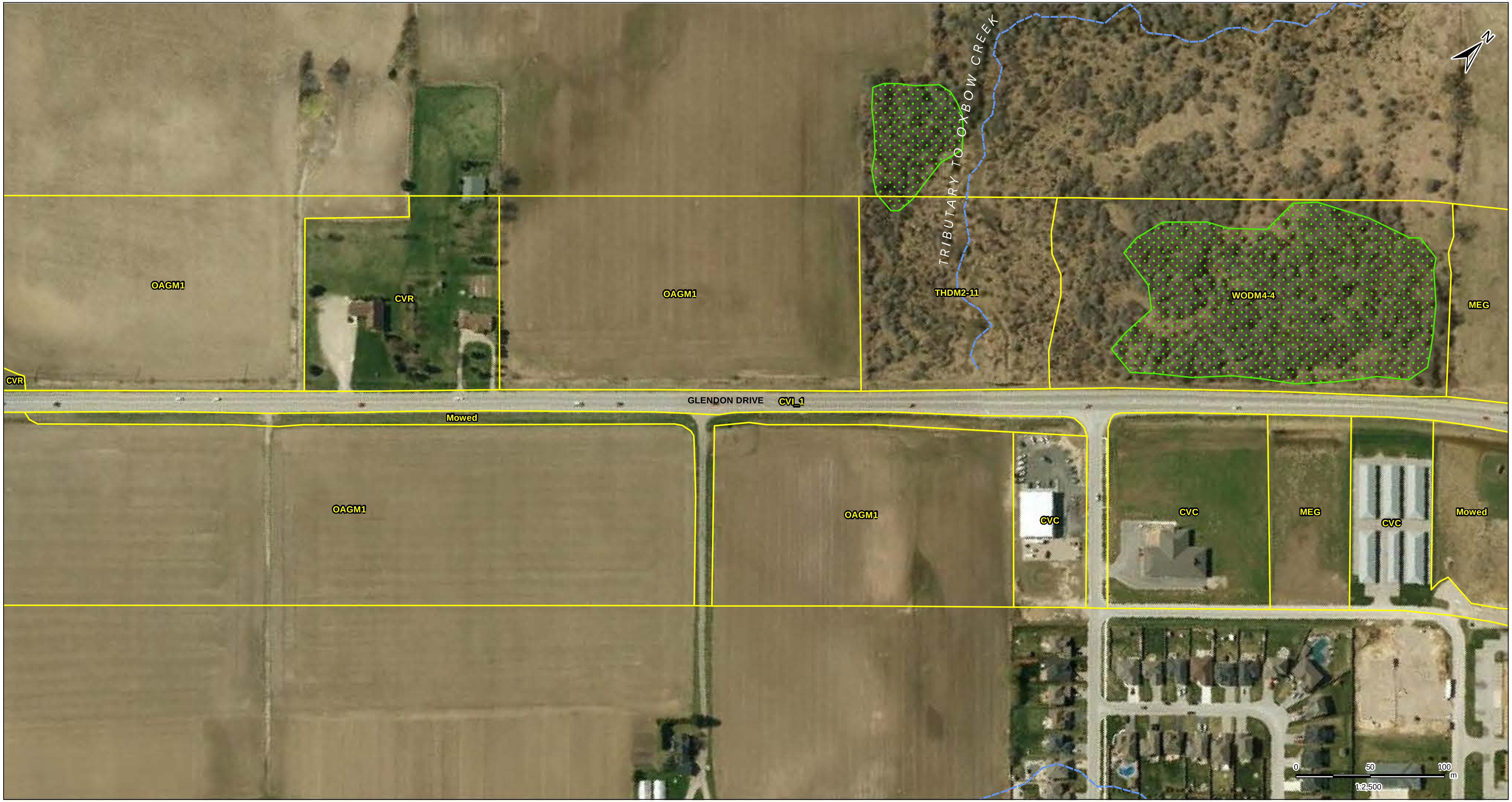
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.

5

Title

Preliminary Ecological Land Classification



V:\01614\active\161413164\design\drawing\GIS\MXD\Terrestrial\161413164_ELC.mxd
Revised: 2015-10-29 By: kbuchanan

October 2015
161412164

Stantec

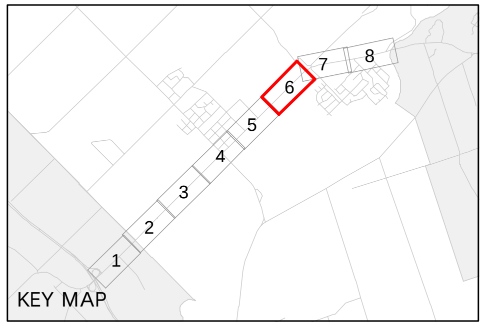
Legend

- — Watercourse (Permanent)
- - - - Watercourse (Intermittent)
- ▭ ELC Boundary
- ⠿ Significant Woodland (OP)
- ■ Provincially Significant Wetland
- ■ Provincially Significant Life Science ANSI
- ▭ Provincial Park

AG	Agriculture
CVC	Commercial
CVI_1	Transportation
CVR	Residential
FOCM6-1	Dry-Fresh White Pine Naturalized Coniferous Plantation
FOD	Deciduous Forest
FODM1-1	Dry-Fresh Red Oak Deciduous Forest
FODM7-7	Fresh-Moist Manitoba Maple Lowland Deciduous Forest
FODM11	Naturalized Deciduous Hedgerow
FOM	Mixed Forest
HR	Hedgerow
ME	Meadow
MEG	Graminoid Meadow
OA	Open Water
OAGM1	Annual Row Crops
OAGM4	Open Pasture
SWT	Thicket Swamp
TAGM1	Coniferous Plantation
THDM2-11	Hawthorn Deciduous Shrub Thicket
WOD	Deciduous Woodland
WODM4-4	Dry-Fresh Black Walnut Deciduous Woodland
WODM5-1	Fresh-Moist Poplar Deciduous Woodland

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.



Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
6

Title

Preliminary Ecological Land Classification

V:\01614\active\161413164\design\drawing\GIS\MXD\Terrestrial\161413164_ELC.mxd
Revised: 2015-10-29 By: kbuchanan

October 2015
161412164

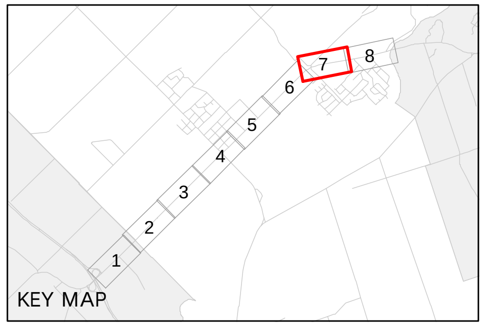
Stantec

Legend

- Watercourse (Permanent)
- Watercourse (Intermittent)
- ELC Boundary
- Significant Woodland (OP)
- Provincially Significant Wetland
- Provincially Significant Life Science ANSI
- Provincial Park

AG	Agriculture	ME	Meadow
CVC	Commercial	MEG	Graminoid Meadow
CVI_1	Transportation	OA	Open Water
CVR	Residential	OAGM1	Annual Row Crops
FOCM6-1	Dry-Fresh White Pine Naturalized Coniferous Plantation	OAGM4	Open Pasture
FOD	Deciduous Forest	SWT	Thicket Swamp
FODM1-1	Dry-Fresh Red Oak Deciduous Forest	TAGM1	Coniferous Plantation
FODM7-7	Fresh-Moist Manitoba Maple Lowland Deciduous Forest	THDM2-11	Hawthorn Deciduous Shrub Thicket
FODM11	Naturalized Deciduous Hedgerow	WOD	Deciduous Woodland
FOM	Mixed Forest	WODM4-4	Dry-Fresh Black Walnut Deciduous Woodland
HR	Hedgerow	WODM5-1	Fresh-Moist Poplar Deciduous Woodland

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

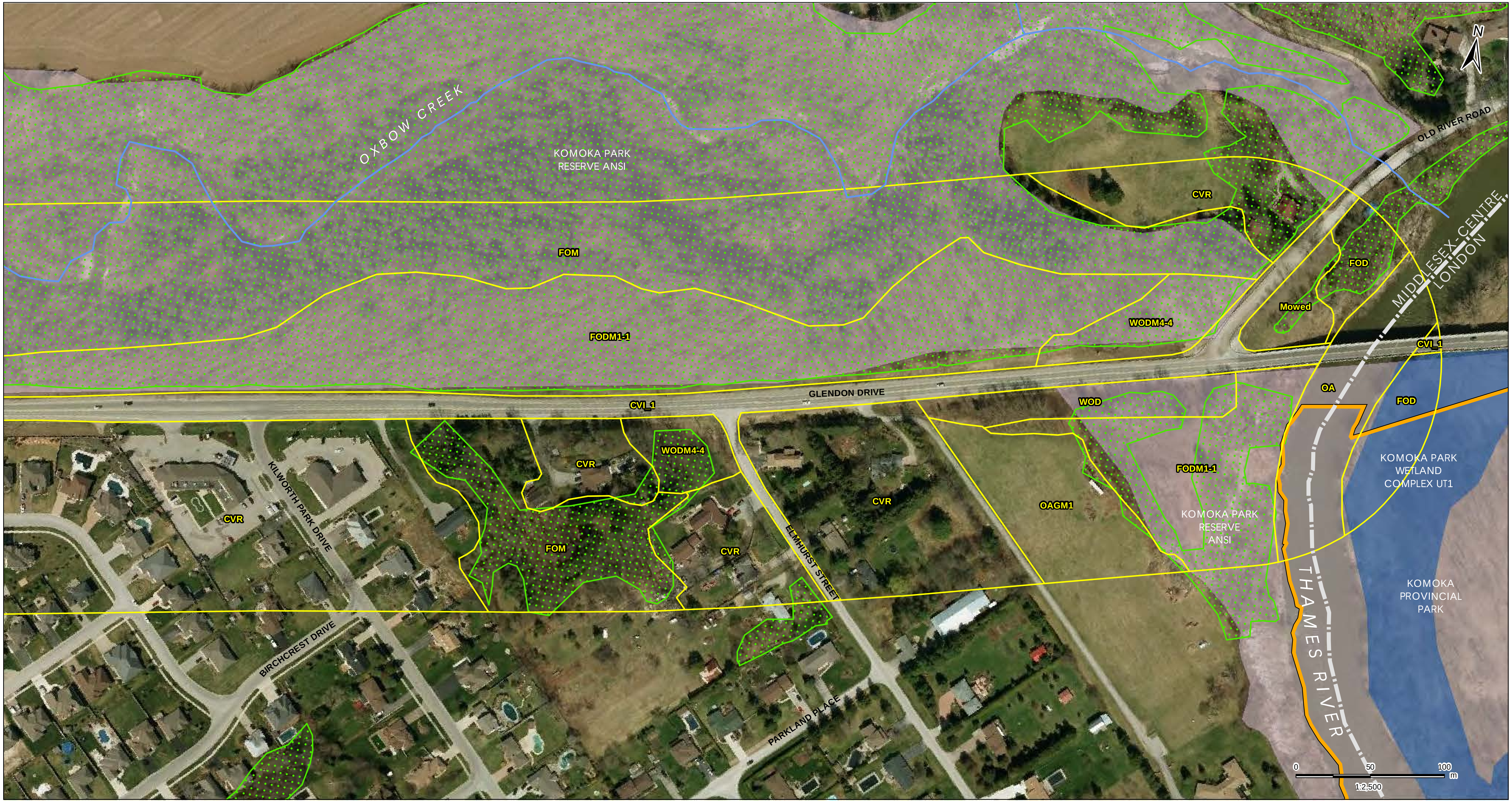


Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
7

Title
Preliminary Ecological
Land Classification

V:\01614\active\161413164\design\drawing\GIS\MXD\Terrestrial\161413164_ELC.mxd
Revised: 2015-10-29 By: kbuchanan



October 2015
161412164

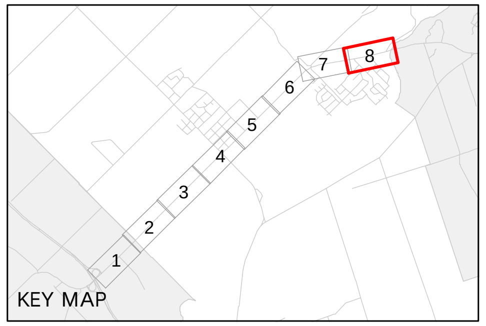
Stantec

Legend

- Watercourse (Permanent)
- Watercourse (Intermittent)
- ELC Boundary
- Significant Woodland (OP)
- Provincially Significant Wetland
- Provincially Significant Life Science ANSI
- Provincial Park

AG	Agriculture
CVC	Commercial
CVI_1	Transportation
CVR	Residential
FOCM6-1	Dry-Fresh White Pine Naturalized Coniferous Plantation
FOD	Deciduous Forest
FODM1-1	Dry-Fresh Red Oak Deciduous Forest
FODM7-7	Fresh-Moist Manitoba Maple Lowland Deciduous Forest
FODM11	Naturalized Deciduous Hedgerow
FOM	Mixed Forest
HR	Hedgerow
ME	Meadow
MEG	Graminoid Meadow
OA	Open Water
OAGM1	Annual Row Crops
OAGM4	Open Pasture
SWT	Thicket Swamp
TAGM1	Coniferous Plantation
THDM2-11	Hawthorn Deciduous Shrub Thicket
WOD	Deciduous Woodland
WODM4-4	Dry-Fresh Black Walnut Deciduous Woodland
WODM5-1	Fresh-Moist Poplar Deciduous Woodland

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.



KEY MAP

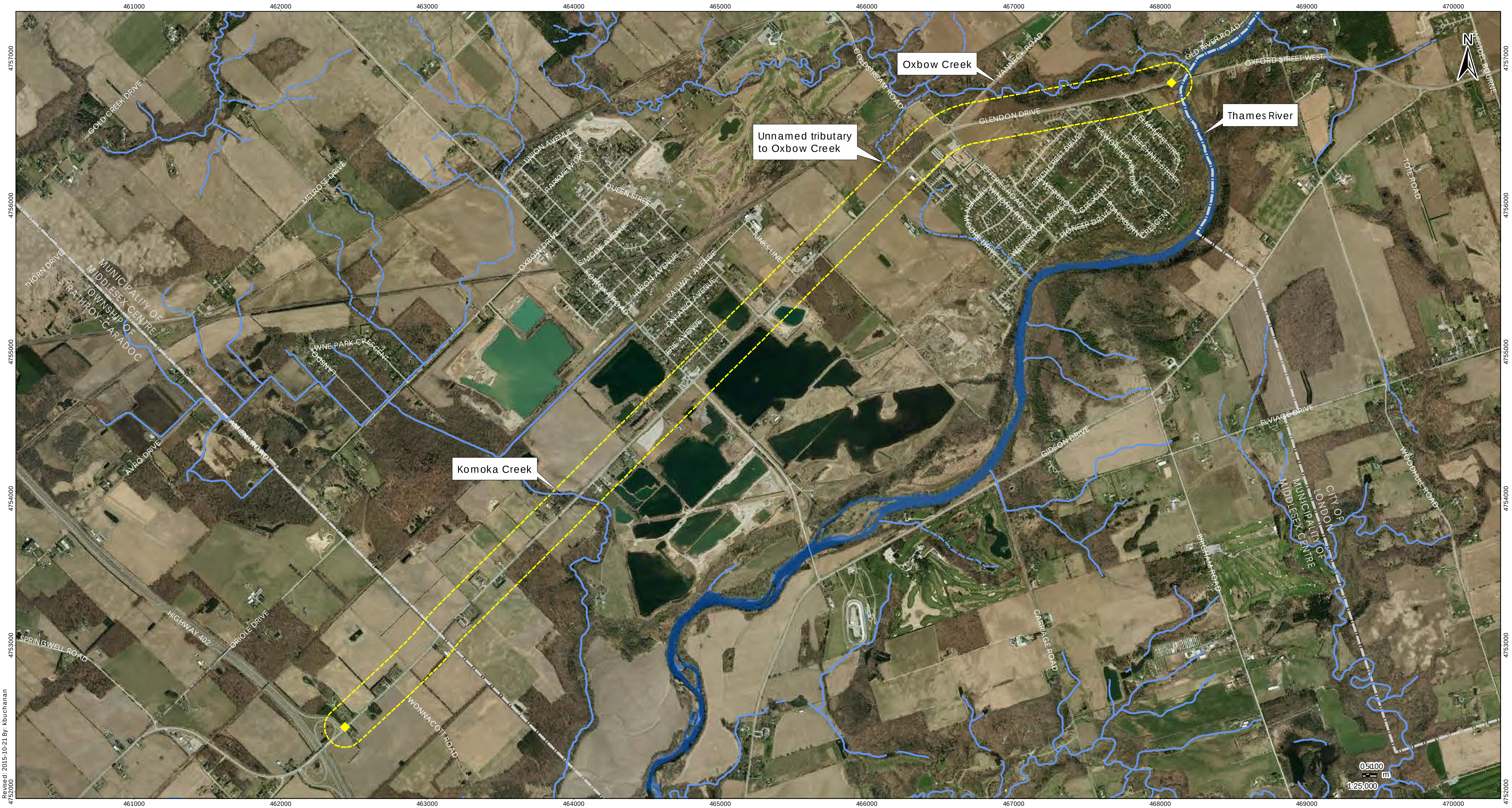
Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
8

Title

Preliminary Ecological Land Classification



V:\01614\active\161413164\design\drawing\GIS\MXD\Aquatic\161413164_Aquatic_Fig1_Overview.mxd
Revised: 2015-10-21 By: kbuchanan

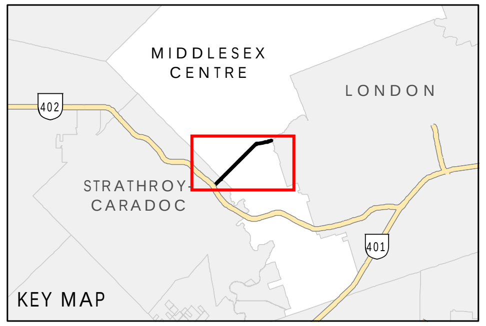
October 2015
161412164

Stantec

Legend

◆	Project Limits
Natural Environment Study Area	
▭	36 m ROW + 120 m Buffer
—	Watercourse (Permanent)
- -	Watercourse (Intermittent)
▭	Municipal Boundary

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.



Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
9

Title

Aquatic Habitat Assessments

APPENDIX B
MNRF CORRESPONDENCE

From: Spisani, Sean
To: "Riddell, Heather (MNRF)"; "Fleischhauer, Andrea (MNRF)"
Cc: Ball, Janice; Mason, Kelly
Subject: DataGlendon Drive Streetscape EA
Date: Wednesday, September 23, 2015 9:55:00 PM
Attachments: 161413164_Background_Booklet.pdf
161413164_NHIC.pdf
161413164_NHIC_20150916_sorted.xlsx

Hi Heather, Andrea,

I hope this email finds you both well. My apologies for copying both of you. Please direct me to the correct contact for this data request.

Stantec has been retained by the Municipality of Middlesex Centre to undertake the Glendon Drive Streetscape Improvements Master Plan Class EA. A study commencement notice will be circulated shortly. The natural environment study area is indicated in the attached figures.

We completed a review of the NHIC and LIO databases and identified a number of species at risk and rare species records. The attached excel file is a list of recent records (1970+). We also noted the following designated natural areas:

- Komoka/Strathroy Creek PSW
- Komoka Park Reserve ANSI (Provincial)

Stantec is requesting confirmation that this information is complete and accurate, and additional relevant natural heritage data:

- Designated natural areas
- Records of species at risk and provincially rare species
- Fisheries information:
    - o species/community information including any aquatic species at risk
    - o watercourse thermal regime
    - o special habitat features (e.g. known spawning areas)
    - o in-water construction timing window;

Thanks in advance for your consideration of this request. Please let me know if there is anything I can provide to assist in your review.

Sean Spisani, B.Sc., ERGC
Senior Ecologist
Stantec
200 - 835 Paramount Drive Stoney Creek ON L8J 0B4
Phone: (905) 381-3223
Cell: (289) 208-6934
Fax: (905) 385-3534
Sean.Spisani@stantec.com

APPENDIX C
BACKGROUND REVIEW WILDLIFE LIST

Appendix C: 161413164 Wildlife Species List

COMMON NAME	SCIENTIFIC NAME	ONTARIO STATUS	GLOBAL STATUS	COSSARO	COSEWIC	AREA SENSITIVITY (ha)	ECO REGION (OWES)	Local Status PIF Priority Species (BCR 13)	Source
BUTTERFLIES									
Hackberry Emperor	*Asterocampa celtis*	S2	G5						NHIC
Tawny Emperor	*Asterocampa clyton*	S2S3	G5						NHIC
AMPHIBIANS									
Red-spotted Newt	*Notophthalmus viridescens*	S5	G5T5						ORAA
Spotted Salamander	*Ambystoma maculatum*	S4	G5						ORAA
Northern Redback Salamander	*Plethodon cinereus*	S5	G5						ORAA
American Toad	*Anaxyrus americanus*	S5	G5						ORAA
Tetraploid Gray Treefrog	*Hyla versicolor*	S5	G5						ORAA
Western Chorus Frog (carolinian)	*Pseudacris triseriata*	S4	G5	NAR	NAR				ORAA
Spring Peeper	*Pseudacris crucifer*	S5	G5						ORAA
Bullfrog	*Lithobates catesbeiana*	S4	G5			1			ORAA
Northern Green Frog	*Lithobates clamitans*	S5	G5						ORAA
Pickerel Frog	*Lithobates palustris*	S4	G5	NAR	NAR				ORAA
Wood Frog	*Lithobates sylvatica*	S5	G5						ORAA
Northern Leopard Frog	*Lithobates pipiens*	S5	G5	NAR	NAR				ORAA
REPTILES									
Snapping Turtle	*Chelydra serpentina*	S3	G5	SC	SC				ORAA
Midland Painted Turtle	*Chrysemys picta marginata*	S5	G5T5						ORAA
Northern Map Turtle	*Graptemys geographica*	S3	G5	SC	SC	30-50			ORAA, NHIC
Blanding's Turtle	*Emydoidea blandingi*	S3	G4	THR	THR				NHIC
Eastern Spiny Softshell	*Apalone spinifera spinifera*	S3	G5	THR	THR				NHIC
Eastern Gartersnake	*Thamnophis sirtalis*	S5	G5						ORAA
Queen Snake	*Regina septemvittata*	S2	G5	END	END		6		ORAA
Redbelly Snake	*Storeria occipitomaculata*	S5	G5						ORAA
Eastern Hog-nosed Snake	*Heterodon platirhinos*	S3	G5	THR	THR	5	6		ORAA
Eastern Milksnake	*Lampropeltis triangulum*	S3	G5	SC	SC				ORAA
BIRDS									
Canada Goose	*Branta canadensis*	S5	G5						OBBA
Mute Swan	*Cygnus olor*	SNA	G5						OBBA
Wood Duck	*Aix sponsa*	S5	G5						OBBA
Mallard	*Anas platyrhynchos*	S5	G5						OBBA

Appendix C: 161413164 Wildlife Species List

COMMON NAME	SCIENTIFIC NAME	ONTARIO STATUS	GLOBAL STATUS	COSSARO	COSEWIC	AREA SENSITIVITY (ha)	ECO REGION (OWES)	Local Status PIF Priority Species (BCR 13)	Source
Ruffed Grouse	*Bonasa umbellus*	S5	G5			20			OBBA
Wild Turkey	*Meleagris gallopava*	S5	G5						OBBA
Pied-billed Grebe	*Podilymbus podiceps*	S4B,S4N	G5						OBBA
Least Bittern	*Ixobrychus exilis*	S4B	G5	THR	THR				OBBA
Great Blue Heron	*Ardea herodias*	S5	G5						OBBA
Turkey Vulture	*Cathartes aura*	S5B	G5						OBBA
Bald Eagle	*Haliaeetus leucocephalus*	S4B,S2N	G4	SC	NAR			X	OBBA
Sharp-shinned Hawk	*Accipiter striatus*	S5	G5	NAR	NAR	20-30			OBBA
Cooper's Hawk	*Accipiter cooperii*	S4	G5	NAR	NAR	4-50+			OBBA
Red-tailed Hawk	*Buteo jamaicensis*	S5	G5	NAR	NAR				OBBA
American Kestrel	*Falco sparverius*	S4	G5					X	OBBA
Virginia Rail	*Rallus limicola*	S5B	G5						OBBA
Sora	*Porzana carolina*	S4B	G5						OBBA
American Coot	*Fulica americana*	S4B	G5	NAR	NAR	50			OBBA
Killdeer	*Charadrius vociferus*	S5B, S5N	G5						OBBA
Spotted Sandpiper	*Actitis macularia*	S5	G5						OBBA
Wilson's Snipe	*Gallinago delicata*	S5B	G5						OBBA
American Woodcock	*Scolopax minor*	S4B	G5						OBBA
Rock Pigeon	*Columba livia*	SNA	G5						OBBA
Mourning Dove	*Zenaida macroura*	S5	G5						OBBA
Yellow-billed Cuckoo	*Coccyzus americanus*	S4B	G5						OBBA
Black-billed Cuckoo	*Coccyzus erythropthalmus*	S5B	G5					X	OBBA
Eastern Screech-Owl	*Megascops asio*	S5	G5	NAR	NAR				OBBA
Great Horned Owl	*Bubo virginianus*	S5	G5						OBBA
Common Nighthawk	*Chordeiles minor*	S4B	G5	SC	THR				OBBA
Chimney Swift	*Chaetura pelagica*	S4B, S4N	G5	THR	THR			X	OBBA
Ruby-throated Hummingbird	*Archilochus colubris*	S5B	G5						OBBA
Belted Kingfisher	*Ceryle alcyon*	S4B	G5					X	OBBA
Red-bellied Woodpecker	*Melanerpes carolinus*	S4	G5						OBBA
Yellow-bellied Sapsucker	*Sphyrapicus varius*	S5B	G5			30-50			OBBA
Downy Woodpecker	*Picoides pubescens*	S5	G5						OBBA
Hairy Woodpecker	*Picoides villosus*	S5	G5			10			OBBA

Appendix C: 161413164 Wildlife Species List

COMMON NAME	*SCIENTIFIC NAME*	ONTARIO STATUS	GLOBAL STATUS	COSSARO	COSEWIC	AREA SENSITIVITY (ha)	ECO REGION (OWES)	Local Status PIF Priority Species (BCR 13)	Source
Northern Flicker	*Colaptes auratus*	S4B	G5					X	OBBA
Pileated Woodpecker	*Dryocopus pileatus*	S5	G5			30-50*			OBBA
Eastern Wood-Pewee	*Contopus virens*	S4B	G5	SC	SC-NS			X	OBBA
Willow Flycatcher	*Empidonax traillii*	S5B	G5					X	OBBA
Least Flycatcher	*Empidonax minimus*	S4B	G5						OBBA
Eastern Phoebe	*Sayornis phoebe*	S5B	G5						OBBA
Great Crested Flycatcher	*Myiarchus crinitus*	S4B	G5						OBBA
Eastern Kingbird	*Tyrannus tyrannus*	S4B	G5					X	OBBA
White-eyed Vireo	*Vireo griseus*	S2B	G5						NHIC
Yellow-throated Vireo	*Vireo flavifrons*	S4B	G5			30			OBBA
Warbling Vireo	*Vireo gilvus*	S5B	G5						OBBA
Red-eyed Vireo	*Vireo olivaceus*	S5B	G5						OBBA
Blue Jay	*Cyanocitta cristata*	S5	G5						OBBA
American Crow	*Corvus brachyrhynchos*	S5B	G5						OBBA
Horned Lark	*Eremophila alpestris*	S5B	G5						OBBA
Purple Martin	*Progne subis*	S4B	G5						OBBA
Tree Swallow	*Tachycineta bicolor*	S4B	G5						OBBA
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	S4B	G5						OBBA
Bank Swallow	*Riparia riparia*	S4B	G5	THR	THR-NS			X	OBBA
Cliff Swallow	*Petrochelidon pyrrhonota*	S4B	G5						OBBA
Barn Swallow	*Hirundo rustica*	S4B	G5	THR	THR-NS				OBBA
Black-capped Chickadee	*Poecile atricapillus*	S5	G5						OBBA
Tufted Titmouse	*Baeolophus bicolor*	S4	G5						OBBA
White-breasted Nuthatch	*Sitta carolinensis*	S5	G5			10			OBBA
House Wren	*Troglodytes aedon*	S5B	G5						OBBA
Sedge Wren	*Cistothorus platensis*	S4B	G5	NAR	NAR				OBBA
Marsh Wren	*Cistothorus palustris*	S4B	G5						OBBA
Carolina Wren	*Thryothorus ludovicianus*	S4	G5						OBBA
Blue-gray Gnatcatcher	*Polioptila caerulea*	S4B	G5			30			OBBA
Eastern Bluebird	*Sialia sialis*	S5B	G5	NAR	NAR				OBBA
Veery	*Catharus fuscescens*	S4B	G5			10-20			OBBA
Wood Thrush	*Hylocichla mustelina*	S4B	G5	SC	THR-NS			X	OBBA

COMMON NAME	***SCIENTIFIC NAME***	ONTARIO STATUS	GLOBAL STATUS	COSSARO	COSEWIC	AREA SENSITIVITY (ha)	ECO REGION (OWES)	Local Status PIF Priority Species (BCR 13)	Source
American Robin	*Turdus migratorius*	S5B	G5						OBBA
Gray Catbird	*Dumetella carolinensis*	S4B	G5						OBBA
Brown Thrasher	*Toxostoma rufum*	S4B	G5					X	OBBA
European Starling	*Sturnus vulgaris*	SNA	G5						OBBA
Cedar Waxwing	*Bombycilla cedrorum*	S5B	G5						OBBA
Ovenbird	*Seiurus aurocapilla*	S4B	G5			20			OBBA
Louisiana Waterthrush	*Parkesia motacilla*	S3B	G5	SC	SC	100		X	OBBA, NHIC
Northern Waterthrush	*Parkesia noveboracensis*	S5B	G5			20			OBBA
Golden-winged Warbler	*Vermivora chrysoptera*	S4B	G4	SC	THR			X	OBBA
Blue-winged Warbler	*Vermivora cyanoptera*	S4B	G5					X	OBBA
Mourning Warbler	*Geothlypis philadelphia*	S4B	G5			30			OBBA
Common Yellowthroat	*Geothlypis trichas*	S5B	G5						OBBA
Hooded Warbler	*Setophaga citrina*	S4B	G5	NAR	NAR	15-30		X	OBBA
American Redstart	*Setophaga ruticilla*	S5B	G5			20-30			OBBA
Yellow Warbler	*Setophaga petechia*	S5B	G5						OBBA
Chestnut-sided Warbler	*Setophaga pensylvanica*	S5B	G5						OBBA
Pine Warbler	*Setophaga pinus*	S5B	G5			15-30			OBBA
Yellow-breasted Chat	*Icteria virens*	S2B	G5	END	SC (END)			X	NHIC
Eastern Towhee	*Pipilo erythrophthalmus*	S4B	G5					X	OBBA
Chipping Sparrow	*Spizella passerina*	S5B	G5						OBBA
Field Sparrow	*Spizella pusilla*	S4B	G5					X	OBBA
Vesper Sparrow	*Pooecetes gramineus*	S4B	G5					X	OBBA
Savannah Sparrow	*Passerculus sandwichensis*	S4B	G5					X	OBBA
Grasshopper Sparrow	*Ammodramus savannarum*	S4B	G5	SC	SC-NS			X	OBBA
Henslow's Sparrow	*Ammodramus henslowii*	SHB	G4	END	END	50		X	NHIC
Song Sparrow	*Melospiza melodia*	S5B	G5						OBBA
Swamp Sparrow	*Melospiza georgiana*	S5B	G5						OBBA
Scarlet Tanager	*Piranga olivacea*	S4B	G5			20			OBBA
Northern Cardinal	*Cardinalis cardinalis*	S5	G5						OBBA
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S4B	G5					X	OBBA
Indigo Bunting	*Passerina cyanea*	S4B	G5						OBBA
Bobolink	*Dolichonyx oryzivorus*	S4B	G5	THR	THR-NS	10		X	OBBA

Appendix C: 161413164 Wildlife Species List

COMMON NAME	SCIENTIFIC NAME	ONTARIO STATUS	GLOBAL STATUS	COSSARO	COSEWIC	AREA SENSITIVITY (ha)	ECO REGION (OWES)	Local Status PIF Priority Species (BCR 13)	Source
Red-winged Blackbird	*Agelaius phoeniceus*	S4	G5						OBBA
Eastern Meadowlark	*Sturnella magna*	S4B	G5	THR	THR-NS			X	OBBA
Common Grackle	*Quiscalus quiscula*	S5B	G5						OBBA
Brown-headed Cowbird	*Molothrus ater*	S4B	G5						OBBA
Orchard Oriole	*Icterus spurius*	S4B	G5						OBBA
Baltimore Oriole	*Icterus galbula*	S4B	G5					X	OBBA
House Finch	*Haemorhous mexicanus*	SNA	G5						OBBA
American Goldfinch	*Carduelis tristis*	S5B	G5						OBBA
House Sparrow	*Passer domesticus*	SNA	G5						OBBA
MAMMALS									
Virginia Opossum	*Didelphis virginiana*	S4	G5						AMO
Masked Shrew	*Sorex cinereus*	S5	G5						AMO
Smoky Shrew	*Sorex fumeus*	S5	G5						AMO
Pygmy Shrew	*Sorex hoyi*	S4	G5				7		AMO
Water Shrew	*Sorex palustris*	S5	G5				7		AMO
Northern Short-tailed Shrew	*Blarina brevicauda*	S5	G5						AMO
Hairy-tailed Mole	*Parascalops breweri*	S4	G5						AMO
Star-nosed Mole	*Condylura cristata*	S5	G5						AMO
Small-footed Myotis	*Myotis leibii*	S2S3	G3	END					AMO
Little Brown Myotis	*Myotis lucifugus*	S4	G5	END	END				AMO
Northern Myotis	*Myotis septentrionalis*	S3?	G4	END	END				AMO
Silver-haired Bat	*Lasionycteris noctivagans*	S4	G5						AMO
Red Bat	*Lasiurus borealis*	S4	G5						AMO
Big Brown Bat	*Eptesicus fuscus*	S5	G5						AMO
Hoary Bat	*Lasiurus cinereus*	S4	G5						AMO
Eastern Cottontail	*Sylvilagus floridanus*	S5	G5						AMO
European Hare	*Lepus europaeus*	SNA	G5						AMO
Eastern Chipmunk	*Tamias striatus*	S5	G5						AMO
Woodchuck	*Marmota monax*	S5	G5						AMO
Grey Squirrel	*Sciurus carolinensis*	S5	G5						AMO
Red Squirrel	*Tamiasciurus hudsonicus*	S5	G5						AMO
Southern Flying Squirrel	*Glaucomys volans*	S4	G5		NAR	20			AMO

Appendix C: 161413164 Wildlife Species List

COMMON NAME	*SCIENTIFIC NAME*	ONTARIO STATUS	GLOBAL STATUS	COSSARO	COSEWIC	AREA SENSITIVITY (ha)	ECO REGION (OWES)	Local Status PIF Priority Species (BCR 13)	Source
Beaver	*Castor canadensis*	S5	G5						AMO
White-footed Mouse	*Peromyscus leucopus*	S5	G5						AMO
Deer Mouse	*Peromyscus maniculatus*	S5	G5						AMO
Muskrat	*Ondatra zibethicus*	S5	G5						AMO
Southern Bog Lemming	*Synaptomys cooperi*	S4	G5						AMO
Meadow Vole	*Microtus pennsylvanicus*	S5	G5						AMO
Woodland Vole	*Microtus pinetorum*	S3?	G5	SC	SC		6		AMO
Norway Rat	*Rattus norvegicus*	SNA	G5						AMO
House Mouse	*Mus musculus*	SNA	G5						AMO
Meadow Jumping Mouse	*Zapus hudsonicus*	S5	G5						AMO
Woodland Jumping Mouse	*Napaeozapus insignis*	S5	G5						AMO
Coyote	*Canis latrans*	S5	G5						AMO
Red Fox	*Vulpes vulpes*	S5	G5						AMO
Raccoon	*Procyon lotor*	S5	G5						AMO
Ermine	*Mustela erminea*	S5	G5						AMO
Long-tailed Weasel	*Mustela frenata*	S4	G5						AMO
Mink	*Mustela vison*	S4	G5						AMO
American Badger (southwestern)	*Taxidea taxus jacksoni*	S2	G5	END	END				NHIC
Striped Skunk	*Mephitis mephitis*	S5	G5						AMO
White-tailed Deer	*Odocoileus virginianus*	S5	G5						AMO

SUMMARY

Total Butterflies: 2
Total Amphibians: 12
Total Reptiles: 10
Total Birds: 109
Total Mammals: 42

SIGNIFICANT SPECIES

Appendix C: 161413164 Wildlife Species List

COMMON NAME	SCIENTIFIC NAME	ONTARIO STATUS	GLOBAL STATUS	COSSARO	COSEWIC	AREA SENSITIVITY (ha)	ECO REGION (OWES)	Local Status PIF Priority Species (BCR 13)	Source

Global: 0

National: 24

Provincial: 27

Regional: 2

Local: 27

Explanation of Status and Acronymns

COSSARO: Committee on the Status of Species at Risk in Ontario

COSEWIC: Committee on the Status of Endangered Wildlife in Canada

REGION: Rare in a Site Region

AMO: Atlas of the Mammals of Ontario

OBBA: Ontario Breeding Bird Atlas

ORAA: Ontario Reptile and Amphibian Atlas

NHIC: Natural Heritage Information Centre

S1: Critically Imperiled—Critically imperiled in the province (often 5 or fewer occurrences)

S2: Imperiled—Imperiled in the province, very few populations (often 20 or fewer),

S3: Vulnerable—Vulnerable in the province, relatively few populations (often 80 or fewer)

S4: Apparently Secure—Uncommon but not rare

S5: Secure—Common, widespread, and abundant in the province

SX: Presumed extirpated

SH: Possibly Extirpated (Historical)

SNR: Unranked

SU: Unrankable—Currently unrankable due to lack of information

SNA: Not applicable—A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

S#S#: Range Rank—A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species

S#B- Breeding status rank

S#N- Non Breeding status rank

?: Indicates uncertainty in the assigned rank

G1: Extremely rare globally; usually fewer than 5 occurrences in the overall range

G1G2: Extremely rare to very rare globally

G2: Very rare globally; usually between 5-10 occurrences in the overall range

Appendix C: 161413164 Wildlife Species List

COMMON NAME	SCIENTIFIC NAME	ONTARIO STATUS	GLOBAL STATUS	COSSARO	COSEWIC	AREA SENSITIVITY (ha)	ECO REGION (OWES)	Local Status PIF Priority Species (BCR 13)	Source

G2G3: Very rare to uncommon globally

G3: Rare to uncommon globally; usually between 20-100 occurrences

G3G4: Rare to common globally

G4: Common globally; usually more than 100 occurrences in the overall range

G4G5: Common to very common globally

G5: Very common globally; demonstrably secure

GU: Status uncertain, often because of low search effort or cryptic nature of the species; more data needed.

GNR: Unranked—Global rank not yet assessed.

T: Denotes that the rank applies to a subspecies or variety

Q: Denotes that the taxonomic status of the species, subspecies, or variety is **questionable**.

END: Endangered

THR: Threatened

SC: Special Concern

2, 3 or NS after a COSEWIC ranking indicates the species is either on Schedule 2, Schedule 3 or No Schedule of the Species At Risk Act (SARA)

NAR: Not At Risk

IND: Indeterminant, insufficient information to assign status

DD: Data Deficient

6: Rare in Site Region 6

7: Rare in Site Region 7

Area: Minimum patch size for area-sensitive species (ha)

* The Pileated Woodpecker will incorporate smaller woodlots into its homerange, therefore it may not be a true area-sensitive species (Naylor et al. 1996)

LATEST STATUS UPDATE

Amphibans: July 2014

Reptiles: April 2015

Birds: April 2015

Mammals: April 2015

S and G ranks and explanations: December 2011

NOTE

Appendix C: 161413164 Wildlife Species List

COMMON NAME	SCIENTIFIC NAME	ONTARIO STATUS	GLOBAL STATUS	COSSARO	COSEWIC	AREA SENSITIVITY (ha)	ECO REGION (OWES)	Local Status PIF Priority Species (BCR 13)	Source

All rankings for birds refer to breeding birds unless the ranking is followed by N

APPENDIX D
PLANT SPECIES LIST

Appendix D: 161413164 Plant Species List

LATIN NAME	COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WETLAND PLANT SPECIES	WEEDINESS INDEX	PROVINCIAL STATUS	OMNR STATUS	COSEWIC STATUS	GLOBAL STATUS	LOCAL STATUS MIDDLESEX
GYMNOSPERMS	**CONIFERS**									
Juniperus virginiana	Eastern Red Cedar					S5			G5	X
Pinaceae	**Pine Family**									
Picea abies	Norway Spruce		5		-1	SE3			G?	I
Pinus resinosa	Red Pine	8	3			S5			G5	IR
Pinus strobus	Eastern White Pine	4	3	T		S5			G5	X
Pinus sylvestris	Scotch Pine		5		-3	SE5			G?	IR
DICOTYLEDONS	**DICOTS**									
Adoxaceae	**Moschatel Family**									
Viburnum lentago	Nannyberry	4	-1	T		S5			G5	C
Anacardiaceae	**Sumac or Cashew Family**									
Rhus typhina	Staghorn Sumac	1	5			S5			G5	C
Toxicodendron rydbergii	Poison-ivy	0	0			S5			G5T	X
Apiaceae	**Carrot or Parsley Family**									
Daucus carota	Wild Carrot		5		-2	SE5			G?	IC
Apocynaceae	**Dogbane Family**									
Apocynum androsaemifolium	Spreading Dogbane	3	5			S5			G5T?	C
Asteraceae	**Composite or Aster Family**									
Solidago canadensis	Canada Goldenrod	1	3			S5			G5	X
Symphyotrichum novae-angliae	New England Aster	2	-3			S5			G5	C
Brassicaceae	**Mustard Family**									
Alliaria petiolata	Garlic Mustard		0		-3	SE5			G5	IC
Cannabaceae	**Hemp Family**									
Celtis occidentalis	Common Hackberry	8	1			S4			G5	X
Cornaceae	**Dogwood Family**									
Cornus foemina	Red Panicled Dogwood	2	-2	T		S5			G5?	X
Cucurbitaceae	**Gourd Family**									
Echinocystis lobata	Prickly Cucumber	3	-2	T		S5			G5	X
Dipsacaceae	**Teasel Family**									
Dipsacus fullonum	Wild Teasel		5		-1	SE5			G?T?	IC
Elaeagnaceae	**Oleaster Family**									
Elaeagnus umbellata	Autumn Olive		3		-3	SE3			G?	IR

Appendix D: 161413164 Plant Species List

LATIN NAME	COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WETLAND PLANT SPECIES	WEEDINESS INDEX	PROVINCIAL STATUS	OMNR STATUS	COSEWIC STATUS	GLOBAL STATUS	LOCAL STATUS MIDD
Fabaceae	**Pea Family**									
Robinia pseudo-acacia	Black Locust		4		-3	SE5			G5	IC
Fagaceae	**Beech Family**									
Quercus alba	White Oak	6	3			S5			G5	C
Quercus macrocarpa	Bur Oak	5	1	T		S5			G5	C
Quercus rubra	Red Oak	6	3			S5			G5	C
Juglandaceae	**Walnut Family**									
Juglans nigra	Black Walnut	5	3			S4			G5	X
Malvaceae	**Mallow Family**									
Tilia americana	Basswood	4	3			S5			G5	C
Moraceae	**Mulberry Family**									
Morus alba	White Mulberry		0		-3	SE5			G?	I
Rhamnaceae	**Buckthorn Family**									
Rhamnus cathartica	Common Buckthorn		3	T	-3	SE5			G?	IC
Rhamnus frangula	Glossy Buckthorn		-1	T	-3	SE5			G?	IU
Rosaceae	**Rose Family**									
Crataegus punctata	Large-fruited Thorn	4	5			S5			G5	C
Malus pumila	Common Crabapple		5		-1	SE5			G5	I
Prunus serotina	Black Cherry	3	3			S5			G5	C
Rubus occidentalis	Thimble-berry	2	5			S5			G5	X
Salicaceae	**Willow Family**									
Populus deltoides ssp. deltoides	Eastern Cottonwood	4	-1	T		SU			G5T5	X
Populus tremuloides	Trembling Aspen		0	T		S5			G5	X
Salix sp.	Willow species									
Sapindaceae	**Maple Family**									
Acer negundo	Manitoba Maple	0	-2	T		S5			G5	C
Acer saccharum	Sugar Maple	4	3			S5			G5T?	C
Acer X freemanii	Freeman's / Swamp Maple			I		S4?				
Ulmaceae	**Elm Family**									
Ulmus americana	White Elm	3	-2	T		S5			G5?	X
Ulmus pumila	Siberian Elm		5		-1	SE3			G?	IR
Vitaceae	**Grape Family**									
Parthenocissus inserta	Inserted Virginia-creeper	3	3			S5			G5	X

Appendix D: 161413164 Plant Species List

LATIN NAME	COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	WETLAND PLANT SPECIES	WEEDINESS INDEX	PROVINCIAL STATUS	OMNR STATUS	COSEWIC STATUS	GLOBAL STATUS	LOCAL STATUS MIDD
Vitis riparia	Riverbank Grape	0	-2			S5			G5	C
MONOCOTYLEDONS	**MONOCOTS**									
Poaceae	**Grass Family**									
Bromus inermis	Awnless Brome		5		-3	SE5			G4G5T?	IC
Typhaceae	**Cattail Family**									
Typha angustifolia	Narrow-leaved Cattail	3	-5	I		S5			G5	X

FLORISTIC SUMMARY & ASSESSMENT

Species Diversity

Total Species:		**42**	
Native Species:		**29**	69%
Exotic Species		**13**	31%
Regionally Significant Species		enter manually	
Locally Significant Species		enter manually	
S1-S3 Species	*rare in Ontario*	0	0%
S4 Species	*uncommon in Ontario*	3	11%
S5 Species	*common in Ontario*	25	89%

Co-efficient of Conservatism (C) and Floristic Quality Index (FQI)

mean C		**3.4**	
C 0 to 3	*lowest sensitivity*	14	54%
C 4 to 6	*moderate sensitivity*	10	38%
C 7 to 8	*high sensitivity*	2	8%
C 9 to 10	*highest sensitivity*	0	0%
FQI		**17**	

Presence of Weedy & Invasive Species

mean weediness		**-2.3**	
weediness = -1	*low potential invasiveness*	4	31%
weediness = -2	*moderate potential invasiveness*	1	8%
weediness = -3	*high potential invasiveness*	8	62%

Appendix D: 161413164 Plant Species List

Presence of Wetland (W) Species

average wetness value		**1.9**	
upland	*W of 5*	11	28%
facultative upland	*W of 4, 3 or 2*	13	33%
facultative	*W of 1, 0 or -1*	9	23%
facultative wetland	*W of -2, -3 or -4*	6	15%
obligate wetland	*W of -5*	1	3%
Total Wetland Tolerant (T) Plant Species as identified in OWES Manual		11	
Total Wetland Indicator (I) Plant Species as identified in OWES Manual		2	

APPENDIX E
WILDLIFE HABITAT ASSESSMENT

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Seasonal Concentration Areas			
Waterfowl Stopover and Staging Area (Terrestrial)	Fields with sheet water or utilized by tundra swans during spring (mid-March to May), or annual spring melt water flooding found in any of the following Community Types: Meadow (CUM1), Thicket (CUT1). Agricultural fields with waste grains are commonly used by waterfowl, and these are not considered SWH unless used by Tundra swans in the Long Point, Rondeau, Lake St. Clair, Grand Bend and Point Pelee Areas.	ELC surveys were used to assess features within the Study Area that may support waterfowl stopover and staging areas (terrestrial).	Cultural meadow and thicket communities were identified within the Study Area. The Study Area is not in a region defined in the criteria as being utilized by migrating tundra swans. No waterfowl concentration areas were identified during the NHIC search (LIO, 2015). Habitat for waterfowl stopover and staging areas (Terrestrial) is unlikely to occur within the Study Area.
Waterfowl Stopover and Staging Area (Aquatic)	The following Community Types: Meadow Marsh (MAM), Shallow Marsh (MAS), Shallow Aquatic (SA), Deciduous Swamp (SWD). Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. The combined area of the ELC ecosites and a 100 m radius area is the SWH. Sewage treatment ponds and storm water ponds do not qualify as a SWH; however, a reservoir managed as a large wetland or pond/lake does qualify.	ELC surveys were used to assess features within the Study Area that may support waterfowl stopover and staging areas (aquatic).	A large open aquatic feature is present within the Study Area, however it does not appear to have sufficient vegetation (to be used as a food source) to accommodate large aggregations of waterfowl. No candidate habitat for waterfowl stopover and staging (aquatic) occurred within the Study Area.
Shorebird Migratory Stopover Area	Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of amour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a significant wildlife habitat. The following community types: Meadow Marsh (MAM), Beach/Bar (BB), or Sand Dune (SD)	ELC surveys were used to assess features within the Study Area that may support migratory shorebirds.	No meadow marshes, beach/bars or sand dunes were identified within the Study Area. No shorebird migratory concentration areas were identified during the NHIC search (LIO, 2015). No candidate habitat for shorebird stopover areas occurred within the Study Area.

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Raptor Wintering Area	At least one of the following Forest Community Types: Deciduous Forest (FOD), Mixed Forest (FOM) or Coniferous Forest (FOC), in combination with one of the following Upland Community Types: Meadow (CUM), Thicket (CUT), Savannah (CUS), Woodland (CUW) (<60% cover) Combined area must be >20 ha and provides roosting, foraging and resting habitats for wintering raptors. Upland habitat (CUM, CUT, CUS, CUW), must represent at least 15 ha of the 20 ha minimum size with limited snow accumulation, and limited disturbance.	ELC surveys were used to assess features within the Study Area that may support wintering raptors.	The Study Area contains a suitable amount of forest/upland habitat however, meadow and thicket habitat is isolated from forest habitat by agriculture. No candidate habitat for raptor wintering areas occurred within the Study Area.
Bat Hibernacula	Hibernacula may be found in caves, mine shafts, underground foundations and karsts. May be found in these Community Types: Crevice (CCR), Cave (CCA).	ELC surveys were used to assess features within the Study Area that may support bat hibernacula.	No crevices, caves or abandoned mines are located within the Study Area. No candidate habitat for bat hibernacula occurred within the Study Area.
Bat Maternity Colonies	Maternity colonies considered significant wildlife habitat are found in forested ecosites. Either of the following Community Types: Deciduous Forest (FOD), Mixed Forest (FOM), Deciduous Swamp (SWD) and Mixed Swamp (SWM) that have>10/ha wildlife trees >25cm diameter at breast height (dbh). Maternity colonies can be found in tree cavities, vegetation and often in buildings (buildings are not considered to be SWH). Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3 or class 1 or 2. Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred.	ELC surveys were used to assess features within the Study Area that may support bat maternity colonies.	Candidate habitat for bat maternity colonies may be present within FOD and FOM communities.
Turtle Wintering Areas	Snapping and Midland Painted turtles utilize ELC community classes: Swamp (SW), Marsh (MA) and Open Water (OA). Shallow water (SA), Open Fen (FEO) and Open Bog (BOO).	ELC surveys were used to assess features within the Study Area that may support areas of permanent standing water but not deep enough	Any deep areas of the Thames River with mud substrate provides potential habitat for overwintering turtles within the Study Area. All other open aquatic features within the Study

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
	Water has to be deep enough not to freeze and have soft mud substrate. Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate dissolved oxygen. Man-made ponds such as sewage lagoons or stormwater management ponds should not be considered significant.	to freeze.	Area have been constructed and therefore do not qualify as candidate significant wildlife habitat.
Snake Hibernacula	Hibernation occurs in sites located below frost lines in burrows, rock crevices, broken and fissured rock and other natural features. Human-made constructed rock piles, old stone fences and crumbling foundations qualify as candidate SWH. Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. Any ecosite in southern Ontario other than very wet ones may provide habitat. The following Community Types may be directly related to snake hibernacula: Talus (TA), Rock Barren (RB), Crevice (CCR), Cave (CCA), and Alvar (RBOA1, RBSA1, RBTA1).	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support snake hibernacula.	No rock features or old foundations were identified during the wildlife assessment. No candidate habitat for snake hibernacula occurs within the Study Area.
Colonial-Nesting Bird Breeding Habitat (Bank and Cliff)	Eroding banks, sandy hills, borrow pits, steep slopes, sand piles, cliff faces, bridge abutments, silos, or barns found in any of the following Community Types: Meadow (CUM), Thicket (CUT), Bluff (BL), Cliff (CL). Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. Does not include a licensed/permitted Mineral Aggregate Operation.	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support colonial bird breeding habitat.	No eroding banks, sandy hills, borrow pits, steep slopes and sand piles were present within the Study Area. No candidate habitat for bank or cliff colonial nesting birds occurs within the Study Area.
Colonial-Nesting Bird Breeding Habitat	Identification of stick nests in any of the following Community Types: Mixed Swamp (SWM),	ELC surveys and wildlife habitat assessments were used to assess	No large stick nests were observed during the wildlife assessment.

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
(Tree/Shrubs)	Deciduous Swamp (SWD), Treed Fen (FET). The edge of the colony and a minimum 300 m area of habitat or extent of the Forest Ecosite containing the colony or any island <15 ha with a colony is the SWH. Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used.	features within the Study Area that may support colonial bird breeding habitat (Trees/Shrubs).	No candidate habitat for tree/shrub colonial nesting birds occurred within the Study Area.
Colonial-Nesting Bird Breeding Habitat (Ground)	Any rocky island or peninsula within a lake or large river. For Brewer's Blackbird close proximity to watercourses in open fields or pastures with scattered trees or shrubs found in any of the following Community Types: Meadow Marsh (MAM1-6), Shallow Marsh (MAS1-3), Meadow (CUM), Thicket (CUT), Savannah (CUS).	ELC surveys were used to assess features within the Study Area that may support colonial bird breeding habitat (Ground).	No rocky islands or peninsulas are present within the Study Area. In southern Ontario, Brewer's Blackbird known occurrences are primarily restricted to the Bruce Peninsula; none are known to occur in the Study Area region and it is considered a" very rare irregular spring and autumn transient" (Cadman et al., 2007; Weir, 2008) No candidate habitat for ground colonial nesting birds occurred within the Study Area.
Migratory Butterfly Stopover Areas	Located within 5 km of Lake Ontario A combination of ELC communities, one from each land class is required: Field (CUM, CUT, CUS) and Forest (FOC, FOM, FOD, CUP) Minimum of 10 ha in size with a combination of field and forest habitat present	ELC surveys and GIS analysis were used to assess features within the Study Area that may support migratory butterfly stopover areas.	The Study Area is not within 5 km of Lake Ontario. No Candidate Significant Wildlife Habitat for migratory butterfly stopover areas occurs within the Study Area.
Landbird Migratory Stopover Areas	The following community types: Forest (FOD, FOM, FOC) or Swamp (SWC, SWM, SWD) Woodlots must be >5 ha in size and within 5 km of Lake Ontario; 2-5ha can be considered if rare in an area of shoreline; woodlands within 2 km of Lake Ontario are more significant; largest sites are more significant.	ELC surveys and GIS analysis were used to assess features within the Study Area that may support landbird migratory stopover areas.	The Study Area is not within 5 km of Lake Ontario. No candidate habitat for migratory landbird stopover areas occurs within the Study Area.
Deer Winter Congregation Areas	Woodlots typically > 100 ha in size unless determined by the MNR as significant. (If large woodlots are rare in a planning area >50ha)	No studies required as the MNRF determines this habitat.	No deer winter congregation areas were identified by the MNRF within the Study Area (LIO, 2015).

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
	All forested ecosites within Community Series: FOC, FOM, FOD, SWC, SWM, SWD Conifer plantations much smaller than 50 ha may also be used		No candidate habitat for deer winter congregation areas occurs within the Study Area.
Cliffs and Talus Slopes	A Cliff is vertical to near vertical bedrock >3 m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris Any ELC Ecosite within Community Series: TAO, TAS, TAT, CLO, CLS, CLT Most cliff and talus slopes occur along the Niagara Escarpment	ELC surveys were used to assess features within the Study Area that would be considered cliffs or talus slopes.	No cliffs or talus slopes were identified within the Study Area. No candidate wildlife habitat for cliffs or talus slopes occurs within the Study Area.
Sand Barrens	Sand barrens typically are exposed sand, generally sparsely vegetated and cause by lack of moisture, periodic fires and erosion. Vegetation can vary from patchy and barren to tree covered but less than 60%. Any of the following Community Types: SBO1 (Open Sand Barren Ecosite), SBS1 (Shrub Sand Barren Ecosite), SBT1 (Treed Sand Barren Ecosite).	ELC surveys were used to assess features within the Study Area that would be considered to be sand barrens.	No sand barrens were identified within the Study Area. No candidate wildlife habitat for sand barrens occurs within the Study Area.
Alvars	An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. Any of the following Community Types: ALO1(Open Alvar Rock Barren Ecosite), ALS1 (Alvar Shrub Rock Barren Ecosite), ALT1 (Treed Alvar Rock Barren Ecosite), FOC1 (Dry-Fresh Pine Coniferous Forest), FOC2 (Dry-Fresh Cedar Coniferous Forest), CUM2 (Bedrock Cultural Meadow), CUS2 (Bedrock Cultural Savannah), CUT2-1 (Common Juniper Cultural Alvar Thicket), or CUW2 (Bedrock Cultural Woodland) An Alvar site > 0.5 ha in size	ELC surveys were used to assess features within the Study Area that would be considered to be alvar communities.	No alvars were identified within the Study Area. No candidate wildlife habitat for alvars occurs within the Study Area.

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Rare Vegetation Communities			
Old-growth Forest	Old-growth forests tend to be relatively undisturbed, structurally complex, and contain a wide variety of trees and shrubs in various age classes. These habitats usually support a high diversity of wildlife species. No minimum size criteria t in any of the following Community Types: FOD (Deciduous Forest), FOM (Mixed Forest), FOC (Coniferous Forest) Forests greater than 120 years old and with no historical forestry management was the main criteria when surveying for old-growth forests.	ELC surveys were used to assess features within the Study Area that would be considered to be old-growth forest communities.	No old growth forests were identified within the Study Area. No candidate wildlife habitat for old growth forests occurs within the Study Area.
Savannahs	A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%. In Ecoregion 6E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). Any of the following Community Types: TPS1 (Dry-Fresh Tallgrass Mixed Savannah Ecosite), TPS2 (Fresh-Moist Tallgrass Deciduous Savannah Ecosite), TPW1 (Dry-Fresh Black Oak Tallgrass Deciduous Woodland Ecosite), TPW2 (Fresh-Moist Tallgrass Deciduous Woodland Ecosite), CUS2 (Bedrock Cultural Savannah Ecosite).	ELC surveys were used to assess features within the Study Area that would be considered to be savannah communities.	No savannahs were identified within the Study Area. No candidate wildlife habitat for savannahs occurs within the Study Area.
Tall-grass Prairies	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover. In Ecoregion 6E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). Any of the following Community Types: TPO1 (Dry Tallgrass Prairie Ecosite), TPO2 (Fresh-Moist Tallgrass Prairie Ecosite).	ELC surveys were used to assess features within the Study Area that would be considered to be tall-grass communities.	No tall grass prairies were identified within the Study Area. No candidate wildlife habitat for tall grass prairies occurs within the Study Area.

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Other Rare Vegetation Communities	Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG	ELC surveys were used to assess features within the Study Area that would be considered to be other rare vegetation communities.	No rare vegetation communities were identified within the Study Area. No candidate wildlife habitat for rare vegetation communities occurs within the Study Area.
Specialized Habitat for Wildlife			
Waterfowl Nesting Area	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SWT1, SWT2, SWD1, SWD2, SWD3, SWD4 Note: includes adjacency to Provincially Significant Wetlands	ELC surveys were used to assess features within the Study Area that may support nesting waterfowl.	No marsh or swamp ELC ecosites were identified within the Study Area. No candidate wildlife habitat for waterfowl nesting areas occurs within the Study Area.
Bald Eagle and Osprey nesting, Foraging, and Perching Habitat	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms). ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support nesting, foraging and perching habitat for large raptors.	No large stick nests were identified within the Study Area. No candidate wildlife habitat for Osprey or Bald Eagle habitat occurs within the Study Area.
Woodland Raptor Nesting Habitat	All natural or conifer plantation woodland/forest stands combined >30 ha and with >4 ha of interior habitat. Interior habitat determined with a 200 m buffer. Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small off-shore islands. May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3	ELC surveys, wildlife habitat assessments and GIS analysis were used to assess features within the Study Area that may support nesting habitat for woodland raptors.	There is no interior habitat within the Study Area, and no stick nests were identified in woodland/forest communities during field surveys. No candidate wildlife habitat for woodland raptor nesting occurs within the Study Area.

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Turtle Nesting Areas	Exposed mineral soil (sand or gravel) areas adjacent (<100 m) or within the following ELC Ecosites: MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, BOO1, FEO1 Best nesting habitat for turtles is close to water, away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used.	ELC surveys were used to assess features within the Study Area that may support turtle nesting areas.	No ELC communities were identified within the Study Area that are associated with candidate wildlife habitat for turtle nesting areas. No candidate wildlife habitat for turtle nesting areas occurs within the Study Area.
Seeps and Springs	Seeps/Springs are areas where ground water comes to the surface. Often they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs. Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system	ELC surveys were used to assess features within the Study Area that may support seeps and springs.	Roadside surveys did not allow for the assessment of seeps/springs within forested habitats. There were no headwater areas identified on LIO mapping. Candidate habitat for seeps and springs is not likely to occur within the Study Area.
Amphibian Breeding Habitat (Woodland)	All Ecosites associated with these ELC Community Series; FOC, FOM, FOD, SWC, SWM, SWD Presence of a wetland, lake, or pond within or adjacent (within 120 m) to a woodland (no minimum size). Some small wetlands may not be mapped and may be important breeding pools for amphibians. Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat	ELC surveys and GIS analysis were used to assess features within the Study Area that may support woodland breeding amphibians.	Vernal pools within woodlands could not be assessed due to lack of access, however pond (OA) habitat occurred adjacent (within 120 m) to woodlands. Candidate amphibian breeding habitat (woodland) occurred within the Study Area.

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Amphibian Breeding Habitat (Wetland)	ELC Community Classes SW, MA, FE, BO, OA and SA. Wetland areas >120 m from woodland habitats. Wetlands and pools (including vernal pools) >500 m^2 (about 25 m diameter) supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNR mapping and could be important amphibian breeding habitats. Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. Bullfrogs require permanent water bodies with abundant emergent vegetation.	ELC surveys and GIS analysis were used to assess features within the Study Area that may support wetland breeding amphibians.	Open aquatic ponds >120m from woodland habitats occur within the Study Area. Candidate habitat for wetland amphibian breeding occurred within the Study Area.
Species of Conservation Concern			
Marsh Bird Breeding Habitat	All wetland habitats with shallow water and emergent aquatic vegetation. May include any of the following Community Types: Meadow Marsh (MAM), Shallow Aquatic (SA), Open Bog (BOO), Open Fen (FEO), or for Green Heron: Swamp (SW), Marsh (MA) and Meadow (CUM1) Community Types.	ELC surveys were used to identify marshes with shallow water and emergent vegetation that may support marsh breeding birds.	No swamp, marsh or aquatic habitats with shallow water and emergent aquatic vegetation were observed within the Study Area. No candidate habitat for marsh breeding birds therefore occurs within the Study Area.
Woodland Area-sensitive Bird Breeding Habitat	Habitats >30ha where interior forest is present (at least 200 m from the forest edge); typically >60 years old. These include any of the following Community Types: Forest (FO), Treed Swamp (SW)	ELC surveys and GIS analysis were used to determine whether woodlots that occurred within the Study Area that were >30 ha with interior habitat present (>200 m from edge).	No woodlots exceeded 30 ha in size with interior forest habitat within the Study Area. No candidate wildlife habitat for woodland area-sensitive breeding bird habitat occurs within the Study Area.
Open Country Bird Breeding Habitat	Grassland areas > 30 ha, not Class 1 or Class 2 agricultural lands, with no row-cropping or hay or livestock pasturing in the last 5 years, in the following Community Type: Meadow (CUM).	ELC surveys and GIS analysis were used to identify grassland communities within the Study Area that may support area-sensitive breeding birds.	No non-agricultural grassland communities >30 ha were identified within the Study Area. No candidate wildlife habitat for open country breeding bird habitat occurs within the Study Area.

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Shrub/Early Successional Bird Breeding Habitat	Oldfield areas succeeding to shrub and thicket habitats >10 ha, not Class 1 or Class 2 agricultural lands, with no row-cropping or intensive hay or livestock pasturing in the last 5 years, in the following Community Types: Thickets (CUT), Savannahs (CUS), or Woodlands (CUW).	ELC surveys and GIS analysis were used to identify large CUT, CUS or CUW communities that may support shrub/early successional breeding birds.	One cultural thicket community and several cultural woodland communities were identified within the Study Area however no communities meet the minimum size criteria to be considered candidate significant wildlife habitat. No candidate wildlife habitat for shrub/early successional breeding bird habitat occurs within the Study Area.
Terrestrial Crayfish	Meadow marshes and edges of shallow marshes (no minimum size). Vegetation communities include MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, MAS1, MAS2, MAS3. Construct burrows in marshes, mudflats, meadows Can be found far from water	ELC surveys were used to identify shallow marsh and meadow marsh communities that occurred within the Study Area.	No marsh communities were identified within the Study Area. No Terrestrial Crayfish chimneys were observed within the Study Area.
Special Concern and Rare Wildlife Species (i.e. all special concern and S1-S3 species)			
Bald Eagle *(Haliaeetus leucocephalus)*	Almost always nests near water, usually on large lakes. Large stick nests are placed in trees located within mature woodlots. They usually require 250 ha of mature forest for breeding, however, along Lake Erie, where the lake provides a valuable food source; the eagles will nest in smaller woodlots or even single trees (Sandilands, 2005).		Habitat for this species can be determined through the consideration of Bald Eagle and Osprey Nesting, Foraging and Perching Habitat. No Bald Eagle and Osprey Nesting, Foraging and Perching Habitat was identified within the Study Area.
Common Nighthawk (*Chordeiles minor*)	The Common Nighthawk is an aerial insectivore and forages at dawn and dusk. Common Nighthawks nest on the ground in open habitats preferably with rocky or graveled substrate. Nighthawks will even nest on gravel roofs in the city.		Open habitat for Common Nighthawk is available within graminoid meadow communities throughout the Study Area.
Eastern Wood-Pewee (*Contopus virens*)	A forest bird of deciduous and mixed woods. Nest-site selection favors open space near the nest, typically provided by clearings, roadways, water, and forest edges. Nests are cryptic as they are covered with lichens, typically appearing like a knot on top of a branch (Cadman et al, 2007).		FOD and FOM communities provide suitable habitat for Eastern Wood-Pewee.
Golden-winged Warbler *(Vermivora chrysoptera)*	The Golden-winged warbler is confined to southern Ontario with local concentrations along the southern edge of the Canadian Shield,		Golden-winged Warbler is a relatively rare species within the range of the Study Area. Successional habitat for Golden-winged Warbler

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
	primarily around southeastern Georgian Bay and north of Kingston. Breeding occurs in successional scrub habitats bordered by forests and nests are constructed on the ground (Cadman et al, 2007). Preference is shown towards early successional scrub (10-30 years into succession) and the species will not persist when the stage of succession has succeeded their requirements.		is limited in the Study Area and restricted to one cultural thicket community (THDM2-11that occurs next to a woodland and may provide suitable habitat.
Grasshopper Sparrow (*Ammodramus savannarum)*	Inhabits drier more open grasslands than most other sparrows. It prefers short, sparse grass with patches of exposed ground. Preferred nesting areas are rough or unimproved pastures and in drier, sparsely vegetated grasslands at least 30 ha in size (Cadman et al. 2007).		There are no large expanses of grasslands or pastures within the Study Area.
Louisiana Waterthrush (*Seiurus motacilla*)	Prefers deciduous and mixed forests with a strong Eastern Hemlock component, in deeply incised ravines (Cadman et al. 2007). It will also inhabit large flooded tracts of mature deciduous swamp forest. It shows a preference for nesting along pristine headwater streams and associated wetlands occurring in large expanses of mature forest and less frequently inhabits wooded swamps (COSEWIC, 2006).		There are no deeply incised ravines, flooded swamps, large expanses of mature forest or pristine headwater streams within the Study Area to support this species.
Wood Thrush (*Hylocichla mustelina*)	Prefers deciduous and mixed forests in southern Ontario, ranging from small and isolated to large and contiguous woodlots. The presence of tall trees and a thick understory are preferred (Cadman et al., 2007).		FOD and FOM communities provide suitable habitat for Wood Thrush.
Map Turtle (*Graptemys geographica*)	Map turtles are highly aquatic and inhabit slow moving, large rivers and lakes with soft bottoms and abundant aquatic vegetation. Basking sites include rocks and deadheads adjacent to deep water (COSEWIC 2002) Nesting occurs in soft sand or soil and at a distance from the water, hibernation is communal and occurs at the bottoms of lakes (MacCulloch, 2002). Females leave the water in June to nest (MacCulloch, 2002).		The Thames River provides habitat for Map Turtle.

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Snapping Turtle (*Chelydra serpentina*)	Inhabits ponds, sloughs, streams, rivers, and shallow bays that are characterized by slow moving water, aquatic vegetation, and soft bottoms. Females show strong nest site fidelity and nest in sand or gravel banks at waterway edges in late May or early June.		The Thames River provides habitat for Snapping Turtle. Open aquatic communities may also provide habitat for Snapping Turtle, although they appeared to have limited aquatic vegetation.
Woodland Vole (*Microtus pinetorum*)	Woodland Voles inhabit deciduous forests with a dense layer of leaf litter, woodland or orchard grassy patches, and areas of dense brush. These voles are primarily subterranean, spending the majority of their time underground in burrows that are made in shallow soil or under leaf litter (Reid, 2006).		Habitat for Woodland Vole may be present within the FOD communities.
Hackberry Emperor *(Asterocampa celtis)*	Adults can be found flying in open woodlands and roadsides where hackberry is present (Holmes et al., 1991).		The Hackberry hedgerow at the west end of the Study Area may provide habitat for the Hackberry Emperor.
Tawny Emperor *(Asterocampa clyton)*	A woodland species, never straying far from Hackberry, its larval food plant (Ross et al, 1998).		The Hackberry hedgerow at the west end of the Study Area may provide breeding habitat for the Tawny Emperor.
Amphibian Movement Corridor			
Amphibian Movement Corridor	Corridors may be found in all ecosites associated with water. Determined based on identifying significant amphibian breeding habitat (wetland).	Identified after Amphibian Breeding Habitat - Wetland is confirmed.	Candidate habitat for amphibian movement corridors may occur within the Study Area – can only be determined based on confirmed amphibian breeding habitat (wetland).

APPENDIX F
SPECIES AT RISK

Appendix E: 161413164 Endangered and Threatened Species Habitat Assessment

Species	COSSARO Status (S-Rank)	Background Review Source	Habitat	Potential Habitat Present Y/N
VASCULAR PLANTS				
American Chestnut (*Castanea dentata*)	Endangered (S2)	NHIC, 2015	Upland deciduous forest on acid to neutral, sandy soil (COSEWIC, 2004)	Y - FOD
Eastern Flowering Dogwood (*Cornus florida*)	Endangered (S2)	NHIC, 2015	An understory plant of dry to fresh deciduous and mixed forests, which frequently grows on the tops of slopes or other dry microsites, and occasionally in moister areas where no flooding occurs; preferred soils range from sand to sandy loam and clay loam (COSEWIC, 2007)	Y – FOD and FOM communities
Butternut (*Juglans cinerea*)	Endangered (S3?)	Farrar, 1995	Found in a variety of habitats throughout Southern Ontario, including woodlands and hedgerows ideal habitat includes rich, moist, and well-drained soils often found along streams, but may also be found on well-drained gravel sites, particularly those made of limestone (COSEWIC, 2003)	Y – all wooded communities including hedgerows
Red Mulberry (*Morus rubra*)	Endangered (S2)	Farrar, 1995	Occurs in moist forests and thickets (NHIC 2010).	Y – Potential habitat in the FODM7-7 and THDM2-11 communities, however quite rare
BIRDS				
Bank Swallow (*Riparia riparia*)	Threatened (S4B)	Cadman et al., 2007	Excavates nests in exposed earth banks along watercourses and lakeshores, roadsides, stockpiles of soil, and the sides of sand and gravel pits. Adjacent grasslands and watercourses used for foraging habitat (Cadman et al., 2007).	N - no exposed banks observed in the Study Area
Barn Swallow (*Hirundo*	Threatened (S4B)	Cadman et al., 2007	Nests on walls or ledges of barns as well as on other	Y – possible nest location under Thames River Bridge;

Species	COSSARO Status (S-Rank)	Background Review Source	Habitat	Potential Habitat Present Y/N
rustica)			human-made structures such as bridges, culverts or other buildings (Cadman et al., 2007)	bridge was not checked for nests during field investigations; bridge should be surveyed for potential nesting Barn Swallows during the breeding bird season.
Bobolink (Dolichonyx oryzivorus)	Threatened (S4B)	Cadman et al., 2007	Nests primarily in forage crops with a mixture of grasses and broad-leaved forbs, predominantly hayfields and pastures. (COSEWIC 2010). Bobolink is an area-sensitive species, with reported lower reproductive success in small habitat fragments (Kuehl and Clark 2002; Winter et al. 2004).	N – graminoid meadow, pasture and hay field habitats are not large enough to provide suitable habitat for Bobolink
Chimney Swift (*Chaetura pelagica*)	Threatened (S4)	Cadman et al., 2007	Uses chimneys for roosting and breeding, as well as walls, rafters, or gables of buildings and, less frequently, natural structures such as hollow trees, tree cavities and cracks in cliffs (Cadman et al., 2007)	N – no chimneys suitable for roosting occurred in the Study Area.
Eastern Meadowlark (*Sturnella magna*)	Threatened (S4B)	Cadman et al., 2007	Typically occurs in meadows, hayfields and pastures. However, it will utilize a wider range of habitat than most grassland species, including mown lawn (e.g. golf course, parks), wooded city ravines, young conifer plantations and orchards (Peck and James 1983).	Y - potential breeding habitat within graminoid meadow and pasture
Henslow's Sparrow (*Ammodramus henslowii*)	Endangered (SHB)	NHIC, 2015	A species of open habitats, consisting of weedy fields and meadows, preferably moist, with a mixture of grasses, forbs and scattered shrubs (Herkert et al., 2002). In general, the species	N – graminoid meadow and pasture are not large enough to provide suitable habitat for Henslow's Sparrow.

Species	COSSARO Status (S-Rank)	Background Review Source	Habitat	Potential Habitat Present Y/N
			prefers large areas of tall, dense grass with a well-developed litter layer and standing dead forb vegetation for singing perches. Sparse to no woody vegetation is important. Henslow's Sparrows are area sensitive generally preferring 50 hectares of more of suitable nesting habitat (Herkert, 1991).	
Least Bittern (Ixobrychus exilis)	Threatened	Cadman et al., 2007	Nests in freshwater marshes where dense aquatic vegetation occurs with woody vegetation and open water. They are found most commonly in marshes greater than 5 ha in size (Gibbs et al., 1992).	N – no marsh habitats occurred within the Study Area
Yellow-breasted Chat (*Icteria virens*)	Endangered (S2B)	NHIC, 2015	Prefers scrubby, early successional habitat; dense tangles of grape vine and raspberry are features of most breeding sites. Yellow-breasted Chats have been recorded in shrub thickets, woodland edges, hedgerows, regenerating abandoned fields and young coniferous plantations, and in hydro and rail rights-of-way (Cadman et al. 2007).	Y – THDM2-11 community
REPTILES				
Eastern Spiny Softshell (*Apalone spinifera spinifera*	Threatened (S3)	NHIC, 2015	Associated with Lake Erie, especially the Sydenham and Thames Rivers. Spiny softshells require sandy beaches and riverbanks for nesting, shallow soft-bottomed water bodies to function as nurseries and	Y – Thames River

Species	COSSARO Status (S-Rank)	Background Review Source	Habitat	Potential Habitat Present Y/N
			refugia, basking areas and deep pools for thermoregulation, and riffle areas for foraging, habitat features may occur over a large area, as long as the intervening habitat doesn't prevent the turtles from travelling between them (COSEWIC 2002).	
Blanding's Turtle (*Emydoidea blandingi*)	Threatened	NHIC, 2015	Frequents lakes, ponds, and marshes, and prefers shallow water with abundant aquatic vegetation and a soft bottom (MacCulloch, 2002). They prefer shallow water that is rich in nutrients, organic soil and dense vegetation. Adults usually occupy open or partially vegetated sites, whereas juveniles occupy areas with thick aquatic vegetation including sphagnum, water lilies and algae. Nesting occurs in dry conifer or mixed hardwood forests, up to 410 m from any body of water, in loose substrates including sand, organic soil, gravel and cobblestone, nesting may also occur along gravel roadways (COSEWIC, 2005).	N – open aquatic ponds have limited vegetation and do not provide suitable habitat
Queen Snake	Endangered (S2)	ORAA, 2015	Habitat for this species is highly specialized and it is rarely found more than 3 m from water. Requires permanent area of water, flowing or still, with a temperature at or above 18.3C throughout most of the active season; abundant cover, such as flat rocks	Y- Thames River

Species	COSSARO Status (S-Rank)	Background Review Source	Habitat	Potential Habitat Present Y/N
			submerged and/or on the bank; and an abundance of crayfish (Wood, 1949).	
Eastern Hognose Snake (*Heterodon platirhinos*)	Threatened (S3)	ORAA, 2015	Requires well-drained loose or sandy soil; open vegetative cover such as open woods; brushland or forest edge; relatively close proximity to water; and climatic conditions typical of the eastern deciduous forest. They are a wide ranging species, often with home ranges up to 100ha (COSEWIC, 2007). Requires habitat with an abundance of toads as prey for adults as well an adequate supply of small amphibians such as salamanders or spring peepers, to sustain hatchlings and juveniles (Schueler 1996).	N – no open, sandy soils observed
MAMMALS				
American Badger (Taxidea taxus jacksoni)	Endangered	NHIC, 2015	The badger requires large expanses of open habitat with deep soils. It requires areas of habitat large enough to sustain sufficiently large prey populations (Ontario American Badger Recovery Team, 2010). It prefers open grasslands, agricultural areas and parklands (Eder, 2002). From 1980 on, most records have been from Norfolk and Middlesex counties, and most commonly from areas in proximity to Lake Erie (Ontario American Badger Recovery Team, 2010).	Y - Actively managed agricultural lands and some limited graminoid meadow habitat were present, however the Study Area was also comprised of much commercial and residential development, where badgers are unlikely to occur.
Small-footed Myotis (*Myotis*	Endangered (S2S3)	Dobbyn, 1994	Inhabits deciduous and coniferous forests, roosts in	Y – potential bat maternity roost habitat within FOD and

Species	COSSARO Status (S-Rank)	Background Review Source	Habitat	Potential Habitat Present Y/N
leibii)			crevices or under bark, and hibernates in caves and mines (Reid, 2006).	FOM Communities No hibernacula features observed or known to occur.
Little Brown Myotis (*Myotis lucifugus*)	Endangered (S4)	Dobbyn, 1994	Commonly found near waterbodies in buildings, attics, roof crevices and loose bark on trees or under bridges (Eder, 2002).	Y – potential bat maternity roost habitat within FOD and FOM Communities No hibernacula features observed or known to occur.
Northern Myotis (Myotis septentrionalis	Endangered (S3?)	Dobbyn, 1994	Resident bat of upland forests of eastern North America, typically foraging for aerial insects in the forest understory. Maternity roosts are located under bark or in buildings with young born in June and July while hibernating colonies typically reside in cave crevices (Reid, 2006).	Y – potential bat maternity roost habitat within FOD and FOM Communities No hibernacula features observed or known to occur.

Stantec

Memo

To: Corri Marr
London

From: Janice Ball
Waterloo

File: Old River Road Improvements
161413164

Date: March 14, 2016

Reference: Summary of a Desktop Natural Heritage Analysis of the Old River Road Streetscape

This memo has been prepared to provide a summary of a desktop natural heritage analysis conducted for Old River Road in the Municipality of Middlesex Centre, Ontario. The purpose of the desktop analysis was to identify natural and anthropogenic features along Old River Road in order to assess the potential impact of proposed road improvements.

A Natural Environment Assessment was completed by LCA Environmental Consultants (LCA, 2011) to support the Old River Road Reconstruction Schedule B Class Environmental Assessment (Spriet Associates, 2011). This desktop natural heritage analysis provides an update to the background review section of the LCA report, including updated species at risk and provincially rare species data, and designated natural heritage features information. A desktop Ecological Land Classification (ELC) assessment of vegetation communities, and a desktop wildlife habitat assessment was also conducted as part of this memo.

Aquatic habitat assessment details have been included from field investigations that were conducted in 2015 to determine existing conditions associated with the draft Glendon Drive Streetscape Environmental Assessment Study Area. Results of 2015 ELC surveys conducted as part of the Glendon Drive existing conditions study were also included in this memo, however classifications were limited to the area within 120m from the intersection of Glendon Drive and Old River Road.

METHODS

The background review included the following resources:

- Natural Heritage Information Centre (NHIC) database (last updated February 18, 2015);
- Ontario Ministry of Natural Resources and Forestry's (MNRF) Land Information Ontario (LIO) digital mapping (LIO, 2015);
- Fisheries and Ocean's Canada (DFO) aquatic species at risk (SAR) mapping (DFO, 2015);
- Middlesex County Official Plan (2006) and Middlesex Natural Heritage Systems Study (2014);
- Natural Heritage Assessment for the Old River Road Reconstruction Schedule B Class Environmental Assessment (LCA Environmental Consultants, 2011);
- Old River Road Reconstruction Schedule B Class Environmental Assessment (Spriet Associates 2011);

- The Ontario Reptile and Amphibian Atlas (ORAA; Ontario Nature, 2015);
- Ontario Breeding Bird Atlas (OBBA; Cadman et al, 2007); and
- Atlas of the Mammals of Ontario (AMO; Dobbyn, 1994).

ELC community delineation followed the ELC field guide for Southern Ontario (Lee et al., 1998 with 2008 updates). Communities were delineated using the on-line Google Maps program (Google 2016) which included Google Streetview. Due to the limitations of the desktop analysis, vegetation community classification was limited to broad categories only (Ecosite except where previously assessed in the field as part of the Glendon Drive existing conditions study). Based on the vegetation community analysis, potential candidate significant wildlife habitat features were also analyzed using the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNRF, 2015).

An aquatic habitat assessment was conducted on September 17, 2015, to assess the watercourses identified by LIO (LIO, 2015) within the Study Area. Field investigations took place within the road right of way (ROW) due to property access limitations. Habitat data consisted of a general description of the watercourse, (i.e., dimensions, bank stability, morphology) and identification of features that typically contribute to fish habitat (i.e., in-water and riparian cover, substrate). The data were used to characterize aquatic habitat within the Study Area and to identify potential fisheries and aquatic habitat constraints. Fish collections were not completed as part of the assessment. Watercourses were photographed and *in situ* water quality parameters (dissolved oxygen, conductivity, pH and temperature) were measured and recorded. The Thames River was not assessed as part of these field investigations due to the availability of background data.

BACKGROUND REVIEW

SIGNIFICANT NATURAL AREAS

According to the Land Information Ontario (LIO) on-line Natural Heritage Mapping program (LIO, 2015), the Oxbow Creek flows under Old River Road near the intersection of Glendon Drive, and it is surrounded by a woodland feature designated as the Komoka Park Reserve Area of Natural and Scientific Interest (ANSI).

The Middlesex County Official Plan (2006; the OP) was reviewed to identify Significant Woodlands. Schedule C of the OP identifies Significant Woodlands in the Study Area (Figure 1). The identification and limits of Significant Woodlands can be refined through site specific study. The Natural Heritage Reference Manual (NHRM, 2010) provides guidance for identifying Significant Woodlands. Based on the NHRM, all woodland ELC units 4 ha in size or larger are expected to qualify as Significant Woodland. ELC types in the Study Area that may qualify as woodlands include: mixed forest (FOM), deciduous forest (FOD) and deciduous woodland (WOD). Other factors such as community composition, diversity, age and function may also be considered when identifying Significant Woodlands.

The Middlesex Natural Heritage Systems Study (2014) identifies Significant Vegetation Patches and provides guidance for identifying preservation priorities. These patches are consistent with the Significant Woodlands identified in the Middlesex County OP.

SPECIES AT RISK AND PROVINCIALLY RARE SPECIES

A review of the available background information identified the following records of provincial species at risk (endangered, threatened or special concern) and provincially rare (S1-S3) species that may occur within the Study Area (discussed below under separate headers for wildlife, flora and aquatic species).

Wildlife Species

The Ontario Reptile and Amphibian Atlas (ORAA; Ontario Nature, 2015), Ontario Breeding Bird Atlas (OBBA; Cadman et al, 2007) and the Atlas of the Mammals of Ontario (AMO; Dobbyn, 1994) were accessed to compile a list of all wildlife species with ranges that overlap with the Study Area (see attached Wildlife Species List), including provincial species at risk (endangered, threatened or special concern) and provincially rare (S1-S3) species. The wildlife atlas range maps are relatively coarse in nature and do not offer precise locations or information on concentrations/densities of records; e.g., the OBBA records are provided in 10 km by 10 km square grids.

The NHIC database provides more precise mapping for wildlife species at risk and provincially rare wildlife species than the atlases (1 km by 1 km squares), and is a better indicator of occurrence of significant species, particularly when used in combination with MNRF correspondence (pending). A complete list of wildlife species at risk and provincially rare wildlife species identified within the range of the Study Area through the NHIC background review is also included in the attached Wildlife Species List.

A total of 2 butterflies, 12 amphibians, 11 reptiles, 109 birds, 42 mammals were identified from the atlas searches and NHIC data.

Of these species records, 7 are provincially endangered and 9 are threatened species and therefore receive species and habitat protection under the Endangered Species Act of Ontario (ESA), 2007. Threatened and endangered species include: Spiny Softshell (*Apalone spinifera spinifera*), Blanding's Turtle (*Emydoidea blandingi*), Queen Snake (*Regina septemvittata*), Eastern Hog-nosed Snake (*Heterodon platirhinos*), Least Bittern (*Ixobrychus exilis*), Chimney Swift (*Chaetura pelagica*), Bank Swallow (*Riparia riparia*), Barn Swallow (*Hirundo rustica*), Yellow-breasted Chat (*Icteria virens*), Henslow's Sparrow (*Ammodramus henslowii*), Bobolink (*Dolichonyx oryzivorus*), Eastern Meadowlark (*Sturnella magna*), Small-footed Myotis (*Myotis leibii*), Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*) and American Badger (*Taxidea taxus jacksoni*). Species at risk designated as special concern and/or provincially rare species are not afforded protection under the ESA.

An additional 13 are species of conservation concern (i.e. those that are ranked S1-S3 or are provincial species of special concern). This includes 2 butterflies, 3 reptiles, 7 birds and 1 mammal as detailed in the attached Wildlife Species List. Habitat for species of conservation concern is a category of significant wildlife habitat, and presence of these species and their habitat is assessed in the Candidate Significant Wildlife Habitat Section.

Vascular Plant Species

A complete list of vascular plant species at risk and provincially rare wildlife species identified within the range of the Study Area through the NHIC background review is provided below.

- Green Dragon (*Arisaema dracontium*) – S3
- Tuberous Indian-plantain (*Arnoglossum plantagineum*) – S3
- Schweinitz's Sedge (*Carex schweinitzii*) – S3
- Rigid Sedge (*Carex tetanica*) – S3
- Hairy-fruited Sedge (*Carex trichocarpa*) – S3
- American Chestnut (*Castanea dentata*) – endangered
- Eastern Flowering Dogwood (*Cornus florida*) – endangered
- Middlesex Frosted Hawthorn (*Crataegus perjucunda*) – S1?
- Lowland Brittle Fern (*Cystopteris protrusa*) – S2
- Blue Ash (Fraxinus quadrangulata) – S2?
- Eastern Green-violet (*Hybanthus concolor*) – S2
- Yellow Stargrass (*Hypoxis hirsuta*) – S3
- Sharp-fruited Rush (*Juncus acuminatus*) – S3
- Purple Twayblade (*Liparis liliifolia*) – S2
- Hoary Puccoon (Lithospermum canescens) – S3
- Soft-hairy False Gromwell (*Lithospermum parviflorum*) – S2
- Scarlet Beebalm (*Monarda didyma*) – S3
- Spotted Beebalm (*Monarda punctata*) – S1
- Slim-flowered Muhly (*Muhlenbergia tenuiflora*) – S2
- Cleland's Evening Primrose (*Oenothera clelandii*) – S1
- False Tomentose Balsam Groundsel (*Packera paupercula var. pseudotomentosa*) – S2S3
- Bristly Buttercup (Ranunculus hispidus var. hispidus) – S3
- Great Plains Ladies'-tresses (*Spiranthes magnicamporum*) – S3?

Two of these species, American Chestnut and Eastern Flowering Dogwood, are endangered and therefore protected by the ESA (2007). The remaining species are not afforded protection under the ESA; i.e., they are species at risk designated as special concern and/or provincially rare species and are addressed under the assessment of candidate significant wildlife habitat.

Endangered tree species whose geographic range overlaps with the Study Area that were not identified in the NHIC database include Butternut (*Juglans cinerea*) and Red Mulberry (*Morus rubra*) (Farrar, 1995).

Aquatic Species

LIO digital mapping (LIO, 2015) indicates the presence of two watercourses within the Study Area (Oxbow Creek and the Thames River). Details for each watercourse are summarized below, including the presence of aquatic species at risk according to DFO aquatic SAR mapping (DFO, 2015). A summary table for all aquatic SAR is included in Table 2, below the watercourse summaries.

Oxbow Creek

According to DFO aquatic SAR mapping (DFO, 2015), the upper reaches of Oxbow Creek (upstream of the Study Area) are mapped for listed mussel species and may be one or more of Rainbow (*Villosa iris*), Kidneyshell (*Ptychobranchus fasciolaris*), Mapleleaf (*Quadrula quadrula*), Rayed Bean (*Villosa fabalis*), Round Pigtoe (*Pleurobema sintoxia*) and Salamander Mussel (*Simpsonaias ambigua*). MNRF's Natural Heritage Information Centre (NHIC) online database (NHIC,

2015) only showed Rainbow (*Villosa iris*) as being a potential SAR in Oxbow Creek. Spotted Sucker (*Minytema melanops*) is identified as occurring in Oxbow Creek however it is not a protected species. The provincial and federal status of species listed on the DFO's mapping for the UTRCA is provided in Table 2.

The majority of Oxbow Creek is classified as a coldwater system. LIO (2015) data suggests that Oxbow Creek serves as habitat for White Sucker (*Catostomus commersonii*), Brook Stickleback (*Culaea inconstans*), Northern Hog Sucker (*Hypentelium nigricans*), Hornyhead Chub (*Nocomis biguttatus*), Common Shiner (*Luxilus cornutus*), Rainbow Trout (*Oncorhynchus mykiss*), and Largemouth Bass (*Micropterus salmoides*).

Thames River

According to DFO's mapping (DFO, 2015) and the MNRF's NHIC online database, the Thames River supports Eastern Sand Darter (*Ammocrypta pellucida*) and is also mapped as critical habitat for this species (NHIC, 2015). Kidneyshell (*Ptychobranchus fasciolaris*), Mapleleaf (*Quadrula quadrula*), Rainbow (*Villosa iris*), Rayed Bean (*Villosa fabalis*), Round Pigtoe (*Pleurobema sintoxia*) and Salamander Mussel (*Simpsonaias ambigua*) may occur in the Thames River, which is also mapped as critical habitat for mussels.

The Thames River is a warmwater system and supports a diversity of large and small-bodied fish species including Yellow Perch (*Perca flavescens*), Largemouth Bass (*Micropterus salmoides*), Smallmouth Bass (*Micropterus dolomieu*), Bullhead species (*Ictaluridae),* Sunfish species (*Centrarchidae*), Longnose Gar (*Lepiososteus osseus*), Emerald Shiner (*Notropis atherinoides*), Ghost Shiner (*Notropis buchanani*), Gizzard Shad (*Dorosoma cepedianum*) and Redhorse species (*Moxostoma*).

Table 2: Aquatic SAR Status Summary

Fish Species	COSSARO Status	SARA[a] Status and Schedule	COSEWIC Status
Spotted Sucker (*Minytema melanops*)	Special Concern	Schedule 1 Special Concern	Special Concern
Eastern Sand Darter (Ammocrypta pellucida)	Endangered	Schedule 1 Threatened	Threatened
Pugnose Minnow (*Opsopoeodus emiliae*)	Threatened	Schedule 1 Special Concern	Threatened
Silver Shiner (*Notropis photogenis*)*	Threatened	Schedule 3 Special Concern	Threatened
Mussel Species	COSSARO Status	SARA[a] Status and Schedule	COSEWIC Status

Kidneyshell (*Ptychobranchus fasciolaris*)	Endangered	Schedule 1 Endangered	Endangered
Mapleleaf (*Quadrula quadrula*)	Threatened	Schedule 1 Endangered	Endangered
Rainbow (*Villosa iris*)	Threatened	Schedule1 Endangered	Endangered
Rayed Bean (*Villosa fabalis*)	Endangered	Schedule 1 Endangered	Endangered
Round Pigtoe (*Pleurobema sintoxia*)	Endangered	Schedule 1 Endangered	Endangered
Salamander Mussel (*Simpsonaias ambigua*)	Endangered	Schedule 1 Endangered	Endangered
* under consideration for listing on SARA Schedule 1			

Stantec is awaiting a response from the MNRF to determine whether there are any additional species at risk or provincially rare species that are of concern in proximity to the Study Area (see attached).

VEGETATION COMMUNITIES

The Study Area along Old River Road was comprised mainly of woodland and residential and agricultural lands. Old River Road is located adjacent to the Thames River, with a narrow strip of vegetation between the road and the river. The Oxbow Creek flows under Old River Road near the intersection of Glendon Drive, and it is surrounded by a woodland feature designated as the Komoka Park Reserve ANSI.

Vegetation communities identified within the Study Area during the desktop analysis are summarized in Table 1 and mapped on Figure 1.

Table 1: Summary of Vegetation Communities

CODE	DESCRIPTION	Vegetation Characteristics
Upland Communities		
Forest		
FOM	Mixed Forest	• One FOM community was located northwest of the intersection of Glendon Drive and Old River Road. This community extended west along the south side

CODE	DESCRIPTION	Vegetation Characteristics
		of Oxbow Creek, parallel to Glendon Drive, and was surrounding by deciduous forest to the north and south. • A second FOM community occurred on the south side of the Thames River, and a third FOM community occurred at the terminus of Pulham Road, east of the Study Area.
FOD	Deciduous Forest	• An extensive FOD community was located on the north side of Old River Road, however the majority of this community was located behind residential properties, away from the ROW. This community was identified as a Significant Woodland in the Middlesex County Official Plan. • A smaller FOD was located on the east side of Old River Road. This community was also located behind residential properties, and away from the ROW. • A small FOD community was located on the northeast corner of the intersection of Old River Road and Glendon Drive. • Lowland FOD communities lined the south bank of the Thames River adjacent to Glendon Drive.
FODM1-1*	Dry-Fresh Red Oak Deciduous Forest	• The FODM1-1 community was dominated by Red Oak in the canopy with White Oak, Bur Oak, Sugar Maple and Black Cherry as associates. • The FODM1-1 community extended along the northern edge of Glendon Drive; only a small section occurred in the Study Area.
FODM11	Naturalized Deciduous Hedgerow	• One naturalized deciduous hedgerow occurred in the Study Area. It appeared to be a narrow extension of the FOD community that extended between Old River Road and an agricultural community.
Woodland		
WOD	Deciduous Woodland	• The WOD community occurred between Old River Road and the Thames River in the ROW. Google Streetview showed that the community was comprised of lowland tree species including Manitoba Maple and Black Walnut; occasional planted ornamental species also occurred along the roadside.
WODM4-4*	Dry – Fresh Black Walnut Deciduous Woodland	• The canopy of the WODM4-4 community was dominated exclusively by young to mid-aged Black Walnut.
Wetland Communities		

CODE	DESCRIPTION	Vegetation Characteristics
MASM1-1	Cattail Mineral Shallow Marsh	• The MASM1-1 community was located north of Old River Road, in close proximity to the ROW. • Google Streetview showed that the MASM1-1 community was dominated by cattails.
Open Aquatic		
OA	Open Aquatic Community Series	• Two small open aquatic features occurred within the Study Area, on the west side of Old River Road; both appeared to be constructed ponds. The larger of the two ponds was approximately 20m from the roadside.
Constructed Communities		
Agricultural		
OAGM1	Annual Row Crops	• There was an abundance of agricultural crops across the landscape. • Unknown annual row crops occurred adjacent to Old River Road at the north end of the Study Area. • One hay field was present within the Study Area between Old River Road and Pulham Road (labelled OAGM1 – Hay).
Constructed		
CVR	Residential	• Residential properties were abundant along Old River Road. Vegetation mainly consisted of manicured lawns and ornamental/non-native tree species.
Non-ELC Communities		
HR	Hedgerow	• This sparse hedgerow community was located between Old River Road and the railroad tracks, and was comprised of deciduous shrub species.

*Identified during 2015 field investigations to support the Draft Glendon Drive EA.

None of the vegetation communities listed above are considered rare in the province.

CANDIDATE SIGNFICANT WILDLIFE HABITAT

Candidate significant wildlife habitat (CSWH) pursuant to the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNR, 2015) was assessed using the ELC vegetation community desktop analysis and GIS analysis. CSWH includes features in the following categories: (a) seasonal concentration areas, (b) rare or specialized habitat, (c) habitat for species of conservation concern, and (d) animal migration corridors. A description of the CSWH criteria and an assessment of the potential presence within the Study Area is attached. A summary of all candidate wildlife habitat identified through this assessment is provided in the text below.

The following candidate wildlife habitats may occur in the Study Area:

- Waterfowl Stopover and Staging Area (Aquatic): The Thames River may provide stopover and staging habitat for migrating waterfowl.
-
- Bat Maternity Colonies: Mature deciduous and mixed forest communities (FOD and FOM) identified throughout the Study Area may provide habitat for bat maternity colonies.
- Turtle Wintering Areas: Any deep water pool areas within the Thames River may provide overwintering habitat for turtles.
- Colonial-Nesting Bird Breeding Habitat (Bank and Cliff): Eroding banks may be present along the Thames River which may provide habitat for bank colonial nesting birds may occur within the Study Area.
- Bald Eagle and Osprey nesting, Foraging, and Perching Habitat: There is a potential for Bald Eagle or Osprey nesting, foraging and perching habitat within the Study Area, as these features could not be observed using Google Streetview.
- Turtle Nesting Areas: Turtle nesting areas may be associated with the MASM1-1 cattail marsh.
- Seeps and Springs: There is a potential for seeps and springs to occur within the forested communities, as these features could not be observed using Google Streetview.
- Amphibian Breeding Habitat (Woodlands): Open aquatic ponds within 120m of a woodland may provide amphibian breeding habitat. Vernal pools within woodlands could not be determined using Google Streetview, and may also provide amphibian breeding habitat.
- Marsh Breeding Bird Habitat: The MASM1-1 cattail marsh may provide breeding habitat for marsh birds.
- Terrestrial Crayfish Habitat: The MASM1-1 cattail marsh may provide habitat for Terrestrial Crayfish.
- Habitat for Special Concern and Rare Wildlife Species: Wildlife species habitat that may occur within the Study Area includes habitat for Wood Thrush, Eastern Wood-Pewee, Golden-winged Warbler, Map Turtle, Snapping Turtle, Eastern Milksnake, Woodland Vole, Hackberry Emperor and Tawny Emperor.

AQUATIC HABITAT ASSESSMENT

Oxbow Creek

Oxbow Creek is a natural watercourse located north of the intersection of Glendon Drive and Old River Road, and is surrounded by lands designated as the Komoka Park Reserve ANSI. Oxbow Creek was assessed at Old River Road (northeast end of the Study Area) and at Vanneck Road (upstream of the Study Area).

The Old River Road Bridge is immediately upstream of the confluence with the Thames River. At this location, Oxbow Creek was dominated by riffle morphology. The substrate was comprised of cobble, boulder, gravel and sand. The mean watercourse wetted width was approximately 9 m and bankfull width was approximately 12 m. The maximum pool depth was 25 cm and mean water depth within in the vicinity of the bridge was 15 cm. The banks in this section of Oxbow Creek appeared to be stable as they are supported by vegetation and boulders. The riparian area of this reach was dominated by sycamore (*Platanus sp*.), Manitoba maple (*Acer negundo*) and staghorn sumac (*Rhus typhina*). In-water cover consisted of boulders. No fish were observed at this reach during field investigations; however, this section of the creek may provide spawning habitat for fish entering the creek from the Thames River.

At the Vanneck Road bridge Oxbow Creek was dominated by run morphology with some pools. Substrate was comprised of cobble, boulder, sand, gravel and clay. The mean watercourse wetted width was approximately 9 m and bankfull width was approximately 11 m. The maximum pool depth was 40 cm and mean water depth in the vicinity of the bridge was 25 cm. The majority of the creek banks in this reach were vegetated and stable. Throughout this reach, the riparian area was dominated by Sycamore (*Platanus sp*.), Staghorn Sumac (*Rhus typhina*), Virginia Creeper (*Parthenocissus quinquefolia*) and River Bank Grape (*Vitis riparia*). In-water cover consisted of deep pools, overhanging vegetation, undercut banks and boulders. Cyprinids, Common Carp and darter species were observed from the bridge and creek banks during the field investigation. Based on field investigations, this section of Oxbow Creek most likely provides spawning, nursery and rearing habitat for some of the coldwater fish species known to occur in Oxbow Creek.

In situ water quality data recorded for Oxbow Creek are provided in Table 3.

Table 3: Water Quality Results at Oxbow Creek; September 17, 2015

Station	Water Temperature (°C)	Dissolved Oxygen (mg/L)	pH	Conductivity (µS/cm)
Oxbow Creek – Vanneck Road Crossing	16.9	8.6	8.16	491

SPECIES AT RISK HABITAT ASSESSMENT

Wildlife species at risk identified through the background review are provided in the attached Wildlife Species List.

The potential for these species to occur within the Study Area will be limited by the habitats that are available. Vegetation communities that have been identified in Table 1 and shown on Figure 1, provide an assessment of the habitat suitability for endangered and threatened species that were identified through the background review.

An assessment of habitat availability for endangered and threatened wildlife species is provided in the attached Species at Risk Assessment Table. Species for which suitable habitat may occur within the Study Area based on this assessment include; American Chestnut, Eastern Flowering Dogwood, Butternut, Red Mulberry, Barn Swallow, Eastern Meadowlark, Wood Thrush, Yellow-Breasted Chat, Eastern Spiny Softshell (Thames River), Queen Snake (Thames River), American Badger, Small-footed Myotis, Little Brown Myotis and Northern Myotis.

An assessment of habitat availability for wildlife species of provincial concern is provided in the attached Significant Wildlife Habitat Assessment Table under the Special Concern and Rare Wildlife Species heading. Species potentially present in the Study Area based on this assessment include; Common Nighthawk, Eastern Wood-Pewee, Golden-winged Warbler, Wood Thrush, Map Turtle, Snapping Turtle, Eastern Milksnake, Woodland Vole, Hackberry Emperor and Tawny Emperor.

STANTEC CONSULTING LTD.

Janice Ball, B.Sc.
Terrestrial Ecologist
Phone: (519) 585-7287
janice.ball@stantec.com

Attachment: Figure 1: Ecological Land Classification
Wildlife Species List
Species at Risk Assessment Table
Significant Wildlife Habitat Assessment Table
MNRF Information Request

c. Sean Spisani, Senior Ecologist, Stantec Consulting Ltd.

REFERENCES

Cadman, M.D., D.A. Sutherland, G.G. Beck, D. Lepage, A.R. Couturier. 2007. Atlas of the Breeding Birds of Ontario, 2001-2005. (eds) Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of natural resources, and Ontario Nature, Toronto, xxii +706pp.

COSEWIC 2002. COSEWIC assessment and update status report on the Milksnake Lampropeltis tirangulum in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. . vi + 29 pp.

COSEWIC 2002. COSEWIC assessment and status report on the northern map turtle Graptemys geogrphica in Canada. Committee on the Status of Endangere Wildlife in Canada. Ottawa. vi + 34 pp.

COSEWIC 2006. COSEWIC assessment and status report on the Golden-winged Warbler Vermivora chrysoptera in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 30 pp.

COSEWIC 2006. COSEWIC assessment and update status report on the Louisiana Waterthrush Seiurus motacilla in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 26 pp

COSEWIC. 2007. Canadian Species at Risk. Committee on the Status of Endangered Wildlife in Canada.

COSEWIC 2007. COSEWIC assessment and status report on the Common Nighthawk Chordeiles minor in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 25 pp

COSEWIC. 2007. COSEWIC assessment and status report on the eastern flowering dogwood Cornus florida in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa vi + 22pp. (www.sararegistry.gc.ca/status/status_e.cfm)

COSEWIC. 2007. COSEWIC assessment and update status report on the Eastern Hog-nosed Snake Heterodon platirhinos in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. viii + 36 pp

Department of Fisheries and Oceans. 2015. Distribution of Fish and Mussel Species at Risk Mapping. May 2015.

Dobbyn, J. 1994. Atlas of the Mammals of Ontario. Federation of Ontario Naturalists.

Endangered Species Act, 2007 (Bill 184). Species at Risk in Ontario List.

Farrar, J.L. 1995. Trees in Canada. Fitzhenry & Whiteside Limited and the Canadian Forest Service. Canada. 198 pp.

Google. 2016. Google Maps web-based mapping program including Google Streetview. Accessed Feb 29, 2016: maps.google.ca

Holmes, A.M., Q.F. Hess, R.R. Tasker, A.J. Hanks. 1991. The Ontario Butterfly Atlas. 1991. Toronto Entomologists' Association, Toronto. 167pp.

LCA Environmental Consultants. 2011. Natural Heritage Assessment for the Old River Road Reconstruction Schedule B Class Environmental Assessment. August, 2011.

Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray. 1998. Ecological land classification for Southwestern Ontario: first approximation and its application. (Updated 2008) Ontario Ministry of Natural Resources, South Central Region, Science Development and Transfer Branch. Technical Manual ELC-005.Michigan Flora Online. A.A. Reznicek, E.G. Voss, and B.S. Walters. February 2011. University of Michigan. http://michiganflora.net/acknowledgments.aspx

MacCulloch, R.D. 2002. The ROM field guide to Amphibians and Reptiles of Ontario. McClelland & Steward Ltd. Toronto, Ontario. 168pp.

Middlesex County. 2006. Middlesex County Official Plan, 2006.

Natural Heritage Information Centre (NHIC)/Land Information Ontario, Ministry of Natural Resources (LIO). 2015. Online natural heritage databases.

Ontario Badger Recovery Strategy. 2010. Recovery strategy for the American Badger (Taxidea taxus) in Ontario. Ontario Recovery Strategy Series. Prepared for Ontario Ministry of Natural Resources, Peterborough, Ontario. vi + 27 pp.

Ontario Nature. 2015. Ontario Reptile and Amphibian Atlas [web application]. Toronto, Ontario. Available: www.ontarionature.org/atlas

Ontario Ministry of Natural Resources (MNR). 2000. Significant Wildlife Habitat Technical Guide. 151 pp.

Ontario Ministry of Natural Resources (MNR). 2010. Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005 Second Edition. Queen's Printer for Ontario. March 18, 2010. 144 pp + appendices.

Ontario Ministry of Natural Resources and Forestry (MNRF). 2015. Significant Wildlife Habitat Criteria Schedule for Ecoregion 7E. January 2015.

Ontario Partners in Flight. 2006. Ontario Landbird Conservation Plan: Lower Great Lakes/St. Lawrence Plain (North American Bird Conservation Region 13), Priorities, Objectives and Recommended Actions. Environment Canada (Ontario Region) and Ontario Ministry of Natural Resources. Final Draft, February 15, 2006.

Reid, F. 2006. The Peterson Field Guide Series: A field guide to mammals of North America, 4th ed. Houghton Mifflin Company, New York, New York. 579 pp.

Ross et. al. 1998. The Butterflies of Canada. University of Toronto Press. 1998.

Schueler, F.W. and F.R. Cook. 1992. The status of the Eastern Hognose Snake, Heterodon platirhinos, in Canada. Prepared for The Committee on the Status of Endangered Wildlife in Canada. Unpublished report. 34 pp. + supplement.

Spriet Associates. 2011. Old River Road Reconstruction Schedule B Class Environmental Assessment, October, 2011.

Wood, J.T. 1949. Observations on Natrix septemvittata (Say) in southwestern Ohio. The American Midland Naturalist 42(3): 744-750.

Stantec

Legend

- 🟥 Study Area
- 🟨 ELC Boundary
- — Watercourse (Permanent)
- - - Watercourse (Intermittent)
- 🟩 Significant Woodland (OP)
- 🟦 Provincially Significant Wetland
- ▨ Provincially Significant Life Science ANSI
- 🟧 Provincial Park

ELC	Description
CVI_1	Transportation
CVR	Residential
FOD	Deciduous Forest
FODM1-1	Dry-Fresh Red Oak Deciduous Forest
FODM11	Naturalized Deciduous Hedgerow
FOM	Mixed Forest
HR	Hedgerow
MASM1-1	Cattail Mineral Shallow Marsh
OA	Open Water
OAGM1	Annual Row Crops
WOD	Deciduous Woodland
WODM4-4	Dry-Fresh Black Walnut Deciduous Woodland

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2013.
3. Orthoimagery © First Base Solutions, 2016.

March 2016
161413164

Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
1

Title

Preliminary Ecological
Land Classification
Old River Road

\\CD1217-F01\work_group\01614\active\161413164\design\drawing\GIS\MXD\Terrestrial\161413164_ELC_OldRiverRoad.mxd
Revised: 2016-03-18 By: albrown

161413164 Endangered and Threatened Species Habitat Assessment Table

Species	COSSARO Status (S-Rank)	Background Review Source	Habitat	Potential Habitat Present Y/N
VASCULAR PLANTS				
American Chestnut (*Castanea dentata*)	Endangered (S2)	NHIC, 2015	Upland deciduous forest on acid to neutral, sandy soil (COSEWIC, 2004)	Y - FOD
Eastern Flowering Dogwood (*Cornus florida*)	Endangered (S2)	NHIC, 2015	An understory plant of dry to fresh deciduous and mixed forests, which frequently grows on the tops of slopes or other dry microsites, and occasionally in moister areas where no flooding occurs; preferred soils range from sand to sandy loam and clay loam (COSEWIC, 2007)	Y – FOD and FOM communities
Butternut (*Juglans cinerea*)	Endangered (S3?)	Farrar, 1995	Found in a variety of habitats throughout Southern Ontario, including woodlands and hedgerows ideal habitat includes rich, moist, and well-drained soils often found along streams, but may also be found on well-drained gravel sites, particularly those made of limestone (COSEWIC, 2003)	Y – all wooded communities including hedgerows
Red Mulberry (*Morus rubra*)	Endangered (S2)	Farrar, 1995	Occurs in moist forests and thickets (NHIC 2010).	Y – Potential habitat in the FOD and FOM communities, however quite rare
BIRDS				
Bank Swallow (*Riparia riparia*)	Threatened (S4B)	Cadman et al., 2007	Excavates nests in exposed earth banks along watercourses and lakeshores, roadsides, stockpiles of soil, and the sides of sand and gravel pits. Adjacent grasslands and watercourses used for foraging habitat (Cadman et al., 2007).	Y – potential exposed banks along the Thames River
Barn Swallow (*Hirundo rustica*)	Threatened (S4B)	Cadman et al., 2007	Nests on walls or ledges of barns as well as on other human-made structures such	Y – possible nest location under Thames River Bridge; bridge was not checked for

Species	COSSARO Status (S-Rank)	Background Review Source	Habitat	Potential Habitat Present Y/N
			as bridges, culverts or other buildings (Cadman et al., 2007)	nests during field investigations; bridge should be surveyed for potential nesting Barn Swallows during the breeding bird season
Bobolink (Dolichonyx oryzivorus)	Threatened (S4B)	Cadman et al., 2007	Nests primarily in forage crops with a mixture of grasses and broad-leaved forbs, predominantly hayfields and pastures. (COSEWIC 2010). Bobolink is an area-sensitive species, with reported lower reproductive success in small habitat fragments (Kuehl and Clark 2002; Winter et al. 2004).	N – the hay field habitat was not large enough to provide suitable habitat for Bobolink
Chimney Swift (*Chaetura pelagica*)	Threatened (S4)	Cadman et al., 2007	Uses chimneys for roosting and breeding, as well as walls, rafters, or gables of buildings and, less frequently, natural structures such as hollow trees, tree cavities and cracks in cliffs (Cadman et al., 2007)	N – chimneys suitable for roosting were not likely to occur within residential houses in the Study Area
Eastern Meadowlark (*Sturnella magna*)	Threatened (S4B)	Cadman et al., 2007	Typically occurs in meadows, hayfields and pastures. However, it will utilize a wider range of habitat than most grassland species, including mown lawn (e.g. golf course, parks), wooded city ravines, young conifer plantations and orchards (Peck and James 1983).	Y - potential breeding habitat within the hay field
Henslow's Sparrow (*Ammodramus henslowii*)	Endangered (SHB)	NHIC, 2015	A species of open habitats, consisting of weedy fields and meadows, preferably moist, with a mixture of grasses, forbs and scattered shrubs (Herkert et al., 2002). In general, the species prefers large areas of tall,	N – the hay field was not large enough to provide suitable habitat for Henslow's Sparrow.

Species	COSSARO Status (S-Rank)	Background Review Source	Habitat	Potential Habitat Present Y/N
			dense grass with a well-developed litter layer and standing dead forb vegetation for singing perches. Sparse to no woody vegetation is important. Henslow's Sparrows are area sensitive generally preferring 50 hectares of more of suitable nesting habitat (Herkert, 1991).	
Least Bittern (Ixobrychus exilis)	Threatened	Cadman et al., 2007	Nests in freshwater marshes where dense aquatic vegetation occurs with woody vegetation and open water. They are found most commonly in marshes greater than 5 ha in size (Gibbs et al., 1992).	N – no large marsh habitats occurred within the Study Area
Yellow-breasted Chat (*Icteria virens*)	Endangered (S2B)	NHIC, 2015	Prefers scrubby, early successional habitat; dense tangles of grape vine and raspberry are features of most breeding sites. Yellow-breasted Chats have been recorded in shrub thickets, woodland edges, hedgerows, regenerating abandoned fields and young coniferous plantations, and in hydro and rail rights-of-way (Cadman et al. 2007).	N – no suitable successional habitat occurred in the Study Area
REPTILES				
Eastern Spiny Softshell (*Apalone spinifera spinifera*	Threatened (S3)	NHIC, 2015	Associated with Lake Erie, especially the Sydenham and Thames Rivers. Spiny softshells require sandy beaches and riverbanks for nesting, shallow soft-bottomed water bodies to function as nurseries and refugia, basking areas and	Y – Thames River

Species	COSSARO Status (S-Rank)	Background Review Source	Habitat	Potential Habitat Present Y/N
			deep pools for thermoregulation, and riffle areas for foraging, habitat features may occur over a large area, as long as the intervening habitat doesn't prevent the turtles from travelling between them (COSEWIC 2002).	
Blanding's Turtle (*Emydoidea blandingi*)	Threatened	NHIC, 2015	Frequents lakes, ponds, and marshes, and prefers shallow water with abundant aquatic vegetation and a soft bottom (MacCulloch, 2002). They prefer shallow water that is rich in nutrients, organic soil and dense vegetation. Adults usually occupy open or partially vegetated sites, whereas juveniles occupy areas with thick aquatic vegetation including sphagnum, water lilies and algae. Nesting occurs in dry conifer or mixed hardwood forests, up to 410 m from any body of water, in loose substrates including sand, organic soil, gravel and cobblestone, nesting may also occur along gravel roadways (COSEWIC, 2005).	N – open aquatic ponds have limited vegetation and do not provide suitable habitat
Queen Snake	Endangered (S2)	ORAA, 2015	Habitat for this species is highly specialized and it is rarely found more than 3 m from water. Requires permanent area of water, flowing or still, with a temperature at or above 18.3C throughout most of the active season; abundant cover, such as flat rocks submerged and/or on the	Y- Thames River

Species	COSSARO Status (S-Rank)	Background Review Source	Habitat	Potential Habitat Present Y/N
			bank; and an abundance of crayfish (Wood, 1949).	
Eastern Hognose Snake (*Heterodon platirhinos*)	Threatened (S3)	ORAA, 2015	Requires well-drained loose or sandy soil; open vegetative cover such as open woods; brushland or forest edge; relatively close proximity to water; and climatic conditions typical of the eastern deciduous forest. They are a wide ranging species, often with home ranges up to 100ha (COSEWIC, 2007). Requires habitat with an abundance of toads as prey for adults as well an adequate supply of small amphibians such as salamanders or spring peepers, to sustain hatchlings and juveniles (Schueler 1996).	N – no open, sandy soils observed
MAMMALS				
American Badger (Taxidea taxus jacksoni)	Endangered	NHIC, 2015	The badger requires large expanses of open habitat with deep soils. It requires areas of habitat large enough to sustain sufficiently large prey populations (Ontario American Badger Recovery Team, 2010). It prefers open grasslands, agricultural areas and parklands (Eder, 2002). From 1980 on, most records have been from Norfolk and Middlesex counties, and most commonly from areas in proximity to Lake Erie (Ontario American Badger Recovery Team, 2010).	Y - Actively managed agricultural lands were present, however the Study Area was also comprised of residential development, where badgers are unlikely to occur.
Small-footed Myotis (*Myotis leibii*)	Endangered (S2S3)	Dobbyn, 1994	Inhabits deciduous and coniferous forests, roosts in crevices or under bark, and	Y – potential bat maternity roost habitat within FOD and FOM Communities

Species	COSSARO Status (S-Rank)	Background Review Source	Habitat	Potential Habitat Present Y/N
			hibernates in caves and mines (Reid, 2006).	No hibernacula features observed or known to occur.
Little Brown Myotis (*Myotis lucifugus*)	Endangered (S4)	Dobbyn, 1994	Commonly found near waterbodies in buildings, attics, roof crevices and loose bark on trees or under bridges (Eder, 2002).	Y – potential bat maternity roost habitat within FOD and FOM Communities No hibernacula features observed or known to occur.
Northern Myotis (Myotis septentrionalis	Endangered (S3?)	Dobbyn, 1994	Resident bat of upland forests of eastern North America, typically foraging for aerial insects in the forest understory. Maternity roosts are located under bark or in buildings with young born in June and July while hibernating colonies typically reside in cave crevices (Reid, 2006).	Y – potential bat maternity roost habitat within FOD and FOM Communities No hibernacula features observed or known to occur.

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Seasonal Concentration Areas			
Waterfowl Stopover and Staging Area (Terrestrial)	Fields with sheet water or utilized by tundra swans during spring (mid-March to May), or annual spring melt water flooding found in any of the following Community Types: Meadow (CUM1), Thicket (CUT1). Agricultural fields with waste grains are commonly used by waterfowl, and these are not considered SWH unless used by Tundra swans in the Long Point, Rondeau, Lake St. Clair, Grand Bend and Point Pelee Areas.	ELC surveys were used to assess features within the Study Area that may support waterfowl stopover and staging areas (terrestrial).	No cultural meadow and thicket communities were identified within the Study Area. The Study Area is not in a region defined in the criteria as being utilized by migrating tundra swans. No waterfowl concentration areas were identified during the NHIC search (LIO, 2015). Habitat for waterfowl stopover and staging areas (Terrestrial) is unlikely to occur within the Study Area.
Waterfowl Stopover and Staging Area (Aquatic)	The following Community Types: Meadow Marsh (MAM), Shallow Marsh (MAS), Shallow Aquatic (SA), Deciduous Swamp (SWD). Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. The combined area of the ELC ecosites and a 100 m radius area is the SWH. Sewage treatment ponds and storm water ponds do not qualif y as a SWH; however, a reservoir managed as a large wetland or pond/lake does qualify.	ELC surveys were used to assess features within the Study Area that may support waterfowl stopover and staging areas (aquatic).	Two small open aquatic features are present within the Study Area, however they likely do not appear to have sufficient vegetation (to be used as a food source) to accommodate large aggregations of waterfowl as they are within highly manicured landscapes. The Thames River may provide suitable habitat for waterfowl stopover and staging (aquatic) within the Study Area.
Shorebird Migratory Stopover Area	Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of amour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a significant wildlife habitat. The following community types: Meadow Marsh (MAM), Beach/Bar (BB), or Sand Dune (SD)	ELC surveys were used to assess features within the Study Area that may support migratory shorebirds.	No meadow marshes, beach/bars or sand dunes were identified within the Study Area. No shorebird migratory concentration areas were identified during the NHIC search (LIO, 2015). No candidate habitat for shorebird stopover areas occurred within the Study Area.

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Raptor Wintering Area	At least one of the following Forest Community Types: Deciduous Forest (FOD), Mixed Forest (FOM) or Coniferous Forest (FOC), in combination with one of the following Upland Community Types: Meadow (CUM), Thicket (CUT), Savannah (CUS), Woodland (CUW) (<60% cover) Combined area must be >20 ha and provides roosting, foraging and resting habitats for wintering raptors. Upland habitat (CUM, CUT, CUS, CUW), must represent at least 15 ha of the 20 ha minimum size with limited snow accumulation, and limited disturbance.	ELC surveys were used to assess features within the Study Area that may support wintering raptors.	The Study Area contains a suitable amount of forest/upland habitat however, there is no meadow or thicket habitat. No candidate habitat for raptor wintering areas occurred within the Study Area.
Bat Hibernacula	Hibernacula may be found in caves, mine shafts, underground foundations and karsts. May be found in these Community Types: Crevice (CCR), Cave (CCA).	ELC surveys were used to assess features within the Study Area that may support bat hibernacula.	No crevices, caves or abandoned mines are known to occur within the Study Area. No candidate habitat for bat hibernacula occurred within the Study Area.
Bat Maternity Colonies	Maternity colonies considered significant wildlife habitat are found in forested ecosites. Either of the following Community Types: Deciduous Forest (FOD), Mixed Forest (FOM), Deciduous Swamp (SWD) and Mixed Swamp (SWM) that have>10/ha wildlife trees >25cm diameter at breast height (dbh). Maternity colonies can be found in tree cavities, vegetation and often in buildings (buildings are not considered to be SWH). Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3 or class 1 or 2. Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred.	ELC surveys were used to assess features within the Study Area that may support bat maternity colonies.	Candidate habitat for bat maternity colonies may be present within FOD and FOM communities.
Turtle Wintering Areas	Snapping and Midland Painted turtles utilize ELC community classes: Swamp (SW), Marsh (MA) and Open Water (OA). Shallow water (SA), Open Fen (FEO) and Open Bog (BOO).	ELC surveys were used to assess features within the Study Area that may support areas of permanent standing water but not deep enough	Any deep areas of the Thames River with mud substrate provides potential habitat for overwintering turtles within the Study Area. All other open aquatic features within the Study

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
	Water has to be deep enough not to freeze and have soft mud substrate. Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate dissolved oxygen. Man-made ponds such as sewage lagoons or stormwater management ponds should not be considered significant.	to freeze.	Area have been constructed and therefore do not qualify as candidate significant wildlife habitat.
Snake Hibernacula	Hibernation occurs in sites located below frost lines in burrows, rock crevices, broken and fissured rock and other natural features. Human-made constructed rock piles, old stone fences and crumbling foundations qualify as candidate SWH. Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. Any ecosite in southern Ontario other than very wet ones may provide habitat. The following Community Types may be directly related to snake hibernacula: Talus (TA), Rock Barren (RB), Crevice (CCR), Cave (CCA), and Alvar (RBOA1, RBSA1, RBTA1).	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support snake hibernacula.	No rock features or old foundations were observed using the Google Streetview program, therefore candidate habitat for snake hibernacula is unlikely to occur within the Study Area.
Colonial-Nesting Bird Breeding Habitat (Bank and Cliff)	Eroding banks, sandy hills, borrow pits, steep slopes, sand piles, cliff faces, bridge abutments, silos, or barns found in any of the following Community Types: Meadow (CUM), Thicket (CUT), Bluff (BL), Cliff (CL). Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. Does not include a licensed/permitted Mineral Aggregate Operation.	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support colonial bird breeding habitat.	Eroding banks may be present along the Thames River within the Study Area. Candidate habitat for bank colonial nesting birds may occur within the Study Area.
Colonial-Nesting Bird Breeding Habitat	Identification of stick nests in any of the following Community Types: Mixed Swamp (SWM),	ELC surveys and wildlife habitat assessments were used to assess	No swamp habitat was identified in the Study Area.

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
(Tree/Shrubs)	Deciduous Swamp (SWD), Treed Fen (FET). The edge of the colony and a minimum 300 m area of habitat or extent of the Forest Ecosite containing the colony or any island <15 ha with a colony is the SWH. Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used.	features within the Study Area that may support colonial bird breeding habitat (Trees/Shrubs).	No candidate habitat for tree/shrub colonial nesting birds occurs within the Study Area.
Colonial-Nesting Bird Breeding Habitat (Ground)	Any rocky island or peninsula within a lake or large river. For Brewer's Blackbird close proximity to watercourses in open fields or pastures with scattered trees or shrubs found in any of the following Community Types: Meadow Marsh (MAM1-6), Shallow Marsh (MAS1-3), Meadow (CUM), Thicket (CUT), Savannah (CUS).	ELC surveys were used to assess features within the Study Area that may support colonial bird breeding habitat (Ground).	No rocky islands or peninsulas are present within the Study Area. In southern Ontario, Brewer's Blackbird known occurrences are primarily restricted to the Bruce Peninsula; none are known to occur in the Study Area region and it is considered a" very rare irregular spring and autumn transient" (Cadman et al., 2007; Weir, 2008) No candidate habitat for ground colonial nesting birds occurred within the Study Area.
Migratory Butterfly Stopover Areas	Located within 5 km of Lake Ontario A combination of ELC communities, one from each land class is required: Field (CUM, CUT, CUS) and Forest (FOC, FOM, FOD, CUP) Minimum of 10 ha in size with a combination of field and forest habitat present	ELC surveys and GIS analysis were used to assess features within the Study Area that may support migratory butterfly stopover areas.	The Study Area is not within 5 km of Lake Ontario. No Candidate Significant Wildlife Habitat for migratory butterfly stopover areas occurs within the Study Area.
Landbird Migratory Stopover Areas	The following community types: Forest (FOD, FOM, FOC) or Swamp (SWC, SWM, SWD) Woodlots must be >5 ha in size and within 5 km of Lake Ontario; 2-5ha can be considered if rare in an area of shoreline; woodlands within 2 km of Lake Ontario are more significant; largest sites are more significant.	ELC surveys and GIS analysis were used to assess features within the Study Area that may support landbird migratory stopover areas.	The Study Area is not within 5 km of Lake Ontario. No candidate habitat for migratory landbird stopover areas occurs within the Study Area.
Deer Winter Congregation Areas	Woodlots typically > 100 ha in size unless determined by the MNR as significant. (If large woodlots are rare in a planning area >50ha)	No studies required as the MNRF determines this habitat.	No deer winter congregation areas were identified by the MNRF within the Study Area (LIO, 2015).

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
	All forested ecosites within Community Series: FOC, FOM, FOD, SWC, SWM, SWD Conifer plantations much smaller than 50 ha may also be used		No candidate habitat for deer winter congregation areas occurs within the Study Area.
Cliffs and Talus Slopes	A Cliff is vertical to near vertical bedrock >3 m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris Any ELC Ecosite within Community Series: TAO, TAS, TAT, CLO, CLS, CLT Most cliff and talus slopes occur along the Niagara Escarpment	ELC surveys were used to assess features within the Study Area that would be considered cliffs or talus slopes.	No cliffs or talus slopes were identified within the Study Area. No candidate wildlife habitat for cliffs or talus slopes occurs within the Study Area.
Sand Barrens	Sand barrens typically are exposed sand, generally sparsely vegetated and cause by lack of moisture, periodic fires and erosion. Vegetation can vary from patchy and barren to tree covered but less than 60%. Any of the following Community Types: SBO1 (Open Sand Barren Ecosite), SBS1 (Shrub Sand Barren Ecosite), SBT1 (Treed Sand Barren Ecosite).	ELC surveys were used to assess features within the Study Area that would be considered to be sand barrens.	No sand barrens were identified within the Study Area. No candidate wildlife habitat for sand barrens occurs within the Study Area.
Alvars	An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. Any of the following Community Types: ALO1(Open Alvar Rock Barren Ecosite), ALS1 (Alvar Shrub Rock Barren Ecosite), ALT1 (Treed Alvar Rock Barren Ecosite), FOC1 (Dry-Fresh Pine Coniferous Forest), FOC2 (Dry-Fresh Cedar Coniferous Forest), CUM2 (Bedrock Cultural Meadow), CUS2 (Bedrock Cultural Savannah), CUT2-1 (Common Juniper Cultural Alvar Thicket), or CUW2 (Bedrock Cultural Woodland) An Alvar site > 0.5 ha in size	ELC surveys were used to assess features within the Study Area that would be considered to be alvar communities.	No alvars were identified within the Study Area. No candidate wildlife habitat for alvars occurs within the Study Area.

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Rare Vegetation Communities			
Old-growth Forest	Old-growth forests tend to be relatively undisturbed, structurally complex, and contain a wide variety of trees and shrubs in various age classes. These habitats usually support a high diversity of wildlife species. No minimum size criteria t in any of the following Community Types: FOD (Deciduous Forest), FOM (Mixed Forest), FOC (Coniferous Forest) Forests greater than 120 years old and with no historical forestry management was the main criteria when surveying for old-growth forests.	ELC surveys were used to assess features within the Study Area that would be considered to be old-growth forest communities.	No old growth forests were identified within the Study Area. No candidate wildlife habitat for old growth forests occurs within the Study Area.
Savannahs	A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%. In Ecoregion 6E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). Any of the following Community Types: TPS1 (Dry-Fresh Tallgrass Mixed Savannah Ecosite), TPS2 (Fresh-Moist Tallgrass Deciduous Savannah Ecosite), TPW1 (Dry-Fresh Black Oak Tallgrass Deciduous Woodland Ecosite), TPW2 (Fresh-Moist Tallgrass Deciduous Woodland Ecosite), CUS2 (Bedrock Cultural Savannah Ecosite).	ELC surveys were used to assess features within the Study Area that would be considered to be savannah communities.	No savannahs were identified within the Study Area. No candidate wildlife habitat for savannahs occurs within the Study Area.
Tall-grass Prairies	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover. In Ecoregion 6E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario). Any of the following Community Types: TPO1 (Dry Tallgrass Prairie Ecosite), TPO2 (Fresh-Moist Tallgrass Prairie Ecosite).	ELC surveys were used to assess features within the Study Area that would be considered to be tall-grass communities.	No tall grass prairies were identified within the Study Area. No candidate wildlife habitat for tall grass prairies occurs within the Study Area.

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Other Rare Vegetation Communities	Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG	ELC surveys were used to assess features within the Study Area that would be considered to be other rare vegetation communities.	No rare vegetation communities were identified within the Study Area. No candidate wildlife habitat for rare vegetation communities occurs within the Study Area.
Specialized Habitat for Wildlife			
Waterfowl Nesting Area	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SWT1, SWT2, SWD1, SWD2, SWD3, SWD4 Note: includes adjacency to Provincially Significant Wetlands	ELC surveys were used to assess features within the Study Area that may support nesting waterfowl.	A cattail marsh adjacent to upland deciduous forest was identified within the Study Area, however it is too small to qualify as significant. No candidate wildlife habitat for waterfowl nesting areas occurs within the Study Area.
Bald Eagle and Osprey nesting, Foraging, and Perching Habitat	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms). ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands	ELC surveys and wildlife habitat assessments were used to assess features within the Study Area that may support nesting, foraging and perching habitat for large raptors.	Bald Eagle and Osprey Nesting, Foraging and Perching Habitat could not be identified using Google Streetview and therefore potential habitat may occur.
Woodland Raptor Nesting Habitat	All natural or conifer plantation woodland/forest stands combined >30 ha and with >4 ha of interior habitat. Interior habitat determined with a 200 m buffer. Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small off-shore islands. May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3	ELC surveys, wildlife habitat assessments and GIS analysis were used to assess features within the Study Area that may support nesting habitat for woodland raptors.	There is no interior habitat within the Study Area. No candidate wildlife habitat for woodland raptor nesting occurs within the Study Area.

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Turtle Nesting Areas	Exposed mineral soil (sand or gravel) areas adjacent (<100 m) or within the following ELC Ecosites: MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, BOO1, FEO1 Best nesting habitat for turtles is close to water, away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used.	ELC surveys were used to assess features within the Study Area that may support turtle nesting areas.	A cattail marsh was identified within the Study Area that may be associated with candidate wildlife habitat for turtle nesting areas. Candidate wildlife habitat for turtle nesting areas occurs within the Study Area.
Seeps and Springs	Seeps/Springs are areas where ground water comes to the surface. Often they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs. Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system	ELC surveys were used to assess features within the Study Area that may support seeps and springs.	Google Streetview did not allow for the assessment of seeps/springs within forested habitats. There were no headwater areas identified on LIO mapping. Candidate habitat for seeps and springs may occur within the Study Area.
Amphibian Breeding Habitat (Woodland)	All Ecosites associated with these ELC Community Series; FOC, FOM, FOD, SWC, SWM, SWD Presence of a wetland, lake, or pond within or adjacent (within 120 m) to a woodland (no minimum size). Some small wetlands may not be mapped and may be important breeding pools for amphibians. Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat	ELC surveys and GIS analysis were used to assess features within the Study Area that may support woodland breeding amphibians.	Vernal pools within woodlands could not be determined using Google Streetview, however two open aquatic ponds (OA) occurred adjacent (within 120 m) to woodlands. Candidate amphibian breeding habitat (woodland) occurred within the Study Area.

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Amphibian Breeding Habitat (Wetland)	ELC Community Classes SW, MA, FE, BO, OA and SA. Wetland areas >120 m from woodland habitats. Wetlands and pools (including vernal pools) >500 m^2 (about 25 m diameter) supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNR mapping and could be important amphibian breeding habitats. Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. Bullfrogs require permanent water bodies with abundant emergent vegetation.	ELC surveys and GIS analysis were used to assess features within the Study Area that may support wetland breeding amphibians.	No open aquatic ponds >120m from woodland habitats occur within the Study Area. No candidate habitat for wetland amphibian breeding occurred within the Study Area.
Species of Conservation Concern			
Marsh Bird Breeding Habitat	All wetland habitats with shallow water and emergent aquatic vegetation. May include any of the following Community Types: Meadow Marsh (MAM), Shallow Aquatic (SA), Open Bog (BOO), Open Fen (FEO), or for Green Heron: Swamp (SW), Marsh (MA) and Meadow (CUM1) Community Types.	ELC surveys were used to identify marshes with shallow water and emergent vegetation that may support marsh breeding birds.	One small cattail marsh occurred within the Study Area. Candidate habitat for marsh breeding birds may occur within the Study Area.
Woodland Area-sensitive Bird Breeding Habitat	Habitats >30ha where interior forest is present (at least 200 m from the forest edge); typically >60 years old. These include any of the following Community Types: Forest (FO), Treed Swamp (SW)	ELC surveys and GIS analysis were used to determine whether woodlots that occurred within the Study Area that were >30 ha with interior habitat present (>200 m from edge).	No woodlots exceeded 30 ha in size with interior forest habitat within the Study Area. No candidate wildlife habitat for woodland area-sensitive breeding bird habitat occurs within the Study Area.
Open Country Bird Breeding Habitat	Grassland areas > 30 ha, not Class 1 or Class 2 agricultural lands, with no row-cropping or hay or livestock pasturing in the last 5 years, in the following Community Type: Meadow (CUM).	ELC surveys and GIS analysis were used to identify grassland communities within the Study Area that may support area-sensitive breeding birds.	No non-agricultural grassland communities >30 ha were identified within the Study Area. No candidate wildlife habitat for open country breeding bird habitat occurs within the Study Area.

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
Shrub/Early Successional Bird Breeding Habitat	Oldfield areas succeeding to shrub and thicket habitats >10 ha, not Class 1 or Class 2 agricultural lands, with no row-cropping or intensive hay or livestock pasturing in the last 5 years, in the following Community Types: Thickets (CUT), Savannahs (CUS), or Woodlands (CUW).	ELC surveys and GIS analysis were used to identify large CUT, CUS or CUW communities that may support shrub/early successional breeding birds.	No early successional communities were identified within the Study Area. No candidate wildlife habitat for shrub/early successional breeding bird habitat occurs within the Study Area.
Terrestrial Crayfish	Meadow marshes and edges of shallow marshes (no minimum size). Vegetation communities include MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, MAS1, MAS2, MAS3. Construct burrows in marshes, mudflats, meadows Can be found far from water	ELC surveys were used to identify shallow marsh and meadow marsh communities that occurred within the Study Area.	One cattail marsh communities was identified within the Study Area. Habitat for Terrestrial Crayfish may occur within the Study Area.
Special Concern and Rare Wildlife Species (i.e. all special concern and S1-S3 species)			
Bald Eagle *(Haliaeetus leucocephalus)*	Almost always nests near water, usually on large lakes. Large stick nests are placed in trees located within mature woodlots. They usually require 250 ha of mature forest for breeding, however, along Lake Erie, where the lake provides a valuable food source; the eagles will nest in smaller woodlots or even single trees (Sandilands, 2005).		Habitat for this species can be determined through the consideration of Bald Eagle and Osprey Nesting, Foraging and Perching Habitat. Bald Eagle and Osprey Nesting, Foraging and Perching Habitat could not be identified using Google Streetview and therefore potential habitat may occur.
Common Nighthawk (*Chordeiles minor*)	The Common Nighthawk is an aerial insectivore and forages at dawn and dusk. Common Nighthawks nest on the ground in open habitats preferably with rocky or graveled substrate. Nighthawks will even nest on gravel roofs in the city.		No suitable open habitat for Common Nighthawk occurs in the Study Area.
Eastern Wood-Pewee (*Contopus virens*)	A forest bird of deciduous and mixed woods. Nest-site selection favors open space near the nest, typically provided by clearings, roadways, water, and forest edges. Nests are cryptic as they are covered with lichens, typically appearing like a knot on top of a branch (Cadman et al, 2007).		FOD and FOM communities provide suitable habitat for Eastern Wood-Pewee.
Golden-winged Warbler *(Vermivora chrysoptera)*	The Golden-winged warbler is confined to southern Ontario with local concentrations along the southern edge of the Canadian Shield, primarily around southeastern Georgian Bay and north of Kingston. Breeding occurs in successional		Successional habitat for Golden-winged Warbler is not present in the Study Area.

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
	scrub habitats bordered by forests and nests are constructed on the ground (Cadman et al, 2007). Preference is shown towards early successional scrub (10-30 years into succession) and the species will not persist when the stage of succession has succeeded their requirements.		
Grasshopper Sparrow (*Ammodramus savannarum)*	Inhabits drier more open grasslands than most other sparrows. It prefers short, sparse grass with patches of exposed ground. Preferred nesting areas are rough or unimproved pastures and in drier, sparsely vegetated grasslands at least 30 ha in size (Cadman et al. 2007).		There are no large expanses of grasslands or pastures within the Study Area.
Louisiana Waterthrush (*Seiurus motacilla*)	Prefers deciduous and mixed forests with a strong Eastern Hemlock component, in deeply incised ravines (Cadman et al. 2007). It will also inhabit large flooded tracts of mature deciduous swamp forest. It shows a preference for nesting along pristine headwater streams and associated wetlands occurring in large expanses of mature forest and less frequently inhabits wooded swamps (COSEWIC, 2006).		There are no deeply incised ravines within the Study Area to support this species.
Wood Thrush (*Hylocichla mustelina*)	Prefers deciduous and mixed forests in southern Ontario, ranging from small and isolated to large and contiguous woodlots. The presence of tall trees and a thick understory are preferred (Cadman et al., 2007).		FOD and FOM communities provide suitable habitat for Wood Thrush.
Map Turtle (*Graptemys geographica*)	Map turtles are highly aquatic and inhabit slow moving, large rivers and lakes with soft bottoms and abundant aquatic vegetation. Basking sites include rocks and deadheads adjacent to deep water (COSEWIC 2002) Nesting occurs in soft sand or soil and at a distance from the water, hibernation is communal and occurs at the bottoms of lakes (MacCulloch, 2002). Females leave the water in June to nest (MacCulloch, 2002).		The Thames River provides habitat for Map Turtle.
Snapping Turtle (*Chelydra serpentina*)	Inhabits ponds, sloughs, streams, rivers, and shallow bays that are characterized by slow		The Thames River provides habitat for Snapping Turtle. Open aquatic communities may also

Candidate Wildlife Habitat	Criteria	Methods	Habitat Assessment of Features Found Within the Study Area
	moving water, aquatic vegetation, and soft bottoms. Females show strong nest site fidelity and nest in sand or gravel banks at waterway edges in late May or early June.		provide habitat for Snapping Turtle.
Eastern Milksnake (*Lampropeltis Triangulum)*	Frequently reported in and around buildings, especially old structures. However, it is found in a variety of habitats, including prairies, pastures, hayfields, rocky hillsides and a wide variety of forest types. Two important features of ideal habitat are proximity to water, and suitable locations for basking and egg-laying, nesting sites may include compost or manure piles, stumps, under boards, or in loose soil (COSEWIC, 2002).		Habitat for Eastern Milksnake may be present within the hay field or forested communities.
Woodland Vole (*Microtus pinetorum*)	Woodland Voles inhabit deciduous forests with a dense layer of leaf litter, woodland or orchard grassy patches, and areas of dense brush. These voles are primarily subterranean, spending the majority of their time underground in burrows that are made in shallow soil or under leaf litter (Reid, 2006).		Habitat for Woodland Vole may be present within the FOD communities.
Hackberry Emperor *(Asterocampa celtis)*	Adults can be found flying in open woodlands and roadsides where hackberry is present (Holmes et al., 1991).		Habitat may be present in areas where hackberry trees have been identified.
Tawny Emperor *(Asterocampa clyton)*	A woodland species, never straying far from Hackberry, its larval food plant (Ross et al, 1998).		Habitat may be present in areas where hackberry trees have been identified.
Amphibian Movement Corridor			
Amphibian Movement Corridor	Corridors may be found in all ecosites associated with water. Determined based on identifying significant amphibian breeding habitat (wetland).	Identified after Amphibian Breeding Habitat - Wetland is confirmed.	No candidate habitat for amphibian movement corridors occurs within the Study Area – can only be determined based on confirmed amphibian breeding habitat (wetland).

From: Spisani, Sean
Sent: Wednesday, September 23, 2015 9:55 PM
To: 'Riddell, Heather (MNRF)'; 'Fleischhauer, Andrea (MNRF)'
Cc: Ball, Janice; Mason, Kelly
Subject: DataGlendon Drive Streetscape EA
Attachments: 161413164_Background_Booklet.pdf; 161413164_NHIC.pdf; 161413164_NHIC_20150916_sorted.xlsx

Hi Heather, Andrea,

I hope this email finds you both well. My apologies for copying both of you. Please direct me to the correct contact for this data request.

Stantec has been retained by the Municipality of Middlesex Centre to undertake the Glendon Drive Streetscape Improvements Master Plan Class EA. A study commencement notice will be circulated shortly. The natural environment study area is indicated in the attached figures.

We completed a review of the NHIC and LIO databases and identified a number of species at risk and rare species records. The attached excel file is a list of recent records (1970+). We also noted the following designated natural areas:

- Komoka/Strathroy Creek PSW
- Komoka Park Reserve ANSI (Provincial)

Stantec is requesting confirmation that this information is complete and accurate, and additional relevant natural heritage data:

- Designated natural areas
- Records of species at risk and provincially rare species
- Fisheries information:
  - species/community information including any aquatic species at risk
  - watercourse thermal regime
  - special habitat features (e.g. known spawning areas)
  - in-water construction timing window;

Thanks in advance for your consideration of this request. Please let me know if there is anything I can provide to assist in your review.

Sean Spisani, B.Sc., ERGC
Senior Ecologist
Stantec
200 - 835 Paramount Drive Stoney Creek ON L8J 0B4
Phone: (905) 381-3223
Cell: (289) 208-6934
Fax: (905) 385-3534
Sean.Spisani@stantec.com

APPENDIX D.1: **COLDSTREAM ROAD**
NATURAL ENVIRONMENT

Stantec

Memo

To:	Stephanie Bergman Stantec London Office	From:	Brian Miller and Sean Spisani Stantec London and Stoney Creek Offices
File:	161413164	Date:	January 9, 2018

Reference: Vegetation and Wildlife Assessment – Glendon Drive EA, Coldstream Road Realignment, Middlesex Centre

This memorandum has been prepared to provide a summary of the vegetation and wildlife surveys conducted for the Coldstream Road Realignment area located on the north side of Glendon Drive in Middlesex Centre, Middlesex County (the Study Area). Natural areas were dominated by hawthorns ranging from dense thicket to open scattered hawthorns mixed with dry to moist meadow. Agricultural fields are also present, including tilled agriculture to the west of the natural area, and hay fields to the north and east (Figure 1).

METHODS

Field surveys were conducted on five dates during spring and summer months. Survey details are listed below in Table 1.

Table 1 Survey Details and Summary

Survey Date	Surveyor(s)	Type of Survey
May 12, 2017	Brian Miller	Ecological Land Classification (ELC), botanical inventory, wildlife habitat assessment, and incidental observations of wildlife
May 23, 2017	Brian Miller	Botanical inventory, breeding bird survey, and amphibian egg mass searches
June 12, 2017	Brian Miller	Breeding bird survey, incidental plant and wildlife observations, and amphibian egg masses assessment
June 28, 2017	Brian Miller	Breeding bird survey, and incidental plant and wildlife observations
August 9, 2017	Brian Miller	Wetland delineation, botanical inventory, and incidental observations of wildlife

VEGETATION

The purpose of the vegetation surveys was to describe the vegetation communities present in the Study Area, and to document all plant species with an emphasis on rare or significant species.

Identification and mapping of ELC vegetation communities follows the protocols of the ELC field guide for Southern Ontario (Lee et al., 1998). Updates to vegetation community names and codes follow the 2008 catalogue of ELC vegetation communities. Wetland features were delineated using the Ontario Wetland Evaluation System, Southern Manual (MNR 2014), including application of the '50% wetland vegetation' rule to map points along a contour line where relative plant species cover consisted mostly of wetland species.

Flora nomenclature for scientific accepted species names is based on VASCAN, the Database of Vascular Plants of Canada (Brouillet et al. 2010+).

Identification of regionally rare or uncommon plant species in Middlesex County is based on Oldham (2017).

The provincial status of vegetation communities and species is based on the Natural Heritage Information Centre (NHIC) list (NHIC 2016). Provincially rare communities and species are those that have a provincial rank of S1 – S3. Identification of potentially sensitive native plant species is based on their assigned coefficient of conservatism (*C*) value, as determined by Oldham et al. (1995). This *C* value, ranging from 0 (low) to 10 (high), is based on a species' tolerance of disturbance and fidelity to a specific natural habitat. Species with a *C* value of 8, 9 or 10 generally exhibit a high degree of fidelity to a narrow range of habitat parameters.

Species at Risk were identified using the Species at Risk in Ontario List which is available online: https://www.ontario.ca/environment-and-energy/species-risk-ontario-list.

WILDLIFE

Targeted wildlife surveys were conducted to document breeding birds and breeding amphibians in the vegetation communities shown on Figure 1. Breeding bird surveys were conducted by traversing the area on foot, and recording all species of birds that were heard or seen. The highest level of breeding evidence was recorded for each species using the codes in the Ontario Breeding Bird Atlas (Cadman *et al.* 2007) codes. Surveys were conducted during early morning hours on three dates in May and June.

To document breeding amphibians, egg masses searches were conducted in all areas of pooling of water that were present in May and June. Surveyors searched the entire features, including margins, to locate egg masses or individual amphibians. Features were inspected by carefully moving leaves, twigs, and other debris by hand to located hidden egg masses, if present.

Surveys were also conducted to assess the potential for Significant Wildlife Habitat features identified in the Significant Wildlife Habitat Criteria Schedule for Ecoregion 7E (MNRF 2015). Candidate features were recorded when identified during surveys.

Area searches for wildlife were conducted during all visits, including visual scans, and hand searches under vegetation, debris, for basking and / or hiding reptiles and small mammals. All incidental observations of wildlife were recorded during all field surveys.

The provincial status of wildlife species is based on the NHIC wildlife list (NHIC 2016). Provincially rare species are those that have a provincial rank of S1 – S3. Species at Risk were identified using the Species at Risk in Ontario List which is available online: https://www.ontario.ca/environment-and-energy/species-risk-ontario-list.

RESULTS

VEGETATION

Vegetation communities documented during field surveys are described in Table 2 below.

One vegetation community documented (WODM4-4) includes a dominant species (Black Walnut) with a provincially rare vegetation community type listed by the NHIC (Moist-Fresh Black Walnut Deciduous Forest); however, WODM4-4 is a relatively young community with dry substrates and similar composition to the adjacent thickets, including old field species. The WODM4-4 is regenerating from cultural disturbance and does not represent a native lowland Black Walnut forest, and does not warrant a provincially rare ranking.

Table 2 Ecological Land Classification (ELC) Vegetation Types

PROPERTY & ELC VEGETATION TYPE	Community Description
	MEADOW COMMUNITIES
MEGM3 Dry - Fresh Graminoid Meadow (1998 Code: CUM1-1)	Upland meadow dominated by typical old field grasses such as smooth brome, tall fescue and orchard grass and an old field exotic sedge (Carex spicata). Canada goldenrod is abundant in patches.
	THICKET COMMUNITIES
THDM2-11 Hawthorn Deciduous Shrub Thicket (1998 Code: CUT1)	Dense thicket dominated by large hawthorn and common apple. The ground layer is this community is disturbed and dominated by species such as orchard grass, garlic mustard, enchanter's nightshade and white avens.
	SAVANNA COMMUNITIES
SVDM3-4 Hawthorn Deciduous Savana (1998 Code: CUS1-1)	This semi-open treed community is dominated by hawthorns. Cockspur hawthorn is a dominant hawthorn species. Other shrubs such as nannyberry and grey dogwood are occasional to abundant associates. The ground layer is diverse due to the wide-ranging moisture regimes from dry upland meadow to moist meadow. Goldenrods, asters and various sedges are common ground layer species.
	WOODLAND COMMUNITIES
WODM4-4	This small woodland community is located at the eastern corner of the Study Area. Young to mid-aged black walnut is dominant. The ground layer is equal in

Table 2 Ecological Land Classification (ELC) Vegetation Types

PROPERTY & ELC VEGETATION TYPE	Community Description
Dry - Fresh Black Walnut Deciduous Woodland (1998 Code: CUW1)	disturbance and species composition as the adjacent THDM2-11 community,
MARSH COMMUNITIES	
MAMM1 Graminoid Mineral Meadow Marsh (1998 Code: MAM2)	This open marsh community is dominated by fox sedge (Carex vulpinoidea) with common associates of porcupine sedge, dark-green bulrush, fowl manna grass, common woolly bulrush, white panicled aster, bentgrass species (Agrostis spp.).

Vascular Plant Species

The following is a floristic summary for the Study Area. A detailed list with all scientific plant names and species statuses is provided as an attachment to this memorandum.

- A total of 142 species of vascular plants were recorded. This total includes taxa identified to species, subspecies (ssp.) and variation (var.) levels.

- 99 of the 142-recorded species are native to Ontario, while 43 are exotic species not native to Ontario.

- 89 native species have a provincial rank of S5, indicating they are common with a secure population in Ontario.

- 9 native species have a provincial rank of S4, indicating they are uncommon, but not rare in the province and populations are apparently secure.

- 1 native species, a wildflower (*Mirabilis nyctaginea*, heart-leaved four-o' clock), has a provincial rank of "S2", indicating this species is rare in Ontario. Although this species is rare in other parts of Ontario, it is an introduced species in the Carolinian Zone (Oldham 2017) and therefore, its presence in the Study Area is non-significant.

- No Butternut or other Species at Risk (SAR) flora were observed in the Study Area.

- 1 native species (*Carex grayi*, Gray's sedge) has a *C* value of 8 indicating this species has a high level of sensitivity to habitat disturbance. It is scattered throughout the wetland portion of the Study Area.

- 3 native species (*Carex formosa, Carex pallescens* and *Eleocharis palustre*) are regionally Rare (R) in Middlesex County. All three species are sedges. *Carex formosa* is common in the Hawthorn Deciduous Savanna (SVDM3-4), except in the driest areas. Carex pallescens and Eleocharis are restricted to the Graminoid Mineral Meadow Marsh (MAMM1).

WILDLIFE

Breeding bird surveys documented a total of 29 birds, 27 of which are likely to be breeding in the Study Area. Barn Swallow and Belted Kingfisher were recorded as foraging and fly-over occurrences respectively, and breeding evidence was not recorded for these species. The complete list of wildlife observations is provided as an attachment to this memorandum.

Two Species at Risk were recorded during breeding bird surveys: Barn Swallow (threatened) and Eastern Meadowlark (threatened). Barn swallow was observed foraging over the MEGM3 unit at the north end of the site (Figure 1) on June 28, and is not considered a breeding occurrence. Eastern Meadowlark was recorded singing from the hayfield immediately west of Coldstream Road on May 28, and in the hayfield north of the train tracks on June 28 (Figure 1).

Amphibian egg mass surveys did not document larval or adult amphibians in areas of pooling water. Pools were present in May, but dry by the June surveys; therefore, the duration of pooling water was too short for amphibian transformation, and pools were not suitable for amphibian breeding. One adult Northern Leopard Frog was observed as an incidental observation; however, suitable breeding habitat was not documented.

Wildlife habitat surveys documented two candidate Significant Wildlife Habitat types:

- Crayfish chimneys were documented in the wetland feature shown on Figure 1. The species of crayfish was not determined. According to the Draft Significant Wildlife Habitat Criterion for Ecoregion 7E (MNR 2014), wetland areas with crayfish chimneys may be candidate Significant Wildlife Habitat; however, species use surveys are required to determine if features qualify as confirmed Significant Wildlife Habitat.

- Milkweed plants in the Study Area provide habitat for Monarch larvae with are a Species at Risk (special concern), and may be considered Significant Wildlife Habitat; however, Monarch was not recorded during field surveys.

No other Significant Wildlife Habitat features were identified during field surveys.

Four additional wildlife species were recorded as incidental observations, including three mammals and one reptile: Eastern Cottontail, Grey Squirrel, White-tailed Deer, and Eastern Gartnersnake. Barn Swallow and Eastern Meadowlark (discussed above) were the only Species at Risk or provincial rare wildlife species observed during field surveys; however, targeted surveys were not conducted for all Species at Risk that have range overlap with the Study Area, including Species at Risk bats, which may use large trees in the Study Area as maternity roosts.

The Endangered Species Act

The Endangered Species Act, 2007 (ESA) protects species at risk and their habitats by prohibiting anyone from killing, harming, harassing or possessing protected species, as well as prohibiting any damage or destruction to the habitat of species identified as endangered, threatened and extirpated on the Species at Risk in Ontario List. All endangered or threated species on the Species at Risk in Ontario List are provided with general habitat protections under the ESA 2007, which protect areas that species depend on to carry out their life processes, such as reproduction, rearing, hibernation, migration or feeding. Any activity that may impact a protected species or its habitat requires the prior issuance of a permit or other authorization from the MNRF. Consultation with MNRF is recommended to determine authorization requirements for any potential impacts to breeding habitat for Eastern Meadowlark, foraging habitat for Barn Swallow, and potential maternity roost trees for bats. To determine authorization requirements, MNRF may require additional surveys; e.g. acoustic surveys to determine presence absence of Species at Risk bats.

CLOSURE

Please contact the undersigned with any questions regarding the findings documented in this memorandum.

STANTEC CONSULTING LTD.

DRAFT

Brian Miller
Botanist / Terrestrial Ecologist
Phone: 226-971-2224
Brian.Miller@stantec.com

Attachment: Figure 1
A – Vascular Plant List
B – Wildlife Species List

REFERENCES

Brouillet, L., F. Coursol, S.J. Meades, M. Favreau, M. Anions, P. Bélisle & P. Desmet. 2010+. VASCAN, the Database of Vascular Plants of Canada. http://data.canadensys.net/vascan/

Cadman, M.D., D.A. Sutherland, G.G. Beck, D. Lepage, and A.R. Couturier (eds). 2007. Atlas of the Breeding Birds of Ontario 2001- 2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto. 706 pp.

Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray. 1998. Ecological land classification for Southern Ontario: first approximation and its application. Ontario Ministry of Natural Resources, South Central Region, Science Development and Transfer Branch. Technical Manual ELC-005.

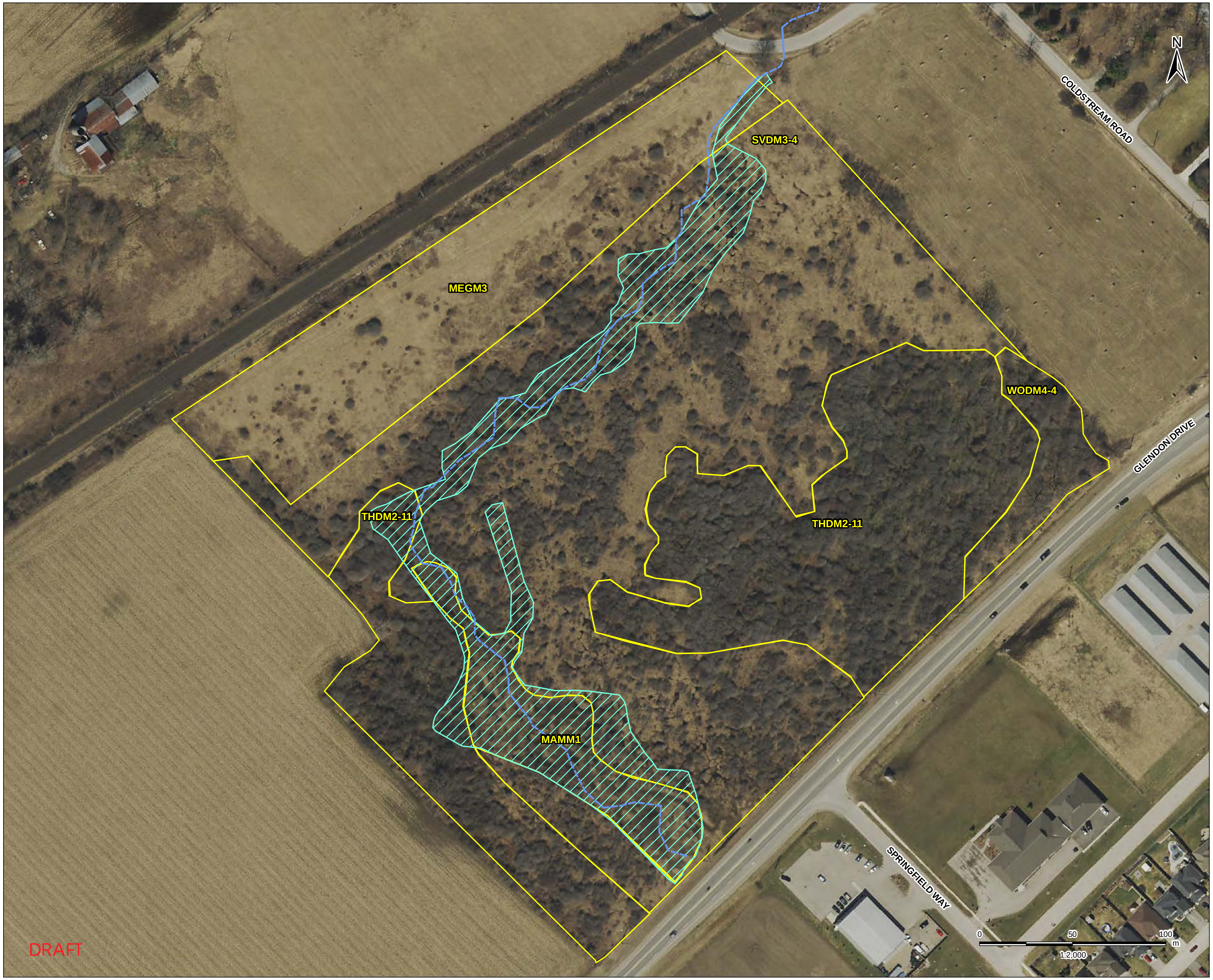
Ministry of Natural Resources (MNR). 2014. Ontario Wetland Evaluation System, Southern Manual. Available online at: http://www.ontariocanada.com/registry/view.do?postingId=8403

Natural Heritage Information Centre (NHIC). 2016. Vascular Plant List and Ontario Plant Community List. Ontario Ministry of Natural Resources, Peterborough. Available at: https://www.ontario.ca/page/get-natural-heritage-information

Newmaster, S.G., A. Lehela, P.W.C Uhlig, S. McMurray and M.J. Oldham. 1998. Ontario plant list. Ontario Ministry of Natural Resources, Ontario Forest Research Institute, Sault Ste. Marie, ON, Forest Research Information Paper No. 123. 550 pp. + appendices.

Oldham, M.J., W.D. Bakowsky and D.A. Sutherland. 1995. Floristic quality assessment for southern Ontario. OMNR, Natural Heritage Information Centre, Peterborough. 68 pp.

Oldham, Michael J. 2017. List of the Vascular Plants of Ontario’s Carolinian Zone (Ecoregion 7E). Carolinian Canada and Ontario Ministry of Natural Resources and Forestry. Peterborough, ON. 132 pp.



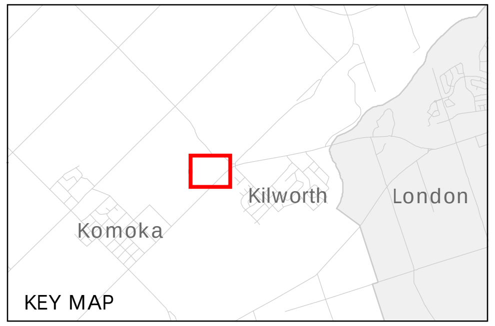
\\Cd1217-f01\work_group\01614\active\161413164\design\drawing\GIS\MXD\Terrestrial\161413164_ELC_Coldstream.mxd
Revised: 2017-09-01 By: kbuchanan

Stantec

Legend

━	Watercourse (Permanent)
╌	Watercourse (Intermittent)
☐	ELC Boundary
▨	Wetland (Stantec 2017)

ELC	Description
MAMM1	Graminoid Mineral Meadow Marsh
MDGM3	Dry - Fresh Graminoid Meadow
SVDM3-4	Hawthorn Deciduous Savanna
THDM2-11	Hawthorn Deciduous Shrub Thicket
WODM4-4	Dry - Fresh Black Walnut Deciduous Woodland



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2017.
3. 2015 orthoimagery used under license with Middlesex County.

September 2017
161413164

Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
1

Title
Preliminary Ecological
Land Classification
Coldstream Road Realignment

ATTACHMENT A – **Plant and Wildlife Lists**

VASCULAR PLANT LIST - Glendon Drive EA - Coldstream Road Realignment

Plant species observed by B. Miller on May 12, May 23, June 12, June 28 and August 9, 2017 in hawthorn savanna and hawthorn thicket west of Coldstream Road at Glendon Drive, Middlesex Centre, Middlesex County

Scientific Name	Common Name	Establishment Means	Coefficient of Conservatism	Wetland Plant Species	Provincial Status	SARO & COSEWIC Status	Middlesex County Status
PTERIDOPHYTES (FERNS & FERN ALLIES)							
Dryopteris carthusiana	spinulose wood fern	native	5	T	S5		X
Equisetum arvense	field horsetail	native	0	T	S5		X
Onoclea sensibilis	sensitive fern	native	4	I	S5		X
Thelypteris palustris	eastern marsh fern	native	5	I	S5		X
ANGIOSPERMS (DICOTS)							
Acalypha rhomboidea	three-seed mercury	native	0		S5		X
Acer negundo	Manitoba maple	native	0	T	S5		X
Achillea millefolium	common yarrow	introduced			SE		I
Agrimonia gryposepala	hooked agrimony	native	2		S5		X
Alliaria petiolata	garlic mustard	introduced			SE5		I
Anemone canadensis	Canada anemone	native	3	T	S5		X
Anemone quinquefolia	wood anemone	native	7		S5		X
Anemone virginiana	Virginia anemone	native	4		S5		X
Apocynum cannabinum var. cannabinum	hemp dogbane	native			S5		X
Apocynum cannabinum var. hypericifolium	clasping-leaved hemp dogbane	native	3		S5		0
Arctium minus	common burdock	introduced			SE5		I
Asclepias incarnata	swamp milkweed	native	6	I	S5		X
Asclepias syriaca	common milkweed	native	0		S5		X
Boehmeria cylindrica	small-spike false nettle	native	4	I	S5		X
Caltha palustris	yellow marsh marigold	native	5	I	S5		C
Carya ovata ovata	shagbark hickory	native	6	T	S5		X
Circaea canadensis	enchanter's nightshade	native	3		S5		X
Cirsium arvense	Canada thistle	introduced			SE5		I
Cirsium vulgare	bull thistle	introduced			SE5		I
Clinopodium vulgare	wild basil	native	4		S5		X
Cornus obliqua	pale dogwood	native	5	I	S5		X
Cornus racemosa	grey dogwood	native	2	T	S5		X
Crataegus crus-galli	cockspur hawthorn	native	4		S5		X
Crataegus spp.	hawthorn species						
Daucus carota	wild carrot	introduced			SE5		I
Dipsacus fullonum	common teasel	introduced			SE5		I
Echinocystis lobata	wild cucumber	native	3	T	S5		X
Elaeagnus umbellata	autumn olive	introduced			SE3		IR
Epilobium cf. coloratum	purple-veined willowherb	native	3	I	S5		X

VASCULAR PLANT LIST - Glendon Drive EA - Coldstream Road Realignment

Plant species observed by B. Miller on May 12, May 23, June 12, June 28 and August 9, 2017 in hawthorn savanna and hawthorn thicket west of Coldstream Road at Glendon Drive, Middlesex Centre, Middlesex County

Scientific Name	Common Name	Establishment Means	Coefficient of Conservatism	Wetland Plant Species	Provincial Status	SARO & COSEWIC Status	Middlesex County Status
Erigeron philadelphicus	Philadelphia fleabane	native	1	T	S5		X
Erigeron pulchellus	robin's-plantain fleabane	native	7		S5		X
Erigeron strigosus	rough fleabane	native	0		S5		X
Eupatorium perfoliatum	common boneset	native	2	I	S5		X
Euthamia graminifolia	grass-leaved goldenrod	native	2		S5		X
Fragaria virginiana	wild strawberry	native	2		S5		X
Frangula alnus	glossy buckthorn	introduced		T	SE5		I
Fraxinus americana	white ash	native	4		S4		X
Galium boreale	northern bedstraw	native	7		S5		X
Galium mollugo	smooth bedstraw	introduced			SE5		I
Galium palustre	common marsh bedstraw	native	5	I	S5		X
Geranium maculatum	spotted geranium	native	6		S5		X
Geranium robertianum	herb-Robert	native			S5		I
Geum aleppicum	yellow avens	native	2	T	S5		X
Geum canadense	white avens	native	3	T	S5		X
Geum cf. urbanum	wood avens	introduced			SE2		I
Hesperis matronalis	dame's rocket	introduced			SE5		I
Hypericum perforatum	common St. John's-wort	introduced			SE5		I
Inula helenium	elecampane	introduced		T	SE5		I
Juglans nigra	black walnut	native	5		S4		X
Leonurus cardiaca	common motherwort	introduced			SE5		I
Leucanthemum vulgare	oxeye daisy	introduced			SE5		I
Lindera benzoin	northern spicebush	native	6	T	S5		X
Lonicera morrowii	Morrow's honeysuckle	introduced			SE3		I
Lycopus americanus	American water-horehound	native	4	I	S5		X
Lysimachia ciliata	fringed yellow loosestrife	native	4	T	S5		X
Lythrum salicaria	purple loosestrife	introduced		I	SE5		I
Malus pumila	common apple	introduced			SE4		I
Medicago lupulina	black medick	introduced			SE5		I
Mentha canadensis	Canada mint	native	3	I	S5		X
Mirabilis nyctaginea	heart-leaved four-o'clock	native			S2		I
Oenothera biennis	common evening primrose	native	0		S5		X
Oxalis stricta	European wood-sorrel	native	0		S5		X
Persicaria hydropiper	marshpepper smartweed	introduced	4	I	SE5		I
Persicaria maculosa	spotted lady's-thumb	introduced		T	SE5		I
Pilosella aurantiaca	orange hawkweed	introduced			SE5		I
Plantago lanceolata	English plantain	introduced			SE5		I
Podophyllum peltatum	May-apple	native	5		S5		X

VASCULAR PLANT LIST - Glendon Drive EA - Coldstream Road Realignment

Plant species observed by B. Miller on May 12, May 23, June 12, June 28 and August 9, 2017 in hawthorn savanna and hawthorn thicket west of Coldstream Road at Glendon Drive, Middlesex Centre, Middlesex County

Scientific Name	Common Name	Establishment Means	Coefficient of Conservatism	Wetland Plant Species	Provincial Status	SARO & COSEWIC Status	Middlesex County Status
Populus deltoides ssp. deltoides	eastern cottonwood	native	4	T	S5		X
Populus tremuloides	trembling aspen	native		T	S5		X
Potentilla recta	sulphur cinquefoil	introduced			SE5		I
Prunella vulgaris ssp. lanceolata	lance-leaved self-heal	native	5	T	S5		C
Ranunculus acris	common buttercup	introduced		T	SE5		I
Rhamnus cathartica	European buckthorn	introduced		T	SE5		I
Ribes americanum	wild black currant	native	4	T	S5		X
Rosa multiflora	multiflora rose	introduced			SE4		I
Rubus idaeus ssp. strigosus	American red raspberry	native	0		S5		X
Rubus occidentalis	black raspberry	native	2		S5		X
Rumex crispus	curled dock	introduced		T	SE5		I
Salix sp.	willow						
Salix amygdaloides	peach-leaved willow	native	6	T	S5		X
Salix interior	sandbar willow	native	3	T	S5		X
Solidago altissima	tall goldenrod	native	1		S5		X
Solidago canadensis	Canada goldenrod	native	1		S5		X
Solidago gigantea	giant goldenrod	native	4	T	S5		X
Stellaria graminea	grass-leaved starwort	introduced		T	SE5		I
Symphyotrichum lanceolatum	white panicled aster	native	3	I	S5		X
Symphyotrichum lateriflorum	calico aster	native	3	T	S5		X
Symphyotrichum novae-angliae	New England aster	native	2		S5		X
Symphyotrichum pilosum var. pilosum	old field aster	native	4		S5		X
Symphyotrichum puniceum	purple-stemmed aster	native	6	I	S5		X
Symphyotrichum urophyllum	arrow-leaved aster	native	6		S4		X
Taraxacum officinale	common dandelion	introduced			SE5		I
Toxicodendron radicans	poison ivy	native	5	T	S5		X
Tragopogon pratensis	meadow goatsbeard	introduced			SE5		I
Ulmus americana	white elm	native	3	T	S5		X
Verbascum blattaria	moth mullein	introduced			SE5		I
Verbena hastata	blue vervain	native	4	I	S5		X
Viburnum lentago	nannyberry	native	4	T	S5		X
Viola sp.	violet species						
Vitis riparia	riverbank grape	native	0		S5		X
ANGIOSPERMS (MONOCOTS)							
Agrostis gigantea	redtop	introduced		T	SE5		X
Agrostis stolonifera	creeping bentgrass	introduced		T	SE5		X
Andropogon gerardii	big bluestem	native	7	0	S4		X
Arisaema triphyllum	Jack-in-the-pulpit	native	5	T	S5		X

VASCULAR PLANT LIST - Glendon Drive EA - Coldstream Road Realignment

Plant species observed by B. Miller on May 12, May 23, June 12, June 28 and August 9, 2017 in hawthorn savanna and hawthorn thicket west of Coldstream Road at Glendon Drive, Middlesex Centre, Middlesex County

Scientific Name	Common Name	Establishment Means	Coefficient of Conservatism	Wetland Plant Species	Provincial Status	SARO & COSEWIC Status	Middlesex County Status
Bromus inermis	smooth brome	introduced		0	SE5		I
Carex alopecoidea	foxtail sedge	native	6	T	S5		X
Carex aurea	golden sedge	native	4	T	S5		C
Carex cf. blanda	woodland sedge	native	3		S5		X
Carex cristatella	crested sedge	native	3	I	S5		X
Carex formosa	handsome sedge	native	6		S4		R
Carex gracillima	graceful sedge	native	4	T	S5		X
Carex granularis	limestone meadow sedge	native	3	T	S5		C
Carex grayi	Gray's sedge	native	8	I	S4		X
Carex hystericina	porcupine sedge	native	5	I	S5		X
Carex pallescens	pale sedge	native	5	T	S5		R
Carex pellita	woolly sedge	native	4	I	S5		X
Carex pensylvanica	Pennsylvania sedge	native	5		S5		X
Carex cf. radiata	eastern star sedge	native	4	T	S4		C
Carex retrorsa	retrorse sedge	native	5	I	S5		X
Carex rosea	rosy sedge	native	5		S5		C
Carex spicata	spiked sedge	introduced			SE5		I
Carex vulpinoidea	fox sedge	native	3	I	S5		X
Cyperus cf. esculentus	perennial yellow flatsedge	native	1	T	S5		X
Dactylis glomerata	orchard grass	introduced			SE5		I
Echinochloa cf. muricata	barnyard grass	native	4	I	S4S5		X
Eleocharis palustris	common spikerush	native	6	I	S5		R
Elymus repens	quackgrass	introduced			SE5		I
Erythronium americanum	yellow trout lily	native	5		S5		X
Glyceria striata	fowl mannagrass	native	3	I	S5		X
Juncus dudleyi	Dudley's rush	native	1	T	S5		X
Juncus effusus	soft rush	native	4	I	S5		X
Lolium arundinaceum	tall fescue	introduced			SE5		I
Panicum capillare	common panicgrass	native	0		S5		X
Phleum pratense	common timothy	introduced			SE5		I
Poa palustris	fowl bluegrass	native	5	I	S5		X
Poa pratensis	Kentucky bluegrass	introduced	0		SE5		X
Scirpus atrovirens	dark-green bulrush	native	3	T	S5		X
Scirpus cyperinus	common woolly bulrush	native	4	I	S5		X
Setaria pumila	yellow foxtail	introduced			SE5		I
Sisyrinchium sp.	blue-eyed-grass	native			S4S5		
Symplocarpus foetidus	eastern skunk cabbage	native	7	I	S5		C

VASCULAR PLANT LIST - Glendon Drive EA - Coldstream Road Realignment

Plant species observed by B. Miller on May 12, May 23, June 12, June 28 and August 9, 2017 in hawthorn savanna and hawthorn thicket west of Coldstream Road at Glendon Drive, Middlesex Centre, Middlesex County

Scientific Name	Common Name	Establishment Means	Coefficient of Conservatism	Wetland Plant Species	Provincial Status	SARO & COSEWIC Status	Middlesex County Status

FLORISTIC SUMMARY	TOTAL
Total Species	142
Native Species	99
Introduced (exotic) species	43
Species at Risk in Ontario (END, THR or SC)	0
Rare in Ontario (S1, S2 or S3)	1
Uncommon to common in Ontario (S4)	9
Common to very common in Ontario (S5)	89
Highly sensitive plant species with C value greater than 7	1
Rare in Middlesex County	3
Wetland Tolerant (T) Plant Species as identified in OWES Manual	42
Wetland Indicator (I) Plant Species as identified in OWES Manual	29

WILDLIFE SPECIES LIST - Glendon Drive EA - Coldstream Road Realignment

Wildlife species observed by B. Miller on May 12, May 23, June 12, June 28 and Auguest 9, 2017

COMMON NAME	***SCIENTIFIC NAME***	ONTARIO STATUS	GLOBAL STATUS	COSSARO	COSEWIC
AMPHIBIANS					
Northern Leopard Frog	*Lithobates pipiens*	S5	G5	NAR	NAR
REPTILES					
Eastern Gartersnake	*Thamnophis sirtalis*	S5	G5		
BIRDS					
Killdeer	*Charadrius vociferus*	S5B, S5N	G5		
American Woodcock	*Scolopax minor*	S4B	G5		
Red-tailed Hawk	*Buteo jamaicensis*	S5	G5	NAR	NAR
Belted Kingfisher	*Megaceryle alcyon*	S4B	G5		
Downy Woodpecker	*Picoides pubescens*	S5	G5		
Willow Flycatcher	*Empidonax traillii*	S5B	G5		
Red-eyed Vireo	*Vireo olivaceus*	S5B	G5		
Blue Jay	*Cyanocitta cristata*	S5	G5		
American Crow	*Corvus brachyrhynchos*	S5B	G5		
Barn Swallow	*Hirundo rustica*	S4B	G5	THR	THR
Black-capped Chickadee	*Poecile atricapillus*	S5	G5		
House Wren	*Troglodytes aedon*	S5B	G5		
American Robin	*Turdus migratorius*	S5B	G5		
Gray Catbird	*Dumetella carolinensis*	S4B	G5		
American Goldfinch	*Spinus tristis*	S5B	G5		
Eastern Towhee	*Pipilo erythrophthalmus*	S4B	G5		
Field Sparrow	*Spizella pusilla*	S4B	G5		
Savannah Sparrow	*Passerculus sandwichensis*	S4B	G5		
Song Sparrow	*Melospiza melodia*	S5B	G5		
Eastern Meadowlark	*Sturnella magna*	S4B	G5	THR	THR
Red-winged Blackbird	*Agelaius phoeniceus*	S4	G5		
Brown-headed Cowbird	*Molothrus ater*	S4B	G5		
Common Grackle	*Quiscalus quiscula*	S5B	G5		
Common Yellowthroat	*Geothlypis trichas*	S5B	G5		
Yellow Warbler	*Setophaga petechia*	S5B	G5		
Chestnut-sided Warbler	*Setophaga pensylvanica*	S5B	G5		
Northern Cardinal	*Cardinalis cardinalis*	S5	G5		
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S4B	G5		
Indigo Bunting	*Passerina cyanea*	S4B	G5		
MAMMALS					
Eastern Cottontail	*Sylvilagus floridanus*	S5	G5		
Grey Squirrel	*Sciurus carolinensis*	S5	G5		
White-tailed Deer	*Odocoileus virginianus*	S5	G5		
SUMMARY					
Total Odonata:					
Total Butterflies:					
Total Other Arthropods					

Total Amphibians:	***1***
Total Reptiles:	***1***
Total Birds:	***29***
Total Breeding Birds:	***27***
Total Mammals:	***3***

SIGNIFICANT SPECIES

Global:	*0*
National:	*2*
Provincial:	*2*

Explanation of Status and Acronymns

COSSARO: Committee on the Status of Species at Risk in Ontario
COSEWIC: Committee on the Status of Endangered Wildlife in Canada
S1: Critically Imperiled—Critically imperiled in the province (often 5 or fewer occurrences)
S2: Imperiled—Imperiled in the province, very few populations (often 20 or fewer),
S3: Vulnerable—Vulnerable in the province, relatively few populations (often 80 or fewer)
S4: Apparently Secure—Uncommon but not rare
S5: Secure—Common, widespread, and abundant in the province
SX: Presumed extirpated
SH: Possibly Extirpated (Historical)
SNR: Unranked
SU: Unrankable—Currently unrankable due to lack of information
SNA: Not applicable—A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
S#S#: Range Rank—A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species
S#B- Breeding status rank
S#N- Non Breeding status rank
?: Indicates uncertainty in the assigned rank
G1: Extremely rare globally; usually fewer than 5 occurrences in the overall range
G1G2: Extremely rare to very rare globally
G2: Very rare globally; usually between 5-10 occurrences in the overall range
G2G3: Very rare to uncommon globally
G3: Rare to uncommon globally; usually between 20-100 occurrences
G3G4: Rare to common globally
G4: Common globally; usually more than 100 occurrences in the overall range
G4G5: Common to very common globally
G5: Very common globally; demonstrably secure
GU: Status uncertain, often because of low search effort or cryptic nature of the species; more data needed.
GNR: Unranked—Global rank not yet assessed.
END: Endangered
THR: Threatened
SC: Special Concern
2, 3 or NS after a COSEWIC ranking indicates the species is either on Schedule 2, Schedule 3 or No Schedule of the Species At Risk Act (SARA)
NAR: Not At Risk
IND: Indeterminant, insufficient information to assign status
DD: Data Deficient

APPENDIX D.1: **COLDSTREAM ROAD**
NATURAL ENVIRONMENT

Stantec

Memo

To: Stephanie Bergman
Stantec London Office

From: Brian Miller and Sean Spisani
Stantec London and Stoney Creek Offices

File: 161413164

Date: January 9, 2018

Reference: Vegetation and Wildlife Assessment – Glendon Drive EA, Coldstream Road Realignment, Middlesex Centre

This memorandum has been prepared to provide a summary of the vegetation and wildlife surveys conducted for the Coldstream Road Realignment area located on the north side of Glendon Drive in Middlesex Centre, Middlesex County (the Study Area). Natural areas were dominated by hawthorns ranging from dense thicket to open scattered hawthorns mixed with dry to moist meadow. Agricultural fields are also present, including tilled agriculture to the west of the natural area, and hay fields to the north and east (Figure 1).

METHODS

Field surveys were conducted on five dates during spring and summer months. Survey details are listed below in Table 1.

Table 1 Survey Details and Summary

Survey Date	Surveyor(s)	Type of Survey
May 12, 2017	Brian Miller	Ecological Land Classification (ELC), botanical inventory, wildlife habitat assessment, and incidental observations of wildlife
May 23, 2017	Brian Miller	Botanical inventory, breeding bird survey, and amphibian egg mass searches
June 12, 2017	Brian Miller	Breeding bird survey, incidental plant and wildlife observations, and amphibian egg masses assessment
June 28, 2017	Brian Miller	Breeding bird survey, and incidental plant and wildlife observations
August 9, 2017	Brian Miller	Wetland delineation, botanical inventory, and incidental observations of wildlife

VEGETATION

The purpose of the vegetation surveys was to describe the vegetation communities present in the Study Area, and to document all plant species with an emphasis on rare or significant species.

Identification and mapping of ELC vegetation communities follows the protocols of the ELC field guide for Southern Ontario (Lee et al., 1998). Updates to vegetation community names and codes follow the 2008 catalogue of ELC vegetation communities. Wetland features were delineated using the Ontario Wetland Evaluation System, Southern Manual (MNR 2014), including application of the '50% wetland vegetation' rule to map points along a contour line where relative plant species cover consisted mostly of wetland species.

Flora nomenclature for scientific accepted species names is based on VASCAN, the Database of Vascular Plants of Canada (Brouillet et al. 2010+).

Identification of regionally rare or uncommon plant species in Middlesex County is based on Oldham (2017).

The provincial status of vegetation communities and species is based on the Natural Heritage Information Centre (NHIC) list (NHIC 2016). Provincially rare communities and species are those that have a provincial rank of S1 – S3. Identification of potentially sensitive native plant species is based on their assigned coefficient of conservatism (*C*) value, as determined by Oldham et al. (1995). This *C* value, ranging from 0 (low) to 10 (high), is based on a species' tolerance of disturbance and fidelity to a specific natural habitat. Species with a *C* value of 8, 9 or 10 generally exhibit a high degree of fidelity to a narrow range of habitat parameters.

Species at Risk were identified using the Species at Risk in Ontario List which is available online: https://www.ontario.ca/environment-and-energy/species-risk-ontario-list.

WILDLIFE

Targeted wildlife surveys were conducted to document breeding birds and breeding amphibians in the vegetation communities shown on Figure 1. Breeding bird surveys were conducted by traversing the area on foot, and recording all species of birds that were heard or seen. The highest level of breeding evidence was recorded for each species using the codes in the Ontario Breeding Bird Atlas (Cadman *et al.* 2007) codes. Surveys were conducted during early morning hours on three dates in May and June.

To document breeding amphibians, egg masses searches were conducted in all areas of pooling of water that were present in May and June. Surveyors searched the entire features, including margins, to locate egg masses or individual amphibians. Features were inspected by carefully moving leaves, twigs, and other debris by hand to located hidden egg masses, if present.

Surveys were also conducted to assess the potential for Significant Wildlife Habitat features identified in the Significant Wildlife Habitat Criteria Schedule for Ecoregion 7E (MNRF 2015). Candidate features were recorded when identified during surveys.

Area searches for wildlife were conducted during all visits, including visual scans, and hand searches under vegetation, debris, for basking and / or hiding reptiles and small mammals. All incidental observations of wildlife were recorded during all field surveys.

The provincial status of wildlife species is based on the NHIC wildlife list (NHIC 2016). Provincially rare species are those that have a provincial rank of S1 – S3. Species at Risk were identified using the Species at Risk in Ontario List which is available online: https://www.ontario.ca/environment-and-energy/species-risk-ontario-list.

RESULTS

VEGETATION

Vegetation communities documented during field surveys are described in Table 2 below.

One vegetation community documented (WODM4-4) includes a dominant species (Black Walnut) with a provincially rare vegetation community type listed by the NHIC (Moist-Fresh Black Walnut Deciduous Forest); however, WODM4-4 is a relatively young community with dry substrates and similar composition to the adjacent thickets, including old field species. The WODM4-4 is regenerating from cultural disturbance and does not represent a native lowland Black Walnut forest, and does not warrant a provincially rare ranking.

Table 2 Ecological Land Classification (ELC) Vegetation Types

PROPERTY & ELC VEGETATION TYPE	Community Description
MEADOW COMMUNITIES	
MEGM3 Dry - Fresh Graminoid Meadow (1998 Code: CUM1-1)	Upland meadow dominated by typical old field grasses such as smooth brome, tall fescue and orchard grass and an old field exotic sedge (*Carex spicata*). Canada goldenrod is abundant in patches.
THICKET COMMUNITIES	
THDM2-11 Hawthorn Deciduous Shrub Thicket (1998 Code: CUT1)	Dense thicket dominated by large hawthorn and common apple. The ground layer is this community is disturbed and dominated by species such as orchard grass, garlic mustard, enchanter's nightshade and white avens.
SAVANNA COMMUNITIES	
SVDM3-4 Hawthorn Deciduous Savana (1998 Code: CUS1-1)	This semi-open treed community is dominated by hawthorns. Cockspur hawthorn is a dominant hawthorn species. Other shrubs such as nannyberry and grey dogwood are occasional to abundant associates. The ground layer is diverse due to the wide-ranging moisture regimes from dry upland meadow to moist meadow. Goldenrods, asters and various sedges are common ground layer species.
WOODLAND COMMUNITIES	
WODM4-4	This small woodland community is located at the eastern corner of the Study Area. Young to mid-aged black walnut is dominant. The ground layer is equal in

Table 2 Ecological Land Classification (ELC) Vegetation Types

PROPERTY & ELC VEGETATION TYPE	Community Description
Dry - Fresh Black Walnut Deciduous Woodland (1998 Code: CUW1)	disturbance and species composition as the adjacent THDM2-11 community,
MARSH COMMUNITIES	
MAMM1 Graminoid Mineral Meadow Marsh (1998 Code: MAM2)	This open marsh community is dominated by fox sedge (Carex vulpinoidea) with common associates of porcupine sedge, dark-green bulrush, fowl manna grass, common woolly bulrush, white panicled aster, bentgrass species (Agrostis spp.).

Vascular Plant Species

The following is a floristic summary for the Study Area. A detailed list with all scientific plant names and species statuses is provided as an attachment to this memorandum.

- A total of 142 species of vascular plants were recorded. This total includes taxa identified to species, subspecies (ssp.) and variation (var.) levels.
- 99 of the 142-recorded species are native to Ontario, while 43 are exotic species not native to Ontario.
- 89 native species have a provincial rank of S5, indicating they are common with a secure population in Ontario.
- 9 native species have a provincial rank of S4, indicating they are uncommon, but not rare in the province and populations are apparently secure.
- 1 native species, a wildflower (*Mirabilis nyctaginea*, heart-leaved four-o' clock), has a provincial rank of "S2", indicating this species is rare in Ontario. Although this species is rare in other parts of Ontario, it is an introduced species in the Carolinian Zone (Oldham 2017) and therefore, its presence in the Study Area is non-significant.
- No Butternut or other Species at Risk (SAR) flora were observed in the Study Area.
- 1 native species (*Carex grayi*, Gray's sedge) has a *C* value of 8 indicating this species has a high level of sensitivity to habitat disturbance. It is scattered throughout the wetland portion of the Study Area.

- 3 native species (*Carex formosa, Carex pallescens* and *Eleocharis palustre*) are regionally Rare (R) in Middlesex County. All three species are sedges. *Carex formosa* is common in the Hawthorn Deciduous Savanna (SVDM3-4), except in the driest areas. Carex pallescens and Eleocharis are restricted to the Graminoid Mineral Meadow Marsh (MAMM1).

WILDLIFE

Breeding bird surveys documented a total of 29 birds, 27 of which are likely to be breeding in the Study Area. Barn Swallow and Belted Kingfisher were recorded as foraging and fly-over occurrences respectively, and breeding evidence was not recorded for these species. The complete list of wildlife observations is provided as an attachment to this memorandum.

Two Species at Risk were recorded during breeding bird surveys: Barn Swallow (threatened) and Eastern Meadowlark (threatened). Barn swallow was observed foraging over the MEGM3 unit at the north end of the site (Figure 1) on June 28, and is not considered a breeding occurrence. Eastern Meadowlark was recorded singing from the hayfield immediately west of Coldstream Road on May 28, and in the hayfield north of the train tracks on June 28 (Figure 1).

Amphibian egg mass surveys did not document larval or adult amphibians in areas of pooling water. Pools were present in May, but dry by the June surveys; therefore, the duration of pooling water was too short for amphibian transformation, and pools were not suitable for amphibian breeding. One adult Northern Leopard Frog was observed as an incidental observation; however, suitable breeding habitat was not documented.

Wildlife habitat surveys documented two candidate Significant Wildlife Habitat types:

- Crayfish chimneys were documented in the wetland feature shown on Figure 1. The species of crayfish was not determined. According to the Draft Significant Wildlife Habitat Criterion for Ecoregion 7E (MNR 2014), wetland areas with crayfish chimneys may be candidate Significant Wildlife Habitat; however, species use surveys are required to determine if features qualify as confirmed Significant Wildlife Habitat.

- Milkweed plants in the Study Area provide habitat for Monarch larvae with are a Species at Risk (special concern), and may be considered Significant Wildlife Habitat; however, Monarch was not recorded during field surveys.

No other Significant Wildlife Habitat features were identified during field surveys.

Four additional wildlife species were recorded as incidental observations, including three mammals and one reptile: Eastern Cottontail, Grey Squirrel, White-tailed Deer, and Eastern Gartnersnake. Barn Swallow and Eastern Meadowlark (discussed above) were the only Species at Risk or provincial rare wildlife species observed during field surveys; however, targeted surveys were not conducted for all Species at Risk that have range overlap with the Study Area, including Species at Risk bats, which may use large trees in the Study Area as maternity roosts.

The Endangered Species Act

The Endangered Species Act, 2007 (ESA) protects species at risk and their habitats by prohibiting anyone from killing, harming, harassing or possessing protected species, as well as prohibiting any damage or destruction to the habitat of species identified as endangered, threatened and extirpated on the Species at Risk in Ontario List. All endangered or threated species on the Species at Risk in Ontario List are provided with general habitat protections under the ESA 2007, which protect areas that species depend on to carry out their life processes, such as reproduction, rearing, hibernation, migration or feeding. Any activity that may impact a protected species or its habitat requires the prior issuance of a permit or other authorization from the MNRF. Consultation with MNRF is recommended to determine authorization requirements for any potential impacts to breeding habitat for Eastern Meadowlark, foraging habitat for Barn Swallow, and potential maternity roost trees for bats. To determine authorization requirements, MNRF may require additional surveys; e.g. acoustic surveys to determine presence absence of Species at Risk bats.

CLOSURE

Please contact the undersigned with any questions regarding the findings documented in this memorandum.

STANTEC CONSULTING LTD.

DRAFT

Brian Miller
Botanist / Terrestrial Ecologist
Phone: 226-971-2224
Brian.Miller@stantec.com

Attachment: Figure 1
A – Vascular Plant List
B – Wildlife Species List

REFERENCES

Brouillet, L., F. Coursol, S.J. Meades, M. Favreau, M. Anions, P. Bélisle & P. Desmet. 2010+. VASCAN, the Database of Vascular Plants of Canada. http://data.canadensys.net/vascan/

Cadman, M.D., D.A. Sutherland, G.G. Beck, D. Lepage, and A.R. Couturier (eds). 2007. Atlas of the Breeding Birds of Ontario 2001- 2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto. 706 pp.

Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray. 1998. Ecological land classification for Southern Ontario: first approximation and its application. Ontario Ministry of Natural Resources, South Central Region, Science Development and Transfer Branch. Technical Manual ELC-005.

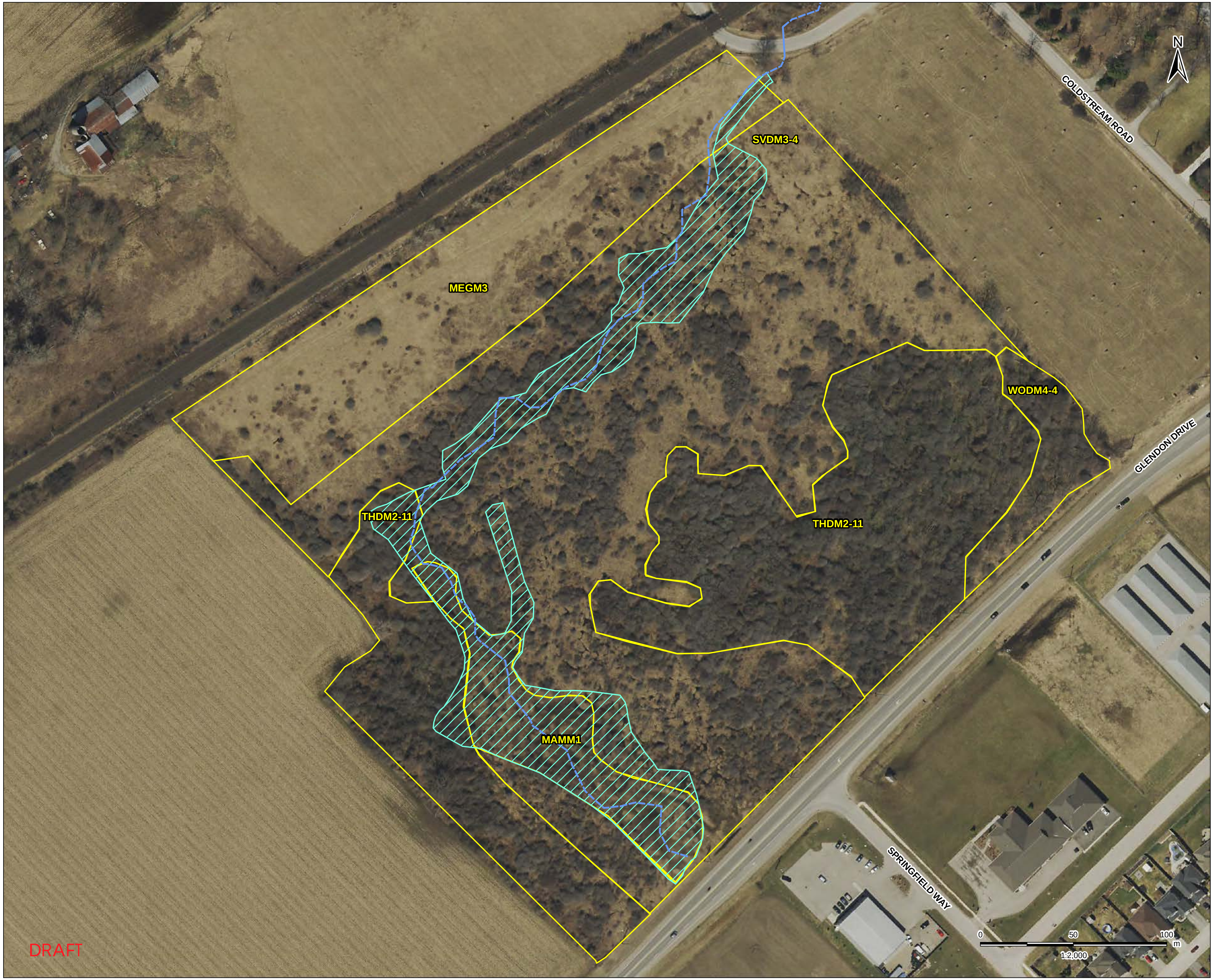
Ministry of Natural Resources (MNR). 2014. Ontario Wetland Evaluation System, Southern Manual. Available online at: http://www.ontariocanada.com/registry/view.do?postingId=8403

Natural Heritage Information Centre (NHIC). 2016. Vascular Plant List and Ontario Plant Community List. Ontario Ministry of Natural Resources, Peterborough. Available at: https://www.ontario.ca/page/get-natural-heritage-information

Newmaster, S.G., A. Lehela, P.W.C Uhlig, S. McMurray and M.J. Oldham. 1998. Ontario plant list. Ontario Ministry of Natural Resources, Ontario Forest Research Institute, Sault Ste. Marie, ON, Forest Research Information Paper No. 123. 550 pp. + appendices.

Oldham, M.J., W.D. Bakowsky and D.A. Sutherland. 1995. Floristic quality assessment for southern Ontario. OMNR, Natural Heritage Information Centre, Peterborough. 68 pp.

Oldham, Michael J. 2017. List of the Vascular Plants of Ontario's Carolinian Zone (Ecoregion 7E). Carolinian Canada and Ontario Ministry of Natural Resources and Forestry. Peterborough, ON. 132 pp.



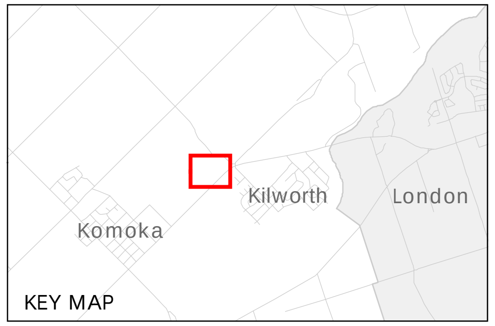
\\Cd1217-f01\work_group\01614\active\161413164\design\drawing\GIS\MXD\Terrestrial\161413164_ELC_Coldstream.mxd
Revised: 2017-09-01 By: kbuchanan

Stantec

Legend

- Watercourse (Permanent)
- Watercourse (Intermittent)
- ▭ ELC Boundary
- ▨ Wetland (Stantec 2017)

ELC	Description
MAMM1	Graminoid Mineral Meadow Marsh
MDGM3	Dry - Fresh Graminoid Meadow
SVDM3-4	Hawthorn Deciduous Savanna
THDM2-11	Hawthorn Deciduous Shrub Thicket
WODM4-4	Dry - Fresh Black Walnut Deciduous Woodland



Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2017.
3. 2015 orthoimagery used under license with Middlesex County.

September 2017
161413164

Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.

1

Title

Preliminary Ecological
Land Classification
Coldstream Road Realignment

ATTACHMENT A – **Plant and Wildlife Lists**

VASCULAR PLANT LIST - Glendon Drive EA - Coldstream Road Realignment

Plant species observed by B. Miller on May 12, May 23, June 12, June 28 and August 9, 2017 in hawthorn savanna and hawthorn thicket west of Coldstream Road at Glendon Drive, Middlesex Centre, Middlesex County

Scientific Name	Common Name	Establishment Means	Coefficient of Conservatism	Wetland Plant Species	Provincial Status	SARO & COSEWIC Status	Middlesex County Status
PTERIDOPHYTES (FERNS & FERN ALLIES)							
Dryopteris carthusiana	spinulose wood fern	native	5	T	S5		X
Equisetum arvense	field horsetail	native	0	T	S5		X
Onoclea sensibilis	sensitive fern	native	4	I	S5		X
Thelypteris palustris	eastern marsh fern	native	5	I	S5		X
ANGIOSPERMS (DICOTS)							
Acalypha rhomboidea	three-seed mercury	native	0		S5		X
Acer negundo	Manitoba maple	native	0	T	S5		X
Achillea millefolium	common yarrow	introduced			SE		I
Agrimonia gryposepala	hooked agrimony	native	2		S5		X
Alliaria petiolata	garlic mustard	introduced			SE5		I
Anemone canadensis	Canada anemone	native	3	T	S5		X
Anemone quinquefolia	wood anemone	native	7		S5		X
Anemone virginiana	Virginia anemone	native	4		S5		X
Apocynum cannabinum var. cannabinum	hemp dogbane	native			S5		X
Apocynum cannabinum var. hypericifolium	clasping-leaved hemp dogbane	native	3		S5		0
Arctium minus	common burdock	introduced			SE5		I
Asclepias incarnata	swamp milkweed	native	6	I	S5		X
Asclepias syriaca	common milkweed	native	0		S5		X
Boehmeria cylindrica	small-spike false nettle	native	4	I	S5		X
Caltha palustris	yellow marsh marigold	native	5	I	S5		C
Carya ovata ovata	shagbark hickory	native	6	T	S5		X
Circaea canadensis	enchanter's nightshade	native	3		S5		X
Cirsium arvense	Canada thistle	introduced			SE5		I
Cirsium vulgare	bull thistle	introduced			SE5		I
Clinopodium vulgare	wild basil	native	4		S5		X
Cornus obliqua	pale dogwood	native	5	I	S5		X
Cornus racemosa	grey dogwood	native	2	T	S5		X
Crataegus crus-galli	cockspur hawthorn	native	4		S5		X
Crataegus spp.	hawthorn species						
Daucus carota	wild carrot	introduced			SE5		I
Dipsacus fullonum	common teasel	introduced			SE5		I
Echinocystis lobata	wild cucumber	native	3	T	S5		X
Elaeagnus umbellata	autumn olive	introduced			SE3		IR
Epilobium cf. coloratum	purple-veined willowherb	native	3	I	S5		X

VASCULAR PLANT LIST - Glendon Drive EA - Coldstream Road Realignment

Plant species observed by B. Miller on May 12, May 23, June 12, June 28 and August 9, 2017 in hawthorn savanna and hawthorn thicket west of Coldstream Road at Glendon Drive, Middlesex Centre, Middlesex County

Scientific Name	Common Name	Establishment Means	Coefficient of Conservatism	Wetland Plant Species	Provincial Status	SARO & COSEWIC Status	Middlesex County Status
Erigeron philadelphicus	Philadelphia fleabane	native	1	T	S5		X
Erigeron pulchellus	robin's-plantain fleabane	native	7		S5		X
Erigeron strigosus	rough fleabane	native	0		S5		X
Eupatorium perfoliatum	common boneset	native	2	I	S5		X
Euthamia graminifolia	grass-leaved goldenrod	native	2		S5		X
Fragaria virginiana	wild strawberry	native	2		S5		X
Frangula alnus	glossy buckthorn	introduced		T	SE5		I
Fraxinus americana	white ash	native	4		S4		X
Galium boreale	northern bedstraw	native	7		S5		X
Galium mollugo	smooth bedstraw	introduced			SE5		I
Galium palustre	common marsh bedstraw	native	5	I	S5		X
Geranium maculatum	spotted geranium	native	6		S5		X
Geranium robertianum	herb-Robert	native			S5		I
Geum aleppicum	yellow avens	native	2	T	S5		X
Geum canadense	white avens	native	3	T	S5		X
Geum cf. urbanum	wood avens	introduced			SE2		I
Hesperis matronalis	dame's rocket	introduced			SE5		I
Hypericum perforatum	common St. John's-wort	introduced			SE5		I
Inula helenium	elecampane	introduced		T	SE5		I
Juglans nigra	black walnut	native	5		S4		X
Leonurus cardiaca	common motherwort	introduced			SE5		I
Leucanthemum vulgare	oxeye daisy	introduced			SE5		I
Lindera benzoin	northern spicebush	native	6	T	S5		X
Lonicera morrowii	Morrow's honeysuckle	introduced			SE3		I
Lycopus americanus	American water-horehound	native	4	I	S5		X
Lysimachia ciliata	fringed yellow loosestrife	native	4	T	S5		X
Lythrum salicaria	purple loosestrife	introduced		I	SE5		I
Malus pumila	common apple	introduced			SE4		I
Medicago lupulina	black medick	introduced			SE5		I
Mentha canadensis	Canada mint	native	3	I	S5		X
Mirabilis nyctaginea	heart-leaved four-o'clock	native			S2		I
Oenothera biennis	common evening primrose	native	0		S5		X
Oxalis stricta	European wood-sorrel	native	0		S5		X
Persicaria hydropiper	marshpepper smartweed	introduced	4	I	SE5		I
Persicaria maculosa	spotted lady's-thumb	introduced		T	SE5		I
Pilosella aurantiaca	orange hawkweed	introduced			SE5		I
Plantago lanceolata	English plantain	introduced			SE5		I
Podophyllum peltatum	May-apple	native	5		S5		X

VASCULAR PLANT LIST - Glendon Drive EA - Coldstream Road Realignment

Plant species observed by B. Miller on May 12, May 23, June 12, June 28 and August 9, 2017 in hawthorn savanna and hawthorn thicket west of Coldstream Road at Glendon Drive, Middlesex Centre, Middlesex County

Scientific Name	Common Name	Establishment Means	Coefficient of Conservatism	Wetland Plant Species	Provincial Status	SARO & COSEWIC Status	Middlesex County Status
Populus deltoides ssp. deltoides	eastern cottonwood	native	4	T	S5		X
Populus tremuloides	trembling aspen	native		T	S5		X
Potentilla recta	sulphur cinquefoil	introduced			SE5		I
Prunella vulgaris ssp. lanceolata	lance-leaved self-heal	native	5	T	S5		C
Ranunculus acris	common buttercup	introduced		T	SE5		I
Rhamnus cathartica	European buckthorn	introduced		T	SE5		I
Ribes americanum	wild black currant	native	4	T	S5		X
Rosa multiflora	multiflora rose	introduced			SE4		I
Rubus idaeus ssp. strigosus	American red raspberry	native	0		S5		X
Rubus occidentalis	black raspberry	native	2		S5		X
Rumex crispus	curled dock	introduced		T	SE5		I
Salix sp.	willow						
Salix amygdaloides	peach-leaved willow	native	6	T	S5		X
Salix interior	sandbar willow	native	3	T	S5		X
Solidago altissima	tall goldenrod	native	1		S5		X
Solidago canadensis	Canada goldenrod	native	1		S5		X
Solidago gigantea	giant goldenrod	native	4	T	S5		X
Stellaria graminea	grass-leaved starwort	introduced		T	SE5		I
Symphyotrichum lanceolatum	white panicled aster	native	3	I	S5		X
Symphyotrichum lateriflorum	calico aster	native	3	T	S5		X
Symphyotrichum novae-angliae	New England aster	native	2		S5		X
Symphyotrichum pilosum var. pilosum	old field aster	native	4		S5		X
Symphyotrichum puniceum	purple-stemmed aster	native	6	I	S5		X
Symphyotrichum urophyllum	arrow-leaved aster	native	6		S4		X
Taraxacum officinale	common dandelion	introduced			SE5		I
Toxicodendron radicans	poison ivy	native	5	T	S5		X
Tragopogon pratensis	meadow goatsbeard	introduced			SE5		I
Ulmus americana	white elm	native	3	T	S5		X
Verbascum blattaria	moth mullein	introduced			SE5		I
Verbena hastata	blue vervain	native	4	I	S5		X
Viburnum lentago	nannyberry	native	4	T	S5		X
Viola sp.	violet species						
Vitis riparia	riverbank grape	native	0		S5		X
ANGIOSPERMS (MONOCOTS)							
Agrostis gigantea	redtop	introduced		T	SE5		X
Agrostis stolonifera	creeping bentgrass	introduced		T	SE5		X
Andropogon gerardii	big bluestem	native	7	0	S4		X
Arisaema triphyllum	Jack-in-the-pulpit	native	5	T	S5		X

VASCULAR PLANT LIST - Glendon Drive EA - Coldstream Road Realignment

Plant species observed by B. Miller on May 12, May 23, June 12, June 28 and August 9, 2017 in hawthorn savanna and hawthorn thicket west of Coldstream Road at Glendon Drive, Middlesex Centre, Middlesex County

Scientific Name	Common Name	Establishment Means	Coefficient of Conservatism	Wetland Plant Species	Provincial Status	SARO & COSEWIC Status	Middlesex County Status
Bromus inermis	smooth brome	introduced		0	SE5		I
Carex alopecoidea	foxtail sedge	native	6	T	S5		X
Carex aurea	golden sedge	native	4	T	S5		C
Carex cf. blanda	woodland sedge	native	3		S5		X
Carex cristatella	crested sedge	native	3	I	S5		X
Carex formosa	handsome sedge	native	6		S4		R
Carex gracillima	graceful sedge	native	4	T	S5		X
Carex granularis	limestone meadow sedge	native	3	T	S5		C
Carex grayi	Gray's sedge	native	8	I	S4		X
Carex hystericina	porcupine sedge	native	5	I	S5		X
Carex pallescens	pale sedge	native	5	T	S5		R
Carex pellita	woolly sedge	native	4	I	S5		X
Carex pensylvanica	Pennsylvania sedge	native	5		S5		X
Carex cf. radiata	eastern star sedge	native	4	T	S4		C
Carex retrorsa	retrorse sedge	native	5	I	S5		X
Carex rosea	rosy sedge	native	5		S5		C
Carex spicata	spiked sedge	introduced			SE5		I
Carex vulpinoidea	fox sedge	native	3	I	S5		X
Cyperus cf. esculentus	perennial yellow flatsedge	native	1	T	S5		X
Dactylis glomerata	orchard grass	introduced			SE5		I
Echinochloa cf. muricata	barnyard grass	native	4	I	S4S5		X
Eleocharis palustris	common spikerush	native	6	I	S5		R
Elymus repens	quackgrass	introduced			SE5		I
Erythronium americanum	yellow trout lily	native	5		S5		X
Glyceria striata	fowl mannagrass	native	3	I	S5		X
Juncus dudleyi	Dudley's rush	native	1	T	S5		X
Juncus effusus	soft rush	native	4	I	S5		X
Lolium arundinaceum	tall fescue	introduced			SE5		I
Panicum capillare	common panicgrass	native	0		S5		X
Phleum pratense	common timothy	introduced			SE5		I
Poa palustris	fowl bluegrass	native	5	I	S5		X
Poa pratensis	Kentucky bluegrass	introduced	0		SE5		X
Scirpus atrovirens	dark-green bulrush	native	3	T	S5		X
Scirpus cyperinus	common woolly bulrush	native	4	I	S5		X
Setaria pumila	yellow foxtail	introduced			SE5		I
Sisyrinchium sp.	blue-eyed-grass	native			S4S5		
Symplocarpus foetidus	eastern skunk cabbage	native	7	I	S5		C

VASCULAR PLANT LIST - Glendon Drive EA - Coldstream Road Realignment

Plant species observed by B. Miller on May 12, May 23, June 12, June 28 and August 9, 2017 in hawthorn savanna and hawthorn thicket west of Coldstream Road at Glendon Drive, Middlesex Centre, Middlesex County

Scientific Name	Common Name	Establishment Means	Coefficient of Conservatism	Wetland Plant Species	Provincial Status	SARO & COSEWIC Status	Middlesex County Status

FLORISTIC SUMMARY	TOTAL
Total Species	142
Native Species	99
Introduced (exotic) species	43
Species at Risk in Ontario (END, THR or SC)	0
Rare in Ontario (S1, S2 or S3)	1
Uncommon to common in Ontario (S4)	9
Common to very common in Ontario (S5)	89
Highly sensitive plant species with C value greater than 7	1
Rare in Middlesex County	3
Wetland Tolerant (T) Plant Species as identified in OWES Manual	42
Wetland Indicator (I) Plant Species as identified in OWES Manual	29

WILDLIFE SPECIES LIST - Glendon Drive EA - Coldstream Road Realignment

Wildlife species observed by B. Miller on May 12, May 23, June 12, June 28 and Augeust 9, 2017

COMMON NAME	***SCIENTIFIC NAME***	ONTARIO STATUS	GLOBAL STATUS	COSSARO	COSEWIC
AMPHIBIANS					
Northern Leopard Frog	*Lithobates pipiens*	S5	G5	NAR	NAR
REPTILES					
Eastern Gartersnake	*Thamnophis sirtalis*	S5	G5		
BIRDS					
Killdeer	*Charadrius vociferus*	S5B, S5N	G5		
American Woodcock	*Scolopax minor*	S4B	G5		
Red-tailed Hawk	*Buteo jamaicensis*	S5	G5	NAR	NAR
Belted Kingfisher	*Megaceryle alcyon*	S4B	G5		
Downy Woodpecker	*Picoides pubescens*	S5	G5		
Willow Flycatcher	*Empidonax traillii*	S5B	G5		
Red-eyed Vireo	*Vireo olivaceus*	S5B	G5		
Blue Jay	*Cyanocitta cristata*	S5	G5		
American Crow	*Corvus brachyrhynchos*	S5B	G5		
Barn Swallow	*Hirundo rustica*	S4B	G5	THR	THR
Black-capped Chickadee	*Poecile atricapillus*	S5	G5		
House Wren	*Troglodytes aedon*	S5B	G5		
American Robin	*Turdus migratorius*	S5B	G5		
Gray Catbird	*Dumetella carolinensis*	S4B	G5		
American Goldfinch	*Spinus tristis*	S5B	G5		
Eastern Towhee	*Pipilo erythrophthalmus*	S4B	G5		
Field Sparrow	*Spizella pusilla*	S4B	G5		
Savannah Sparrow	*Passerculus sandwichensis*	S4B	G5		
Song Sparrow	*Melospiza melodia*	S5B	G5		
Eastern Meadowlark	*Sturnella magna*	S4B	G5	THR	THR
Red-winged Blackbird	*Agelaius phoeniceus*	S4	G5		
Brown-headed Cowbird	*Molothrus ater*	S4B	G5		
Common Grackle	*Quiscalus quiscula*	S5B	G5		
Common Yellowthroat	*Geothlypis trichas*	S5B	G5		
Yellow Warbler	*Setophaga petechia*	S5B	G5		
Chestnut-sided Warbler	*Setophaga pensylvanica*	S5B	G5		
Northern Cardinal	*Cardinalis cardinalis*	S5	G5		
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S4B	G5		
Indigo Bunting	*Passerina cyanea*	S4B	G5		
MAMMALS					
Eastern Cottontail	*Sylvilagus floridanus*	S5	G5		
Grey Squirrel	*Sciurus carolinensis*	S5	G5		
White-tailed Deer	*Odocoileus virginianus*	S5	G5		
SUMMARY					
Total Odonata:					
Total Butterflies:					
Total Other Arthropods					

Total Amphibians:	***1***
Total Reptiles:	***1***
Total Birds:	***29***
Total Breeding Birds:	***27***
Total Mammals:	***3***

SIGNIFICANT SPECIES

Global:	*0*
National:	*2*
Provincial:	*2*

Explanation of Status and Acronymns

COSSARO: Committee on the Status of Species at Risk in Ontario

COSEWIC: Committee on the Status of Endangered Wildlife in Canada

S1: Critically Imperiled—Critically imperiled in the province (often 5 or fewer occurrences)

S2: Imperiled—Imperiled in the province, very few populations (often 20 or fewer),

S3: Vulnerable—Vulnerable in the province, relatively few populations (often 80 or fewer)

S4: Apparently Secure—Uncommon but not rare

S5: Secure—Common, widespread, and abundant in the province

SX: Presumed extirpated

SH: Possibly Extirpated (Historical)

SNR: Unranked

SU: Unrankable—Currently unrankable due to lack of information

SNA: Not applicable—A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

S#S#: Range Rank—A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species

S#B- Breeding status rank

S#N- Non Breeding status rank

?: Indicates uncertainty in the assigned rank

G1: Extremely rare globally; usually fewer than 5 occurrences in the overall range

G1G2: Extremely rare to very rare globally

G2: Very rare globally; usually between 5-10 occurrences in the overall range

G2G3: Very rare to uncommon globally

G3: Rare to uncommon globally; usually between 20-100 occurrences

G3G4: Rare to common globally

G4: Common globally; usually more than 100 occurrences in the overall range

G4G5: Common to very common globally

G5: Very common globally; demonstrably secure

GU: Status uncertain, often because of low search effort or cryptic nature of the species; more data needed.

GNR: Unranked—Global rank not yet assessed.

END: Endangered

THR: Threatened

SC: Special Concern

2, 3 or NS after a COSEWIC ranking indicates the species is either on Schedule 2, Schedule 3 or No Schedule of the Species At Risk Act (SARA)

NAR: Not At Risk

IND: Indeterminant, insufficient information to assign status

DD: Data Deficient

D.1 TREE INVENTORY

Tree Inventory and Preservation Report

Glendon Drive Streetscape Environmental Assessment, Technical Memo #1

Prepared for:
County of Middlesex Centre

Prepared by:
Stantec Consulting Ltd.
171 Queens Ave
London ON N6A 5J7

Project No. 1614-13164

October 30, 2015

Sign-off Sheet

This document entitled Tree Inventory and Preservation Report was prepared by Stantec Consulting Ltd. ("Stantec") for the account of the County of Middlesex (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by ____
(signature)

Alexandra Hossfeld, BLA

Landscape Architect Intern, ISA Certified Arborist
Tel: (519) 645-2007 x 6662
Fax: (519) 645-6575
alexandra.hossfeld@stantec.com

Reviewed by ____
(signature)

Jennifer Koskinen, HBESfcon

ISA Certified Arborist
Tel: (519) 585-7442
Fax: (519) 579-8664
jennifer.koskinen@stantec.com

Table of Contents

LIST OF APPENDICES

1.0 INTRODUCTION

Stantec Consulting Ltd. has been retained by County of Middlesex Centre to complete a preliminary Tree Inventory and Preservation Plan as part of the Master Plan Municipal Class Environmental Assessment (EA) phase of the Glendon Drive Streetscape Improvements project in Kilworth-Komoka, Ontario. A subsequent detailed design for the streetscape improvements will encompass potential upgrades to the storm sewer system and appurtenances under Glendon Drive; pedestrian and cyclist passage along Glendon Drive; intersection turning movement improvements both northbound and eastbound; and the development of an enhanced streetscape along Glendon Drive, predominantly within the cores of the Kilworth-Komoka communities.

The study area is an approximately 7.4km long stretch of Glendon Drive, between Old River Road in the east, and the ramp to Highway 402 westbound, in the west. This stretch of Glendon Drive extends past agricultural areas, woodlots, residential properties, commercial nodes (the main intersections in the communities of Kilworth and Komoka), and conservation lands, including property acquired by Komoka Provincial Park.

The Tree Inventory and Preservation Plan is a requirement of the EA process, and the findings of this report are intended to inform the final preferred improvements alternative.

1.1 REPORT CONTENT AND PURPOSE

This report identifies existing trees located within the right-of-way (ROW) and on private property that may be impacted by the road improvements. The tree inventory will aid in determining preferred alignments of the final road design in order to avoid or mitigate impacts to healthy trees.

Outlined below is a summary of information contained within this report:

- Tree inventory data for trees <10 cm Diameter at Breast Height (DBH) and greater, including species identification, diameter class, and general condition;
- Analysis of tree data in conjunction with the presumed construction limits, and recommendations for management;
- Figures showing existing conditions and limits of potential ultimate ROW, inventoried tree and vegetated areas, and vegetation units of high preservation priority.

2.0 METHODOLOGY

2.1 SITE REVIEW

A visual assessment of trees located within the ROW, as well as trees adjacent to the ROW that may be impacted by construction, was undertaken on September 21st and 22nd 2015 by Ms. Alexandra Hossfeld, BLA, ISA Certified Arborist, and Ms. Jennifer Koskinen HBESfcon, ISA Certified Arborist. A subsequent site visit was undertaken by A. Hossfeld on September 25th, 2015.

The trees included in the inventory were grouped into 86 vegetation units, identified as “Unit 1”, “Unit 2”, etc., and summarized in a data table entitled *Table 1. General Tree Inventory* located in Appendix ‘A’ of this report. The extent of vegetation units were determined based on vegetation located within the future Right of Way (ROW), which was determined onsite based on landmarks in the field. Data collected for each tree includes botanical and common names, general health / condition assessment, diameter class, and comments specific to the species. The location of each vegetation unit is identified on the Tree Inventory Plan, in Appendix ‘B’.

2.1.1 Determining Tree Inventory and Locating Vegetation Units

Preliminary plans including aerial photography of the subject area as well as the potential new ROW, referred to on the Tree Inventory Plans as the ‘Estimated Potential Ultimate ROW’ were created and consulted in the field. The plan assumes an offset of 18 metres from the centerline of Glendon Drive as the future ROW limits. An additional 5 metres offset outside the ROW was shown on the field plans and helped the arborists to determine which trees and vegetation located on private property could be impacted by potential development. Drawings were used in the field to scale distances and identify trees and landmarks.

2.2 TREE CONDITION RATING

Outlined below are the detailed guidelines utilized for the condition classification:

Excellent: (Vigour Class 6: Healthy)
No major branch mortality: crown is reasonably normal with less than 10% branch or twig mortality; no signs of decay.

Good: (Vigour Class 5: Light Decline)
Branch mortality, twig dieback in 11-25% of the crown: broken branches or crown missing based on presence of old snags is less than 26%; minor evidence of decay.

Fair: (Vigour Class 4: Moderate Decline)
Branch mortality, twig dieback in 26-50% of the crown: broken branches or crown area missing based on presence of old snags is 50% or less; decay evident.

Poor: (Vigour Class 3: Severe Decline)
Branch mortality, twig dieback in more than 50% of the crown: broken branches or crown area missing based on presence of old snags in more than 50%; decay resulting in high hazard assessment.

Dead: (Vigour Class 2: Dead due to Natural Causes)
Tree is dead, either standing or down: phloem under bark has brown streaks: few epicormic shoots may be present.

Dead: (Vigour Class 1: Dead due to Human Causes)
Tree removed: Has been sawed or girdled by human activity.

2.3 REPORT

Tree inventory data has been compiled in Table 1. The table describes vegetation units inventoried, as well as Preservation Priority (high, medium, low) in order to mitigate impacts to protected healthy trees during the final design phase.

The Tree Inventory Plans identify location of vegetation units to be used in conjunction with Table 1 to identify high preservation areas.

2.4 PRESERVATION PRIORITY

Inventoried vegetation units were analyzed to identify a preservation priority of High, Medium, or Low. The priority level is based on the trees' condition rating, the diameter at breast height (DBH), whether species are native, non-native, or invasive non-native species, and whether they form part of a Significant Vegetation Patch. Significant Vegetation Patches are determined based on a 15 point evaluation of significance in the Middlesex Natural Heritage Systems Study (2014). This document was taken into consideration when identifying preservation priority for vegetation units.

The following outlines the qualifications for each preservation priority, followed by definitions for native, non-native, and invasive non-native species:

High	Native tree or landscape tree with a condition rating of excellent, or good, and with DBH >30cm, and / or Trees part of a significant vegetation patches with trees that meet the above criteria
Medium	Native tree with a condition rating of fair, and 11cm to 30cm DBH; and/or Non-Native tree with a condition rating of excellent, good, or fair, and with DBH 11cm and greater.

Low	Native tree with a condition rating of poor, and 10cm DBH or less; and/or Non-Native with a condition rating of poor, and 10cm DBH or less; and/or Invasive non-native tree with a condition rating of poor to excellent, and a DBH of any size.

Native Species*: species known to have existed on a site prior to European settlement.

Invasive Non-Native*: non-native species that reproduce aggressively and displace native plant species in an area.

Non–Native: species that are not native species, and are not considered to be invasive.

*referenced from The Middlesex Natural Heritage Study

3.0 OBSERVATIONS & ASSESSMENT

3.1 OBSERVATIONS

Inventoried vegetation includes the following species:

fir sp. *(abies sp.)*, Freeman maple *(Acer freemanii)*, Manitoba maple *(Acer negundo)**, Norway maple *(Acer platanoides)*, Crimson King Norway maple *(Acer platanoides 'Crimson King')*, red maple *(Acer rubrum)*, silver maple *(Acer saccharinum)*, sugar maple *(Acer saccharum)*, ash spp. *(Fraxinus spp.)*, white ash *(Fraxinus americana)*, serviceberry sp. *(Amelanchier sp.)*, paper birch *(Betula papyrifera)*, European birch *(Betula pendula)*, blue beech *(Carpinus caroliniana)*, bitternut hickory *(Carya cordiformis)*, northern catalpa *(Catalpa speciosa)*, eastern hackberry *(Celtis occidentalis)*, eastern redbud *(Cercis canadensis)*, smokebush *(Cotinus coggygria)*, hawthorn sp. *(Crataegus sp.)*, autumn olive *(Eleagnus umbellata)*, thornless honeylocust *(Gleditsia triacanthos var. inermis)*, butternut *(Juglans cinerea)*, black walnut *(Juglans nigra)*, juniper sp. *(Juniperus sp.)*, red juniper *(Juniperus virginiana)*, eastern larch *(Larix laricina)*, saucer magnolia *(Magnolia x soulangiana)*, apple sp. *(Malus sp.)*, white mulberry *(Morus alba)**, weeping mulberry *(Morus alba 'Pendula')*, hop-hornbeam *(Ostrya virginiana)*, Norway spruce *(Picea abies)*, Colorado spruce *(Picea pungens)*, Colorado blue spruce *(Picea pungens glauca)* white spruce *(Picea glauca)*, Austrian pine *(Pinus nigra)*, red pine *(Pinus resinosa)*, Scotch pine *(Pinus sylvestris)**, white pine *(Pinus strobus)*, poplar sp. *(Populus sp.)*, eastern cottonwood *(Populus deltoides)*, trembling aspen *(Populus tremuloides)*, cherry sp. *(Prunus sp.)*, black cherry *(Prunus serotina)*, white oak *(Quercus alba)*, bur oak *(Quercus macrocarpa)*, chinquapin oak *(Quercus muehlenbergii)*, red oak *(Quercus rubra)*, European buckthorn *(Rhamnus cathartica)*, staghorn sumac *(Rhus typhina)*, black locust *(Robinia pseudoacacia)**, willow sp. *(Salix sp.)*, white willow *(Salix alba)*, weeping willow *(Salix alba tristis)*, mountain ash *(Sorbus aucuparia)*, lilac sp. *(Syringa sp.)*, American basswood *(Tilia americana)*, littleleaf linden *(Tilia cordata)*, eastern white cedar *(Thuja occidentalis)*, emerald cedar *(Thuja occidentalis 'Smaragd')*, eastern hemlock *(Tsuga canadensis)*, elm sp. *(Ulmus sp.)*, white elm *(Ulmus americana)*, Siberian elm *(Ulmus chinensis)*, and slippery elm *(Ulmus rubra)*. *Denotes an invasive species

3.1.1 Butternut

A review for endangered species, such as butternut (*Juglans cinerea*), was completed from the edge of the limit of grading. The review captured approximately 10 metres off of the edge of the estimated ultimate ROW into the adjacent lands.

There was one butternut tree that was observed on site, in Unit 3, just inside the woodland edge opposite the southwest corner of Elmhurst St., as identified on figure 37 in Appendix ‘A’. The Ontario Ministry of Natural Resources (OMNR) requires a minimal 25m buffer of the trees natural environment from the stem of the tree. The tree is growing close to the wooded edge; as such the existing mowed boulevard, gravel shoulder, and road would not be considered the tree’s natural habitat and would not be included as part of the tree’s buffer. It is recommended that during detail design encroaching into this area be avoided if possible. If the design identifies construction adjacent to this wooded area then Tree Protection fencing shall be placed along the edge of the forest, and 25m from each side of the tree. If the tree will be impacted or if the buffer will be encroached upon, then a Butternut Assessment shall be completed by an OMNR Certified Butternut Assessor prior to start of work.

3.2 ASSESSMENT

The vegetation units identified along Glendon Drive predominantly include trees in good condition, with the majority given a designation of high preservation priority. During detail design engineers should try to limit impact to these areas identified as high preservation priority.

Vegetation units with the majority of trees identified as ‘high preservation priority’ have been shown in red on the Tree Inventory Plans and highlighted in Table 1 for ease of identification.

Once design drawings have been finalized, it is recommended that a Tree Management Plan be completed to identify tree removals, preservation areas, and recommendations for management and Tree Protection Fence locations.

3.2.1 Preservation Priority & Significant Vegetation Patches

A total of 66 out of 86 inventoried vegetation units are identified as High Preservation Priority. Six vegetation patches were rated Medium Priority, and the remaining 14 were Low Priority.

The Middlesex Natural Heritage Systems Study (2014) has identified natural areas within the study limits as ‘Significant Vegetation Patches’, and several of the vegetation units inventoried as part of this study fall within these patches. These units are as follows: Units 1 through 8, Unit 17, Unit 36, Unit 40, Unit 66, Units 76 through 77, Units 83 through 84, and Unit 86. Units 76 and 77 are part of Komoka Provincial Park. Unit 86 also borders an area adjacent to the Thames River, identified by the OMNR as an Area of Natural and Scientific Interest.

Impacts to vegetation units rated as High Priority should be avoided when finalizing detailed design. More detailed information regarding impact prevention and mitigation for each unit may be identified once the design engineering is finalized and construction limits are established.

4.0 DISCLAIMER

The assessment of the trees presented within this report has been made using accepted arboricultural techniques. These include a visual examination of the above-ground parts of each tree for structural defects, scars, external indications of decay, evidence of insect presence, discoloured foliage, the general condition of the trees and the surrounding site, as well as the proximity of property and people. None of the trees examined were dissected, cored, probed, or climbed, and detailed root crown examinations involving excavation were not undertaken.

Notwithstanding the recommendations and conclusions made in this report, it must be realized that trees are living organisms and their health and vigour is constantly changing. They are not immune to changes in site conditions or seasonal variations in the weather.

While reasonable efforts have been made to ensure the trees recommended for retention are healthy, no guarantees are offered or implied, that these trees or any part of them will remain standing. It is both professionally and practically impossible to predict with absolute certainty the behavior of any single tree or group of trees in all circumstances. Inevitably a standing tree will always pose some risk. Most trees have the potential for failure if provided with the necessary combinations of stresses and elements. This risk can only be eliminated if the tree is removed.

Although every effort has been made to ensure that this assessment is reasonably accurate the trees should be re-assessed periodically. The assessment presented in this report is valid at the time of inspection.

5.0 REFERENCES

Middlesex County. 2014. *Middlesex Natural Heritage Systems Study: A study to identify natural heritage systems in Middlesex County*. Project management by Upper Thames River Conservation Authority in cooperation with Middlesex County Conservation Authorities.

APPENDIX A
TABLE 1 – GENERAL TREE INVENTORY

TABLE 1. General Tree Inventory

Project Name: Glendon Drive Streetscape Improvements: Master Plan Municipal Class EA
Data Collected: September 21, 22, 24 2015

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
Unit 1							
	Acer rubrum	red maple	20-30	good	2		High
	Acer rubrum	red maple	20-30	poor	2	*<10 cm dbh deciduous shrubs in front	
	Acer rubrum	red maple	30-40	poor	1		
	Acer saccharum	sugar maple	10-20	good	1		
	Acer saccharum	sugar maple	20-30	good	1		
	Fraxinus americana	white ash	10-20	good	1		
	Juglans nigra	black walnut	10-20	good	2		
Unit 2							
	Acer negundo	Manitoba maple	10-20	poor	2	*<10 cm dbh staghorn sumac lining slope	High
	Betula papyrifera	paper birch	10-20	poor	1	*wooded area adjacent to road in good condition, will require further inventory in future if impacting	
	Fraxinus americana	white ash	10-20	good	2	*<10 cm dbh ash from poor-good condition	
	Juglans nigra	black walnut	10-20	good	4	*<10 cm dbh buckthorn near end of unit 2	
	Juglans nigra	black walnut	20-30	good	6		
	Morus alba	white mulberry	20-30	good	1		
	Populus tremuloides	trembling aspen	10-20	good	3		
	Quercus alba	white oak	60-70	good	1		
	Ulmus rubra	slippery elm	10-20	poor	2		
	Ulmus rubra	slippery elm	20-30	good	1		
Unit 3							
	Acer rubrum	red maple	10-20	good	1		High
	Acer rubrum	red maple	20-30	good	2		
	Acer rubrum	red maple	30-40	good	2		
	Acer rubrum	red maple	40-50	good	2		
	Acer rubrum	red maple	50-60	good	2		
	Acer saccharum	sugar maple	10-20	good	10	*<10 cm dbh buckthorn growing along edge	
	Acer saccharum	sugar maple	20-30	good	1		
	Acer saccharum	sugar maple	30-40	good	1		
	Acer saccharum	sugar maple	40-50	good	1		
	Acer saccharum	sugar maple	50-60	poor	1	girdled with wire	
	Fraxinus sp.	ash sp.	30-40	dead	1		
	Juglans cinerea	butternut	5	poor	1	Located adjacent to Elmhurst St. sign. Endangered Species, refer to report.	
	Juglans nigra	black walnut	10-20	good	2		
	Morus alba	white mulberry	10-20	good	1		
	Ostrya virginiana	hop-hornbeam	10-20	good	7		
	Ostrya virginiana	hop-hornbeam	20-30	good	1		

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
	Quercus alba	white oak	10-20	good	1		High
	Quercus alba	white oak	50-60	good	2		
	Quercus alba	white oak	60-70	good	2		
	Quercus rubra	red oak	60-70	good	2		
Unit 4							
	Acer saccharum	sugar maple	10-20	good	53	*one <10 cm dbh hackberry growing in understorey	High
	Acer saccharum	sugar maple	10-20	poor	1	*cherry understorey growing close to edge of unit	
	Acer saccharum	sugar maple	20-30	good	15		
	Acer saccharum	sugar maple	20-30	poor	1		
	Acer saccharum	sugar maple	30-40	good	4		
	Acer saccharum	sugar maple	30-40	poor	2		
	Acer saccharum	sugar maple	50-60	dead	1		
	Carya cordiformis	bitternut hickory	10-20	poor	1		
	Fraxinus sp.	ash sp.	10-20	dead	1		
	Fraxinus sp.	ash sp.	20-30	dead	1		
	Juglans nigra	black walnut	20-30	dead	1		
	Juglans nigra	black walnut	30-40	good	1		
	Juglans nigra	black walnut	50-60	good	1		
	Juglans nigra	black walnut	60-70	good	1	overhangs ditch	
	Pinus strobus	white pine	20-30	good	1		
	Quercus alba	white oak	10-20	good	1		
	Quercus alba	white oak	20-30	good	2		
	Quercus alba	white oak	30-40	poor	4		
	Quercus alba	white oak	40-50	good	3		
	Quercus alba	white oak	50-60	good	1		
	Quercus alba	white oak	60-70	good	1		
	Quercus rubra	red oak	30-40	good	3		
	Rhamnus cathartica	European buckthorn	10-20	good	1	on woodland edge	
Unit 5							
	Acer rubrum	red maple	20-30	good	1	*serviceberry growing in understorey	High
	Acer saccharum	sugar maple	10-20	dead	2		
	Acer saccharum	sugar maple	10-20	good	56		
	Acer saccharum	sugar maple	20-30	good	31		
	Acer saccharum	sugar maple	20-30	poor	1		
	Acer saccharum	sugar maple	30-40	good	4		
	Acer saccharum	sugar maple	50-60	poor	1		
	Fraxinus sp.	ash sp.	10-20	good	1		

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
	Fraxinus sp.	ash sp.	10-20	dead	9		High
	Fraxinus sp.	ash sp.	20-30	dead	2		
	Ostrya virginiana	hop-hornbeam	10-20	good	1		
	Quercus alba	white oak	10-20	good	3		
	Quercus alba	white oak	20-30	good	6		
	Quercus alba	white oak	30-40	good	4		
	Quercus alba	white oak	40-50	good	4		
	Quercus rubra	red oak	30-40	good	3		
	Quercus rubra	red oak	40-50	good	2		
	Quercus rubra	red oak	50-60	good	1		
Unit 6							
	Acer rubrum	red maple	10-20	good	1		High
	Acer rubrum	red maple	10-20	poor	1		
	Acer rubrum	red maple	20-30	good	1		
	Acer rubrum	red maple	30-40	good	1		
	Acer saccharum	sugar maple	10-20	good	34		
	Acer saccharum	sugar maple	20-30	good	32		
	Acer saccharum	sugar maple	20-30	poor	1		
	Acer saccharum	sugar maple	30-40	good	2		
	Acer saccharum	sugar maple	40-50	good	1		
	Acer saccharum	sugar maple	50-60	poor	1		
	Crataegus sp.	hawthorn sp.	10-20	fair	1		
	Fraxinus sp.	ash sp.	10-20	fair	1		
	Fraxinus sp.	ash sp.	10-20	dead	6		
	Fraxinus sp.	ash sp.	20-30	dead	2		
	Ostrya virginiana	hop-hornbeam	10-20	good	1		
	Pinus strobus	white pine	40-50	good	1		
	Populus sp.	poplar sp.	10-20	good	1		
	Populus sp.	poplar sp.	40-50	good	1		
	Prunus serotina	black cherry	10-20	good	1		
	Quercus alba	white oak	10-20	good	5		
	Quercus alba	white oak	10-20	dead	1		
	Quercus alba	white oak	20-30	good	2		
	Quercus alba	white oak	20-30	fair	3		
	Quercus alba	white oak	30-40	fair	4		
	Quercus alba	white oak	30-40	good	5		
	Quercus alba	white oak	30-40	fair	2		
	Quercus alba	white oak	40-50	poor	1		
	Quercus rubra	red oak	30-40	good	7		

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
	Quercus rubra	red oak	30-40	dead	1		High
	Quercus rubra	red oak	40-50	good	2		
	Tllia americana	American basswood	10-20	fair	4		
	Tllia americana	American basswood	20-30	good	1		
Unit 7							
	Acer rubrum	red maple	30-40	good	4	*<10cm dbh ash saplings in understorey, sumac on edge	High
	Acer saccharum	sugar maple	10-20	good	6		
	Acer saccharum	sugar maple	20-30	good	9		
	Acer saccharum	sugar maple	30-40	good	7		
	Acer saccharum	sugar maple	40-50	good	3		
	Amelanchier sp.	serviceberry sp.	10-20	good	1		
	Celtis occidentalis	eastern hackberry	30-40	good	1		
	Fraxinus sp.	ash sp.	10-20	dead	8		
	Fraxinus sp.	ash sp.	30-40	dead	1		
	Prunus serotina	black cherry	10-20	good	6		
	Prunus serotina	black cherry	30-40	good	1		
	Prunus sp.	cherry sp.	10-20	good	1		
	Quercus alba	white oak	20-30	good	5		
	Quercus alba	white oak	30-40	good	4		
	Quercus alba	white oak	30-40	fair	1		
	Quercus alba	white oak	30-40	dead	1		
	Quercus alba	white oak	40-50	good	8		
	Quercus macrocarpa	bur oak	10-20	good	1		
	Quercus macrocarpa	bur oak	20-30	good	2		
	Quercus macrocarpa	bur oak	30-40	good	3		
	Quercus macrocarpa	bur oak	40-50	good	2		
	Quercus rubra	red oak	30-40	good	6		
	Quercus rubra	red oak	40-50	good	2		
	Quercus rubra	red oak	50-60	good	5		
Unit 8							
	Fraxinus sp.	ash sp.	50-60	dead	1		High
	Fraxinus sp.	ash sp.	60-70	dead	1	*sumac along edge, disturbance to edge vegetation	
	Prunus serotina	black cherry	10-20	good	1		
	Prunus serotina	black cherry	10-20	fair	3		
	Prunus serotina	black cherry	10-20	dead	1		
	Prunus serotina	black cherry	20-30	good	2		
	Prunus serotina	black cherry	50-60	fair	1		
	Quercus macrocarpa	bur oak	20-30	good	1		
	Quercus macrocarpa	bur oak	20-30	dead	2		

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
	Quercus macrocarpa	bur oak	30-40	good	2		High
	Quercus macrocarpa	bur oak	30-40	fair	1		
	Quercus macrocarpa	bur oak	30-40	poor	1		
	Quercus macrocarpa	bur oak	40-50	good	1		
	Quercus macrocarpa	bur oak	40-50	fair	1		
	Quercus macrocarpa	bur oak	50-60	fair	2		
	Quercus macrocarpa	bur oak	50-60	dead	1		
	Quercus rubra	red oak	40-50	good	1		
	Tllia americana	American basswood	30-40	fair	1		
Unit 9							
	Acer saccharum	sugar maple	10-20	fair	2		Medium
	Acer saccharum	sugar maple	10-20	poor	1		
	Acer saccharum	sugar maple	20-30	good	2		
	Acer saccharum	sugar maple	20-30	fair	2		
	Acer saccharum	sugar maple	20-30	poor	1		
	Acer saccharum	sugar maple	30-40	good	3		
Unit 10							
20123 Vanneck Road	*Picea glauca*	white spruce	20-30	good	2		High
	Larix laricina	eastern larch	50-60	fair	1		
	Acer negundo	Manitoba maple	10-20	good	1		
	Acer freemanii	Freeman maple	10-20	good	1		
	Abies sp.	fir sp.	10-20	good	2		
	Abies sp.	fir sp.	10-20	poor	1		
	Picea pungens	Colorado spruce	20-30	good	4		
	Picea abies	Norway spruce	10-20	good	4		
	Picea abies	Norway spruce	30-40	good	4		
	Picea abies	Norway spruce	20-30	good	2		
Unit 11							
Wooded area (20123 & 20101)	*Carya cordiformis*	bitternut hickory	10-20	good	1	*sumac growing along property line	High
	Cotinus coggygria	smokebush	<10	good	1		
	Picea pungens	Colorado spruce	<10	good	1		
	Pinus resinosa	red pine	<10	good	2		
	Quercus rubra	red oak	50-60 m.s	good	1	3 stems	
	Quercus rubra	red oak	100+	good	1	dripline hangs over road	
	Tllia americana	American basswood	20-30	fair	1	dripline hangs over property line	
	Picea abies	Norway spruce	10-20	good	1		

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
Unit 12							
20101 Vanneck Road	*Acer negundo*	Manitoba maple	30-40	good	1		High
	Fraxinus americana	white ash	10-20	good	4		
	Juglans nigra	black walnut	<10	good	3	along front property line	
	Juglans nigra	black walnut	10-20	good	2	along front property line	
	Juglans nigra	black walnut	20-30	good	6	Dripline hangs into ROW	
	Picea pungens glauca	Colorado blue spruce	10-20	good	8	screens front yard	
	Picea glauca	white spruce	10-20	good	9	along front property line	
	Thuja occidentalis	eastern white cedar	<10	good	2		
	Thuja occidentalis	eastern white cedar	10-20	good	5	located at front of property	
Unit 13							
20093 Vanneck Road	*Acer saccharum*	sugar maple	10-20	good	3	in front yard landscape	High
	Acer saccharum	sugar maple	20-30	good	2	in front yard landscape	
	Juglans nigra	black walnut	<10	good	1		
	Picea abies	Norway spruce	10-20	fair	1		
	Picea abies	Norway spruce	10-20	poor	7	line property adjacent to road	
	Picea abies	Norway spruce	20-30	good	7	line property adjacent to road	
	Picea pungens	Colorado spruce	20-30	good	2		
	Pinus nigra	Austrian pine	10-20	good	1	at entrance to driveway	
	Populus sp.	poplar sp.	20-30	dead	1		
	Syringa sp.	Lilac	<10	good	1		
	Thuja occidentalis	eastern white cedar	10-20	good	1	located on edge of property	
Unit 14							
22496 Vanneck Road	*Acer platanoides*	Norway maple	30-40	good	2	*front yard landscaped	High
	Picea glauca	white spruce	10-20	good	2	located on edge of property	
	Thuja occidentalis	eastern white cedar	10-20	fair	6	Row of cedars along driveway 10m off road	
Unit 15							
	Crataegus sp.	hawthorn sp.	10-20	fair	4	*cluster of hawthorn, <10cm dbh	Medium
	Juglans nigra	black walnut	10-20	fair	6	isolated species on edge of field	
	Juglans nigra	black walnut	50-60	poor	1	north side of Coldstream Road	
Unit 16							
	Crataegus sp.	hawthorn sp.	10-20	good	1		Low
	Crataegus sp.	hawthorn sp.	10-20	dead	1		
	Ulmus rubra	slippery elm	<10	poor	1	cut in half	
Unit 17							
	Crataegus sp.	hawthorn sp.	<10	fair	4	grapevine in crown	High
	Crataegus sp.	hawthorn sp.	<10	dead	6	grapevine in crown	
	Crataegus sp.	hawthorn sp.	10-20	fair	16	grapevine in crown	
	Crataegus sp.	hawthorn sp.	10-20	poor	5	grapevine in crown	

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
	Crataegus sp.	hawthorn sp.	10-20	dead	4	grapevine in crown	High
	Crataegus sp.	hawthorn sp.	20-30	poor	2	grapevine in crown	
	Crataegus sp.	hawthorn sp.	20-30	dead	1		
	Juglans nigra	black walnut	10-20	good	15	tent caterpillars, Virginia creeper in crown	
	Juglans nigra	black walnut	10-20	fair	2	tent caterpillars, Virginia creeper in crown	
	Juglans nigra	black walnut	20-30	good	9	tent caterpillars, Virginia creeper in crown	
	Juglans nigra	black walnut	20-30	fair	1	tent caterpillars, Virginia creeper in crown	
	Juglans nigra	black walnut	30-40	good	1	tent caterpillars, Virginia creeper in crown	
	Juglans nigra	black walnut	50-60	good	1	tent caterpillars, Virginia creeper in crown	
	Rhamnus cathartica	European buckthorn	<10	good	3		
	Rhamnus cathartica	European buckthorn	10-20	good	1		
	Ulmus americana	white elm	10-20	fair	1	*golden rod groundcover, dogwood shrubs <10cm dbh	
	Unknown sp.	unknown species	10-20	dead	5	covered in grapevine	
Unit 18							
	Crataegus sp.	hawthorn sp.	<10	poor	3	*golden rod, aster groundcover, dogwood <10cm dbh	Low
	Crataegus sp.	hawthorn sp.	10-20	fair	6		
	Ulmus sp.	elm sp.	<10	fair	1		
	Unknown sp.	unknown species	10-20	dead	1	covered in grapevine	
Unit 19							
	Crataegus sp.	hawthorn sp.	<10	dead	1	grapevine in crown	Low
	Crataegus sp.	hawthorn sp.	<10	poor	1	grapevine in crown	
	Crataegus sp.	hawthorn sp.	<10	good	1	grapevine in crown	
	Acer negundo	Manitoba maple	20-30	good	1	grapevine in crown	
Unit 20							
10266 Glendon Drive	*Acer saccharinum*	silver maple	30-40	good	1		High
	Juglans nigra	black walnut	10-20	good	1		
	Picea abies	Norway spruce	20-30	good	2		
	Picea glauca	white spruce	10-20	good	2		
	Picea pungens	Colorado spruce	10-20	good	1		
	Syringa sp.	lilac	<10	good	1		
	Thuja occidentalis	eastern white cedar	10-20	good	2		
Unit 21							
10246 Glendon Drive	*Picea pungens*	Colorado spruce	20-30	good	1		High
	Pinus nigra	Austrian pine	20-30	good	1		
Unit 22							
10194 Glendon Drive	*Juniperus sp.*	horizontal juniper	<10	fair	1	shrub - has been severely cut back	Low
	Juniperus sp.	horizontal juniper	<10	good	2	shrub	
Unit 23							
	Juniperus sp.	horizontal juniper	<10	good		12m x 2m shrub	

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
10190 Glendon Drive	*Picea pungens*	Colorado spruce	20-30	good			High
	Acer platanoides	Norway maple	30-40	good		some dieback in west Norway maple	
Unit 24							
10178 Glendon Drive	*Pinus resinosa*	red pine	20-30	good	1		High
	Pinus resinosa	red pine	30-40	good	2		
	Pinus sylvestris	Scotch pine	10-20	good	2		
	Pinus sylvestris	Scotch pine	20-30	good	2		
	Thuja occidentalis 'Smaragd'	emerald cedar	<10	good	3		
Unit 25							
Komoka YMCA/Arena	*Acer rubrum*	red maple	<10	good	4		Low
	Quercus rubra	red oak	<10	good	5		
Unit 26							
10082 Glendon Drive	*Acer saccharinum*	silver maple	20-20	fair	1		High
	Acer saccharinum	silver maple	60-70 m.s.	good	1		
	Juglans nigra	black walnut	<10	good	1	shrubby	
	Juglans nigra	black walnut	30-40 m.s.	good	1		
	Picea abies	Norway spruce	20-30	good	1		
	Salix sp.	willow sp.	30-40	good	2	approximately 4 stems in each tree	
Unit 27							
Natural Area / Pond	*Juglans nigra*	black walnut	<10	good	1		Medium
	Juglans nigra	black walnut	10-20	good	1		
	Picea abies	Norway spruce	<10	good	18		
	Salix sp.	willow sp.	50-60 m.s.	fair	1		
	Ulmus pumila	Siberian elm	10-20	good	6		
Unit 28							
10006 Glendon Drive	*Acer freemanii*	Freeman maple	70-80	good	2		High
	Picea pungens	Colorado spruce	10-20	good	3		
	Unknown sp.	unknown species	10-20	dead	1		
Unit 29							
9998 Glendon Drive	*Acer platanoides*	Norway maple	20-30	good	1		High
Unit 30							
9990 Glendon Drive	*Acer freemanii*	Freeman maple	50-60	good	1		High
	Acer negundo	Manitoba maple	30-40	good	1		
	Acer platanoides	Norway maple	30-40	good	1		
	Picea pungens	Colorado spruce	10-20	good	1		
Unit 31							
57 Delaware Street	*Acer platanoides*	Norway maple	30-40	good	1		High
	Cercis canadensis	eastern redbud	10-20	good	1		
	Picea pungens	Colorado spruce	<10	good	1		

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
	Malus sp.	apple sp.	10-20	good	1		
Unit 32							
57 Delaware Street	*Picea pungens*	Colorado spruce	10-20	good	1		High
	Sorbus aucuparia	mountain ash	10-20	good	1		
	Tilia cordata	littleleaf linden	30-40	good	1		
Unit 33							
9964 Glendon Drive	*Acer platanoides*	Norway maple	30-40	good	1		High
	Tilia cordata	littleleaf linden	20-30	good	1		
Unit 34							
Country Hearth Restaurant(plaza)	*Tilia cordata*	littleleaf linden	20-30	good	2	*juniper and chokecherry shrubs in boulevard	High
Unit 35							
9918 Glendon Drive	*Acer sp.*	maple sp.	<10	poor	1		Low
	Thuja occidentalis	eastern white cedar	<10	poor	1		
	Thuja occidentalis	eastern white cedar	10-20	good	1		
Unit 36							
	Acer negundo	Manitoba maple	<10	good	9	*Surveyed from fence line on ROW, 5m off of fence	Low
	Acer negundo	Manitoba maple	10-20	good	14	*dense vegetation	
	Acer negundo	Manitoba maple	20-30	good	4	*grapevine in edge	
	Acer negundo	Manitoba maple	50-60	poor	2	*some trees leaning on overhead cable	
	Juniperus virginiana	eastern red juniper	10-20	good	2		
	Morus alba	white mulberry	<10	good	1		
	Pinus resinosa	red pine	10-20	good	16		
	Pinus resinosa	red pine	30-40	good	3		
	Pinus resinosa	red pine	20-30	good	16		
	Pinus sylvestris	Scotch pine	<10	good	5		
	Pinus sylvestris	Scotch pine	10-20	good	8		
	Pinus sylvestris	Scotch pine	10-20	fair	1		
	Pinus sylvestris	Scotch pine	20-30	good	21		
	Pinus sylvestris	Scotch pine	30-40	good	1	virginia creeper in crown	
	Pinus sp.	pine sp.	10-20	dead	20		
Unit 37							
	Pinus strobus	white pine	10-20	good	1	*sumac <10 cm dbh	Low
	Pinus strobus	white pine	20-30	fair	1		
	Pinus sylvestris	Scotch pine	<10	poor	1		
	Pinus sylvestris	Scotch pine	<10	good	4		
	Pinus sylvestris	Scotch pine	10-20	good	13		Low
	Pinus sylvestris	Scotch pine	10-20	dead	4		
	Pinus sylvestris	Scotch pine	10-20	fair	1		
	Pinus sylvestris	Scotch pine	20-30	good	6		

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
	Pinus sylvestris	Scotch pine	20-30	dead	1		
	Populus deltoides	eastern cottonwood	40-50	fair	1		
Unit 38							
9826 Glendon Drive	*Acer freemanii*	Freeman maple	10-20	good	1		High
	Acer freemanii	Freeman maple	30-40	good	1		
	Acer negundo	Manitoba maple	10-20 m.s.	good	3		
	Acer negundo	Manitoba maple	10-20 m.s.	fair	1		
	Acer negundo	Manitoba maple	30-40	good	1		
	Juniperus sp.	juniper sp.	<10	fair	1	grapevine	
	Quercus rubra	red oak	20-30	good	1		
	Quercus rubra	red oak	30-40	good	1		
	Thuja occidentalis	eastern white cedar	10-20	good	8		
Unit 39							
	Acer negundo	Manitoba maple	10-20 m.s.	good	10	*grapvine covering vegetation	Low
	Acer negundo	Manitoba maple	20-30 m.s.	good	1		
	Juglans nigra	black walnut	<10	fair	1		
	Juglans nigra	black walnut	<10	good	3		
Unit 40							
	Acer negundo	Manitoba maple	10-20	good	5		Medium
	Acer negundo	Manitoba maple	10-20	poor	1		
	Acer negundo	Manitoba maple	20-30 m.s.	good	3		
	Acer negundo	Manitoba maple	20-30	good	2		
	Acer negundo	Manitoba maple	30-40	good	1		
	Acer negundo	Manitoba maple	30-40	fair	1		
	Acer negundo	Manitoba maple	30-40	poor	1		
	Acer negundo	Manitoba maple	40-50	good	1		
	Acer negundo	Manitoba maple	40-50	poor	1		
	Amelanchier sp.	serviceberry sp.	10-20	good	1		
	Juglans nigra	black walnut	10-20	good	2		
	Juglans nigra	black walnut	10-20	fair	1		
	Populus deltoides	eastern cottonwood	50-60	good	1		
	Prunus serotina	black cherry	10-20	good	1		
	Quercus alba	white oak	10-20	good	1		
	Quercus alba	white oak	40-50	good	1		
	Quercus rubra	red oak	50-60 m.s.	good	1		Medium
	Quercus rubra	red oak	60-70	good	1		
	Salix sp.	willow sp.	30-40	good	1		
	Ulmus pumila	Siberian elm	30-40	fair	1		
Unit 41							

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
9692 Glendon Drive	*Acer negundo*	Manitoba maple	30-40	good	1		High
	Acer platanoides	Norway maple	20-30	good	1		
	Pinus strobus	white pine	10-20	good	2		
	Pinus strobus	white pine	20-30	good	3	row on property line	
	Populus tremuloides	trembling aspen	<10	good	1		
	salix alba tristis	weeping willow	30-40	good	1		
	salix alba tristis	weeping willow	50-60	good	1		
Unit 42							
9682 Glendon Drive	*Acer freemanii*	Freeman maple	50-60	good	1	*(all trees up to house were counted for this property)*	High
	Picea abies	Norway spruce	10-20	good	1		
	Picea glauca	white spruce	30-40	good	1		
Unit 43							
9664 Glendon Drive	*Acer freemanii*	Freeman maple	30-40	good	2		High
Unit 44							
	Picea glauca	white spruce	10-20	good	23		High
	Picea glauca	white spruce	20-30	good	4		
	Picea pungens glauca	Colorado blue spruce	<10	good	2		
	Picea pungens glauca	Colorado blue spruce	20-30	good	1		
	Pinus sylvestris	Scotch pine	20-30	good	1		
	Ulmus pumila	Siberian elm	10-20	good	1		
	Ulmus pumila	Siberian elm	20-30	good	4		
Unit 45							
9598 Glendon Drive	*Pinus resinosa*	red pine	<10	good	1		High
	Pinus strobus	white pine	<10	good	4		
	Prunus serotina	black cherry	30-40	good	1		
	Quercus macrocarpa	bur oak	30-40 m.s.	good	3		
	Quercus macrocarpa	bur oak	30-40	good	2		
	Quercus macrocarpa	bur oak	50-60 m.s.	good	3		
	Quercus rubra	red oak	30-40	good	3		
	Quercus rubra	red oak	40-50	good	3		
	Quercus rubra	red oak	50-60	good	1		
Unit 46							
9584 Glendon Drive	*Picea abies*	Norway spruce	10-20	good	2		High
9584 Glendon Drive	*Picea glauca*	white spruce	10-20	good	1		High
	Quercus rubra	red oak	40-50	good	1		
	Thuja occidentalis	eastern white cedar	<10	good	4		
Unit 47							
9548 Glendon Drive	*Betula pendula*	European birch	20-30	good	1		High
	Malus sp.	apple sp.	10-20	good	1		

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
	Picea abies	Norway spruce	10-20	good	4		
Unit 48							
9398 Glendon Drive	*Celtis occidentalis*	eastern hackberry	30-40 m.s.	fair	1		High
	Picea abies	Norway spruce	30-40	good	1		
Unit 49							
9394 Glendon Drive	*Acer platanoides*	Norway maple	20-30	good	2		High
	Acer platanoides	Norway maple	30-40	good	1		
	Acer platanoides 'Crimson King'	Crimson King Norway maple	10-20	good	1		
	Junipers virginiana	eastern red cedar	10-20	fair	1		
	Picea pungens glauca	Colorado blue spruce	<10	good	1		
	Pinus strobus	white pine	40-50	good	1		
Unit 50							
9384 Glendon Drive	*Catalpa speciosa*	northern catalpa	10-20	good	1	pruned	High
	Picea glauca	white spruce	10-20	good	1		
	Thuja occidentalis	eastern white cedar	10-20	good	3		
	Pinus sylvestris	Scotch pine	20-30	good	1		
Unit 51							
9374 Glendon Drive	*Acer freemanii*	Freeman maple	20-30	good	1		High
	Acer freemanii	Freeman maple	50-60	good	1		
	Acer freemanii	Freeman maple	100+	good	1		
	Gleditsia triacanthos var. inermis	thornless honeylocust	30-40	good	1		
	Malus sp.	apple sp.	20-30	good	1		
	Picea abies	Norway spruce	10-20	good	2		
Unit 52							
9334 Glendon Drive	*Picea abies*	Norway spruce	30-40	good	1		High
	Picea abies	Norway spruce	100+	poor	1	stem cut in half	
	Picea glauca	white spruce	10-20	good	2		
	Picea glauca	white spruce	20-30	good	1		
	Picea pungens glauca	Colorado blue spruce	10-20	good	10		
	Pinus strobus	white pine	10-20	good	1		
	Quercus rubra	red oak	10-20	good	1		
	Thuja occidentalis	eastern white cedar	10-20	good	4		
Unit 53							
9325 Glendon Drive	*Acer platanoides*	Norway maple	10-20	good	2		High
	Picea abies	Norway spruce	30-40	good	2		
	Picea abies	Norway spruce	40-50	good	1		
	Picea glauca	white spruce	<10	good	1		
Unit 54							
	Picea abies	Norway spruce	20-30	good	3		

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
9351 Glendon Drive	*Picea abies*	Norway spruce	20-30	fair	1		High
	Pinus resinosa	red pine	30-40	good	18		
	Pinus resinosa	red pine	30-40	dead	2		
	Pinus strobus	white pine	20-30	good	3		
	Pinus strobus	white pine	30-40	good	9		
	Quercus rubra	red oak	10-20	good	2	grapevine	
Unit 55							
22395 Wonnacott Road	*Ulmu rubra*	slippery elm	<10	good	15		Low
Unit 56							
	Acer negundo	Manitoba maple	<10	good	1		High
	Celtis occidentalis	hackberry	10-20	good	1		
	Celtis occidentalis	hackberry	30-40	good	2		
	Quercus macrocarpa	bur oak	10-20 m.s.	fair	1		
Unit 57							
9449 Glendon Drive	*Picea abies*	Norway spruce	30-40	good	2		Medium
	Ulmus pumila	Siberian elm	20-30	fair	1		
	Ulmus pumila	Siberian elm	30-40	good	1		
Unit 58							
	Ulmus pumila	Siberian elm	10-20	good	15	*hedge row along road	Low
	Ulmus pumila	Siberian elm	20-30	good	26		
	Ulmus pumila	Siberian elm	20-30	fair	5		
	Ulmus pumila	Siberian elm	20-30	dead	1		
	Ulmus pumila	Siberian elm	30-40	good	36		
	Ulmus pumila	Siberian elm	30-40	poor	1		
	Ulmus pumila	Siberian elm	40-50	fair	1		
Unit 59							
9501 Glendon Drive	*Acer freemanii*	Freeman maple	40-50	good	1		High
	Acer freemanii	Freeman maple	70-80	good	1		
	Acer rubrum	red maple	<10	good	1		
	Picea pungens glauca	Colorado blue spruce	<10	good	14		
	Pinus sylvestris	Scotch pine	30-40	good	1		
9501 Glendon Drive	*Ulmus pumila*	Siberian elm	30-40	good	1		High
	Ulmus pumila	Siberian elm	70-80	good	1		
Unit 60							
9561 Glendon Drive	*Catalpa speciosa*	northern catalpa	<10	good	1	pruned to small shrub	High
	Juniperus virginiana	red cedar	10-20 m.s.	fair	1	*3m x 3m low juniper	
	Magnolia x soulangiana	saucer magnolia	10-20	good	1		
	Picea glauca	white spruce	10-20	fair	2		
	Picea glauca	white spruce	10-20	good	2		

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
	Picea pungens glauca	Colorado blue spruce	20-30	fair	2		
Unit 61							
9573 Glendon Drive	*Acer platanoides*	Norway maple	40-50	good	1		High
Unit 62							
9581 Glendon Drive (Camp Kee-mo-kee)	*Acer saccharum*	sugar maple	10-20	good	33	*grapevine in edge, sugar maple saplings in understorey, buckthorn saplings in understorey, serviceberry saplings in understorey	High
	Acer rubrum	red maple	10-20	good	1		
	Acer rubrum	red maple	20-30	good	1		
	Acer rubrum	red maple	30-40	good	1		
	Celtis occidentalis	eastern hackberry	<10	good	1		
	Pinus strobus	white pine	30-40	good	1		
	Pinus strobus	white pine	40-50	good	1		
	Prunus serotina	black cherry	10-20	good	2		
	Prunus serotina	black cherry	20-30	good	2		
	Prunus serotina	black cherry	30-40	fair	1		
	Prunus serotina	black cherry	40-50	good	1		
	Quercus alba	white oak	10-20	good	5		
	Quercus alba	white oak	10-20	fair	1	grapevine	
	Quercus alba	white oak	20-30	good	2		
	Quercus alba	white oak	30-40	good	3		
	Quercus macrocarpa	bur oak	20-30	good	4		
	Quercus macrocarpa	bur oak	10-20	good	11		
	Quercus macrocarpa	bur oak	30-40	good	7		
	Quercus rubra	red oak	10-20	good	3		
	Quercus rubra	red oak	20-30	good	17		
	Quercus rubra	red oak	20-30	fair	1	grapevine in crown	
	Quercus rubra	red oak	20-30	poor	1	grapevine in crown	
	Quercus rubra	red oak	30-40	good	12		
	Quercus rubra	red oak	40-50 m.s.	good	1		
	Quercus rubra	red oak	40-50	good	4		
	Rhamnus cathartica	European buckthorn	10-20	good	2		
9581 Glendon Drive (Camp Kee-mo-kee)	*Unknown sp.*	unknown species	10-20	dead	2		High
Unit 63							
9629 Glendon Drive	*Acer platanoides*	Norway maple	20-30	good	2	*hedge with deciduous shrubs, 1m x 3m horizontal juniper in ditch	High
	Platanus acerifolia	London plane tree	20-30	good	1		
	Quercus rubra	red oak	40-50	good	2		
	Thuja occidentalis	eastern white cedar	<10	fair	Approx. 20		
Unit 64							
	Malus sp.	apple sp.	30-40	fair	1	suckers	
	Prunus serotina	black cherry	30-40	good	1	grapevine in crown	

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
9637 Glendon Drive	*Quercus macrocarpa*	bur oak	30-40	good	2		High
	Quercus rubra	red oak	30-40	good	1		
	Quercus rubra	red oak	40-50	good	1		
	Rhamnus cathartica	European buckthorn	10-20 m.s.	good	1	grapevine in crown	
Unit 65							
Sandy Stables	*Picea sp.*	spruce sp.	<10	good	Approx. 52		High
	Pinus strobus	white pine	70-80	good	1		
	Quercus macrocarpa	bur oak	50-60	good	1		
	Ulmus pumila	Siberian elm	30-40	good	1		
	Ulmus pumila	Siberian elm	50-60	good	1		
Unit 66							
	Acer negundo	Manitoba maple	20-30	good	5		High
	Acer negundo	Manitoba maple	20-30	fair	1		
	Acer negundo	Manitoba maple	30-40 m.s.	good	4	grapevine in crown	
	Acer negundo	Manitoba maple	40-50	good	1		
	Acer rubrum	red maple	10-20	good	1		
	Juglans nigra	black walnut	<10	good	1		
	Quercus macrocarpa	bur oak	20-30	good	1		
	Quercus macrocarpa	bur oak	40-50	good	1		
	Salix alba	white willow	100	good	1		
	Tllia americana	basswood	10-20	good	1		
	Tllia americana	basswood	20-30	good	2		
Unit 67							
9749 Glendon Drive	*Acer platanoides 'Crimson King'*	Crimson King Norway maple	30-40	good	3		High
	Morus alba	white mulberry	20-30	good	1		
	Picea abies	Norway spruce	10-20	good	1		
	Picea abies	Norway spruce	40-50	good	2		
	Picea pungens	Colorado spruce	10-20	good	1		
Unit 68							
	Acer saccharinum	silver maple	30-40 m.s.	good	1		High
	Acer saccharinum	silver maple	40-50 m.s.	good	2		
	Acer saccharinum	silver maple	50-60 m.s.	good	4		
	Acer saccharinum	silver maple	60-70	good	1		
Unit 69							
9803 Glendon Drive	*Picea abies*	Norway spruce	10-20	good	3		High
	Picea abies	Norway spruce	20-30	good	7		
	Picea abies	Norway spruce	30-40	good	5		
	Picea abies	Norway spruce	40-50	good	3		
	Syringa sp.	lilac	<10	good	1		

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
	Tilia cordata	littleleaf linden	40-50	good	2		
Unit 70							
9817 Glendon Drive	*Picea pungens*	Colorado spruce	<10	good	2	*Deciduous shrubs by driveway	Low
Unit 71							
9826 Glendon Drive	*Rhus typhina*	staghorn sumac	<10	good	Multiple	growing between ditch and field	Low
Unit 72							
Intersection at Komoka Road (Esso Station landscape)	*Acer freemanii*	Freeman maple	<10	good	1		Medium
	Acer freemanii	Freeman maple	10-20	good	1		
	Ulmus sp.	elm sp.	<10	good	1	infested with ladybugs	
	Ulmus sp.	elm sp.	10-20	good	1	infested with ladybugs	
Unit 73							
	Acer negundo	Manitoba maple	<10 m.s.	fair	1	shrubby	High
	Acer negundo	Manitoba maple	<10 m.s.	good	1	*sumac <10cm dbh growing adjacent to ditch	
	Acer negundo	Manitoba maple	10-20	good	2		
	Acer negundo	Manitoba maple	10-20 m.s.	dead	1		
	Populus deltoides	eastern cottonwood	20-30	good	1		
	Populus deltoides	eastern cottonwood	30-40 m.s.	good	1		
	Populus deltoides	eastern cottonwood	60-70 m.s.	good	1		
	Populus deltoides	eastern cottonwood	100+	good	1	grapevine in crown	
Unit 74							
Aqua golf	*Picea abies*	Norway spruce	10-20	good	7		High
	Picea abies	Norway spruce	10-20	fair	2		
	Picea abies	Norway spruce	10-20	poor	2		
	Picea abies	Norway spruce	10-20	dead	1		
	Picea abies	Norway spruce	20-30	good	2		
	Picea glauca	white spruce	<10	good	1		
	Picea glauca	white spruce	10-20	good	14		
	Picea glauca	white spruce	10-20	fair	2		
Aqua golf	*Picea glauca*	white spruce	20-30	good	5		High
	Picea glauca	white spruce	30-40	good	1		
Unit 75							
10121 Glendon Drive	*Acer platanoides*	Norway maple	40-50	good	2	*upright juniper in front yard	High
	Catalpa speciosa	northern catalpa	40-50	good	1		
	Picea pungens	Colorado spruce	10-20	good	3		
Unit 76							
	Acer negundo	Manitoba maple	10-20	good	2	*honey suckle, buckthorn, <10 cm dbh Manitoba maple saplings, <10 cm dbh white mulberry saplings, <10 cm dbh Freeman maple, <10 cm dbh ash saplings on woodland edge / in understorey	
	Acer negundo	Manitoba maple	20-30	good	2		
	Acer negundo	Manitoba maple	30-40	good	1		
	Acer negundo	Manitoba maple	40-50	good	1		

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
Komoka Provincial Park	*Celtis occidentalis*	hackberry	10-20	good	1		High
	Morus alba	white mulberry	10-20	good	1		
	Morus alba	white mulberry	30-40	good	1		
	Picea abies	Norway spruce	<10	good	1		
	Pinus sylvestris	Scotch pine	10-20	good	1		
	Populus deltoides	eastern cottonwood	30-40	good	1		
	Populus deltoides	eastern cottonwood	60-70 m.s.	good	1		
	Prunus serotina	black cherry	10-20	fair	2		
	Prunus serotina	black cherry	10-20	poor	1		
	Prunus serotina	black cherry	10-20	dead	2		
	Prunus serotina	black cherry	20-30	good	4		
	Prunus serotina	black cherry	20-30	fair	1		
	Prunus serotina	black cherry	20-30	dead	1		
	Prunus serotina	black cherry	40-50	fair	1		
	Quercus rubra	red oak	60-70	good	3	grapevine	
	Ulmus sp.	elm sp.	10-20	good	1		
	Ulmus sp.	elm sp.	10-20	fair	1		
	Unknown sp.	unknown species	10-20	dead	3		
Unit 77							
Komoka Provincial Park	*Acer negundo*	Manitoba maple	30-40	fair	1	*grassy slope covered in vines, raspberry, sumac <10 cm dbh, European buckthorn <10 cm dbh, glossy buckthorn <10 cm dbh, <10 cm dbh aspen, <10 cm dbh black walnut; vegetation surveyed from gravel shoulder	High
	Elaeagnus umbellata	autumn olive	10-20	good	1		
	Pinus sylvestris	Scotch pine	10-20	fair	1	grapvine	
	Pinus sylvestris	Scotch pine	20-30	fair	1	grapvine	
	Pinus sylvestris	Scotch pine	30-40	good	1	grapvine	
	Populus deltoides	eastern cottonwood	70-80	good	1		
	Populus tremuloides	trembling aspen	<10	good	1		
	Populus tremuloides	trembling aspen	10-20	good	11		
Komoka Provincial Park	*Populus tremuloides*	trembling aspen	20-30	good	1		High
	Populus tremuloides	trembling aspen	30-40	good	3		
	Populus tremuloides	trembling aspen	40-50	good	1		
	Quercus alba	white oak	30-40 m.s.	good	2		
	Quercus rubra	red oak	20-30	poor	1	stem broken	
	Quercus rubra	red oak	30-40	good	1		
	Quercus rubra	red oak	40-50	good	1		
Unit 78							
New Subdivision Under Development	*Acer freemanii*	Freeman maple	<10	good	3	*(trees in backyard of new residential property not shown on aerial)*	Low
	Carpinus caroliniana	blue beech	<10	good	7	*approx. 4 ornamental shrubs on property line not shown on aerial	
	Thuja occidentalis 'Smaragd'	emerald cedar	<10	good	29		
Unit 79							

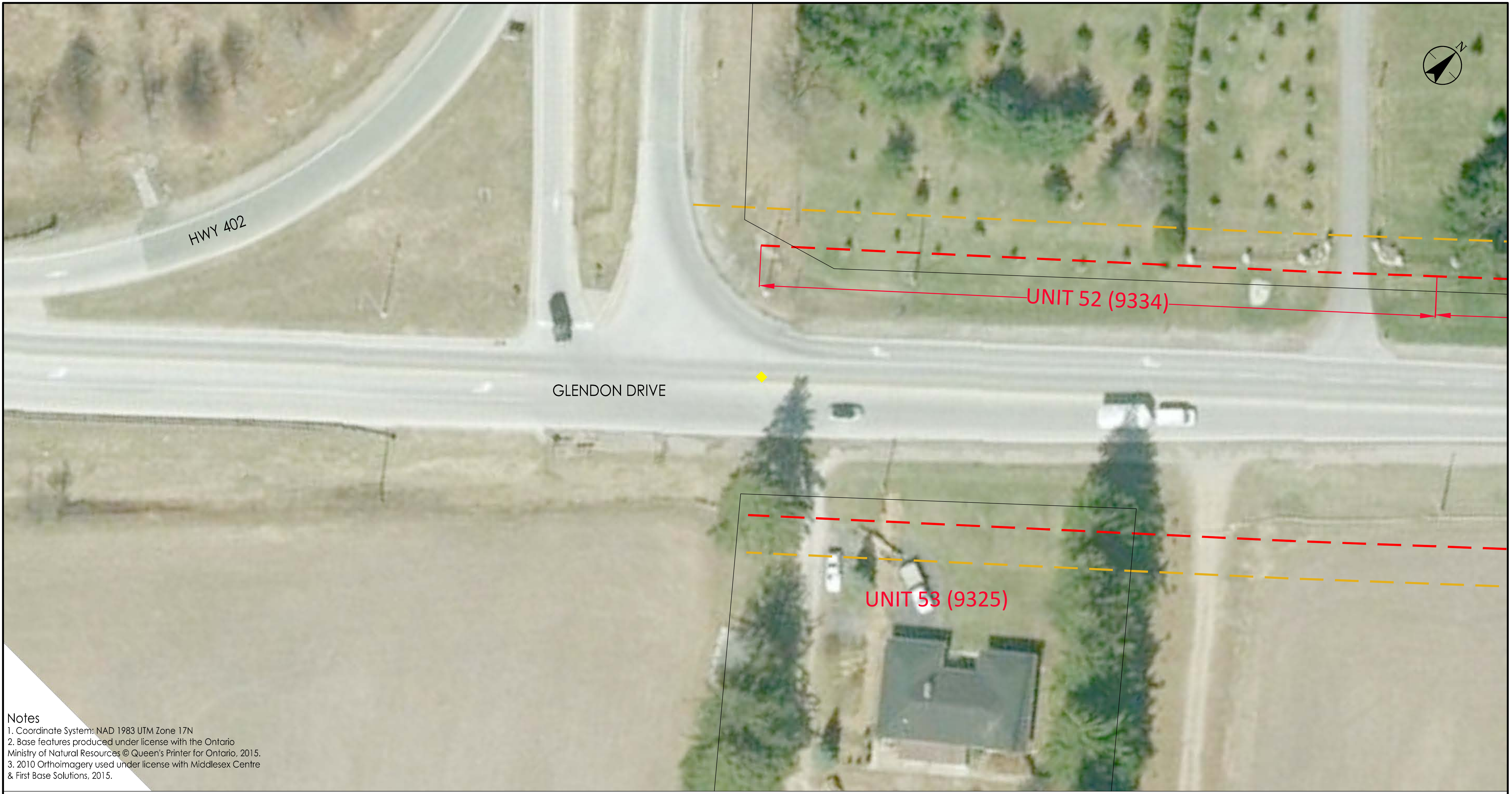
Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
Rear Yards of Residences on Earlscourt Terrace	*Acer platanoides*	Norway maple	20-30	poor	1	Crown pruned more than 50% on north side	High
	Acer saccharum	sugar maple	30-40	good	1	behind wall	
	Picea abies	Norway spruce	10-20	good	12	behind wall	
	Picea pungens glauca	Colorado blue spruce	10-20	good	7	behind wall	
	Picea sp.	spruce sp.	<10	good	7	behind wall	
	Thuja sp.	cedar sp.	10-20	good	4	behind wall	
	Rhus typhina	staghorn sumac	10-20	good	4	growing in ditch	
						*multiple staghorn sumac <10 cm dbh in ROW	
Unit 80							
Hillside Restaurant	*Acer platanoides 'Crimson King'*	Crimson King' Norway maple	10-20	good	1	*mugo pine shrubs, 4m x 2m deciduous shrubs in boulevard adjacent to parking lot, 12m x 2m barberry shrub, 2 cedar shrubs	High
	Morus alba 'Pendula'	weeping white mulberry	10-20	good	1		
Unit 81							
Hillside Plaza	*Acer platanoides*	Norway maple	10-20	good	1		High
	Picea glauca	white spruce	10-20	good	1		
	Thuja occidentalis 'Smaragd'	emerald cedar	<10	good	3	adjacent to ice cream truck	
Unit 82							
10607 Glendon Drive	*Picea pungens glauca*	Colorado blue spruce	<10	good	2		High
	Picea pungens glauca	Colorado blue spruce	10-20	good	6		
	Juglans nigra	black walnut	10-20	good	1		
	Juglans nigra	black walnut	30-40	good	1		
	Quercus muehlenbergii	chinquapin oak	10-20	good	2	in lawn area / part of residential landscape, tree west of driveway has a broken branch	
	Thuja occidentalis	eastern white cedar	10-20	good	1		
	Thuja occidentalis	eastern white cedar	10-20	fair	2		
	Thuja occidentalis	eastern white cedar	10-20	dead	1		
Unit 83							
10627 Glendon Drive	*Fraxinus sp.*	ash sp.	10-20	dead	1	*edge vegetation includes black walnut <10 cm dbh, ash sp. <10 cm dbh, European buckthorn <10 cm dbh, sugar maple <10 cm dbh	High
10627 Glendon Drive	*Juglans nigra*	black walnut	10-20	good	3	*white cedar hedge growing back of property line on east side of driveway	High
	Juglans nigra	black walnut	20-30	good	1		
	Juglans nigra	black walnut	40-50	good	1		
	Juglans nigra	black walnut	50-60	good	1		
	Juglans nigra	black walnut	60-70	good	1		
	Morus alba	white mulberry	10-20	good	1		
	Picea abies	Norway spruce	30-40	good	1		
	Picea abies	Norway spruce	30-40	fair	1		
	Picea glauca	white spruce	10-20	poor	1		
	Picea glauca	white spruce	10-20	dead	2		
	Picea glauca	white spruce	20-30	good	4		
	Picea glauca	white spruce	20-30	poor	1	main stem cut at half height	
	Picea glauca	white spruce	30-40	good	2		

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
	Pinus resinosa	red pine	20-30	good	2		
	Pinus resinosa	red pine	30-40	good	1		
	Pinus strobus	white pine	10-20	good	1		
	Pinus strobus	white pine	20-30	good	1		
	Pinus sylvestris	Scotch pine	10-20	good	1		
	Pinus sylvestris	Scotch pine	20-30	good	1		
	Pinus sylvestris	Scotch pine	20-30	poor	1		
	Prunus sp.	cherry sp.	10-20	good	1		
	Thuja occidentalis	eastern white cedar	10-20	good	1		
	Thuja occidentalis	eastern white cedar	10-20	fair	6		
	Thuja occidentalis	eastern white cedar	10-20	dead	2		
	Unknown sp.	unknown species	10-20	dead	2		
Unit 84							
10627 Glendon Drive	*Juglans nigra*	black walnut	10-20	good	1		High
	Juglans nigra	black walnut	20-30	good	2		
	Juglans nigra	black walnut	50-60	good	3		
	Larix laricina	eastern larch	20-30	fair	1		
	Thuja occidentalis	eastern white cedar	10-20	fair	15	hedge, virginia creeper	
	Ulmus pumila	Siberian elm	10-20	fair	1		
	Ulmus pumila	Siberian elm	30-40 m.s.	good	1		
	Unknown sp.	unknown species	10-20	dead	1		
	Unknown sp.	unknown species	30-40	dead	1		
						*vegetation same as previous + lilac shrub, white mulberry <10 cm dbh in understorey, Siberian elm <10 cm dbh, virginia creeper	
Unit 85							
Elmhurst Street property	*Acer saccharum*	sugar maple	30-40	good	3		High
Elmhurst Street property	*Juglans nigra*	black walnut	20-30	good	1		High
	Juglans nigra	black walnut	30-40	good	1		
	Picea glauca	white spruce	10-20	good	13	grapevine	
	Picea glauca	white spruce	10-20	poor	11	main stems cut under hydro lines, grapevine, virginia creeper	
	Picea glauca	white spruce	10-20	dead	6	main stems cut under hydro lines	
	Picea glauca	white spruce	20-30	good	12		
	Picea glauca	white spruce	20-30	poor	8	main stems cut under hydro lines	
	Ulmus pumila	Siberian elm	20-30 m.s.	good	1	grapevine, virginia creeper	
Unit 86							
	Acer negundo	Manitoba maple	10-20	fair	1	grapevine	
	Acer saccharum	sugar maple	10-20	good	1		
	Acer saccharum	sugar maple	10-20	fair	1		
	Acer saccharum	sugar maple	20-30	good	1		
	Acer saccharum	sugar maple	30-40	good	1		

Unit #	Botanical Name	Common Name	DBH (cm)	Condition	Approximate # of Trees	Comments	Preservation Priority
10679 Glendon Drive *Significan Vegetation Patch*	*Betula papyrifera*	white birch	10-20	good	3		High
	Betula papyrifera	white birch	20-30	good	1		
	Betula papyrifera	white birch	30-40	good	2		
	Carpinus caroliniana	blue beech	10-20	good m.s.	1		
	Fraxinus sp.	ash sp.	10-20	dead	4		
	Juglans nigra	black walnut	10-20	good	8	grapevine	
	Juglans nigra	black walnut	20-30	good	3		
	Juglans nigra	black walnut	30-40	good	2		
	Juglans nigra	black walnut	40-50	good	1	under hydro lines	
	Pinus strobus	white pine	10-20	good	3		
	Populus tremuloides	trembling aspen	10-20	good	2		
	Quercus rubra	red oak	60-70	good	1		
	Robinia pseudoacacia	black locust	10-20	good	19		
	Robinia pseudoacacia	black locust	10-20	poor	3		
	Robinia pseudoacacia	black locust	20-30	good	12		
	Thuja occidentalis	eastern white cedar	10-20	good	3	grapevine	
	Tilia americana	American basswood	10-20	good	3		
	Tilia americana	American basswood	10-20	fair	1		
	Tilia americana	American basswood	20-30	good	3		
	Tsuga canadensis	eastern hemlock	10-20	good	1	*less than 10 cm dbh vegetation found in understorey: highbush cranberry, black locust, sugar maple, staghorn sumac, eastern white cedar, white ash, pagoda dogwood, witch hazel, hemlock, white pine	

* Denotes vegetation <10 cm dbh found within Unit limits

APPENDIX B
TREE INVENTORY PLAN



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

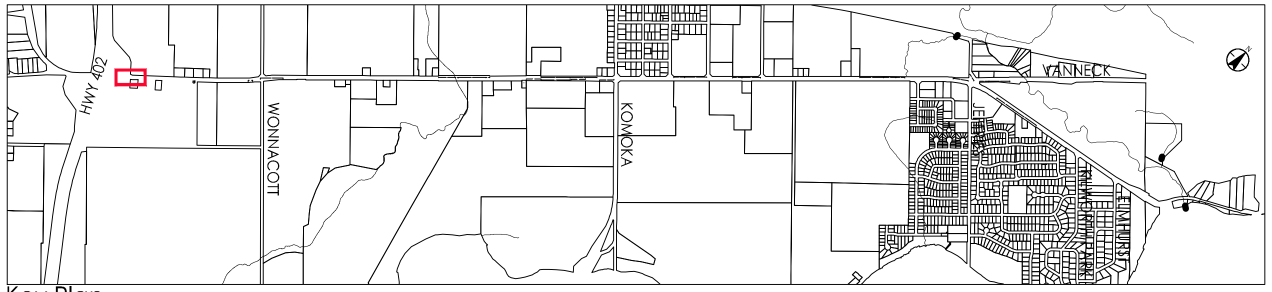
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
■■■■■	Municipal Boundary
├◄UNIT #►┤	Unit with High Preservation Priority
├◄UNIT #►┤	Unit with Medium or Low Preservation Priority



Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
1

Title
Tree Inventory Plan

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

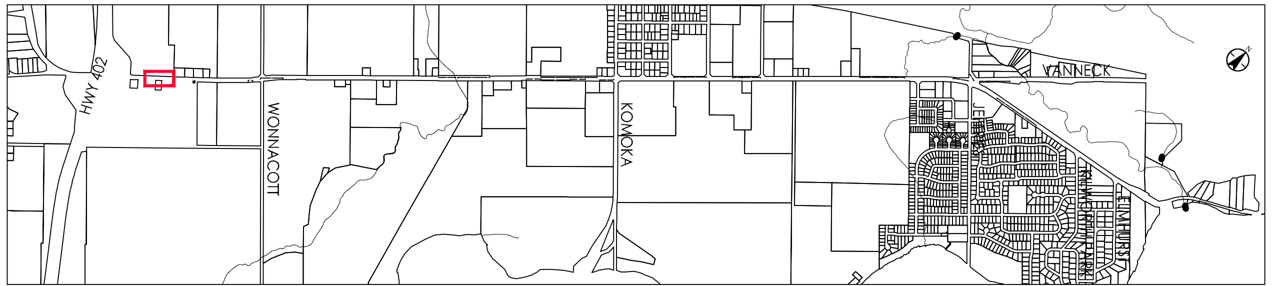
1:500 0 5 15 25m

October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
▬ ▬ ▬	Municipal Boundary
├◄UNIT #►┤	Unit with High Preservation Priority
├◄UNIT #►┤	Unit with Medium or Low Preservation Priority

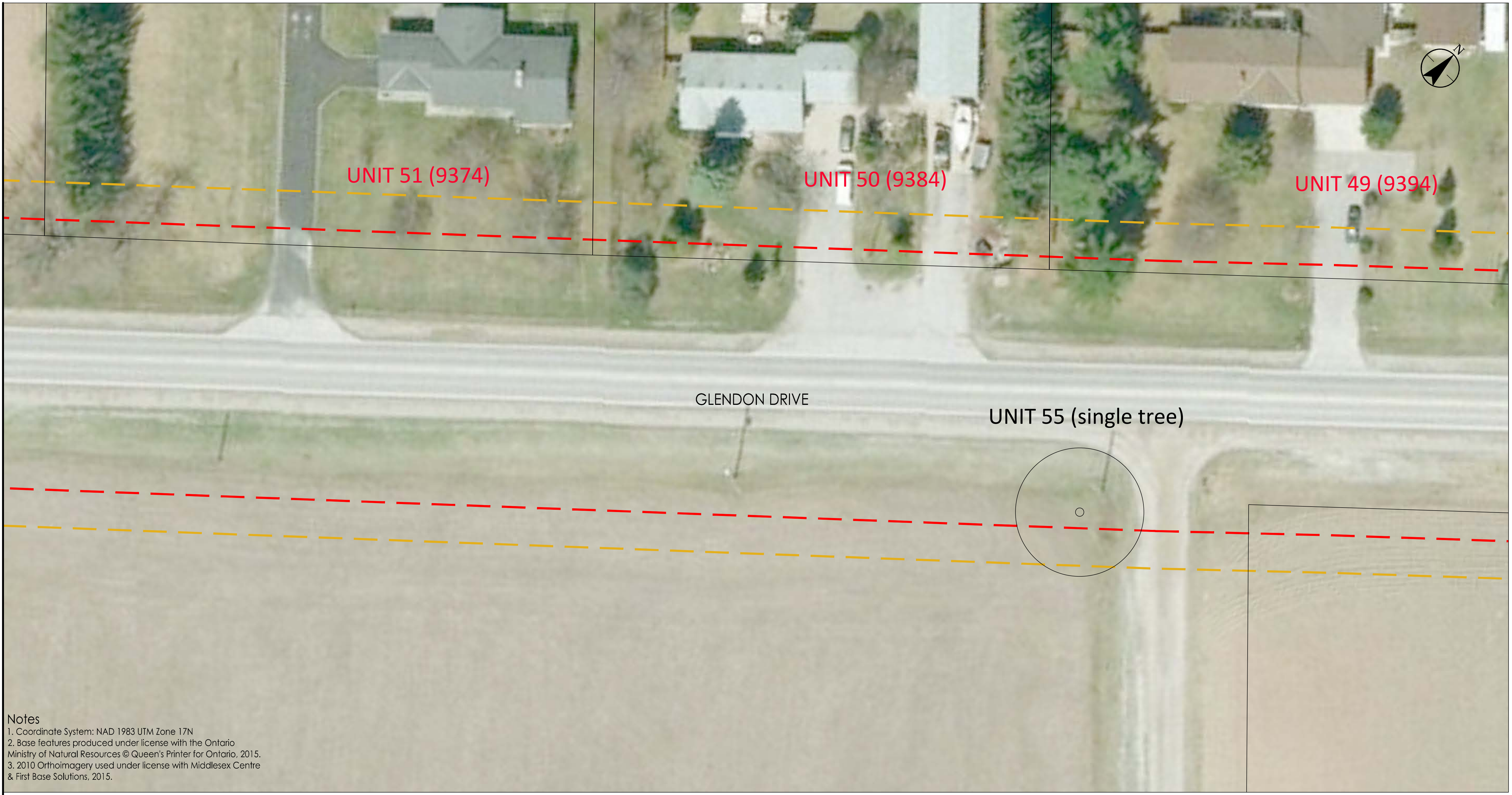


Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
2

Title
Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

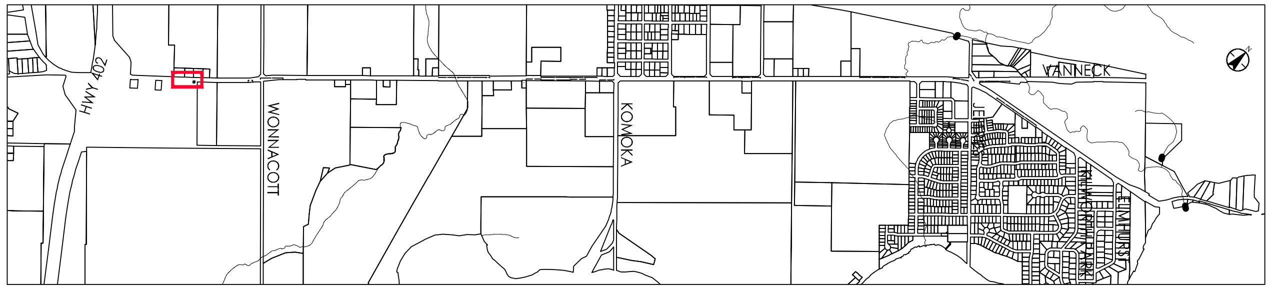
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - - -	Estimated Potential Ultimate ROW (36m)
- - - - - -	Tree Search Area (+5m)
——	Watercourse (permanent)
- - - - - -	Watercourse (intermittent)
■■■■■■	Municipal Boundary
├UNIT #┤	Unit with High Preservation Priority
├UNIT #┤	Unit with Medium or Low Preservation Priority



Key Plan

Client/Project

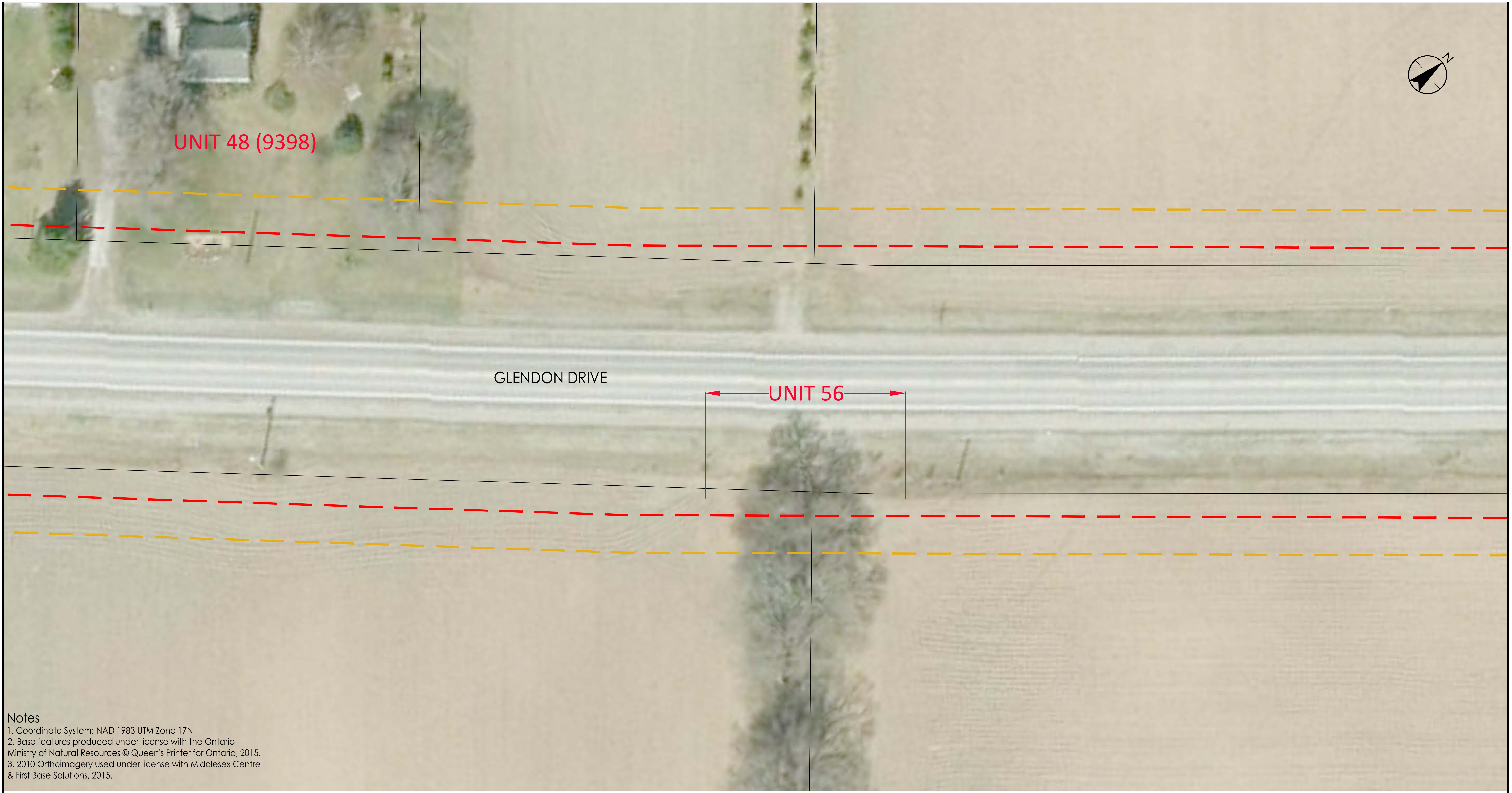
Middlesex Centre/Middlesex County

Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 3

Title

Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

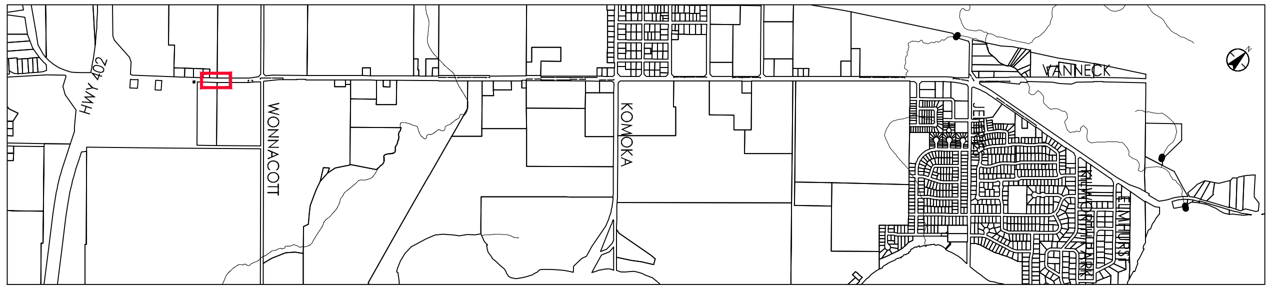
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
▬ ▬ ▬	Municipal Boundary
├◄UNIT #►┤	Unit with High Preservation Priority
├◄UNIT #►┤	Unit with Medium or Low Preservation Priority



Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
4

Title
Tree Inventory Plan

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

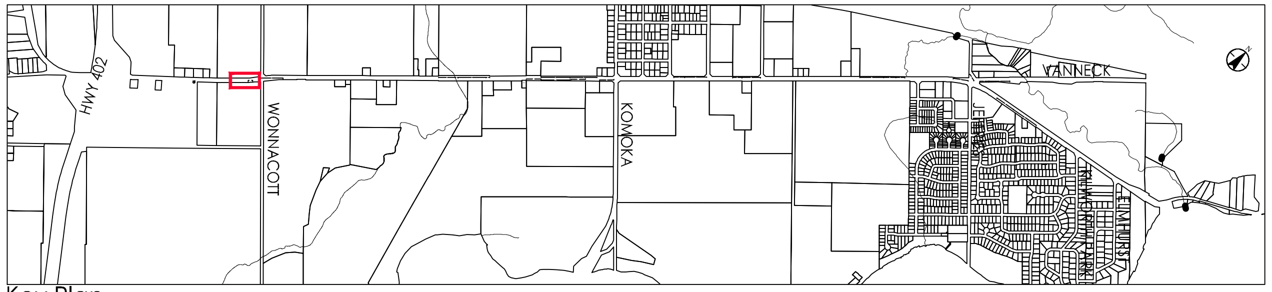
1:500 0 5 15 25m

October, 2015
161413164

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
■■■■■	Municipal Boundary
├←UNIT #→┤	Unit with High Preservation Priority
├←UNIT #→┤	Unit with Medium or Low Preservation Priority



Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 5

Title
Tree Inventory Plan

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

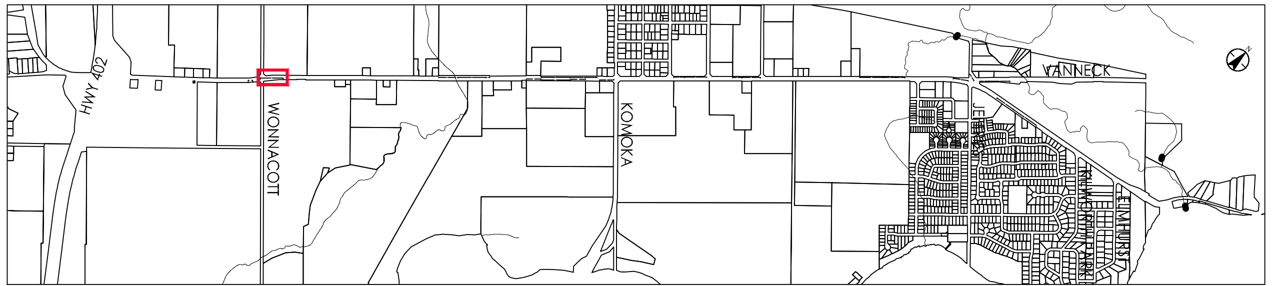
1:500 0 5 15 25m

October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
▬ ▬ ▬	Municipal Boundary
⊢UNIT #⊣	Unit with High Preservation Priority
⊢UNIT #⊣	Unit with Medium or Low Preservation Priority

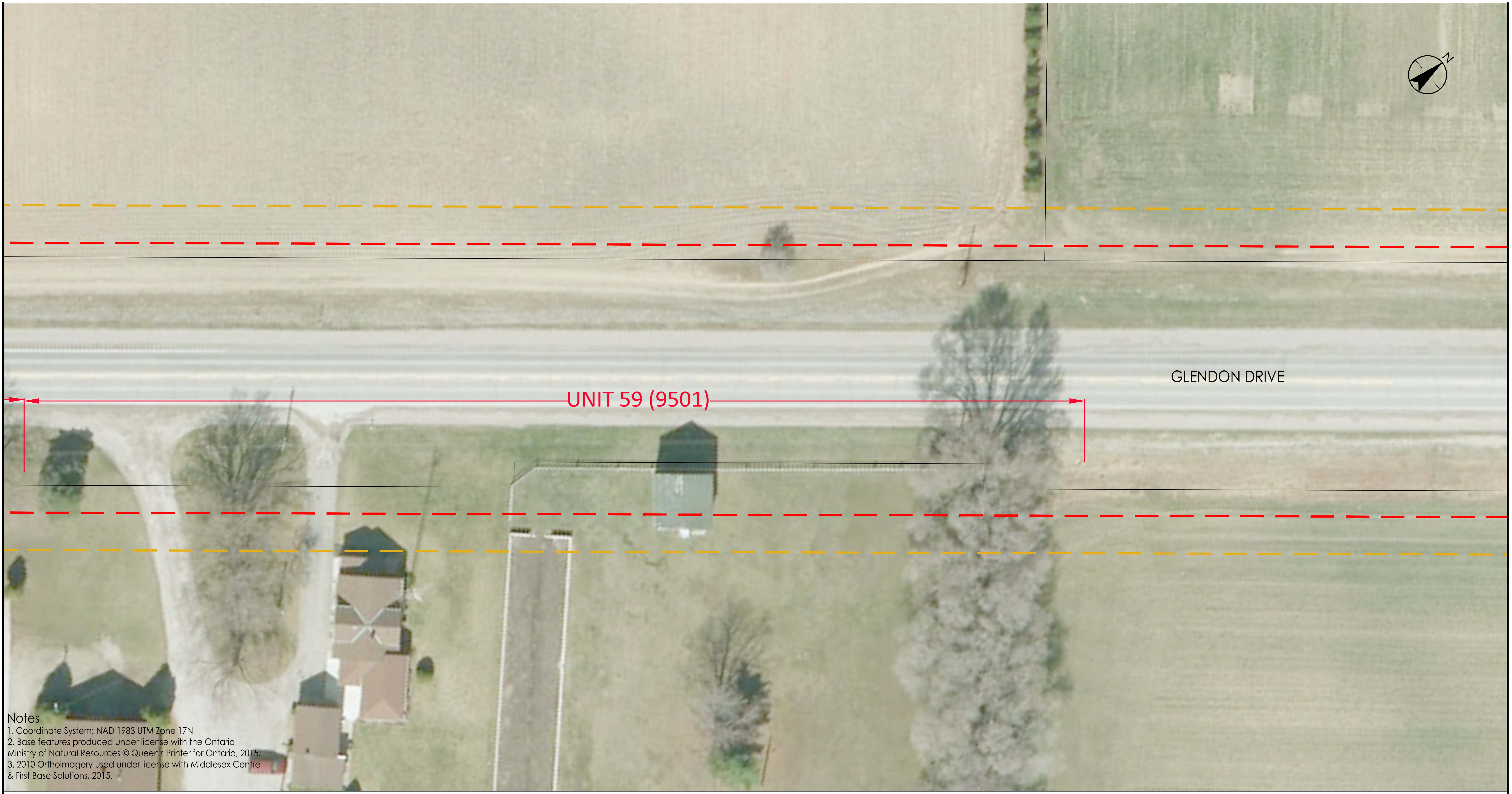


Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
6

Title
Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

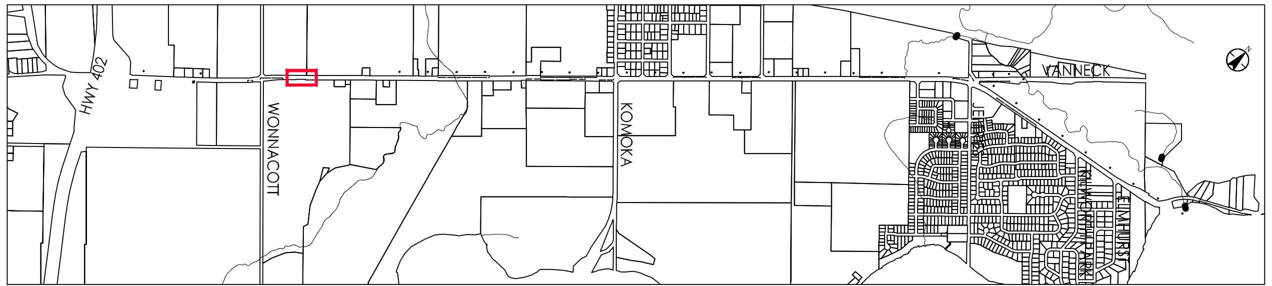
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆ Project Limits
☐ Property Line (c. 2009)
- - - - Estimated Potential Ultimate ROW (36m)
- - - - Tree Search Area (+5m)
—— Watercourse (permanent)
- - - - Watercourse (intermittent)
- - - - Municipal Boundary
UNIT # Unit with High Preservation Priority
UNIT # Unit with Medium or Low Preservation Priority

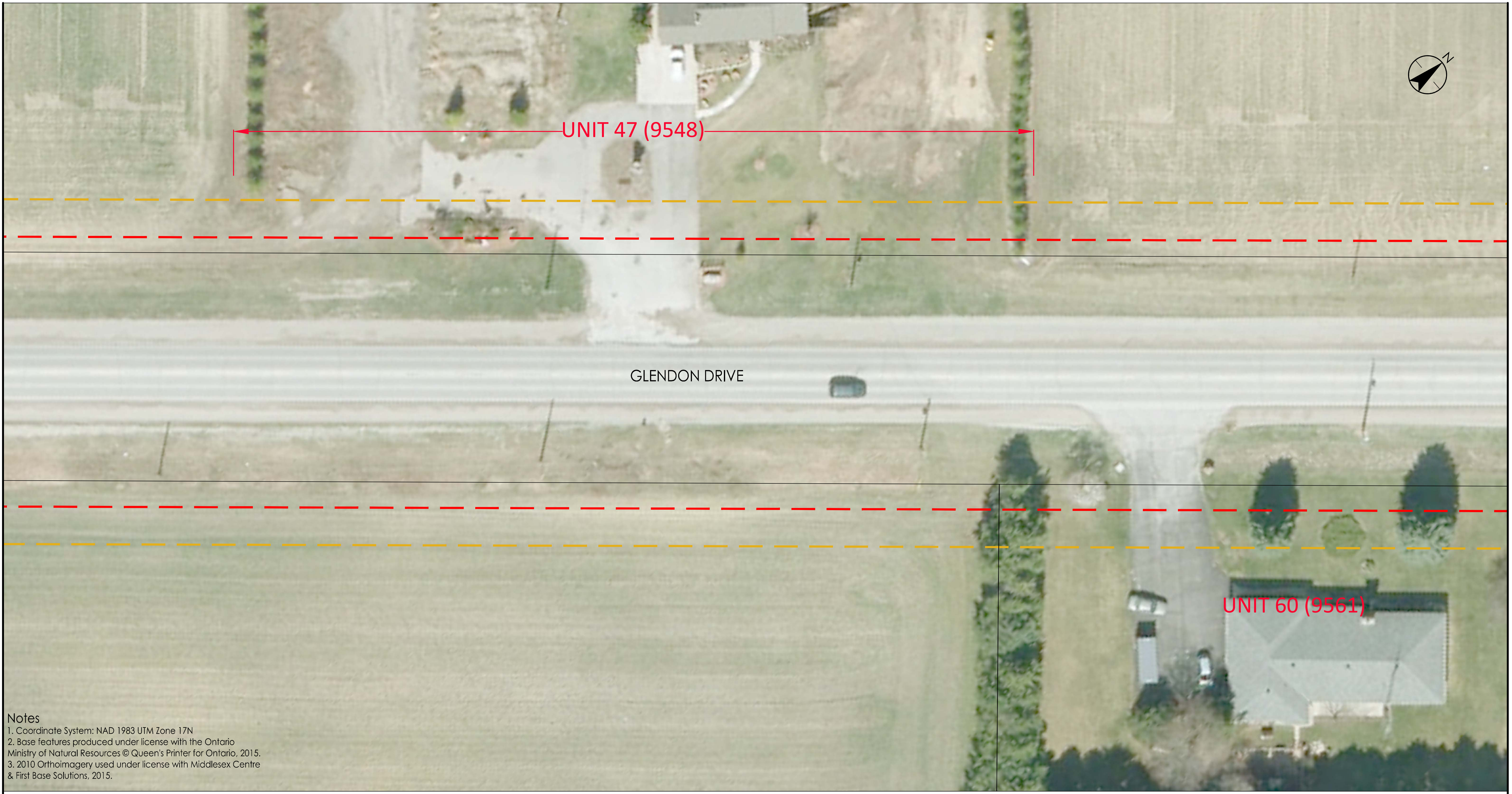


Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
7

Title
Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

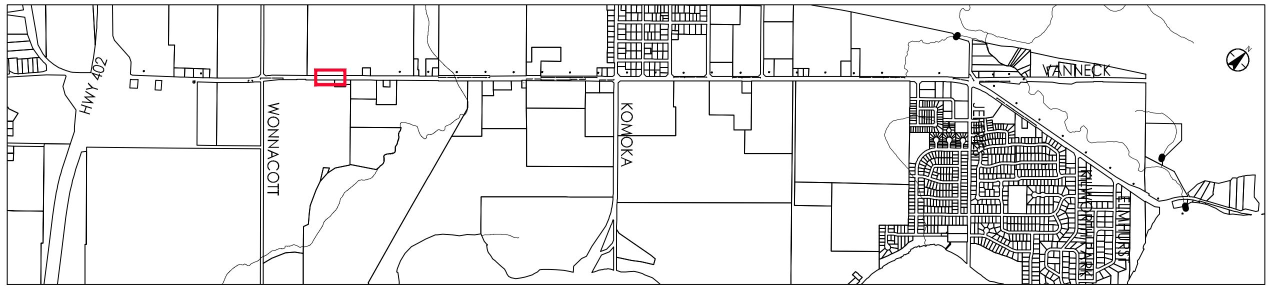
1:500 0 5 15 25m

October, 2015
161413164

Stantec

Legend

◆	Project Limits
□	Property Line (c. 2009)
- - -	Estimated Potential Ultimate ROW (36m)
- - -	Tree Search Area (+5m)
——	Watercourse (permanent)
- - -	Watercourse (intermittent)
------	Municipal Boundary
├─UNIT #─┤	Unit with High Preservation Priority
├─UNIT #─┤	Unit with Medium or Low Preservation Priority



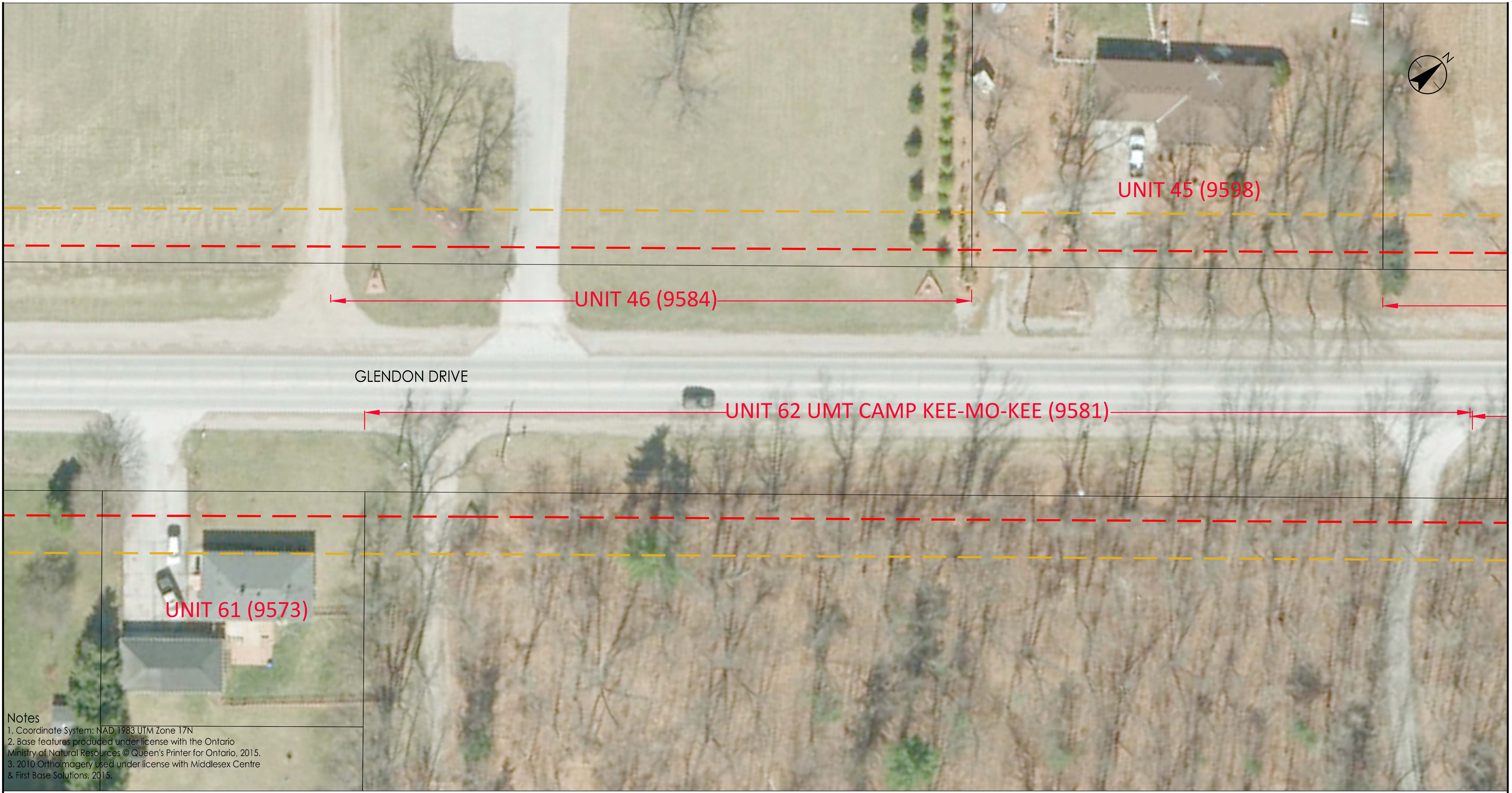
Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
8

Title
Tree Inventory Plan

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

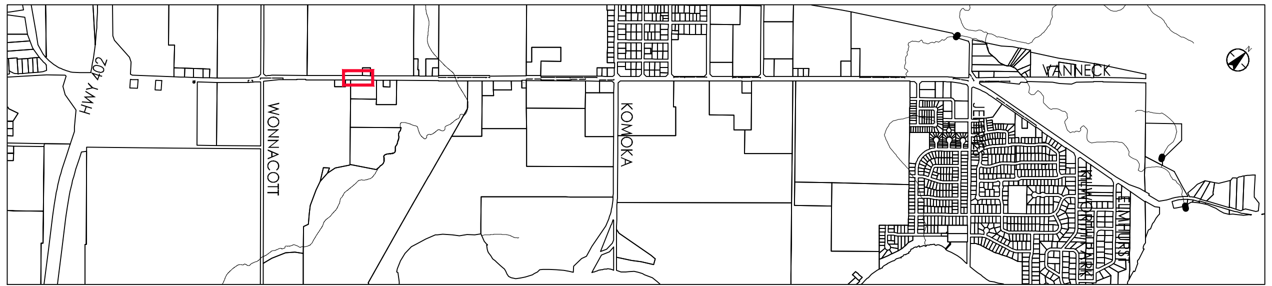
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - -	Estimated Potential Ultimate ROW (36m)
- - - -	Tree Search Area (+5m)
——	Watercourse (permanent)
- - - -	Watercourse (intermittent)
- - - -	Municipal Boundary
├─UNIT #─┤	Unit with High Preservation Priority
├─UNIT #─┤	Unit with Medium or Low Preservation Priority

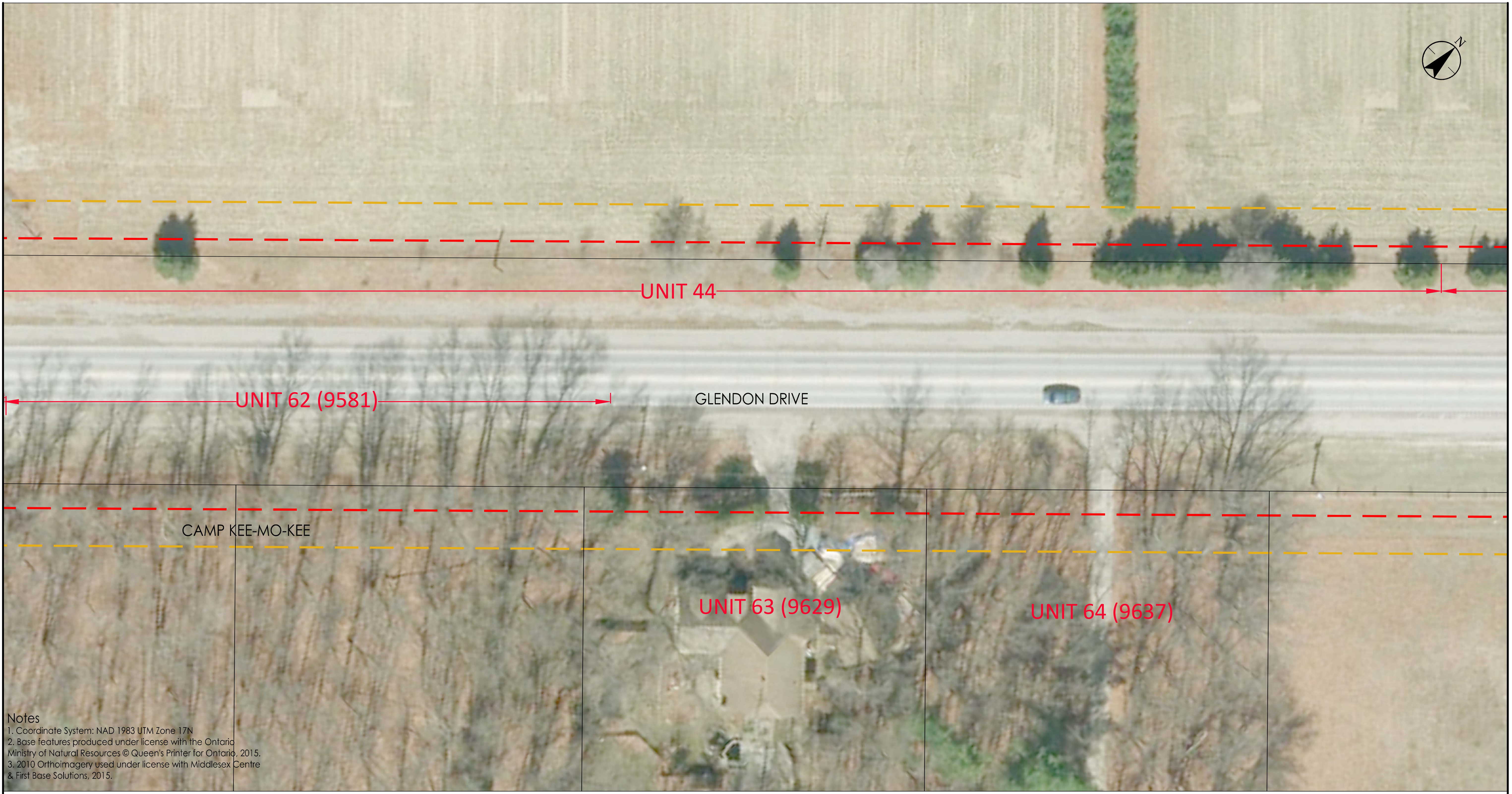


Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
9

Title
Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

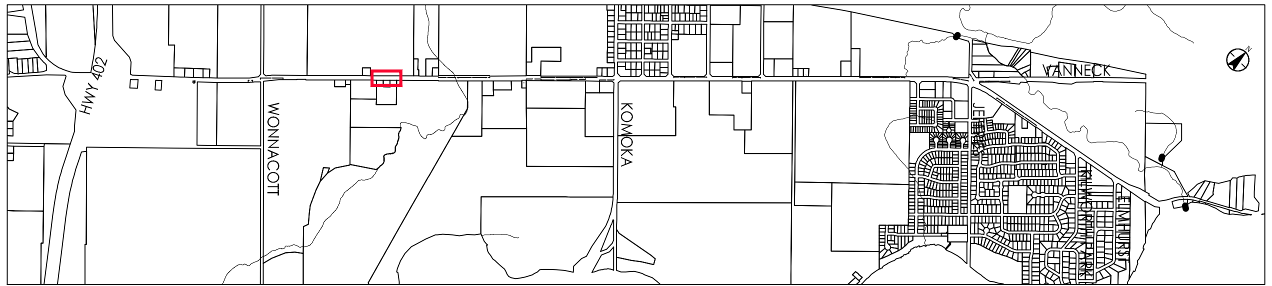
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - -	Estimated Potential Ultimate ROW (36m)
- - -	Tree Search Area (+5m)
—	Watercourse (permanent)
- - -	Watercourse (intermittent)
▬ ▬	Municipal Boundary
├─UNIT #─┤	Unit with High Preservation Priority
├─UNIT #─┤	Unit with Medium or Low Preservation Priority

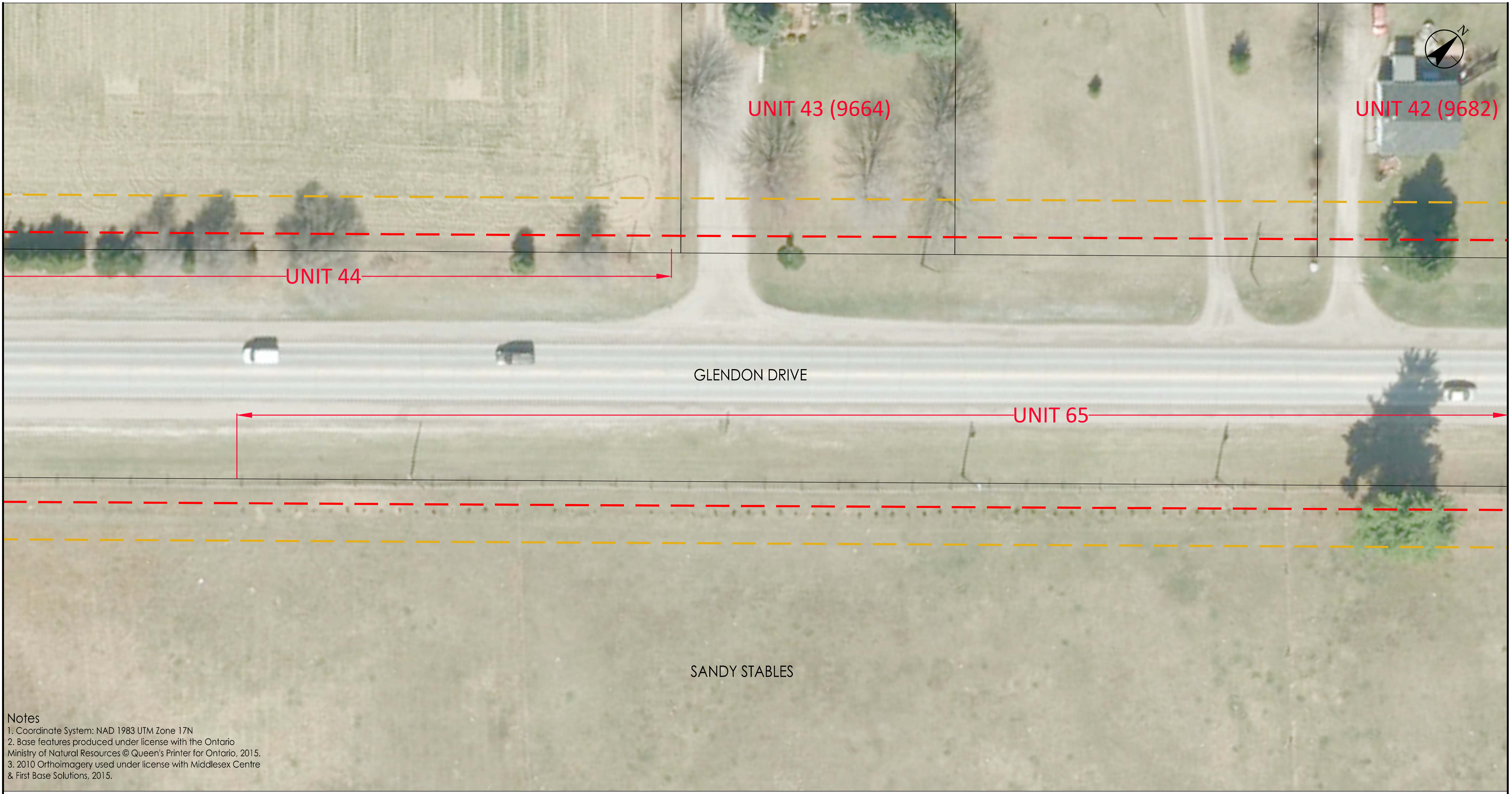


Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 10

Title
Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

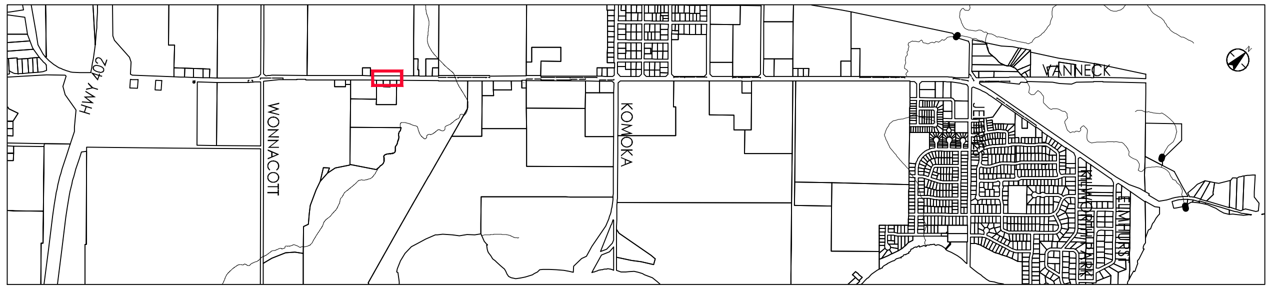
1:500 0 5 15 25m

October, 2015
161413164

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
▬ ▬ ▬	Municipal Boundary
⊢UNIT #⊣	Unit with High Preservation Priority
⊢UNIT #⊣	Unit with Medium or Low Preservation Priority



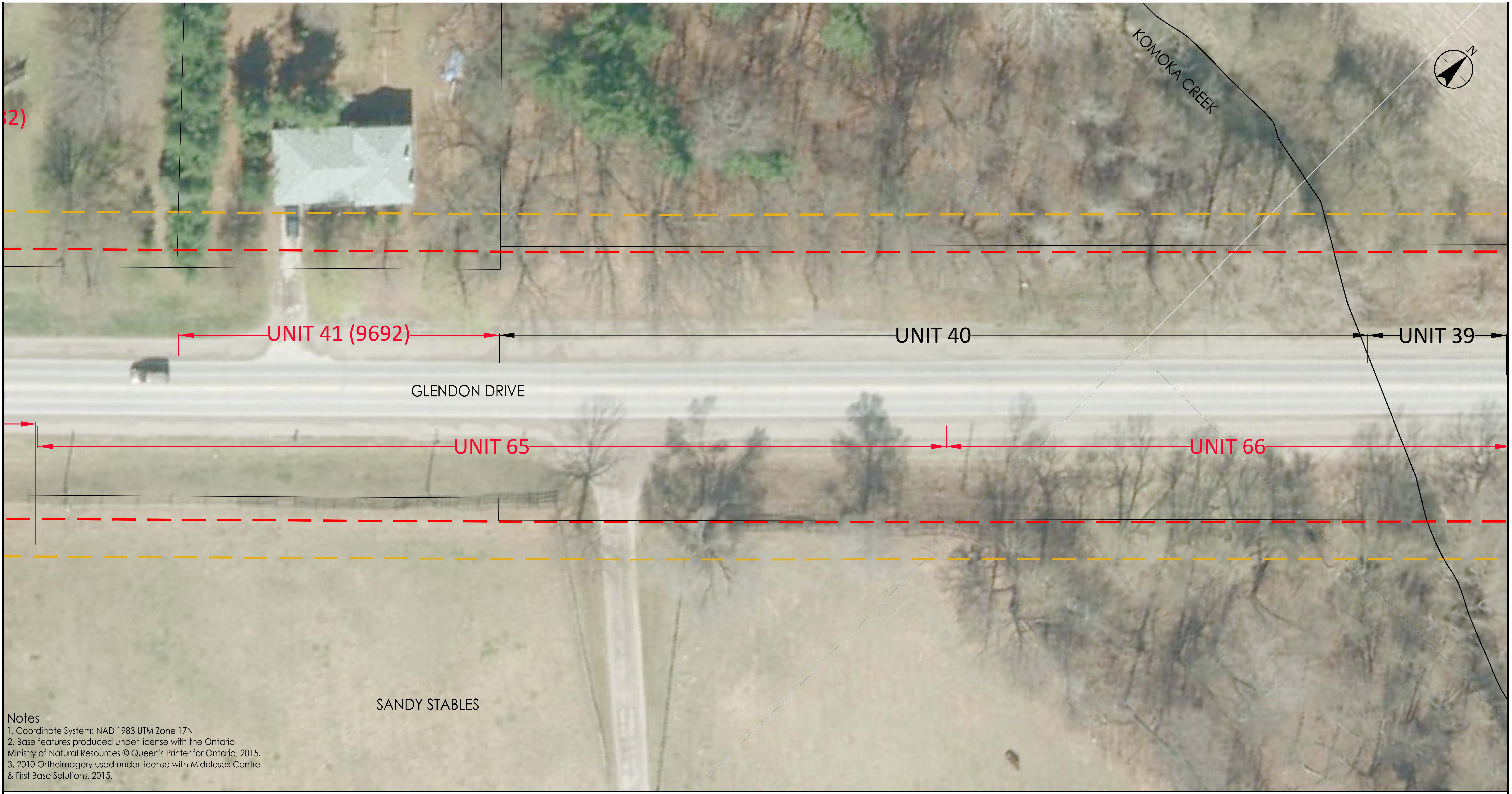
Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 11

Title
Tree Inventory Plan

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

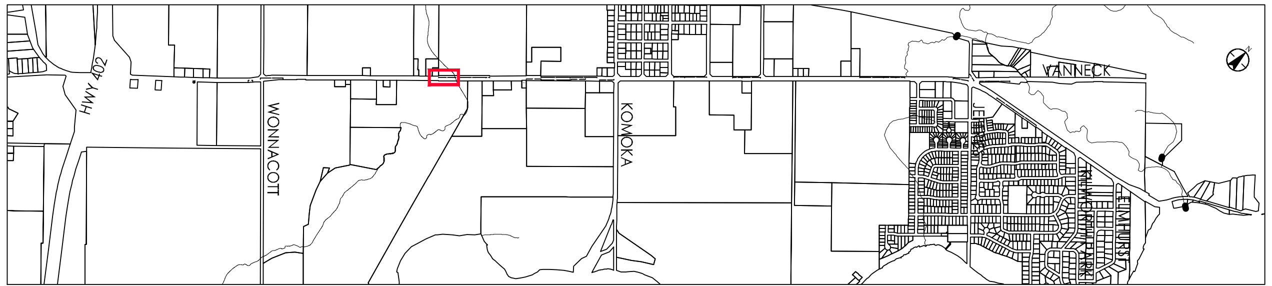
1:500 0 5 15 25m

October, 2015
161413164

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
▬ ▬ ▬	Municipal Boundary
├─UNIT #─┤	Unit with High Preservation Priority
├─UNIT #─┤	Unit with Medium or Low Preservation Priority



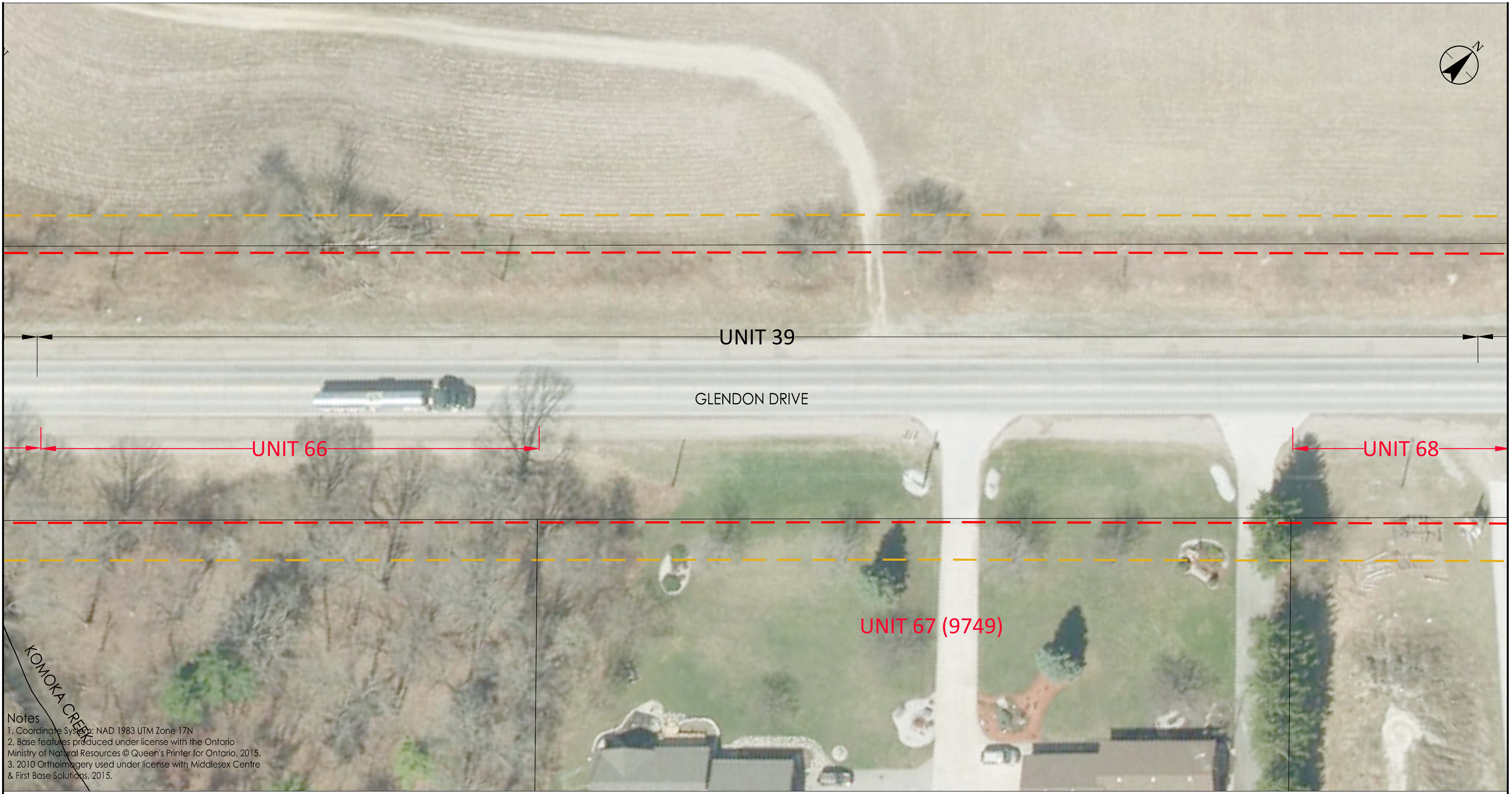
Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 12

Title
Tree Inventory Plan

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

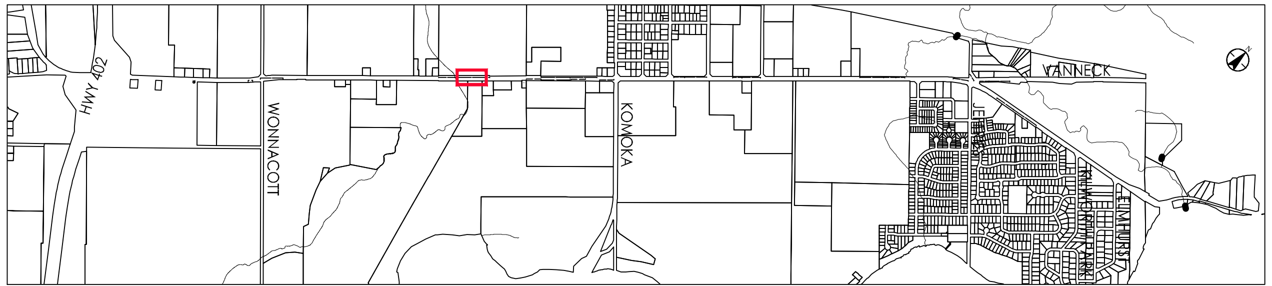
1:500 0 5 15 25m

October, 2015
161413164

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - -	Estimated Potential Ultimate ROW (36m)
- - -	Tree Search Area (+5m)
―	Watercourse (permanent)
- - -	Watercourse (intermittent)
▬ ▬	Municipal Boundary
├─UNIT #─┤	Unit with High Preservation Priority
├─UNIT #─┤	Unit with Medium or Low Preservation Priority



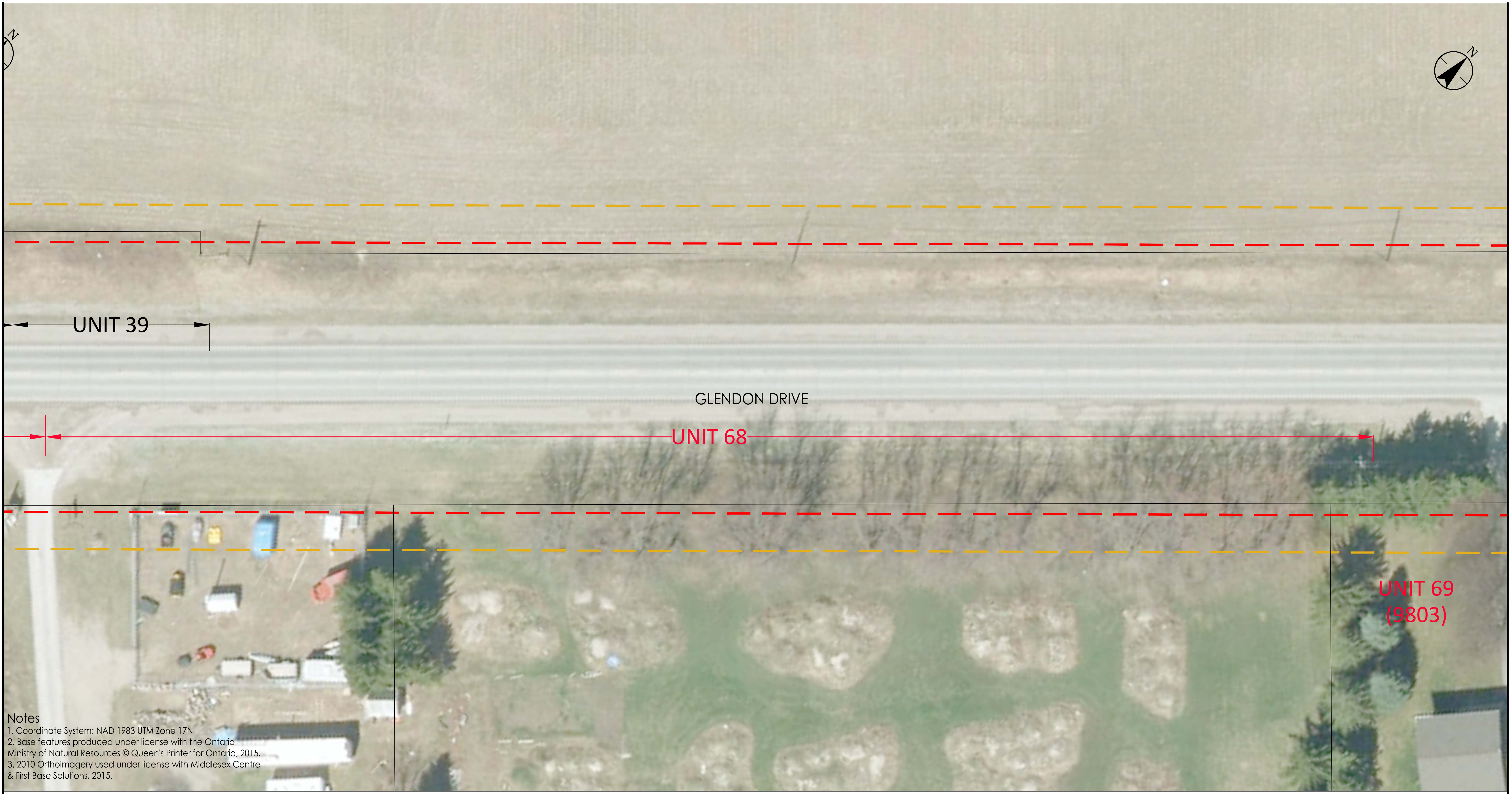
Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 13

Title
Tree Inventory Plan

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

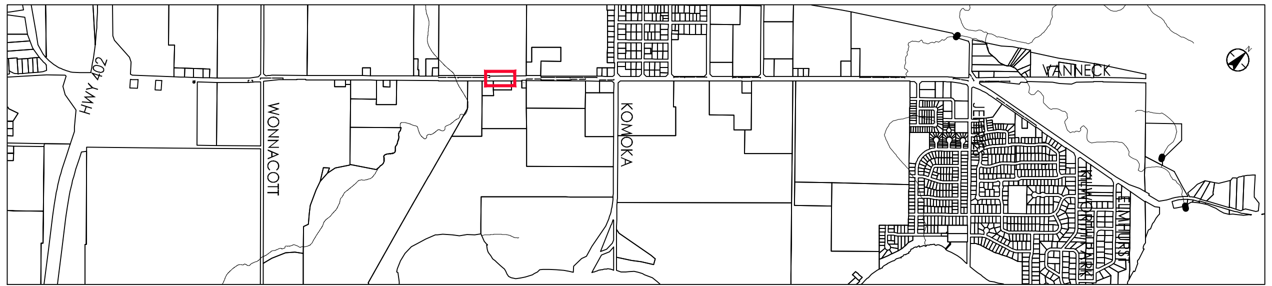
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
■ ■ ■ ■	Municipal Boundary
├—UNIT #—┤	Unit with High Preservation Priority
├—UNIT #—┤	Unit with Medium or Low Preservation Priority

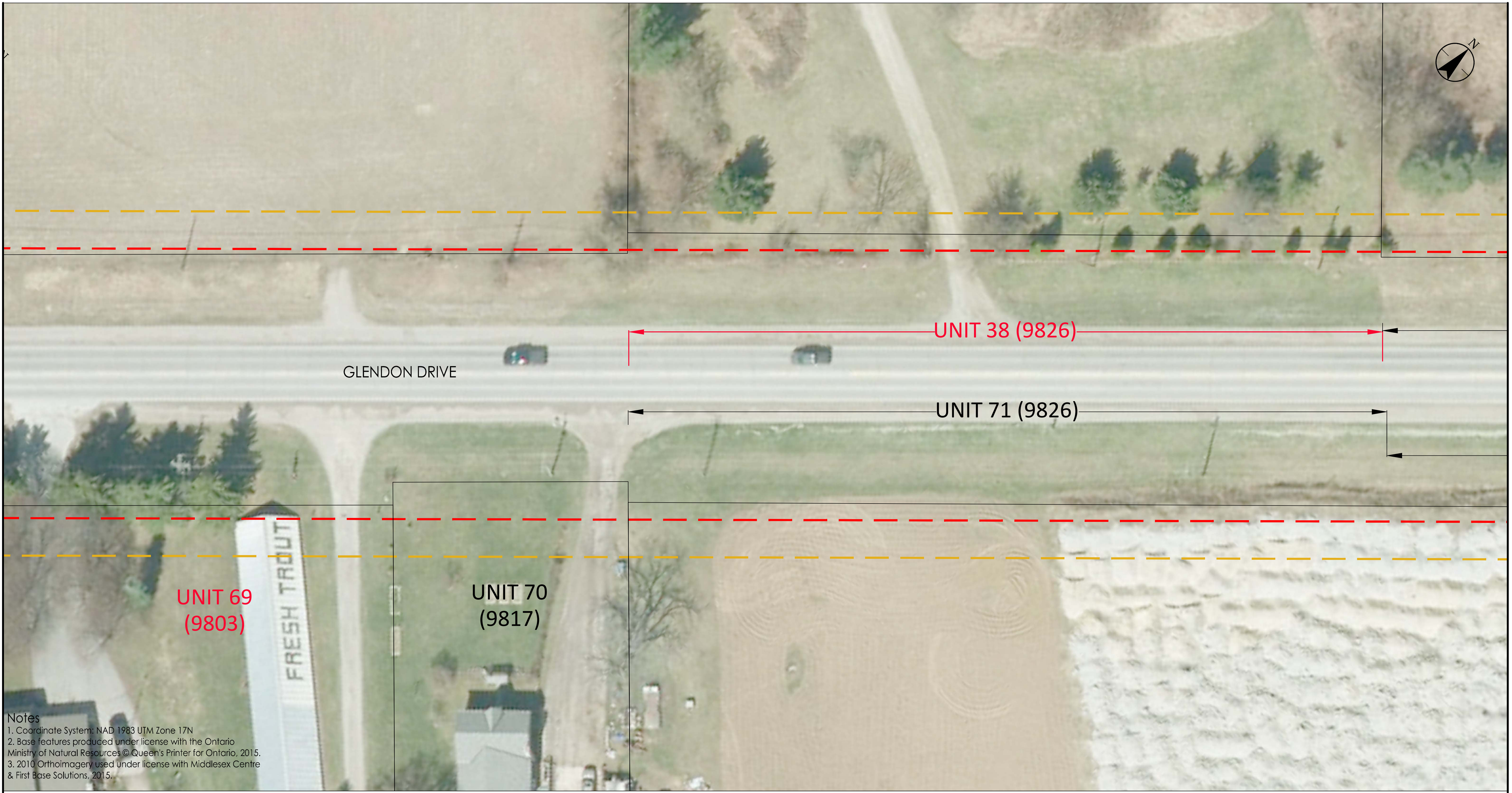


Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 14

Title
Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

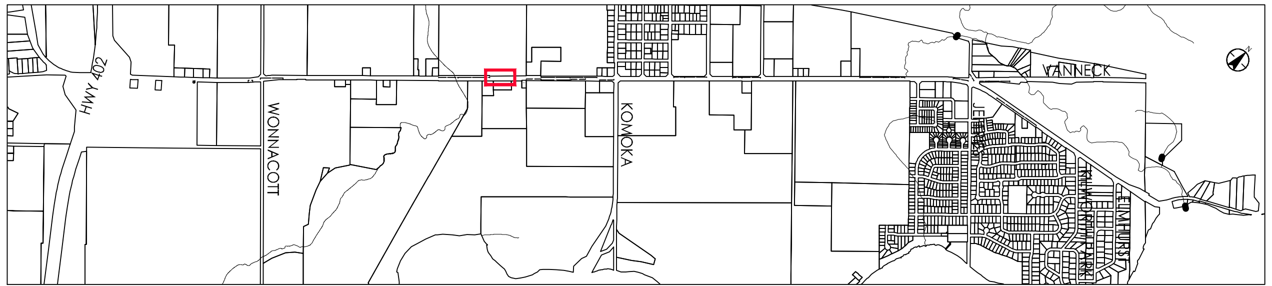
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - -	Estimated Potential Ultimate ROW (36m)
- - -	Tree Search Area (+5m)
——	Watercourse (permanent)
- - -	Watercourse (intermittent)
▬ ▬	Municipal Boundary
├─UNIT #─┤	Unit with High Preservation Priority
├─UNIT #─┤	Unit with Medium or Low Preservation Priority

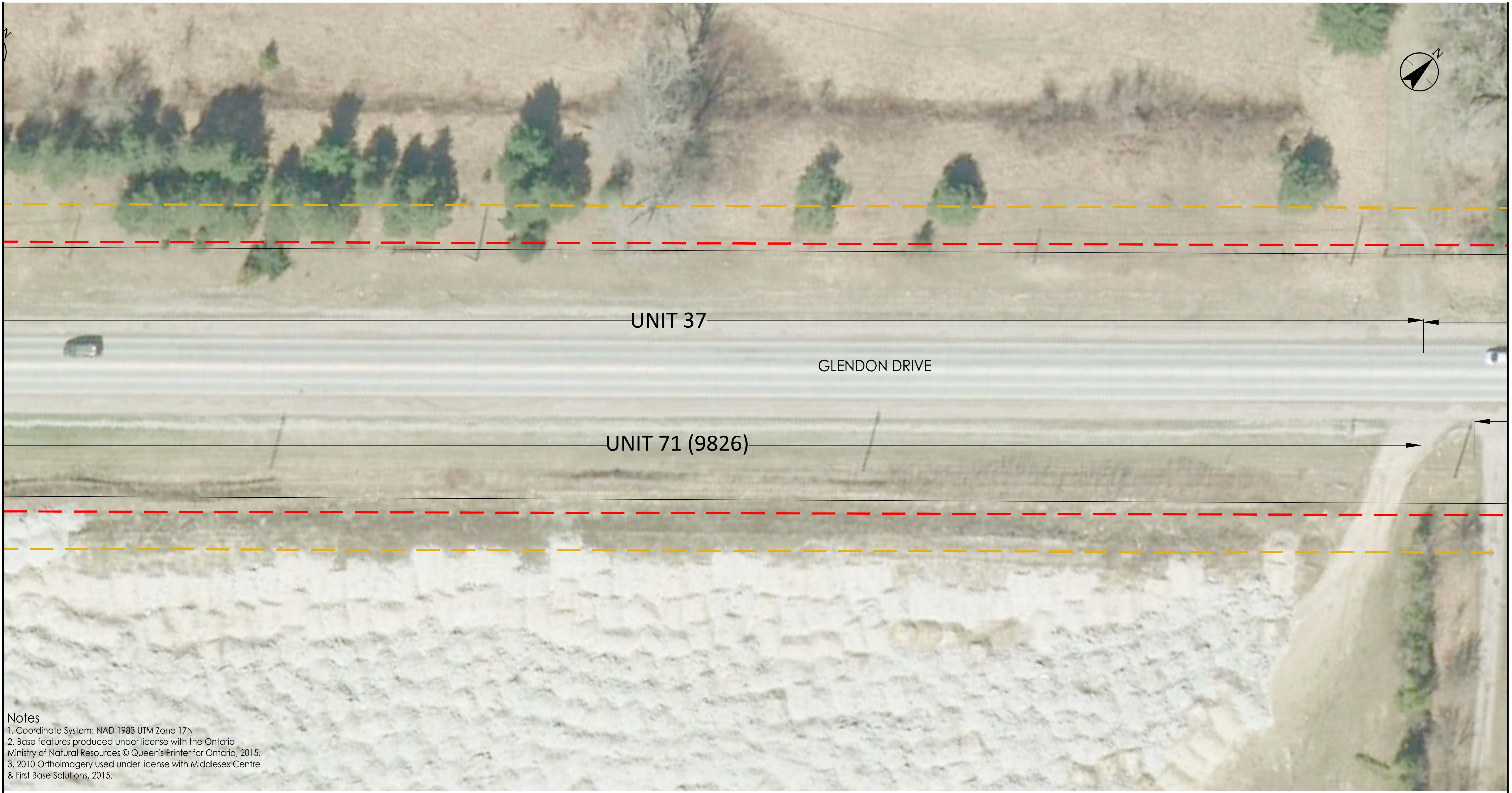


Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 15

Title
Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

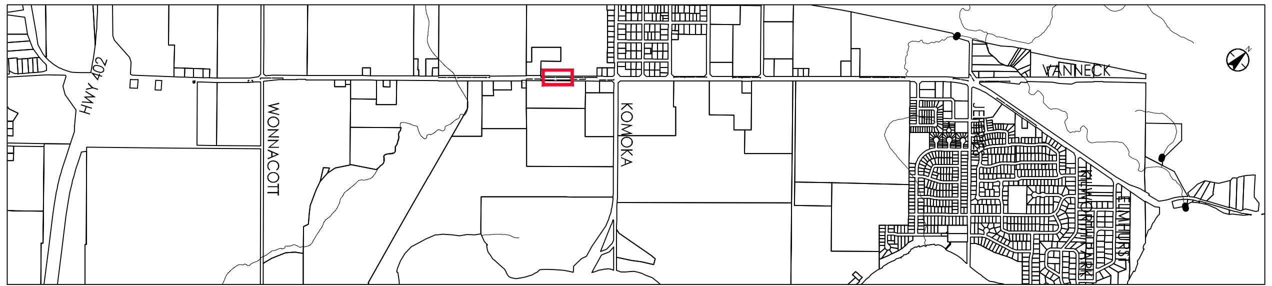
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - -	Estimated Potential Ultimate ROW (36m)
- - -	Tree Search Area (+5m)
───	Watercourse (permanent)
- - -	Watercourse (intermittent)
▬ ▬ ▬	Municipal Boundary
├─UNIT #─┤	Unit with High Preservation Priority
├─UNIT #─┤	Unit with Medium or Low Preservation Priority



Key Plan

Client/Project

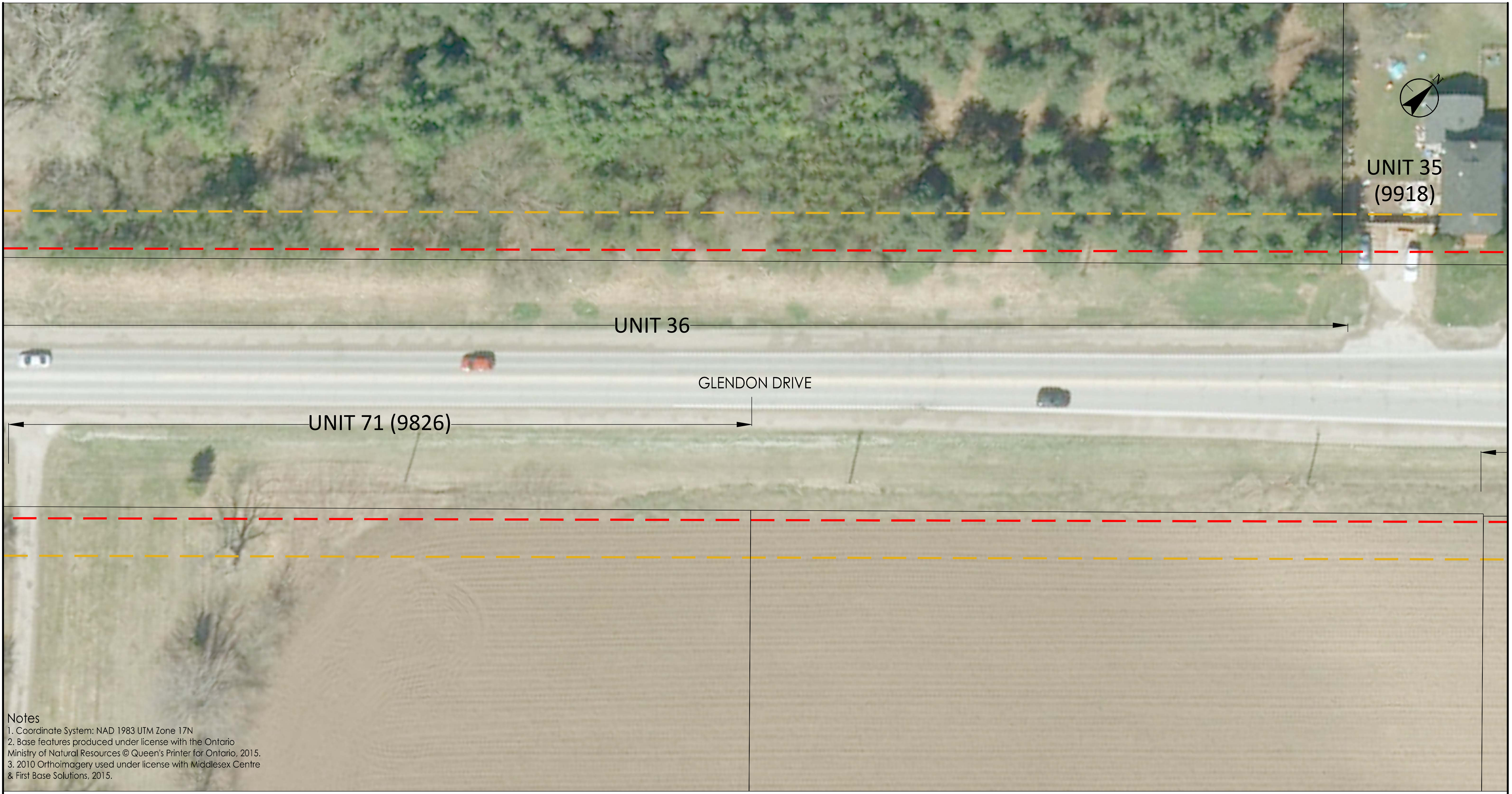
Middlesex Centre/Middlesex County

Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 16

Title

Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

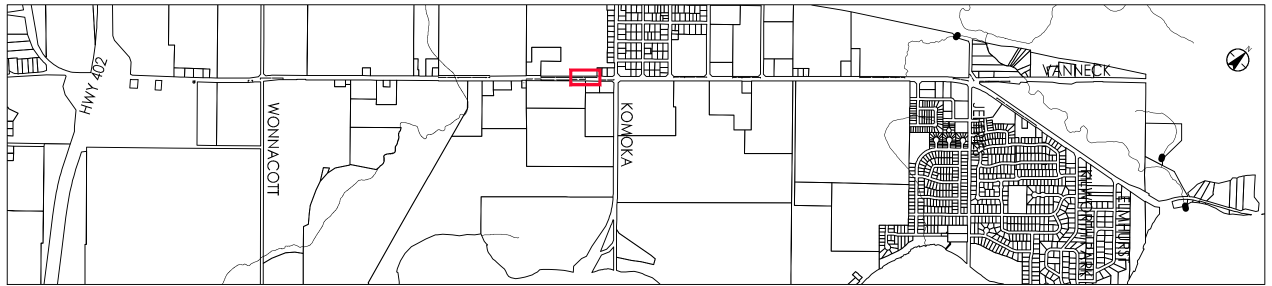
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - -	Estimated Potential Ultimate ROW (36m)
- - -	Tree Search Area (+5m)
—	Watercourse (permanent)
- - -	Watercourse (intermittent)
----	Municipal Boundary
UNIT #	Unit with High Preservation Priority
UNIT #	Unit with Medium or Low Preservation Priority

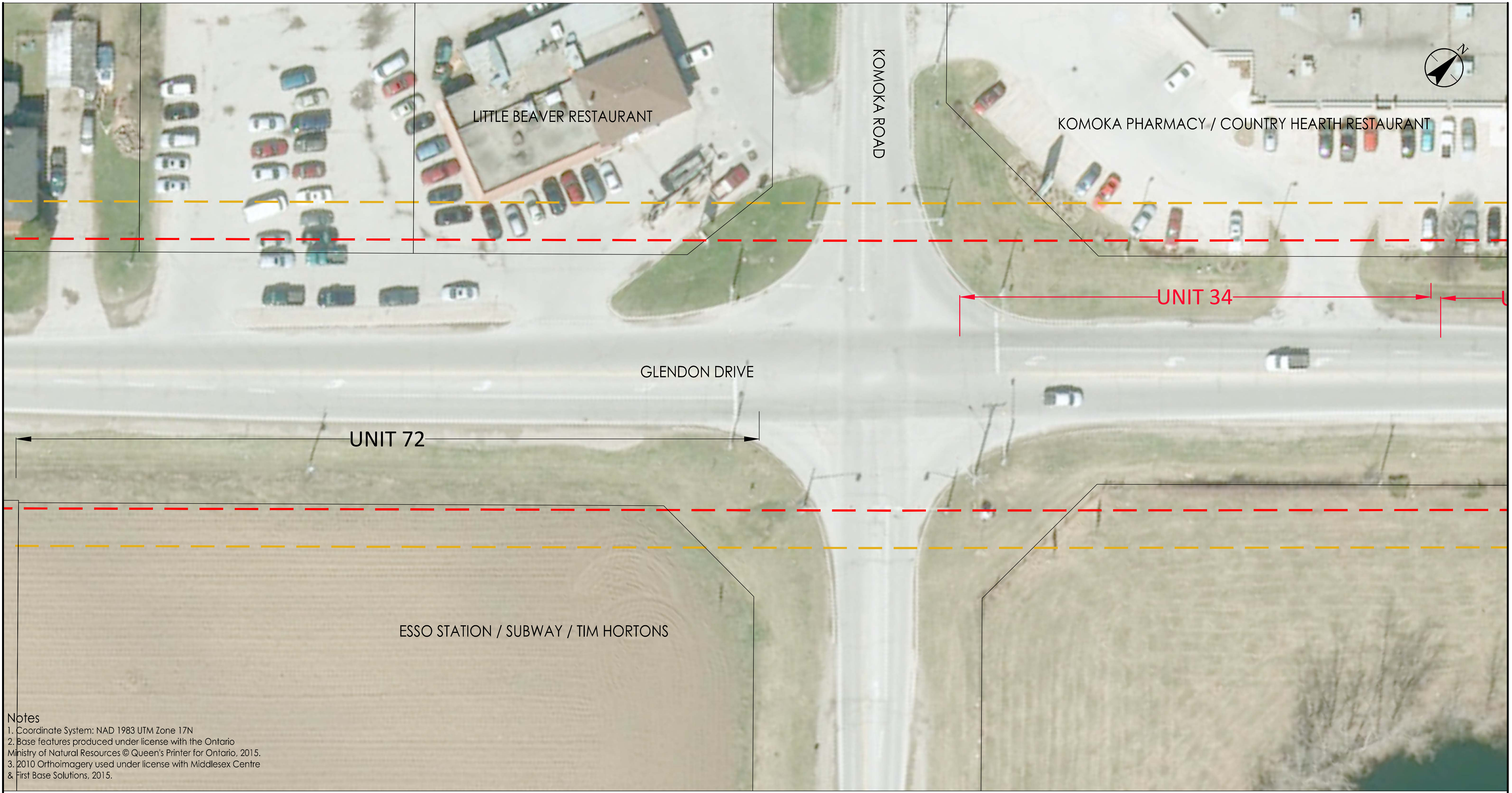


Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 17

Title
Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

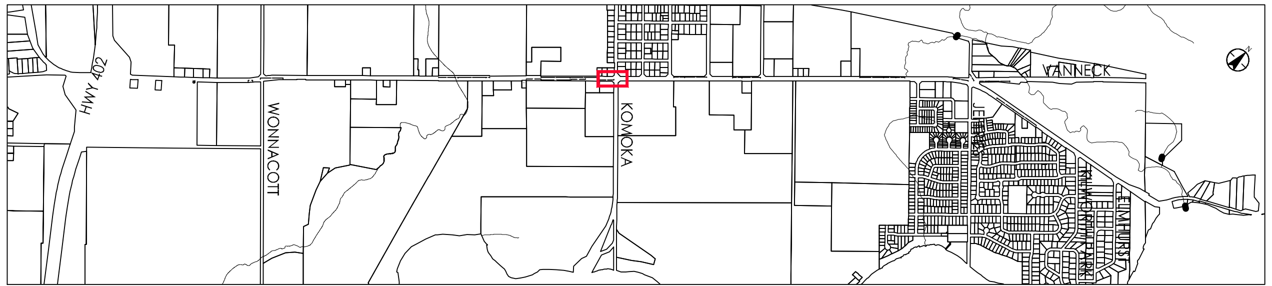
ORIGINAL SHEET - ANSI B

October, 2015
161413164

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
▬ ▬ ▬	Municipal Boundary
⊢UNIT #⊣	Unit with High Preservation Priority
⊢UNIT #⊣	Unit with Medium or Low Preservation Priority



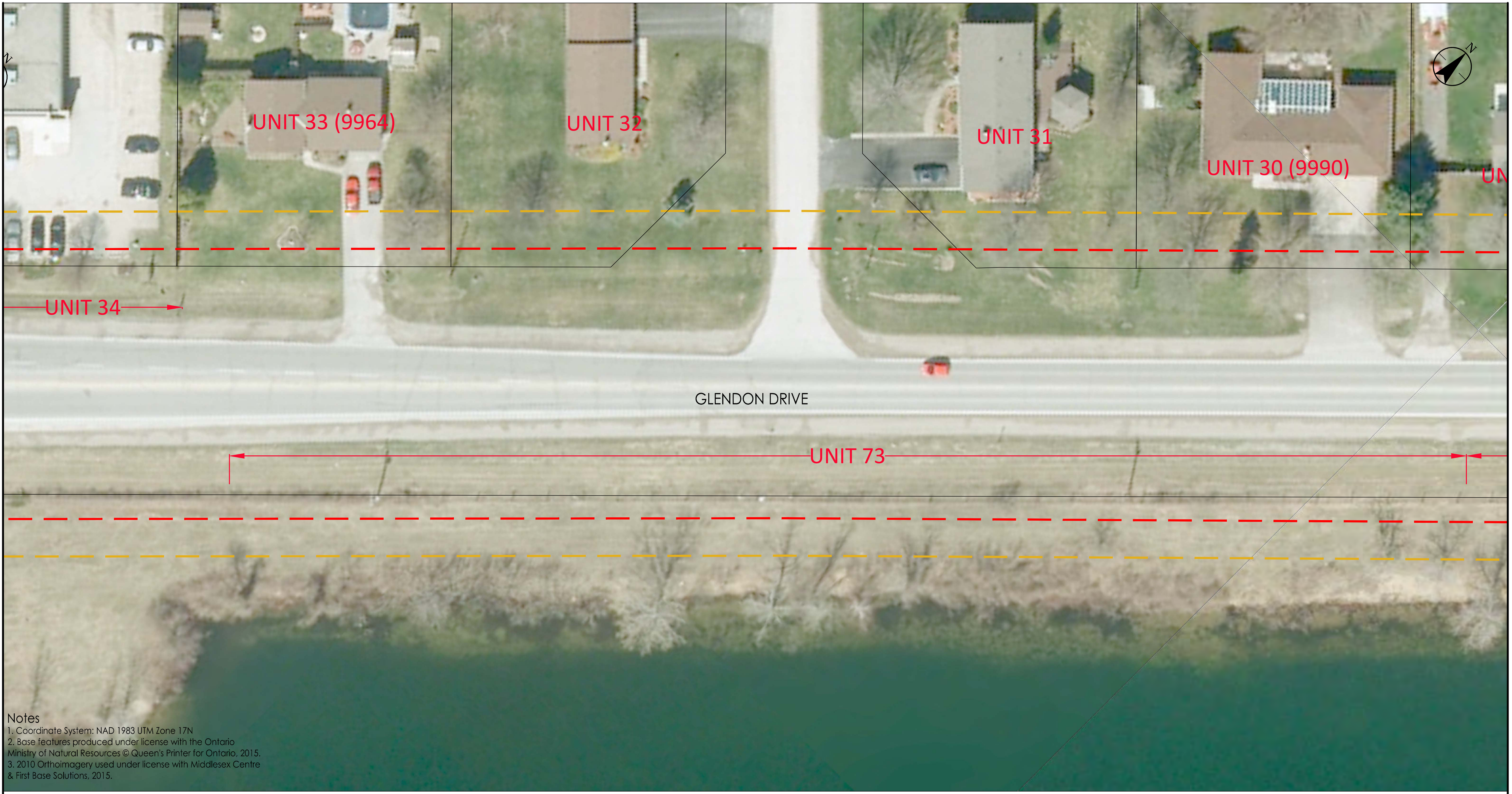
Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 18

Title
Tree Inventory Plan

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

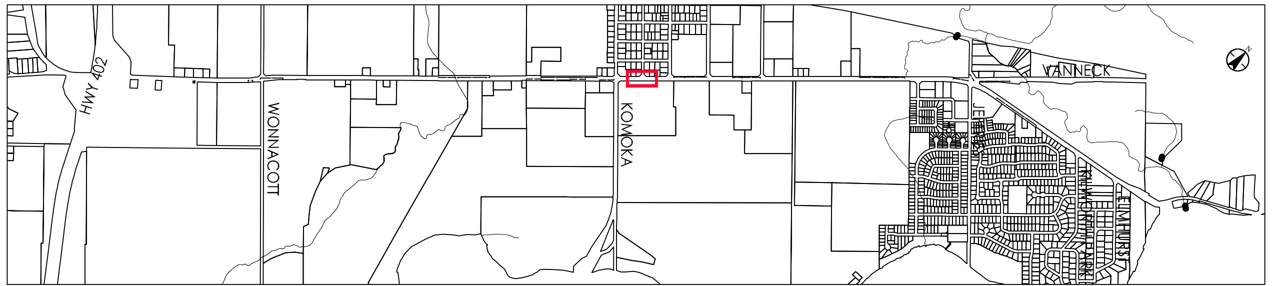
1:500 0 5 15 25m

October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Legend

◆	Project Limits
☐	Property Line (c. 2009)
- - -	Estimated Potential Ultimate ROW (36m)
- - -	Tree Search Area (+5m)
—	Watercourse (permanent)
- - -	Watercourse (intermittent)
- - -	Municipal Boundary
├─UNIT #─┤	Unit with High Preservation Priority
├─UNIT #─┤	Unit with Medium or Low Preservation Priority

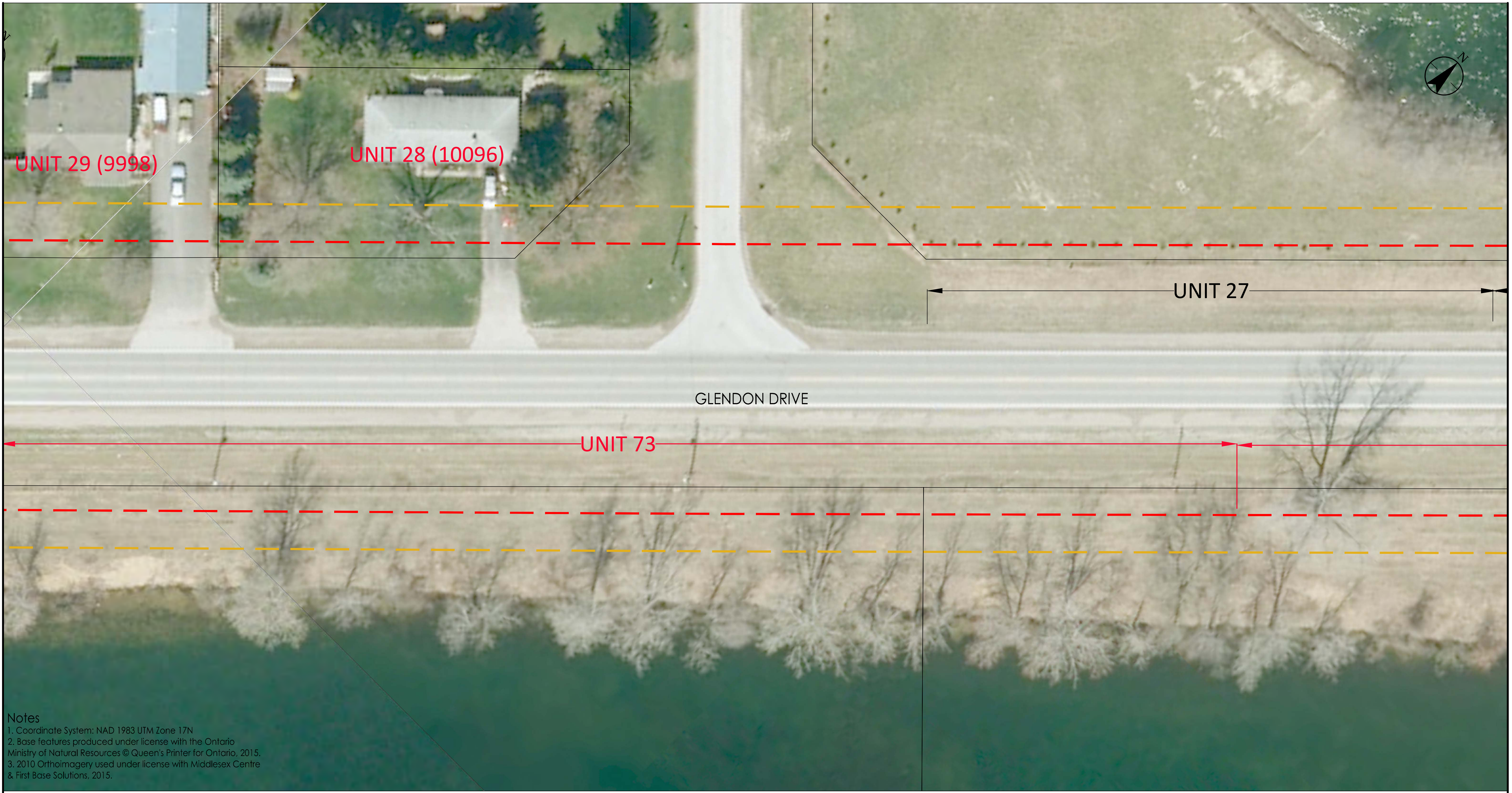


Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
19

Title
Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

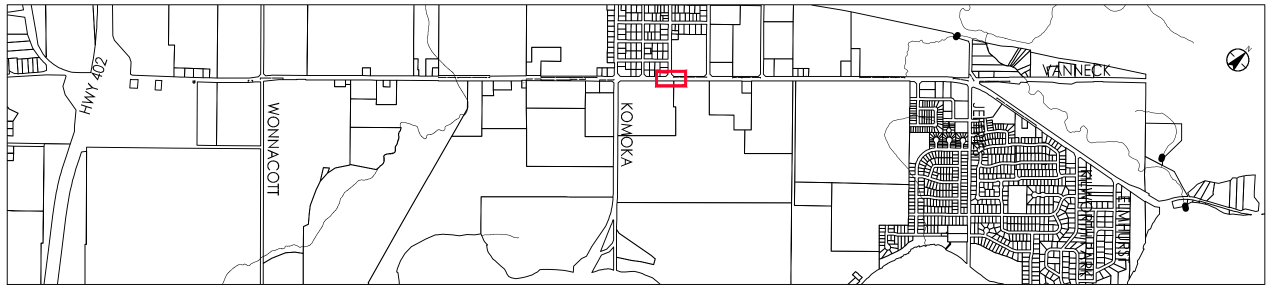
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - -	Estimated Potential Ultimate ROW (36m)
- - - -	Tree Search Area (+5m)
——	Watercourse (permanent)
- - - -	Watercourse (intermittent)
▬ ▬ ▬	Municipal Boundary
├◄UNIT #►┤	Unit with High Preservation Priority
├◄UNIT #►┤	Unit with Medium or Low Preservation Priority

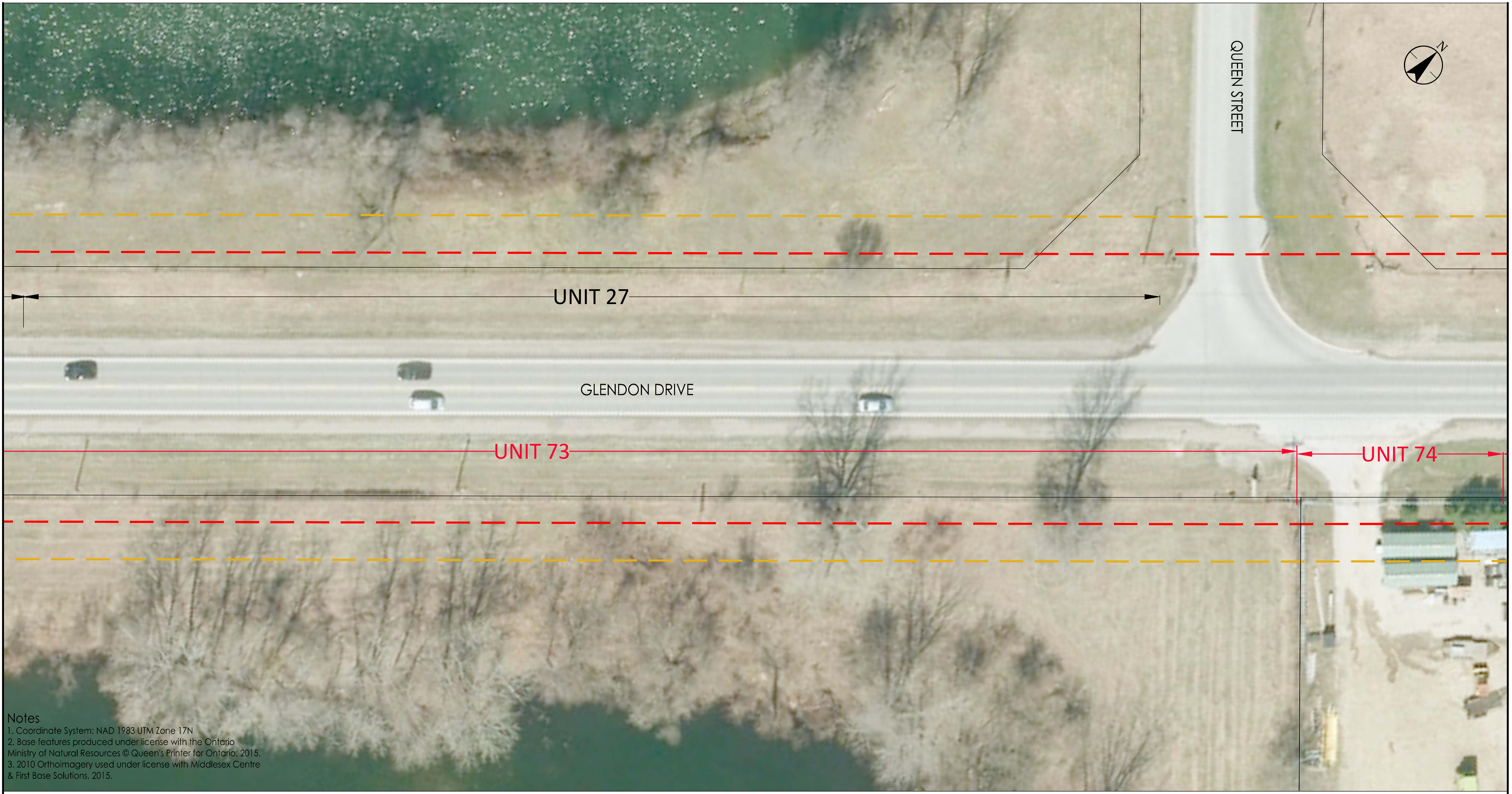


Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 20

Title
Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

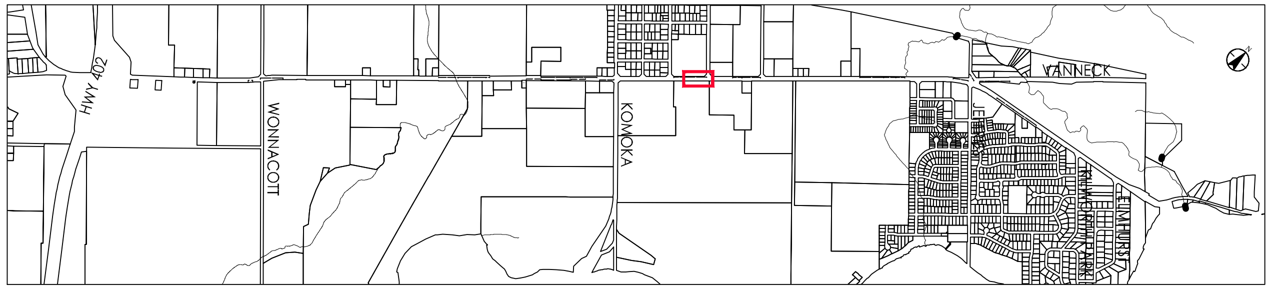
1:500 0 5 15 25m

October, 2015
161413164

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
▬ ▬ ▬	Municipal Boundary
├─UNIT #─┤	Unit with High Preservation Priority
├─UNIT #─┤	Unit with Medium or Low Preservation Priority



Key Plan

Client/Project

Middlesex Centre/Middlesex County

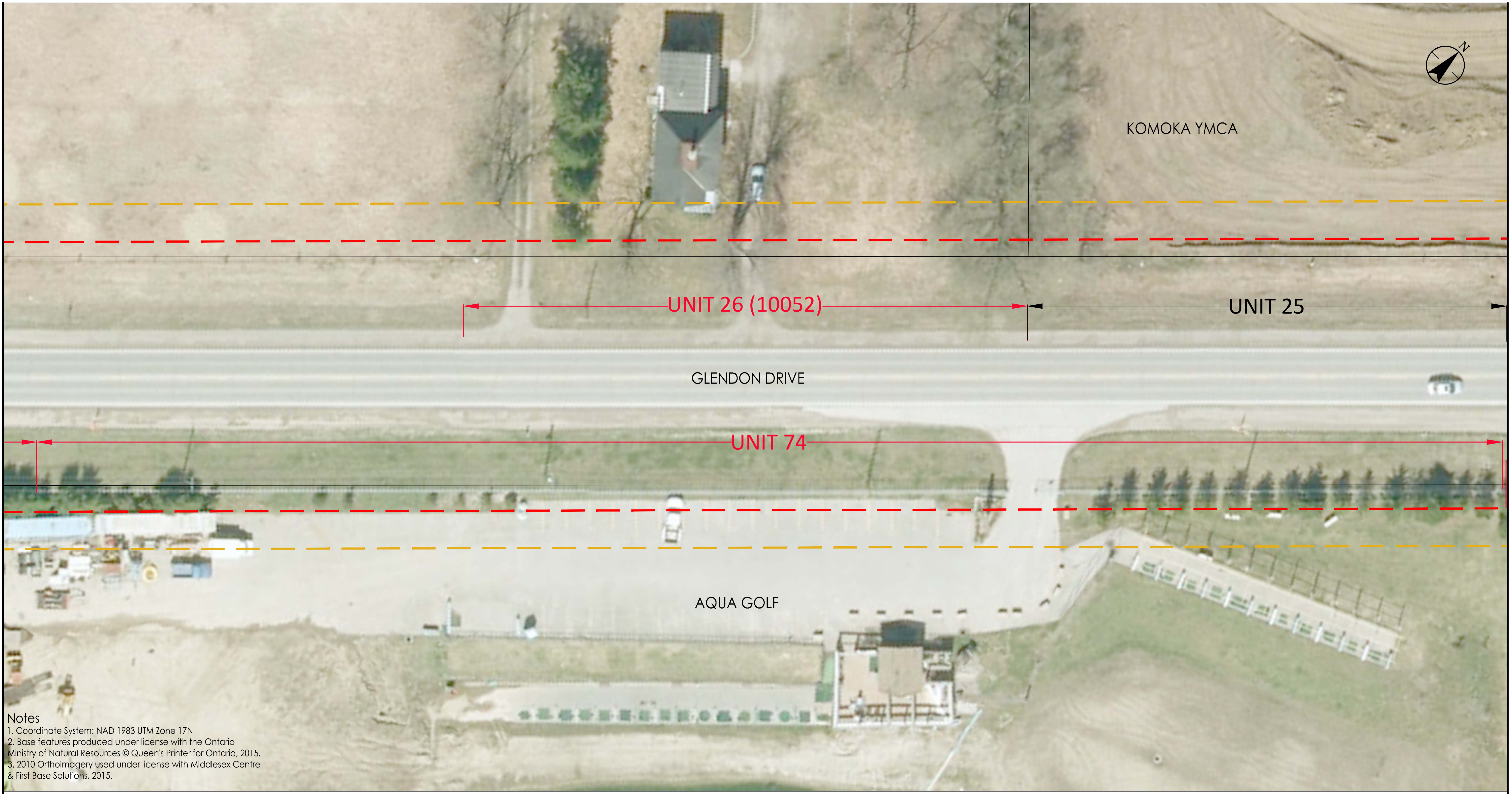
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 21

Title

Tree Inventory Plan

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

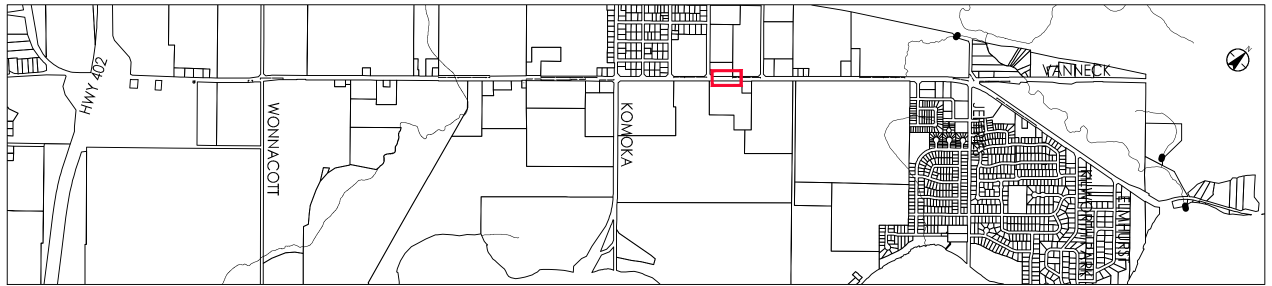
1:500 0 5 15 25m

October, 2015
161413164

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
■■■■■	Municipal Boundary
├←UNIT #→┤	Unit with High Preservation Priority
├←UNIT #→┤	Unit with Medium or Low Preservation Priority



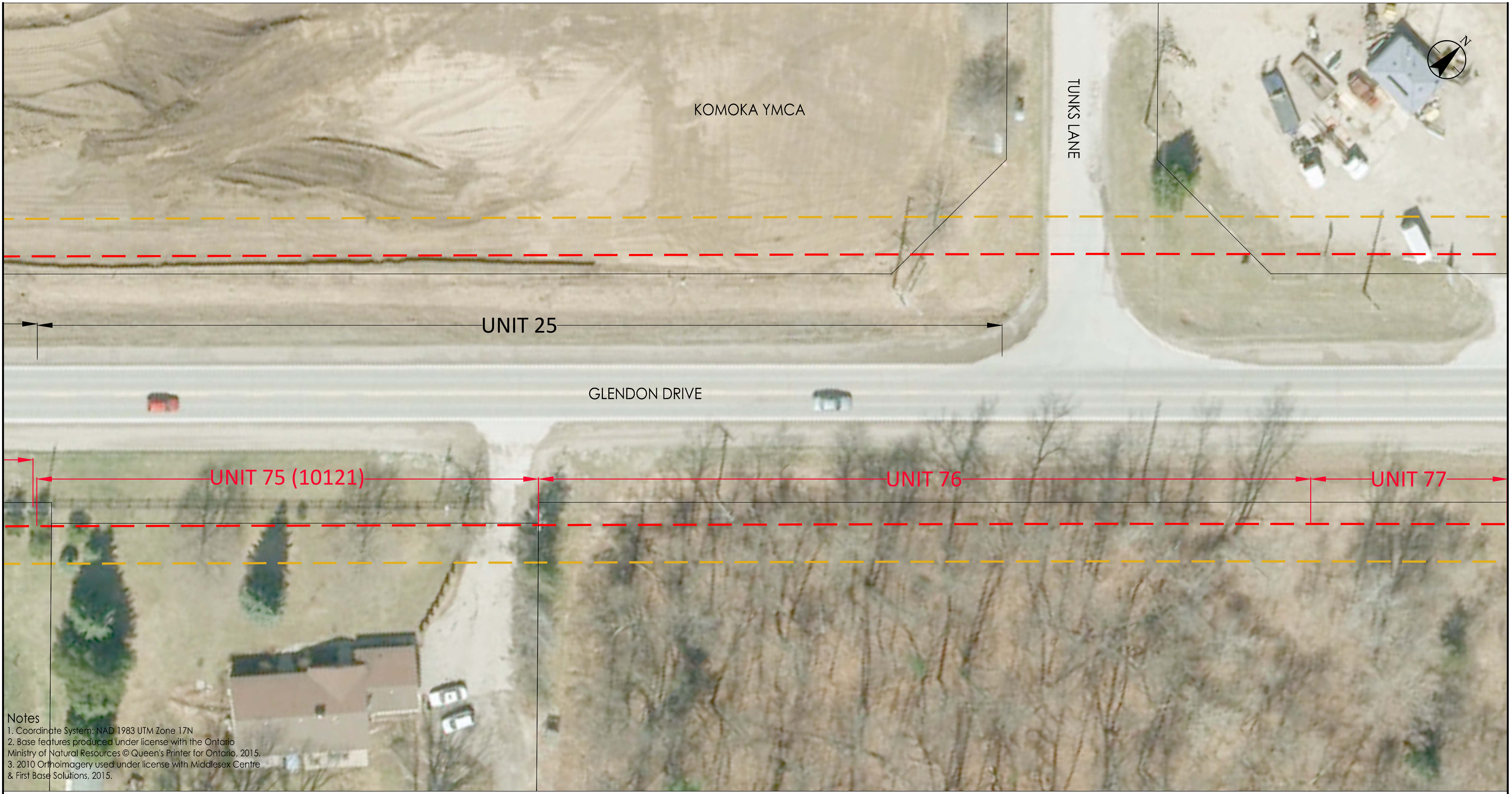
Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 22

Title
Tree Inventory Plan

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

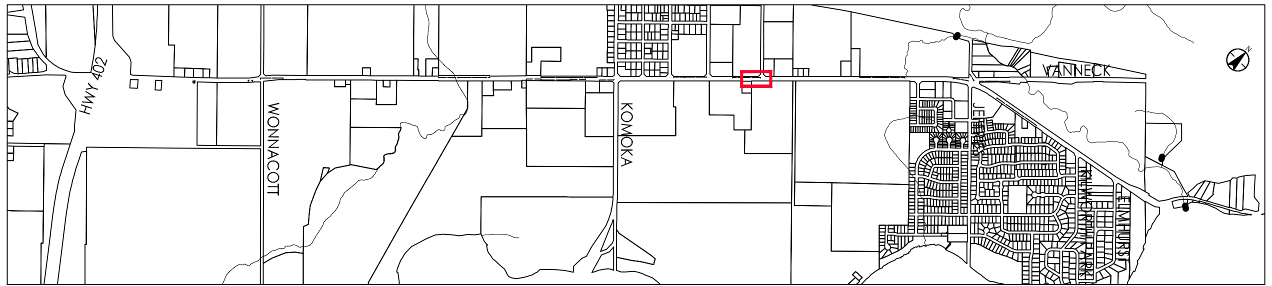
1:500 0 5 15 25m

October, 2015
161413164

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
■ ■ ■ ■	Municipal Boundary
⊢UNIT #⊣	Unit with High Preservation Priority
⊢UNIT #⊣	Unit with Medium or Low Preservation Priority



Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 23

Title
Tree Inventory Plan

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500

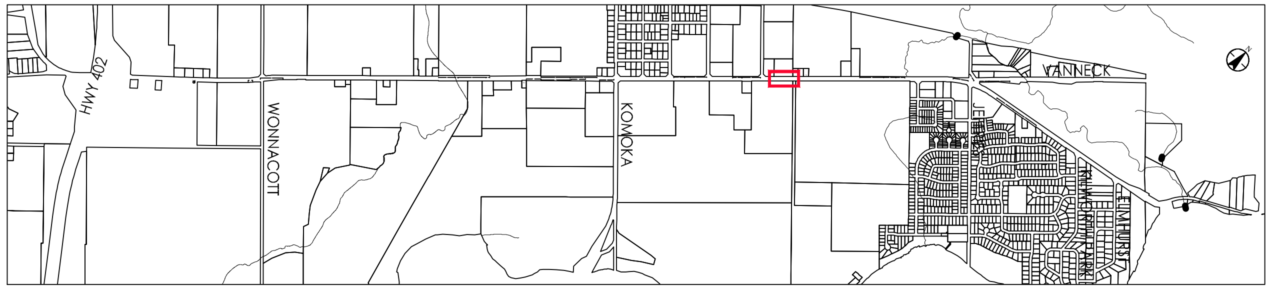
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - -	Estimated Potential Ultimate ROW (36m)
- - - -	Tree Search Area (+5m)
——	Watercourse (permanent)
- - - -	Watercourse (intermittent)
- - - -	Municipal Boundary
├─UNIT #─┤	Unit with High Preservation Priority
├─UNIT #─┤	Unit with Medium or Low Preservation Priority

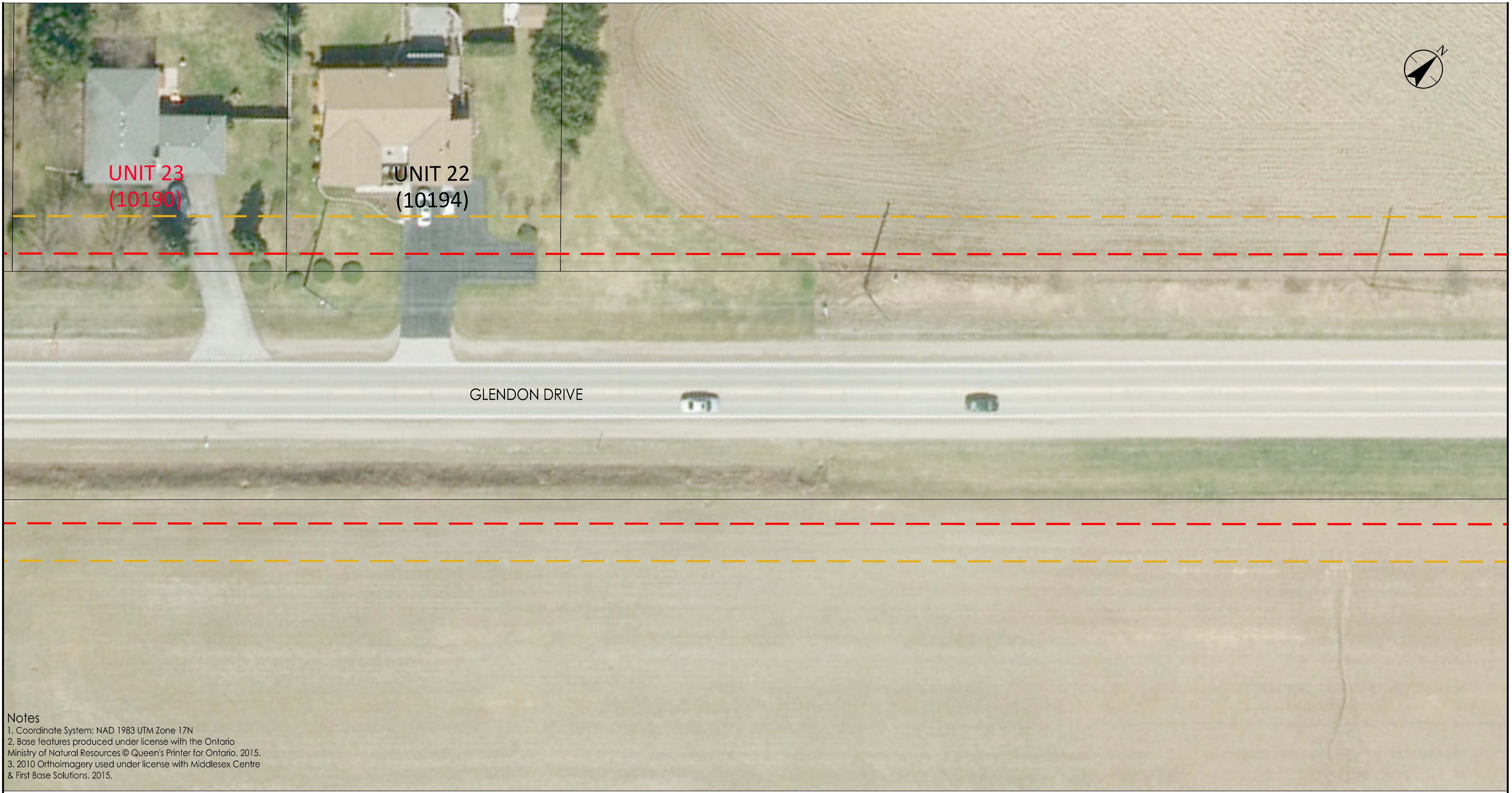


Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 24

Title
Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

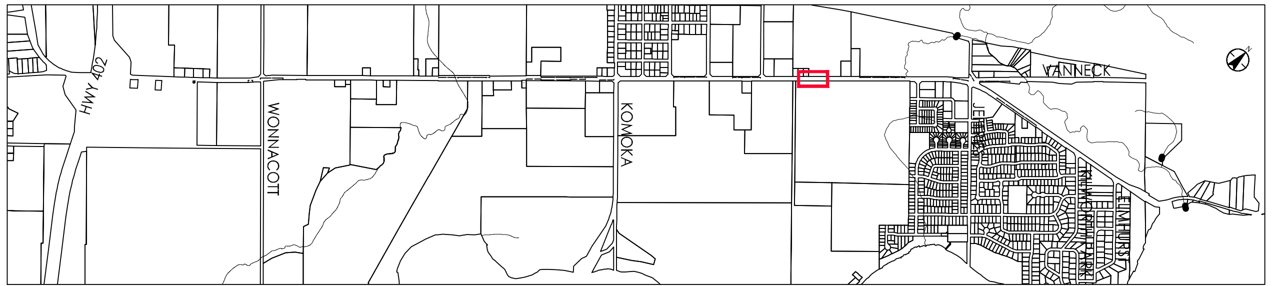
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
——	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
■■■■■	Municipal Boundary
UNIT #	Unit with High Preservation Priority
UNIT #	Unit with Medium or Low Preservation Priority



Key Plan

Client/Project

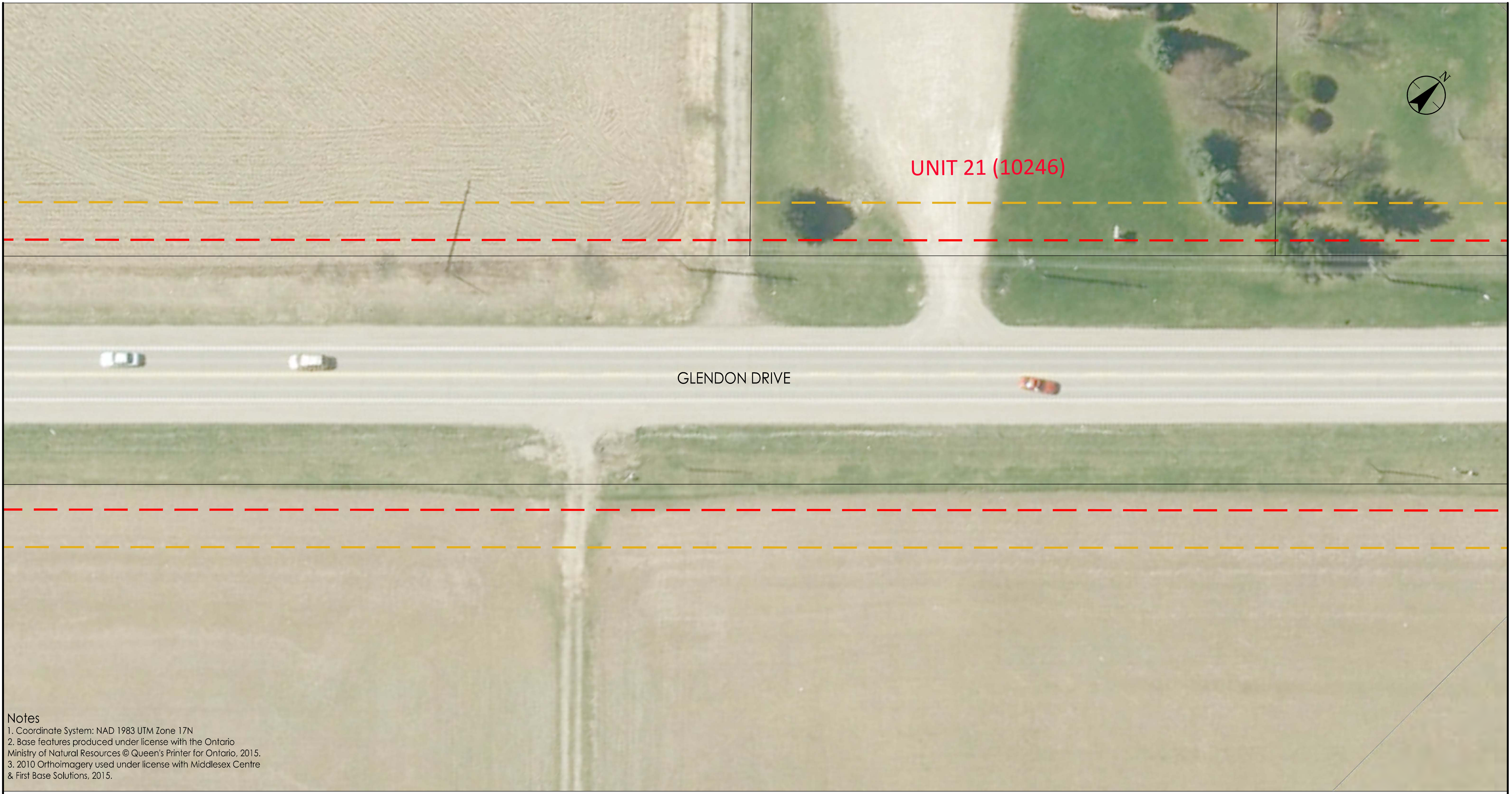
Middlesex Centre/Middlesex County

Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 25

Title

Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

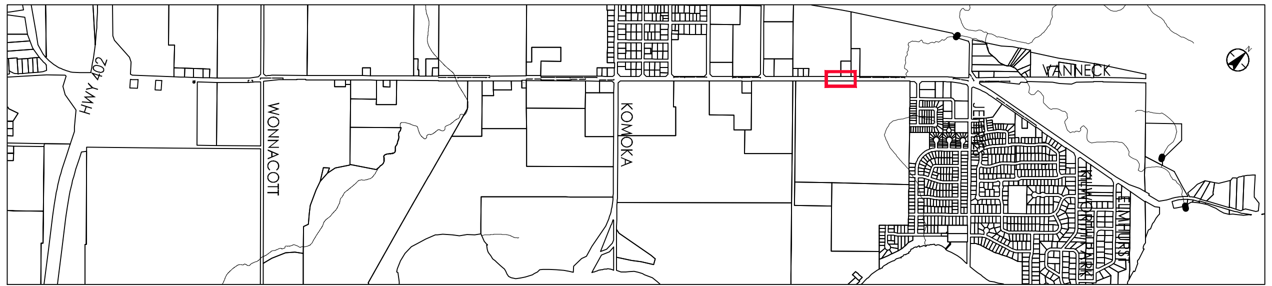
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - -	Estimated Potential Ultimate ROW (36m)
- - - -	Tree Search Area (+5m)
——	Watercourse (permanent)
- - - -	Watercourse (intermittent)
- - - -	Municipal Boundary
├UNIT #┤	Unit with High Preservation Priority
├UNIT #┤	Unit with Medium or Low Preservation Priority



Key Plan

Client/Project

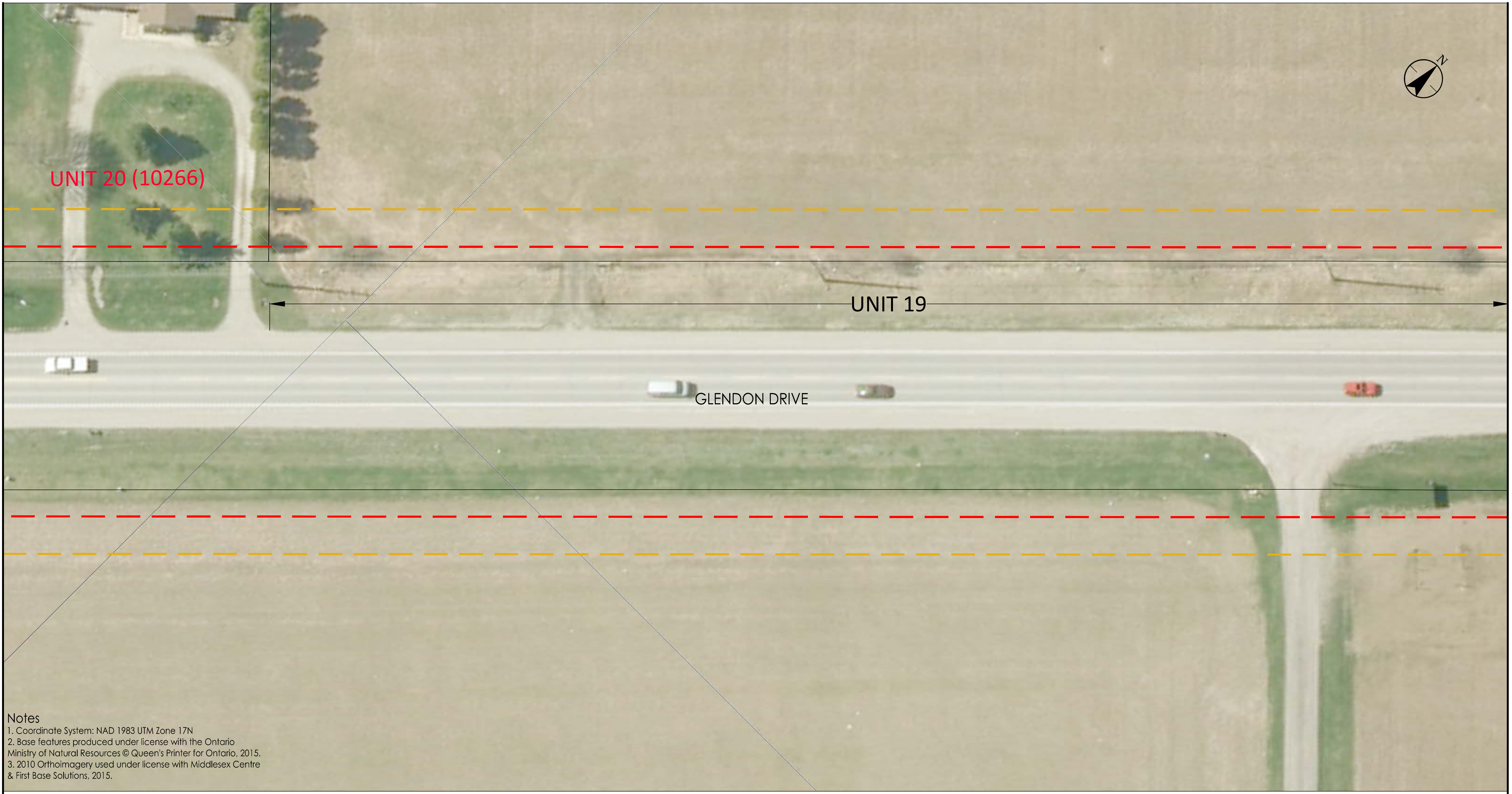
Middlesex Centre/Middlesex County

Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 26

Title

Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

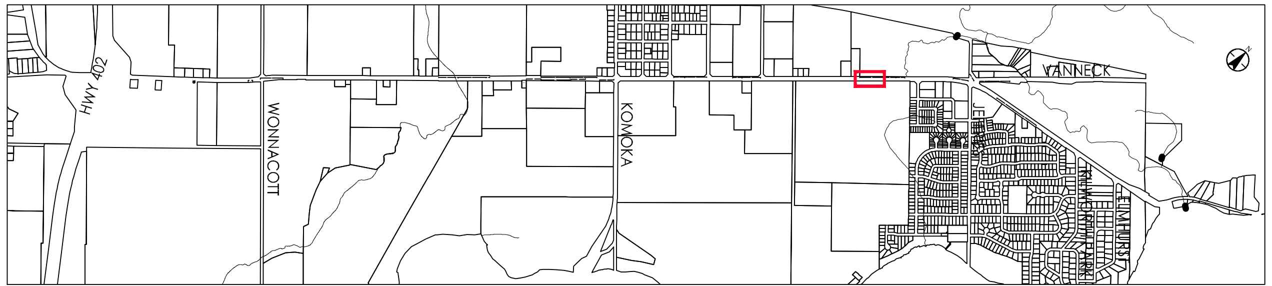
1:500 0 5 15 25m

October, 2015
161413164

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - -	Estimated Potential Ultimate ROW (36m)
- - - -	Tree Search Area (+5m)
——	Watercourse (permanent)
- - - -	Watercourse (intermittent)
- - - -	Municipal Boundary
UNIT #	Unit with High Preservation Priority
UNIT #	Unit with Medium or Low Preservation Priority



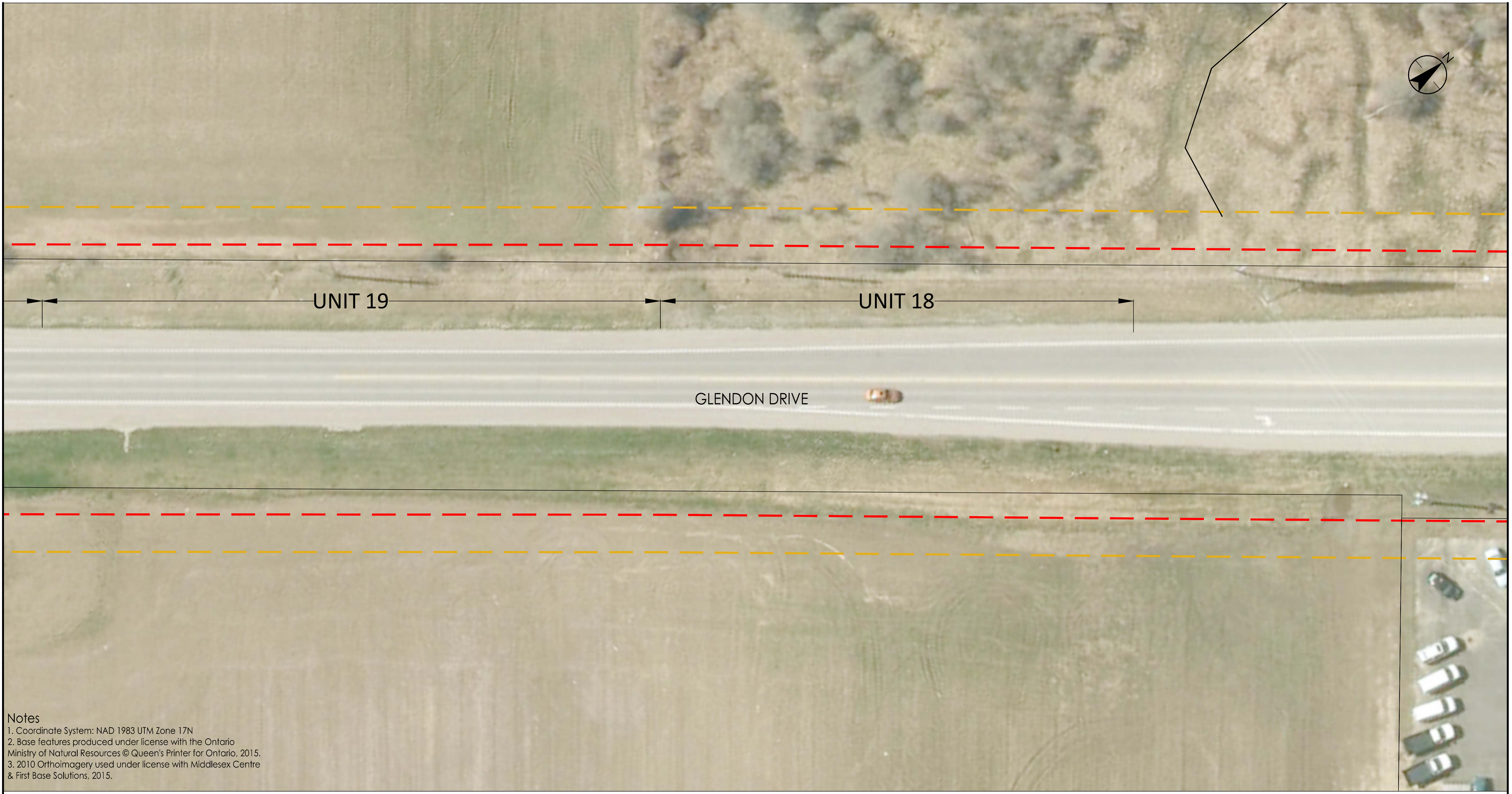
Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 27

Title
Tree Inventory Plan

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

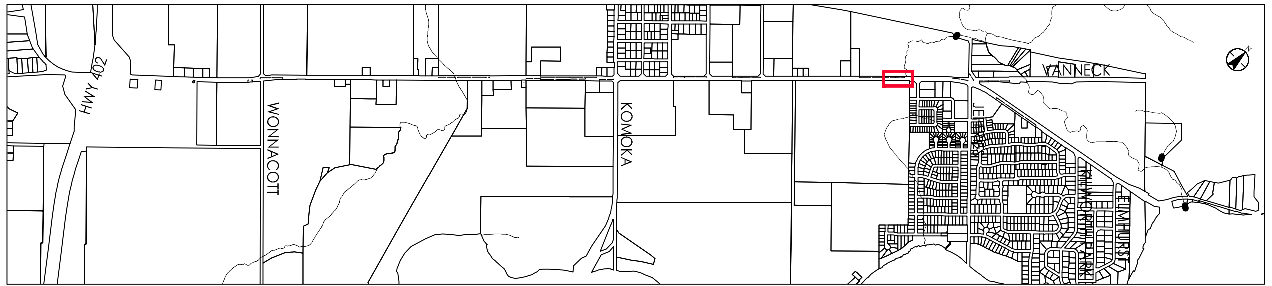
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

- ◆ Project Limits
- ▭ Property Line (c. 2009)
- - - - Estimated Potential Ultimate ROW (36m)
- - - - Tree Search Area (+5m)
- —— Watercourse (permanent)
- - - - Watercourse (intermittent)
- ▬▬▬ Municipal Boundary
- ├─UNIT #─┤ Unit with High Preservation Priority
- ├─UNIT #─┤ Unit with Medium or Low Preservation Priority



Key Plan

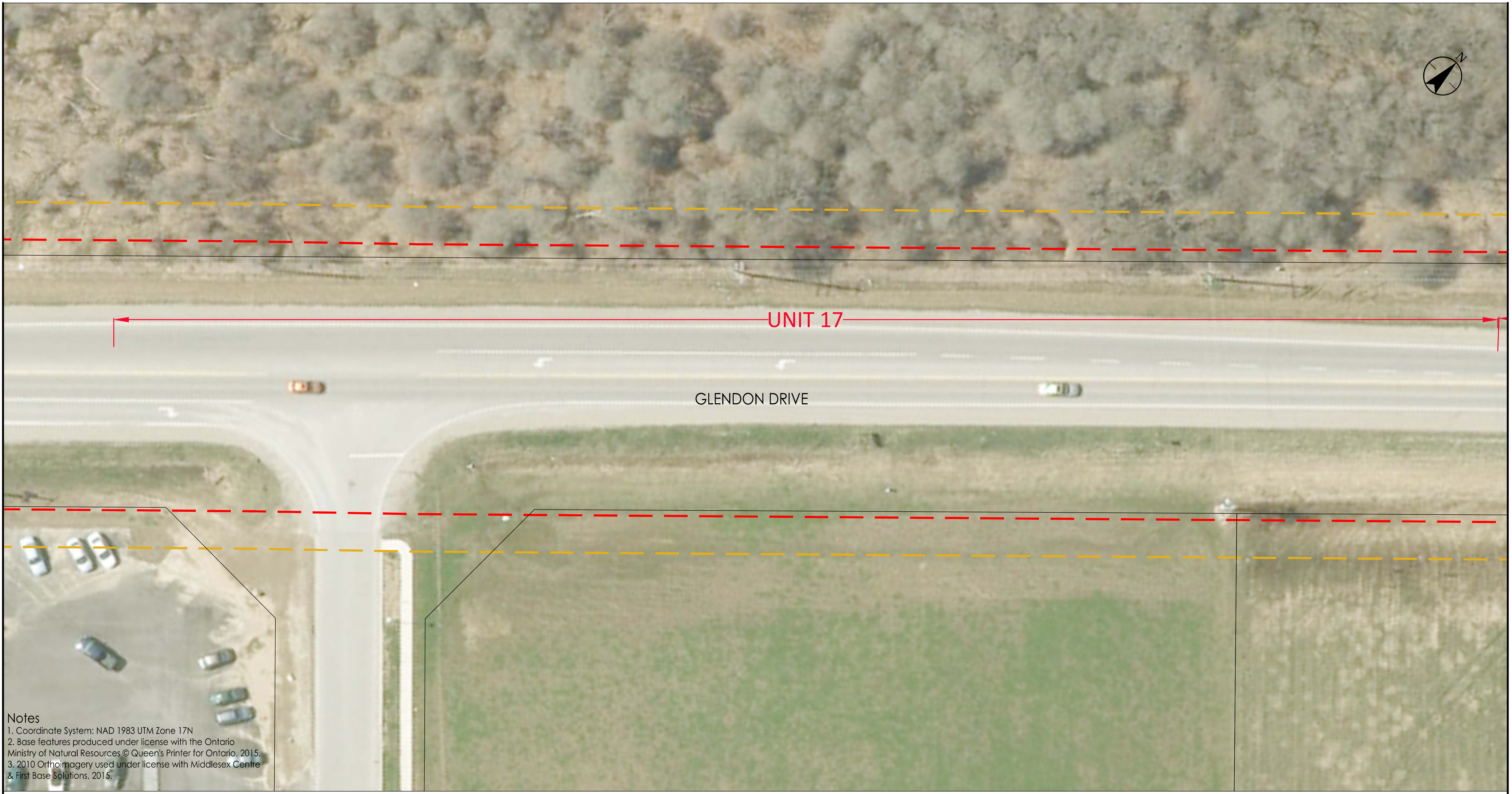
Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 28

Title

Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

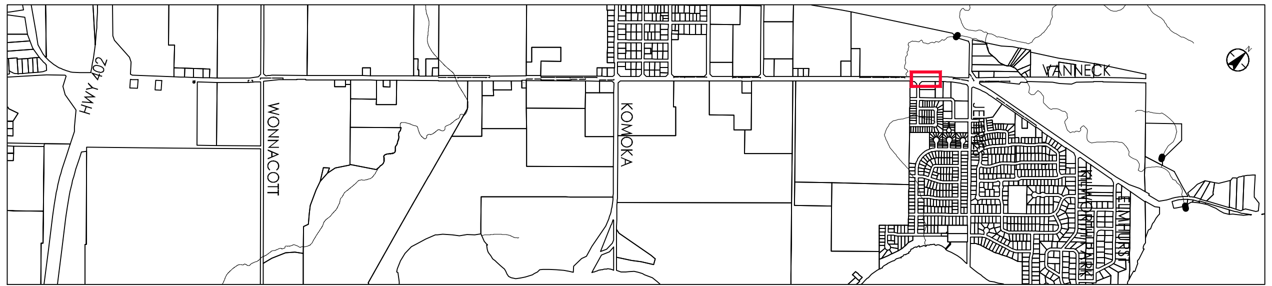
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - -	Estimated Potential Ultimate ROW (36m)
- - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - -	Watercourse (intermittent)
■■■■	Municipal Boundary
├─UNIT #─┤	Unit with High Preservation Priority
├─UNIT #─┤	Unit with Medium or Low Preservation Priority



Key Plan

Client/Project

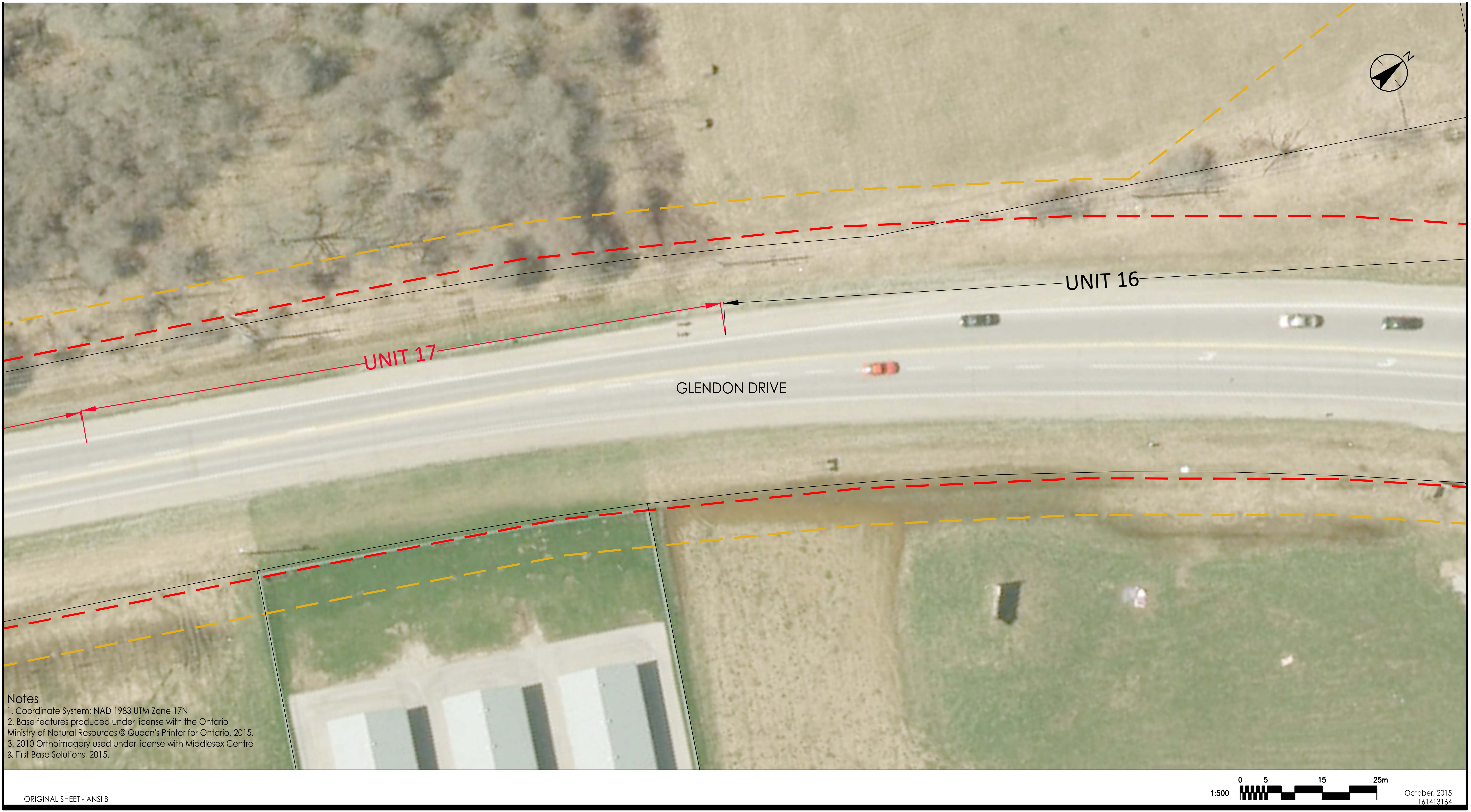
Middlesex Centre/Middlesex County

Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 29

Title

Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

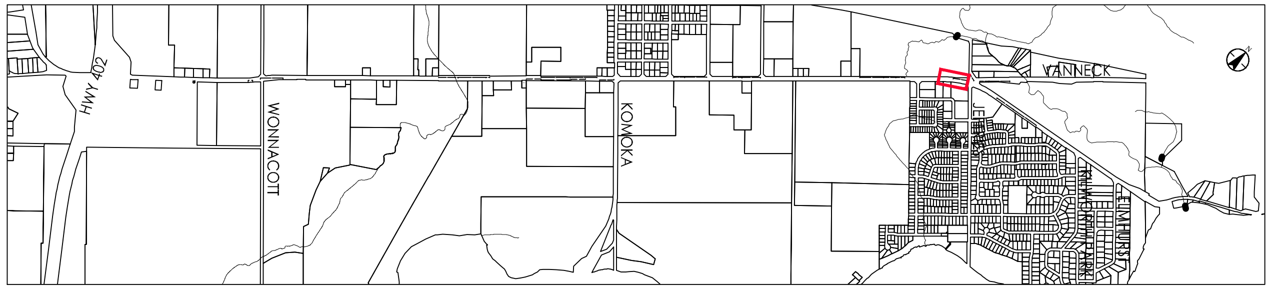
ORIGINAL SHEET - ANSI B

October, 2015
161413164

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
▬ ▬ ▬	Municipal Boundary
|←UNIT #→|	Unit with High Preservation Priority
|←UNIT #→|	Unit with Medium or Low Preservation Priority



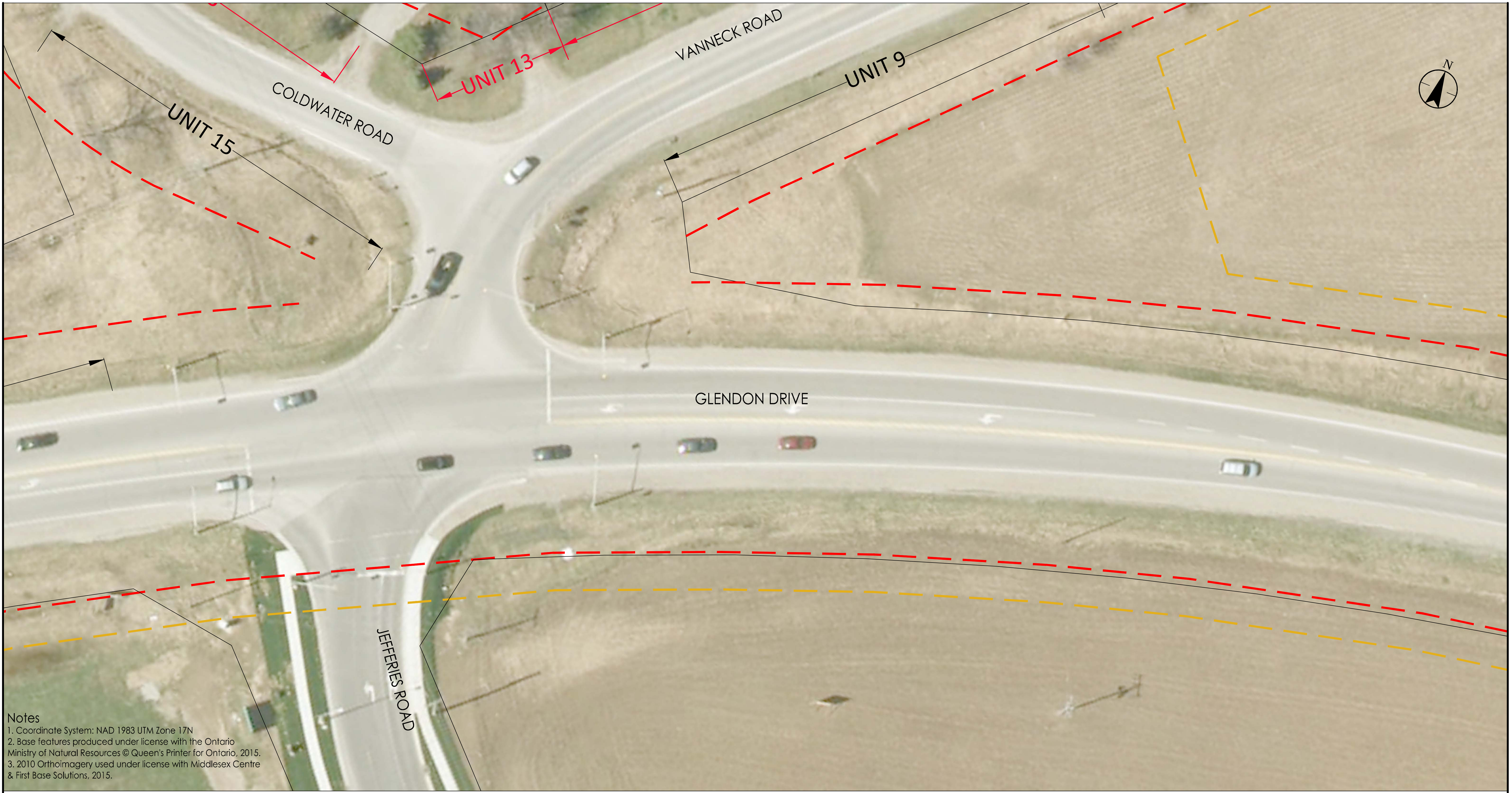
Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 30

Title
Tree Inventory Plan

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

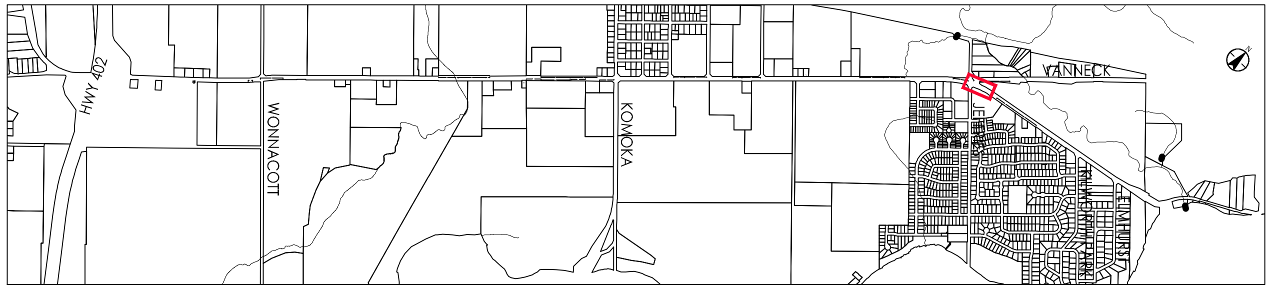
1:500 0 5 15 25m

October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Legend

◆	Project Limits
▭	Property Line (c. 2009)
┄	Estimated Potential Ultimate ROW (36m)
┄	Tree Search Area (+5m)
—	Watercourse (permanent)
┄	Watercourse (intermittent)
┅	Municipal Boundary
├UNIT #┤	Unit with High Preservation Priority
├UNIT #┤	Unit with Medium or Low Preservation Priority

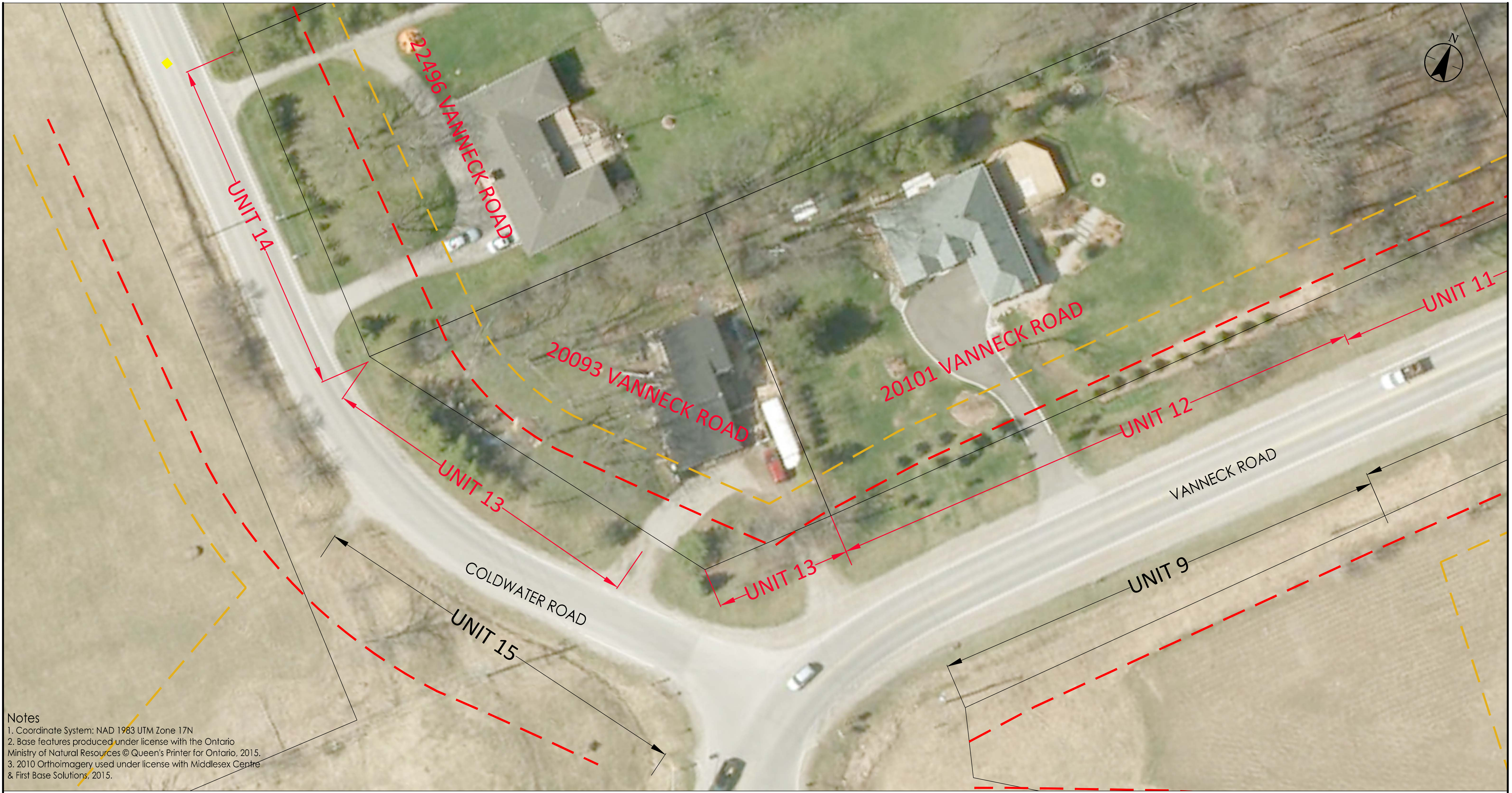


Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No.
31

Title
Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

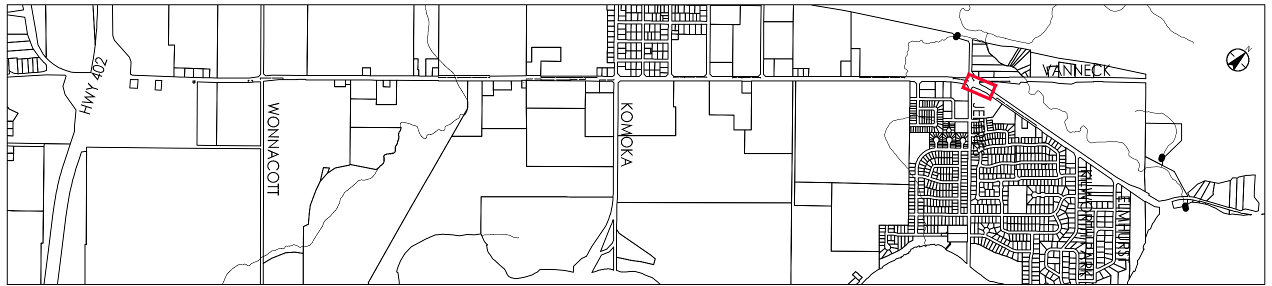
1:500 0 5 15 25m

October, 2015
161413164

Stantec

Legend

- ◆ Project Limits
- ▭ Property Line (c. 2009)
- - - - Estimated Potential Ultimate ROW (36m)
- - - - Tree Search Area (+5m)
- —— Watercourse (permanent)
- - - - Watercourse (intermittent)
- ---- Municipal Boundary
- |←UNIT #→| Unit with High Preservation Priority
- |←UNIT #→| Unit with Medium or Low Preservation Priority



Key Plan

Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 32

Title

Tree Inventory Plan

W:\161413164A\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

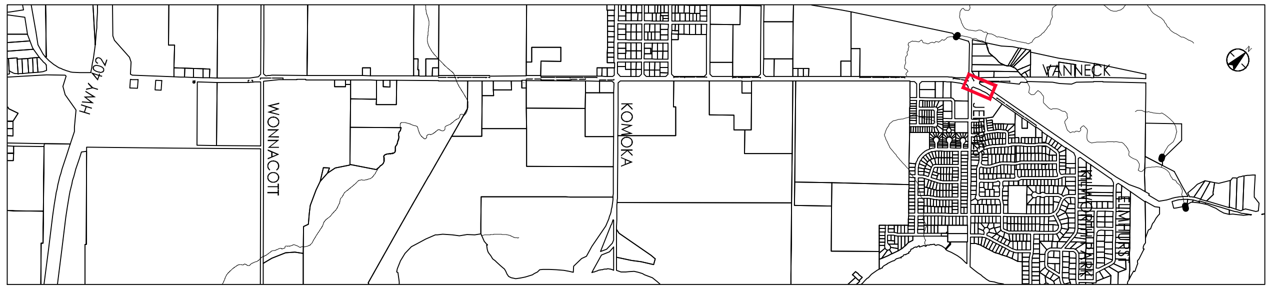
1:500 0 5 15 25m

October, 2015
161413164

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - -	Estimated Potential Ultimate ROW (36m)
- - -	Tree Search Area (+5m)
—	Watercourse (permanent)
- - -	Watercourse (intermittent)
-----	Municipal Boundary
├UNIT #┤	Unit with High Preservation Priority
├UNIT #┤	Unit with Medium or Low Preservation Priority



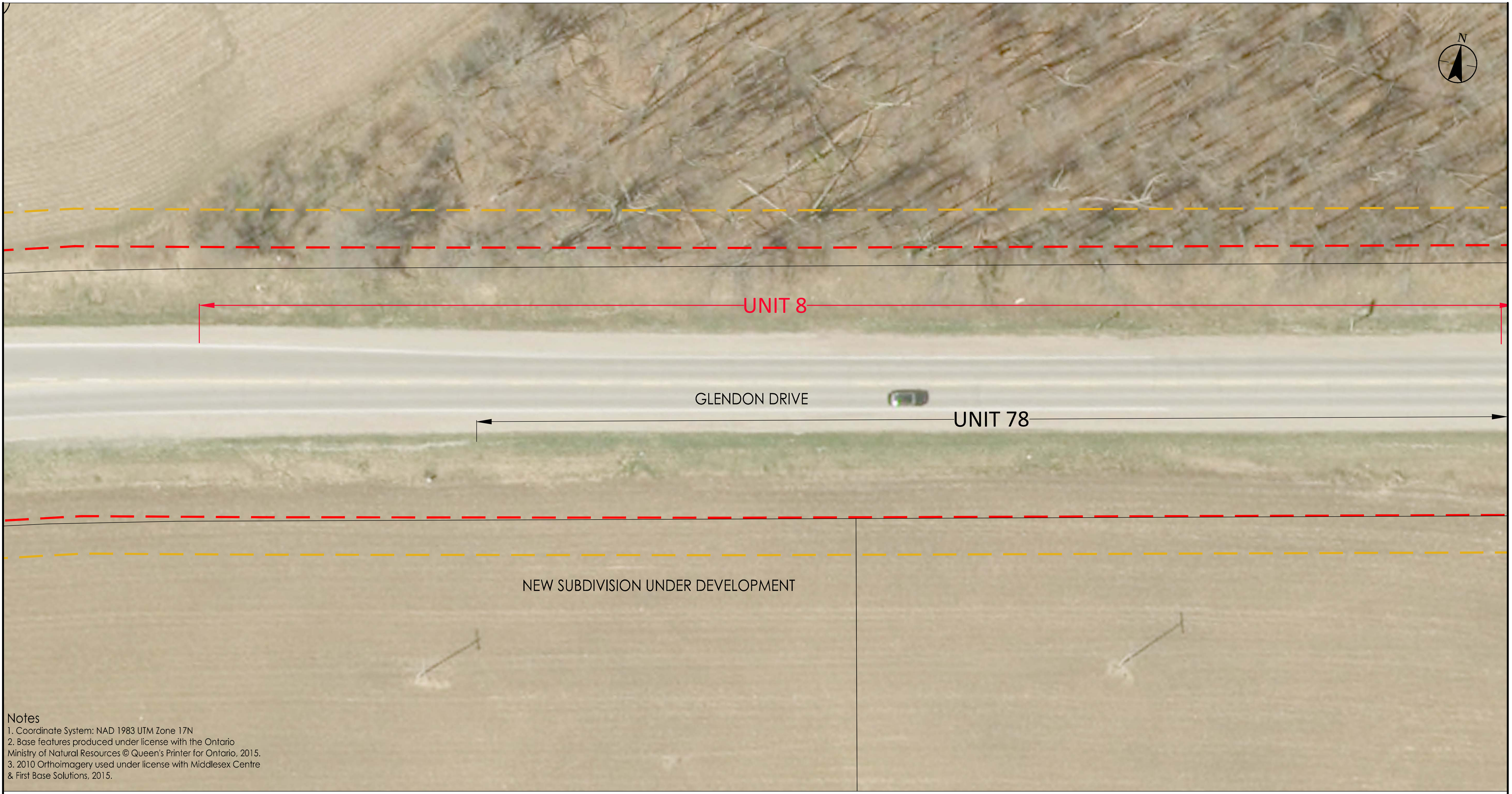
Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 33

Title
Tree Inventory Plan

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

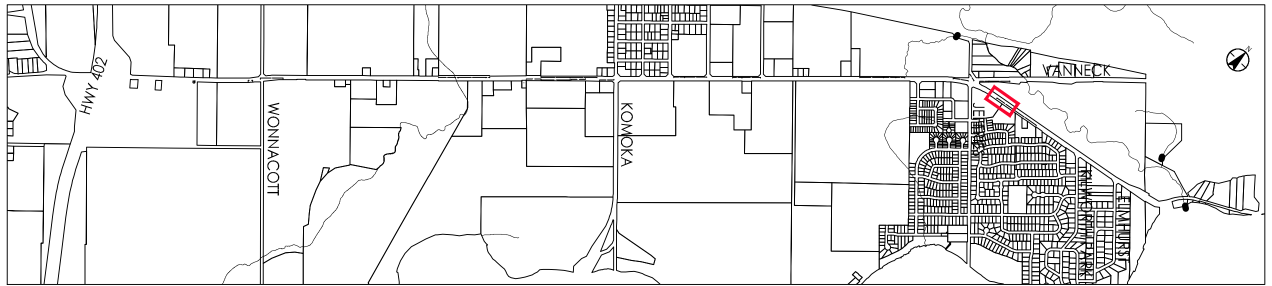
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - -	Estimated Potential Ultimate ROW (36m)
- - - -	Tree Search Area (+5m)
――	Watercourse (permanent)
- - - -	Watercourse (intermittent)
▬ ▬ ▬	Municipal Boundary
├─UNIT #─┤	Unit with High Preservation Priority
├─UNIT #─┤	Unit with Medium or Low Preservation Priority

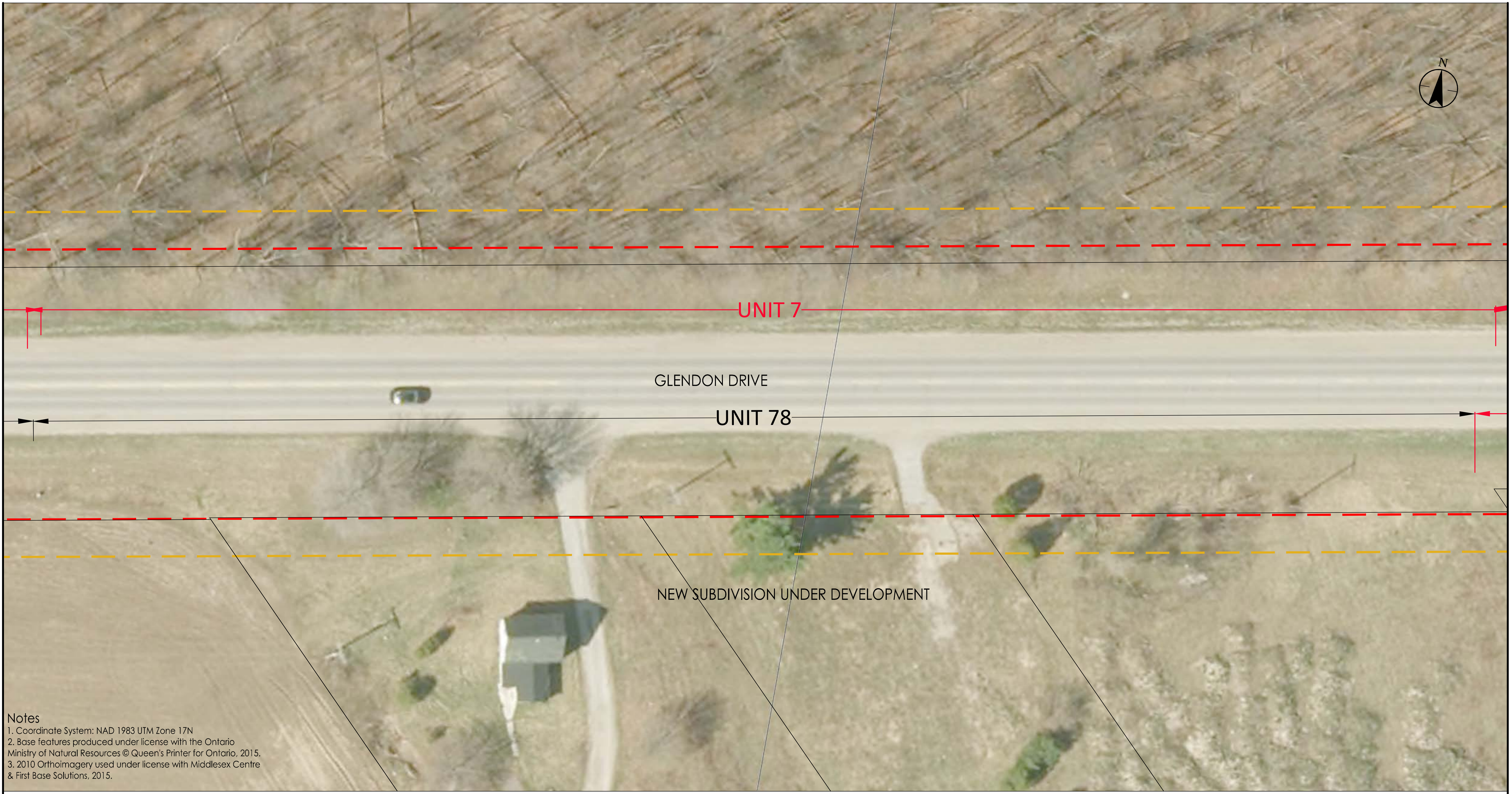


Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 34

Title
Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

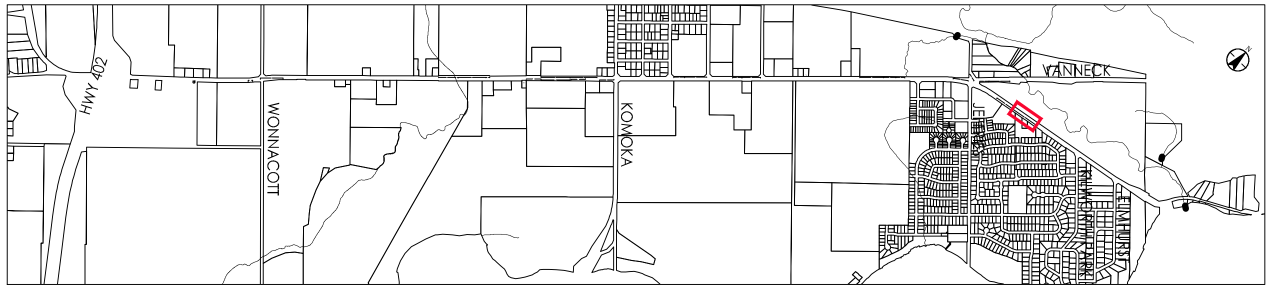
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆ Project Limits
▭ Property Line (c. 2009)
- - - Estimated Potential Ultimate ROW (36m)
- - - Tree Search Area (+5m)
— Watercourse (permanent)
- - - Watercourse (intermittent)
- - - Municipal Boundary
|←UNIT #→| Unit with High Preservation Priority
|←UNIT #→| Unit with Medium or Low Preservation Priority



Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 35

Title
Tree Inventory Plan

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

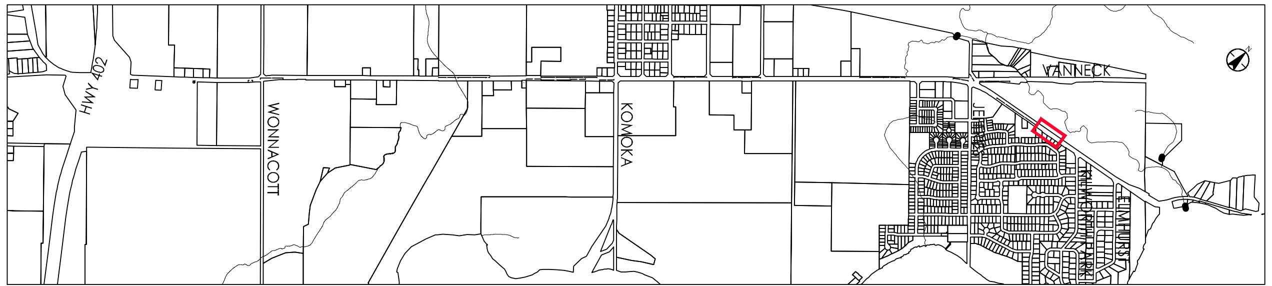
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - -	Estimated Potential Ultimate ROW (36m)
- - -	Tree Search Area (+5m)
—	Watercourse (permanent)
- - -	Watercourse (intermittent)
▬ ▬	Municipal Boundary
├UNIT #┤	Unit with High Preservation Priority
├UNIT #┤	Unit with Medium or Low Preservation Priority



Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 36

Title
Tree Inventory Plan

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

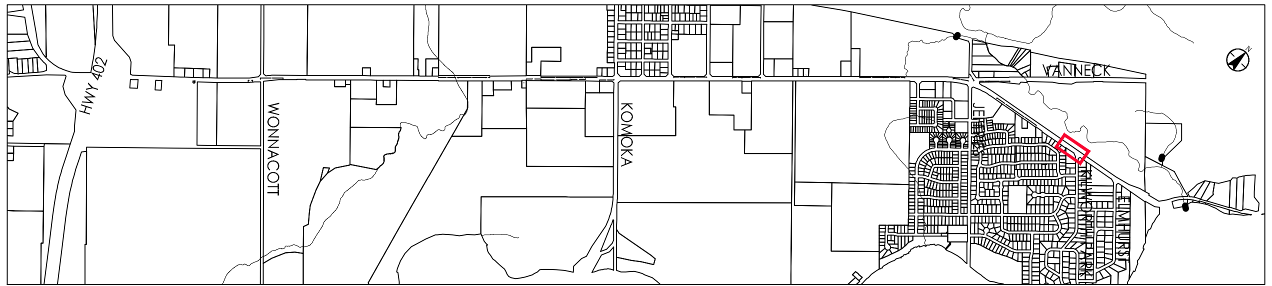
ORIGINAL SHEET - ANSI B

October, 2015
161413164

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
▬ ▬ ▬	Municipal Boundary
⊢UNIT #⊣	Unit with High Preservation Priority
⊢UNIT #⊣	Unit with Medium or Low Preservation Priority



Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 37

Title
Tree Inventory Plan

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

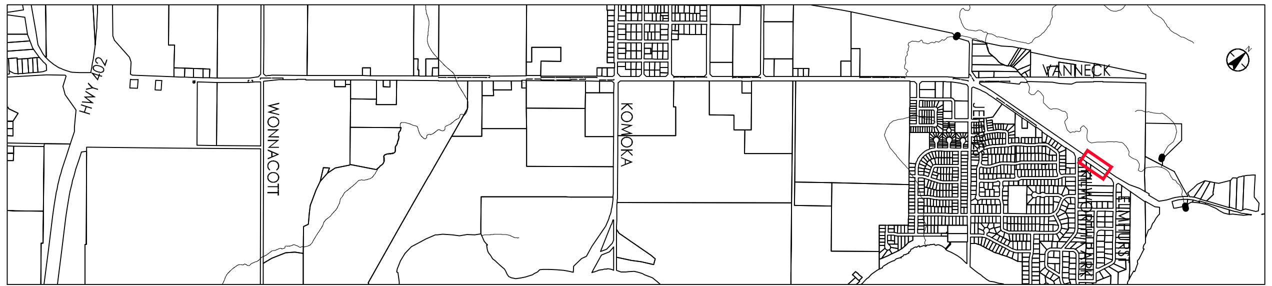
October, 2015
161413164

Stantec

Notes

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
■ ■ ■ ■	Municipal Boundary
⊢UNIT #⊣	Unit with High Preservation Priority
⊢UNIT #⊣	Unit with Medium or Low Preservation Priority



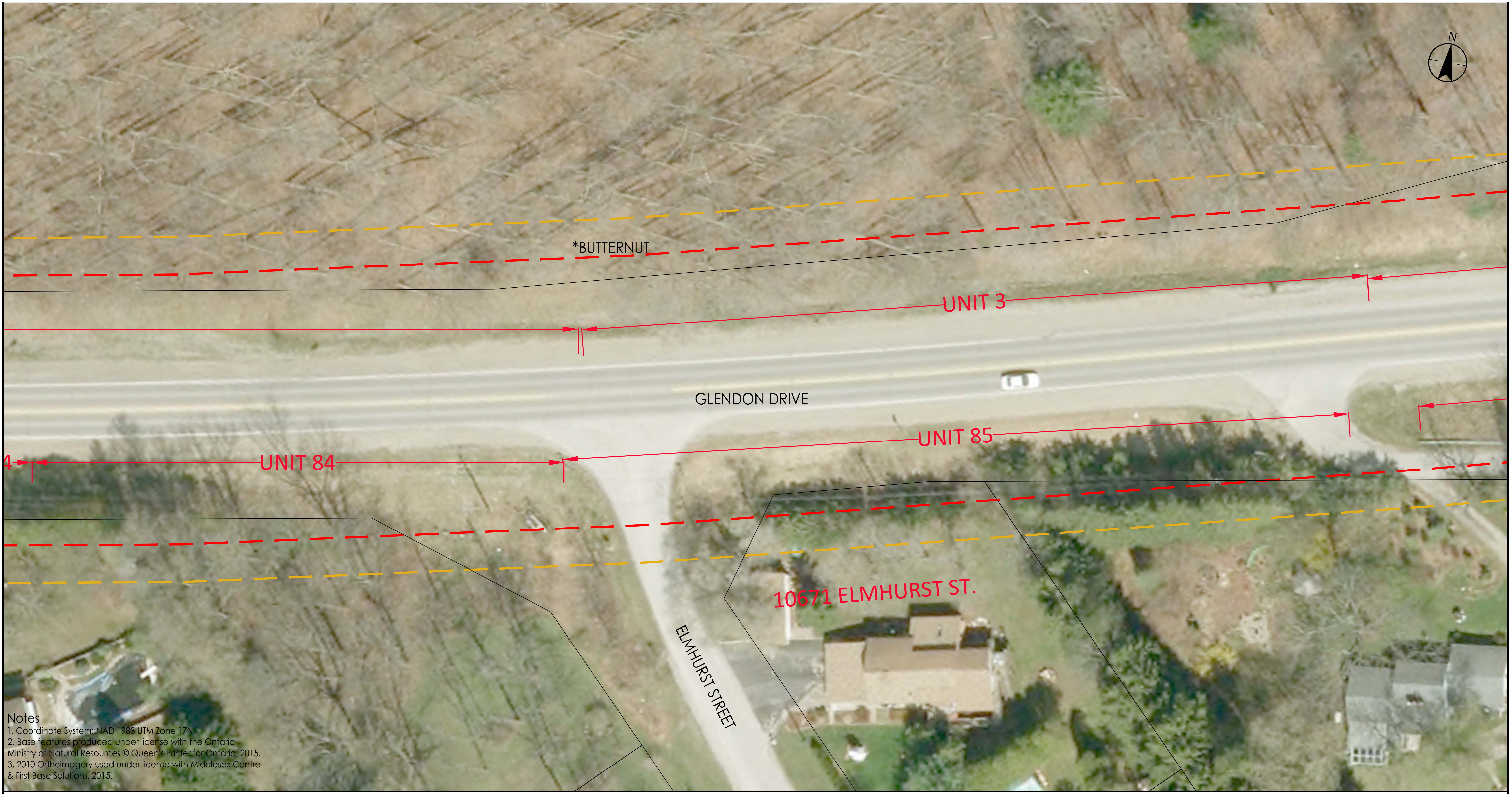
Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 38

Title
Tree Inventory Plan

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

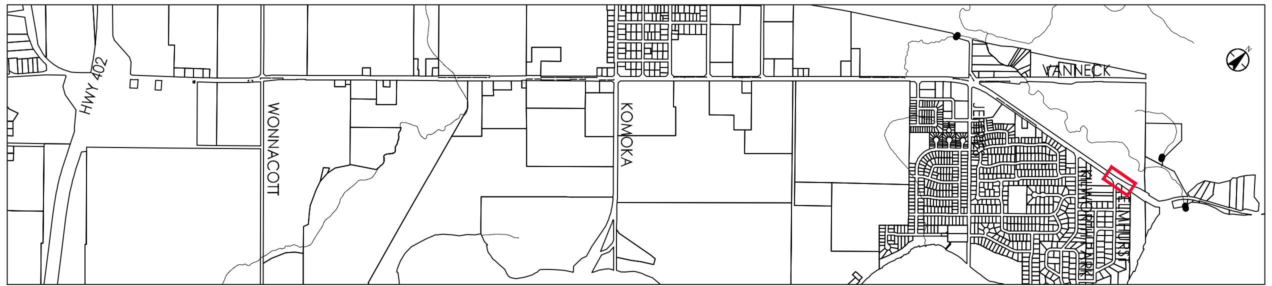
October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Stantec

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
▬ ▬ ▬	Municipal Boundary
├←UNIT #→┤	Unit with High Preservation Priority
├←UNIT #→┤	Unit with Medium or Low Preservation Priority

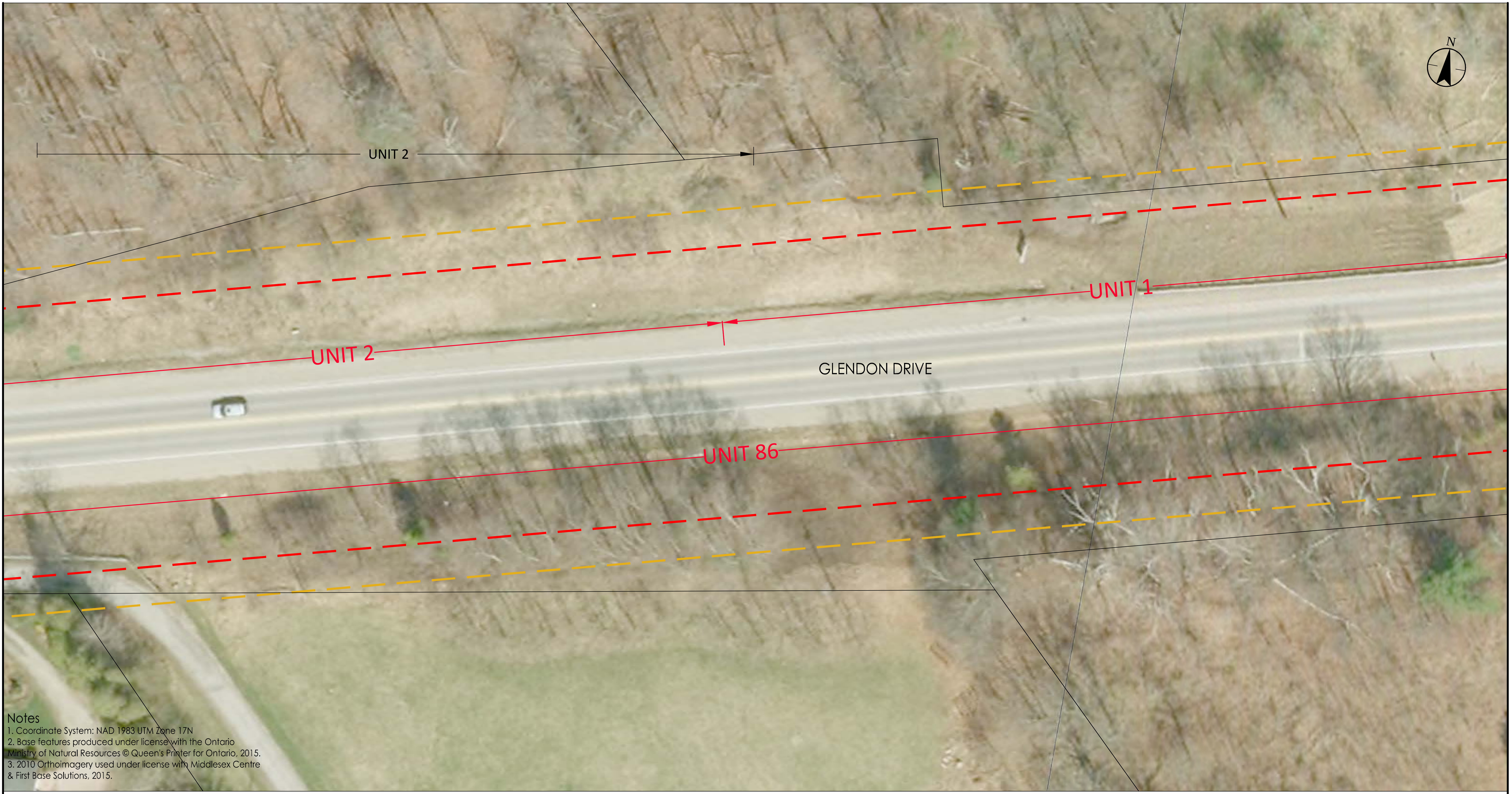


Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 39

Title
Tree Inventory Plan



Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

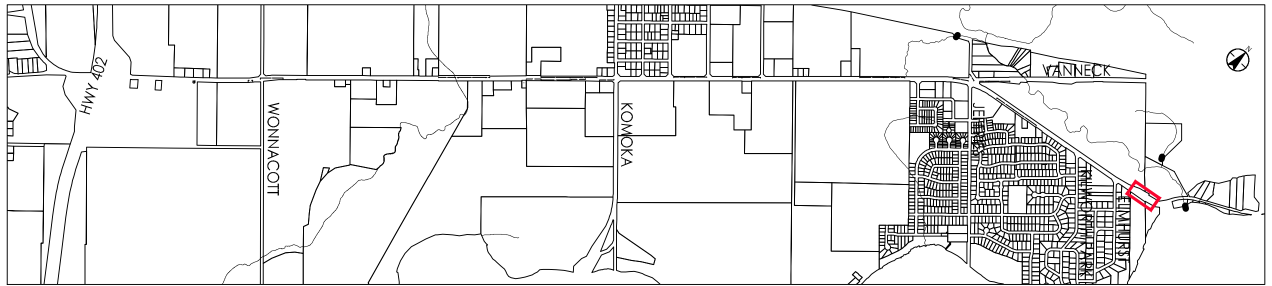
1:500 0 5 15 25m

October, 2015
161413164

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - - -	Estimated Potential Ultimate ROW (36m)
- - - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - - -	Watercourse (intermittent)
■■■■■	Municipal Boundary
⊢UNIT #⊣	Unit with High Preservation Priority
⊢UNIT #⊣	Unit with Medium or Low Preservation Priority



Key Plan

Client/Project
Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 40

Title
Tree Inventory Plan

Notes
1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2015.
3. 2010 Orthoimagery used under license with Middlesex Centre & First Base Solutions, 2015.

ORIGINAL SHEET - ANSI B

1:500 0 5 15 25m

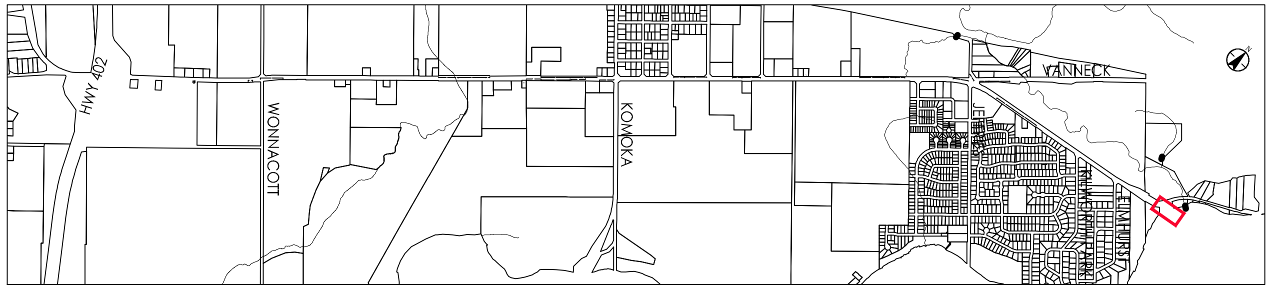
October, 2015
161413164

Stantec

Notes

Legend

◆	Project Limits
▭	Property Line (c. 2009)
- - - -	Estimated Potential Ultimate ROW (36m)
- - - -	Tree Search Area (+5m)
———	Watercourse (permanent)
- - - -	Watercourse (intermittent)
■■■■	Municipal Boundary
├─UNIT #─┤	Unit with High Preservation Priority
├─UNIT #─┤	Unit with Medium or Low Preservation Priority



Key Plan

Client/Project

Middlesex Centre/Middlesex County
Glendon Drive Streetscape Improvements
Master Plan Municipal Class EA

Figure No. 41

Title

Tree Inventory Plan

W:\161413164\design\drawing\GIS\CAD\161413164_TreeInventory.DWG

APPENDIX E: TRAFFIC ANALYSIS

Stantec

Memo

To: Corri Marr
London ON Office

From: Adrian Soo
Garry Pappin
Markham, ON

File: 161413164

Date: October 30, 2015

Reference: Glendon Drive Master Plan EA – Transportation Technical Memo

1.0 INTRODUCTION

1.1 Background

Glendon Drive (County Road 14) is an east-west arterial road that provides connectivity between the local communities of Komoka and Kilworth, a main commuter route to the City of London to the east and to the Highway 402 interchange to the west, and a through traffic route for intra-County traffic. With the anticipated pace of new development, travel demand pressures within the corridor are apparent. As the local communities develop, it will be important to make improvements to Glendon Drive that will maintain its arterial road function and provide sufficient road capacity, while safely and efficiently accommodating active transportation modes.

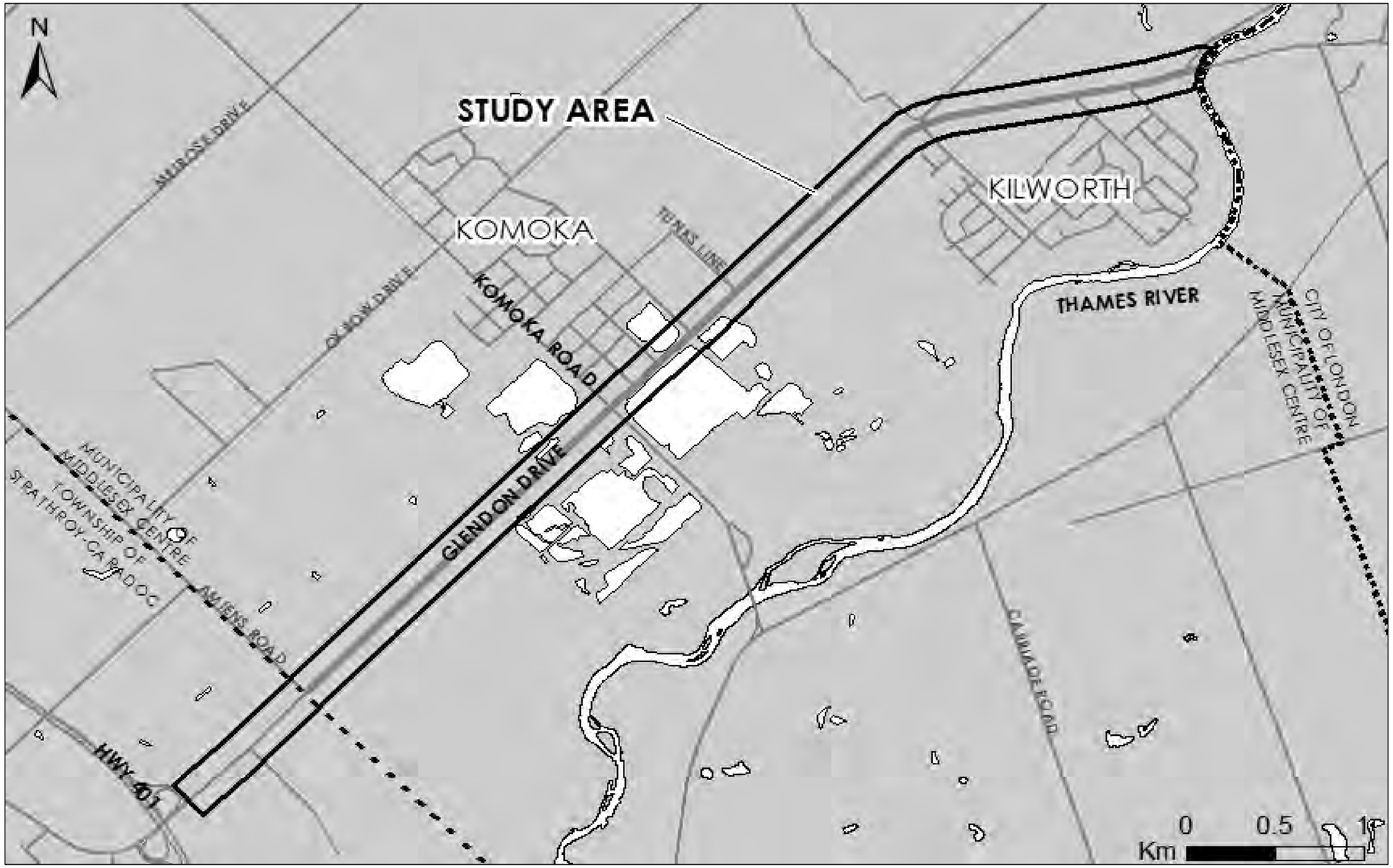
Within the Schedule C Class Environmental Assessment (Class EA) planning and design process, transportation conditions have been examined for existing and future time frames to assist in determining the need and justification for improvements to the subject Glendon Drive corridor, and to assist in evaluating and selecting improvement alternatives.

1.2 Purpose and Scope

Stantec Consulting Ltd. was retained by the County of Middlesex and Middlesex Centre to undertake a Master Plan Class Environmental Assessment. The Study Area includes Glendon Drive from the City of London Western City Limits westerly to east of the Highway 402 interchange. The Study Area is illustrated in **Figure 1**.

The objectives of the Study from a transportation perspective are as follows:

- Summarize and review background reports, and identify information that is relevant to Glendon Drive transportation requirements;
- Develop an understanding of the operation of the existing transportation facilities within the corridor;
- Identify existing and future operational and safety deficiencies/opportunities; and
- Identify shorter and longer term operational and safety improvements for Glendon Drive within the Study Area.



N

N.T.S.

Figure 1
Study Area

2.0 BACKGROUND REPORTS

The following background reports have been reviewed, and the key points applicable to this Study are summarized below:

Official Plan of the Municipality of Middlesex Centre, Municipality of Middlesex Centre (June 2014)

- General transportation goals of the Middlesex Centre Official Plan include consideration of bicycle and pedestrian transportation options within, and between Municipal settlement areas, the promotion of development that will support pedestrian access and circulation, and the establishment of a Municipal wide trail system (Section 9.4.1).
- Municipal design policies are intended to preserve the "village-scapes" in settlement areas. Middlesex Centre Urban Design Guidelines are intended to supplement the policies in this section. Design policies for streetscapes and the public realm (Section 6.4) include streetscaping that reflects the character of settlement areas; on-street parking is permitted where appropriate; and a network of public open spaces integrated into neighbourhoods.
- OPA 29 (2013) policies for the Special Policy areas #22-25 are directed toward creating a unique and sustainable town centre that recognizes the evolution of Glendon Drive to a main street and as such promotes safe passage of pedestrians and cyclists.

County of Middlesex Official Plan, Middlesex County (August 2006)

- County Transportation policies recognize that there is a strong relationship between transportation and urban form. These policies respond to regional priorities to maintain a high service level for motor vehicles on County Roads by discouraging development that may inhibit traffic movement along the County road system; and controlling access on high volume arterial roads. (Section 2.4.2).
- Safe, convenient and attractive pedestrian facilities are encouraged in Settlement Areas (Section 2.4.2.2).
- The Plan designates the portion of Glendon Drive in the study area as a four-lane arterial road (Schedule B). Minimum Right-Of-Way widths for arterial roads are 36 m and 30 m within settlement areas. Settlement Areas in the study area are conceptually identified on Schedule A as points at the town centres of Komoka (north of Glendon Drive) and Kilworth (at Glendon Drive).

Municipality of Middlesex Centre Official Plan Amendment No. 28; Comprehensive Review & Secondary Plan; File No. 39-MC-OPA28 – Middlesex Centre Manager of Planning (April 2012)

- Official Plan Amendment No. 28 identifies objectives for growth and development, particularly for the Komoka-Kilworth Secondary Plan area. This includes a safe, connected, and multi-modal transportation network that supports a variety of transportation options and land uses, including a network of multi-use trails.

- Lands designated as the "Village Centre" include a section of Glendon Drive that is approximately 625m from Tunks Lane to a location further east (Schedule A-2). The plan envisions a traditional main street along Glendon Drive in the Village Centre area such that any future development should be mixed-use and should consider an urban road cross section that includes pedestrian-oriented streetscapes, off-street cycling facilities, wide sidewalks, street lighting, trees, furniture, on-street parking, bicycle parking and well defined pedestrian crossing locations (Section 5.7.3).

- Multi-use trails are considered an integral part of the transportation system with variations to trail location permitted provided the intent of the Plan is maintained. The Plan identifies a trail along Glendon Drive between Komoka Road and Queen Street. Multi-use trails are also shown intersecting with Glendon Drive at a location west of Komoka Road; along a new collector road extending north from Crestview Drive, and at Jeffries Road. The intersections of Jefferies Road and Komoka Road are identified as Community Gateways (Schedule A-2).

Middlesex Centre Official Plan Amendment No. 29; File No. 39T-MC-OPA29; Wellness and Recreation Centre Area – Middlesex Centre Manager of Planning (June 2013)

- Official Plan Amendment No.29 re-designates the Komoka-Kilworth town centre to the location of the Special Policy Areas 22-25 which includes the Wellness and Recreation Centre Area. In addition to the Village Centre designation, this area includes permitted medium density residential uses and parks and recreation uses.

Roundabout Feasibility Study, Glendon Drive and Vanneck Road/Jefferies Road – GHD Inc. (November 2014)

- Study conclusions and recommendations indicate that a roundabout is not feasible at this location due to the prohibitive costs of additional property required for construction. Study conclusions also list disadvantages of a roundabout at this location including higher construction costs, larger intersection footprint, and issues with pedestrian and cyclist comfort and perceptions of safety.

- It is recommended that the County continue to look for potential locations for roundabouts where:

    - Traffic signals are not warranted but where stop signs result in unacceptable delays for minor road traffic;

    - At intersections with a high proportion of left-turning vehicles, or where the main traffic route turns;

    - Offset intersections or intersections with unusual geometry;

    - Locations with high-speed right-angle and head-on collision history;

    - Locations where there is a priority for gateway treatments, landscaping or other aesthetic improvements.

10293 Glendon Drive, Kilworth, ON – Traffic Impact Study – Stantec Consulting Ltd. (March 2015)

- This study identified the future need for two new signalized intersections along Glendon Drive with auxiliary turn lanes as well as highlighting the future need to consider improvements at the Glendon Drive/Jefferies Road-Vanneck Road intersection.

Segway Residential Development, Kilworth – Traffic Impact Study –F.R. Berry Associates (July 2009)

- This study was done in support of proposed development on lands immediately south of the 10293 Glendon Drive site. The traffic impact associated with this development was addressed within the appropriate context at the time it was prepared, but was subsequently updated as part of the 10293 Glendon Drive Traffic Impact Study noted above.

A Municipal Centre for Middlesex Centre, Ontario – Avi Friedman Consultants Inc. (October 2011)

- This study proposes a Plan for a mixed-use town centre to complement the Wellness Centre recreation complex and develop a Village Centre for Komoka-Kilworth. The Plan includes a public park and medium density residential uses surrounding the Wellness Centre. Design principles include sustainability, walkability, and a strong local identity.

- Traffic calming measure are proposed for Glendon Drive in the vicinity of the municipal centre including landscaping, textured paving at intersections, sidewalk “projections”, signalized intersections, and bicycle paths.

Municipality of Middlesex Centre, Community Services Master Plan – Monteith & Brown Planning Consultants (May 2012)

- Master Plan household survey found that Walking and Cycling are a priority recreational activity in Middlesex Centre with 85% of respondents walking and hiking for leisure. 44% of respondents also participated in cycling and mountain biking. These activities ranked as the first and third most popular activity respectively. When asked to rank the importance and level of satisfaction with municipal trails and pathways, 81% of respondents indicated that trails were ‘important’ or ‘very important’ while the level of satisfaction was considerably lower (51%). This suggests that residents’ expectations are not being met.

- The Master Plan includes a parks and trails assessment with a number of recommendations relevant to the study area. These include:
    - Identifying trail development, pedestrian crossings, and connectivity opportunities through the planning approvals process;
    - Incremental development of a recreational and active transportation trail system throughout Komoka-Kilworth;
    - development of a regionally integrated trail system in cooperation with neighbouring municipalities.
- The Plan recommends a trail for pedestrian and bicycle use along Glendon Drive between Komoka Rd and Queen St. providing access to the Wellness Centre. The Plan cites OPA 28 to support these recommended improvements.

Municipality of Middlesex Centre, Trails Master Plan – Monteith & Brown Planning Consultants (April 2014)

- The goal of the recommended trail network is to connect settlement areas and key destinations. The Plan includes trails (primary, secondary, tertiary), sidewalks, bicycle routes and amenities – secondary trails may include adjacent sidewalks and are intended to connect users with primary and tertiary trails and for recreational and utilitarian uses.

- Glendon Drive corridor is identified as a proposed secondary trail between the Thames River bridge and approximately 500m east of Amiens Rd); and as a potential cycling route between the Thames River bridge and Komoka Road. Komoka Road is also identified a proposed cycling route.

- Glendon Drive is an important connector to the proposed trail network with 8 connections identified along the corridor to proposed secondary trails.

- Completion of the trails network is identified as a long-term objective

County of Middlesex, Employment Land Needs Study – Millier Dickinson Blais, Watson & Associates Economists Ltd. (April 2012)

- High level population forecast (housing forecast model -2011-2031) identifies an increase in population in the County from 73,000 in 2011 to 85,950 in 2031 or 0.8% annually

County of Middlesex, Economic Development Strategic Plan – Millier Dickinson Blais (January 2014)

- A lack of transportation options other than private auto (public transit) was consistently identified in stakeholder consultation as a challenge to economic development.

County of Middlesex Tourism Signage Strategy

- “Grassroutes” wayfinding signage has been implemented along Glendon Drive between Komoka and Highway 402 to promote this route as one of a series of driving routes intended to promote tourism activity. The routes are intended to provide the highest concentration of local tourism products and attractions.

County of Middlesex, Population Project 2001 – 2026, County of Middlesex (November 2003)

- This report provides a County population forecast for 2026 that represents an annual growth rate of 0.2%, which results in an overall projected increase in population between 2001 and 2026 of 5%.

Middlesex Centre, 2012 – 2017 Strategic Plan, Middlesex Centre (2012)

- Investment in the expansion of the Middlesex Centre trail system is recommended over the medium term to support economic development through development of tourism potential in the area.

Municipality of Middlesex Centre Settlement Area Urban Design Guidelines, Zelinka Priamo Limited

- The Guidelines are intended to assist with the development of Urban Settlement Areas and are primarily focused on private property. Streetscape recommendations for Gateway streets include improvements to the quality of the pedestrian realm through the provision of street trees (boulevard and median).

Middlesex County Trails Guide, Middlesex on the Move

- Promotional campaign literature funded by the Ontario government to encourage physical activity and health living, including the promotion of local trails.
- Trails in close proximity to the study area include Komoka Provincial Park trails and the Thames River Trail, south of the Glendon Drive corridor.

3.0 STUDY AREA CHARACTERISTICS – EXISTING CONDITIONS

3.1 Land Use

The adjacent existing land uses within the Study Area limits are predominantly residential development to the east, agricultural land to the north and west, and a gravel pit to the south.

3.2 Road Network

The characteristics of the roads and intersections in the vicinity of the subject Study Area limits are described below. Reference was made to the County Maps from the Middlesex County website and the Municipality of Middlesex Centre Official Plan.

Glendon Drive (County Road 14) is an east-west two lane undivided arterial and links the communities of Komoka and Kilworth to the City of London. It has white edge of pavement markings, variable yellow centerline markings ranging from double solid to disallow passing, dashed and solid to allow passing in one direction, and dashed to allow passing in either direction. Along Glendon Drive within the Study Area the maximum posted speed limited transitions from 80 km/h to 70 km/h to 50 km/h. The 50 km/h maximum speed zone covers from just west of Komoka Road easterly to just west of Queen Street N. The 70 km/h maximum speed zone extends from just west of Queen Street N easterly to a point located approximately 350 metres east of Queen Street S. The 80 km/h maximum posted speed limit covers the areas east of the 70 km/h zone and west of Komoka Road.

The following roads intersect with Glendon Drive within our Study Area as described below:

- Amiens Road is a north-south two lane local road. There are no posted speed limit signs within vicinity to Glendon Drive, and therefore, the statutory 50 km/h limit applies. It forms an unsignalized T-intersection with Glendon Drive, with stop control on the Amiens Road southbound approach. No auxiliary turn lanes are provided on Glendon Drive, but it is noted that in the westbound direction there is a slight right turn taper provided;

- Komoka Road (County Road 16) is a north-south collector road as classified by the Middlesex County Official Plan. It has a posted speed limit of 50 km/h. A signalized intersection is formed with Glendon Drive, with auxiliary left turn lanes provided on all approaches. An auxiliary right turn lane is provided on the westbound approach. While there are pedestrian crossing signal heads at this intersection, there are no crosswalk lines;

- Queen Street N is a north-south local road with a posted speed limit of 40 km/h. An unsignalized T-intersection is formed with Glendon Drive, and the Queen Street approach operates under stop control. Auxiliary turn lanes are not provided on Glendon Drive, though a westbound right turn taper is provided;

- Tunks Lane is north-south local road. Tunks Lane provides access to the Komoka Community Centre and Wellness & Recreation Complex. The section of Tunks Lane fronting the Complex expands to a three lane cross section with one travel lane in each direction, in addition to a continuous two-way centre left-turn lane. There are no posted speed limit signs within the vicinity of Glendon Drive, and therefore, the statutory 50 km/h limit applies. An unsignalized T-intersection is formed with Glendon Drive, and the Tunks Lane approach operates under stop control. Auxiliary left and right turn lanes are provided on Glendon Drive;

- Springfield Way is a north-south two lane local road. There are no posted speed limit signs, and therefore, the statutory 50 km/h limit applies. This road provides access to a small residential and commercial area. An unsignalized T-intersection is formed with Glendon Drive, and the Springfield Way approach operates under stop control. Auxiliary left and right turn lanes are provided on Glendon Drive;

- Jefferies Road-Vanneck Road (County Road 38) is a north-south two lane road that intersects with Glendon Drive (Vanneck Road as the north leg and Jefferies Road as the south leg). Approximately 25 m north of Glendon Drive, Vanneck Road shifts to an east-west alignment and is intersected by Coldstream Road, with the latter road running north-south. Vanneck Road is classified as a rural arterial road and has a posted 80 km/h speed limit. Jefferies Road provides a collector road function for the residential area south of Glendon Drive, and is designed as a collector road according to the Middlesex Centre standards. The classification of this road in the Middlesex Official Plan, however, does not indicate it to be a collector (by default it would have a local street classification). There is no posted speed limit, and therefore, the statutory 50 km/h limit applies. The intersection with Glendon Drive is signalized, and auxiliary left turn lanes are provided on the eastbound, westbound, and northbound approaches;

- Kilworth Park Drive is a north-south two lane local road. There are no posted speed limit signs, and therefore, the statutory 50 km/h limit applies. The road has an urban cross-section with curb and gutter. This road provides access to residential and commercial areas. An unsignalized T-intersection is formed with Glendon Drive, and the Kilworth Park Drive approach operates under stop control. Auxiliary left and right turn lanes are provided on Glendon Drive; and

- Old River Road is a two-lane north-south local road. There are no posted speed limit signs within the vicinity of Glendon Drive, and therefore, the statutory 50 km/h limit applies. An unsignalized T-intersection is formed with Glendon Drive, and the Old River Road approach operates under stop control. It should be noted that eastbound left turn movements from Glendon Drive to Old River Road are prohibited by signage. No auxiliary turn lanes on Old River Road or Glendon Drive are provided.

3.3 Public Transit

Currently, there is no public transit service serving the communities of Komoka and Kilworth. School buses were observed to be operating along the corridor.

The background report, "*A Municipal Centre for Middlesex Centre*" (Avi Friedman Consultants Inc.), concluded that, "Public transportation systems need to be introduced into the area to connect the Wellness Centre with other communities as well as with London". The report also notes the need to support transit investments and reduce public health risks by encouraging cycling and walking.

3.4 Active Transportation

Active transportation conditions along the Glendon Drive corridor were observed during a driving and walking site visit on Wednesday, September 30, 2015.

3.4.1 Summary

There was no pedestrian activity and very light bicycle activity observed on Glendon Drive. Cyclists were observed riding on the roadway and crossing correctly at signalized intersections. Moderate to low volumes of motor vehicle traffic were observed along Glendon Drive. As previously noted, the posted speed limit is 80 km/h except for two locations in the Komoka area: west of Komoka Rd to Queen Street (50 km/h); and between Queen Street and a point east of Tunks Lane (70 km/h). Despite these changes in the posted speed limit, visual and environmental cues such as lane widths and development along the corridor are not dramatically different in these areas and motor vehicles were observed to maintain relatively consistent speeds of approximately 80 km/h or more.

3.4.2 General Observations

Weather:

- Conditions were clear and sunny, little to no wind, 18 degrees Celsius.

3.4.3 Pedestrian Facilities

Sidewalks:

Throughout the Study Area there are no pedestrian facilities currently in place along Glendon Drive. Gravel shoulders are present along the corridor. Cross streets approaching Glendon Drive that have sidewalks include Komoka Road (1.45m wide and 1.7m wide at the intersection, north of Glendon Drive on the east side only); Springfield Way (1.5m wide, south of Glendon Drive on the east side only); and Jefferies Road (1.5m wide, south of Glendon Drive, both sides).

Photo 1 shows a typical cross section between Tunks Lane and Queen Street near the Komoka Wellness and Recreation Complex.

Photo 1: Typical Glendon Drive Cross Section With Gravel Shoulder

Trails:

Hiking trails can be accessed from Glendon Drive/Oxford Street West, just east of the Study Area at the entrance to Komoka Provincial Park. This trail access is for hiking only. Cycling trails are accessed via the Gideon Drive entrance south of the Study Area.

Bicycle Facilities:

There are no dedicated bicycle facilities on Glendon Drive or on the approaching cross streets. Despite the absence of dedicated facilities, **Photo 2** shows billboard type signage directed to motorists along the Glendon Drive corridor that has been placed adjacent to the Wellness and Recreation Complex. The signage promotes safety and awareness for cyclists riding in shared lane conditions.

Photo 2: Bicycle Safety Signage on Glendon Drive

Transit Facilities:

As noted previously, there are no public transit services available along Glendon Drive.

Pedestrian Activity:

No pedestrian activity was observed during the site visit.

Bicycle Activity:

As illustrated in **Photo 3**, two bicycles were observed during the site visit travelling north and south along Komoka Road and crossing at the signalized intersection at Glendon Drive.

Photo 3: Cyclists Observed Crossing Glendon Drive at Komoka Road

Table 1 summarizes the detailed observations of the active transportation environment and conditions.

<table>
<tr><th colspan="2">Table 1
Detailed Observations of Existing Active Transportation Facilities</th></tr>
<tr><th>Intersection</th><th>Observations</th></tr>
<tr><td>Glendon Drive/Komoka Road


Curb ramps are incorrectly oriented to the centre of the intersection</td><td>• <u>Crosswalk markings</u>: No pavement markings are present for pedestrian crossings
• <u>Crossing control</u>: Pedestrian signals are present in all four directions. Push buttons must be used to obtain a pedestrian signal in the N-S direction. Push buttons are set back a considerable distance (3.9m) from pedestrian crossing
• <u>Curb Ramps:</u> channelized ramps are present on all corners except for the NW corner (depressed curb). Channelized ramps are oriented incorrectly to the centre of the intersection (curb ramps must align with the direction of travel AODA Design of Public Spaces Standards Part IV.1 Section 80.26 (1)).
• <u>Sidewalk approaches:</u> There are no sidewalks on the intersection approaches except for the north east side of Komoka Road
• <u>Lighting:</u> Light standards are present on three corners, missing from NW corner</td></tr>
</table>

Table 1
Detailed Observations of Existing Active Transportation Facilities

Intersection	Observations
Glendon Drive/Springfield Way  Sidewalk and lighting on Springfield Way ends south of Glendon Drive	• Access to Glendon Drive: No signal or pedestrian crossings • Sidewalks: SB sidewalk on Springfield Way ends at Glendon Drive • Lighting: No lighting at Glendon Drive. Light standards along Springfield Way east side only
Glendon Drive/Jefferies Road-Vanneck Road  Sidewalk leads to Glendon Drive, but no pedestrian crossings delineated at the intersection. No pedestrian signal heads noted	• Intersection Geometry: Offset intersection with Vanneck Road creates sight line issues for N-S crossing on west leg of intersection • Pedestrian Crossings: There are no pedestrian signals or pavement markings at the intersection • Sidewalks: 1.5m wide sidewalks are present on both sides of the Jefferies Road south approach up to the intersection (1.8m wide at SE corner) • Curb Ramps: Depressed curbs on SW and SE corner mountable curbs (no sidewalks on NE and NW corners). No tactile indicators or guide lines on ramps • Curb Radii: wide curb radii allow turning vehicles to travel at higher speeds. School bus observed encroaching onto sidewalk while making an EB to SB right turn

3.5 Traffic Data Collection Program

A data collection effort was undertaken to collect all necessary data to profile the traffic characteristics of the Study Area. Traffic Survey Analysis Inc. (TSA) was contracted by Stantec to undertake the data collection program. The traffic volume data for 8 intersections within the Study Area were manually collected on Tuesday, September 29, 2015. The intersection counts were conducted for an eight hour period, and specifically, 7:00 to 10:00 a.m., 11:30 a.m. to 1:30 p.m., and 3:00 to 6:00 p.m.

Base year 2015 a.m. and p.m. peak hour traffic volumes are illustrated in **Figure 2**, which is broken into parts 1, 2, and 3 to cover the Study Area.

Traffic was recorded for three vehicle classifications as follows:

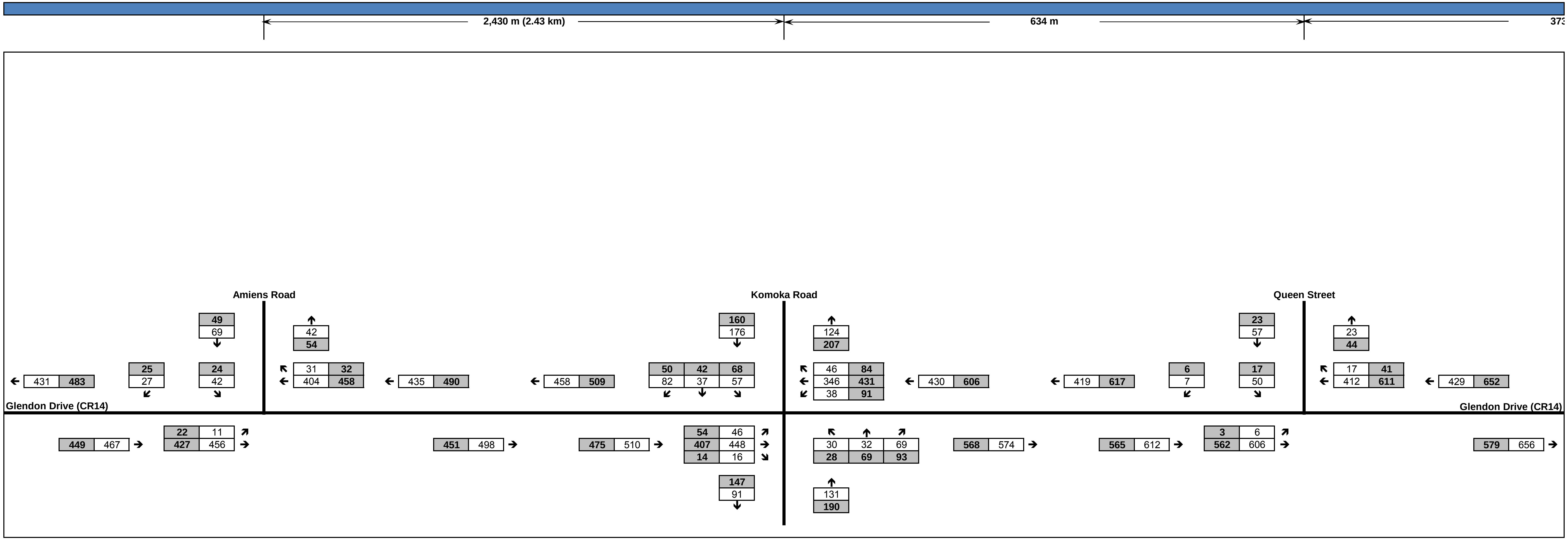
- Automobiles (all passenger type vehicles including motorcycles, vans, pick-up trucks, etc.);
- Trucks (more than four tires); and
- Tractor-trailer other trucks.

In addition, all pedestrian crossing traffic was counted at each intersection.

Automatic traffic recorder (ATR) counter tubes were installed at three representative mid-block locations along Glendon Drive to record volume, speed, and classification characteristics by direction. The ATRs collected data for the one week period from Thursday, October 1, 2015 to Wednesday, October 7, 2015, inclusive. It should be noted that at one location the ATR tubes were damaged and data was recollected for the one week period from (Wednesday, October 14, 2015 to Tuesday, October 20, 2015), inclusive. Data was recorded for 24 hours each day in one hour intervals with vehicle movements sorted into 13 classification bins, and vehicle speeds recorded in 10 km/h bin increments.

In addition to the traffic data collection program, available data from MTO for the Highway 402 interchange ramp terminals, and other available traffic data were provided by County staff.

The data collection program is summarized in **Table 2**.



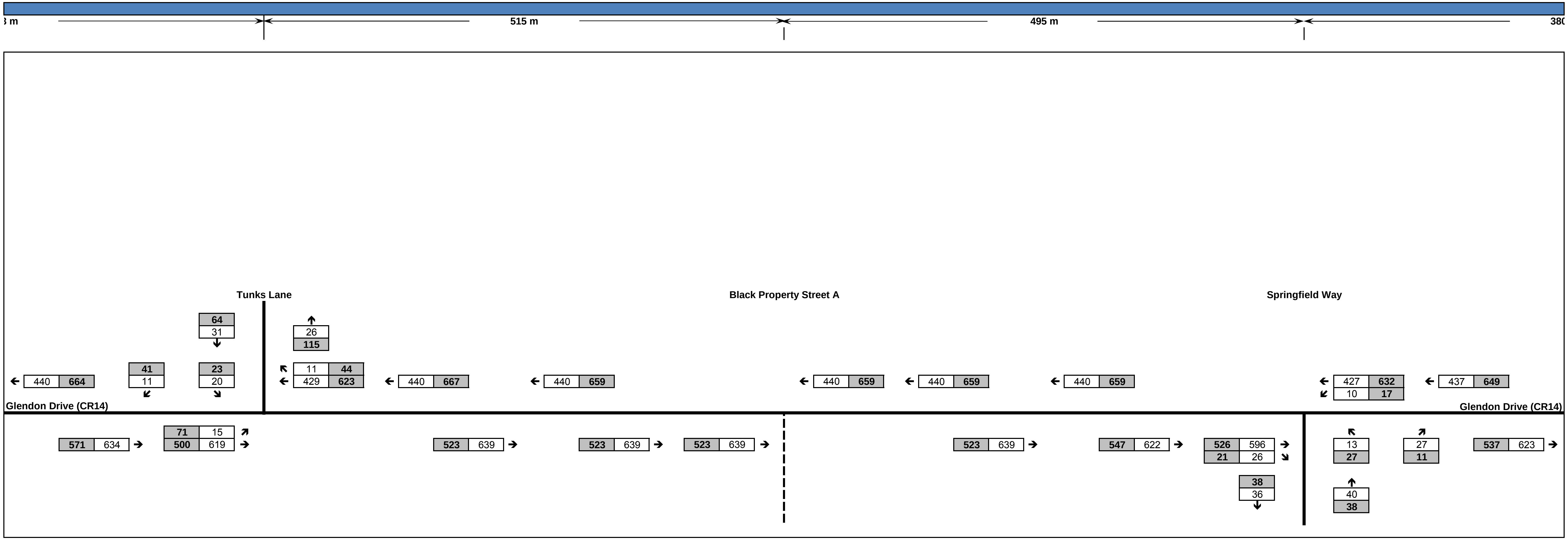
AM Peak Hour 123

PM Peak Hour **123**

N.T.S.

N

Figure 2
2015 Existing Peak Hour Traffic Volumes
1/3



AM Peak Hour 123

PM Peak Hour **123**

N.T.S.

N

Figure 2
2015 Existing Peak Hour Traffic Volumes
2/3

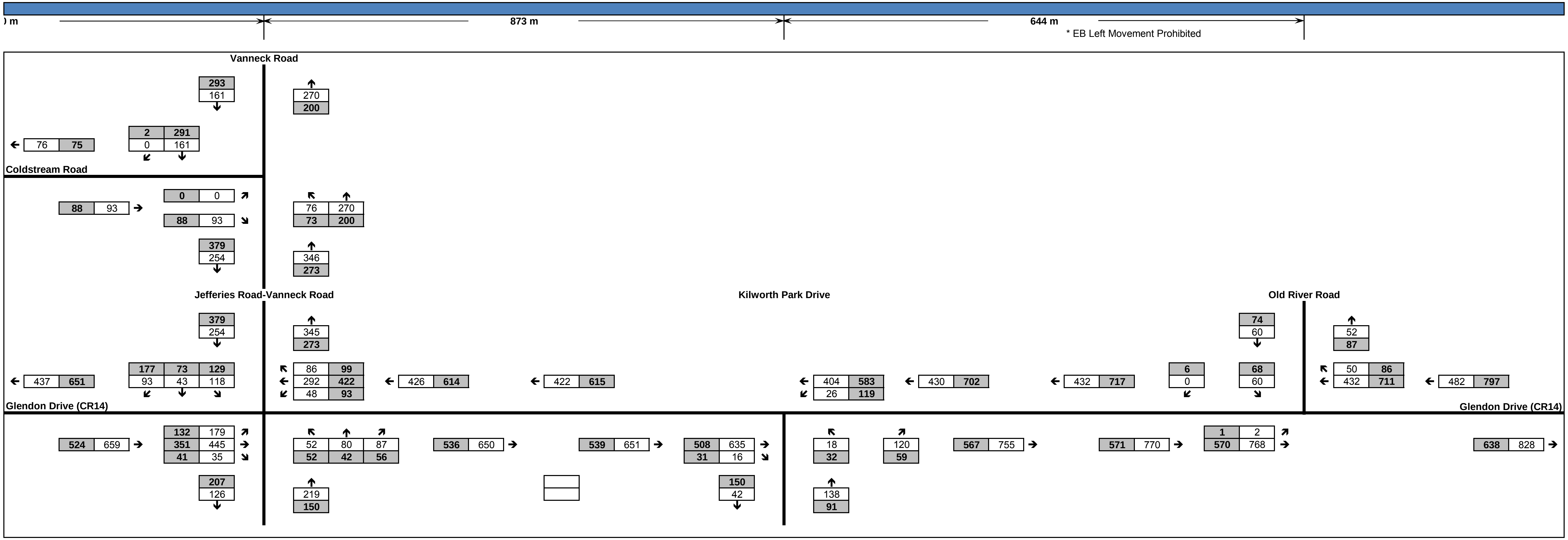


Figure 2

2015 Existing Peak Hour Traffic Volumes

3/3

AM Peak Hour	123
PM Peak Hour	**123**

N.T.S.

N

Reference: Glendon Drive Master Plan EA – Transportation Technical Memo

Table 2
Traffic Data Collection Program

Manual Intersection Counts	**Collection Dates (Source)**
Highway 402 West Terminal/Glendon Drive	June 2, 2015 (MTO)
Highway 402 East Terminal/Glendon Drive	June 3, 2015 (MTO)
Amiens Road/Glendon Drive	September 29, 2015 (Stantec)
Komoka Road/Glendon Drive	
Queen Street/Glendon Drive	
Tunks Lane/Glendon Drive	
Jefferies Road-Vanneck Road/Glendon Drive	
Coldstream Road/Vanneck Road	
Kilworth Park Drive/Glendon Drive	
Old River Road/Glendon Drive	
Historical Intersection Counts	**Collection Dates**
Jefferies Road-Vanneck Road/Glendon Drive	September 24, 2014 (County)
Springfield Way/Glendon Drive	May 22, 2013 (Stantec)
ATR Counts	**Collection Dates**
Glendon Drive between Amiens Road and Komoka Road (Location 1)	Thursday, October 1, 2015 to Wednesday, October 7, 2015 (Stantec)
Glendon Drive between Tunks Lane and Springfield Way (Location 2)	
Glendon Drive between Kilworth Park Drive and Old River Road (Location 3)	Wednesday, October 14, 2015 to Tuesday, October 20, 2015 (Stantec)
Historical AADT Counts	**Collection Dates**
Station ID 1401: Glendon Drive, located east of Komoka Road	2003, 2005, 2007, 2009, 2011, 2013, 2015 data (County)
Station ID 1402: Glendon Drive, located west of Highway 402	2013, 2015 data (County)
Station ID 1601: Komoka Road, located south of Glendon Drive	2003, 2005, 2007, 2009, 2011, 2013, 2015 data (County)
Station ID 1602: Komoka Road, located north of Glendon Drive	2003, 2005, 2007, 2009, 2011, 2013, 2015 data (County)
Station ID 3801: Vanneck Road, located east of Coldstream Road	2003, 2005, 2007, 2009, 2011, 2013, 2015 data (County)
Station ID 3802: Vanneck Road, located north of Nairn Road	2013, 2015 data (County)
Signal Timing Plans	**Collection Dates**
Komoka Road/Glendon Drive	Obtained in 2015 (County)
Jefferies Road-Vanneck Road/Glendon Drive	

All raw traffic data has been included for reference in **Appendix A**.

3.6 Collision Data

Collision information for the Study Area was provided by County staff for the period 2010 to approximately mid-2015 inclusive. All collision reports were prepared by the Ontario Provincial Police (OPP), rather than self-reporting, and they contain a significant amount of detail often accompanied with an illustration of the collision if possible. The names of people involved in the collisions were redacted prior to the review of this information.

4.0 EXISTING TRANSPORTATION CONDITIONS

4.1 Traffic Volume

A comparison of the Glendon Drive daily traffic volumes (two-way) by location and day at each ATR location is shown in **Figure 3**.

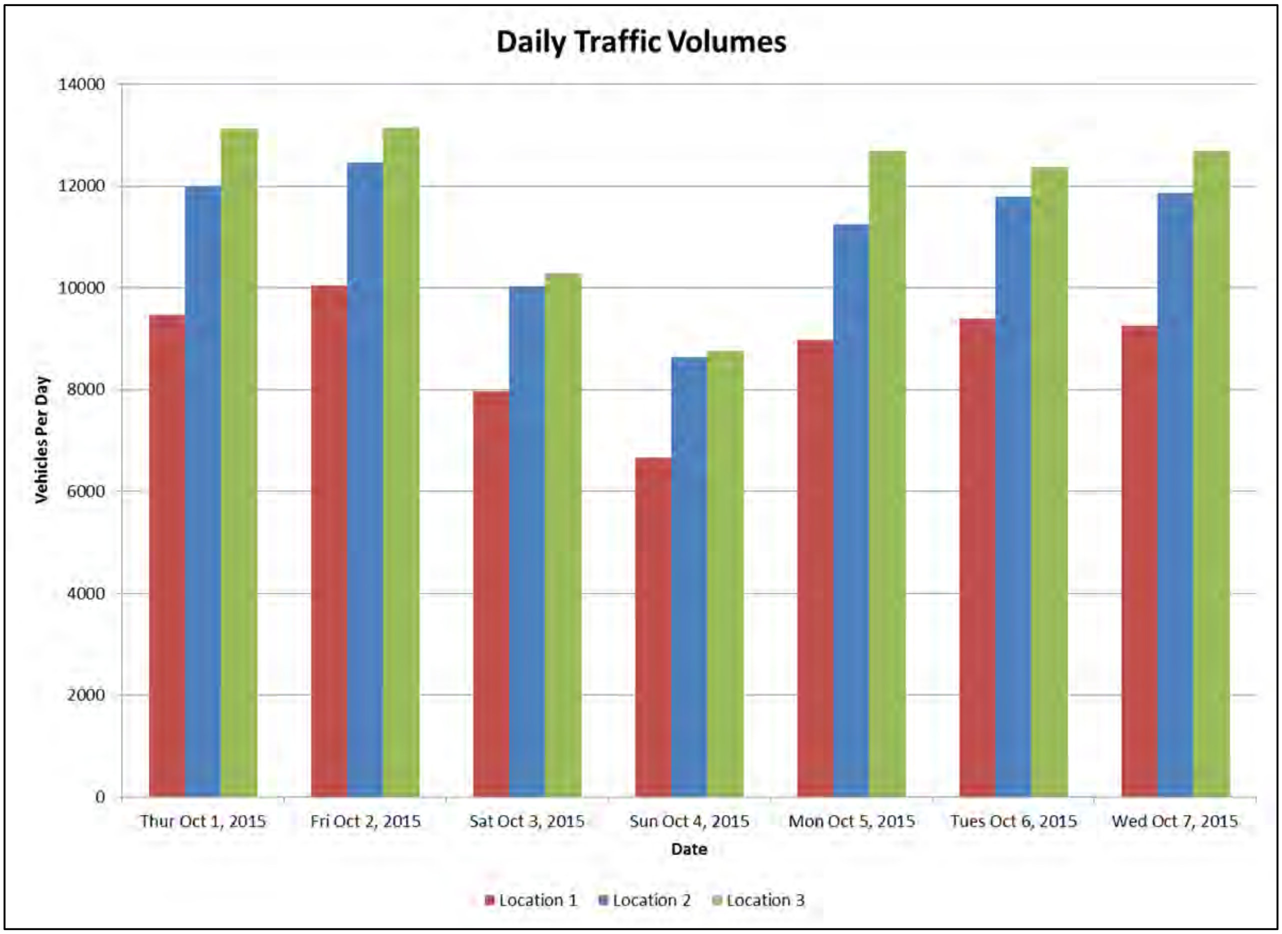


Figure 3 – Glendon Drive: Two-Way Daily Traffic Volumes

Location 1, between Amiens Road and Komoka Road, had typical weekday volumes of 9,000 to 10,000 vehicles per day. Saturday and Sunday weekend volumes were recorded to be in the range of 7,000 to 8,000 vehicles per day.

Location 2, between Tunks Lane and Springfield Way had higher volumes than at Location 1, with typical weekday volumes of 11,000 to 12,000 vehicles per day. At Location 2, weekend volumes are in the range of 9,000 to 10,000 vehicles per day.

Location 3, between Kilworth Park Drive and Old River Road had the highest daily traffic volumes in comparison to Location 1 and Location 2, with typical weekday volumes of 13,000 vehicles per day. Saturday and Sunday weekend volumes were recorded to be in the range of 9,000 to 10,000 vehicles per day.

Depending on the relationship between the peak hour and daily traffic (typically, the peak hour represents eight to 12 per cent of daily traffic), a general rule-of-thumb is that two lane roads that operate at or approaching capacity during peak hour periods have daily traffic volumes of approximately 15,000 vehicles. The traffic volumes recorded in the Study Area were all found to be well within this daily volume threshold.

The average weekday and weekend daily traffic volumes by hour are shown for Locations 1, 2, and 3 in **Figures 4, 5, and 6**, respectively.

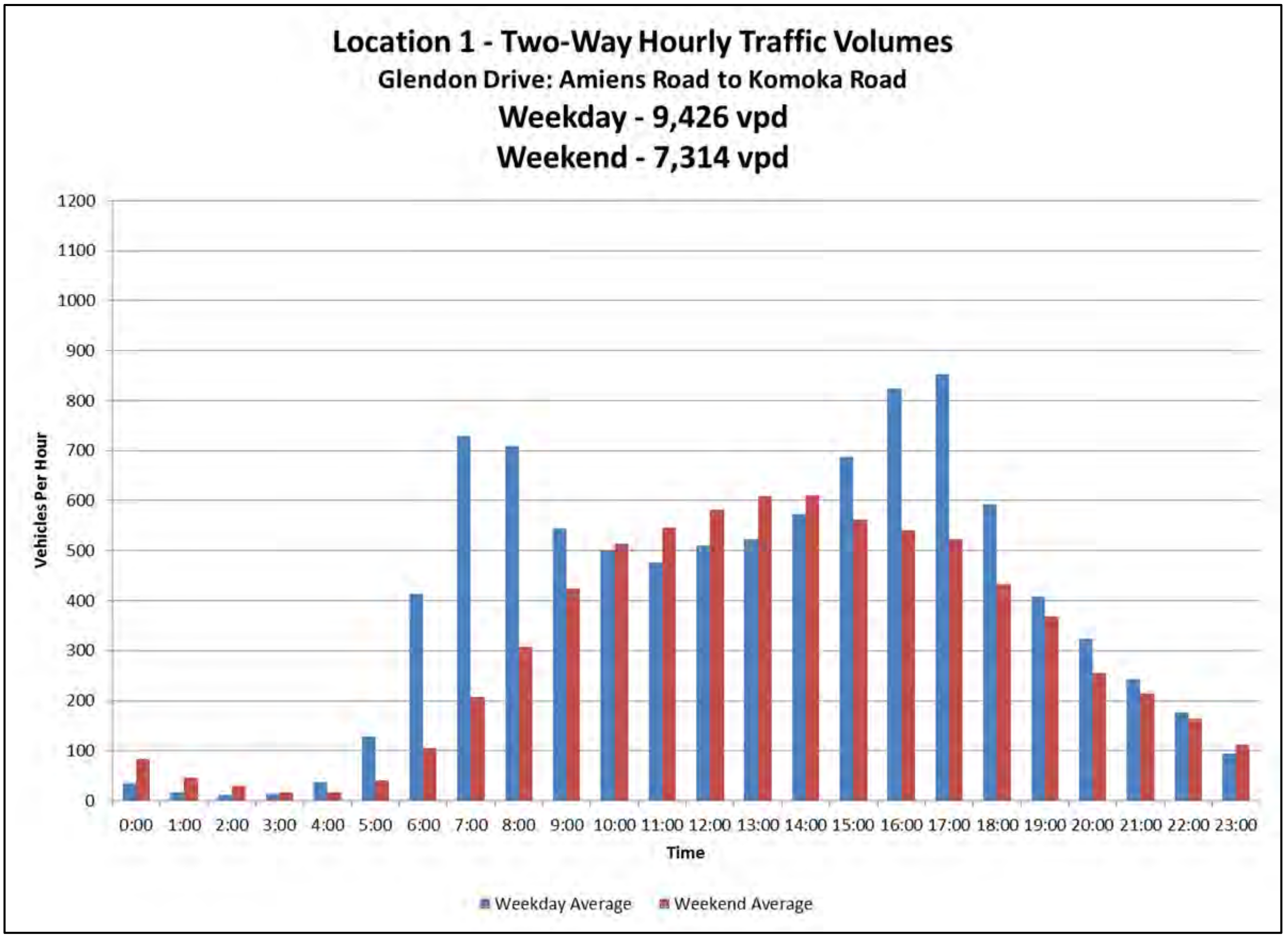


Figure 4 – Location 1: Average Hourly Traffic Volumes

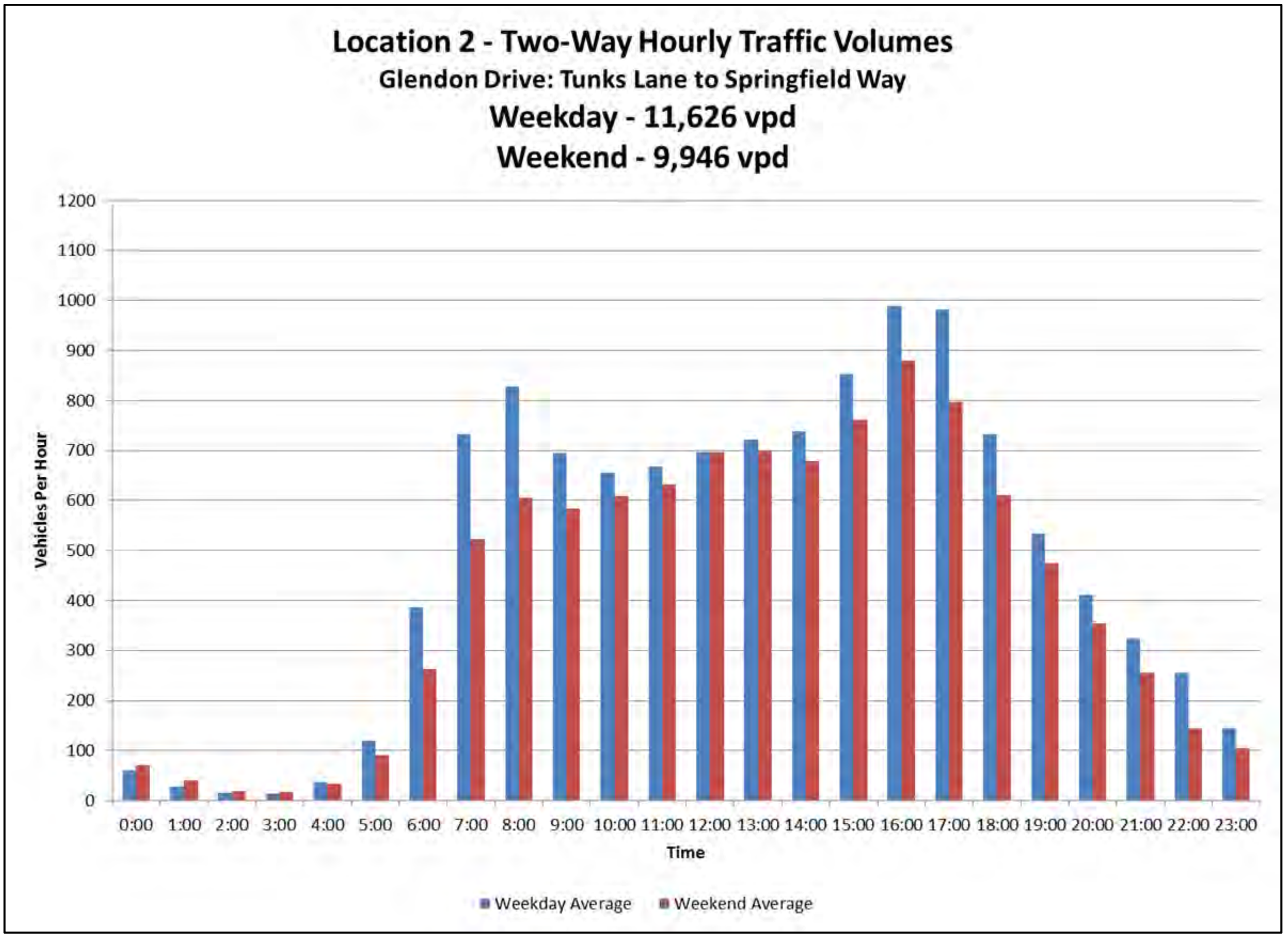


Figure 5 – Location 2: Average Hourly Traffic Volumes

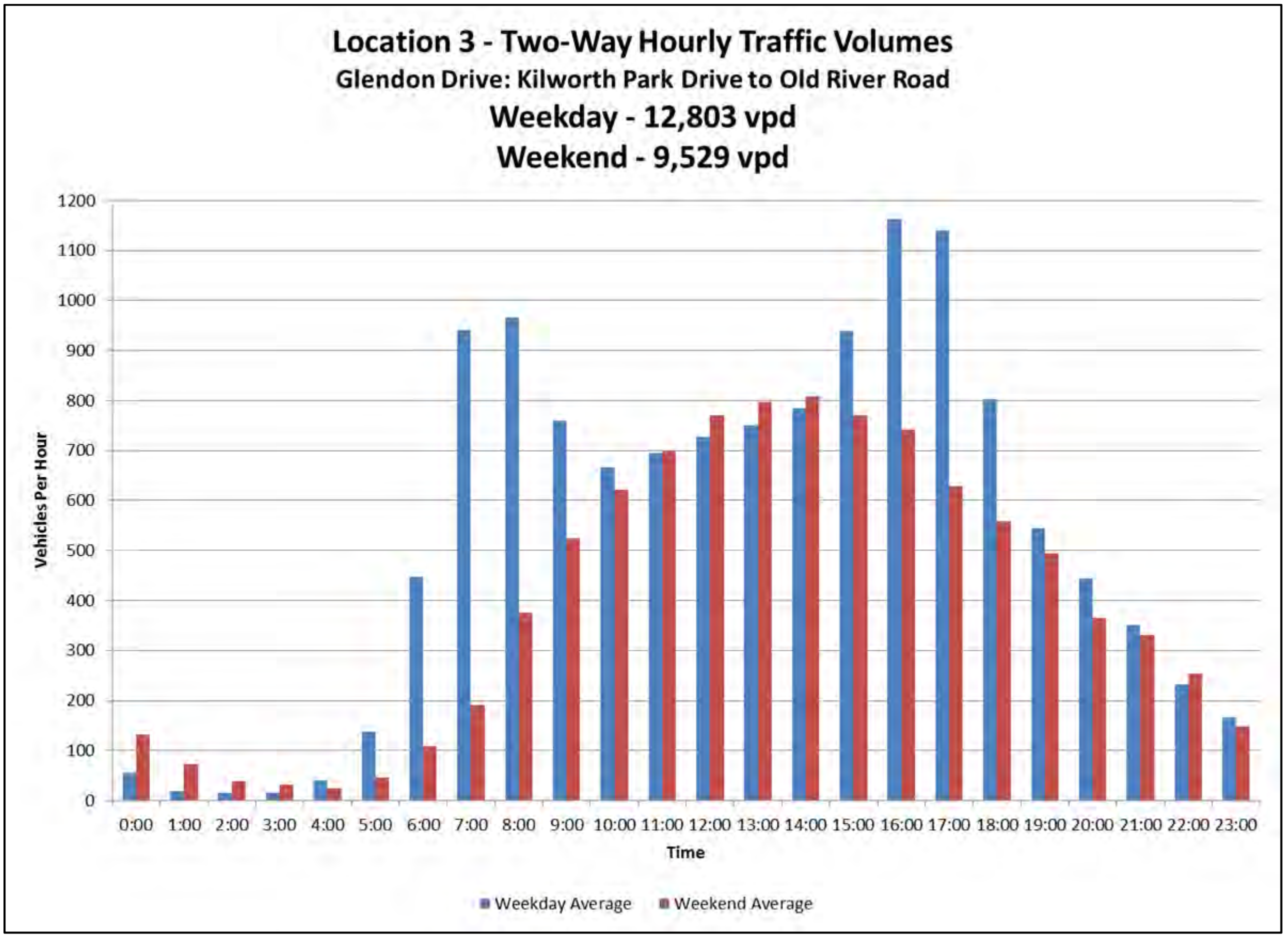


Figure 6 – Location 3: Average Hourly Traffic Volumes

For the three locations, the total traffic profile for weekdays shows a gradual increase in hourly traffic volumes from 5:00 a.m. onwards and peaking between 7:00 and 9:00 a.m., reducing slightly during the mid-day off-peak times, and again peaking between 3:00 and 6:00 p.m. It is noted that the afternoon peak period hourly volumes are greater than those during the morning peak period.

Weekend traffic increases more gradually throughout the day. At Location 1, the weekend peak hour occurs between 1:00 and 2:00 p.m., at Location 2, the peak hour occurs between 4:00 and 5:00 p.m., and at Location 3, the weekend peak hour occurs between 1:00 and 2:00 p.m. The weekend peak period hourly traffic volumes are lower than the weekday peak period hourly traffic volumes. This confirms that the weekday peak hours represent the design conditions for analysis.

4.2 Traffic Speed

Directional speed data for the three count locations is presented in **Table 3**.

Table 3
Glendon Road Speed Characteristics – Weekly Average[1]

Speed Statistics by Direction	**Location 1**		**Location 2**		**Location 3**	
	EB	**WB**	**EB**	**WB**	**EB**	**WB**
Posted Speed Limit	80 km/h	80 km/h	70 km/h	70 km/h	80 km/h	80 km/h
Average Speed	90.8	88.1	78.4	86.3	81.0	77.2
50th Percentile Speed	91.1	87.7	78.3	86.4	82.5	77.2
85th Percentile Speed	99.2	97.2	87.4	97.2	90.6	86.6
Pace (20 km/h)	80.1 – 100.0 81.8%	80.1 – 100.0 83.0%	70.1 – 90.0 83.5%	80.1 – 100.0 69.5%	70.1 – 90.0 75.5%	70.1 – 90.0 81.3%
Compliance with Speed Limit	6.7%	11.0%	10.7%	3.8%	39.5%	64.5
Speeds above 80 km/h	-	-	41.5%	76.8%	-	-
Speeds above 90 km/h	54.2%	38.1%	-	-	15.4%	4.5%

[1] *Location 1: Amiens Road to Komoka Road; Location 2: Tunks Lane to Springfield Way; Location 3: Kilworth Park Drive to Old River Road*

Based on the speed information collected, it is clear that there is poor compliance with the posted speed limit at the selected locations. The 50th and 85th percentile speeds at Locations 1 and 2 are greater than the posted speed limits and the percentage of vehicles travelling at speeds greater than 10 km/h over the speed limit are relatively high. At Location 3, the 50th and 85th percentile speeds are reasonably close to the speed limit. The relatively high speeds recorded between Amiens Road and Komoka Road can be attributed to some vehicles travelling to and from Highway 402, which has a 100 km/h posted maximum speed limit, as well as the rural nature of this section of roadway with very little roadside development and infrequent intersections and driveways.

4.3 Traffic Composition

The vehicle classification information derived from the ATR data is summarized in **Table 4**.

Table 4
Weekly Vehicle Classification (7-Day Average)

Location	Composition by Vehicle Class[1]
1: Amiens Road to Komoka Road	93% Passenger Vehicles 2% Light Trucks 5% Heavy Trucks
2: Tunks Lane to Springfield Way	92% Passenger Vehicles 1% Light Trucks 7% Heavy Trucks
3: Kilworth Park Drive to Old River Road	91% Passenger Vehicles 1% Light Trucks 8% Heavy Trucks

[1] Passenger Vehicles (Cars, Cycles, 2A-4T); Light Trucks (Bus, 2A-SU, 3A-SU); Heavy Trucks (4A-SU+ and larger)

The ATR classifications were also confirmed through a comparison the eight-hour manual turning movement/classification counts. In summary, the percentage breakdown between passenger vehicles and trucks can be considered typical for this type of arterial road in a rural/urban fringe environment.

All detailed ATR data for volumes, speed, and classification are attached in **Appendix A**.

4.4 Roadway Capacity Analysis

A mid-block roadway link analysis was done by comparing the existing weekday a.m. and p.m. peak hour traffic volumes derived from the manual intersection counts to a typical planning level arterial roadway capacity of 900 vehicles per hour per lane (vphpl) for arterial roads with signalized intersections. It is noted that this is a conservative estimate of lane capacity for the more rural, free flow sections of Glendon Drive (such as the two lane bridge over the Thames River), however, the two existing traffic signals do represent a constraint on the capacity of the subject section of Glendon Drive.

As shown in **Table 5**, this information was used to calculate the existing volume to capacity (v/c) ratios for road sections along Glendon Drive. The following colour coding is utilized to further illustrate the v/c ratios:

- Green $v/c < 0.80$ "Good" flow condition
- Orange $0.80 \leq v/c < 0.90$ "Unstable" flow condition

• Red	$0.90 \le v/c < 1.00$	"Congested" flow condition
• Dark Red	$v/c \ge 1.00$	"Very Congested" flow condition

Table 5
Glendon Drive Mid-Block Roadway Link Capacity Analysis
Existing Conditions

Road Section	**AM Peak Hour**				**PM Peak Hour**			
	EB		**WB**		**EB**		**WB**	
	Vol[1]	**v/c**[2]	**Vol**	**v/c**	**Vol**[1]	**v/c**[2]	**Vol**	**v/c**
West of Amiens Road	467	0.52	431	0.48	481	0.53	514	0.57
Amiens Road – Komoka Road	510	0.57	458	0.51	475	0.53	509	0.57
Komoka Road – Queen Street	612	0.68	430	0.48	568	0.63	617	0.69
Queen Street – Tunks Lane	656	0.73	440	0.49	579	0.64	664	0.74
Tunks Lane – Springfield Way	639	0.71	440	0.49	523	0.58	667	0.74
Springfield Way – Jefferies Road-Vanneck Road	659	0.73	437	0.49	537	0.60	651	0.72
Jefferies Road-Vanneck Road – Kilworth Park Drive	651	0.72	426	0.47	539	0.60	615	0.68
Kilworth Park Drive – Old River Road	770	0.86	432	0.48	571	0.63	717	0.80

[1] Volume = two-way traffic; [2] v/c = two-way traffic/capacity of 900 vehicles per hour per lane

Under existing conditions, Glendon Drive is generally operating well within capacity and with most v/c ratios less than 0.80 (i.e. operating with traffic volumes 20% less than capacity). There are some exceptions where the traffic volumes are approaching capacity, namely, the roadway section between Kilworth Park Drive and Old River Road. The v/c ratios are relatively high (approaching 0.90 indicating a potentially "unstable" flow condition) in the peak directions of commuter travel – i.e. eastbound towards London in the a.m. peak hour and westbound from London in the p.m. peak hour.

4.5 Intersection Traffic Operations

The quality of intersection operations at signalized and unsignalized intersections is evaluated in terms of level of service (LOS) and volume to capacity (v/c) as defined by the *Highway Capacity Manual* (HCM). LOS is evaluated on the basis of average control delay per vehicle and includes deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Capacity is evaluated in terms of ratio of demand flow to capacity with a capacity condition represented by a v/c ratio of 1.00 (i.e., volume demand equals capacity). For signalized intersections the LOS ranges from A for 10 seconds average delay or less to LOS F for delays greater than 80 seconds as shown in **Table 6**.

Table 6
Level of Service Criteria
Signalized Intersections

Level of Service (LOS)	Delay (seconds / vehicle)
A	0 – 10 seconds
B	> 10 – 20 seconds
C	> 20 – 35 seconds
D	> 35 – 55 seconds
E	> 55 – 80 seconds
D	> 80 seconds

The LOS criteria for unsignalized intersections are somewhat different from the criteria for signalized intersections primarily because the characteristics of different transportation facilities result in different driver perceptions. The expectation is that a signalized intersection is designed to carry higher traffic volumes and experience greater delay than an unsignalized intersection. The delay values for unsignalized intersections range from 10 seconds or less for LOS A to greater than 50 seconds for LOS F as shown in **Table 7**.

Table 7
Level of Service Criteria
Unsignalized Intersections

Level of Service (LOS)	Delay (seconds / vehicle)
A	0 – 10 seconds
B	> 10 – 15 seconds
C	> 15 – 25 seconds
D	> 25 – 35 seconds
E	> 35 – 50 seconds
D	> 50 seconds

Acceptable operations are generally considered to be LOS C or better. However, during peak hours, a LOS D is considered acceptable for through movements and for the overall intersection operation, and a LOS E is considered acceptable for turning movements. Similar to LOS, the v/c ratio for signalized intersections is calculated as a whole (sum of critical movements), and for individual movements. For unsignalized intersections, LOS is only calculated for those movements that conflict with opposing free-flow traffic and is not defined for the intersections as a whole.

While the LOS and v/c for each movement are related, they are calculated independently. Therefore, it is possible to have a poor intersection level of service associated with a low v/c ratio or a good level of a service associated with a high v/c ratio. The designation LOS F does not automatically imply that the volume demands at an intersection or on a specific movement exceed capacity, nor does a LOS better than E automatically imply that unused capacity is available.

To assess the existing peak hour conditions, a level of service analysis was conducted using *Synchro 9.0 software*, which implements the methods of the 2000/2010 Highway Capacity Manual. The key parameters used in the analysis include:

- Existing lane configurations;
- Heavy vehicle percentages as derived from existing traffic counts;
- Calculated peak hour factors (PHF). It is noted that this factor adjusts the hourly volumes to better represent conditions during the peak 15 minutes of intersection operations;
- Signal timings as provided by Middlesex County staff; and
- Synchro default values for all other inputs.

The results of the analysis are presented in **Table 8**. The Synchro analysis outputs have been provided for reference in **Appendix B**.

Table 8
Existing 2015 Base Year Conditions
Peak Hour Operational Analysis

Intersection	Approach/Movement		AM Peak Hour				PM Peak Hour			
			LOS[1]	Delay[2]	v/c[3]	Q[4]	LOS[1]	Delay[2]	v/c[3]	Q[4]
Glendon Drive/ Amiens Road *Unsignalized*	EB	Left/Thru	A	< 1	0.01	< 1	A	1	0.02	1
	WB	Thru/Right	Unopposed Movement							
	SB	Left/Right	C	17	0.20	5	C	17	0.15	4
Glendon Drive/ Komoka Road *Signalized*	EB	Left	B	13	0.15	9	B	14	0.20	11
		Thru/Right	C	21	0.70	73	B	19	0.60	61
	WB	Left	B	15	0.17	8	B	17	0.32	13
		Thru	B	18	0.51	45	B	20	0.60	54
		Right	C	28	0.03	4	C	21	0.05	6
	NB	Left	B	12	0.07	7	B	12	0.06	6
		Thru/Right	B	12	0.10	10	B	13	0.16	15
	SB	Left	B	13	0.12	11	B	13	0.15	12
		Thru/Right	B	12	0.12	11	B	12	0.10	10
	Overall Intersection		***B***	***18***	***0.41***	***-***	***B***	***17***	***0.38***	***-***
Glendon Drive/ Queen Street *Unsignalized*	EB	Left/Thru	A	< 1	0.01	< 1	A	< 1	0.00	< 1
	WB	Thru	Unopposed Movement							
		Right	Unopposed Movement							
	SB	Left/Right	C	24	0.25	7	C	22	0.10	3

Table 8
Existing 2015 Base Year Conditions
Peak Hour Operational Analysis

Intersection	Approach/Movement		AM Peak Hour				PM Peak Hour			
			LOS[1]	Delay[2]	v/c[3]	Q[4]	LOS[1]	Delay[2]	v/c[3]	Q[4]
Glendon Drive/ Tunks Lane *Unsignalized*	EB	Left	A	9	0.02	< 1	A	9	0.08	2
		Thru	Unopposed Movement							
	WB	Thru	Unopposed Movement							
		Right	Unopposed Movement							
	SB	Left	C	24	0.01	3	D	31	0.15	4
		Right	B	11	0.02	1	B	13	0.09	2
Glendon Drive/ Springfield Way *Unsignalized*	EB	Thru	Unopposed Movement							
		Right	Unopposed Movement							
	WB	Left	A	9	0.01	< 1	A	9	0.02	< 1
		Thru	Unopposed Movement							
	NB	Left/Right	C	17	0.12	3	D	27	0.20	5
Glendon Drive/ Jefferies Road-Vanneck Road *Signalized*	EB	Left	A	8	0.35	15	B	11	0.42	16
		Thru/Right	A	8	0.49	39	A	9	0.44	38
	WB	Left	A	7	0.11	7	A	9	0.21	13
		Thru/Right	A	9	0.38	35	B	13	0.59	64
	NB	Left	C	22	0.23	13	B	19	0.23	13
		Thru/Right	C	22	0.29	22	B	17	0.13	13
	SB	Left/Thru/Right	D	45	0.82	60	D	46	0.89	82
	Overall Intersection		***B***	***16***	***0.58***	**-**	***B***	***20***	***0.69***	**-**
Vanneck Road/ Coldstream Rd *Unsignalized*	EB	Left/Right	A	10	0.13	3	B	11	0.13	3
	NB	Left/Thru	A	2	0.06	2	A	3	0.06	2
	SB	Thru/Right	Unopposed Movement							
Glendon Drive/ Kilworth Park Drive *Unsignalized*	EB	Thru	Unopposed Movement							
		Right	Unopposed Movement							
	WB	Left	A	9	0.03	1	A	9	0.12	3
		Thru	Unopposed Movement							
	NB	Left/Right	C	20	0.38	13	C	25	0.34	11
Glendon Drive/ Old River Road *Unsignalized*	EB	Left/Thru	A	< 1	0.00	< 1	A	< 1	0.00	< 1
	WB	Thru/Right	Unopposed Movement							
	SB	Left/Right	D	35	0.35	11	E	43	0.46	16

[1] Level of Service, LOS E/F highlighted, if any; [2] Delay in seconds; [3] Volume to capacity ratio, 0.90 and higher highlighted, if any; [4] 95th Percentile queue in metres

The analysis indicates that under existing conditions virtually all Study Area intersections currently operate at good levels of service and with all movements well within their theoretical capacity. One exception would be at the intersection of Glendon Drive with Old River Road where the southbound stop controlled approach is shown to operate at LOS E (long delays). While long delays could be expected with the relatively high volume of through traffic on Glendon Drive, the relatively low southbound traffic volume (68 southbound left turning vehicles in the p.m. peak hour) is well within the available capacity.

4.6 Field Observations

A site visit was conducted by Stantec staff on Wednesday, September 30, 2015. The following general observations were noted:

- Weather was generally sunny, clear, temperature in the range of 15 to 20 degrees Celsius;
- All intersections generally operated with minimal delays and queues, and the volume demands appeared to be within capacity; and
- It was noted that due to the geometry of the Glendon Drive/Jefferies Road-Vanneck Road intersection and the fifth leg introduced just north of the intersection (Coldstream Road), there is potential for driver confusion and temporary delays as related to traffic travelling between Glendon Drive and Coldstream Road. This is evident especially when vehicle queues on southbound Vanneck Road occasionally and temporarily block access to Coldstream Road (despite signage advising motorists not to block the intersection). These conditions represent a safety concern, especially to motorists who are unfamiliar with the characteristics of this intersection.

The traffic operations observed in the field were found to be consistent with the results of the analysis.

4.7 Safety Review

4.7.1 Collision Data

As previously noted, all collision data used in this review was originally obtained by the County of Middlesex from police collision report forms. Collisions not reported to the police are not included in this review. As noted previously, the collision summary data has been attached for reference in **Appendix A.**

Collision information for an approximate six-year period from 2010 to 2015 was provided for the Glendon Drive Study Area. It is noted that since the collision data provided for 2015 does not represent an entire year, it has been omitted from the analysis. A total of 68 recorded intersection collisions and 30 mid-block collisions were identified for the five-year period from 2010 to 2014 inclusive.

4.7.2 Collision Analysis

In regard to intersection collisions in the Study Area as a whole, the collision types and notable locational attributes were as follows:

- 20 collisions (29%) were recorded as turning movement collisions of which 12 collisions (60%) occurred at Glendon Drive/Old River Road;
- 19 collisions (28%) were recorded as rear-end collisions of which 7 collisions (37%) occurred at Glendon Drive/Komoka Road;
- 17 collisions (25%) were recorded as angle collisions of which 12 collisions (71%) occurred at Glendon Drive/Old River Road;
- 7 collisions (10%) were recorded as single motor vehicle collisions, which occurred at various locations;
- 4 collisions (6%) were recorded as sideswipe collisions; and
- 1 collision (1%) was recorded as an approaching collision.

It should be noted that for the intersection of Glendon Drive/Old River Road (stop –controlled T-intersection), the "angle collisions" could also be considered as "turning movement" collisions (and vice versa) since the police officer's decision on classifying the collision type is somewhat subjective.

In total, there were no fatal intersection collisions recorded and 22 total non-fatal injury related collisions (32% of total) over the five-year data period.

In regard to the 30 mid-block collisions in the Study Area as a whole, the collision types recorded were as follows:

- 21 collisions (70%) were recorded as single motor vehicle collisions of which 11 collisions (52%) occurred on Glendon Drive between Amiens Road and Komoka Road;
- 4 collisions (13%) were recorded as sideswipe collisions;
- 4 collisions (13%) were recorded as rear-end collisions; and
- 1 collision (3%) was recorded as an angle collision.

Of note, 12 of the mid-block collisions (40%) involved wildlife (deer). Virtually all of these collisions, 11 (92%), occurred in 2011, while 1 occurred in 2014.

In total, there were no fatal mid-block collisions recorded, 5 non-fatal injury related collisions (17% of total and excluding wildlife incidents), and 25 property damage only (PDO) classified collisions. In reviewing all the collision reports and information, it is noted that there were no reported collisions involving and pedestrians or cyclists.

In reviewing intersection and mid-block average annual collision rates, which are respectively expressed in terms of the number of collisions per million vehicles entering an intersection and per million vehicle kilometres travelled, it was found that all locations but one had a collision rate less than 1.0. This is a typical bench mark for determining the potential need for safety-related improvements at an intersection. The Glendon Drive/Old River Road intersection had an annual average collision rate of 1.3 for the five year period 2010 to 2014 inclusive.

4.7.3 Collision Trends

As previously noted, the intersection of Glendon Drive/Old River Road intersection experienced the highest number of collisions for the five year period examined as well as the highest intersection collision rate. At this intersection, it was noted that rear-end and angle/turning-movement collisions were ranked highest. The rear-end collisions can be attributed in part to motorists attempting the prohibited eastbound left turn movement from Glendon Drive to Old River Road (prohibited by regulatory signage, including advance signage). The angle and turning movement related collisions are likely due to the effects of tree foliage and the nearby bridge structure over the Thames River, which were both observed to limit the available sight distance. A collision diagram illustrating the collisions experienced at this location has been prepared. The diagram is attached for reference in **Appendix A**.

The intersection of Jefferies Road-Vanneck Road with Glendon Drive was ranked second in total number of intersection-related collisions. At this location rear-end collisions were the highest recorded collision type. The collisions can be attributed to the closely spaced intersection of Coldstream Road, as well as the curved southbound approach of Vanneck Road, which both affect the available sight distance and the perception-reaction time by motorists.

5.0 TRAFFIC FORECASTING

5.1 Methodology

The horizon year considered for analysis is 2035, which represents a 20 year planning horizon. Based on land use information provided by County planning staff for proposed and/or approved developments, the number of new trips were estimated and assigned to the Glendon Drive corridor. Additionally, a background growth rate of 0.25% per annum, or 5% growth over the 20 year period was included to account for general population and employment growth beyond the Study Area. As a logic check, the resultant future growth in traffic was compared to the historical growth trends.

5.2 Historical Growth Trends

For comparison with the results of the forecasting methodology outlined above, the historical growth in traffic along Glendon Drive and Vanneck Road was reviewed. The County provided average annual daily traffic (AADT) volumes for the period 2003 to 2015 inclusive for the AADT count stations shown in **Figure 7**. The traffic data and annual growth rates (calculated by a regression analysis) for stations 1401 (Glendon Drive) and 3801 (Vanneck Road) are presented in **Table 9**.

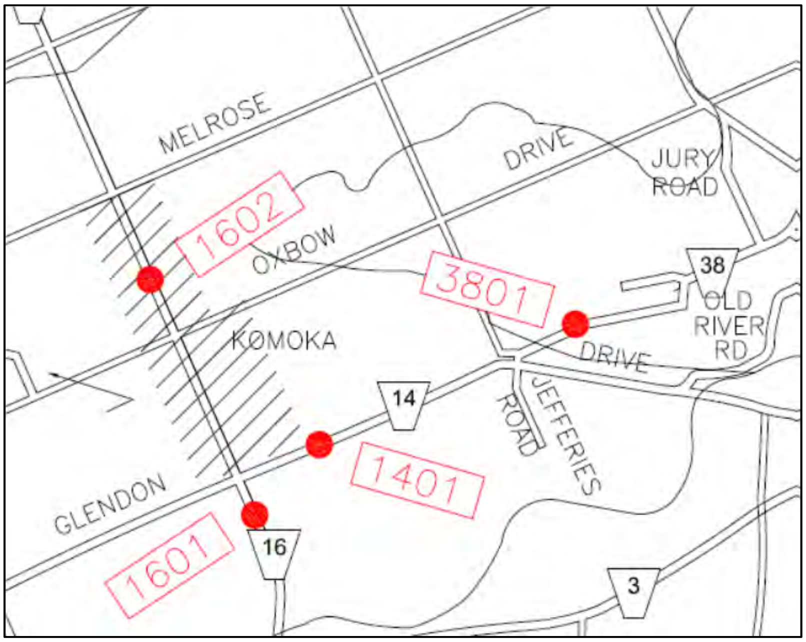


Figure 7 – County Road AADT Station Locations

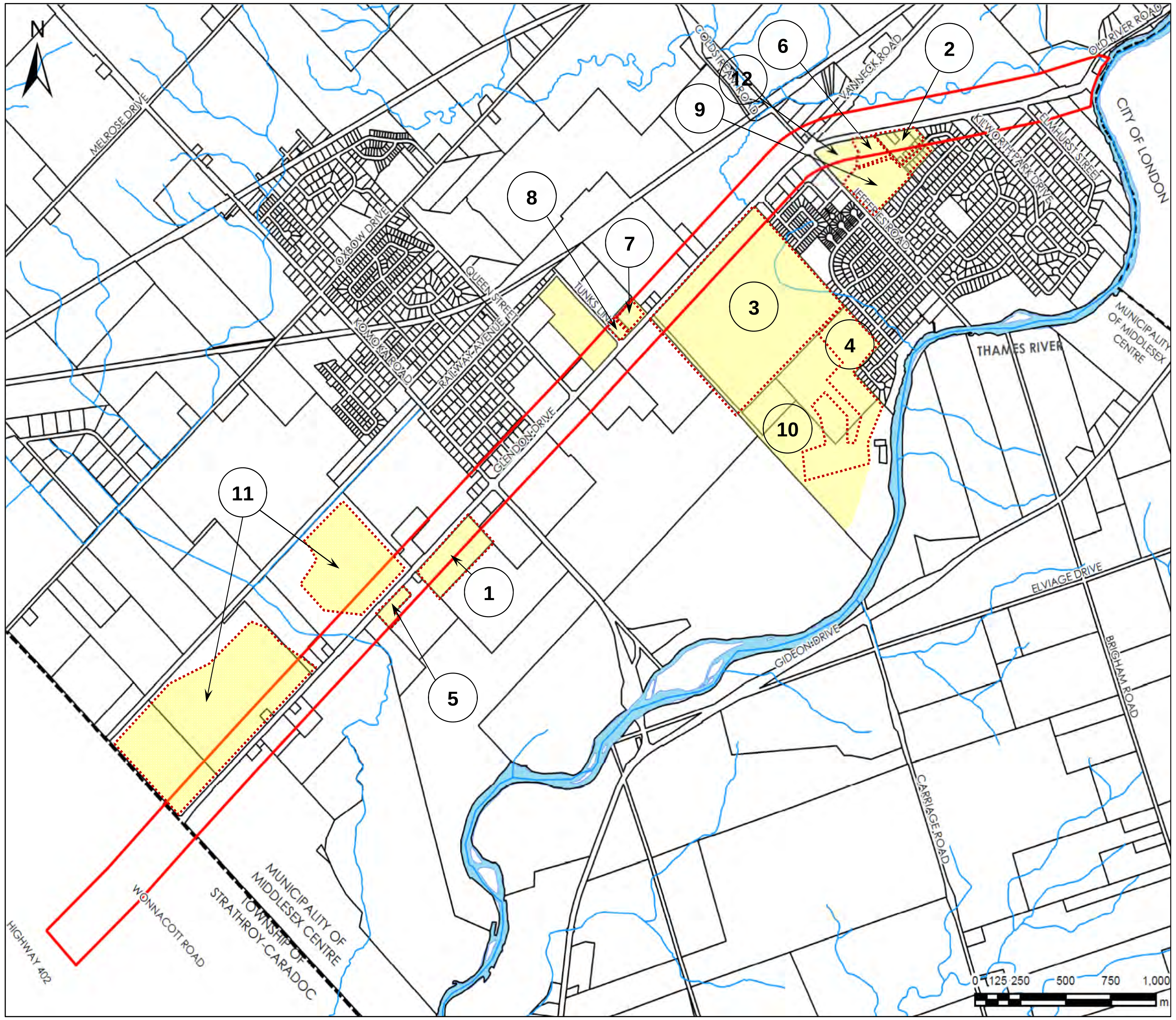
Table 9
AADT Volumes and Annual Growth

Station ID	2003	2005	2007	2009	2011	2013	2015	Growth Rate: 2003-2015
1401 (Glendon Drive)	9,425	10,691	10,400	9,545	12,454	11,448	12,161	2.1% per annum
3801 (Vanneck Road)	3,331	3,111	3,112	4,264	3,774	4,575	5,138	3.7% per annum

The historical growth trends indicate that traffic volumes along Glendon Drive and Vanneck Road have increased at an annual rate of 2.1% and 3.7%, respectively.

5.3 Future Developments

The locations of future developments are shown in **Figure 8**, and the land use details and supporting transportation studies (where available) are summarized in **Table 10**. It is our understanding that several of these developments are in the review process and are not yet approved.



1. **9879 Glendon Drive - Balla Lago Estates**
2. **10497 Glendon Drive - Birchcrest**
3. **10293 Glendon Drive - Black Property**
4. **Southwinds Development - Graham Property**
5. **9763 Glendon Drive - Elysium Spa**
6. **9 Dausett Drive - Kilworth Mews**
7. **10166 Glendon Drive - Potential Grocery Store**
8. **10148 Glendon Drive - Potential Retail**
9. **Kilworth Heights Residential Development**
10. **Segway Residential Development**
11. **Future Strategic Employment Lands - Industrial Park**
12. **Proposed Commercial Development - Glendon Dr/Jefferies Rd**

N

N.T.S.

Figure 8
Development Locations

Table 10
Future Background Developments

Development (Land Use)	Proposed or Potential Development
1. 9879 Glendon Drive – Balla Lago Estates (Residential)	32 single family detached units
2. 10497 Glendon Drive – Birchcrest (Residential)	32 single family detached units
3. 10293 Glendon Drive – Black Property (Residential/Commercial)	446 single family detached units, 790 townhouse units, 4.9 ha "Village Commercial" with assumed 20% coverage to estimate commercial floor area
4. Southwinds Development – Graham Property (Residential)	108 single family detached units
5. 9763 Glendon Drive – Elysium Spa (Recreational)	865 SM gross floor area
6. 9 Dausett Drive – Kilworth Mews (Residential)	19 single family detached units, 16 townhouses
7. 10166 Glendon Drive – Currently Garden Patch Green (Commercial)	N/A – No detailed information available (potential grocery store)
8. 10148 Glendon Drive – Unoccupied Lands (Commercial/Retail)	N/A – No detailed information available
9. Kilworth Heights (Residential)	58 single family detached units, 58 townhouses, 3.2 ha "Village Centre" with assumed 20% coverage to estimate commercial floor area
10. Segway Development (Residential)	525 single family residential units
11. Future Strategic Employment Areas (Business Park/Industrial Park)	Two parcels – 41.3 ha (west parcel) and 26.9 ha (east parcel)
12. Proposed Commercial Development – Litera Properties (Commercial/Retail)	7,000 SF Medical-Dental Office, 15,000 SF Hardware store, 25,000 SF Supermarket, 15,000 SF Pharmacy, 5,000 SF High turnover restaurant, 3,000 SF Fast food restaurant, Gas Bar w/ convenience store & 8 fueling stations

5.3.1 Trip Generation

The peak hour trip generation for the future developments was either taken from the traffic studies that were conducted at the time they were proposed, or where supporting studies were not available, the trip generation was estimated based on the proposed land use. For the latter developments, the trip generation was based on information contained in the manual, "Trip Generation, 9th Edition", published by the Institute of Transportation Engineers (ITE). Since development sites 7 and 8 did not have detailed land use information available (e.g. proposed commercial floor area), they were not considered at the time of writing.

To minimize the potential for double-counting trips between complementary land uses within the Study area (e.g. a home to work trip between residential and employment land uses being counted as both an outbound trip from a residence and an inbound trip to an employment area), the trip generation for employment and commercial land uses was adjusted to 50% of the ITE trip rates. For the purpose of the new development traffic assignment, the resultant site trips are summarized in **Table 11**.

Table 11
Future Developments
Site Trip Generation

Development (Land Use)	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
1. 9879 Glendon Drive – Balla Lago Estates (Residential)	8	24	32	24	14	38
2. 10497 Glendon Drive – Birchcrest (Residential)	8	24	32	24	14	38
3. 10293 Glendon Drive – Black Property (Residential/Commercial)	200	565	765	723	490	1,212
4. Southwinds Development – Graham Property (Residential)	21	64	85	71	42	113
5. 9763 Glendon Drive – Elysium Spa (Recreational)	7	7	13	20	15	35
6. 9 Dausett Drive – Kilworth Mews (Residential)	8	27	35	24	13	37
7. 10166 Glendon Drive – Currently Garden Patch Green (Commercial)	-	-	-	-	-	-
8. 10148 Glendon Drive – Unoccupied Lands (Commerical/Retail)	-	-	-	-	-	-
9. Kilworth Heights (Residential)	56	89	145	117	158	335
10. Segway Development (Residential)	100	295	395	335	195	530
11. Future Strategic Employment Areas (Industrial Park)	441	90	531	109	408	517
12. Proposed Commercial Development (Commercial/Retail)	216	172	388	320	318	638
Total	***1,065***	***1,357***	***2,421***	***1,767***	***1,667***	***3,493***

5.3.2 Distribution and Assignment

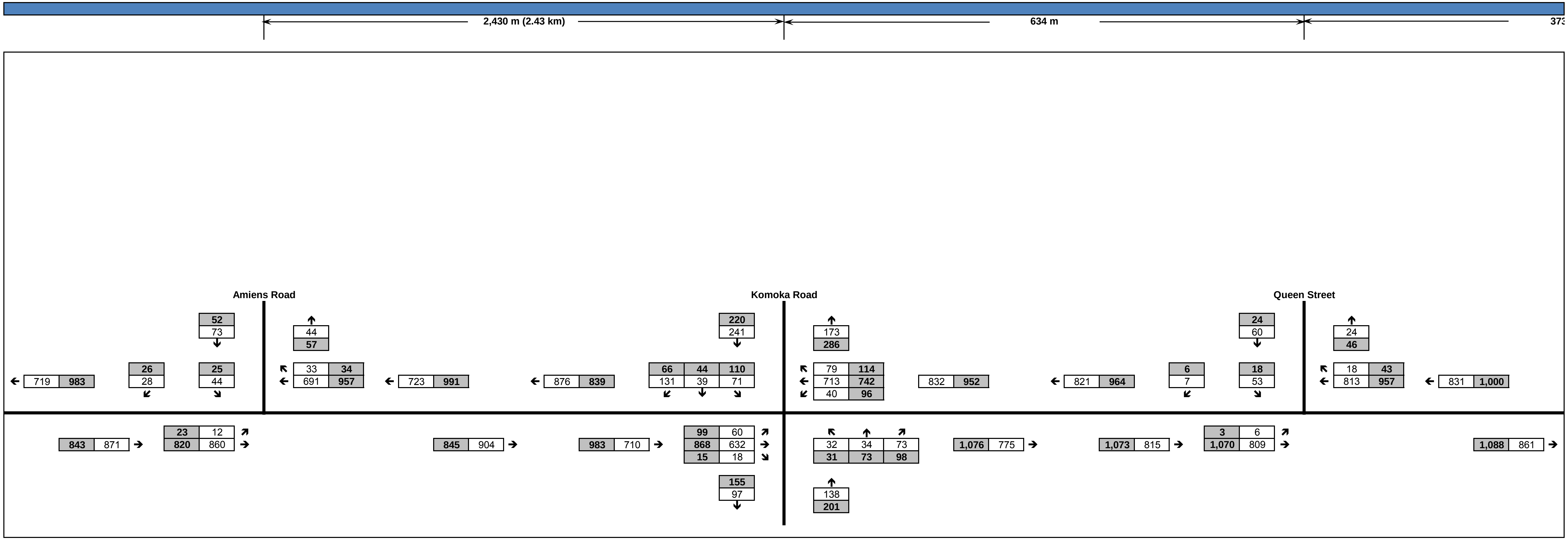
For each background development, the site trips were distributed and assigned to the Study Area intersections either according to the information in the supporting transportation studies, or where this information was not available, according to a combination of existing traffic patterns and the location of the development relative to the adjacent road network. The detailed trip distributions and site traffic assignments are provided for reference in **Appendix C**.

5.4 Total Traffic Forecast 20-Year Horizon

The future 2035 peak hour traffic forecasts are shown in **Figure 9**, which is broken into parts 1, 2, and 3 to cover the Study Area. The forecasts are a combination of existing traffic volumes, general background growth (5% increase over 20 years), and the future development site traffic assignments.

5.5 Review and Summary

The 2035 peak hour traffic forecasts were compared with the base year 2015 peak hour traffic volumes to determine the resultant growth rate. For the section of Glendon Drive in the vicinity of the County's count station 1401, the a.m. and p.m. peak hour annual compound growth rates were found to be 1.8% and 2.1%, respectively. For the section of Vanneck Road in the vicinity of the County's count station 3801, the a.m. and p.m. peak hour annual compound growth rates were found to be 3.2% and 3.9%, respectively. These growth rates generally reflect the comparable historical growth trend between 2003 and 2015, which was found to be 2.1% per annum at the Glendon Drive location (station 1401) and 3.7% per annum at the Vanneck Road location (station 3801). This comparison assists in confirming the reasonableness of the forecasts, and validates their use for determining future road and intersection requirements.

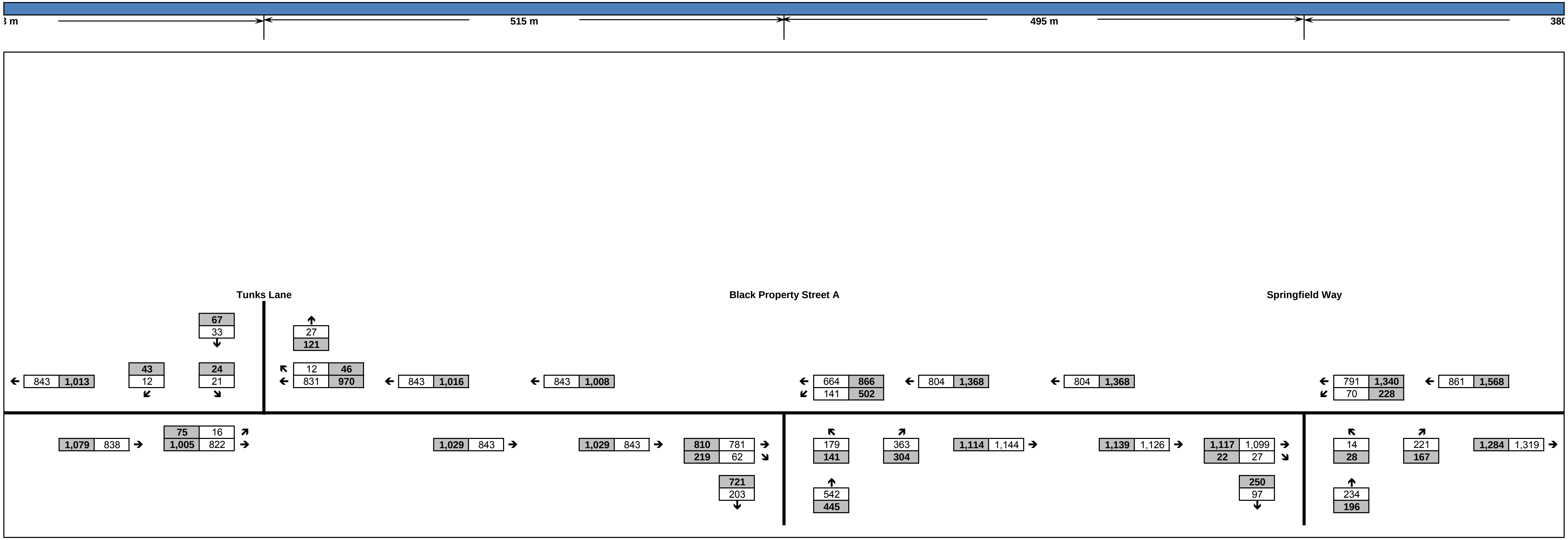


AM Peak Hour 123
PM Peak Hour **123**

N.T.S.

N

Figure 9
2035 Future Peak Hour Traffic Volumes
1/3

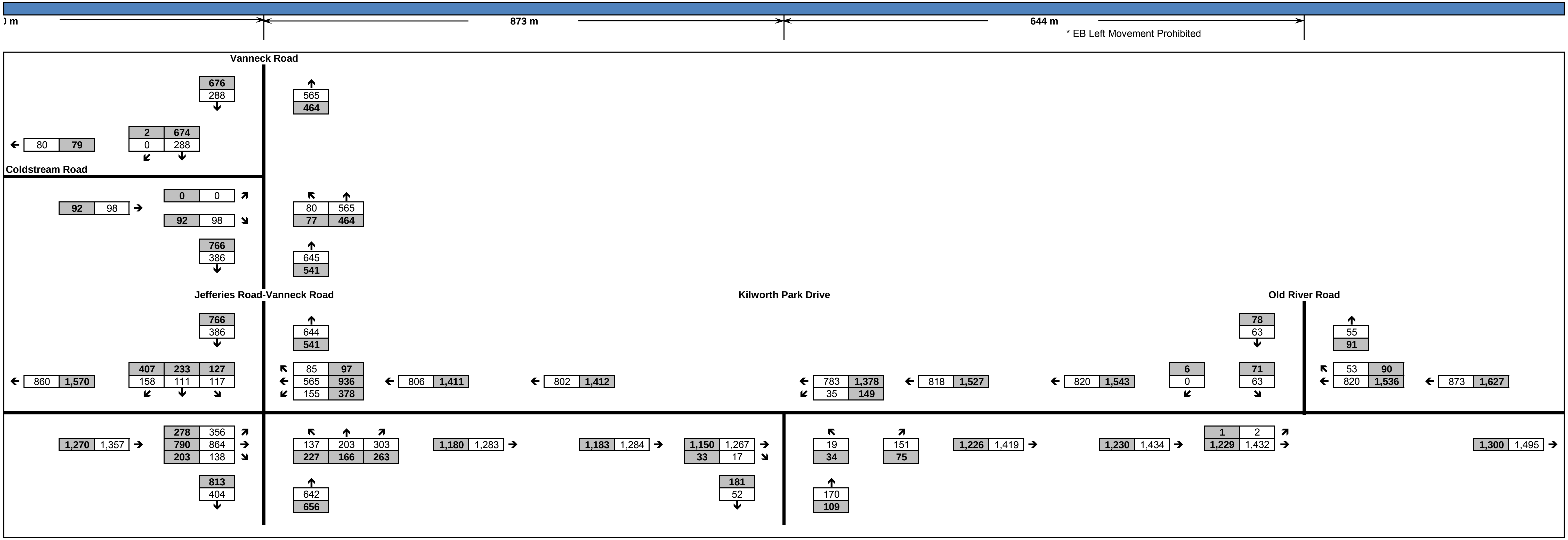


AM Peak Hour 123
PM Peak Hour **123**

N.T.S.

N

Figure 9
2035 Future Peak Hour Traffic Volumes
2/3



AM Peak Hour 123

PM Peak Hour **123**

N.T.S.

N

Figure 9

2035 Future Peak Hour Traffic Volumes

3/3

6.0 FUTURE TRANSPORTATION CONDITIONS

6.1 Roadway Capacity Analysis

The future roadway v/c ratios for road sections along Glendon Drive are summarized in **Table 12**. As was done for existing conditions, the following colour coding is utilized to further illustrate the v/c ratios:

Green	v/c < 0.80	'Good' flow condition
Orange	0.80 ≤ v/c < 0.90	'Unstable' flow condition
Red	0.90 ≤ v/c < 1.00	'Congested' flow condition
Dark Red	v/c ≥ 1.00	'Very Congested' flow condition

Table 12
Glendon Drive Mid-Block Roadway Link Capacity Analysis
Future Conditions, Existing Two-Lane Roadway

Road Section	AM Peak Hour				PM Peak Hour			
	EB		WB		EB		WB	
	Vol	v/c[1]	Vol	v/c	Vol	v/c[1]	Vol	v/c
West of Amiens Road	871	0.97	719	0.80	843	0.94	983	1.09
Amiens Road – Komoka Road	904	1.00	876	0.97	983	1.09	991	1.10
Komoka Road – Queen Street	815	0.91	832	0.92	1,076	1.20	964	1.07
Queen Street – Tunks Lane	861	0.96	843	0.94	1,088	1.21	1,013	1.13
Tunks Lane – Black Property Street A	843	0.94	843	0.94	1,029	1.14	1,016	1.13
Black Property Street A – Springfield Way	1,144	1.27	804	0.89	1,139	1.27	1,368	1.52
Springfield Way - Jefferies Road-Vanneck Road	1,357	1.51	861	0.96	1,284	1.43	1,570	1.74
Jefferies Road-Vanneck Road – Kilworth Park Drive	1,284	1.43	806	0.90	1,183	1.31	1,412	1.57
Kilworth Park Drive – Old River Road	1,434	1.59	820	0.91	1,230	1.37	1,543	1.71

[1] *v/c = two-way traffic/capacity of 900 vehicles per hour per lane*

The mid-block roadway link analysis indicates that the 2035 traffic volume demands would exceed the capacity of the current two-lane roadway. Therefore, the traffic forecasts have been re-analyzed assuming an improvement to a four-lane road (two travel lanes in each direction). The analysis results are summarized in **Table 13**.

Table 13
Glendon Drive Mid-Block Roadway Link Capacity Analysis
Future Conditions, Four-Lane Roadway

Road Section	AM Peak Hour				PM Peak Hour			
	EB		WB		EB		WB	
	Vol	v/c[1]	Vol	v/c	Vol	v/c[1]	Vol	v/c
West of Amiens Road	871	0.48	719	0.40	843	0.47	983	0.55
Amiens Road – Komoka Road	904	0.50	876	0.49	983	0.55	991	0.55
Komoka Road – Queen Street	815	0.45	832	0.46	1,076	0.60	964	0.54
Queen Street – Tunks Lane	861	0.48	843	0.47	1,088	0.60	1,013	0.56
Tunks Lane – Black Property Street A	843	0.47	843	0.47	1,029	0.57	1,016	0.56
Black Property Street A – Springfield Way	1,144	0.64	804	0.45	1,139	0.63	1,368	0.76
Springfield Way - Jefferies Road-Vanneck Road	1,357	0.75	861	0.48	1,284	0.71	1,570	0.87
Jefferies Road-Vanneck Road – Kilworth Park Drive	1,284	0.71	806	0.45	1,183	0.66	1,412	0.78
Kilworth Park Drive – Old River Road	1,434	0.80	820	0.46	1,230	0.68	1,543	0.86

[1] *v/c = two-way traffic/capacity of 900 vehicles per hour per lane (1,800 vphpl per direction with four lane roadway)*

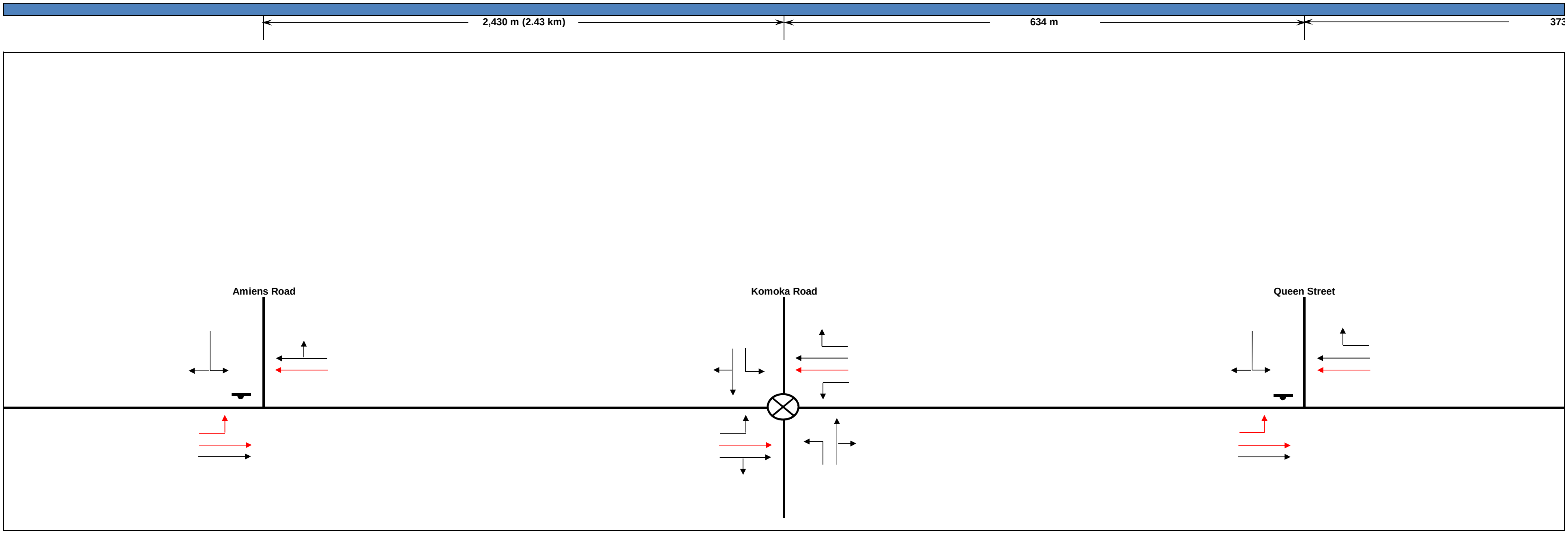
As shown above, Glendon Drive as a four-lane road would be able to accommodate the future traffic projections.

6.2 Intersection Traffic Operations

To assess the operating conditions and lane requirements for the 2035 future weekday a.m. and p.m. peak hour forecasts, a level of service analysis was undertaken using the same methodology as in the analysis of existing conditions. The following improvements were assumed for the future analysis:

- Glendon Drive as a four-lane road from a point east of Highway 402 to a point east of the Glendon Drive/Kilworth Park Drive intersection, auxiliary left turn and right turn lanes provided along Glendon Drive where required for either capacity or safety, and new traffic signals on Glendon Road at the proposed Black property development's site access Street A and Springfield Way. The lane configurations and traffic control used for the analysis of future traffic conditions are illustrated in **Figure 10**; and
- Signal timing plans optimized within existing cycle lengths and phases at Glendon Drive/Komoka Road and the signal cycle length increased from the existing 60 seconds to 90 seconds at Glendon Drive/Jefferies Road-Vanneck Road with advanced green phases added.

The results of the operational analysis for future conditions are presented by intersection or by pairs of intersections where appropriate (i.e. serving common land uses or closely spaced together). The Synchro analysis output is provided for reference in **Appendix D**.



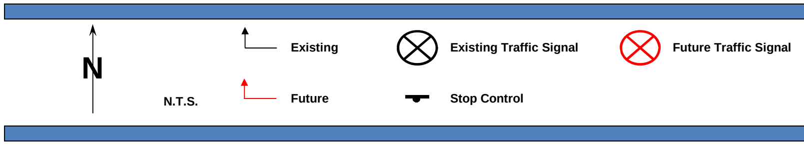


Figure 10
Future Lane Configurations and Traffic Control for Analysis
1/3

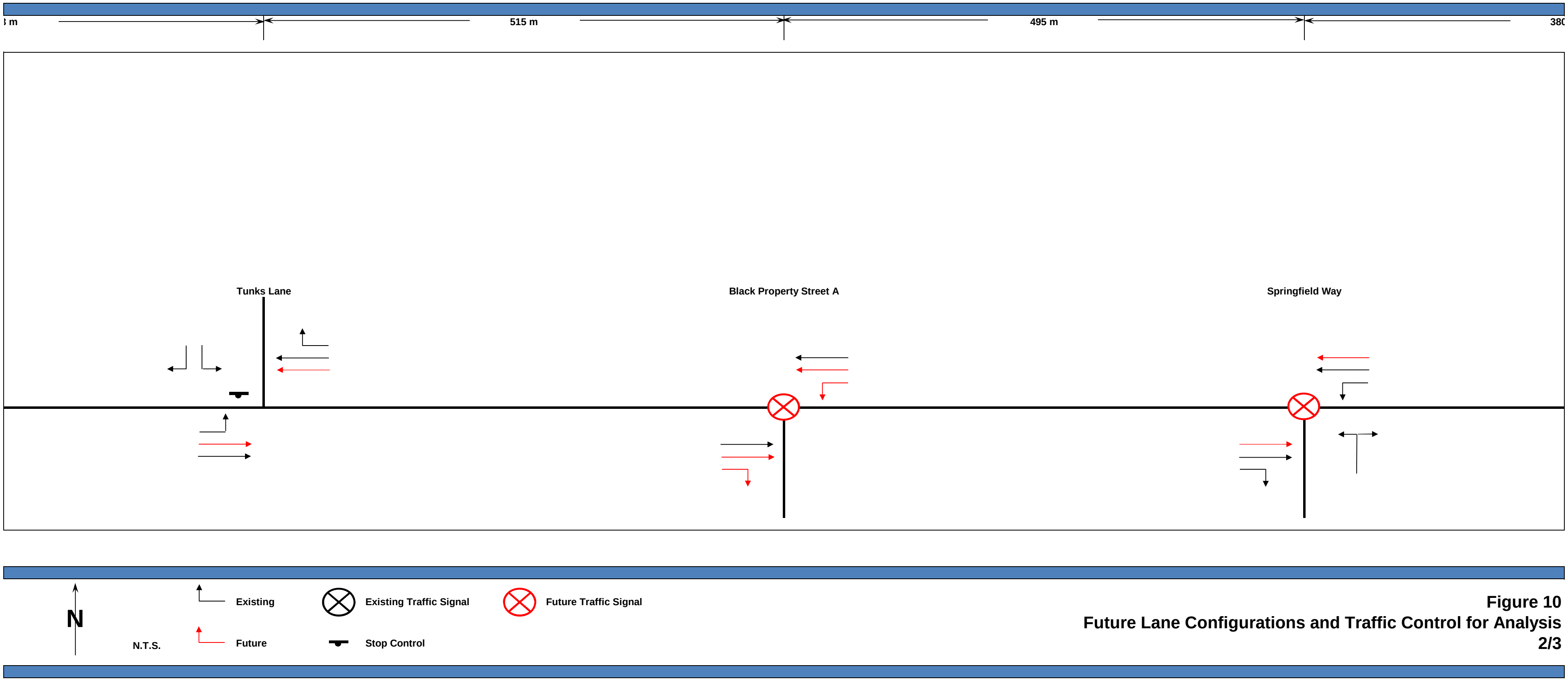


Figure 10
Future Lane Configurations and Traffic Control for Analysis
2/3

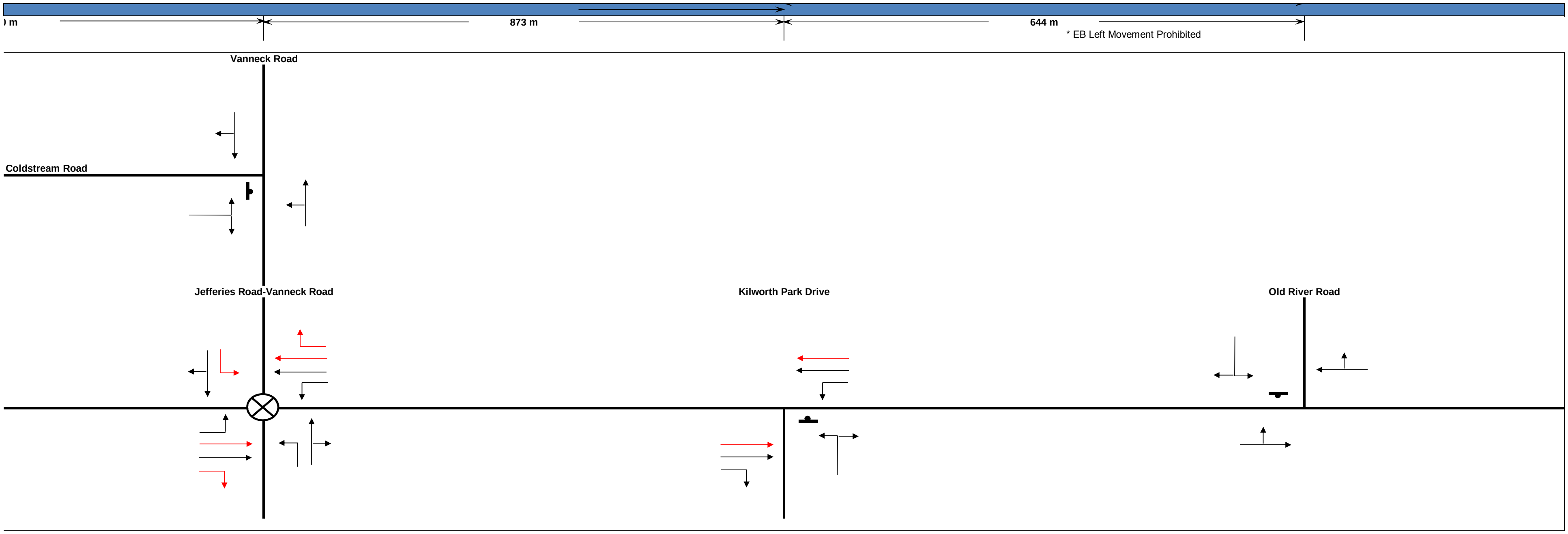


Figure 10

Future Lane Configurations and Traffic Control for Analysis

3/3

The analysis of the Glendon Drive/Amiens Road intersection is presented in **Table 14**. This T-intersection was analyzed with an auxiliary eastbound left turn lane. While it was found that the future eastbound left turn volumes would not meet typical warrant thresholds for an auxiliary turn lane, it was recognized that there would be potential safety issues without a left turn lane due to this section of Glendon Drive having relatively high future traffic volumes and a higher speed operation.

Table 14
Future 2035 Conditions, Glendon Drive/Amiens Road
Peak Hour Operational Analysis

Intersection	**Approach/Movement**		**AM Peak Hour**				**PM Peak Hour**			
			LOS[1]	**Delay[2]**	**v/c[3]**	**Q[4]**	**LOS[1]**	**Delay[2]**	**v/c[3]**	**Q[4]**
Glendon Drive/ Amiens Road *Unsignalized*	EB	Left	A	10	0.02	< 1	B	11	0.04	1
		Dual Thru	Unopposed Movement							
	WB	Thru-Thru/Right	Unopposed Movement							
	SB	Left/Right	D	27	0.31	10	D	34	0.31	9

[1] Level of Service, LOS E/F highlighted, if any; [2] Delay in seconds; [3] Volume to capacity ratio, 0.90 and higher highlighted, if any; [4] 95th Percentile queue in metres

Under future conditions, the Glendon Road/Amiens Road intersection is shown to operate at an acceptable level of service as an unsignalized intersection.

The analysis of the Glendon Drive/Komoka Road signalized intersection is presented in **Table 15**.

Table 15
Future 2035 Conditions, Glendon Drive/Komoka Road
Peak Hour Operational Analysis

Intersection	**Approach/Movement**		**AM Peak Hour**				**PM Peak Hour**			
			LOS[1]	**Delay[2]**	**v/c[3]**	**Q[4]**	**LOS[1]**	**Delay[2]**	**v/c[3]**	**Q[4]**
Glendon Drive/ Komoka Road *Signalized*	EB	Left	B	13	0.25	12	B	14	0.35	17
		Thru-Thru/Right	B	13	0.45	38	B	13	0.54	49
	WB	Left	B	11	0.15	8	B	17	0.43	19
		Dual Thru	B	13	0.49	43	B	12	0.45	40
		Right	B	10	0.05	6	A	9	0.07	7
	NB	Left	B	14	0.09	8	B	16	0.09	8
		Thru/Right	B	14	0.12	12	B	17	0.22	19
	SB	Left	B	16	0.23	17	B	18	0.30	21
		Thru/Right	B	15	0.20	17	B	16	0.13	13
	Overall Intersection		***B***	***13***	***0.38***	**-**	***B***	***13***	***0.45***	**-**

[1] Level of Service, LOS E/F highlighted, if any; [2] Delay in seconds; [3] Volume to capacity ratio, 0.90 and higher highlighted, if any; [4] 95th Percentile queue in metres

Under future conditions, the Glendon Road/ Komoka Road intersection is shown to operate at an acceptable level of service. All movements would operate at LOS C or better, and well within the intersection's theoretical capacity.

The analysis of the Glendon Drive/Queen Street and Glendon Drive/Tunks Lane T-intersections is presented in **Table 16**. The Glendon Drive/Queen Street intersection was analyzed with an auxiliary eastbound left turn lane and an auxiliary westbound right turn lane. While these lanes are not warranted from a traffic volume perspective, they were included to recognize the safety benefits of exclusive turn lanes. The same auxiliary turn lanes are part of existing conditions at the Glendon Drive/Tunks Lane intersection.

Table 16
Future 2035 Conditions, Glendon Drive at Queen Street and at Tunks Lane
Peak Hour Operational Analysis

Intersection	**Approach/Movement**		**AM Peak Hour**				**PM Peak Hour**			
			LOS[1]	**Delay[2]**	**v/c[3]**	**Q[4]**	**LOS[1]**	**Delay[2]**	**v/c[3]**	**Q[4]**
Glendon Drive/ Queen Street *Unsignalized*	EB	Left	A	10	0.01	< 1	B	12	0.01	< 1
		Dual Thru	Unopposed Movement							
	WB	Dual Thru	Unopposed Movement							
		Right	Unopposed Movement							
	SB	Left/Right	E	42	0.41	14	E	39	0.19	5
Glendon Drive/ Tunks Lane *Unsignalized*	EB	Left	B	12	0.03	1	B	11	0.12	3
		Dual Thru	Unopposed Movement							
	WB	Dual Thru	Unopposed Movement							
		Right	Unopposed Movement							
	SB	Left	E	39	0.17	5	F	72	0.32	9
		Right	B	12	0.02	1	B	13	0.09	2

[1] Level of Service, LOS E/F highlighted, if any; [2] Delay in seconds; [3] Volume to capacity ratio, 0.90 and higher highlighted, if any; [4] 95th Percentile queue in metres

Under future conditions, the traffic operations at the unsignalized intersections of both Glendon Drive/Queen Street and Glendon Drive/Tunks Lane would be characterized by long delays (LOS E/F) for the southbound approaches during both the a.m. and p.m. peak hours. The long delays would be related to having fewer and shorter gaps in traffic along Glendon Drive with higher traffic volumes in the future. This is not an unusual condition where a minor road operating under stop control intersects with a major road. Notwithstanding the delays, each of the southbound approaches would operate within capacity. While the need for further improvements is not demonstrated by this analysis, it would be prudent to monitor traffic conditions at both intersections to determine the need for additional traffic control measures. With the Glendon Drive/Tunks Lane intersection providing access to the Komoka Community Centre and Wellness & Recreation Complex, it could be considered a likely location for signalization at some point in the future.

The analysis of the Glendon Drive/Street A (Black Property) and Glendon Drive/Springfield Way intersections is presented in **Table 17**. Based on the recommendations of the Traffic Impact Study conducted for the proposed development of the Black Property (and other new developments on adjacent lands), both intersections were analyzed with traffic signal control. A westbound left turn lane and an eastbound right turn lane were also included for the analysis of the Glendon Drive/Street A intersection. The same auxiliary turn lanes are part of existing conditions at the Glendon Drive/Springfield Way intersection.

Table 17
Future 2035 Conditions, Glendon Drive at Street A and at Springfield Way
Peak Hour Operational Analysis

Intersection	**Approach/Movement**		**AM Peak Hour**				**PM Peak Hour**			
			LOS[1]	**Delay[2]**	**v/c[3]**	**Q[4]**	**LOS[1]**	**Delay[2]**	**v/c[3]**	**Q[4]**
Glendon Drive/ Black Property Street A *Signalized*	EB	Dual Thru	B	12	0.43	55	C	34	0.79	95
		Right	A	9	0.04	5	C	23	0.17	17
	WB	Left	C	26	0.51	31	D	36	0.80	127
		Dual Thru	C	20	0.36	58	A	7	0.39	59
	NB	Left	C	26	0.35	44	D	35	0.43	41
		Right	C	31	0.59	68	C	32	0.21	21
	Overall Intersection		***B***	***20***	***0.54***	**-**	***C***	***25***	***0.70***	**-**
Glendon Drive/ Springfield Way *Signalized*	EB	Dual Thru	A	8	0.54	41	C	31	0.72	105
		Right	A	4	0.02	1	C	35	0.02	2
	WB	Left	A	10	0.35	7	C	21	0.58	27
		Dual Thru	A	6	0.39	27	A	9	0.60	79
	NB	Left	C	25	0.03	7	C	30	0.08	11
		Right	C	30	0.41	28	C	30	0.11	16
	Overall Intersection		***A***	***10***	***0.50***	**-**	***C***	***20***	***0.55***	**-**

[1] Level of Service, LOS E/F highlighted, if any; [2] Delay in seconds; [3] Volume to capacity ratio, 0.90 and higher highlighted, if any; [4] 95th Percentile queue in metres

Under future conditions, both the Glendon Drive/Street A and Glendon Drive/Springfield Way intersections would operate at an acceptable level of service. All movements would operate at LOS D or better, and well within the intersection's theoretical capacity.

The analysis of the Glendon Drive/Jefferies Road-Vanneck Road and Vanneck Road/Coldstream Road intersections is presented in **Table 18**. Under the future analysis, signal timings were optimized at the Glendon Drive/Jefferies Road-Vanneck Road intersection to account for the higher traffic volumes and to minimize overall intersection delay. The cycle length was increased from the existing 60 seconds to 90 seconds. This included examining several different combinations of signal splits and advance turn phasing. The background traffic studies for the Black Property and Segway proposed developments identified the need for geometric improvements at this intersection including an auxiliary southbound left turn lane. Also with the higher traffic forecasts developed for the EA, auxiliary eastbound and westbound right turn lanes on the Glendon Drive approaches were also incorporated in the analysis.

Table 18
Future 2035 Conditions, Glendon Drive at Jefferies Road-Vanneck Road and at Coldstream Road
Peak Hour Operational Analysis

Intersection	Approach/Movement		AM Peak Hour				PM Peak Hour			
			LOS[1]	Delay[2]	v/c[3]	Q[4]	LOS[1]	Delay[2]	v/c[3]	Q[4]
Glendon Drive/ Jefferies Road-Vanneck Road *Signalized*	EB	Left	E	64	0.97	80	F	174	1.23	91
		Dual Thru	B	20	0.56	79	D	36	0.70	79
		Right	B	18	0.16	21	D	44	0.25	31
	WB	Left	D	54	0.80	59	F	181	1.31	115
		Dual Thru	C	25	0.49	57	C	32	0.80	105
		Right	B	20	0.06	8	C	20	0.07	11
	NB	Left	C	32	0.48	38	F	194	1.30	77
		Thru/Right	E	72	0.99	144	D	37	0.74	102
	SB	Left	C	30	0.53	23	C	30	0.56	25
		Thru/Right	C	21	0.35	42	F	123	1.16	192
	Overall Intersection		***D***	***36***	***0.84***	***-***	***F***	***80***	***1.20***	***-***
Vanneck Road/ Coldstream Rd *Unsignalized*	EB	Left/Right	B	11	0.17	5	C	16	0.23	7
	NB	Left/Thru	A	2	0.08	2	A	2	0.09	2
	SB	Thru/Right	Unopposed Movement							

[1] Level of Service, LOS E/F highlighted, if any; [2] Delay in seconds; [3] Volume to capacity ratio, 0.90 and higher highlighted, if any; [4] 95th Percentile queue in metres

Under future conditions, both the Glendon Drive/Jefferies Road-Vanneck Road and Vanneck Road/Coldstream Road intersections would operate at an acceptable level of service under the a.m. peak hour. Notwithstanding this finding, there would be several movements at the Glendon Drive/Jefferies Road-Vanneck Road intersection approaching capacity and several movements over capacity under the p.m. peak hour. It should also be recognized that the proximity of the Vanneck Road/Coldstream Road intersection to Glendon Drive (approximately 20m) represents safety and operational concerns due to the many potential conflict points that result within a small physical area. As part of the EA, alternative intersection designs will be examined to address these concerns.

The analysis of the Glendon Drive/Kilworth Park Drive and Glendon Drive/Old River Road T-intersections is presented in **Table 19**. The analysis includes the existing eastbound right turn lane and westbound left turn lane at the Glendon Drive/Kilworth Park Drive intersection. For northbound left turns from Kilworth Park Drive to Glendon Drive, the analysis included two-stage left turn movements – first to the centre median area and second merging with westbound traffic. The existing lanes were used for the analysis of the Glendon Drive/Old River Road intersection due to the proximity of the bridge over the Thames River just to the east of this intersection. The potential future widening of the bridge is beyond the scope of this EA.

Table 19
Future 2035 Conditions
Peak Hour Operational Level of Service Analysis

Intersection	Approach/Movement		AM Peak Hour				PM Peak Hour			
			LOS[1]	Delay[2]	v/c[3]	Q[4]	LOS[1]	Delay[2]	v/c[3]	Q[4]
Glendon Drive/ Kilworth Park Drive *Unsignalized*	EB	Dual Thru	Unopposed Movement							
		Right	Unopposed Movement							
	WB	Left	B	13	0.08	2	B	14	0.27	8
		Dual Thru	Unopposed Movement							
	NB	Left/Right	D	25	0.51	21	C	24	0.38	13
Glendon Drive/ Old River Road *Unsignalized*	EB	Left/Thru	A	< 1	0.00	< 1	A	< 1	0.00	< 1
	WB	Thru/Right	Unopposed Movement							
	SB	Left/Right	F	586	1.75	54	F	Err[5]	4.40	Err[5]

[1] Level of Service, LOS E/F highlighted, if any; [2] Delay in seconds; [3] Volume to capacity ratio, 0.90 and higher highlighted, if any; [4] 95th Percentile queue in metres; [5] Err =Error cannot calculate

Under future conditions, the Glendon Drive/Kilworth Park Drive intersection would operate with all movements at LOS C and within capacity. While the need for further improvements is not demonstrated by this analysis, it would be prudent to monitor traffic conditions at this intersection to determine the need for additional traffic control measures. With this intersection providing access to several commercial developments and a large residential subdivision to the south of Glendon Drive, it could be considered a likely location for signalization at some point in the future.

The Glendon Drive/Old River Road intersection would operate with extremely long delays for southbound traffic movements from Old River Road assuming both left and right turns will continue to be permitted. With the eastbound left turn movement from Glendon Drive to Old River Road currently prohibited, consideration could be given to restricting access to Old River Road to right turns in and out only as an interim improvement to address previously noted safety concerns as well as the future capacity issue. If restricted to right turns only, the southbound approach of Old River Road would operate at an acceptable level of service during the future peak hours (LOS D or better). Further improvements at this intersection would be dependent on increasing the traffic carrying capacity of the bridge structure on Glendon Drive immediately east of Old River Road (i.e. widening to four lanes).

6.3 Active Transportation Analysis

The Komoka-Kilworth Secondary Plan identifies a proposed boulevard multi-use trail in the Glendon Drive corridor between Komoka Road and Queen Street. The Secondary Plan also shows proposed multi-use trails intersecting with Glendon Drive at a location west of Komoka Road, along a new collector road extending north from Crestview Drive, and at Jeffries Road.

In the Middlesex Centre Trails Master Plan (2014) the Glendon Drive corridor is identified as a proposed secondary trail between the Thames River bridge and approximately 500m east of Amiens Rd; and as a potential cycling route between the Thames River bridge and Komoka Road. Komoka Road is also identified as a proposed cycling route. The Plan also shows 8 connections along the Glendon Drive corridor to other proposed secondary trails.

Considerations for accommodating active transportation under existing conditions must take into account very high 85th percentile operating speeds (approaching or exceeding 90km/h) along Glendon Drive. In addition, existing two-way daily traffic volumes on Glendon Drive are approximately 10,000 vehicles per day and are projected to approximately double by 2035.

Following existing provincial guidance provided in Ontario Traffic Manual (OTM) Book 18 for the preselection of appropriate bicycle facilities, existing conditions along Glendon Drive warrant consideration of physically or spatially separated active transportation facilities. **Figure 11** shows the nomograph provided in OTM Book 18 for the preselection of bicycle facilities based on 85th percentile speeds and traffic volumes along a corridor.

A facility such as a boulevard multi-use trail would be most appropriate based on a consideration of the existing speeds and volumes of traffic along the corridor, and in a scenario where future speeds are similar to existing. OTM Book 18 guidance also suggests that in rural locations where it may not be possible to provide physically separated facilities, a paved shoulder with a painted buffer may be an alternative treatment for a bicycle facility (Ontario Traffic Manual Book 18).

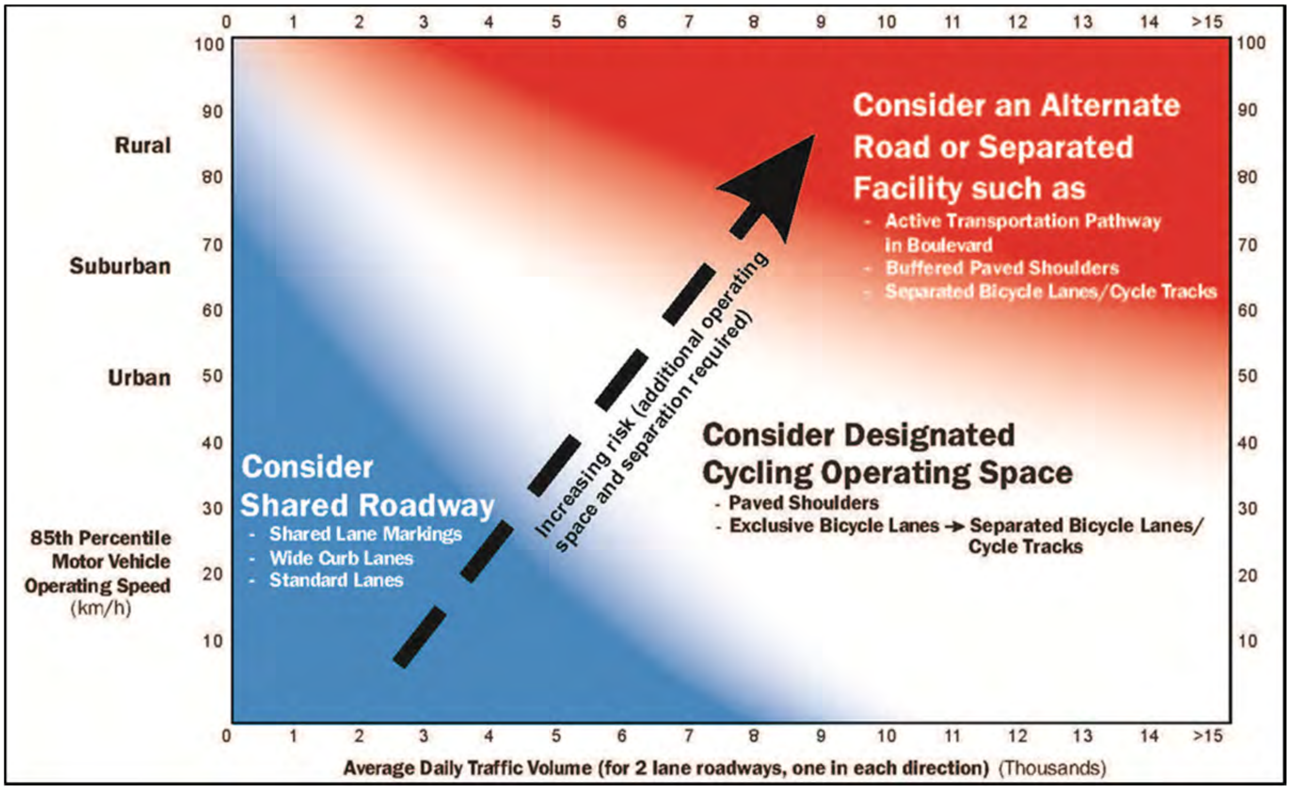


Figure 11 – Cycling Facility Preselection Nomograph (OTM Book 18, 2013)

Further analysis of the Glendon Drive corridor shows that this route currently provides an important east-west connection linking the Komoka and Kilworth town centres as well as providing access to the Wellness Centre and to the Komoka Provincial Park trails (there are currently no alternative routes available). Consequently, it can be described today as a rural corridor with relatively infrequent intersections, which accommodates a vehicle mix of approximately 5% to 9% heavy vehicles per day. The presence of heavy vehicles in addition to the speeds and volumes of traffic in shared traffic lanes has significant impacts on safety and comfort for active transportation users. Although there have been no reported collisions involving pedestrians or cyclists between 2010 and 2015, this must be considered in the context of low levels of observed pedestrian and bicycle activity. These details further support the conclusions of the facility preselection and indicate that a separated facility such as a boulevard multi-use trail should be further investigated to accommodate active transportation along Glendon Drive while it remains a two lane roadway.

If Glendon Drive is assumed to be a four lane roadway in the future with a similar role and function, but with increased urban development and accesses along the corridor, the selection of bike facilities could reasonably be expanded to include consideration of on-street bike lanes (exclusive bike lanes or separated bike lanes) in combination with sidewalks for exclusive pedestrian use.

7.0 SUMMARY OF FUTURE TRANSPORTATION IMPROVEMENTS

Based on the traffic forecasts prepared for a 20 year horizon (2035), it is clear that there will be a need for an additional lane of east-west road capacity to serve future development within and immediately adjacent to the Glendon Drive corridor. In this technical memorandum, it has been shown that widening Glendon Drive to four lanes would satisfy the capacity requirements. While improvements to parallel east-west roads, such as Oxbow Drive to the north and Gideon Drive (County Road 3), could be considered as alternatives to widening Glendon Drive, the use of these roadways would require indirect travel to or from the future developments situated along Glendon Drive and would not preclude the need to make substantial intersection improvements along Glendon Drive. Further, Oxbow Drive and Gideon Drive do not provide a comparable function to Glendon Drive in terms of direct access to Highway 402 to the west and to the City of London to the east. Therefore, from a traffic capacity perspective, widening Glendon Drive would be preferred over improvements to the parallel east-west roads.

In addition to an additional through lane in each direction, the traffic operations improvements to intersections along the Glendon Drive corridor would include the following:

- At Amiens Road: eastbound auxiliary left turn lane;
- At Komoka Road: optimize signal timings;
- At Queen Street: eastbound auxiliary left turn lane and westbound auxiliary right turn lane;
- At Tunks Lane: monitor for potential future need for traffic signals, and consider including traffic signal underground duct work as part of a future reconstruction of this intersection;
- At Street A (access to future Black Property development): traffic signals, and westbound auxiliary left turn lane and eastbound auxiliary right turn lane;
- At Springfield Way: traffic signals;
- At Jefferies Road-Vanneck Road: optimize signal timings, eastbound and westbound auxiliary right turn lanes, and southbound auxiliary left turn lane;
- At Kilworth Park Drive: monitor for potential future need for traffic signals, and consider including traffic signal underground duct work as part of a future reconstruction of this intersection;
- At Old River Road: consider restricting access to right turns in and right turns out as an interim improvement prior to the implementation of potential future traffic carrying capacity improvements to the Glendon Drive bridge structure over the Thames River.

As related to future improvements to the Glendon Drive/ Jefferies Road-Vanneck Road intersection, design alternatives should be considered for the intersection of Vanneck Road/Coldstream Road to address the traffic safety and operational concerns related to its close proximity (approximately 20m) to Glendon Drive.

It can also be anticipated that additional road improvements will be required to facilitate access for future commercial-retail land uses with frontage along Glendon Drive as well as to the employment lands located along the north side of Glendon Drive between Amiens Road and Komoka Road. The details of the access requirements would be determined through Traffic Impact Studies conducted in support of proposed developments.

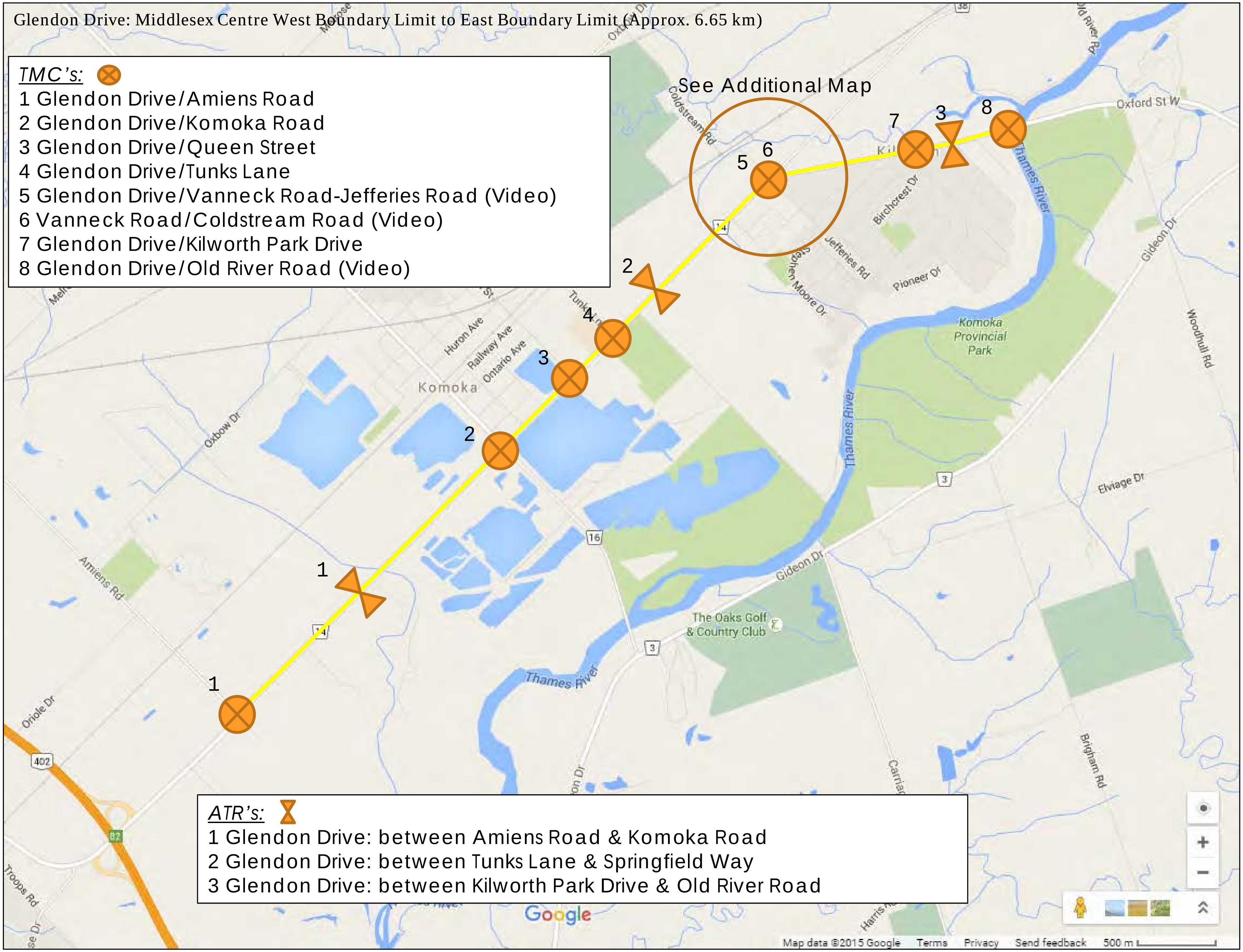
With the widening of Glendon Drive, the active transportation network can also be improved. As discussed within the technical memorandum, the alternatives for completing an east-west active transportation network would include multi-use boulevard paths for use by both pedestrians and cyclists, or with a four lane Glendon Drive, on-street bike lanes (exclusive bike lanes or separated bike lanes) and sidewalks for exclusive use by pedestrians. This range of alternatives could represent interim and ultimate improvements. In addition to the improvements for east-west active transportation, the north-south movement of pedestrians and cyclists would be facilitated at new signalized intersections where controlled crossings of Glendon Drive would be provided. At all existing and new signalized intersections, pedestrian signal heads and crosswalks should be provided. Design alternatives for accommodating cyclists at signalized intersections will be considered in the next phase of the EA.

Attachment: Appendix A, Appendix B, Appendix C, and Appendix D

c.

APPENDIX A

TRAFFIC DATA



Glendon Drive: Middlesex Centre West Boundary Limit to East Boundary Limit (Approx. 6.65 km)

TMC's: ⊗
1 Glendon Drive/Amiens Road
2 Glendon Drive/Komoka Road
3 Glendon Drive/Queen Street
4 Glendon Drive/Tunks Lane
5 Glendon Drive/Vanneck Road-Jefferies Road (Video)
6 Vanneck Road/Coldstream Road (Video)
7 Glendon Drive/Kilworth Park Drive
8 Glendon Drive/Old River Road (Video)

ATR's: ⧗
1 Glendon Drive: between Amiens Road & Komoka Road
2 Glendon Drive: between Tunks Lane & Springfield Way
3 Glendon Drive: between Kilworth Park Drive & Old River Road

Glendon Drive & Amiens Road

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

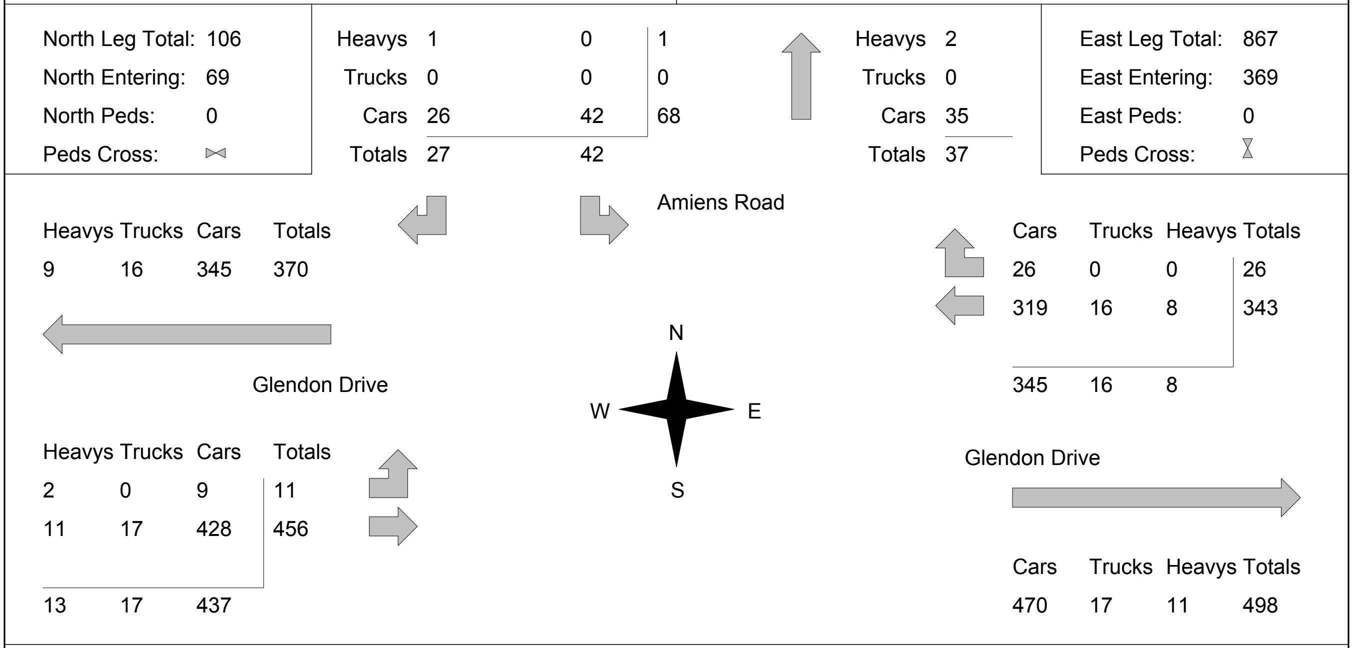
Municipality: Komoka
Site #: 0000003301
Intersection: Glendon Drive & Amiens Road
TFR File #: 3
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E



North Leg Total: 106
North Entering: 69
North Peds: 0
Peds Cross: ⋈

Heavys	1	0	1
Trucks	0	0	0
Cars	26	42	68
Totals	27	42	

Heavys	2
Trucks	0
Cars	35
Totals	37

East Leg Total: 867
East Entering: 369
East Peds: 0
Peds Cross: ⧗

Heavys	Trucks	Cars	Totals
9	16	345	370

Cars	Trucks	Heavys	Totals
26	0	0	26
319	16	8	343
345	16	8	

Heavys	Trucks	Cars	Totals
2	0	9	11
11	17	428	456
13	17	437	

Cars	Trucks	Heavys	Totals
470	17	11	498

Peds Cross: ⧗
West Peds: 0
West Entering: 467
West Leg Total: 837

Comments

Glendon Drive & Amiens Road

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 13:30:00

One Hour Peak
From: 12:30:00
To: 13:30:00

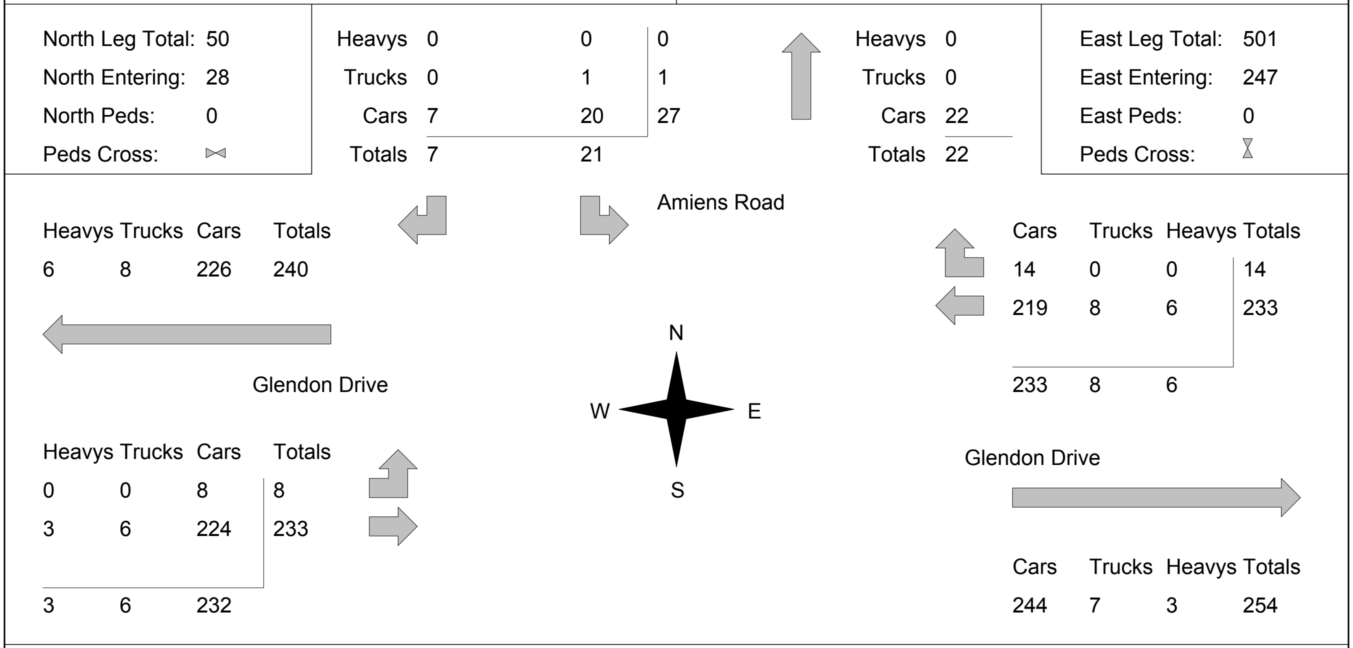
Municipality: Komoka
Site #: 0000003301
Intersection: Glendon Drive & Amiens Road
TFR File #: 3
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E



North Leg Total:	50
North Entering:	28
North Peds:	0
Peds Cross:	⋈

Heavys	0	0	0
Trucks	0	1	1
Cars	7	20	27
Totals	7	21	

Heavys	0
Trucks	0
Cars	22
Totals	22

East Leg Total:	501
East Entering:	247
East Peds:	0
Peds Cross:	⧗

Heavys	Trucks	Cars	Totals
6	8	226	240

Cars	Trucks	Heavys	Totals
14	0	0	14
219	8	6	233
233	8	6	

Heavys	Trucks	Cars	Totals
0	0	8	8
3	6	224	233
3	6	232	

Cars	Trucks	Heavys	Totals
244	7	3	254

Peds Cross:	⧗
West Peds:	0
West Entering:	241
West Leg Total:	481

Comments

Glendon Drive & Amiens Road

Afternoon Peak Diagram

Specified Period		**One Hour Peak**	
From:	15:00:00	**From:**	16:30:00
To:	18:00:00	**To:**	17:30:00

Municipality: Komoka
Site #: 0000003301
Intersection: Glendon Drive & Amiens Road
TFR File #: 3
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

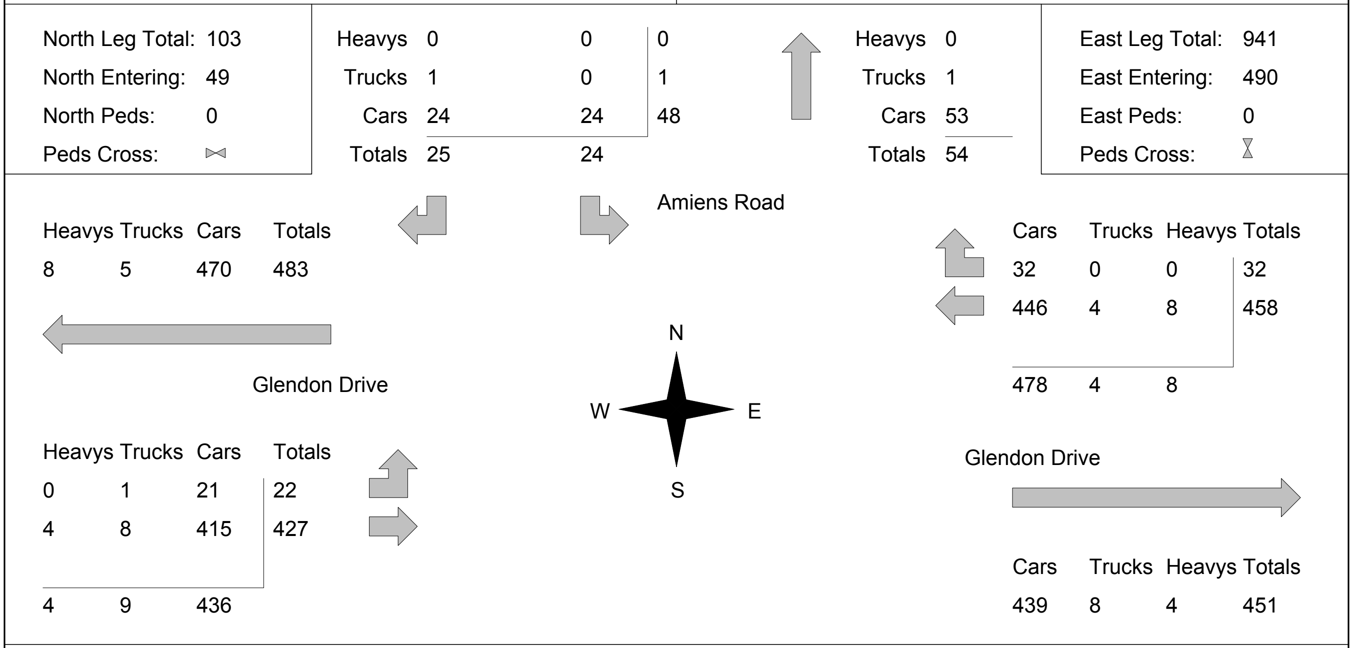
Major Road: Glendon Drive runs W/E

North Leg Total:	103
North Entering:	49
North Peds:	0
Peds Cross:	⋈

Heavys	0	0	0
Trucks	1	0	1
Cars	24	24	48
Totals	25	24	

Heavys	0
Trucks	1
Cars	53
Totals	54

East Leg Total:	941
East Entering:	490
East Peds:	0
Peds Cross:	⧗



Heavys	Trucks	Cars	Totals
8	5	470	483

Cars	Trucks	Heavys	Totals
32	0	0	32
446	4	8	458
478	4	8	

Heavys	Trucks	Cars	Totals
0	1	21	22
4	8	415	427
4	9	436	

Cars	Trucks	Heavys	Totals
439	8	4	451

Peds Cross:	⧗
West Peds:	0
West Entering:	449
West Leg Total:	932

Comments

Glendon Drive & Amiens Road

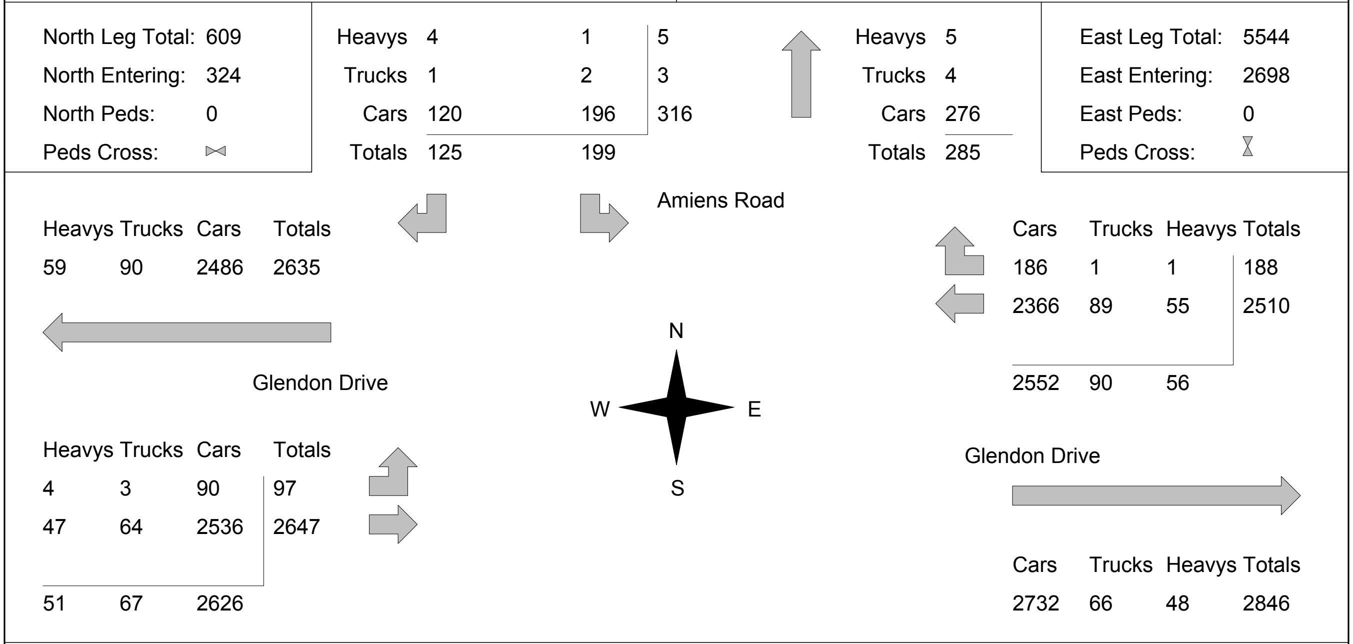
Total Count Diagram

Municipality: Komoka
Site #: 0000003301
Intersection: Glendon Drive & Amiens Road
TFR File #: 3
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E



North Leg Total: 609
North Entering: 324
North Peds: 0
Peds Cross: ⋈

Heavys	4	1	5
Trucks	1	2	3
Cars	120	196	316
Totals	125	199	

Heavys	5
Trucks	4
Cars	276
Totals	285

East Leg Total: 5544
East Entering: 2698
East Peds: 0
Peds Cross: ⧗

Amiens Road

Heavys	Trucks	Cars	Totals
59	90	2486	2635

Glendon Drive

Heavys	Trucks	Cars	Totals
4	3	90	97
47	64	2536	2647
51	67	2626	

Cars	Trucks	Heavys	Totals
186	1	1	188
2366	89	55	2510
2552	90	56	

Glendon Drive

Cars	Trucks	Heavys	Totals
2732	66	48	2846

Peds Cross: ⧗
West Peds: 0
West Entering: 2744
West Leg Total: 5379

Comments

Glendon Drive & Amiens Road
Traffic Count Summary

Intersection: Glendon Drive & Amiens Road	Count Date: 29-Sep-2015	Municipality: Komoka

North Approach Totals						North/South Total Approaches	South Approach Totals					
	Includes Cars, Trucks, & Heavys							Includes Cars, Trucks, & Heavys				
Hour Ending	Left	Thru	Right	Grand Total	Total Peds		Hour Ending	Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	28	0	26	54	0	54	8:00:00	0	0	0	0	0
9:00:00	44	0	19	63	0	63	9:00:00	0	0	0	0	0
10:00:00	26	0	11	37	0	37	10:00:00	0	0	0	0	0
12:00:00	9	0	6	15	0	15	12:00:00	0	0	0	0	0
13:00:00	19	0	5	24	0	24	13:00:00	0	0	0	0	0
15:00:00	12	0	3	15	0	15	15:00:00	0	0	0	0	0
16:00:00	19	0	14	33	0	33	16:00:00	0	0	0	0	0
17:00:00	21	0	17	38	0	38	17:00:00	0	0	0	0	0
18:00:00	21	0	24	45	0	45	18:00:00	0	0	0	0	0
Totals:	199	0	125	324	0	324		0	0	0	0	0

East Approach Totals						East/West Total Approaches	West Approach Totals					
	Includes Cars, Trucks, & Heavys							Includes Cars, Trucks, & Heavys				
Hour Ending	Left	Thru	Right	Grand Total	Total Peds		Hour Ending	Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	0	298	13	311	0	750	8:00:00	10	429	0	439	0
9:00:00	0	318	19	337	0	732	9:00:00	11	384	0	395	0
10:00:00	0	226	15	241	0	548	10:00:00	8	299	0	307	0
12:00:00	0	119	10	129	0	246	12:00:00	1	116	0	117	0
13:00:00	0	227	19	246	0	475	13:00:00	7	222	0	229	0
15:00:00	0	110	6	116	0	253	15:00:00	4	133	0	137	0
16:00:00	0	393	32	425	0	721	16:00:00	13	283	0	296	0
17:00:00	0	428	42	470	0	880	17:00:00	23	387	0	410	0
18:00:00	0	391	32	423	0	837	18:00:00	20	394	0	414	0
Totals:	0	2510	188	2698	0	5442		97	2647	0	2744	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	8:00	9:00	10:00	13:00	15:00	16:00	17:00	18:00
Crossing Values:	28	44	26	19	12	19	21	21

Glendon Drive & Komoka Road

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

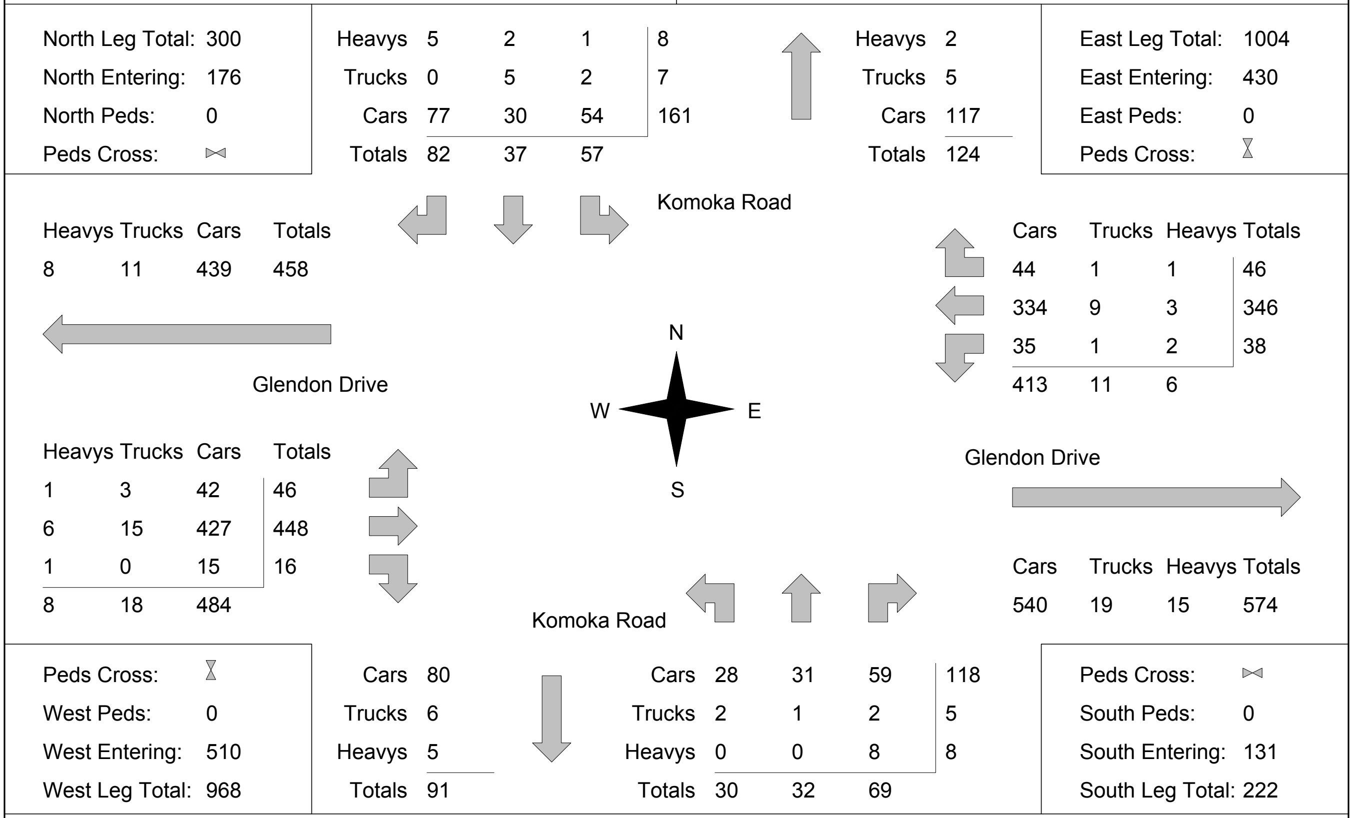
Municipality: Komoka
Site #: 0000003302
Intersection: Glendon Drive & Komoka Road
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Glendon Drive runs W/E



North Leg Total: 300
North Entering: 176
North Peds: 0
Peds Cross: ⋈

Heavys	5	2	1	8
Trucks	0	5	2	7
Cars	77	30	54	161
Totals	82	37	57	

Heavys	2
Trucks	5
Cars	117
Totals	124

East Leg Total: 1004
East Entering: 430
East Peds: 0
Peds Cross: ⧗

Heavys	Trucks	Cars	Totals
8	11	439	458

Cars	Trucks	Heavys	Totals
44	1	1	46
334	9	3	346
35	1	2	38
413	11	6	

Heavys	Trucks	Cars	Totals
1	3	42	46
6	15	427	448
1	0	15	16
8	18	484	

Cars	Trucks	Heavys	Totals
540	19	15	574

Peds Cross: ⧗
West Peds: 0
West Entering: 510
West Leg Total: 968

Cars	80
Trucks	6
Heavys	5
Totals	91

Cars	28	31	59	118
Trucks	2	1	2	5
Heavys	0	0	8	8
Totals	30	32	69	

Peds Cross: ⋈
South Peds: 0
South Entering: 131
South Leg Total: 222

Comments

Glendon Drive & Komoka Road

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 13:30:00

One Hour Peak
From: 12:00:00
To: 13:00:00

Municipality: Komoka
Site #: 0000003302
Intersection: Glendon Drive & Komoka Road
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Glendon Drive runs W/E

North Leg Total: 281
North Entering: 143
North Peds: 0
Peds Cross: ⋈

Heavys	2	1	0	3
Trucks	3	2	4	9
Cars	35	40	56	131
Totals	40	43	60	

Heavys	3
Trucks	8
Cars	127
Totals	138

East Leg Total: 643
East Entering: 315
East Peds: 0
Peds Cross: ⧗

Komoka Road

Heavys	Trucks	Cars	Totals
6	10	272	288

Cars	Trucks	Heavys	Totals
47	2	0	49
218	6	3	227
38	1	0	39
303	9	3	

Glendon Drive

N
W E
S

Heavys	Trucks	Cars	Totals
2	3	31	36
3	2	219	224
0	4	14	18
5	9	264	

Glendon Drive

Cars	Trucks	Heavys	Totals
315	10	3	328

Komoka Road

Peds Cross: ⧗
West Peds: 0
West Entering: 278
West Leg Total: 566

Cars	92
Trucks	7
Heavys	1
Totals	100

Cars	19	49	40	108
Trucks	1	3	4	8
Heavys	1	1	0	2
Totals	21	53	44	

Peds Cross: ⋈
South Peds: 0
South Entering: 118
South Leg Total: 218

Comments

Glendon Drive & Komoka Road

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:45:00
To: 17:45:00

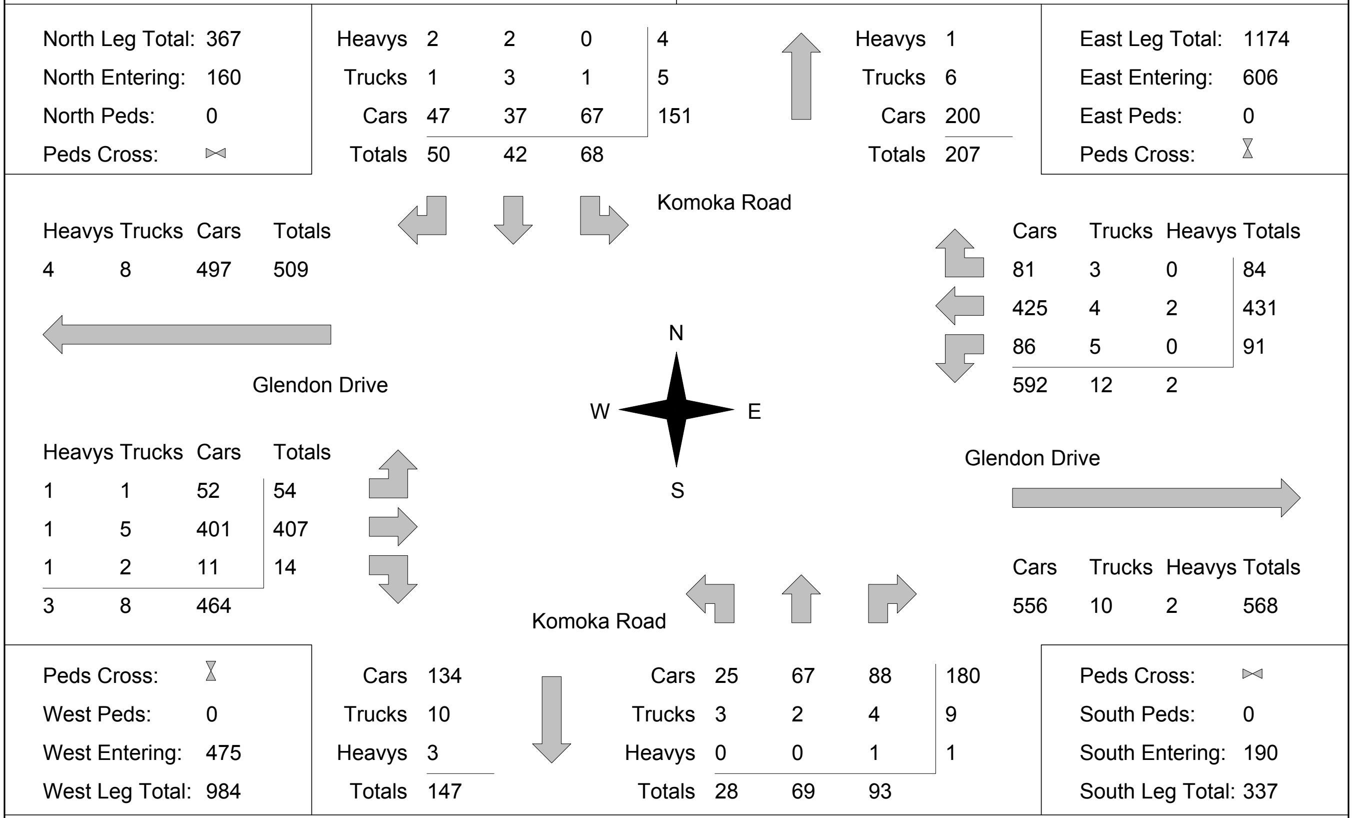
Municipality: Komoka
Site #: 0000003302
Intersection: Glendon Drive & Komoka Road
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Glendon Drive runs W/E



North Leg Total:	367
North Entering:	160
North Peds:	0
Peds Cross:	⋈

Heavys	2	2	0	4
Trucks	1	3	1	5
Cars	47	37	67	151
Totals	50	42	68	

Heavys	1
Trucks	6
Cars	200
Totals	207

East Leg Total:	1174
East Entering:	606
East Peds:	0
Peds Cross:	⧗

Komoka Road

Heavys	Trucks	Cars	Totals
4	8	497	509

Glendon Drive

Cars	Trucks	Heavys	Totals
81	3	0	84
425	4	2	431
86	5	0	91
592	12	2	

Heavys	Trucks	Cars	Totals
1	1	52	54
1	5	401	407
1	2	11	14
3	8	464	

Glendon Drive

Cars	Trucks	Heavys	Totals
556	10	2	568

Komoka Road

Peds Cross:	⧗
West Peds:	0
West Entering:	475
West Leg Total:	984

Cars	134
Trucks	10
Heavys	3
Totals	147

Cars	25	67	88	180
Trucks	3	2	4	9
Heavys	0	0	1	1
Totals	28	69	93	

Peds Cross:	⋈
South Peds:	0
South Entering:	190
South Leg Total:	337

Comments

Glendon Drive & Komoka Road

Total Count Diagram

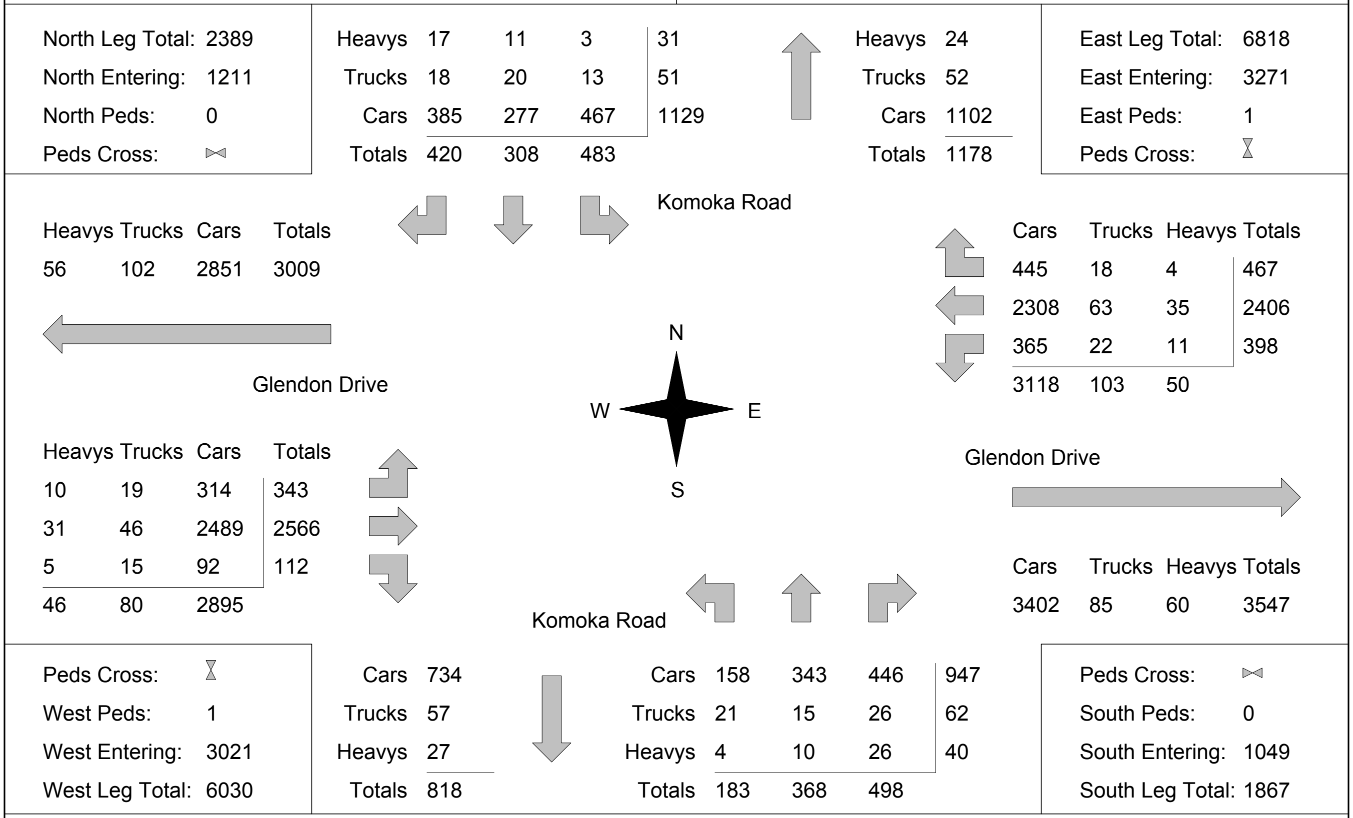
Municipality: Komoka
Site #: 0000003302
Intersection: Glendon Drive & Komoka Road
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Glendon Drive runs W/E



North Leg Total: 2389
North Entering: 1211
North Peds: 0
Peds Cross: ⋈

Heavys	17	11	3	31
Trucks	18	20	13	51
Cars	385	277	467	1129
Totals	420	308	483	

Heavys	24
Trucks	52
Cars	1102
Totals	1178

East Leg Total: 6818
East Entering: 3271
East Peds: 1
Peds Cross: ⧗

Heavys	Trucks	Cars	Totals
56	102	2851	3009

Cars	Trucks	Heavys	Totals
445	18	4	467
2308	63	35	2406
365	22	11	398
3118	103	50	

Heavys	Trucks	Cars	Totals
10	19	314	343
31	46	2489	2566
5	15	92	112
46	80	2895	

Cars	Trucks	Heavys	Totals
3402	85	60	3547

Peds Cross: ⧗
West Peds: 1
West Entering: 3021
West Leg Total: 6030

Cars	734
Trucks	57
Heavys	27
Totals	818

Cars	158	343	446	947
Trucks	21	15	26	62
Heavys	4	10	26	40
Totals	183	368	498	

Peds Cross: ⋈
South Peds: 0
South Entering: 1049
South Leg Total: 1867

Comments

Glendon Drive & Komoka Road
Traffic Count Summary

Intersection: Glendon Drive & Komoka Road | Count Date: 29-Sep-2015 | Municipality: Komoka

North Approach Totals							South Approach Totals					
	Includes Cars, Trucks, & Heavys							Includes Cars, Trucks, & Heavys				
Hour Ending	Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches	Hour Ending	Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	63	48	92	203	0	313	8:00:00	20	25	65	110	0
9:00:00	65	37	43	145	0	269	9:00:00	23	41	60	124	0
10:00:00	70	31	47	148	0	241	10:00:00	11	28	54	93	0
12:00:00	25	17	25	67	0	115	12:00:00	13	16	19	48	0
13:00:00	60	43	40	143	0	261	13:00:00	21	53	44	118	0
15:00:00	22	22	21	65	0	127	15:00:00	15	24	23	62	0
16:00:00	58	37	58	153	0	291	16:00:00	28	53	57	138	0
17:00:00	57	40	39	136	0	323	17:00:00	31	65	91	187	0
18:00:00	63	33	55	151	0	320	18:00:00	21	63	85	169	0
Totals:	483	308	420	1211	0	2260		183	368	498	1049	0

East Approach Totals							West Approach Totals					
	Includes Cars, Trucks, & Heavys							Includes Cars, Trucks, & Heavys				
Hour Ending	Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches	Hour Ending	Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	35	261	39	335	0	793	8:00:00	34	413	11	458	0
9:00:00	53	329	42	424	1	879	9:00:00	51	390	14	455	0
10:00:00	32	221	44	297	0	669	10:00:00	44	309	19	372	0
12:00:00	17	97	35	149	0	275	12:00:00	15	107	4	126	0
13:00:00	39	227	49	315	0	593	13:00:00	36	224	18	278	0
15:00:00	15	96	23	134	0	282	15:00:00	20	122	6	148	0
16:00:00	55	366	67	488	0	806	16:00:00	43	259	16	318	1
17:00:00	74	411	88	573	0	985	17:00:00	51	352	9	412	0
18:00:00	78	398	80	556	0	1010	18:00:00	49	390	15	454	0
Totals:	398	2406	467	3271	1	6292		343	2566	112	3021	1

Calculated Values for Traffic Crossing Major Street

Hours Ending:	8:00	9:00	10:00	13:00	15:00	16:00	17:00	18:00
Crossing Values:	131	130	112	134	61	140	153	147

Glendon Drive & Queen Street

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 7:15:00
To: 8:15:00

Municipality: Komoka
Site #: 0000003303
Intersection: Glendon Drive & Queen Street
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

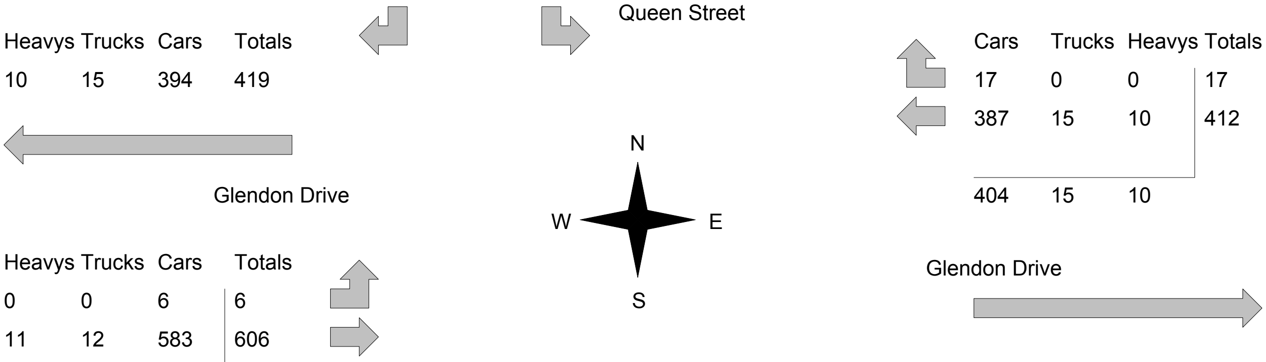
Major Road: Glendon Drive runs W/E

North Leg Total: 80
North Entering: 57
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	0	0	0
Cars	7	50	57
Totals	7	50	

Heavys	0
Trucks	0
Cars	23
Totals	23

East Leg Total: 1085
East Entering: 429
East Peds: 0
Peds Cross: ⧗



Heavys	Trucks	Cars	Totals
10	15	394	419

Cars	Trucks	Heavys	Totals
17	0	0	17
387	15	10	412
404	15	10	

Heavys	Trucks	Cars	Totals
0	0	6	6
11	12	583	606
11	12	589	

Cars	Trucks	Heavys	Totals
633	12	11	656

Peds Cross: ⧗
West Peds: 0
West Entering: 612
West Leg Total: 1031

Comments

Glendon Drive & Queen Street

Mid-day Peak Diagram

Specified Period		**One Hour Peak**	
From:	11:30:00	**From:**	12:30:00
To:	13:30:00	**To:**	13:30:00

Municipality: Komoka
Site #: 0000003303
Intersection: Glendon Drive & Queen Street
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E

North Leg Total: 48
North Entering: 23
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	0	0	0
Cars	3	20	23
Totals	3	20	
	↲	↳	

Queen Street

↑	
Heavys	0
Trucks	0
Cars	25
Totals	25

East Leg Total: 677
East Entering: 319
East Peds: 0
Peds Cross: ⧗

Heavys	Trucks	Cars	Totals
3	13	285	301

←

Glendon Drive

	Cars	Trucks	Heavys	Totals
↰	21	0	0	21
←	282	13	3	298
	303	13	3	

N
W ✦ E
S

Heavys	Trucks	Cars	Totals	
0	0	4	4	↱
3	10	325	338	→
3	10	329		

Glendon Drive

→

Cars	Trucks	Heavys	Totals
345	10	3	358

Peds Cross: ⧗
West Peds: 0
West Entering: 342
West Leg Total: 643

Comments

Glendon Drive & Queen Street

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:45:00
To: 17:45:00

Municipality: Komoka
Site #: 0000003303
Intersection: Glendon Drive & Queen Street
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E

North Leg Total: 67
North Entering: 23
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	0	0	0
Cars	6	17	23
Totals	6	17	

Heavys	0
Trucks	1
Cars	43
Totals	44

East Leg Total: 1231
East Entering: 652
East Peds: 0
Peds Cross: ⧗

Queen Street

Heavys	Trucks	Cars	Totals
3	12	602	617

Glendon Drive

Cars	Trucks	Heavys	Totals
41	0	0	41
596	12	3	611
637	12	3	

N
W E
S

Heavys	Trucks	Cars	Totals
0	1	2	3
2	9	551	562
2	10	553	

Glendon Drive

Cars	Trucks	Heavys	Totals
568	9	2	579

Peds Cross: ⧗
West Peds: 0
West Entering: 565
West Leg Total: 1182

Comments

Glendon Drive & Queen Street

Total Count Diagram

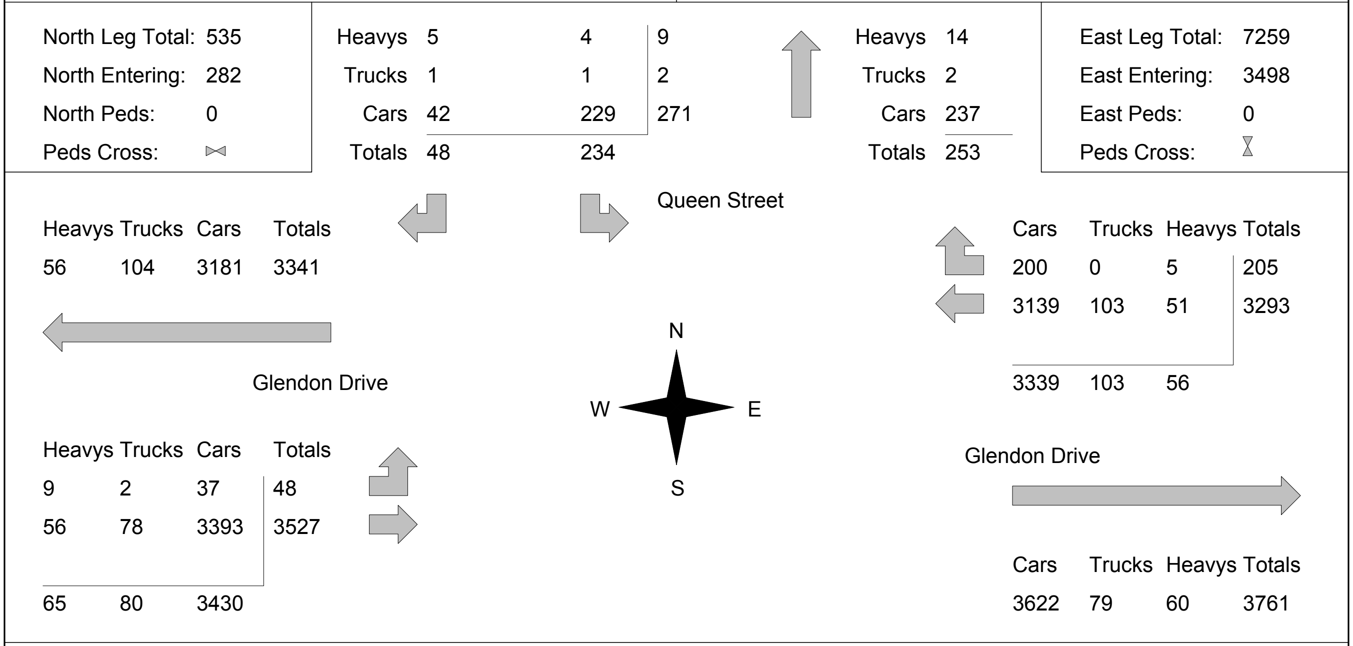
Municipality: Komoka
Site #: 0000003303
Intersection: Glendon Drive & Queen Street
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E



North Leg Total:	535
North Entering:	282
North Peds:	0
Peds Cross:	⋈

Heavys	5	4	9
Trucks	1	1	2
Cars	42	229	271
Totals	48	234	

Heavys	14
Trucks	2
Cars	237
Totals	253

East Leg Total:	7259
East Entering:	3498
East Peds:	0
Peds Cross:	⧗

Heavys	Trucks	Cars	Totals
56	104	3181	3341

Cars	Trucks	Heavys	Totals
200	0	5	205
3139	103	51	3293
3339	103	56	

Heavys	Trucks	Cars	Totals
9	2	37	48
56	78	3393	3527
65	80	3430	

Cars	Trucks	Heavys	Totals
3622	79	60	3761

Peds Cross:	⧗
West Peds:	0
West Entering:	3575
West Leg Total:	6916

Comments

Glendon Drive & Queen Street
Traffic Count Summary

Intersection: Glendon Drive & Queen Street | Count Date: 29-Sep-2015 | Municipality: Komoka

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	47	0	7	54	0	54	8:00:00	0	0	0	0	0
9:00:00	42	0	7	49	0	49	9:00:00	0	0	0	0	0
10:00:00	28	0	7	35	0	35	10:00:00	0	0	0	0	0
12:00:00	6	0	0	6	0	6	12:00:00	0	0	0	0	0
13:00:00	18	0	1	19	0	19	13:00:00	0	0	0	0	0
15:00:00	12	0	2	14	0	14	15:00:00	0	0	0	0	0
16:00:00	35	0	15	50	0	50	16:00:00	0	0	0	0	0
17:00:00	26	0	3	29	0	29	17:00:00	0	0	0	0	0
18:00:00	20	0	6	26	0	26	18:00:00	0	0	0	0	0
Totals:	234	0	48	282	0	282		0	0	0	0	0

East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	0	330	14	344	0	918	8:00:00	9	565	0	574	0
9:00:00	0	415	37	452	0	978	9:00:00	11	515	0	526	0
10:00:00	0	292	13	305	0	736	10:00:00	7	424	0	431	0
12:00:00	0	153	4	157	0	305	12:00:00	1	147	0	148	0
13:00:00	0	322	20	342	0	663	13:00:00	4	317	0	321	0
15:00:00	0	143	8	151	0	324	15:00:00	2	171	0	173	0
16:00:00	0	493	37	530	0	902	16:00:00	6	366	0	372	0
17:00:00	0	579	37	616	0	1105	17:00:00	5	484	0	489	0
18:00:00	0	566	35	601	0	1142	18:00:00	3	538	0	541	0
Totals:	0	3293	205	3498	0	7073		48	3527	0	3575	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	8:00	9:00	10:00	13:00	15:00	16:00	17:00	18:00
Crossing Values:	47	42	28	18	12	35	26	20

Glendon Drive & Tunks Lane

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

Municipality: Komoka
Site #: 0000003304
Intersection: Glendon Drive & Tunks Lane
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E

North Leg Total: 57
North Entering: 31
North Peds: 0
Peds Cross: ⋈

Heavys	1	1	2
Trucks	0	1	1
Cars	10	18	28
Totals	11	20	

Heavys	5
Trucks	2
Cars	19
Totals	26

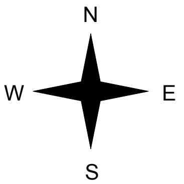
East Leg Total: 1079
East Entering: 440
East Peds: 0
Peds Cross: ⧗

Tunks Lane

Heavys	Trucks	Cars	Totals
7	11	422	440

Cars	Trucks	Heavys	Totals
10	1	0	11
412	11	6	429
422	12	6	

Glendon Drive



Heavys	Trucks	Cars	Totals
5	1	9	15
9	13	597	619
14	14	606	

Glendon Drive

Cars	Trucks	Heavys	Totals
615	14	10	639

Peds Cross: ⧗
West Peds: 0
West Entering: 634
West Leg Total: 1074

Comments

Glendon Drive & Tunks Lane

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 13:30:00

One Hour Peak
From: 12:00:00
To: 13:00:00

Municipality: Komoka
Site #: 0000003304
Intersection: Glendon Drive & Tunks Lane
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E

North Leg Total: 68
North Entering: 46
North Peds: 0
Peds Cross: ⋈

Heavys	3	0	3
Trucks	0	2	2
Cars	16	25	41
Totals	19	27	

Heavys	2
Trucks	0
Cars	20
Totals	22

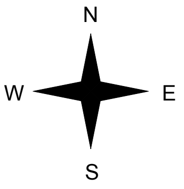
East Leg Total: 687
East Entering: 331
East Peds: 0
Peds Cross: ⧗

Tunks Lane

Heavys	Trucks	Cars	Totals
3	9	328	340

Cars	Trucks	Heavys	Totals
10	0	0	10
312	9	0	321
322	9	0	

Glendon Drive



Heavys	Trucks	Cars	Totals
2	0	10	12
2	8	319	329
4	8	329	

Glendon Drive

Cars	Trucks	Heavys	Totals
344	10	2	356

Peds Cross: ⧗
West Peds: 0
West Entering: 341
West Leg Total: 681

Comments

Glendon Drive & Tunks Lane

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:30:00
To: 17:30:00

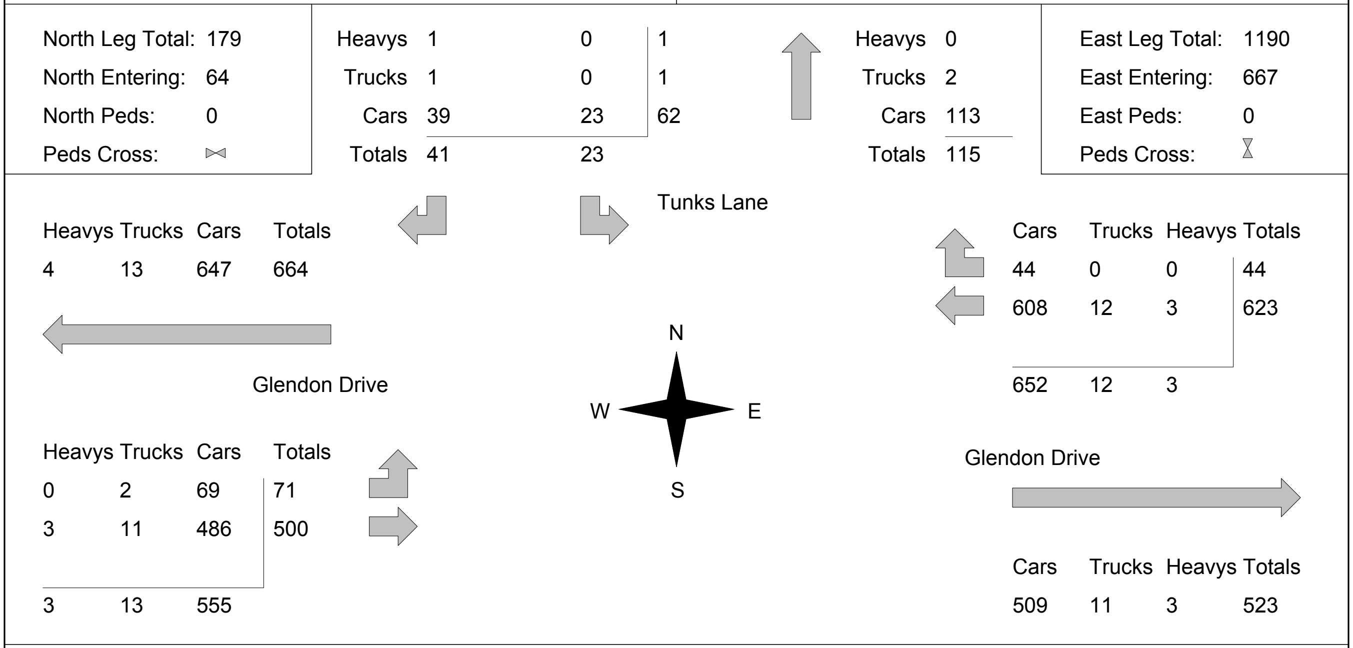
Municipality: Komoka
Site #: 0000003304
Intersection: Glendon Drive & Tunks Lane
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E



North Leg Total: 179
North Entering: 64
North Peds: 0
Peds Cross: ⋈

Heavys	1	0	1
Trucks	1	0	1
Cars	39	23	62
Totals	41	23	

Heavys	0
Trucks	2
Cars	113
Totals	115

East Leg Total: 1190
East Entering: 667
East Peds: 0
Peds Cross: ⧗

Heavys	Trucks	Cars	Totals
4	13	647	664

Cars	Trucks	Heavys	Totals
44	0	0	44
608	12	3	623
652	12	3	

Heavys	Trucks	Cars	Totals
0	2	69	71
3	11	486	500
3	13	555	

Cars	Trucks	Heavys	Totals
509	11	3	523

Peds Cross: ⧗
West Peds: 0
West Entering: 571
West Leg Total: 1235

Comments

Glendon Drive & Tunks Lane

Total Count Diagram

Municipality: Komoka
Site #: 0000003304
Intersection: Glendon Drive & Tunks Lane
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E

North Leg Total: 694
North Entering: 300
North Peds: 0
Peds Cross: ⋈

Heavys	13	4	17
Trucks	8	3	11
Cars	121	151	272
Totals	142	158	
	↲	↳	

↑	
Heavys	18
Trucks	7
Cars	369
Totals	394

East Leg Total: 7278
East Entering: 3539
East Peds: 0
Peds Cross: ⧗

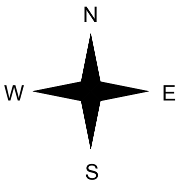
Tunks Lane

Heavys	Trucks	Cars	Totals
53	101	3339	3493

←

Glendon Drive

	Cars	Trucks	Heavys	Totals
↰	184	2	2	188
←	3218	93	40	3351
	3402	95	42	



Heavys	Trucks	Cars	Totals	
16	5	185	206	↱
44	74	3463	3581	→
60	79	3648		

Glendon Drive

→

Cars	Trucks	Heavys	Totals
3614	77	48	3739

Peds Cross: ⧗
West Peds: 0
West Entering: 3787
West Leg Total: 7280

Comments

Glendon Drive & Tunks Lane
Traffic Count Summary

Intersection: Glendon Drive & Tunks Lane | **Count Date:** 29-Sep-2015 | **Municipality:** Komoka

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	12	0	9	21	0	21	8:00:00	0	0	0	0	0
9:00:00	25	0	12	37	0	37	9:00:00	0	0	0	0	0
10:00:00	12	0	12	24	0	24	10:00:00	0	0	0	0	0
12:00:00	13	0	11	24	0	24	12:00:00	0	0	0	0	0
13:00:00	27	0	19	46	0	46	13:00:00	0	0	0	0	0
15:00:00	5	0	6	11	0	11	15:00:00	0	0	0	0	0
16:00:00	14	0	7	21	0	21	16:00:00	0	0	0	0	0
17:00:00	21	0	24	45	0	45	17:00:00	0	0	0	0	0
18:00:00	29	0	42	71	0	71	18:00:00	0	0	0	0	0
Totals:	158	0	142	300	0	300		0	0	0	0	0

East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	0	329	13	342	0	942	8:00:00	11	589	0	600	0
9:00:00	0	436	13	449	0	1008	9:00:00	11	548	0	559	0
10:00:00	0	295	24	319	0	779	10:00:00	24	436	0	460	0
12:00:00	0	157	8	165	0	320	12:00:00	7	148	0	155	0
13:00:00	0	321	10	331	0	672	13:00:00	12	329	0	341	0
15:00:00	0	141	9	150	0	324	15:00:00	11	163	0	174	0
16:00:00	0	513	19	532	0	944	16:00:00	9	403	0	412	0
17:00:00	0	611	45	656	0	1188	17:00:00	49	483	0	532	0
18:00:00	0	548	47	595	0	1149	18:00:00	72	482	0	554	0
Totals:	0	3351	188	3539	0	7326		206	3581	0	3787	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	8:00	9:00	10:00	12:00	13:00	16:00	17:00	18:00
Crossing Values:	12	25	12	13	27	14	21	29

Glendon Drive & Vanneck Road / Jefferies Road

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

Municipality: Komoka
Site #: 0000003305
Intersection: Glendon Drive & Vanneck Road / Je
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Glendon Drive runs W/E

North Leg Total: 599
North Entering: 254
North Peds: 0
Peds Cross: ⋈

Heavys	3	1	0	4
Trucks	4	1	9	14
Cars	86	41	109	236
Totals	93	43	118	

Heavys	5
Trucks	11
Cars	329
Totals	345

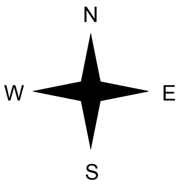
East Leg Total: 1076
East Entering: 426
East Peds: 0
Peds Cross: ⧗

Vanneck Road

Heavys	Trucks	Cars	Totals
7	13	417	437

Cars	Trucks	Heavys	Totals
82	3	1	86
281	7	4	292
47	1	0	48
410	11	5	

Glendon Drive



Heavys	Trucks	Cars	Totals
2	5	172	179
3	9	433	445
3	3	29	35
8	17	634	

Glendon Drive

Cars	Trucks	Heavys	Totals
628	19	3	650

Jefferies Road

Peds Cross: ⧗
West Peds: 0
West Entering: 659
West Leg Total: 1096

Cars	117
Trucks	5
Heavys	4
Totals	126

Cars	50	75	86	211
Trucks	2	3	1	6
Heavys	0	2	0	2
Totals	52	80	87	

Peds Cross: ⋈
South Peds: 0
South Entering: 219
South Leg Total: 345

Comments

Glendon Drive & Vanneck Road / Jefferies Road

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 13:30:00

One Hour Peak
From: 12:00:00
To: 13:00:00

Municipality: Komoka
Site #: 0000003305
Intersection: Glendon Drive & Vanneck Road / Je
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Glendon Drive runs W/E

North Leg Total: 302
North Entering: 156
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	1	1
Trucks	5	0	2	7
Cars	62	22	64	148
Totals	67	22	67	

Heavys	1
Trucks	11
Cars	134
Totals	146

East Leg Total: 694
East Entering: 316
East Peds: 0
Peds Cross: ⧗

Vanneck Road

Heavys	Trucks	Cars	Totals
0	10	320	330

Glendon Drive

Heavys	Trucks	Cars	Totals
1	5	78	84
0	6	247	253
1	0	15	16
2	11	340	

N
W
E
S

Cars	Trucks	Heavys	Totals
33	5	0	38
236	3	0	239
39	0	0	39
308	8	0	

Glendon Drive

Cars	Trucks	Heavys	Totals
368	9	1	378

Jefferies Road

Peds Cross: ⧗
West Peds: 0
West Entering: 353
West Leg Total: 683

Cars	76
Trucks	0
Heavys	1
Totals	77

Cars	22	23	57	102
Trucks	2	1	1	4
Heavys	0	0	0	0
Totals	24	24	58	

Peds Cross: ⋈
South Peds: 0
South Entering: 106
South Leg Total: 183

Comments

Glendon Drive & Vanneck Road / Jefferies Road

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:45:00
To: 17:45:00

Municipality: Komoka
Site #: 0000003305
Intersection: Glendon Drive & Vanneck Road / Je
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Signalized Intersection ****

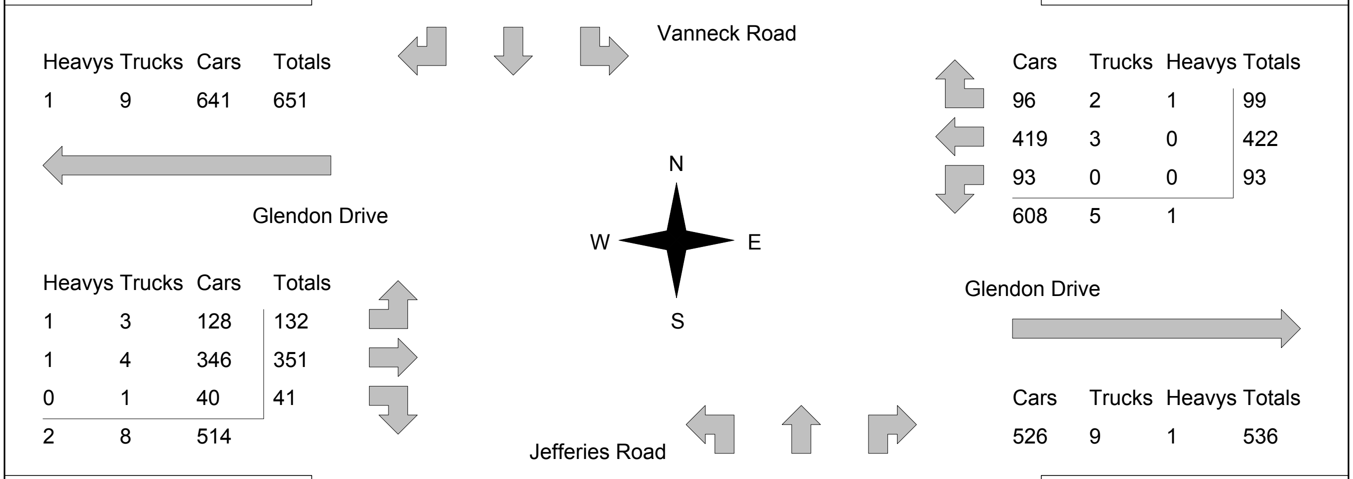
Major Road: Glendon Drive runs W/E

North Leg Total: 652
North Entering: 379
North Peds: 0
Peds Cross: ⋈

Heavys	1	0	0	1
Trucks	6	0	4	10
Cars	170	73	125	368
Totals	177	73	129	

Heavys	2
Trucks	6
Cars	265
Totals	273

East Leg Total: 1150
East Entering: 614
East Peds: 0
Peds Cross: ⧗



Heavys	Trucks	Cars	Totals
1	9	641	651

Cars	Trucks	Heavys	Totals
96	2	1	99
419	3	0	422
93	0	0	93
608	5	1	

Heavys	Trucks	Cars	Totals
1	3	128	132
1	4	346	351
0	1	40	41
2	8	514	

Cars	Trucks	Heavys	Totals
526	9	1	536

Peds Cross: ⧗
West Peds: 0
West Entering: 524
West Leg Total: 1175

Cars	206
Trucks	1
Heavys	0
Totals	207

Cars	52	41	55	148
Trucks	0	1	1	2
Heavys	0	0	0	0
Totals	52	42	56	

Peds Cross: ⋈
South Peds: 0
South Entering: 150
South Leg Total: 357

Comments

Glendon Drive & Vanneck Road / Jefferies Road

Total Count Diagram

Municipality: Komoka
Site #: 0000003305
Intersection: Glendon Drive & Vanneck Road / Je
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Glendon Drive runs W/E

North Leg Total:	3633
North Entering:	1830
North Peds:	0
Peds Cross:	⋈

Heavys	14	8	5	27
Trucks	39	5	33	77
Cars	798	298	630	1726
Totals	851	311	668	

Heavys	24
Trucks	65
Cars	1714
Totals	1803

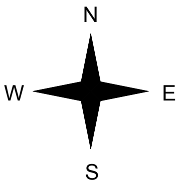
East Leg Total:	7083
East Entering:	3372
East Peds:	0
Peds Cross:	⧗

Vanneck Road

Heavys	Trucks	Cars	Totals
39	105	3405	3549

Glendon Drive

Cars	Trucks	Heavys	Totals
539	19	3	561
2320	56	10	2386
414	11	0	425
3273	86	13	



Heavys	Trucks	Cars	Totals
13	38	877	928
16	40	2488	2544
12	12	235	259
41	90	3600	

Glendon Drive

Cars	Trucks	Heavys	Totals
3604	84	23	3711

Jefferies Road

Peds Cross:	⧗
West Peds:	0
West Entering:	3731
West Leg Total:	7280

Cars	947
Trucks	28
Heavys	20
Totals	995

Cars	287	298	486	1071
Trucks	10	8	11	29
Heavys	15	8	2	25
Totals	312	314	499	

Peds Cross:	⋈
South Peds:	0
South Entering:	1125
South Leg Total:	2120

Comments

Glendon Drive & Vanneck Road / Jefferies Road

Traffic Count Summary

Intersection: Glendon Drive & Vanneck Road / J	Count Date: 29-Sep-2015	Municipality: Komoka

North Approach Totals						North/South Total Approaches	South Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	96	28	79	203	0	404	8:00:00	36	62	103	201	0
9:00:00	91	33	88	212	0	432	9:00:00	71	68	81	220	0
10:00:00	56	29	72	157	0	248	10:00:00	26	18	47	91	0
12:00:00	27	12	31	70	0	109	12:00:00	11	10	18	39	0
13:00:00	67	22	67	156	0	262	13:00:00	24	24	58	106	0
15:00:00	33	11	38	82	0	112	15:00:00	8	9	13	30	0
16:00:00	92	47	140	279	0	395	16:00:00	33	26	57	116	0
17:00:00	95	65	181	341	0	518	17:00:00	56	45	76	177	0
18:00:00	111	64	155	330	0	475	18:00:00	47	52	46	145	0
Totals:	668	311	851	1830	0	2955		312	314	499	1125	0

East Approach Totals						East/West Total Approaches	West Approach Totals					
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds		Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	33	238	66	337	0	947	8:00:00	164	419	27	610	0
9:00:00	51	275	77	403	0	973	9:00:00	153	383	34	570	0
10:00:00	31	226	61	318	0	778	10:00:00	111	319	30	460	0
12:00:00	15	119	40	174	0	339	12:00:00	38	113	14	165	0
13:00:00	39	239	38	316	0	669	13:00:00	84	253	16	353	0
15:00:00	16	98	27	141	0	306	15:00:00	35	121	9	165	0
16:00:00	78	370	66	514	0	913	16:00:00	92	266	41	399	0
17:00:00	82	431	101	614	0	1113	17:00:00	129	321	49	499	0
18:00:00	80	390	85	555	0	1065	18:00:00	122	349	39	510	0
Totals:	425	2386	561	3372	0	7103		928	2544	259	3731	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	8:00	9:00	10:00	12:00	13:00	16:00	17:00	18:00
Crossing Values:	194	230	111	50	115	172	216	222

Vanneck Road & Coldstream Road

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

Municipality: Komoka
Site #: 0000003306
Intersection: Vanneck Road & Coldstream Road
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

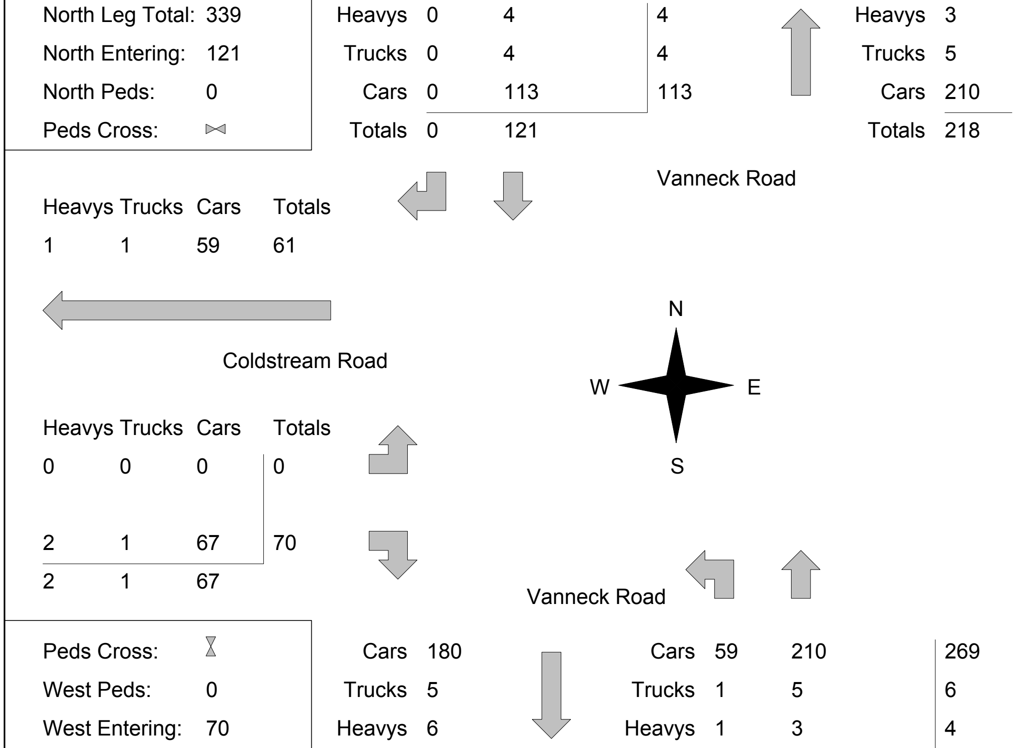
**** Non-Signalized Intersection ****

Major Road: Vanneck Road runs N/S

North Leg Total: 339
North Entering: 121
North Peds: 0
Peds Cross: ⋈

Heavys	0	4	4
Trucks	0	4	4
Cars	0	113	113
Totals	0	121	

Heavys	3
Trucks	5
Cars	210
Totals	218



Heavys	Trucks	Cars	Totals
1	1	59	61

Heavys	Trucks	Cars	Totals
0	0	0	0
2	1	67	70
2	1	67	

Peds Cross: ⧗
West Peds: 0
West Entering: 70
West Leg Total: 131

Cars	180
Trucks	5
Heavys	6
Totals	191

Cars	59	210	269
Trucks	1	5	6
Heavys	1	3	4
Totals	61	218	

Peds Cross: ⋈
South Peds: 0
South Entering: 279
South Leg Total: 470

Comments

Vanneck Road & Coldstream Road

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 13:30:00

One Hour Peak
From: 11:45:00
To: 12:45:00

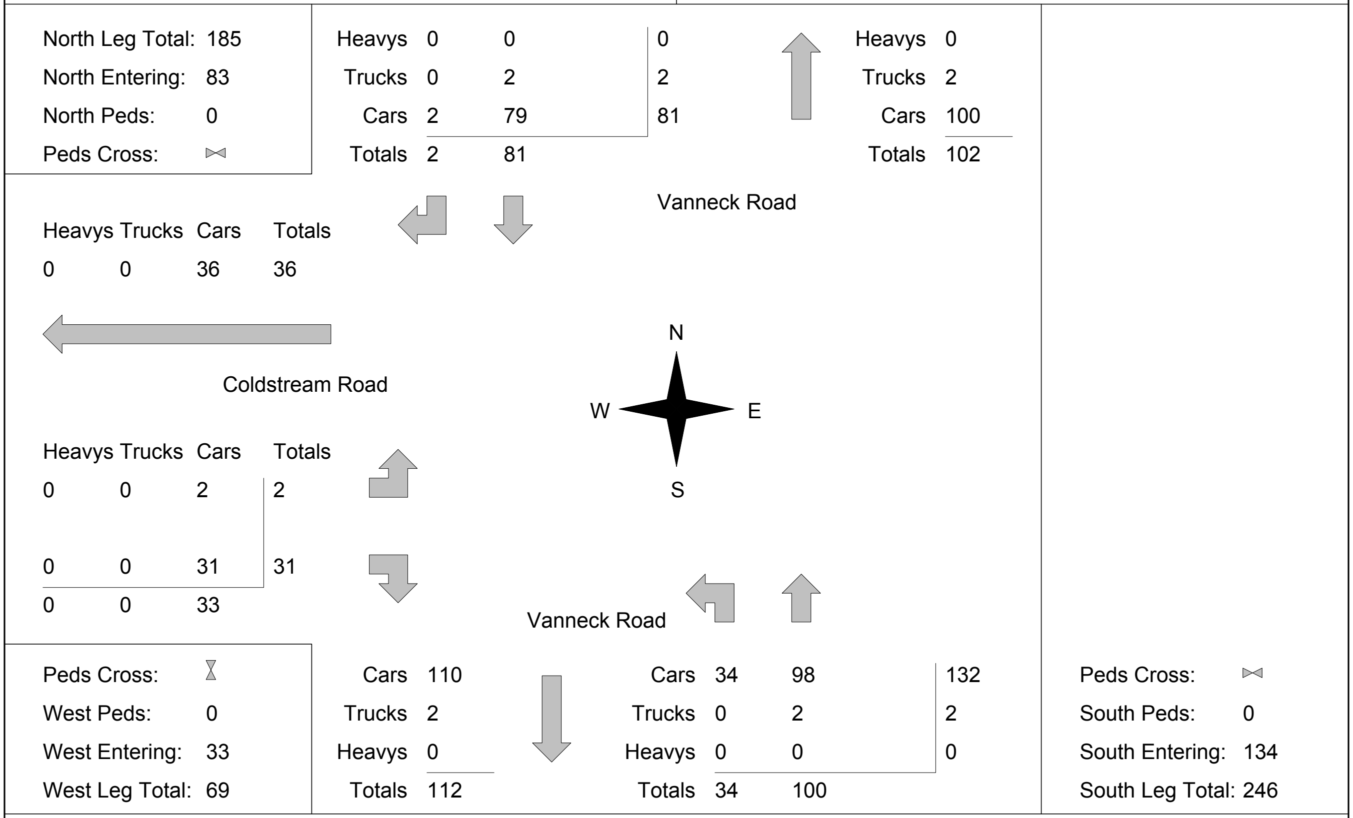
Municipality: Komoka
Site #: 0000003306
Intersection: Vanneck Road & Coldstream Road
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Vanneck Road runs N/S



North Leg Total: 185
North Entering: 83
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	0	2	2
Cars	2	79	81
Totals	2	81	

Heavys	0
Trucks	2
Cars	100
Totals	102

Heavys	Trucks	Cars	Totals
0	0	36	36

Heavys	Trucks	Cars	Totals
0	0	2	2
0	0	31	31
0	0	33	

Peds Cross: ⧗
West Peds: 0
West Entering: 33
West Leg Total: 69

Cars	110
Trucks	2
Heavys	0
Totals	112

Cars	34	98	132
Trucks	0	2	2
Heavys	0	0	0
Totals	34	100	

Peds Cross: ⋈
South Peds: 0
South Entering: 134
South Leg Total: 246

Comments

Vanneck Road & Coldstream Road

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

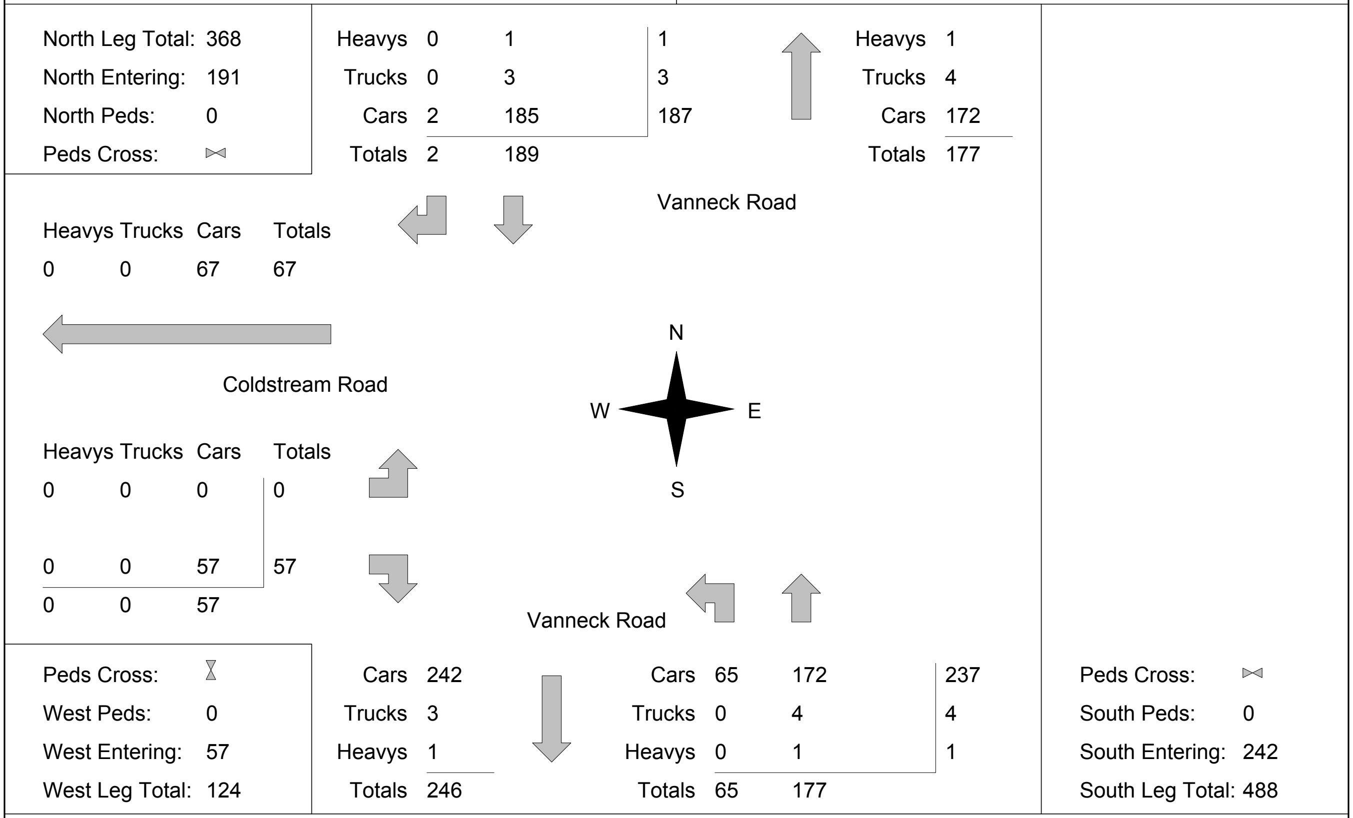
Municipality: Komoka
Site #: 0000003306
Intersection: Vanneck Road & Coldstream Road
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Vanneck Road runs N/S



North Leg Total: 368
North Entering: 191
North Peds: 0
Peds Cross: ⋈

Heavys	0	1	1
Trucks	0	3	3
Cars	2	185	187
Totals	2	189	

Heavys	1
Trucks	4
Cars	172
Totals	177

Heavys	Trucks	Cars	Totals
0	0	67	67

Heavys	Trucks	Cars	Totals
0	0	0	0
0	0	57	57
0	0	57	

Peds Cross: ⧗
West Peds: 0
West Entering: 57
West Leg Total: 124

Cars	242
Trucks	3
Heavys	1
Totals	246

Cars	65	172	237
Trucks	0	4	4
Heavys	0	1	1
Totals	65	177	

Peds Cross: ⋈
South Peds: 0
South Entering: 242
South Leg Total: 488

Comments

Vanneck Road & Coldstream Road

Total Count Diagram

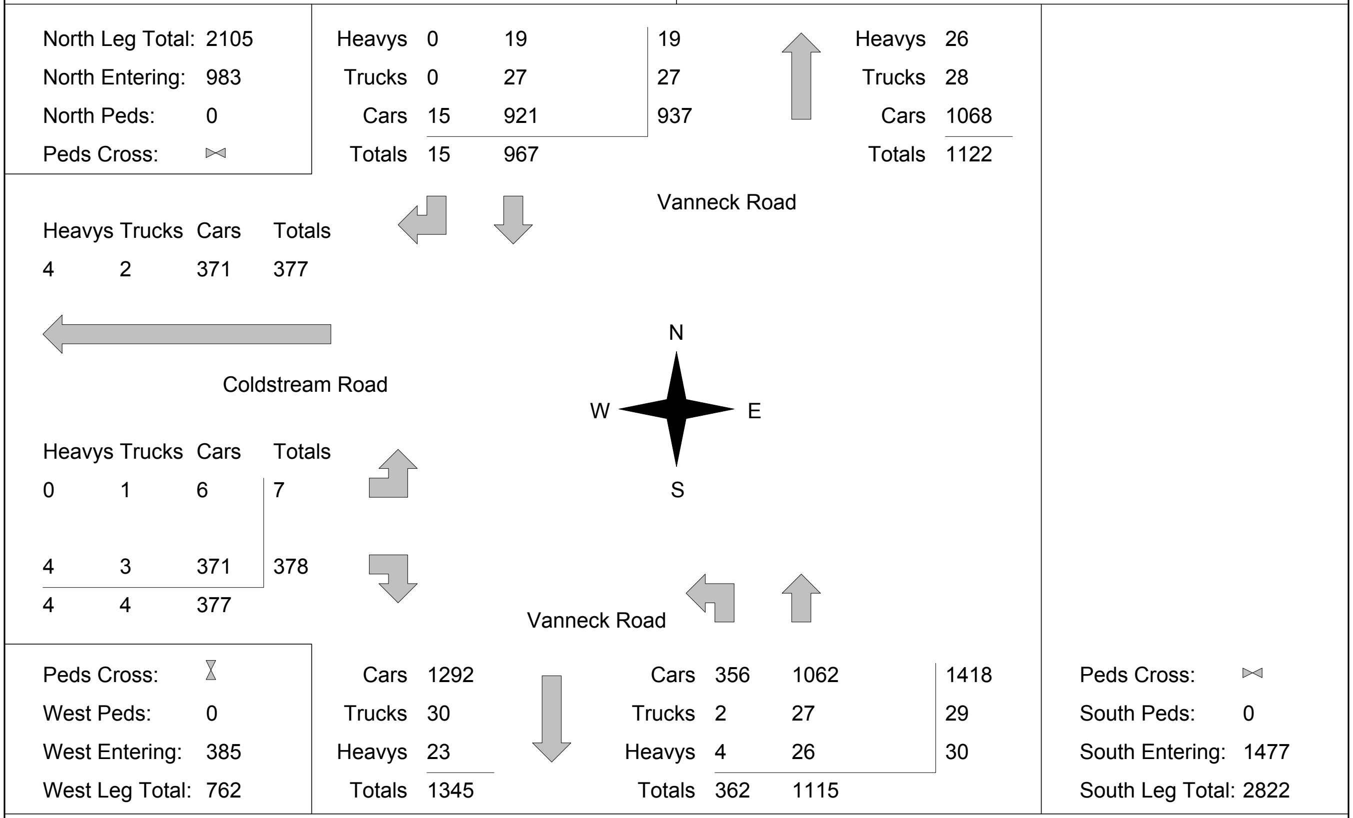
Municipality: Komoka
Site #: 0000003306
Intersection: Vanneck Road & Coldstream Road
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Vanneck Road runs N/S



North Leg Total: 2105
North Entering: 983
North Peds: 0
Peds Cross: ⋈

Heavys	0	19	19
Trucks	0	27	27
Cars	15	921	937
Totals	15	967	

Heavys	26
Trucks	28
Cars	1068
Totals	1122

Heavys	Trucks	Cars	Totals
4	2	371	377

Heavys	Trucks	Cars	Totals
0	1	6	7
4	3	371	378
4	4	377	

Peds Cross: ⋈
West Peds: 0
West Entering: 385
West Leg Total: 762

Cars	1292
Trucks	30
Heavys	23
Totals	1345

Cars	356	1062	1418
Trucks	2	27	29
Heavys	4	26	30
Totals	362	1115	

Peds Cross: ⋈
South Peds: 0
South Entering: 1477
South Leg Total: 2822

Comments

Vanneck Road & Coldstream Road
Traffic Count Summary

Intersection: Vanneck Road & Coldstream Roac | **Count Date:** 29-Sep-2015 | **Municipality:** Komoka

North Approach Totals							South Approach Totals					
	Includes Cars, Trucks, & Heavys							Includes Cars, Trucks, & Heavys				
Hour Ending	Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches	Hour Ending	Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	0	85	0	85	0	327	8:00:00	43	199	0	242	0
9:00:00	0	117	0	117	0	395	9:00:00	59	219	0	278	0
10:00:00	1	83	5	89	0	225	10:00:00	44	92	0	136	0
12:00:00	0	39	1	40	0	102	12:00:00	23	39	0	62	0
13:00:00	0	76	1	77	0	204	13:00:00	24	103	0	127	0
15:00:00	0	34	1	35	0	79	15:00:00	15	29	0	44	0
16:00:00	0	157	4	161	0	318	16:00:00	42	115	0	157	0
17:00:00	0	196	3	199	0	435	17:00:00	59	177	0	236	0
18:00:00	0	180	0	180	0	375	18:00:00	53	142	0	195	0
Totals:	1	967	15	983	0	2460		362	1115	0	1477	0

East Approach Totals							West Approach Totals					
	Includes Cars, Trucks, & Heavys							Includes Cars, Trucks, & Heavys				
Hour Ending	Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches	Hour Ending	Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	0	0	0	0	0	60	8:00:00	0	0	60	60	0
9:00:00	0	0	0	0	0	57	9:00:00	1	0	56	57	0
10:00:00	0	0	0	0	0	45	10:00:00	0	0	45	45	0
12:00:00	0	0	0	0	0	20	12:00:00	1	0	19	20	0
13:00:00	0	0	0	0	0	30	13:00:00	2	0	28	30	0
15:00:00	0	0	0	0	0	20	15:00:00	2	0	18	20	0
16:00:00	0	0	0	0	0	65	16:00:00	0	0	65	65	0
17:00:00	0	0	0	0	0	47	17:00:00	0	0	47	47	0
18:00:00	0	0	0	0	0	41	18:00:00	1	0	40	41	0
Totals:	0	0	0	0	0	385		7	0	378	385	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	8:00	9:00	10:00	12:00	13:00	16:00	17:00	18:00
Crossing Values:	0	1	0	1	2	0	0	1

Glendon Drive & Kilworth Park Drive

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

Municipality: Komoka
Site #: 0000003307
Intersection: Glendon Drive & Kilworth Park Drive
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E

East Leg Total: 1185
East Entering: 430
East Peds: 0
Peds Cross: ⧗

Heavys	Trucks	Cars	Totals
4	10	408	422

Glendon Drive

Cars	Trucks	Heavys	Totals
390	10	4	404
25	1	0	26
415	11	4	

N
W E
S

Heavys	Trucks	Cars	Totals
2	14	619	635
0	3	13	16
2	17	632	

Glendon Drive

Cars	Trucks	Heavys	Totals
739	14	2	755

Kilworth Park Drive

Peds Cross: ⧗
West Peds: 0
West Entering: 651
West Leg Total: 1073

Cars	38
Trucks	4
Heavys	0
Totals	42

Cars	18	120	138
Trucks	0	0	0
Heavys	0	0	0
Totals	18	120	

Peds Cross: ⋈
South Peds: 0
South Entering: 138
South Leg Total: 180

Comments

Glendon Drive & Kilworth Park Drive

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 13:30:00

One Hour Peak
From: 12:00:00
To: 13:00:00

Municipality: Komoka
Site #: 0000003307
Intersection: Glendon Drive & Kilworth Park Drive
TFR File #: 1
Count date: 29-Sep-2015

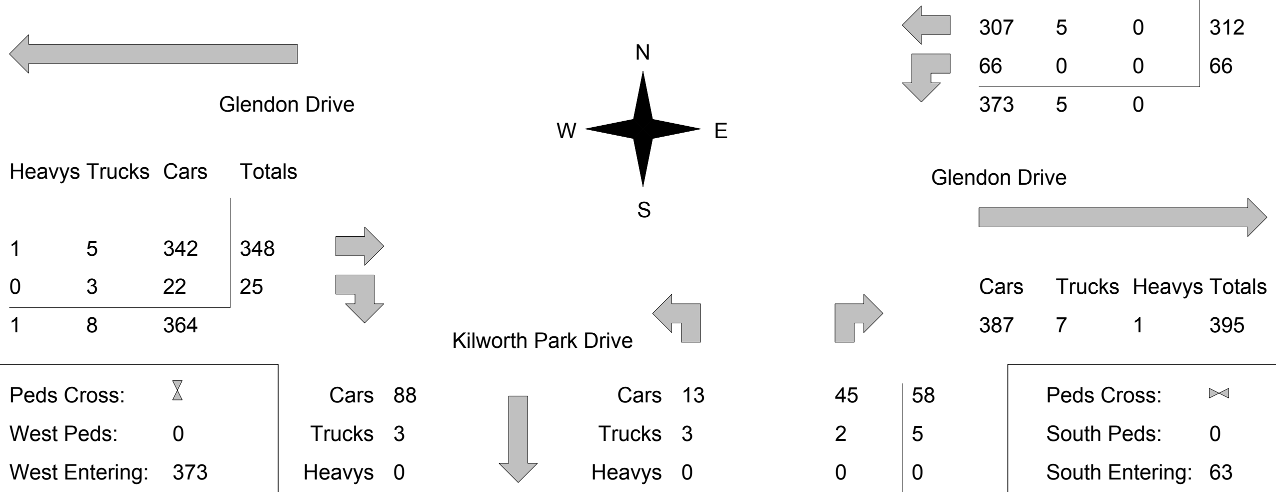
Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E

East Leg Total: 773
East Entering: 378
East Peds: 0
Peds Cross: ⧗



Heavys	Trucks	Cars	Totals
0	8	320	328

Cars	Trucks	Heavys	Totals
307	5	0	312
66	0	0	66
373	5	0	

Heavys	Trucks	Cars	Totals
1	5	342	348
0	3	22	25
1	8	364	

Cars	Trucks	Heavys	Totals
387	7	1	395

Peds Cross: ⧗
West Peds: 0
West Entering: 373
West Leg Total: 701

Cars	88
Trucks	3
Heavys	0
Totals	91

Cars	13	45	58
Trucks	3	2	5
Heavys	0	0	0
Totals	16	47	

Peds Cross: ⋈
South Peds: 0
South Entering: 63
South Leg Total: 154

Comments

Glendon Drive & Kilworth Park Drive

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:30:00
To: 17:30:00

Municipality: Komoka
Site #: 0000003307
Intersection: Glendon Drive & Kilworth Park Drive
TFR File #: 1
Count date: 29-Sep-2015

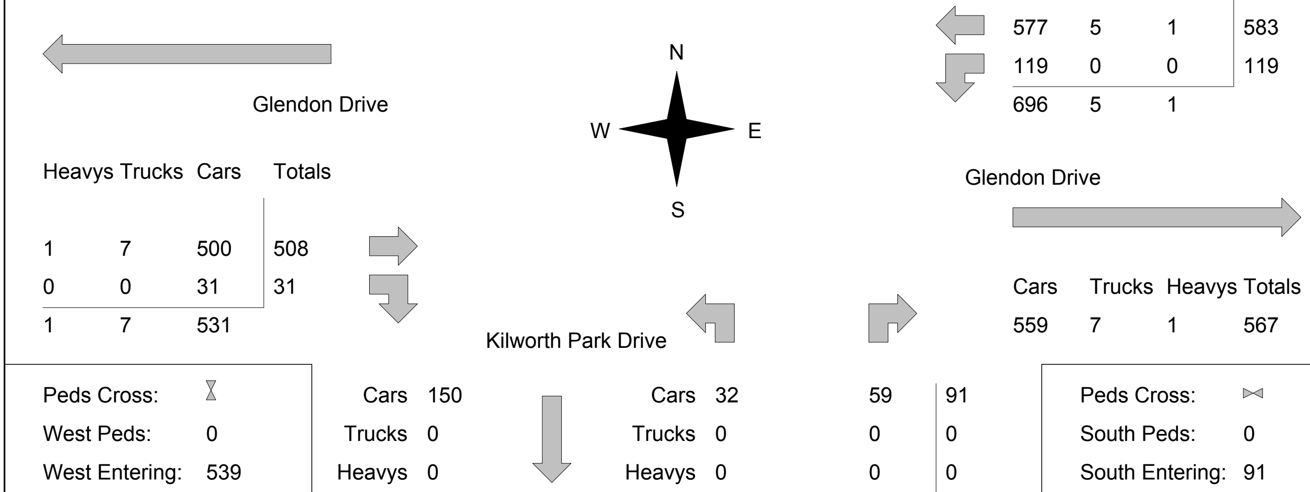
Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E

East Leg Total: 1269
East Entering: 702
East Peds: 0
Peds Cross: ⧗



Heavys	Trucks	Cars	Totals
1	5	609	615

Cars	Trucks	Heavys	Totals
577	5	1	583
119	0	0	119
696	5	1	

Heavys	Trucks	Cars	Totals
1	7	500	508
0	0	31	31
1	7	531	

Cars	Trucks	Heavys	Totals
559	7	1	567

Peds Cross: ⧗
West Peds: 0
West Entering: 539
West Leg Total: 1154

Cars	150
Trucks	0
Heavys	0
Totals	150

Cars	32	59	91
Trucks	0	0	0
Heavys	0	0	0
Totals	32	59	

Peds Cross: ⋈
South Peds: 0
South Entering: 91
South Leg Total: 241

Comments

Glendon Drive & Kilworth Park Drive

Total Count Diagram

Municipality: Komoka
Site #: 0000003307
Intersection: Glendon Drive & Kilworth Park Drive
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E

East Leg Total: 7910
East Entering: 3809
East Peds: 0
Peds Cross: ⧖

Heavys	Trucks	Cars	Totals
16	84	3295	3395

Glendon Drive

Heavys	Trucks	Cars	Totals
18	67	3455	3540
4	8	168	180
22	75	3623	

N
W E
S

Cars	Trucks	Heavys	Totals
3139	76	14	3229
571	8	1	580
3710	84	15	

Glendon Drive

Cars	Trucks	Heavys	Totals
4008	73	20	4101

Kilworth Park Drive

Peds Cross: ⧖
West Peds: 0
West Entering: 3720
West Leg Total: 7115

Cars	739
Trucks	16
Heavys	5
Totals	760

Cars	156	553	709
Trucks	8	6	14
Heavys	2	2	4
Totals	166	561	

Peds Cross: ⋈
South Peds: 0
South Entering: 727
South Leg Total: 1487

Comments

Glendon Drive & Kilworth Park Drive

Traffic Count Summary

Intersection: Glendon Drive & Kilworth Park Driv **Count Date:** 29-Sep-2015 **Municipality:** Komoka

North Approach Totals						North/South Total Approaches	South Approach Totals					
	Includes Cars, Trucks, & Heavys							Includes Cars, Trucks, & Heavys				
Hour Ending	Left	Thru	Right	Grand Total	Total Peds		Hour Ending	Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	0	0	0	0	0	136	8:00:00	14	0	122	136	0
9:00:00	0	0	0	0	0	130	9:00:00	21	0	109	130	0
10:00:00	0	0	0	0	0	80	10:00:00	19	0	61	80	0
12:00:00	0	0	0	0	0	36	12:00:00	9	0	27	36	0
13:00:00	0	0	0	0	0	63	13:00:00	16	0	47	63	0
15:00:00	0	0	0	0	0	34	15:00:00	8	0	26	34	0
16:00:00	0	0	0	0	0	75	16:00:00	26	0	49	75	0
17:00:00	0	0	0	0	0	85	17:00:00	28	0	57	85	0
18:00:00	0	0	0	0	0	88	18:00:00	25	0	63	88	0
Totals:	0	0	0	0	0	727		166	0	561	727	0

East Approach Totals						East/West Total Approaches	West Approach Totals					
	Includes Cars, Trucks, & Heavys							Includes Cars, Trucks, & Heavys				
Hour Ending	Left	Thru	Right	Grand Total	Total Peds		Hour Ending	Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	24	328	0	352	0	965	8:00:00	0	598	15	613	0
9:00:00	30	387	0	417	0	974	9:00:00	0	542	15	557	0
10:00:00	41	306	0	347	0	760	10:00:00	0	393	20	413	0
12:00:00	29	167	0	196	0	357	12:00:00	0	153	8	161	0
13:00:00	66	312	0	378	0	751	13:00:00	0	348	25	373	0
15:00:00	30	142	0	172	0	342	15:00:00	0	159	11	170	0
16:00:00	98	483	0	581	0	986	16:00:00	0	386	19	405	0
17:00:00	137	573	0	710	0	1207	17:00:00	0	465	32	497	0
18:00:00	125	531	0	656	0	1187	18:00:00	0	496	35	531	0
Totals:	580	3229	0	3809	0	7529		0	3540	180	3720	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	8:00	9:00	10:00	12:00	13:00	16:00	17:00	18:00
Crossing Values:	14	21	19	9	16	26	28	25

Glendon Drive & Old River Road

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

Municipality: Komoka
Site #: 0000003308
Intersection: Glendon Drive & Old River Road
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E

North Leg Total: 112
North Entering: 60
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	0	1	1
Cars	0	59	59
Totals	0	60	

↑

Heavys	0
Trucks	0
Cars	52
Totals	52

East Leg Total: 1310
East Entering: 482
East Peds: 0
Peds Cross: ⧗

↲ ↳

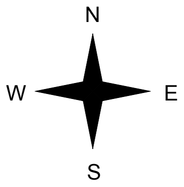
Old River Road

Heavys	Trucks	Cars	Totals
3	10	419	432

←

Cars	Trucks	Heavys	Totals
50	0	0	50
419	10	3	432
469	10	3	

Glendon Drive



Heavys	Trucks	Cars	Totals
0	0	2	2
2	13	753	768
2	13	755	

Glendon Drive

→

Cars	Trucks	Heavys	Totals
812	14	2	828

Peds Cross: ⧗
West Peds: 0
West Entering: 770
West Leg Total: 1202

Comments

Glendon Drive & Old River Road

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 13:30:00

One Hour Peak
From: 11:30:00
To: 12:30:00

Municipality: Komoka
Site #: 0000003308
Intersection: Glendon Drive & Old River Road
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

Person(s) who counted:

**** Non-Signalized Intersection ****

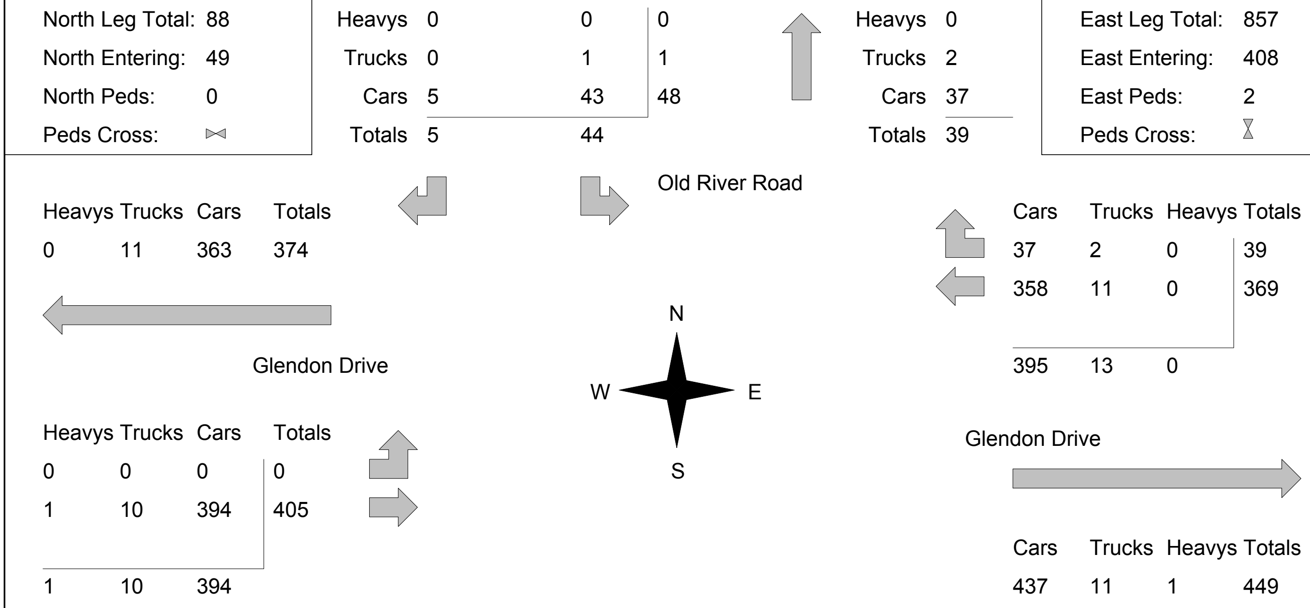
Major Road: Glendon Drive runs W/E

North Leg Total: 88
North Entering: 49
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	0	1	1
Cars	5	43	48
Totals	5	44	

Heavys	0
Trucks	2
Cars	37
Totals	39

East Leg Total: 857
East Entering: 408
East Peds: 2
Peds Cross: ⧗



Heavys	Trucks	Cars	Totals
0	11	363	374

Cars	Trucks	Heavys	Totals
37	2	0	39
358	11	0	369
395	13	0	

Heavys	Trucks	Cars	Totals
0	0	0	0
1	10	394	405
1	10	394	

Cars	Trucks	Heavys	Totals
437	11	1	449

Peds Cross: ⧗
West Peds: 0
West Entering: 405
West Leg Total: 779

Comments

Glendon Drive & Old River Road

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:30:00
To: 17:30:00

Municipality: Komoka
Site #: 0000003308
Intersection: Glendon Drive & Old River Road
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain

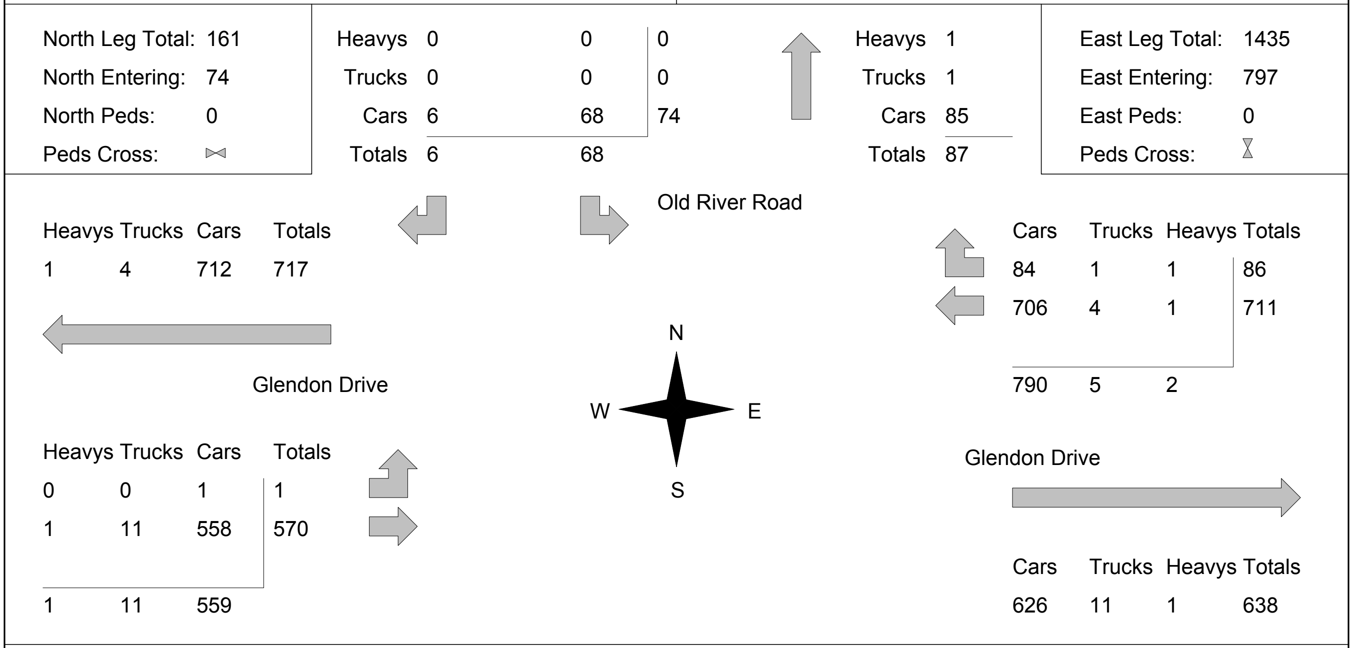
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E

North Leg Total: 161
North Entering: 74
North Peds: 0
Peds Cross: ⋈

East Leg Total: 1435
East Entering: 797
East Peds: 0
Peds Cross: ⧗



Heavys	0	0	0
Trucks	0	0	0
Cars	6	68	74
Totals	6	68	

Heavys	1
Trucks	1
Cars	85
Totals	87

Heavys	Trucks	Cars	Totals
1	4	712	717

Cars	Trucks	Heavys	Totals
84	1	1	86
706	4	1	711
790	5	2	

Heavys	Trucks	Cars	Totals
0	0	1	1
1	11	558	570
1	11	559	

Cars	Trucks	Heavys	Totals
626	11	1	638

Peds Cross: ⧗
West Peds: 0
West Entering: 571
West Leg Total: 1288

Comments

Glendon Drive & Old River Road

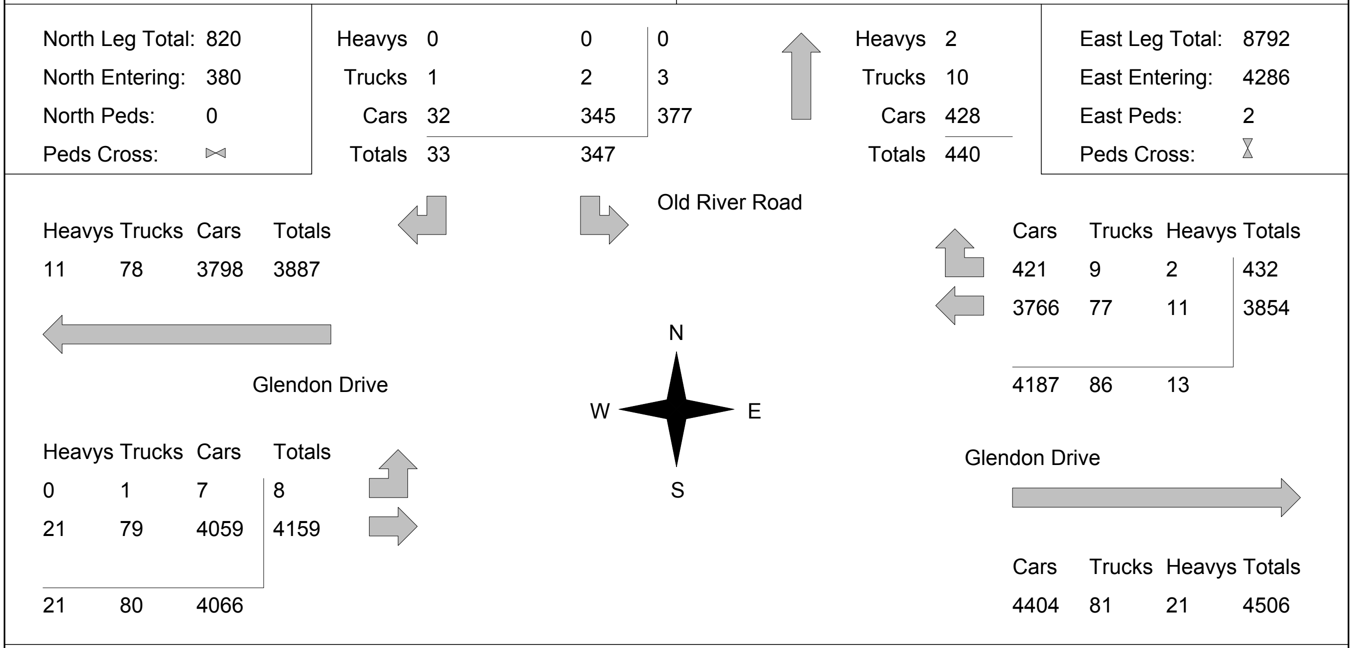
Total Count Diagram

Municipality: Komoka
Site #: 0000003308
Intersection: Glendon Drive & Old River Road
TFR File #: 1
Count date: 29-Sep-2015

Weather conditions:
Cloudy / Rain
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E



North Leg Total: 820
North Entering: 380
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	1	2	3
Cars	32	345	377
Totals	33	347	

Heavys	2
Trucks	10
Cars	428
Totals	440

East Leg Total: 8792
East Entering: 4286
East Peds: 2
Peds Cross: ⧗

Old River Road

Heavys	Trucks	Cars	Totals
11	78	3798	3887

Cars	Trucks	Heavys	Totals
421	9	2	432
3766	77	11	3854
4187	86	13	

Glendon Drive

Heavys	Trucks	Cars	Totals
0	1	7	8
21	79	4059	4159
21	80	4066	

Glendon Drive

Cars	Trucks	Heavys	Totals
4404	81	21	4506

Peds Cross: ⧗
West Peds: 0
West Entering: 4167
West Leg Total: 8054

Comments

Glendon Drive & Old River Road
Traffic Count Summary

Intersection: Glendon Drive & Old River Road	Count Date: 29-Sep-2015	Municipality: Komoka

North Approach Totals						North/South Total Approaches	South Approach Totals					
	Includes Cars, Trucks, & Heavys							Includes Cars, Trucks, & Heavys				
Hour Ending	Left	Thru	Right	Grand Total	Total Peds		Hour Ending	Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	42	0	2	44	0	44	8:00:00	0	0	0	0	0
9:00:00	53	0	2	55	0	55	9:00:00	0	0	0	0	0
10:00:00	32	0	6	38	0	38	10:00:00	0	0	0	0	0
12:00:00	20	0	2	22	0	22	12:00:00	0	0	0	0	0
13:00:00	37	0	6	43	0	43	13:00:00	0	0	0	0	0
15:00:00	10	0	1	11	0	11	15:00:00	0	0	0	0	0
16:00:00	36	0	5	41	0	41	16:00:00	0	0	0	0	0
17:00:00	60	0	3	63	0	63	17:00:00	0	0	0	0	0
18:00:00	57	0	6	63	0	63	18:00:00	0	0	0	0	0
Totals:	347	0	33	380	0	380		0	0	0	0	0

East Approach Totals						East/West Total Approaches	West Approach Totals					
	Includes Cars, Trucks, & Heavys							Includes Cars, Trucks, & Heavys				
Hour Ending	Left	Thru	Right	Grand Total	Total Peds		Hour Ending	Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	0	356	52	408	0	1146	8:00:00	1	737	0	738	0
9:00:00	0	422	42	464	0	1126	9:00:00	2	660	0	662	0
10:00:00	0	338	38	376	0	843	10:00:00	1	466	0	467	0
12:00:00	0	191	23	214	1	408	12:00:00	0	194	0	194	0
13:00:00	0	386	30	416	1	815	13:00:00	2	397	0	399	0
15:00:00	0	178	20	198	0	386	15:00:00	0	188	0	188	0
16:00:00	0	584	53	637	0	1077	16:00:00	1	439	0	440	0
17:00:00	0	734	97	831	0	1354	17:00:00	0	523	0	523	0
18:00:00	0	665	77	742	0	1298	18:00:00	1	555	0	556	0
Totals:	0	3854	432	4286	2	8453		8	4159	0	4167	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	8:00	9:00	10:00	12:00	13:00	16:00	17:00	18:00
Crossing Values:	42	53	32	21	38	36	60	57

Basic Axle Classification Report: S03301

Station ID : S03301
Info Line 1 : Glendon Dr btwn
Info Line 2 : Amiens Rd & Komoka Rd

GPS Lat/Lon :
DB File : S03301.DB

Last Connected Device Type : Unic-L
Version Number : 1.30
Serial Number : U55511

Number of Lanes : 2
Posted Speed Limit :

Lane #1 Configuration

#	Dir.	Information	Vehicle Sensors	Sensor Spacing	Loop Length	Comment
1.		WB	Ax-Ax	150 cm	182 cm	

Lane #1 Basic Axle Classification Data From: 00:00 - 10/01/2015 To: 23:59 - 10/07/2015

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	*Time*	*Cycle*	*Cars*	*2A-4T*	*Buses*	*2A-SU*	*3A-SU*	*4A-SU*	*4A-ST*	*5A-ST*	*6A-ST*	*5A-MT*	*6A-MT*	*Other*	*Total*
10/01/15	00:00	2	13	3	0	2	0	0	0	0	0	0	0	0	20
Thu	01:00	0	5	1	0	0	0	0	0	1	0	0	0	0	7
	02:00	0	3	2	0	0	0	0	0	0	0	0	0	0	5
	03:00	0	6	3	0	0	0	0	0	0	0	0	0	0	9
	04:00	0	13	4	0	0	0	0	0	0	0	0	0	0	17
	05:00	1	35	20	0	2	0	0	1	1	0	3	0	0	63
	06:00	0	108	42	0	2	2	0	0	0	0	5	1	0	160
	07:00	0	221	46	0	1	4	0	1	1	3	13	0	4	294
	08:00	2	196	66	2	8	3	1	4	6	2	14	1	4	309
	09:00	3	181	57	0	8	1	2	3	3	1	4	0	1	264
	10:00	1	162	46	0	4	1	1	1	2	3	7	0	4	232
	11:00	3	153	49	1	2	4	1	5	3	2	10	1	4	238
	12:00	3	158	48	0	3	1	1	1	3	3	4	1	5	231
	13:00	4	179	48	0	5	3	1	2	1	1	3	0	3	250
	14:00	9	197	56	0	3	4	2	6	7	1	4	2	8	299
	15:00	3	214	57	0	6	1	0	4	0	1	13	1	3	303
	16:00	7	293	87	0	9	0	0	8	0	0	15	1	6	426
	17:00	7	341	90	0	0	5	1	9	7	2	22	1	1	486
	18:00	6	247	59	0	1	1	0	1	3	1	14	0	3	336
	19:00	1	198	44	0	0	0	0	0	0	1	3	1	0	248
	20:00	3	159	28	0	0	2	0	1	0	0	0	0	1	194
	21:00	5	114	28	0	0	0	0	2	0	1	1	0	0	151
	22:00	0	70	14	0	0	0	0	0	0	1	3	0	0	88
	23:00	1	48	10	0	0	0	0	0	0	0	0	0	0	59
Daily Total :		61	3314	908	3	56	32	10	49	38	23	138	10	47	4689
Percent :		1%	71%	19%	0%	1%	1%	0%	1%	1%	0%	3%	0%	1%	
Average :		3	138	38	0	2	1	0	2	2	1	6	0	2	195

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	*Time*	*Cycle*	*Cars*	*2A-4T*	*Buses*	*2A-SU*	*3A-SU*	*4A-SU*	*4A-ST*	*5A-ST*	*6A-ST*	*5A-MT*	*6A-MT*	*Other*	*Total*
10/02/15	00:00	1	12	6	0	0	0	0	0	0	0	1	0	1	21
Fri	01:00	0	7	2	0	0	0	0	0	0	1	0	0	0	10
	02:00	0	9	2	0	0	0	0	0	0	0	0	0	0	11
	03:00	0	5	1	0	0	0	0	0	0	0	0	0	0	6
	04:00	0	14	5	0	0	0	0	1	0	0	0	0	0	20
	05:00	0	37	21	0	1	0	0	0	0	0	0	0	0	59
	06:00	1	81	35	0	2	0	0	0	1	0	4	0	2	126
	07:00	1	193	45	0	3	0	0	1	3	3	13	1	4	267
	08:00	4	222	62	0	5	4	0	1	6	2	9	3	4	322
	09:00	3	188	41	0	6	2	1	3	3	2	13	2	4	268
	10:00	0	172	58	0	6	2	1	4	3	0	9	2	3	260
	11:00	4	148	42	0	4	1	1	3	0	6	7	0	5	221
	12:00	5	193	51	0	3	2	1	5	1	1	8	0	3	273
	13:00	3	228	53	0	2	4	3	5	0	2	14	1	2	317
	14:00	4	235	64	0	1	2	0	5	3	0	17	1	3	335
	15:00	7	265	88	0	3	5	0	3	5	0	13	0	2	391
	16:00	9	322	82	0	8	3	1	8	1	1	25	0	4	464
	17:00	5	323	76	0	4	1	1	2	2	0	17	0	4	435
	18:00	8	268	56	0	1	2	1	3	1	0	17	0	4	361
	19:00	2	201	48	1	1	2	0	0	0	0	8	0	1	264
	20:00	1	159	32	0	0	0	0	0	2	0	8	0	0	202
	21:00	1	111	27	0	0	0	0	0	0	0	2	0	0	141
	22:00	0	135	36	0	0	1	0	0	0	0	0	0	0	172
	23:00	0	62	12	0	0	0	0	0	0	0	0	0	0	74
Daily Total :		59	3590	945	1	50	31	10	44	31	18	185	10	46	5020
Percent :		1%	72%	19%	0%	1%	1%	0%	1%	1%	0%	4%	0%	1%	
Average :		2	150	39	0	2	1	0	2	1	1	8	0	2	208

(DEFAULTC) Date	Time	#1 Cycle	#2 Cars	#3 2A-4T	#4 Buses	#5 2A-SU	#6 3A-SU	#7 4A-SU	#8 4A-ST	#9 5A-ST	#10 6A-ST	#11 5A-MT	#12 6A-MT	#13 Other	Total
10/03/15	00:00	0	29	10	0	1	0	0	0	0	0	1	0	0	41
Sat	01:00	0	26	5	0	0	0	0	0	0	0	0	0	0	31
	02:00	0	11	1	0	0	1	0	0	0	0	0	0	0	13
	03:00	0	6	3	0	0	0	0	0	0	0	0	0	0	9
	04:00	0	7	0	0	0	0	0	0	0	0	0	0	0	7
	05:00	0	21	6	0	0	0	0	0	0	0	0	0	0	27
	06:00	1	34	11	0	0	0	0	0	3	1	0	0	0	50
	07:00	1	92	25	0	1	0	0	0	0	0	2	0	1	122
	08:00	2	124	39	1	0	0	0	2	1	0	2	0	0	171
	09:00	0	179	41	0	1	0	0	0	2	0	5	0	0	228
	10:00	1	224	43	0	2	2	0	4	0	1	17	0	1	295
	11:00	3	216	63	0	1	1	0	2	1	0	9	0	1	297
	12:00	2	229	57	0	1	2	0	3	4	0	17	0	3	318
	13:00	1	229	74	0	2	1	0	1	2	0	10	0	2	322
	14:00	6	299	69	0	1	1	0	2	3	1	13	2	1	398
	15:00	4	198	53	0	2	2	0	1	0	0	9	0	3	272
	16:00	5	195	40	0	1	2	0	2	2	0	12	0	4	263
	17:00	2	235	40	0	2	0	1	1	0	1	6	0	1	289
	18:00	0	181	54	0	0	0	0	1	2	0	10	0	0	248
	19:00	0	127	31	0	0	1	0	0	1	0	4	0	0	164
	20:00	2	95	20	0	0	1	0	0	0	0	3	0	0	121
	21:00	0	109	23	0	2	0	0	0	0	0	3	0	0	137
	22:00	3	107	14	0	1	0	0	1	0	0	1	0	0	127
	23:00	3	68	11	0	0	0	0	0	0	0	1	0	0	83
Daily Total :		36	3041	733	1	18	14	1	20	21	4	125	2	17	4033
Percent :		1%	75%	18%	0%	0%	0%	0%	0%	1%	0%	3%	0%	0%	
Average :		2	127	31	0	1	1	0	1	1	0	5	0	1	170

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	Time	Cycle	Cars	2A-4T	Buses	2A-SU	3A-SU	4A-SU	4A-ST	5A-ST	6A-ST	5A-MT	6A-MT	Other	Total
10/04/15	00:00	1	35	6	0	0	0	0	0	0	0	0	0	0	42
Sun	01:00	0	16	4	0	0	0	0	0	0	0	0	0	0	20
	02:00	0	17	2	0	1	0	0	0	0	0	0	0	0	20
	03:00	0	9	2	0	0	0	0	0	0	0	0	0	0	11
	04:00	0	8	2	0	0	0	0	0	0	0	0	0	0	10
	05:00	0	9	3	0	0	0	0	0	0	0	0	0	0	12
	06:00	1	22	9	0	0	0	0	1	0	0	1	0	0	34
	07:00	0	49	17	1	0	0	0	0	0	1	0	0	0	68
	08:00	2	65	26	0	0	1	0	0	1	0	1	0	1	97
	09:00	3	128	34	0	0	1	0	0	0	0	4	0	1	171
	10:00	2	155	40	0	1	0	0	0	2	0	9	0	0	209
	11:00	0	186	43	0	0	0	1	3	2	0	3	0	0	238
	12:00	4	205	48	0	0	0	0	1	0	0	11	0	3	272
	13:00	5	234	49	0	0	1	0	1	1	0	11	1	0	303
	14:00	2	217	37	0	0	1	0	2	0	2	9	0	4	274
	15:00	2	204	45	0	0	0	0	1	0	0	9	0	1	262
	16:00	8	207	32	0	0	1	0	2	0	0	11	0	1	262
	17:00	2	214	38	0	0	0	0	1	2	0	8	0	0	265
	18:00	2	147	37	0	0	0	1	1	1	0	10	0	0	199
	19:00	2	156	38	0	0	1	0	0	1	0	2	0	0	200
	20:00	2	115	22	0	1	0	0	0	1	0	3	0	0	144
	21:00	1	73	15	0	0	0	0	0	0	0	1	0	0	90
	22:00	1	42	11	0	0	0	0	0	0	0	1	0	0	55
	23:00	0	32	5	0	0	0	0	0	0	0	1	0	1	39
Daily Total :		40	2545	565	1	3	6	2	13	11	3	95	1	12	3297
Percent :		1%	77%	17%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	
Average :		2	106	24	0	0	0	0	1	0	0	4	0	1	138

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	Time	Cycle	Cars	2A-4T	Buses	2A-SU	3A-SU	4A-SU	4A-ST	5A-ST	6A-ST	5A-MT	6A-MT	Other	Total
10/05/15	00:00	0	12	1	0	1	0	0	0	0	0	0	0	0	14
Mon	01:00	0	6	3	0	0	0	0	0	0	1	0	0	0	10
	02:00	0	2	1	0	0	0	0	0	0	0	0	0	1	4
	03:00	0	3	3	0	0	0	0	0	0	0	0	0	0	6
	04:00	0	14	6	0	0	1	0	0	1	0	0	0	0	22
	05:00	0	36	28	0	1	0	0	1	1	0	0	0	2	69
	06:00	3	109	39	0	1	2	0	2	0	0	2	0	3	161
	07:00	6	228	33	0	3	0	1	1	3	1	18	1	6	301
	08:00	6	228	50	0	3	1	0	4	3	1	24	2	4	326
	09:00	6	189	57	0	3	2	1	3	2	1	4	0	3	271
	10:00	3	155	57	0	2	1	1	5	4	1	10	0	7	246
	11:00	6	156	38	0	3	1	1	3	0	3	5	0	3	219
	12:00	3	164	22	0	4	4	1	2	3	1	5	0	3	212
	13:00	2	193	52	0	4	2	1	1	3	1	3	0	3	265
	14:00	16	188	55	0	4	6	3	2	0	0	7	0	0	281
	15:00	12	216	64	0	7	5	1	7	4	3	8	1	4	332
	16:00	11	308	91	0	4	6	1	4	0	1	14	1	2	443
	17:00	9	342	96	0	0	6	1	1	4	1	16	0	4	480
	18:00	4	192	55	0	2	1	1	6	0	0	8	1	1	271
	19:00	2	164	36	0	0	1	0	3	1	0	1	0	1	209
	20:00	2	121	26	0	0	2	1	0	1	0	1	0	1	155
	21:00	1	88	17	0	0	1	0	0	0	0	0	0	1	108
	22:00	1	64	15	0	0	0	0	1	0	1	0	1	1	84
	23:00	0	41	8	0	0	0	0	0	0	0	0	0	0	49
Daily Total :		93	3219	853	0	42	42	14	46	30	16	126	7	50	4538
Percent :		2%	71%	19%	0%	1%	1%	0%	1%	1%	0%	3%	0%	1%	
Average :		4	134	36	0	2	2	1	2	1	1	5	0	2	190

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	*Time*	*Cycle*	*Cars*	*2A-4T*	*Buses*	*2A-SU*	*3A-SU*	*4A-SU*	*4A-ST*	*5A-ST*	*6A-ST*	*5A-MT*	*6A-MT*	*Other*	*Total*
10/06/15	00:00	0	20	3	0	1	0	0	0	0	0	0	0	0	24
Tue	01:00	0	8	3	0	0	1	0	0	0	0	0	0	0	12
	02:00	0	2	0	0	0	0	0	0	2	0	0	0	1	5
	03:00	0	3	1	0	0	0	0	0	0	0	0	0	0	4
	04:00	0	19	3	0	0	1	0	0	0	0	0	0	0	23
	05:00	1	34	21	0	1	1	0	1	0	0	0	0	1	60
	06:00	4	112	38	0	1	1	0	1	1	1	6	0	4	169
	07:00	6	235	45	0	0	4	2	2	6	1	17	2	5	325
	08:00	4	202	52	0	6	0	0	3	2	2	23	1	3	298
	09:00	1	149	42	0	3	5	1	6	2	1	7	0	4	221
	10:00	0	137	51	0	3	3	0	5	1	5	13	1	4	223
	11:00	1	182	46	0	5	1	0	6	1	2	3	1	2	250
	12:00	5	167	43	0	1	3	0	0	5	3	9	2	7	245
	13:00	6	218	51	0	9	4	0	2	4	0	10	0	5	309
	14:00	5	197	59	0	6	4	0	2	1	3	8	0	7	292
	15:00	5	235	75	0	5	1	1	7	5	4	18	1	4	361
	16:00	7	295	84	0	5	5	0	5	6	2	24	2	2	437
	17:00	5	325	107	0	0	3	0	3	3	1	21	1	4	473
	18:00	0	248	54	0	0	1	0	3	3	0	16	0	1	326
	19:00	3	173	40	0	2	0	0	0	1	0	3	0	0	222
	20:00	5	164	23	0	0	0	0	0	0	0	0	1	0	193
	21:00	3	130	26	0	0	0	1	0	0	2	1	0	1	164
	22:00	2	60	12	0	0	0	0	0	0	0	1	0	0	75
	23:00	1	27	8	0	0	0	0	0	0	0	0	0	0	36
Daily Total :		64	3342	887	0	48	38	5	46	43	27	180	12	55	4747
Percent :		1%	70%	19%	0%	1%	1%	0%	1%	1%	1%	4%	0%	1%	
Average :		3	139	37	0	2	2	0	2	2	1	8	1	2	199

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	Time	Cycle	Cars	2A-4T	Buses	2A-SU	3A-SU	4A-SU	4A-ST	5A-ST	6A-ST	5A-MT	6A-MT	Other	Total
10/07/15	00:00	0	11	1	0	1	0	0	0	0	0	0	0	0	13
Wed	01:00	0	5	3	0	0	1	0	0	0	0	0	0	0	9
	02:00	0	2	0	0	0	0	0	0	0	0	0	0	1	3
	03:00	1	7	0	0	0	0	0	1	0	0	0	0	0	9
	04:00	0	14	2	0	0	0	0	0	0	0	0	0	0	16
	05:00	1	40	23	0	0	0	0	1	1	0	0	0	1	67
	06:00	2	102	54	0	0	0	0	0	0	1	5	0	1	165
	07:00	5	224	55	0	4	5	0	3	1	1	19	0	6	323
	08:00	3	251	65	0	3	2	0	4	3	0	12	0	3	346
	09:00	4	158	46	0	3	1	2	4	2	0	11	1	1	233
	10:00	0	154	36	0	0	0	0	2	1	1	8	0	4	206
	11:00	3	142	48	0	1	3	0	3	2	3	10	0	2	217
	12:00	3	166	37	0	3	2	0	0	1	1	8	0	1	222
	13:00	6	201	46	0	4	2	1	3	1	3	8	0	4	279
	14:00	6	219	58	1	1	6	1	3	0	1	7	1	5	309
	15:00	10	280	69	0	3	5	1	2	2	4	18	2	2	398
	16:00	15	292	87	0	6	2	1	0	6	4	21	1	5	440
	17:00	4	301	83	0	4	3	1	4	5	0	19	0	5	429
	18:00	4	218	49	0	0	2	0	2	0	1	10	1	3	290
	19:00	2	162	47	0	0	0	0	0	0	0	12	0	0	223
	20:00	6	167	33	0	0	0	0	0	2	2	2	0	0	212
	21:00	2	129	19	0	0	0	0	1	0	0	2	0	1	154
	22:00	2	79	14	0	0	1	0	0	0	0	1	0	0	97
	23:00	1	42	5	0	0	1	0	1	0	0	0	0	0	50
Daily Total :		80	3366	880	1	33	36	7	34	27	22	173	6	45	4710
Percent :		2%	71%	19%	0%	1%	1%	0%	1%	1%	0%	4%	0%	1%	
Average :		3	140	37	0	1	2	0	1	1	1	7	0	2	195

Lane #3 Configuration

#	Dir.	Information	Vehicle Sensors	Sensor Spacing	Loop Length	Comment
3.		EB	Ax-Ax	150 cm	182 cm	

Lane #3 Basic Axle Classification Data From: 00:00 - 10/01/2015 To: 23:59 - 10/07/2015

	(DEFAULTC)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	Time	Cycle	Cars	2A-4T	Buses	2A-SU	3A-SU	4A-SU	4A-ST	5A-ST	6A-ST	5A-MT	6A-MT	Other	Total
10/01/15	00:00	0	18	4	0	1	0	0	0	0	0	0	0	0	23
Thu	01:00	0	2	1	0	0	0	0	0	0	0	0	0	0	3
	02:00	0	3	0	0	0	0	0	0	0	0	0	0	0	3
	03:00	0	5	3	0	0	0	0	0	0	0	0	0	0	8
	04:00	0	12	2	0	0	0	0	0	0	0	0	0	0	14
	05:00	1	42	22	0	0	0	1	0	0	0	0	0	1	67
	06:00	2	165	97	0	3	6	2	1	4	3	3	0	3	289
	07:00	1	278	122	0	3	3	1	3	4	2	11	0	5	433
	08:00	1	270	111	1	8	4	0	6	0	1	11	1	3	417
	09:00	1	188	73	1	6	4	1	0	2	3	3	0	5	287
	10:00	0	180	73	1	6	2	0	4	1	1	9	0	2	279
	11:00	0	180	61	0	1	3	0	2	0	1	5	0	5	258
	12:00	1	193	61	0	4	2	1	2	1	4	8	0	3	280
	13:00	0	157	60	1	4	2	0	4	3	0	3	2	3	239
	14:00	0	180	72	0	9	3	0	1	0	2	5	0	2	274
	15:00	2	215	72	0	10	3	2	0	0	2	9	0	1	316
	16:00	0	257	75	0	4	4	0	0	0	3	11	1	3	358
	17:00	0	301	105	0	1	1	1	3	1	0	23	0	3	439
	18:00	1	193	66	0	0	0	0	3	1	1	5	1	2	273
	19:00	2	119	35	0	0	0	0	1	0	1	4	0	1	163
	20:00	2	98	35	0	0	0	1	0	1	1	3	0	0	141
	21:00	0	74	24	0	0	0	0	0	0	0	2	0	1	101
	22:00	0	49	16	0	0	0	0	0	0	0	1	0	1	67
	23:00	0	26	12	0	0	0	0	0	0	0	1	0	0	39
Daily Total :		14	3205	1202	4	60	37	10	30	18	25	117	5	44	4771
Percent :		0%	67%	25%	0%	1%	1%	0%	1%	0%	1%	2%	0%	1%	
Average :		1	134	50	0	3	2	0	1	1	1	5	0	2	200

(DEFAULTC) Date	Time	#1 Cycle	#2 Cars	#3 2A-4T	#4 Buses	#5 2A-SU	#6 3A-SU	#7 4A-SU	#8 4A-ST	#9 5A-ST	#10 6A-ST	#11 5A-MT	#12 6A-MT	#13 Other	Total
10/02/15	00:00	0	11	4	0	0	0	0	0	0	0	0	0	0	15
Fri	01:00	0	5	7	0	0	0	0	0	0	0	0	0	0	12
	02:00	0	7	1	0	0	0	0	0	0	0	0	0	0	8
	03:00	0	5	2	0	0	0	0	0	0	0	0	0	0	7
	04:00	0	18	4	0	0	0	0	0	1	0	0	0	0	23
	05:00	0	47	15	0	0	0	0	0	0	0	0	0	0	62
	06:00	0	134	90	0	1	6	1	0	3	2	3	0	0	240
	07:00	1	268	120	1	4	5	1	1	3	3	10	1	5	423
	08:00	2	243	108	0	7	0	0	4	0	2	9	0	4	379
	09:00	0	191	71	0	4	3	0	2	2	3	7	0	1	284
	10:00	1	189	68	0	5	2	1	5	5	4	6	1	2	289
	11:00	0	182	82	0	2	2	0	3	2	1	7	1	3	285
	12:00	1	196	72	0	4	1	0	0	0	2	9	0	1	286
	13:00	2	180	63	0	4	3	0	1	1	0	4	0	1	259
	14:00	1	204	75	0	7	2	1	4	0	0	10	0	1	305
	15:00	0	238	85	0	2	1	0	6	2	1	2	0	1	338
	16:00	1	321	77	0	2	2	0	1	0	2	15	2	2	425
	17:00	1	301	94	0	2	0	0	2	0	0	18	0	2	420
	18:00	2	218	67	0	0	1	0	1	1	0	8	0	0	298
	19:00	0	144	49	0	2	0	0	0	0	0	2	0	0	197
	20:00	0	106	33	1	0	0	0	0	0	0	5	0	0	145
	21:00	0	117	21	0	0	1	0	0	0	0	1	0	0	140
	22:00	0	108	22	0	0	0	0	0	0	1	0	0	0	131
	23:00	0	39	17	0	0	0	0	0	0	0	0	0	0	56
Daily Total :		12	3472	1247	2	46	29	4	30	20	21	116	5	23	5027
Percent :		0%	69%	25%	0%	1%	1%	0%	1%	0%	0%	2%	0%	0%	
Average :		1	145	52	0	2	1	0	1	1	1	5	0	1	210

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	Time	Cycle	Cars	2A-4T	Buses	2A-SU	3A-SU	4A-SU	4A-ST	5A-ST	6A-ST	5A-MT	6A-MT	Other	Total
10/03/15	00:00	1	33	10	0	0	0	0	0	0	0	0	0	1	45
Sat	01:00	0	17	3	0	0	0	0	0	0	0	0	0	0	20
	02:00	0	8	2	0	0	0	0	0	0	0	0	0	0	10
	03:00	0	8	0	0	0	0	0	0	0	0	0	0	0	8
	04:00	0	7	4	0	0	0	0	0	0	1	0	0	0	12
	05:00	0	14	5	0	0	0	0	0	1	0	1	0	0	21
	06:00	0	45	23	0	0	0	0	0	0	0	0	0	1	69
	07:00	0	91	41	0	2	0	0	0	1	0	3	0	0	138
	08:00	0	124	66	0	1	0	0	1	0	0	5	2	0	199
	09:00	0	190	76	0	0	0	0	1	0	0	8	0	0	275
	10:00	0	189	76	0	3	1	0	1	0	0	7	0	2	279
	11:00	1	205	81	0	0	1	0	2	1	0	7	1	0	299
	12:00	0	201	68	0	1	1	0	0	0	0	7	0	1	279
	13:00	0	243	73	1	1	1	0	1	1	0	10	0	0	331
	14:00	0	204	69	0	1	1	0	2	0	1	8	0	1	287
	15:00	0	226	79	0	1	0	1	0	0	0	8	0	1	316
	16:00	0	225	60	0	2	0	0	1	0	0	9	0	0	297
	17:00	0	198	52	0	1	1	0	0	1	0	12	0	0	265
	18:00	0	163	50	0	0	0	1	0	0	0	2	0	2	218
	19:00	0	123	54	1	1	0	0	1	1	0	3	0	1	185
	20:00	0	90	25	0	0	0	0	0	0	0	1	0	0	116
	21:00	0	85	23	0	0	0	0	0	0	0	2	0	0	110
	22:00	0	74	18	0	2	0	0	0	0	0	1	0	0	95
	23:00	0	47	10	0	2	0	0	0	0	0	1	0	0	60
Daily Total :		2	2810	968	2	18	6	2	10	6	2	95	3	10	3934
Percent :		0%	71%	25%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	
Average :		0	117	40	0	1	0	0	0	0	0	4	0	0	162

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	Time	Cycle	Cars	2A-4T	Buses	2A-SU	3A-SU	4A-SU	4A-ST	5A-ST	6A-ST	5A-MT	6A-MT	Other	Total
10/04/15	00:00	0	31	7	0	0	0	0	0	0	0	1	0	0	39
Sun	01:00	0	20	2	0	0	0	0	0	0	0	0	0	0	22
	02:00	0	8	5	0	3	0	0	0	0	0	0	0	0	16
	03:00	0	7	0	0	0	0	0	0	0	0	0	0	0	7
	04:00	0	3	2	0	0	0	0	0	0	0	0	0	0	5
	05:00	0	13	8	0	0	0	0	0	0	0	0	0	0	21
	06:00	0	43	15	0	0	0	0	0	0	0	0	0	0	58
	07:00	0	54	30	0	0	0	0	0	0	0	1	0	0	85
	08:00	0	105	41	0	0	0	0	0	0	0	2	0	0	148
	09:00	1	123	46	0	1	1	0	2	0	0	2	0	0	176
	10:00	0	183	53	0	0	0	0	2	0	0	6	0	0	244
	11:00	2	206	48	0	0	0	0	0	0	0	3	0	1	260
	12:00	1	222	63	0	0	1	0	1	0	0	7	0	0	295
	13:00	0	203	50	0	0	0	0	1	0	0	7	0	0	261
	14:00	1	203	51	0	0	0	0	0	0	0	5	0	2	262
	15:00	1	206	59	0	0	0	0	2	0	0	6	0	1	275
	16:00	7	178	60	0	2	2	0	3	0	0	8	0	1	261
	17:00	5	170	43	0	1	0	0	1	1	0	5	0	0	226
	18:00	1	161	32	0	0	0	0	1	0	1	3	1	0	200
	19:00	0	150	36	0	0	0	0	0	0	0	1	0	0	187
	20:00	1	94	30	0	0	0	0	1	0	0	5	0	1	132
	21:00	0	75	13	0	0	0	0	0	0	0	2	0	0	90
	22:00	0	36	15	0	0	0	0	0	0	0	0	0	0	51
	23:00	0	31	12	0	0	0	0	0	0	0	0	0	0	43
Daily Total :		20	2525	721	0	7	4	0	14	1	1	64	1	6	3364
Percent :		1%	75%	21%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	
Average :		1	105	30	0	0	0	0	1	0	0	3	0	0	140

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	*Time*	*Cycle*	*Cars*	*2A-4T*	*Buses*	*2A-SU*	*3A-SU*	*4A-SU*	*4A-ST*	*5A-ST*	*6A-ST*	*5A-MT*	*6A-MT*	*Other*	*Total*
10/05/15	00:00	0	16	1	0	0	0	0	0	0	0	0	0	0	17
Mon	01:00	0	2	1	0	0	0	0	0	0	0	0	0	0	3
	02:00	0	3	1	0	0	0	0	0	0	0	0	0	0	4
	03:00	0	7	3	0	0	0	0	0	0	0	0	0	0	10
	04:00	0	12	6	0	0	0	0	0	0	0	0	0	1	19
	05:00	0	45	17	0	0	0	1	0	2	0	0	0	0	65
	06:00	2	147	84	0	4	6	1	1	2	1	7	1	0	256
	07:00	0	311	102	0	4	3	1	3	1	2	6	1	2	436
	08:00	0	260	92	0	4	3	0	1	1	0	5	0	4	370
	09:00	0	208	80	1	2	3	0	0	0	2	5	0	1	302
	10:00	1	170	60	1	2	4	0	1	2	1	4	0	1	247
	11:00	3	158	57	1	3	0	0	0	1	2	2	0	3	230
	12:00	2	178	69	0	4	2	0	0	0	2	6	0	2	265
	13:00	2	166	41	0	2	2	1	1	0	0	6	0	1	222
	14:00	1	160	70	0	2	0	0	0	0	2	5	0	1	241
	15:00	2	214	78	0	7	4	3	1	0	1	6	1	1	318
	16:00	1	251	71	0	7	1	2	2	2	2	11	0	3	353
	17:00	2	263	88	0	2	1	1	3	0	1	22	1	4	388
	18:00	3	167	66	0	1	0	0	0	0	0	9	0	1	247
	19:00	0	123	33	0	0	0	0	0	1	0	2	0	1	160
	20:00	2	89	20	1	0	1	0	0	0	0	4	0	0	117
	21:00	1	62	14	0	0	0	1	0	1	1	2	0	0	82
	22:00	0	42	10	0	0	0	0	0	0	0	0	0	1	53
	23:00	0	23	8	0	0	0	0	0	0	0	0	0	0	31
Daily Total :		22	3077	1072	4	44	30	11	13	13	17	102	4	27	4436
Percent :		0%	69%	24%	0%	1%	1%	0%	0%	0%	0%	2%	0%	1%	
Average :		1	128	45	0	2	1	0	1	1	1	4	0	1	185

(DEFAULTC) Date	Time	#1 Cycle	#2 Cars	#3 2A-4T	#4 Buses	#5 2A-SU	#6 3A-SU	#7 4A-SU	#8 4A-ST	#9 5A-ST	#10 6A-ST	#11 5A-MT	#12 6A-MT	#13 Other	Total
10/06/15	00:00	0	11	4	0	0	0	0	0	0	0	0	0	0	15
Tue	01:00	0	7	3	0	0	0	0	0	0	0	0	0	0	10
	02:00	0	8	0	0	0	0	0	0	1	0	0	0	0	9
	03:00	0	7	4	0	0	0	0	0	0	0	0	0	0	11
	04:00	0	12	2	0	0	0	0	0	0	0	0	0	2	16
	05:00	0	39	22	0	0	0	0	0	0	0	1	0	0	62
	06:00	2	149	85	0	2	5	1	1	0	4	3	1	1	254
	07:00	4	290	115	0	3	6	0	2	2	2	12	0	2	438
	08:00	0	251	97	1	9	8	1	5	3	2	7	0	3	387
	09:00	0	178	92	0	3	3	1	1	1	2	4	1	1	287
	10:00	0	192	59	1	4	3	0	0	1	0	7	1	1	269
	11:00	1	148	61	1	1	3	0	0	2	7	7	0	0	231
	12:00	0	179	62	1	8	0	0	1	0	2	8	0	1	262
	13:00	1	166	53	0	6	2	0	4	2	3	8	1	3	249
	14:00	1	160	68	0	4	1	1	2	0	1	7	2	1	248
	15:00	1	251	84	0	8	1	0	3	1	2	4	0	2	357
	16:00	2	271	83	0	3	4	1	2	0	1	11	0	2	380
	17:00	4	265	83	0	2	1	0	2	0	1	15	0	4	377
	18:00	3	185	69	0	2	0	0	3	1	1	9	1	1	275
	19:00	1	134	56	0	1	3	0	1	0	0	2	0	2	200
	20:00	1	92	33	0	0	0	0	1	0	0	1	0	1	129
	21:00	0	61	14	0	0	0	0	0	0	0	1	0	0	76
	22:00	1	46	16	0	0	0	0	0	1	0	0	0	0	64
	23:00	0	31	5	0	0	0	0	0	0	0	0	0	0	36
Daily Total :		22	3133	1170	4	56	40	5	28	15	28	107	7	27	4642
Percent :		0%	67%	25%	0%	1%	1%	0%	1%	0%	1%	2%	0%	1%	
Average :		1	131	49	0	2	2	0	1	1	1	4	0	1	193

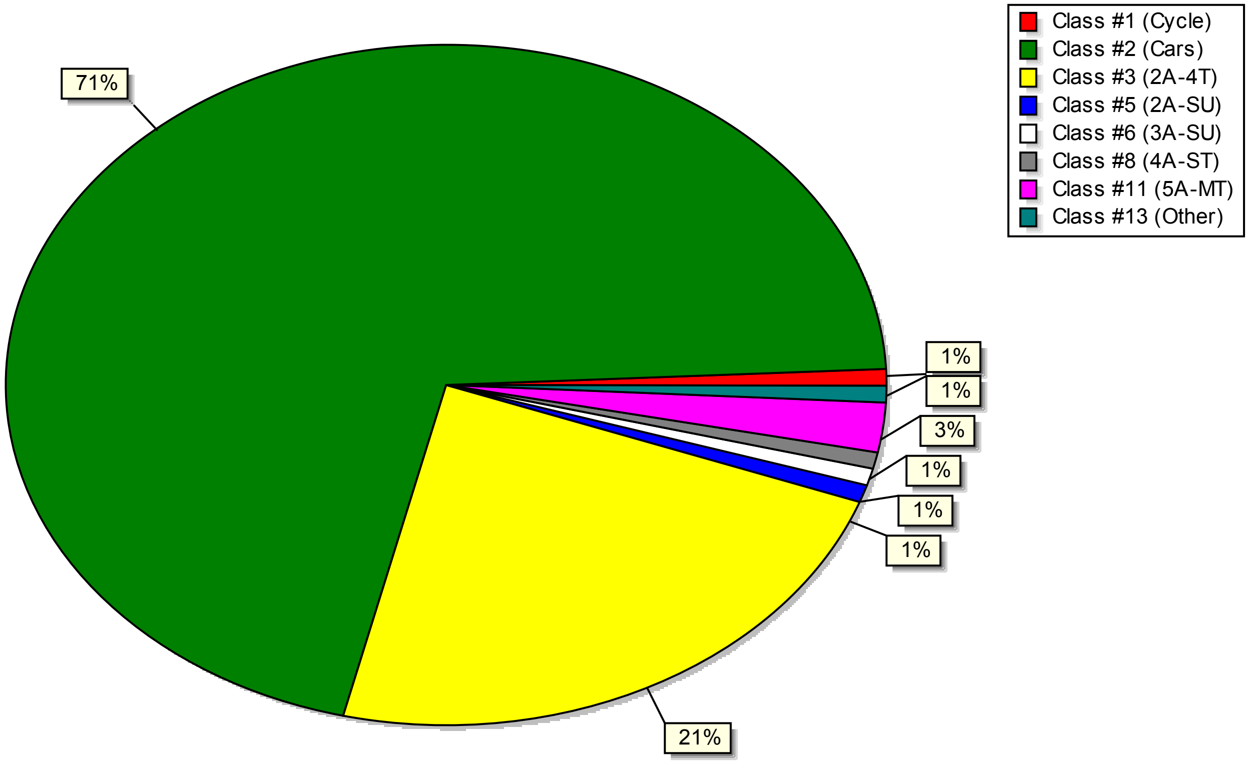
(DEFAULTC) Date	Time	#1 Cycle	#2 Cars	#3 2A-4T	#4 Buses	#5 2A-SU	#6 3A-SU	#7 4A-SU	#8 4A-ST	#9 5A-ST	#10 6A-ST	#11 5A-MT	#12 6A-MT	#13 Other	Total
10/07/15	00:00	0	13	2	0	0	1	0	0	0	0	0	0	0	16
Wed	01:00	0	7	0	0	0	0	0	0	0	0	0	0	1	8
	02:00	0	3	2	0	0	0	0	0	0	0	0	0	0	5
	03:00	0	1	1	0	0	0	0	0	0	0	0	0	0	2
	04:00	0	10	2	0	0	0	0	0	0	0	0	0	0	12
	05:00	0	37	24	0	0	0	0	0	1	1	0	0	1	64
	06:00	3	148	85	0	1	5	0	0	0	2	2	0	0	246
	07:00	1	280	103	1	6	1	1	0	2	1	4	1	2	403
	08:00	1	267	100	0	5	1	0	2	2	1	12	2	4	397
	09:00	1	194	91	0	3	3	0	2	2	2	8	0	1	307
	10:00	1	175	68	1	1	2	0	2	2	1	2	0	2	257
	11:00	1	163	54	0	3	3	0	2	0	0	3	0	3	232
	12:00	1	186	70	1	5	3	1	1	2	0	4	0	2	276
	13:00	3	158	48	0	4	2	0	4	2	1	4	0	0	226
	14:00	5	190	66	0	5	4	0	0	0	2	7	0	1	280
	15:00	1	213	83	0	5	2	0	4	0	3	11	1	1	324
	16:00	3	267	95	0	3	3	0	2	1	0	16	0	2	392
	17:00	0	231	71	0	1	4	0	3	1	1	22	1	2	337
	18:00	4	214	57	0	2	1	0	0	0	0	7	0	0	285
	19:00	1	109	37	0	0	1	0	1	2	0	4	0	2	157
	20:00	1	98	28	0	0	0	0	0	0	0	1	0	0	128
	21:00	0	79	19	0	0	0	0	0	0	0	1	0	0	99
	22:00	0	42	9	0	1	0	0	0	0	0	0	0	0	52
	23:00	0	35	9	0	0	0	0	0	1	0	0	0	0	45
Daily Total :		27	3120	1124	3	45	36	2	23	18	15	108	5	24	4550
Percent :		1%	69%	25%	0%	1%	1%	0%	1%	0%	0%	2%	0%	1%	
Average :		1	130	47	0	2	2	0	1	1	1	5	0	1	191

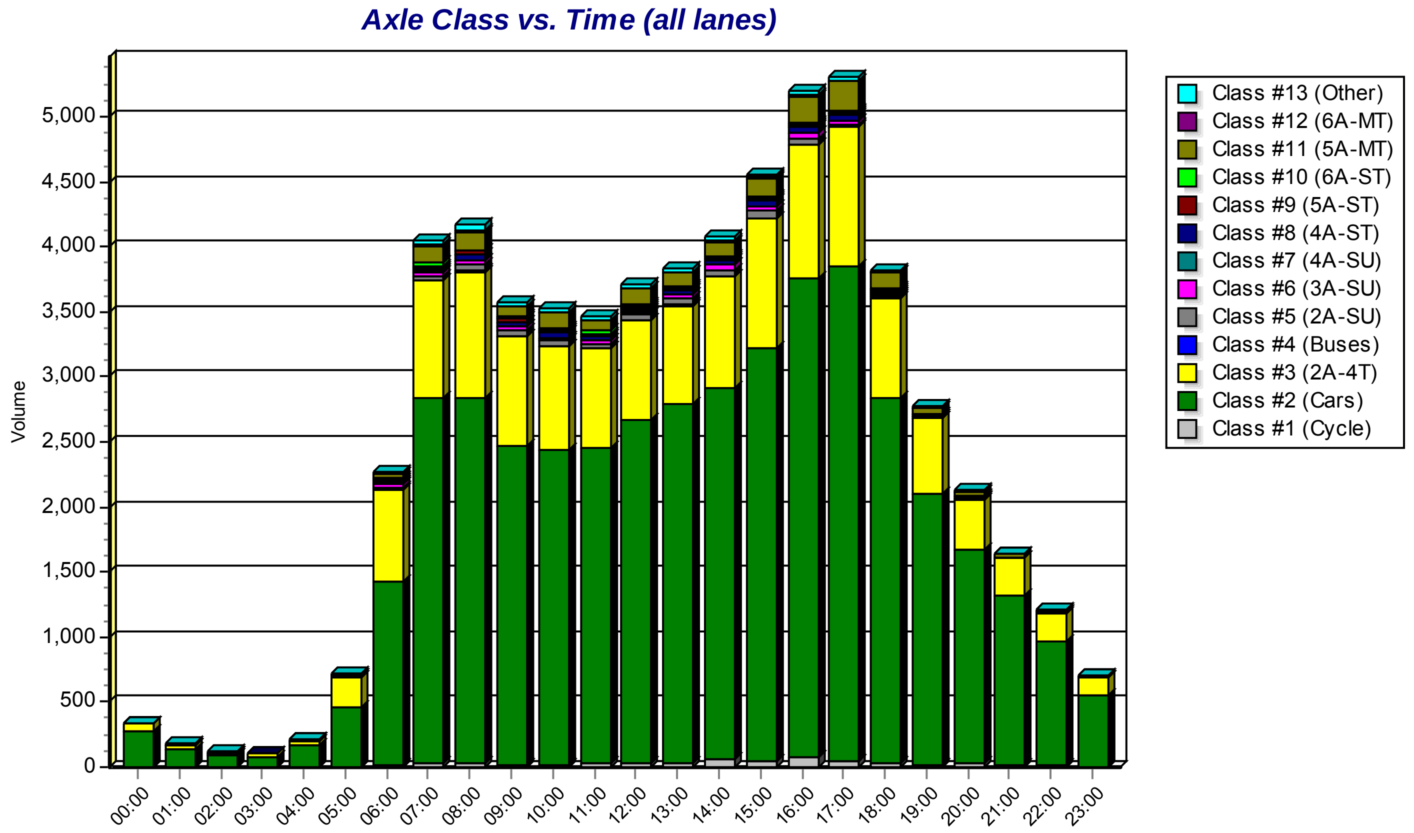
Basic Axle Class Summary: S03301

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Description	Lane	Cycle	Cars	2A-4T	Buses	2A-SU	3A-SU	4A-SU	4A-ST	5A-ST	6A-ST	5A-MT	6A-MT	Other	Total
TOTAL COUNT :	#1.	433	22417	5771	7	250	199	49	252	201	113	1022	48	272	31034
	#3.	119	21342	7504	19	276	182	34	148	91	109	709	30	161	30724
		552	43759	13275	26	526	381	83	400	292	222	1731	78	433	61758
Percents :	#1.	1%	72%	19%	0%	1%	1%	0%	1%	1%	0%	3%	0%	1%	50%
	#3.	0%	69%	24%	0%	1%	1%	0%	0%	0%	0%	2%	0%	1%	50%
		1%	71%	21%	0%	1%	1%	0%	1%	0%	0%	3%	0%	1%	
Average :	#1.	3	133	34	0	1	1	0	2	1	1	6	0	2	184
	#3.	1	127	45	0	2	1	0	1	1	1	4	0	1	184
		4	260	79	0	3	2	0	3	2	2	10	0	3	368
Days & ADT :	#1.	7.0	4433												
	#3.	7.0	4389												
		7.0	8822												

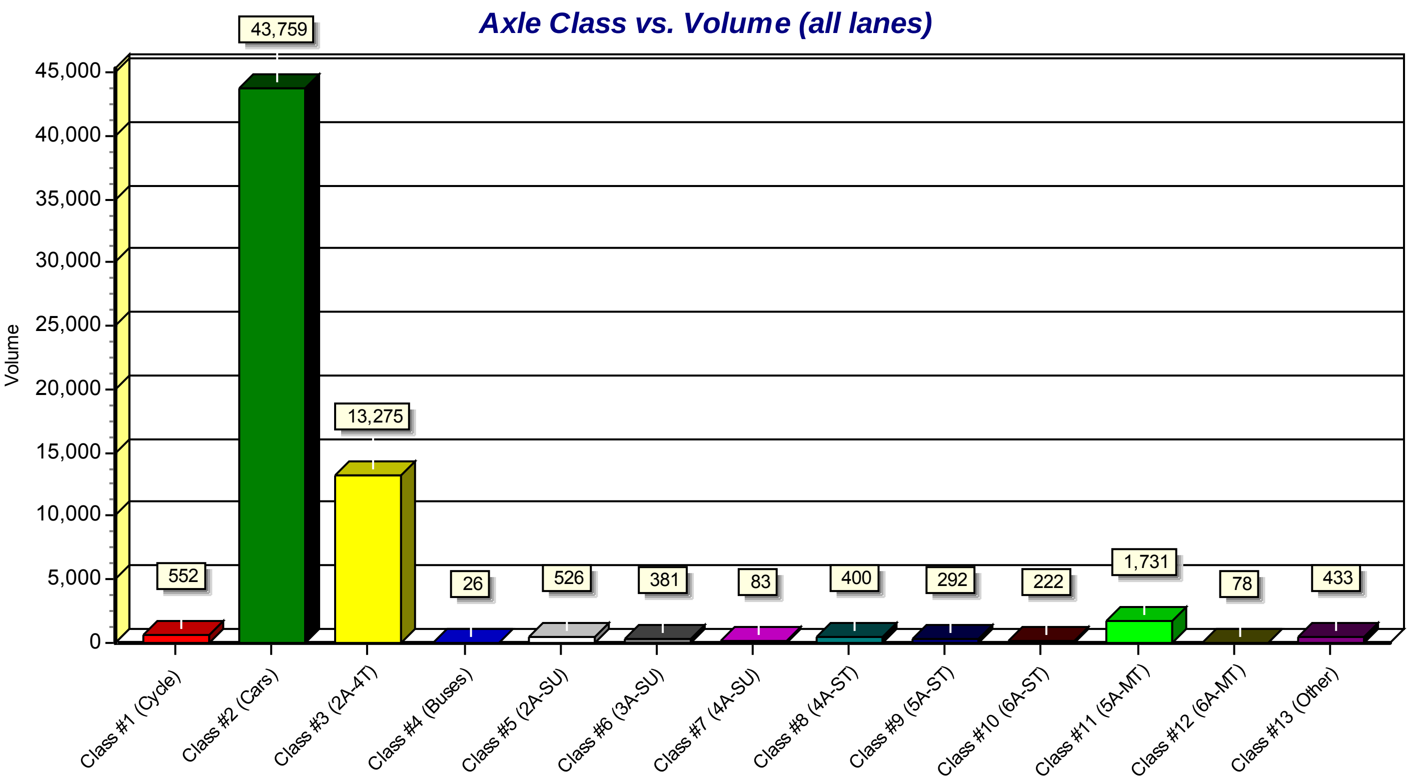
S03301 Axle Class Charts For Data From: 00:00 - 10/01/2015 To: 23:59 - 10/07/2015

Axle Class Percentages:





S03301 Axle Class Charts For Data From: 00:00 - 10/01/2015 To: 23:59 - 10/07/2015



Basic Speed Classification Report: S03301

Lane #1 Configuration

#	Dir.	Information	Vehicle Sensors	Sensor Spacing	Loop Length	Comment
1.		WB	Ax-Ax	150 cm	182 cm	

Lane #1 Basic Speed Classification Data From: 00:00 - 10/01/2015 To: 23:59 - 10/07/2015

(STANTEC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16	
Date	Time	0.0 - 9.9	10.0 - 19.9	20.0 - 29.9	30.0 - 39.9	40.0 - 49.9	50.0 - 59.9	60.0 - 69.9	70.0 - 79.9	80.0 - 89.9	90.0 - 99.9	100.0 - 109.9	110.0 - 119.9	120.0 - 129.9	130.0 - 139.9	140.0 - 149.9	Other	Total
10/01/15	00:00	0	0	1	0	0	0	0	0	7	5	5	2	0	0	0	0	20
Thu	01:00	0	0	1	0	0	0	0	1	2	2	0	1	0	0	0	0	7
	02:00	0	0	0	0	0	0	0	2	1	1	1	0	0	0	0	0	5
	03:00	0	0	0	0	0	0	0	0	4	5	0	0	0	0	0	0	9
	04:00	0	0	0	0	0	0	0	0	5	7	2	2	1	0	0	0	17
	05:00	0	0	0	1	0	0	0	1	17	21	18	4	1	0	0	0	63
	06:00	0	0	0	0	0	0	0	8	58	72	19	2	1	0	0	0	160
	07:00	0	0	0	1	0	0	4	38	157	86	7	1	0	0	0	0	294
	08:00	0	0	0	0	0	0	0	30	173	96	8	0	1	0	1	0	309
	09:00	0	0	0	0	1	1	3	25	113	104	15	2	0	0	0	0	264
	10:00	0	0	0	0	0	0	6	28	119	69	8	2	0	0	0	0	232
	11:00	0	0	0	0	0	0	0	11	122	94	8	1	0	1	0	1	238
	12:00	0	0	0	0	0	0	0	12	118	77	22	1	1	0	0	0	231
	13:00	0	0	0	1	0	0	2	35	123	78	10	1	0	0	0	0	250
	14:00	0	0	1	0	0	2	4	30	139	106	16	0	1	0	0	0	299
	15:00	0	0	0	0	0	0	1	27	145	109	20	1	0	0	0	0	303
	16:00	0	0	0	0	0	0	9	24	195	171	26	1	0	0	0	0	426
	17:00	0	0	0	0	0	0	0	29	245	190	16	4	1	0	0	1	486
	18:00	0	0	0	0	0	2	4	20	164	132	14	0	0	0	0	0	336
	19:00	0	0	0	0	0	1	1	27	137	72	10	0	0	0	0	0	248
	20:00	0	0	0	0	0	0	1	16	95	69	10	3	0	0	0	0	194
	21:00	0	0	0	0	0	0	1	13	73	44	18	2	0	0	0	0	151
	22:00	0	0	0	0	0	0	0	4	44	33	6	0	1	0	0	0	88
	23:00	0	0	0	0	0	0	1	3	14	32	6	2	1	0	0	0	59
Daily Total :		0	0	3	3	1	6	37	384	2270	1675	265	32	9	1	1	2	4689
Percent :		0%	0%	0%	0%	0%	0%	1%	8%	48%	36%	6%	1%	0%	0%	0%	0%	
Average :		0	0	0	0	0	0	2	16	95	70	11	1	0	0	0	0	184

Speeds - Average: 88.8 50% : 88.5 67% : 92.7 85% : 97.7 20kph Pace: 80.1 -100.0 (84.1%)

	(STANTEC)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16	
Date	Time	0.0 - 9.9	10.0 - 19.9	20.0 - 29.9	30.0 - 39.9	40.0 - 49.9	50.0 - 59.9	60.0 - 69.9	70.0 - 79.9	80.0 - 89.9	90.0 - 99.9	100.0 - 109.9	110.0 - 119.9	120.0 - 129.9	130.0 - 139.9	140.0 - 149.9	Other	Total
10/02/15	00:00	0	0	0	0	0	0	1	1	3	11	4	1	0	0	0	0	21
Fri	01:00	0	0	0	0	0	0	0	1	4	3	1	0	1	0	0	0	10
	02:00	0	0	0	0	0	0	0	0	2	6	3	0	0	0	0	0	11
	03:00	0	0	0	0	0	0	0	0	4	2	0	0	0	0	0	0	6
	04:00	0	0	0	0	0	0	0	0	5	8	7	0	0	0	0	0	20
	05:00	0	0	0	0	0	0	0	3	14	25	13	3	1	0	0	0	59
	06:00	0	0	0	1	0	0	0	4	46	51	21	3	0	0	0	0	126
	07:00	0	0	0	1	0	2	0	21	151	81	9	1	0	0	1	0	267
	08:00	0	0	0	0	1	4	0	53	160	96	8	0	0	0	0	0	322
	09:00	0	0	0	0	0	0	1	29	153	73	12	0	0	0	0	0	268
	10:00	0	0	0	0	0	0	0	36	151	62	10	0	0	0	0	1	260
	11:00	0	2	0	0	0	0	3	31	115	60	7	1	1	0	0	1	221
	12:00	0	0	1	0	0	0	6	12	137	90	25	2	0	0	0	0	273
	13:00	0	0	0	0	0	0	0	33	155	112	14	1	0	0	0	2	317
	14:00	0	0	0	1	2	1	0	16	165	136	12	1	0	0	1	0	335
	15:00	0	0	0	0	0	0	4	35	199	136	14	1	0	0	0	2	391
	16:00	1	0	0	0	5	6	0	38	256	136	19	2	1	0	0	0	464
	17:00	0	0	0	0	0	2	7	53	221	144	7	0	1	0	0	0	435
	18:00	0	0	1	0	0	0	2	41	197	103	14	3	0	0	0	0	361
	19:00	0	0	0	0	1	2	4	46	132	75	4	0	0	0	0	0	264
	20:00	0	0	0	0	2	0	1	25	90	72	11	0	1	0	0	0	202
	21:00	0	0	0	0	0	1	1	14	71	40	13	1	0	0	0	0	141
	22:00	0	0	0	0	0	0	1	15	79	61	15	1	0	0	0	0	172
	23:00	0	0	0	0	0	0	0	5	33	28	6	2	0	0	0	0	74
Daily Total :		1	2	2	3	11	18	31	512	2543	1611	249	23	6	0	2	6	5020
Percent :		0%	0%	0%	0%	0%	0%	1%	10%	51%	32%	5%	0%	0%	0%	0%	0%	
Average :		0	0	0	0	0	1	1	21	106	67	10	1	0	0	0	0	195

Speeds - Average: 87.8 50% : 87.6 67% : 91.6 85% : 97.1 20kph Pace: 80.1 -100.0 (82.7%)

Date	(STANTEC) Time	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
10/03/15	00:00	0	0	0	0	0	0	0	0	13	17	9	2	0	0	0	0	41
Sat	01:00	0	0	0	0	0	0	0	0	14	10	6	1	0	0	0	0	31
	02:00	0	0	0	0	0	0	0	1	3	7	0	1	1	0	0	0	13
	03:00	0	0	0	0	0	0	0	0	2	7	0	0	0	0	0	0	9
	04:00	0	0	0	0	0	0	0	0	2	4	1	0	0	0	0	0	7
	05:00	0	0	0	0	0	1	0	2	5	13	5	0	1	0	0	0	27
	06:00	0	0	0	0	0	0	0	5	6	23	12	4	0	0	0	0	50
	07:00	0	0	0	1	0	0	1	5	51	56	8	0	0	0	0	0	122
	08:00	0	0	0	0	0	0	0	19	79	65	6	2	0	0	0	0	171
	09:00	0	0	0	0	0	0	1	30	103	82	8	3	0	0	0	1	228
	10:00	0	0	0	0	0	0	0	27	156	94	14	2	1	0	1	0	295
	11:00	0	0	0	0	0	0	4	27	159	90	14	3	0	0	0	0	297
	12:00	0	0	0	0	0	1	5	32	164	101	12	3	0	0	0	0	318
	13:00	0	0	0	0	0	0	3	11	155	123	23	6	0	1	0	0	322
	14:00	0	1	0	0	0	0	2	46	240	96	11	2	0	0	0	0	398
	15:00	0	0	0	0	0	1	1	47	152	63	6	2	0	0	0	0	272
	16:00	0	1	0	0	0	0	1	40	132	77	9	2	0	0	0	1	263
	17:00	0	0	0	0	0	5	2	37	149	86	10	0	0	0	0	0	289
	18:00	0	0	0	0	0	0	0	36	107	90	12	2	0	0	0	1	248
	19:00	0	0	0	0	0	0	0	30	88	42	3	0	0	0	0	1	164
	20:00	0	0	0	0	0	0	5	20	52	37	7	0	0	0	0	0	121
	21:00	0	0	0	0	0	0	4	22	63	40	8	0	0	0	0	0	137
	22:00	0	0	0	0	0	0	3	35	51	34	4	0	0	0	0	0	127
	23:00	0	0	0	0	0	0	1	14	34	28	4	2	0	0	0	0	83
Daily Total :		0	2	0	1	0	8	33	486	1980	1285	192	37	3	1	1	4	4033
Percent :		0%	0%	0%	0%	0%	0%	1%	12%	49%	32%	5%	1%	0%	0%	0%	0%	
Average :		0	0	0	0	0	0	1	20	83	54	8	2	0	0	0	0	207

Speeds - Average: 87.9 50% : 87.6 67% : 91.6 85% : 97.2 20kph Pace: 80.1 -100.0 (81.0%)

	(STANTEC)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16	
Date	Time	0.0 - 9.9	10.0 - 19.9	20.0 - 29.9	30.0 - 39.9	40.0 - 49.9	50.0 - 59.9	60.0 - 69.9	70.0 - 79.9	80.0 - 89.9	90.0 - 99.9	100.0 - 109.9	110.0 - 119.9	120.0 - 129.9	130.0 - 139.9	140.0 - 149.9	Other	Total
10/04/15	00:00	0	0	0	0	0	1	0	5	23	10	3	0	0	0	0	0	42
Sun	01:00	0	0	0	0	0	0	0	1	12	4	3	0	0	0	0	0	20
	02:00	0	0	0	0	0	0	0	3	9	5	3	0	0	0	0	0	20
	03:00	0	0	0	0	0	0	0	0	5	2	2	2	0	0	0	0	11
	04:00	0	0	0	0	0	0	0	0	5	4	1	0	0	0	0	0	10
	05:00	0	0	0	0	0	1	0	1	4	2	2	1	1	0	0	0	12
	06:00	0	0	0	0	0	0	0	0	12	14	5	2	1	0	0	0	34
	07:00	0	0	0	0	0	0	0	4	33	23	7	1	0	0	0	0	68
	08:00	0	0	0	0	0	0	0	10	44	27	15	0	1	0	0	0	97
	09:00	0	0	0	0	0	0	1	11	96	56	7	0	0	0	0	0	171
	10:00	0	0	0	0	0	0	2	23	94	75	14	1	0	0	0	0	209
	11:00	0	0	0	7	1	0	0	10	109	98	12	1	0	0	0	0	238
	12:00	0	0	0	0	0	0	0	28	156	75	13	0	0	0	0	0	272
	13:00	0	0	0	0	0	0	0	20	152	104	24	3	0	0	0	0	303
	14:00	0	0	0	0	0	0	0	13	158	94	8	1	0	0	0	0	274
	15:00	0	0	0	0	0	0	2	11	143	87	17	2	0	0	0	0	262
	16:00	0	0	0	0	0	0	0	11	121	110	18	0	1	0	1	0	262
	17:00	0	0	0	0	0	1	7	13	131	98	15	0	0	0	0	0	265
	18:00	0	0	0	0	0	0	0	20	92	71	14	0	0	1	0	1	199
	19:00	0	0	0	0	0	0	2	15	108	65	9	1	0	0	0	0	200
	20:00	0	0	0	0	0	0	0	10	64	54	15	1	0	0	0	0	144
	21:00	0	0	0	0	0	0	2	4	29	40	13	2	0	0	0	0	90
	22:00	0	0	0	0	0	0	0	1	22	16	13	1	1	1	0	0	55
	23:00	0	0	0	0	0	0	0	1	17	15	4	2	0	0	0	0	39
Daily Total :		0	0	0	7	1	3	16	215	1639	1149	237	21	5	2	1	1	3297
Percent :		0%	0%	0%	0%	0%	0%	0%	7%	50%	35%	7%	1%	0%	0%	0%	0%	
Average :		0	0	0	0	0	0	1	9	68	48	10	1	0	0	0	0	168

Speeds - Average: 89.3 50% : 88.6 67% : 93.0 85% : 98.0 20kph Pace: 80.1 -100.0 (84.6%)

Date	(STANTEC) Time	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
10/05/15	00:00	0	0	0	0	0	0	1	0	7	5	1	0	0	0	0	0	14
Mon	01:00	0	0	0	0	0	0	1	1	3	3	2	0	0	0	0	0	10
	02:00	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	4
	03:00	0	0	0	0	0	0	0	0	1	5	0	0	0	0	0	0	6
	04:00	0	0	0	0	0	0	0	2	5	11	4	0	0	0	0	0	22
	05:00	0	0	0	0	0	0	0	1	14	30	20	4	0	0	0	0	69
	06:00	0	0	2	1	0	0	0	4	60	66	24	4	0	0	0	0	161
	07:00	0	0	0	0	0	0	8	59	150	77	6	1	0	0	0	0	301
	08:00	0	0	0	0	0	0	0	32	182	101	11	0	0	0	0	0	326
	09:00	0	0	0	0	0	0	3	41	138	82	7	0	0	0	0	0	271
	10:00	0	0	0	0	1	0	9	30	116	75	14	1	0	0	0	0	246
	11:00	0	0	0	0	0	0	1	18	121	71	6	2	0	0	0	0	219
	12:00	0	1	0	0	0	1	1	23	112	66	7	0	0	0	1	0	212
	13:00	0	0	0	0	0	0	1	23	147	83	11	0	0	0	0	0	265
	14:00	0	0	1	0	0	0	2	30	150	85	11	1	1	0	0	0	281
	15:00	0	0	0	0	0	3	3	49	179	85	9	3	0	0	0	1	332
	16:00	0	0	0	0	0	0	18	31	256	128	9	1	0	0	0	0	443
	17:00	0	0	0	0	0	0	0	35	267	162	14	1	0	0	0	1	480
	18:00	0	0	0	0	0	0	0	22	149	84	15	1	0	0	0	0	271
	19:00	0	0	0	0	0	0	0	27	107	65	9	1	0	0	0	0	209
	20:00	0	0	0	0	0	1	3	15	55	62	18	1	0	0	0	0	155
	21:00	0	0	0	0	0	0	0	8	33	56	9	2	0	0	0	0	108
	22:00	0	0	0	0	0	1	1	8	31	35	8	0	0	0	0	0	84
	23:00	0	0	0	0	0	0	1	0	13	24	9	2	0	0	0	0	49
Daily Total :		0	1	3	1	1	6	53	459	2299	1462	224	25	1	0	1	2	4538
Percent :		0%	0%	0%	0%	0%	0%	1%	10%	51%	32%	5%	1%	0%	0%	0%	0%	
Average :		0	0	0	0	0	0	2	19	96	61	9	1	0	0	0	0	137

Speeds - Average: 88.0 50% : 87.6 67% : 91.7 85% : 97.1 20kph Pace: 80.1 -100.0 (82.9%)

(STANTEC) Date	Time	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
10/06/15	00:00	0	0	0	0	0	0	0	1	7	11	5	0	0	0	0	0	24
Tue	01:00	0	0	0	0	0	0	1	0	4	5	0	2	0	0	0	0	12
	02:00	0	0	0	0	0	0	0	2	2	0	1	0	0	0	0	0	5
	03:00	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	4
	04:00	0	0	0	0	0	0	1	1	4	10	5	2	0	0	0	0	23
	05:00	0	0	0	1	0	0	0	5	21	19	12	1	1	0	0	0	60
	06:00	0	1	0	0	0	0	0	18	55	70	23	1	1	0	0	0	169
	07:00	0	1	1	0	0	0	5	22	195	88	11	2	0	0	0	0	325
	08:00	0	0	0	0	1	0	0	27	194	71	5	0	0	0	0	0	298
	09:00	0	0	0	0	0	0	3	47	121	43	6	0	0	0	0	1	221
	10:00	0	0	0	0	0	0	1	36	123	58	4	0	1	0	0	0	223
	11:00	0	0	0	0	0	1	2	32	147	63	4	0	0	0	0	1	250
	12:00	0	0	0	0	0	0	5	39	133	56	11	1	0	0	0	0	245
	13:00	0	0	0	0	0	1	1	46	162	94	5	0	0	0	0	0	309
	14:00	0	0	0	0	0	0	0	34	145	109	3	1	0	0	0	0	292
	15:00	0	0	0	0	0	3	1	37	207	106	7	0	0	0	0	0	361
	16:00	0	0	0	0	0	0	0	51	276	107	3	0	0	0	0	0	437
	17:00	0	0	0	0	0	1	0	36	249	164	18	4	0	0	1	0	473
	18:00	0	0	0	0	0	0	4	34	180	99	9	0	0	0	0	0	326
	19:00	0	0	0	0	0	2	0	28	116	66	9	1	0	0	0	0	222
	20:00	0	0	0	0	0	0	0	12	77	87	16	1	0	0	0	0	193
	21:00	0	0	0	0	0	0	4	14	75	55	15	1	0	0	0	0	164
	22:00	0	0	0	0	0	0	0	6	28	30	10	1	0	0	0	0	75
	23:00	0	0	0	0	0	0	0	1	17	13	5	0	0	0	0	0	36
Daily Total :		0	2	1	1	1	8	29	531	2539	1424	187	18	3	0	1	2	4747
Percent :		0%	0%	0%	0%	0%	0%	1%	11%	53%	30%	4%	0%	0%	0%	0%	0%	
Average :		0	0	0	0	0	0	1	22	106	59	8	1	0	0	0	0	188

Speeds - Average: 87.5 50% : 87.1 67% : 90.6 85% : 96.5 20kph Pace: 80.1 -100.0 (83.5%)

(STANTEC) Date	Time	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
10/07/15	00:00	0	0	0	0	0	0	0	1	4	7	1	0	0	0	0	0	13
Wed	01:00	0	0	0	0	0	0	0	1	2	2	1	3	0	0	0	0	9
	02:00	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	3
	03:00	0	0	0	0	0	0	0	1	3	5	0	0	0	0	0	0	9
	04:00	0	0	0	0	0	0	1	0	8	4	2	1	0	0	0	0	16
	05:00	0	0	0	1	0	0	0	6	18	26	13	2	1	0	0	0	67
	06:00	0	0	0	1	0	0	0	13	59	67	21	3	0	0	0	1	165
	07:00	0	1	0	0	0	0	2	51	172	85	8	3	0	0	0	1	323
	08:00	0	0	0	0	0	0	0	46	215	75	7	2	0	1	0	0	346
	09:00	0	0	0	0	1	0	2	27	138	56	8	0	0	0	1	0	233
	10:00	0	0	0	0	0	0	0	20	107	71	7	1	0	0	0	0	206
	11:00	0	0	0	0	0	0	2	19	129	58	8	1	0	0	0	0	217
	12:00	0	0	0	0	1	0	1	29	115	66	9	1	0	0	0	0	222
	13:00	0	0	0	0	0	0	5	34	165	63	11	0	0	0	0	1	279
	14:00	0	0	0	0	0	2	8	46	178	69	5	1	0	0	0	0	309
	15:00	0	0	0	0	0	0	10	54	243	82	7	1	1	0	0	0	398
	16:00	0	0	0	0	0	0	3	46	235	146	10	0	0	0	0	0	440
	17:00	0	0	3	1	4	10	5	46	213	130	14	2	1	0	0	0	429
	18:00	0	0	0	0	0	0	4	24	164	92	6	0	0	0	0	0	290
	19:00	0	0	0	0	0	0	3	12	123	70	12	3	0	0	0	0	223
	20:00	0	0	0	0	0	0	1	15	100	80	15	1	0	0	0	0	212
	21:00	0	0	1	0	0	0	0	10	75	58	10	0	0	0	0	0	154
	22:00	0	0	0	0	0	0	0	10	44	31	7	4	1	0	0	0	97
	23:00	0	0	0	0	0	0	0	1	16	17	14	2	0	0	0	0	50
Daily Total :		0	1	4	3	6	12	47	512	2528	1360	197	31	4	1	1	3	4710
Percent :		0%	0%	0%	0%	0%	0%	1%	11%	54%	29%	4%	1%	0%	0%	0%	0%	
Average :		0	0	0	0	0	1	2	21	105	57	8	1	0	0	0	0	197

Speeds - Average: 87.4 50% : 87.0 67% : 90.5 85% : 96.6 20kph Pace: 80.1 -100.0 (82.5%)

Lane #3 Configuration

#	Dir.	Information	Vehicle Sensors	Sensor Spacing	Loop Length	Comment
3.	EB		Ax-Ax	150 cm	182 cm	

Lane #3 Basic Speed Classification Data From: 00:00 - 10/01/2015 To: 23:59 - 10/07/2015

Date	(STANTEC) Time	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
10/01/15	00:00	0	0	0	0	0	0	0	1	4	14	4	0	0	0	0	0	23
Thu	01:00	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	3
	02:00	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	3
	03:00	0	0	0	0	0	0	0	0	4	1	3	0	0	0	0	0	8
	04:00	0	0	0	0	0	0	0	0	6	4	4	0	0	0	0	0	14
	05:00	0	0	0	0	0	0	0	6	17	29	11	1	3	0	0	0	67
	06:00	0	0	0	0	0	0	1	20	107	130	29	2	0	0	0	0	289
	07:00	0	0	0	0	0	4	3	31	208	163	19	3	0	1	0	1	433
	08:00	0	1	0	0	4	13	9	27	193	142	27	1	0	0	0	0	417
	09:00	0	0	0	0	0	2	0	17	124	123	20	1	0	0	0	0	287
	10:00	0	0	0	0	1	2	8	15	151	81	19	2	0	0	0	0	279
	11:00	0	0	0	0	1	1	2	11	117	104	19	3	0	0	0	0	258
	12:00	0	0	1	0	0	0	0	12	126	111	27	3	0	0	0	0	280
	13:00	0	0	0	1	2	2	2	15	83	107	22	4	1	0	0	0	239
	14:00	0	0	0	0	0	2	6	16	116	110	22	1	1	0	0	0	274
	15:00	0	0	0	0	1	2	4	13	111	141	42	1	0	0	0	1	316
	16:00	0	0	0	0	0	0	0	14	138	161	43	2	0	0	0	0	358
	17:00	0	0	0	0	11	0	1	8	129	242	42	5	0	0	0	1	439
	18:00	0	1	0	0	0	1	5	6	76	134	43	6	1	0	0	0	273
	19:00	0	1	0	0	0	0	1	3	59	78	21	0	0	0	0	0	163
	20:00	0	0	0	1	0	0	0	7	60	53	19	1	0	0	0	0	141
	21:00	0	0	0	0	0	0	1	2	31	44	17	5	1	0	0	0	101
	22:00	0	0	0	0	0	0	0	5	14	29	15	3	1	0	0	0	67
	23:00	0	0	0	0	0	0	0	0	16	17	5	1	0	0	0	0	39
Daily Total :		0	3	1	2	20	29	43	229	1891	2020	475	46	8	1	0	3	4771
Percent :		0%	0%	0%	0%	0%	1%	1%	5%	40%	42%	10%	1%	0%	0%	0%	0%	
Average :		0	0	0	0	1	1	2	10	79	84	20	2	0	0	0	0	195

Speeds - Average: 90.4 50% : 91.0 67% : 94.9 85% : 99.1 20kph Pace: 80.1 -100.0 (82.0%)

	(STANTEC)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16	
Date	Time	0.0 - 9.9	10.0 - 19.9	20.0 - 29.9	30.0 - 39.9	40.0 - 49.9	50.0 - 59.9	60.0 - 69.9	70.0 - 79.9	80.0 - 89.9	90.0 - 99.9	100.0 - 109.9	110.0 - 119.9	120.0 - 129.9	130.0 - 139.9	140.0 - 149.9	Other	Total
10/02/15	00:00	0	0	0	0	0	0	0	1	4	5	5	0	0	0	0	0	15
Fri	01:00	0	0	0	0	0	0	0	0	6	4	0	2	0	0	0	0	12
	02:00	0	0	0	0	0	0	0	0	2	3	0	3	0	0	0	0	8
	03:00	0	0	0	0	0	0	0	0	2	1	3	0	1	0	0	0	7
	04:00	0	0	0	0	0	0	0	3	7	9	4	0	0	0	0	0	23
	05:00	0	0	0	0	0	0	0	2	15	24	13	5	2	1	0	0	62
	06:00	0	0	0	0	0	1	0	7	96	105	25	6	0	0	0	0	240
	07:00	0	1	0	0	1	0	1	13	177	192	35	1	1	0	0	1	423
	08:00	0	1	0	0	0	0	4	30	176	143	23	2	0	0	0	0	379
	09:00	0	0	0	0	0	0	3	20	143	99	18	1	0	0	0	0	284
	10:00	0	0	0	5	3	2	2	32	147	82	15	1	0	0	0	0	289
	11:00	0	0	0	0	0	0	1	19	119	107	36	2	1	0	0	0	285
	12:00	0	0	0	0	1	1	0	21	106	125	27	5	0	0	0	0	286
	13:00	0	0	0	0	0	0	1	7	83	126	36	3	1	0	0	2	259
	14:00	0	0	1	0	0	0	0	14	129	133	26	1	0	0	0	1	305
	15:00	0	0	0	0	0	0	0	13	132	150	38	5	0	0	0	0	338
	16:00	0	1	0	0	0	0	4	10	139	237	31	1	1	1	0	0	425
	17:00	0	1	0	0	0	0	0	16	151	201	48	2	1	0	0	0	420
	18:00	0	0	0	0	0	3	1	20	102	130	36	6	0	0	0	0	298
	19:00	0	0	0	0	0	1	4	18	78	77	15	4	0	0	0	0	197
	20:00	0	0	0	0	0	2	1	8	59	53	21	1	0	0	0	0	145
	21:00	0	0	0	0	0	1	0	11	50	55	22	1	0	0	0	0	140
	22:00	0	0	0	0	0	0	1	11	45	60	11	2	1	0	0	0	131
	23:00	0	0	0	0	0	0	0	1	18	20	15	2	0	0	0	0	56
Daily Total :		0	4	1	5	5	11	23	277	1986	2141	503	56	9	2	0	4	5027
Percent :		0%	0%	0%	0%	0%	0%	0%	6%	40%	43%	10%	1%	0%	0%	0%	0%	
Average :		0	0	0	0	0	0	1	12	83	89	21	2	0	0	0	0	199

Speeds - Average: 90.7 50% : 91.1 67% : 95.0 85% : 99.2 20kph Pace: 80.1 -100.0 (82.1%)

	(STANTEC)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16	
		0.0 -	10.0 -	20.0 -	30.0 -	40.0 -	50.0 -	60.0 -	70.0 -	80.0 -	90.0 -	100.0 -	110.0 -	120.0 -	130.0 -	140.0 -		
Date	Time	9.9	19.9	29.9	39.9	49.9	59.9	69.9	79.9	89.9	99.9	109.9	119.9	129.9	139.9	149.9	Other	Total
10/03/15	00:00	1	0	0	0	0	0	0	2	17	15	9	1	0	0	0	0	45
Sat	01:00	0	0	0	0	0	0	0	0	5	8	4	2	1	0	0	0	20
	02:00	0	0	0	0	0	0	0	0	3	4	3	0	0	0	0	0	10
	03:00	0	0	0	0	0	0	0	0	2	5	1	0	0	0	0	0	8
	04:00	0	0	0	0	0	1	0	0	4	3	2	1	1	0	0	0	12
	05:00	0	0	0	0	0	0	0	1	5	12	2	1	0	0	0	0	21
	06:00	0	0	0	0	0	0	0	2	17	31	15	2	2	0	0	0	69
	07:00	0	1	0	0	0	0	0	5	52	55	19	5	1	0	0	0	138
	08:00	0	0	0	0	0	0	1	5	61	89	34	7	2	0	0	0	199
	09:00	0	0	0	0	0	1	0	19	66	149	38	2	0	0	0	0	275
	10:00	0	0	0	0	0	1	0	14	115	118	26	4	1	0	0	0	279
	11:00	0	0	0	0	0	0	0	24	122	122	27	4	0	0	0	0	299
	12:00	0	0	0	0	0	0	2	11	93	142	30	1	0	0	0	0	279
	13:00	0	0	0	0	0	0	1	14	110	166	38	2	0	0	0	0	331
	14:00	0	0	0	0	0	0	1	20	114	130	18	1	0	0	1	2	287
	15:00	0	0	0	0	0	1	2	19	140	128	25	1	0	0	0	0	316
	16:00	0	0	0	0	0	0	0	12	121	138	24	2	0	0	0	0	297
	17:00	0	0	0	0	0	0	0	24	112	106	19	3	1	0	0	0	265
	18:00	0	0	0	0	0	0	0	8	81	102	25	2	0	0	0	0	218
	19:00	0	0	0	0	0	0	4	28	68	70	15	0	0	0	0	0	185
	20:00	0	0	0	0	0	1	2	18	42	44	7	2	0	0	0	0	116
	21:00	0	0	0	1	0	0	0	4	45	44	13	3	0	0	0	0	110
	22:00	0	0	0	0	1	0	1	22	44	24	3	0	0	0	0	0	95
	23:00	0	0	0	0	0	0	0	5	17	29	5	2	1	0	0	1	60
Daily Total :		1	1	0	1	1	5	14	257	1456	1734	402	48	10	0	1	3	3934
Percent :		0%	0%	0%	0%	0%	0%	0%	7%	37%	44%	10%	1%	0%	0%	0%	0%	
Average :		0	0	0	0	0	0	1	11	61	72	17	2	0	0	0	0	208

Speeds - Average: 91.0 50% : 91.5 67% : 95.3 85% : 99.3 20kph Pace: 80.1 -100.0 (81.1%)

	(STANTEC)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16	
Date	Time	0.0 - 9.9	10.0 - 19.9	20.0 - 29.9	30.0 - 39.9	40.0 - 49.9	50.0 - 59.9	60.0 - 69.9	70.0 - 79.9	80.0 - 89.9	90.0 - 99.9	100.0 - 109.9	110.0 - 119.9	120.0 - 129.9	130.0 - 139.9	140.0 - 149.9	Other	Total
10/04/15	00:00	0	0	0	0	0	0	2	6	12	14	5	0	0	0	0	0	39
Sun	01:00	0	0	0	0	0	0	1	1	9	8	2	0	0	0	1	0	22
	02:00	0	0	0	0	0	0	0	2	1	9	3	1	0	0	0	0	16
	03:00	0	0	0	0	0	0	0	0	2	2	3	0	0	0	0	0	7
	04:00	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	0	5
	05:00	0	0	0	0	0	0	1	1	7	6	3	2	1	0	0	0	21
	06:00	0	0	0	0	0	0	0	3	24	17	14	0	0	0	0	0	58
	07:00	0	0	0	0	0	0	0	10	29	33	10	3	0	0	0	0	85
	08:00	0	0	0	0	0	0	0	8	37	71	30	2	0	0	0	0	148
	09:00	0	0	0	2	0	0	1	11	70	70	22	0	0	0	0	0	176
	10:00	0	0	0	0	0	1	0	14	121	85	20	2	0	0	0	1	244
	11:00	0	1	0	0	0	0	0	31	96	105	22	4	0	0	0	1	260
	12:00	0	0	0	0	0	0	3	33	119	114	21	1	3	0	0	1	295
	13:00	0	0	0	0	0	0	2	5	88	136	29	1	0	0	0	0	261
	14:00	0	0	0	1	4	1	1	11	87	124	30	3	0	0	0	0	262
	15:00	0	0	0	0	0	0	0	6	83	145	36	5	0	0	0	0	275
	16:00	0	0	0	0	0	0	0	10	76	137	30	5	3	0	0	0	261
	17:00	0	0	0	0	0	0	0	5	70	101	41	9	0	0	0	0	226
	18:00	0	0	0	0	0	0	0	4	59	95	36	6	0	0	0	0	200
	19:00	0	0	0	0	0	0	1	7	75	83	18	3	0	0	0	0	187
	20:00	0	0	0	1	0	0	0	7	35	60	24	3	1	0	1	0	132
	21:00	0	0	0	0	0	0	0	2	30	42	10	6	0	0	0	0	90
	22:00	0	0	0	0	0	0	0	2	12	17	17	2	0	0	1	0	51
	23:00	0	0	0	0	0	0	0	0	9	27	5	2	0	0	0	0	43
Daily Total :		0	1	0	4	4	2	12	179	1152	1504	432	60	8	0	3	3	3364
Percent :		0%	0%	0%	0%	0%	0%	0%	5%	34%	45%	13%	2%	0%	0%	0%	0%	
Average :		0	0	0	0	0	0	1	7	48	63	18	3	0	0	0	0	164

Speeds - Average: 91.9 50% : 92.3 67% : 96.0 85% : 100.2 20kph Pace: 80.1 -100.0 (79.0%)

Date	(STANTEC) Time	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
10/05/15	00:00	0	0	0	0	0	0	0	1	0	11	5	0	0	0	0	0	17
Mon	01:00	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	3
	02:00	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	4
	03:00	0	0	0	0	0	0	0	0	0	5	3	2	0	0	0	0	10
	04:00	0	0	0	0	0	0	0	0	7	8	2	0	2	0	0	0	19
	05:00	0	0	0	0	0	0	0	2	20	21	16	6	0	0	0	0	65
	06:00	0	0	0	0	0	0	1	12	91	110	34	6	0	2	0	0	256
	07:00	0	0	0	0	0	0	1	31	197	179	24	1	2	0	0	1	436
	08:00	0	0	0	0	0	0	0	21	174	147	26	1	0	1	0	0	370
	09:00	0	0	0	0	0	0	1	12	134	137	18	0	0	0	0	0	302
	10:00	0	0	0	0	0	0	1	9	116	94	22	2	2	0	0	1	247
	11:00	0	0	0	0	0	1	1	29	115	72	10	2	0	0	0	0	230
	12:00	0	0	0	0	0	0	1	20	101	115	25	3	0	0	0	0	265
	13:00	0	0	0	0	1	0	1	13	87	94	22	4	0	0	0	0	222
	14:00	0	0	0	0	0	0	5	11	114	87	19	4	1	0	0	0	241
	15:00	0	0	0	0	5	4	4	26	135	122	20	2	0	0	0	0	318
	16:00	0	1	0	0	1	0	1	11	155	153	28	1	2	0	0	0	353
	17:00	0	0	0	1	9	2	1	10	142	180	38	4	0	0	0	1	388
	18:00	0	0	0	0	0	0	3	8	99	113	22	1	0	1	0	0	247
	19:00	0	0	0	0	0	1	1	9	53	70	22	4	0	0	0	0	160
	20:00	0	0	0	1	0	0	0	9	32	52	20	3	0	0	0	0	117
	21:00	0	0	0	0	0	0	0	4	14	44	14	3	1	2	0	0	82
	22:00	0	0	0	0	0	0	0	0	15	28	9	1	0	0	0	0	53
	23:00	0	0	0	0	0	0	0	0	7	21	3	0	0	0	0	0	31
Daily Total :		0	1	0	2	16	8	22	238	1808	1867	402	50	13	6	0	3	4436
Percent :		0%	0%	0%	0%	0%	0%	0%	5%	41%	42%	9%	1%	0%	0%	0%	0%	
Average :		0	0	0	0	1	0	1	10	75	78	17	2	1	0	0	0	140

Speeds - Average: 90.6 50% : 90.8 67% : 94.8 85% : 99.0 20kph Pace: 80.1 -100.0 (82.8%)

	(STANTEC)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16	
Date	Time	0.0 - 9.9	10.0 - 19.9	20.0 - 29.9	30.0 - 39.9	40.0 - 49.9	50.0 - 59.9	60.0 - 69.9	70.0 - 79.9	80.0 - 89.9	90.0 - 99.9	100.0 - 109.9	110.0 - 119.9	120.0 - 129.9	130.0 - 139.9	140.0 - 149.9	Other	Total
10/06/15	00:00	0	0	0	0	0	0	0	3	2	4	6	0	0	0	0	0	15
Tue	01:00	0	0	0	0	0	0	0	1	3	5	0	1	0	0	0	0	10
	02:00	0	0	0	0	0	0	0	0	1	4	4	0	0	0	0	0	9
	03:00	0	0	0	0	0	0	0	0	6	4	1	0	0	0	0	0	11
	04:00	0	0	0	0	0	0	1	0	4	8	2	0	1	0	0	0	16
	05:00	0	0	0	0	0	0	0	4	20	22	8	5	3	0	0	0	62
	06:00	0	0	0	0	0	0	0	12	84	112	36	10	0	0	0	0	254
	07:00	0	0	0	0	0	1	4	23	235	157	16	1	0	1	0	0	438
	08:00	0	1	0	0	0	0	0	39	173	150	18	5	0	0	1	0	387
	09:00	0	0	0	0	0	0	0	27	147	93	17	3	0	0	0	0	287
	10:00	0	0	0	0	0	0	0	24	107	107	28	2	1	0	0	0	269
	11:00	0	0	0	0	0	0	1	23	99	88	14	6	0	0	0	0	231
	12:00	0	0	0	1	0	0	0	17	128	102	12	2	0	0	0	0	262
	13:00	0	1	0	0	0	1	1	26	102	98	19	1	0	0	0	0	249
	14:00	0	0	0	0	0	0	2	20	102	97	27	0	0	0	0	0	248
	15:00	0	0	0	0	0	1	0	25	192	123	14	1	1	0	0	0	357
	16:00	0	0	0	0	0	1	1	13	150	173	38	2	1	0	0	1	380
	17:00	0	0	0	0	0	0	0	5	144	199	21	5	0	1	0	2	377
	18:00	0	0	0	0	0	0	0	11	111	125	25	0	1	0	0	2	275
	19:00	0	0	0	0	0	0	3	8	66	94	23	5	0	1	0	0	200
	20:00	0	0	0	1	0	0	0	4	41	57	25	1	0	0	0	0	129
	21:00	0	0	0	0	0	1	0	0	23	33	17	2	0	0	0	0	76
	22:00	0	1	0	0	0	0	0	2	24	23	10	4	0	0	0	0	64
	23:00	0	0	0	0	0	0	0	0	9	19	6	1	1	0	0	0	36
Daily Total :		0	3	0	2	0	5	13	287	1973	1897	387	57	9	3	1	5	4642
Percent :		0%	0%	0%	0%	0%	0%	0%	6%	43%	41%	8%	1%	0%	0%	0%	0%	
Average :		0	0	0	0	0	0	1	12	82	79	16	2	0	0	0	0	185

Speeds - Average: 90.3 50% : 90.3 67% : 94.5 85% : 98.8 20kph Pace: 80.1 -100.0 (83.4%)

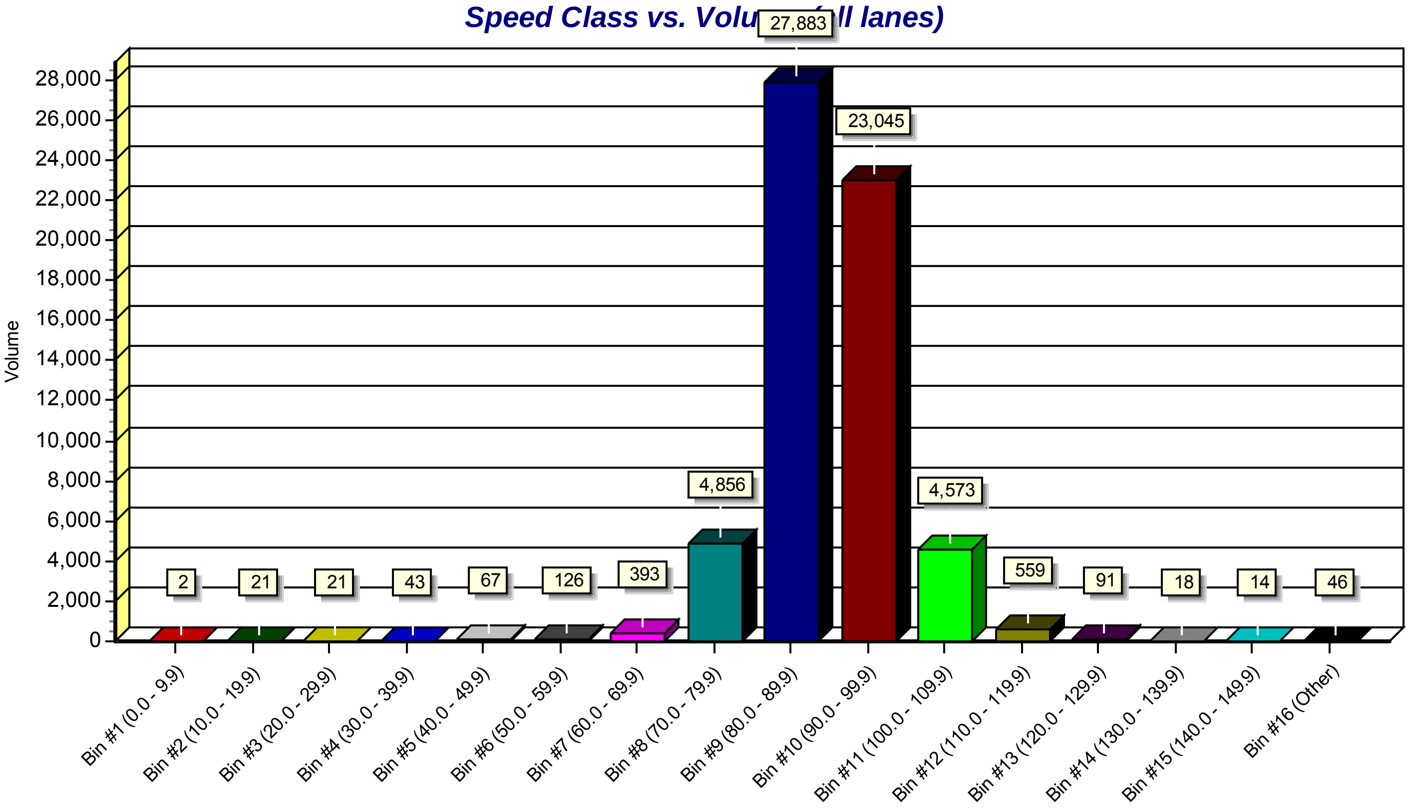
Date	(STANTEC) Time	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
10/07/15	00:00	0	0	0	0	0	0	0	0	4	9	2	1	0	0	0	0	16
Wed	01:00	0	0	0	0	0	0	1	2	2	2	1	0	0	0	0	0	8
	02:00	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	0	5
	03:00	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2
	04:00	0	0	0	0	0	0	0	0	4	6	1	1	0	0	0	0	12
	05:00	0	0	0	0	0	0	1	2	21	23	13	4	0	0	0	0	64
	06:00	0	0	1	0	0	0	2	12	58	111	55	6	1	0	0	0	246
	07:00	0	0	0	0	0	0	3	20	162	185	33	0	0	0	0	0	403
	08:00	0	0	0	0	0	0	1	39	170	162	23	2	0	0	0	0	397
	09:00	0	0	0	1	0	0	1	22	140	124	12	6	0	0	1	0	307
	10:00	0	0	1	0	0	0	2	15	120	93	25	1	0	0	0	0	257
	11:00	0	0	0	0	0	0	1	18	109	84	18	1	0	0	0	1	232
	12:00	0	0	4	5	0	0	1	14	111	120	20	1	0	0	0	0	276
	13:00	0	0	0	1	0	1	1	17	98	82	23	2	1	0	0	0	226
	14:00	0	0	0	0	0	1	1	14	130	108	22	4	0	0	0	0	280
	15:00	0	0	0	0	0	0	0	18	142	130	30	2	0	1	0	1	324
	16:00	0	0	0	0	0	0	2	33	152	172	25	7	0	0	0	1	392
	17:00	0	0	0	0	0	1	1	16	144	146	24	4	0	0	0	1	337
	18:00	0	0	0	0	0	0	1	19	88	142	30	4	0	0	0	1	285
	19:00	0	0	0	0	0	0	0	11	57	72	14	2	1	0	0	0	157
	20:00	0	0	0	1	0	2	0	9	51	49	15	1	0	0	0	0	128
	21:00	0	0	0	0	0	0	0	7	26	53	12	1	0	0	0	0	99
	22:00	0	0	0	0	0	0	0	2	20	22	7	1	0	0	0	0	52
	23:00	0	0	0	0	0	0	0	0	9	18	14	4	0	0	0	0	45
Daily Total :		0	0	6	8	0	5	20	290	1819	1916	421	55	3	1	1	5	4550
Percent :		0%	0%	0%	0%	0%	0%	0%	6%	40%	42%	9%	1%	0%	0%	0%	0%	
Average :		0	0	0	0	0	0	1	12	76	80	18	2	0	0	0	0	192

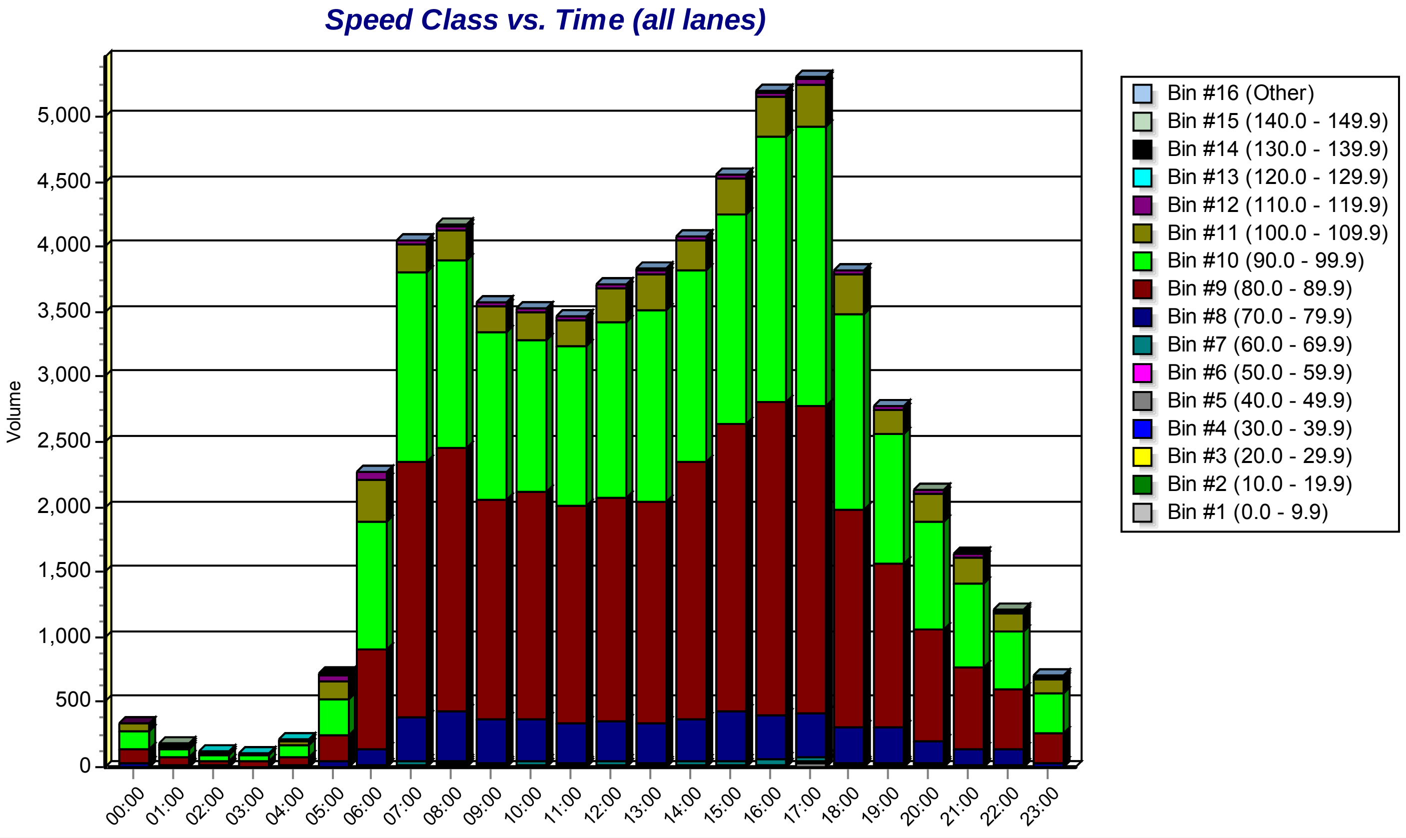
Speeds - Average: 90.4 50% : 90.8 67% : 94.8 85% : 99.0 20kph Pace: 80.1 -100.0 (82.1%)

Basic Speed Class Summary: S03301

(STANTEC) Description	Lane	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
TOTAL COUNT :	#1.	1	8	13	19	21	61	246	3099	15798	9966	1551	187	31	5	8	20	31034
	#3.	1	13	8	24	46	65	147	1757	12085	13079	3022	372	60	13	6	26	30724
		2	21	21	43	67	126	393	4856	27883	23045	4573	559	91	18	14	46	61758
Percents :	#1.	0%	0%	0%	0%	0%	0%	1%	10%	51%	32%	5%	1%	0%	0%	0%	0%	50%
	#3.	0%	0%	0%	0%	0%	0%	0%	6%	39%	43%	10%	1%	0%	0%	0%	0%	50%
		0%	0%	0%	0%	0%	0%	1%	8%	45%	37%	7%	1%	0%	0%	0%	0%	
Average :	#1.	0	0	0	0	0	0	1	18	94	59	9	1	0	0	0	0	182
	#3.	0	0	0	0	0	0	1	10	72	78	18	2	0	0	0	0	181
		0	0	0	0	0	0	2	28	166	137	27	3	0	0	0	0	363
Days & ADT :	#1.	7.0	4433															
	#3.	7.0	4389															
		7.0	8822															
Avg,50,67,85%:	#1.	88.0	87.7	91.7	97.2	80.1	-100.0	83%										
Pace (pace %)	#3.	90.7	91.1	95.0	99.2	80.1	-100.0	82%										
		89.4	89.1	93.6	98.3	80.1	-100.0	83%										

S03301 Speed Class Charts For Data From: 00:00 - 10/01/2015 To: 23:59 - 10/07/2015





Basic Axle Classification Report: S03302

Station ID : S03302
Info Line 1 : Glendon Dr btwn
Info Line 2 : Tunks Lane & Springfield Way
GPS Lat/Lon :
DB File : S03302.DB

Last Connected Device Type : Unic-L
Version Number : 1.30
Serial Number :
Number of Lanes : 2
Posted Speed Limit :

Lane #1 Configuration

#	Dir.	Information	Vehicle Sensors	Sensor Spacing	Loop Length	Comment
1.		WB	Ax-Ax	150 cm	182 cm	

Lane #1 Basic Axle Classification Data From: 00:00 - 10/01/2015 To: 23:59 - 10/07/2015

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	*Time*	*Cycle*	*Cars*	*2A-4T*	*Buses*	*2A-SU*	*3A-SU*	*4A-SU*	*4A-ST*	*5A-ST*	*6A-ST*	*5A-MT*	*6A-MT*	*Other*	*Total*
10/01/15	00:00	1	11	6	0	1	0	0	0	0	0	0	0	0	19
Thu	01:00	0	6	3	0	0	0	0	0	0	0	0	0	0	9
	02:00	0	2	1	0	0	0	0	0	1	0	0	0	0	4
	03:00	0	6	3	0	0	0	0	0	0	0	0	0	0	9
	04:00	0	10	5	0	0	0	0	0	0	0	0	0	0	15
	05:00	1	50	23	0	1	1	0	0	0	0	0	0	0	76
	06:00	0	82	48	1	1	4	0	0	0	1	4	0	3	144
	07:00	0	207	83	3	0	1	0	4	3	3	21	1	3	329
	08:00	0	230	104	8	3	3	2	7	4	2	28	1	4	396
	09:00	1	177	99	3	9	4	0	5	2	1	14	3	4	322
	10:00	0	165	84	1	2	3	0	1	2	0	19	0	1	278
	11:00	2	163	97	1	9	1	2	2	6	0	10	0	6	299
	12:00	3	178	99	0	6	3	0	2	1	1	11	0	4	308
	13:00	1	182	92	1	6	5	2	3	4	1	11	0	2	310
	14:00	2	233	112	5	3	1	2	4	4	0	7	0	2	375
	15:00	1	235	135	3	5	2	0	2	5	0	27	0	2	417
	16:00	1	334	170	4	8	1	4	5	7	2	22	1	7	566
	17:00	0	376	190	0	2	3	0	4	7	0	48	1	10	641
	18:00	0	273	110	1	0	0	0	0	4	1	19	1	5	414
	19:00	1	234	82	0	4	0	0	1	0	0	18	0	1	341
	20:00	0	161	75	0	2	0	0	0	2	0	11	0	2	253
	21:00	2	144	64	0	0	0	0	1	0	1	5	0	0	217
	22:00	2	89	37	0	1	0	0	1	1	0	1	0	0	132
	23:00	1	48	18	0	1	0	0	0	0	0	0	0	0	68
Daily Total :		19	3596	1740	31	64	32	12	42	53	13	276	8	56	5942
Percent :		0%	61%	29%	1%	1%	1%	0%	1%	1%	0%	5%	0%	1%	
Average :		1	150	73	1	3	1	1	2	2	1	12	0	2	249

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	Time	Cycle	Cars	2A-4T	Buses	2A-SU	3A-SU	4A-SU	4A-ST	5A-ST	6A-ST	5A-MT	6A-MT	Other	Total
10/02/15	00:00	0	16	7	0	0	0	0	0	0	0	0	0	0	23
Fri	01:00	0	10	7	0	0	0	0	0	0	1	0	0	0	18
	02:00	0	5	4	0	0	0	0	0	0	0	0	0	0	9
	03:00	0	5	1	0	0	0	0	0	0	0	0	0	0	6
	04:00	0	14	9	0	0	0	0	0	0	0	0	0	0	23
	05:00	0	31	20	0	0	0	0	0	0	0	1	0	0	52
	06:00	0	91	53	1	1	0	1	0	1	0	6	0	1	155
	07:00	0	181	85	1	3	0	0	4	4	2	20	0	4	304
	08:00	1	224	102	1	5	3	2	5	5	2	23	2	6	381
	09:00	0	207	102	1	6	1	0	1	5	1	17	4	3	348
	10:00	0	160	95	2	4	3	0	3	1	1	20	0	1	290
	11:00	0	174	102	1	1	2	2	1	2	2	14	0	3	304
	12:00	1	202	113	1	7	3	1	5	4	0	20	2	3	362
	13:00	0	258	125	0	5	5	3	3	9	0	15	1	4	428
	14:00	3	228	127	0	4	3	1	5	2	0	17	1	4	395
	15:00	2	278	153	0	10	3	2	4	5	0	25	1	5	488
	16:00	3	350	163	3	5	4	3	2	5	0	40	2	5	585
	17:00	1	346	171	0	4	0	1	3	8	0	42	1	4	581
	18:00	5	260	120	0	2	1	0	2	1	0	16	0	2	409
	19:00	0	219	91	0	2	0	0	1	1	0	7	0	0	321
	20:00	1	158	73	0	1	0	1	0	0	0	7	0	0	241
	21:00	0	117	49	0	0	0	0	1	1	0	1	0	0	169
	22:00	0	136	83	0	1	0	0	1	0	0	5	0	0	226
	23:00	0	66	22	1	0	0	0	0	0	0	0	0	0	89
Daily Total :		17	3736	1877	12	61	28	17	41	54	9	296	14	45	6207
Percent :		0%	60%	30%	0%	1%	0%	0%	1%	1%	0%	5%	0%	1%	
Average :		1	156	78	1	3	1	1	2	2	0	12	1	2	260

(DEFAULTC) Date	Time	#1 Cycle	#2 Cars	#3 2A-4T	#4 Buses	#5 2A-SU	#6 3A-SU	#7 4A-SU	#8 4A-ST	#9 5A-ST	#10 6A-ST	#11 5A-MT	#12 6A-MT	#13 Other	Total
10/03/15	00:00	0	42	13	0	0	0	0	0	0	0	1	0	0	56
Sat	01:00	0	23	15	0	0	1	0	0	0	0	0	0	0	39
	02:00	0	14	4	0	0	0	0	0	0	0	0	0	0	18
	03:00	0	3	6	0	0	0	0	0	0	0	0	0	0	9
	04:00	0	6	2	0	0	0	0	0	0	0	0	0	0	8
	05:00	0	23	10	0	0	0	0	0	0	0	1	0	0	34
	06:00	0	38	17	0	0	0	0	1	2	0	0	0	0	58
	07:00	0	96	42	1	0	0	0	0	0	1	2	1	0	143
	08:00	0	129	78	0	3	0	0	3	1	0	4	0	0	218
	09:00	0	191	76	0	2	0	0	1	1	0	13	0	4	288
	10:00	0	221	105	0	1	1	1	4	6	0	14	0	4	357
	11:00	0	249	116	0	4	0	1	3	3	0	17	0	1	394
	12:00	1	264	121	0	2	0	0	4	1	0	24	1	0	418
	13:00	1	253	127	0	6	0	2	2	1	0	16	1	2	411
	14:00	0	272	122	0	0	0	0	0	5	0	13	0	1	413
	15:00	0	250	108	0	1	1	0	4	6	0	19	0	2	391
	16:00	0	237	122	0	1	1	0	2	1	0	20	0	2	386
	17:00	0	220	103	0	1	0	0	1	2	1	17	0	1	346
	18:00	0	159	85	0	1	1	0	0	3	0	14	1	1	265
	19:00	0	127	57	1	1	0	0	1	1	0	5	0	0	193
	20:00	0	124	49	0	0	0	0	0	0	0	3	0	0	176
	21:00	0	116	53	1	3	0	1	0	2	0	3	0	0	179
	22:00	1	102	34	0	1	0	0	1	0	0	0	0	0	139
	23:00	1	59	28	0	0	0	0	0	0	0	1	0	0	89
Daily Total :		4	3218	1493	3	27	5	5	27	35	2	187	4	18	5028
Percent :		0%	64%	30%	0%	1%	0%	0%	1%	1%	0%	4%	0%	0%	
Average :		0	134	62	0	1	0	0	1	1	0	8	0	1	208

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	Time	Cycle	Cars	2A-4T	Buses	2A-SU	3A-SU	4A-SU	4A-ST	5A-ST	6A-ST	5A-MT	6A-MT	Other	Total
10/04/15	00:00	0	37	16	0	0	0	0	0	0	0	0	0	0	53
Sun	01:00	0	22	8	0	1	0	0	0	0	0	0	0	0	31
	02:00	0	15	4	1	1	0	0	0	0	0	0	0	0	21
	03:00	0	9	5	0	0	0	0	0	0	0	0	0	0	14
	04:00	0	9	2	0	0	0	0	0	0	0	0	0	0	11
	05:00	0	11	3	0	0	0	0	1	0	0	0	0	0	15
	06:00	1	29	13	0	0	1	0	1	0	0	1	0	0	46
	07:00	0	53	29	1	0	0	0	1	0	0	0	0	0	84
	08:00	0	97	40	0	0	2	0	0	0	0	4	0	1	144
	09:00	1	171	55	0	1	0	1	0	0	0	9	0	2	240
	10:00	0	173	82	1	0	0	0	1	3	0	18	0	0	278
	11:00	0	195	75	0	0	0	0	5	5	0	18	2	1	301
	12:00	0	248	101	0	1	0	0	2	2	0	19	0	1	374
	13:00	2	232	121	0	1	1	1	3	2	0	13	0	2	378
	14:00	0	249	99	0	2	2	0	3	3	0	12	0	0	370
	15:00	2	217	87	0	0	0	0	0	2	0	14	1	3	326
	16:00	8	236	111	0	0	0	1	2	0	0	15	1	3	377
	17:00	2	212	87	0	0	0	0	0	2	0	12	0	0	315
	18:00	4	165	83	0	0	0	1	0	2	1	8	0	0	264
	19:00	1	147	70	0	2	0	0	3	1	0	5	1	0	230
	20:00	0	129	52	0	2	0	0	0	1	0	7	0	0	191
	21:00	0	70	39	0	0	0	0	0	1	0	3	0	0	113
	22:00	0	44	26	0	0	0	0	0	0	0	1	0	0	71
	23:00	0	38	9	0	0	0	0	0	0	0	0	0	0	47
Daily Total :		21	2808	1217	3	11	6	4	22	24	1	159	5	13	4294
Percent :		0%	65%	28%	0%	0%	0%	0%	1%	1%	0%	4%	0%	0%	
Average :		1	117	51	0	0	0	0	1	1	0	7	0	1	179

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	Time	Cycle	Cars	2A-4T	Buses	2A-SU	3A-SU	4A-SU	4A-ST	5A-ST	6A-ST	5A-MT	6A-MT	Other	Total
10/05/15	00:00	0	8	3	0	1	0	0	0	0	0	0	0	0	12
Mon	01:00	0	5	5	0	0	0	0	0	0	0	0	0	1	11
	02:00	0	2	1	0	0	0	0	0	0	0	0	0	0	3
	03:00	0	2	0	0	0	1	0	0	0	0	0	0	0	3
	04:00	0	15	6	0	0	0	0	0	0	0	0	0	0	21
	05:00	0	38	33	0	1	0	0	0	1	1	1	0	0	75
	06:00	1	100	57	2	2	1	0	3	2	1	5	0	0	174
	07:00	2	200	79	5	1	4	0	1	4	2	20	0	3	321
	08:00	0	251	99	3	3	0	3	2	3	0	17	0	7	388
	09:00	1	182	95	0	6	2	0	3	2	0	22	0	1	314
	10:00	1	147	83	1	6	1	1	5	2	1	13	1	2	264
	11:00	1	177	70	0	3	2	2	2	1	2	13	0	2	275
	12:00	1	191	80	2	5	3	0	2	5	2	7	1	0	299
	13:00	4	206	98	0	7	6	0	0	3	0	10	1	1	336
	14:00	0	190	107	7	5	2	1	2	4	0	16	2	3	339
	15:00	2	250	157	7	8	4	2	3	5	1	18	2	6	465
	16:00	3	380	163	2	8	6	2	3	2	4	33	1	7	614
	17:00	1	349	163	1	2	4	3	4	3	0	42	1	7	580
	18:00	4	242	121	0	2	1	1	2	3	1	18	0	1	396
	19:00	1	176	66	0	1	2	1	2	0	1	9	0	1	260
	20:00	1	141	56	0	0	0	0	0	1	1	5	0	0	205
	21:00	0	113	48	0	0	0	1	0	0	0	1	0	0	163
	22:00	2	62	25	0	0	0	0	0	0	0	1	0	0	90
	23:00	0	33	11	0	0	0	0	0	0	0	1	0	0	45
Daily Total :		25	3460	1626	30	61	39	17	34	41	17	252	9	42	5653
Percent :		0%	61%	29%	1%	1%	1%	0%	1%	1%	0%	4%	0%	1%	
Average :		1	144	68	1	3	2	1	1	2	1	11	0	2	237

(DEFAULTC) Date	Time	#1 Cycle	#2 Cars	#3 2A-4T	#4 Buses	#5 2A-SU	#6 3A-SU	#7 4A-SU	#8 4A-ST	#9 5A-ST	#10 6A-ST	#11 5A-MT	#12 6A-MT	#13 Other	Total
10/06/15	00:00	0	15	7	0	1	0	0	0	0	0	0	0	0	23
Tue	01:00	0	7	6	0	0	0	0	0	0	0	0	0	0	13
	02:00	0	3	0	0	0	0	0	0	2	1	0	0	0	6
	03:00	0	4	2	0	0	0	0	0	0	0	0	0	0	6
	04:00	0	15	7	0	0	0	0	0	0	0	0	0	0	22
	05:00	0	39	22	0	1	1	0	1	0	0	0	0	0	64
	06:00	0	112	57	2	3	3	0	1	1	0	7	0	2	188
	07:00	0	204	82	4	4	2	0	7	5	2	22	1	6	339
	08:00	2	200	97	4	2	0	2	5	5	3	42	1	5	368
	09:00	0	169	84	1	5	1	0	3	3	2	14	1	4	287
	10:00	1	160	80	1	4	6	0	3	4	4	17	1	3	284
	11:00	1	189	84	1	8	0	0	2	4	1	10	0	1	301
	12:00	0	208	93	1	3	2	1	2	2	2	20	0	2	336
	13:00	3	215	117	2	5	2	1	0	2	3	15	0	4	369
	14:00	0	249	151	7	7	2	2	1	4	2	11	1	2	439
	15:00	0	250	138	6	7	0	0	4	5	3	30	2	3	448
	16:00	3	342	162	3	6	3	1	5	10	0	41	2	10	588
	17:00	0	344	172	0	1	1	4	8	10	0	36	2	13	591
	18:00	2	256	128	0	4	1	3	0	5	0	29	0	1	429
	19:00	1	206	89	0	2	0	1	1	1	0	8	0	1	310
	20:00	1	178	76	0	0	0	0	4	0	0	5	0	1	265
	21:00	2	113	32	0	0	2	1	0	2	0	3	0	0	155
	22:00	4	70	20	0	1	0	1	0	0	0	1	0	0	97
	23:00	0	25	9	0	1	0	0	0	0	0	0	0	0	35
Daily Total :		20	3573	1715	32	65	26	17	47	65	23	311	11	58	5963
Percent :		0%	60%	29%	1%	1%	0%	0%	1%	1%	0%	5%	0%	1%	
Average :		1	149	71	1	3	1	1	2	3	1	13	0	2	248

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	Time	Cycle	Cars	2A-4T	Buses	2A-SU	3A-SU	4A-SU	4A-ST	5A-ST	6A-ST	5A-MT	6A-MT	Other	Total
10/07/15	00:00	0	16	4	0	0	0	0	0	0	0	0	0	0	20
Wed	01:00	0	8	2	0	1	0	0	0	0	0	0	0	0	11
	02:00	0	4	1	0	0	1	0	0	0	0	0	0	1	7
	03:00	0	5	1	0	0	0	0	0	0	0	0	0	0	6
	04:00	0	13	6	0	0	0	0	0	0	0	0	0	0	19
	05:00	0	42	25	0	0	0	0	0	0	0	0	0	0	67
	06:00	1	102	59	2	1	1	0	1	1	1	6	0	0	175
	07:00	0	202	90	4	2	7	4	1	2	0	26	1	5	344
	08:00	0	253	118	3	9	1	1	2	3	1	29	1	5	426
	09:00	0	176	72	0	2	2	1	6	1	0	19	0	2	281
	10:00	1	149	77	1	7	2	1	1	3	2	5	0	2	251
	11:00	2	173	82	0	2	3	1	2	2	2	16	1	1	287
	12:00	2	185	87	1	8	0	0	1	1	2	8	1	2	298
	13:00	4	226	109	1	6	4	0	1	4	5	17	0	1	378
	14:00	2	202	132	3	6	4	0	4	7	2	19	0	3	384
	15:00	4	296	143	5	1	3	0	0	10	3	32	1	4	502
	16:00	10	340	154	2	3	2	2	4	5	2	50	1	6	581
	17:00	3	353	183	0	2	2	2	4	5	1	37	1	4	597
	18:00	2	227	113	0	5	0	0	1	8	0	20	0	2	378
	19:00	2	204	100	0	1	2	1	1	3	0	7	0	0	321
	20:00	3	184	99	0	0	0	0	0	0	0	7	0	0	293
	21:00	1	142	43	0	0	0	0	1	0	0	4	0	0	191
	22:00	3	82	37	0	1	0	1	0	0	0	1	0	0	125
	23:00	1	42	12	0	0	0	0	0	0	0	0	0	0	55
Daily Total :		41	3626	1749	22	57	34	14	30	55	21	303	7	38	5997
Percent :		1%	60%	29%	0%	1%	1%	0%	1%	1%	0%	5%	0%	1%	
Average :		2	151	73	1	2	1	1	1	2	1	13	0	2	250

Lane #3 Configuration

#	Dir.	Information	Vehicle Sensors	Sensor Spacing	Loop Length	Comment
3.		EB	Ax-Ax	150 cm	182 cm	

Lane #3 Basic Axle Classification Data From: 00:00 - 10/01/2015 To: 23:59 - 10/07/2015

Date	(DEFAULTC) Time	#1 Cycle	#2 Cars	#3 2A-4T	#4 Buses	#5 2A-SU	#6 3A-SU	#7 4A-SU	#8 4A-ST	#9 5A-ST	#10 6A-ST	#11 5A-MT	#12 6A-MT	#13 Other	Total
10/01/15	00:00	0	20	8	0	1	0	0	0	0	0	0	0	0	29
Thu	01:00	0	3	0	0	0	0	0	0	0	0	0	0	0	3
	02:00	0	5	0	0	0	0	0	0	0	0	0	0	0	5
	03:00	0	5	1	0	0	0	0	0	0	0	0	0	0	6
	04:00	0	19	4	0	0	0	0	0	0	0	0	0	0	23
	05:00	1	52	19	0	0	0	1	0	0	0	1	0	0	74
	06:00	2	186	85	0	1	2	2	2	4	4	10	0	3	301
	07:00	1	367	121	0	4	8	2	1	3	0	15	0	5	527
	08:00	1	404	102	0	6	1	2	7	4	1	30	3	6	567
	09:00	1	279	83	0	1	5	0	2	2	2	14	1	7	397
	10:00	0	252	61	0	5	3	1	2	1	0	11	0	3	339
	11:00	0	258	63	0	2	5	1	2	2	1	11	0	4	349
	12:00	1	262	62	0	3	1	0	2	2	3	7	0	2	345
	13:00	0	236	59	0	3	2	1	1	2	0	20	0	4	328
	14:00	0	227	62	0	7	1	1	2	1	1	10	1	4	317
	15:00	1	290	73	0	8	2	0	2	0	1	33	0	1	411
	16:00	3	315	65	0	3	3	4	5	0	3	26	0	2	429
	17:00	1	376	78	0	1	1	1	1	1	1	42	1	5	509
	18:00	3	274	51	0	0	1	0	0	1	0	13	0	2	345
	19:00	3	207	45	0	2	0	1	1	0	1	4	0	0	264
	20:00	1	161	24	0	0	1	1	0	1	0	3	0	0	192
	21:00	2	100	20	0	0	0	0	1	0	0	3	0	1	127
	22:00	1	69	12	0	0	0	0	0	0	0	3	0	0	85
	23:00	0	66	20	0	0	0	0	0	0	0	1	0	0	87
Daily Total :		22	4433	1118	0	47	36	18	31	24	18	257	6	49	6059
Percent :		0%	73%	18%	0%	1%	1%	0%	1%	0%	0%	4%	0%	1%	
Average :		1	185	47	0	2	2	1	1	1	1	11	0	2	254

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	Time	Cycle	Cars	2A-4T	Buses	2A-SU	3A-SU	4A-SU	4A-ST	5A-ST	6A-ST	5A-MT	6A-MT	Other	Total
10/02/15	00:00	0	26	8	0	0	0	0	0	0	0	0	0	0	34
Fri	01:00	0	8	2	0	0	0	0	0	1	0	0	0	0	11
	02:00	0	8	0	0	0	0	0	0	0	0	0	0	0	8
	03:00	0	6	1	0	0	0	0	0	0	0	0	0	0	7
	04:00	0	20	5	0	0	0	0	0	0	0	0	0	0	25
	05:00	0	49	13	0	0	0	0	1	0	0	1	0	0	64
	06:00	0	169	84	0	1	4	1	0	3	2	3	2	1	270
	07:00	1	345	118	0	3	8	3	2	3	1	17	0	3	504
	08:00	2	347	101	0	7	1	0	4	0	3	28	0	7	500
	09:00	1	271	85	0	3	3	1	2	1	1	18	0	5	391
	10:00	2	290	67	0	2	3	0	5	4	2	12	0	5	392
	11:00	0	289	63	0	6	6	0	3	1	2	16	2	3	391
	12:00	0	246	82	0	6	3	0	4	1	2	7	1	4	356
	13:00	1	243	61	0	4	2	1	1	1	1	20	0	3	338
	14:00	2	264	66	1	4	2	3	0	1	2	24	0	4	373
	15:00	0	306	66	0	4	3	1	5	1	0	29	0	3	418
	16:00	2	374	73	0	1	2	2	6	2	1	35	0	1	499
	17:00	2	356	68	0	0	2	3	2	0	2	23	1	6	465
	18:00	0	299	56	0	2	2	1	1	2	1	23	1	2	390
	19:00	2	193	39	0	1	0	1	1	0	0	4	0	1	242
	20:00	1	132	24	0	1	0	2	0	0	1	5	0	0	166
	21:00	0	152	19	0	0	0	0	0	0	1	1	0	0	173
	22:00	0	132	13	0	0	0	0	0	1	0	4	1	1	152
	23:00	0	66	11	0	0	0	0	0	1	0	1	0	0	79
Daily Total :		16	4591	1125	1	45	41	19	37	23	22	271	8	49	6248
Percent :		0%	73%	18%	0%	1%	1%	0%	1%	0%	0%	4%	0%	1%	
Average :		1	191	47	0	2	2	1	2	1	1	11	0	2	261

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	Time	Cycle	Cars	2A-4T	Buses	2A-SU	3A-SU	4A-SU	4A-ST	5A-ST	6A-ST	5A-MT	6A-MT	Other	Total
10/03/15	00:00	0	49	10	0	0	0	0	1	1	0	0	0	0	61
Sat	01:00	0	17	4	0	0	0	0	0	0	0	0	0	0	21
	02:00	0	8	1	0	0	0	0	0	0	0	0	0	0	9
	03:00	0	10	0	0	0	0	0	0	0	0	0	0	0	10
	04:00	0	9	3	0	0	0	0	0	0	1	0	0	0	13
	05:00	0	19	6	0	0	0	0	0	0	0	0	0	0	25
	06:00	0	52	21	0	0	0	0	0	0	1	1	0	0	75
	07:00	1	95	26	0	1	0	0	0	0	0	5	0	0	128
	08:00	0	175	68	0	1	0	0	1	0	0	10	1	1	257
	09:00	0	262	71	0	0	1	1	2	2	0	16	0	2	357
	10:00	0	292	69	0	2	1	1	2	2	0	15	1	1	386
	11:00	1	296	78	0	0	1	1	2	1	0	12	0	2	394
	12:00	0	298	65	0	2	0	0	0	0	0	17	0	3	385
	13:00	0	332	76	0	0	0	1	3	3	0	18	1	3	437
	14:00	1	287	51	0	0	0	0	0	1	0	17	0	2	359
	15:00	0	287	57	0	0	1	1	2	1	0	16	0	2	367
	16:00	0	276	53	0	2	1	0	1	0	0	16	0	0	349
	17:00	0	250	39	0	1	2	0	0	0	0	16	0	0	308
	18:00	0	245	48	0	2	0	0	0	3	0	13	0	0	311
	19:00	0	162	38	1	1	0	1	1	0	0	6	0	0	210
	20:00	0	119	21	0	0	0	0	1	0	0	0	0	0	141
	21:00	0	112	21	0	0	0	0	1	0	0	2	0	0	136
	22:00	0	129	25	0	1	0	0	0	0	0	4	0	0	159
	23:00	0	87	10	0	0	0	0	0	0	0	1	0	0	98
Daily Total :		3	3868	861	1	13	7	6	17	14	2	185	3	16	4996
Percent :		0%	77%	17%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	
Average :		0	161	36	0	1	0	0	1	1	0	8	0	1	209

(DEFAULTC) Date	Time	#1 Cycle	#2 Cars	#3 2A-4T	#4 Buses	#5 2A-SU	#6 3A-SU	#7 4A-SU	#8 4A-ST	#9 5A-ST	#10 6A-ST	#11 5A-MT	#12 6A-MT	#13 Other	Total
10/04/15	00:00	0	49	10	0	0	0	0	0	0	0	1	0	0	60
Sun	01:00	0	31	4	0	0	0	0	0	0	0	0	0	0	35
	02:00	0	7	2	0	2	0	0	0	0	0	0	0	0	11
	03:00	0	8	1	0	0	0	0	0	0	0	0	0	0	9
	04:00	0	3	4	0	0	0	0	0	0	0	0	0	0	7
	05:00	0	13	3	0	0	0	0	0	0	0	0	0	0	16
	06:00	0	44	9	0	0	0	0	0	0	0	0	0	0	53
	07:00	0	54	24	0	0	0	0	0	0	0	1	0	0	79
	08:00	0	139	31	0	0	0	0	0	0	0	4	0	0	174
	09:00	0	174	45	0	1	0	0	2	0	0	8	0	1	231
	10:00	0	266	49	0	0	0	1	0	1	0	14	1	1	333
	11:00	0	285	63	0	0	1	1	2	3	0	18	1	1	375
	12:00	0	292	68	0	0	1	1	3	1	0	21	0	1	388
	13:00	0	306	53	0	0	1	3	1	3	0	14	1	2	384
	14:00	2	261	43	0	0	2	1	3	0	0	15	0	6	333
	15:00	4	272	46	0	0	1	0	2	0	0	14	0	4	343
	16:00	6	274	45	0	2	2	1	1	0	2	9	0	3	345
	17:00	5	228	35	0	0	1	0	2	1	0	6	0	1	279
	18:00	4	194	31	0	0	1	1	0	0	0	9	0	0	240
	19:00	1	196	27	0	0	0	0	1	0	0	9	0	0	234
	20:00	0	142	19	0	0	0	0	0	0	0	1	0	0	162
	21:00	2	112	22	0	0	0	1	0	0	1	2	0	0	140
	22:00	0	58	11	0	0	0	0	0	0	0	0	0	0	69
	23:00	0	42	10	0	0	0	0	0	0	0	0	0	0	52
Daily Total :		24	3450	655	0	5	10	10	17	9	3	146	3	20	4352
Percent :		1%	79%	15%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	
Average :		1	144	27	0	0	0	0	1	0	0	6	0	1	180

(DEFAULTC) Date	Time	#1 Cycle	#2 Cars	#3 2A-4T	#4 Buses	#5 2A-SU	#6 3A-SU	#7 4A-SU	#8 4A-ST	#9 5A-ST	#10 6A-ST	#11 5A-MT	#12 6A-MT	#13 Other	Total
10/05/15	00:00	0	17	1	0	0	0	0	0	0	0	0	0	0	18
Mon	01:00	0	3	0	0	0	0	0	0	0	0	0	0	0	3
	02:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
	03:00	0	9	1	0	0	0	0	0	0	0	0	0	0	10
	04:00	0	19	8	0	0	0	0	0	0	0	0	0	0	27
	05:00	0	51	20	0	0	0	1	0	1	0	1	0	1	75
	06:00	4	161	77	0	1	7	0	0	1	0	2	0	0	253
	07:00	1	403	103	0	7	5	1	2	2	2	26	0	8	560
	08:00	0	365	95	0	5	6	0	7	2	0	20	0	6	506
	09:00	1	276	83	0	2	0	0	3	0	0	13	0	4	382
	10:00	0	261	62	1	2	4	0	3	0	0	9	0	0	342
	11:00	3	224	57	2	4	1	0	2	3	1	14	1	2	314
	12:00	1	242	75	0	2	3	0	1	1	1	6	0	2	334
	13:00	3	227	50	0	4	2	0	0	4	0	11	0	0	301
	14:00	0	231	61	0	2	0	1	4	1	1	15	0	1	317
	15:00	1	262	75	0	9	8	0	4	0	2	18	2	6	387
	16:00	2	318	55	0	3	2	2	5	2	2	23	0	8	422
	17:00	2	302	63	0	0	2	0	7	0	2	35	1	6	420
	18:00	3	254	43	0	1	0	0	0	0	1	14	0	4	320
	19:00	1	178	35	0	0	0	0	4	0	0	8	0	0	226
	20:00	1	134	14	0	0	0	0	0	0	0	3	0	0	152
	21:00	1	82	10	0	0	0	0	0	0	1	2	0	0	96
	22:00	0	42	13	0	0	0	0	2	0	0	1	0	1	59
	23:00	0	54	13	0	0	0	0	0	0	0	0	0	0	67
Daily Total :		24	4117	1014	3	42	40	5	44	17	13	221	4	49	5593
Percent :		0%	74%	18%	0%	1%	1%	0%	1%	0%	0%	4%	0%	1%	
Average :		1	172	42	0	2	2	0	2	1	1	9	0	2	234

(DEFAULTC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
Date	Time	Cycle	Cars	2A-4T	Buses	2A-SU	3A-SU	4A-SU	4A-ST	5A-ST	6A-ST	5A-MT	6A-MT	Other	Total
10/06/15	00:00	0	12	6	0	0	0	0	0	0	0	0	0	0	18
Tue	01:00	0	7	2	0	0	0	0	0	0	0	0	0	0	9
	02:00	0	9	0	0	0	0	0	0	0	0	0	0	0	9
	03:00	0	4	2	0	0	0	0	0	1	0	0	0	0	7
	04:00	0	16	5	0	0	0	0	0	0	0	0	0	0	21
	05:00	0	57	13	0	0	1	0	0	0	0	0	0	0	71
	06:00	0	181	87	0	2	6	1	1	1	4	2	0	0	285
	07:00	4	375	102	0	5	4	2	3	4	1	21	1	5	527
	08:00	2	350	101	0	9	8	3	4	4	2	26	3	5	517
	09:00	0	286	83	0	3	5	0	3	5	3	14	0	5	407
	10:00	0	261	74	0	4	1	0	3	1	1	4	1	3	353
	11:00	2	207	60	0	2	4	3	2	1	6	13	0	1	301
	12:00	0	246	61	0	3	1	0	2	1	2	17	1	2	336
	13:00	0	218	63	0	8	2	2	3	5	2	9	1	1	314
	14:00	1	224	59	0	4	1	1	1	2	1	14	1	2	311
	15:00	1	323	65	0	9	1	3	1	5	2	22	0	6	438
	16:00	1	357	79	0	2	5	3	6	0	1	30	1	4	489
	17:00	3	316	56	0	1	1	3	4	6	0	35	0	4	429
	18:00	1	253	52	0	1	0	2	1	5	2	16	0	4	337
	19:00	3	161	39	0	2	2	1	3	2	0	9	0	1	223
	20:00	0	147	23	0	0	0	0	2	0	0	1	0	0	173
	21:00	1	113	13	0	0	0	0	0	0	0	2	0	0	129
	22:00	0	62	20	0	0	0	1	0	0	0	0	0	0	83
	23:00	0	39	6	0	0	0	0	0	0	0	2	0	0	47
Daily Total :		19	4224	1071	0	55	42	25	39	43	27	237	9	43	5834
Percent :		0%	72%	18%	0%	1%	1%	0%	1%	1%	0%	4%	0%	1%	
Average :		1	176	45	0	2	2	1	2	2	1	10	0	2	244

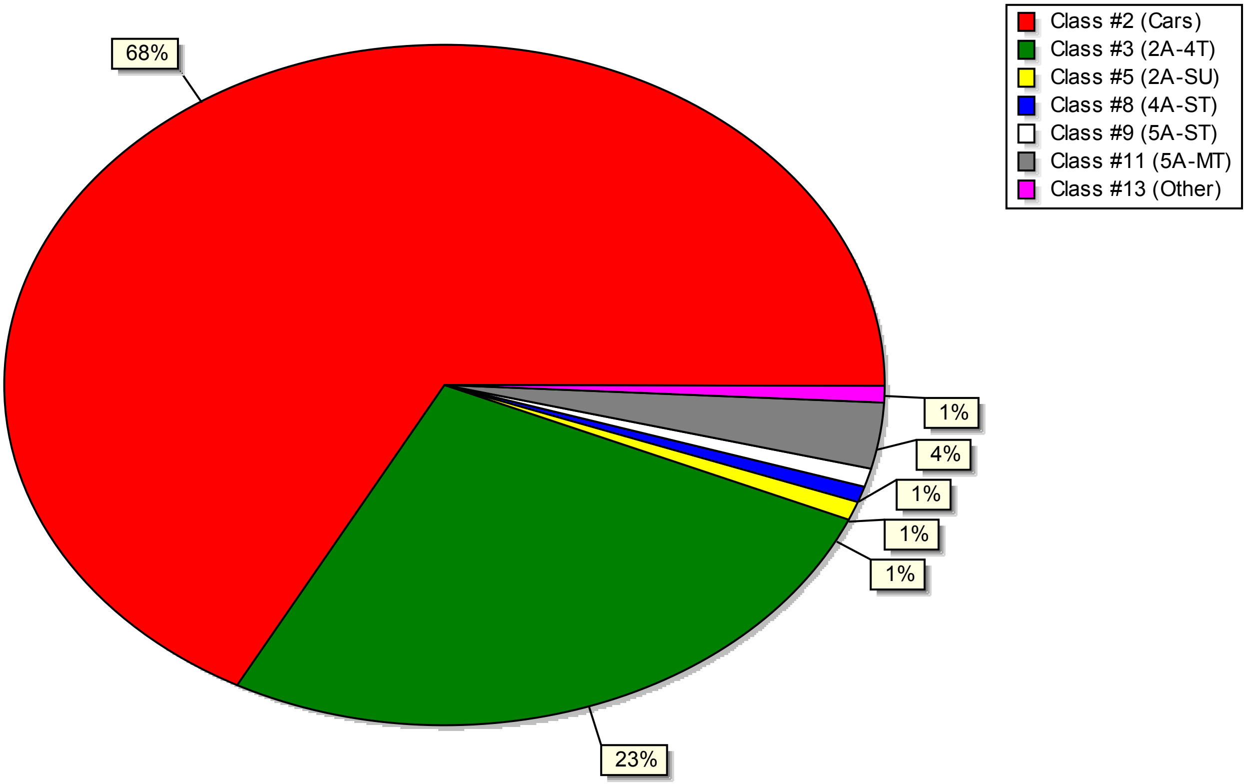
(DEFAULTC) Date	Time	#1 Cycle	#2 Cars	#3 2A-4T	#4 Buses	#5 2A-SU	#6 3A-SU	#7 4A-SU	#8 4A-ST	#9 5A-ST	#10 6A-ST	#11 5A-MT	#12 6A-MT	#13 Other	Total
10/07/15	00:00	0	16	3	0	0	1	0	0	0	0	0	0	0	20
Wed	01:00	0	6	0	0	0	0	0	0	0	0	0	0	1	7
	02:00	0	4	1	0	0	0	0	0	0	0	0	0	0	5
	03:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
	04:00	0	15	2	0	0	0	0	0	0	0	0	0	0	17
	05:00	0	46	21	0	0	0	0	0	1	1	0	0	1	70
	06:00	4	172	91	0	0	3	0	3	2	3	5	0	2	285
	07:00	1	361	104	0	6	2	0	7	3	2	20	4	8	518
	08:00	3	356	90	0	7	0	6	1	6	1	29	1	8	508
	09:00	3	300	72	0	2	3	3	1	3	1	13	0	0	401
	10:00	1	241	79	0	4	4	1	2	0	1	8	0	5	346
	11:00	6	240	51	0	3	2	0	2	1	1	17	0	1	324
	12:00	2	255	65	0	2	3	0	1	1	0	10	0	3	342
	13:00	2	206	56	0	5	3	1	2	1	1	18	1	2	298
	14:00	2	236	60	1	3	2	0	3	4	3	12	0	0	326
	15:00	3	271	61	0	7	6	1	5	0	2	22	0	6	384
	16:00	6	327	77	0	0	6	0	8	2	0	39	0	7	472
	17:00	2	321	55	0	0	3	4	6	5	2	33	0	10	441
	18:00	5	307	49	0	2	2	1	1	3	1	14	0	1	386
	19:00	1	189	45	0	0	1	2	2	1	0	3	0	0	244
	20:00	0	136	19	0	0	0	0	0	2	0	3	0	0	160
	21:00	0	122	17	0	0	0	0	0	1	0	3	0	0	143
	22:00	0	69	13	0	0	0	0	0	0	0	1	0	0	83
	23:00	0	62	11	0	0	0	1	0	1	0	1	0	0	76
Daily Total :		41	4260	1042	1	41	41	20	44	37	19	251	6	55	5858
Percent :		1%	73%	18%	0%	1%	1%	0%	1%	1%	0%	4%	0%	1%	
Average :		2	178	43	0	2	2	1	2	2	1	10	0	2	245

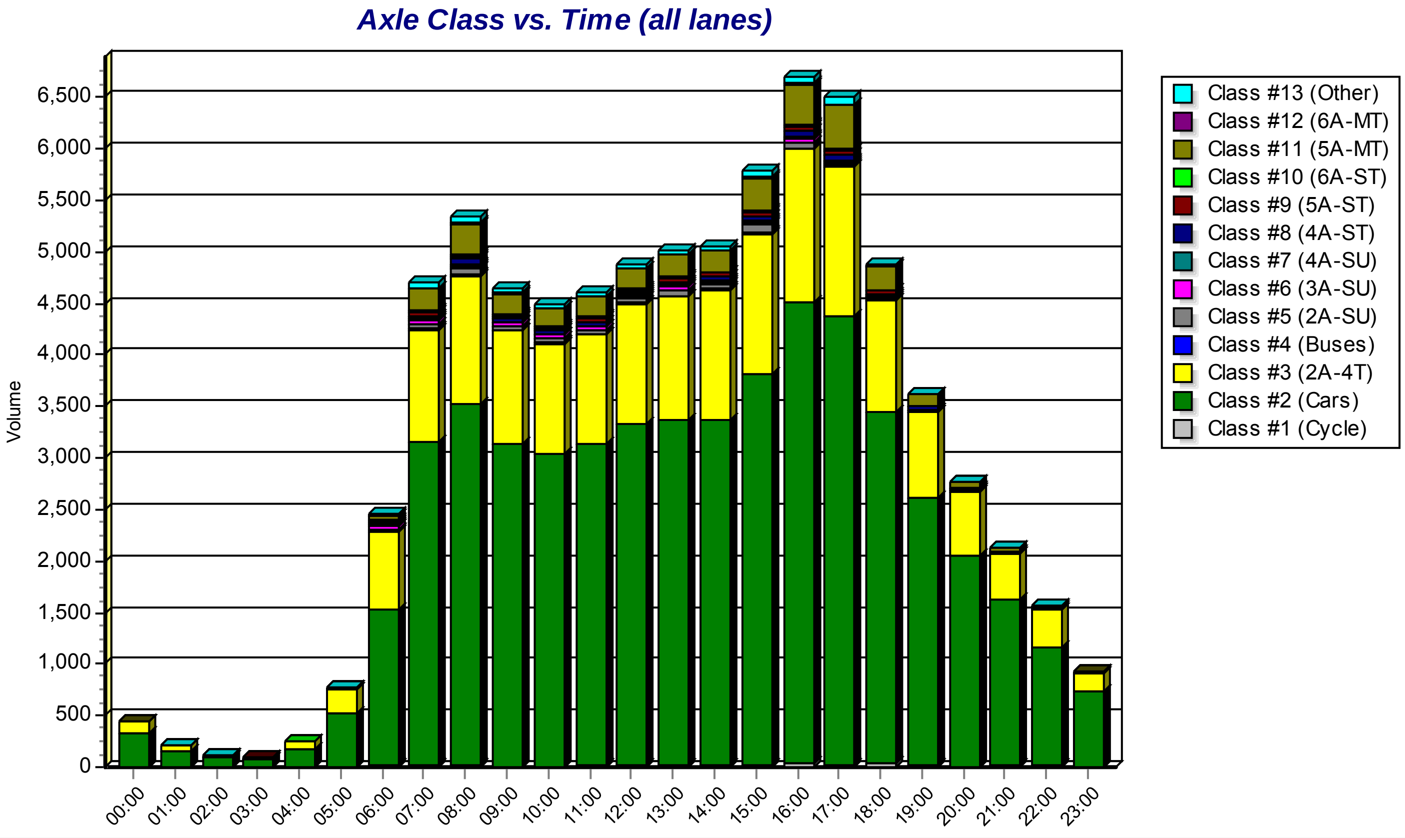
Basic Axle Class Summary: S03302

(DEFAULTC) *Description*	*Lane*	#1 *Cycle*	#2 *Cars*	#3 *2A-4T*	#4 *Buses*	#5 *2A-SU*	#6 *3A-SU*	#7 *4A-SU*	#8 *4A-ST*	#9 *5A-ST*	#10 *6A-ST*	#11 *5A-MT*	#12 *6A-MT*	#13 *Other*	*Total*
TOTAL COUNT :	#1.	147	24017	11417	133	346	170	86	243	327	86	1784	58	270	39084
	#3.	149	28943	6886	6	248	217	103	229	167	104	1568	39	281	38940
		296	52960	18303	139	594	387	189	472	494	190	3352	97	551	78024
Percents :	#1.	0%	61%	29%	0%	1%	0%	0%	1%	1%	0%	5%	0%	1%	50%
	#3.	0%	74%	18%	0%	1%	1%	0%	1%	0%	0%	4%	0%	1%	50%
		0%	68%	23%	0%	1%	0%	0%	1%	1%	0%	4%	0%	1%	
Average :	#1.	1	143	68	1	2	1	1	1	2	1	11	0	2	234
	#3.	1	172	41	0	1	1	1	1	1	1	9	0	2	231
		2	315	109	1	3	2	2	2	3	2	20	0	4	465
Days & ADT :	#1.	7.0	5583												
	#3.	7.0	5562												
		7.0	11146												

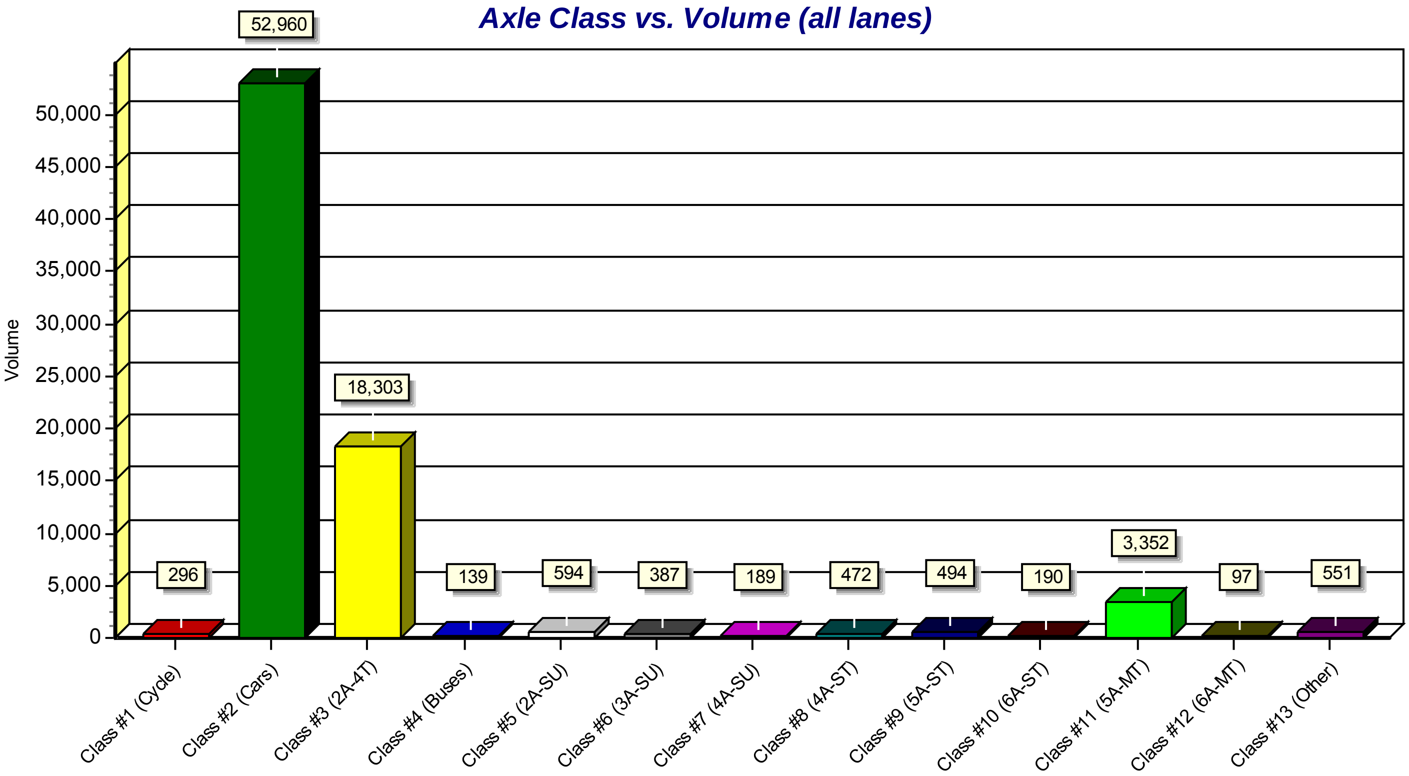
S03302 Axle Class Charts For Data From: 00:00 - 10/01/2015 To: 23:59 - 10/07/2015

Axle Class Percentages:





S03302 Axle Class Charts For Data From: 00:00 - 10/01/2015 To: 23:59 - 10/07/2015



Basic Speed Classification Report: S03302

Lane #1 Configuration

#	Dir.	Information	Vehicle Sensors	Sensor Spacing	Loop Length	Comment
1.		WB	Ax-Ax	150 cm	182 cm	

Lane #1 Basic Speed Classification Data From: 00:00 - 10/01/2015 To: 23:59 - 10/07/2015

(STANTEC) Date	Time	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
10/01/15	00:00	0	0	0	0	0	0	0	2	2	11	3	0	0	1	0	0	19
Thu	01:00	0	0	0	0	0	1	0	1	1	5	1	0	0	0	0	0	9
	02:00	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	4
	03:00	0	0	0	0	0	0	0	1	1	5	2	0	0	0	0	0	9
	04:00	0	0	0	0	0	0	0	0	1	10	3	0	1	0	0	0	15
	05:00	0	0	0	0	0	0	0	7	19	20	23	6	1	0	0	0	76
	06:00	0	0	0	0	0	0	2	5	47	60	25	5	0	0	0	0	144
	07:00	0	1	1	0	1	3	3	57	137	104	16	3	0	0	0	3	329
	08:00	1	1	1	1	2	3	5	74	159	126	19	2	0	0	0	2	396
	09:00	0	0	0	0	0	0	3	61	134	96	25	0	0	1	0	2	322
	10:00	0	0	0	2	3	0	5	41	122	90	12	3	0	0	0	0	278
	11:00	0	0	0	0	0	10	21	109	117	35	7	0	0	0	0	0	299
	12:00	0	0	1	0	0	3	31	87	116	63	5	1	1	0	0	0	308
	13:00	0	0	0	1	0	2	21	66	110	92	16	1	0	0	0	1	310
	14:00	0	2	5	2	1	6	14	73	172	85	15	0	0	0	0	0	375
	15:00	0	2	1	1	2	5	15	95	187	87	16	4	1	0	0	1	417
	16:00	0	0	0	0	1	8	25	102	219	188	18	3	0	0	0	2	566
	17:00	0	0	0	1	0	0	5	125	259	197	47	4	2	0	1	0	641
	18:00	0	0	0	0	0	0	7	73	179	135	18	2	0	0	0	0	414
	19:00	0	0	0	1	0	2	3	39	159	100	32	4	0	1	0	0	341
	20:00	0	0	0	0	0	1	0	33	89	98	29	3	0	0	0	0	253
	21:00	0	0	0	0	0	0	2	16	83	81	25	8	1	1	0	0	217
	22:00	0	0	0	0	0	0	1	13	39	53	21	3	2	0	0	0	132
	23:00	0	0	0	0	0	0	1	5	20	28	10	3	1	0	0	0	68
Daily Total :		1	6	9	9	10	44	164	1085	2374	1771	388	55	10	4	1	11	5942
Percent :		0%	0%	0%	0%	0%	1%	3%	18%	40%	30%	7%	1%	0%	0%	0%	0%	
Average :		0	0	0	0	0	2	7	45	99	74	16	2	0	0	0	0	231

Speeds - Average: 86.6 50% : 87.0 67% : 91.7 85% : 97.7 20kph Pace: 80.1 -100.0 (69.8%)

(STANTEC) Date	Time	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
10/02/15	00:00	0	0	0	0	0	0	1	4	3	6	9	0	0	0	0	0	23
Fri	01:00	0	0	0	0	0	0	0	2	4	4	6	1	1	0	0	0	18
	02:00	0	0	0	0	0	0	0	1	1	3	3	1	0	0	0	0	9
	03:00	0	0	0	0	0	0	0	0	1	5	0	0	0	0	0	0	6
	04:00	0	0	0	0	0	0	0	3	0	8	7	5	0	0	0	0	23
	05:00	0	0	0	0	0	0	2	4	13	18	12	3	0	0	0	0	52
	06:00	0	0	0	0	0	0	0	12	49	56	28	6	4	0	0	0	155
	07:00	0	0	0	0	0	0	4	49	135	85	28	1	1	1	0	0	304
	08:00	0	0	0	1	4	1	11	65	173	102	21	2	0	0	0	1	381
	09:00	0	0	0	0	0	1	10	88	155	80	11	1	0	0	0	2	348
	10:00	0	0	0	1	0	0	9	52	125	70	31	2	0	0	0	0	290
	11:00	0	0	0	0	1	0	5	70	123	77	25	3	0	0	0	0	304
	12:00	0	0	0	0	0	0	3	56	169	107	24	1	2	0	0	0	362
	13:00	0	0	0	3	3	0	17	92	183	107	22	0	1	0	0	0	428
	14:00	0	0	0	0	0	1	2	77	172	112	29	2	0	0	0	0	395
	15:00	0	0	0	1	0	2	16	101	228	119	17	2	0	2	0	0	488
	16:00	0	1	0	0	0	26	31	128	249	117	29	2	1	0	1	0	585
	17:00	0	0	0	0	0	0	10	89	269	182	27	2	1	0	0	1	581
	18:00	0	1	0	2	0	4	10	67	183	113	24	4	1	0	0	0	409
	19:00	0	0	0	0	0	0	4	44	133	101	31	8	0	0	0	0	321
	20:00	0	0	0	0	0	0	1	17	87	91	37	5	2	0	1	0	241
	21:00	0	0	0	0	0	0	3	21	55	70	13	6	0	0	1	0	169
	22:00	0	0	0	0	0	0	1	25	81	77	34	6	2	0	0	0	226
	23:00	0	0	0	0	1	0	0	10	20	32	19	7	0	0	0	0	89
Daily Total :		0	2	0	8	9	35	140	1077	2611	1742	487	70	16	3	3	4	6207
Percent :		0%	0%	0%	0%	0%	1%	2%	17%	42%	28%	8%	1%	0%	0%	0%	0%	
Average :		0	0	0	0	0	1	6	45	109	73	20	3	1	0	0	0	245

Speeds - Average: 87.3 50% : 87.1 67% : 91.8 85% : 98.0 20kph Pace: 80.1 -100.0 (70.1%)

Date	(STANTEC) Time	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
10/03/15	00:00	0	0	0	0	0	0	0	8	13	19	13	1	2	0	0	0	56
Sat	01:00	0	0	0	0	0	0	0	3	13	17	5	1	0	0	0	0	39
	02:00	0	0	0	0	0	0	0	1	3	5	5	2	1	1	0	0	18
	03:00	0	0	0	0	0	0	0	1	4	2	2	0	0	0	0	0	9
	04:00	0	0	0	0	0	0	0	1	1	3	3	0	0	0	0	0	8
	05:00	0	0	0	0	0	1	0	6	8	10	8	0	0	1	0	0	34
	06:00	0	0	0	0	0	0	1	4	10	21	15	4	2	1	0	0	58
	07:00	0	0	0	0	0	0	1	20	56	46	19	0	1	0	0	0	143
	08:00	0	0	0	0	0	0	1	37	92	60	26	2	0	0	0	0	218
	09:00	0	0	0	1	0	0	3	66	134	66	12	5	0	0	1	0	288
	10:00	0	0	0	0	0	1	11	73	152	95	22	3	0	0	0	0	357
	11:00	0	0	0	0	0	1	7	73	195	93	20	3	0	0	0	2	394
	12:00	0	0	0	0	0	1	11	91	172	118	23	1	0	0	0	1	418
	13:00	0	0	0	0	0	1	11	82	182	105	25	5	0	0	0	0	411
	14:00	0	0	0	2	1	0	2	60	189	126	30	3	0	0	0	0	413
	15:00	0	0	0	1	0	0	15	92	164	100	19	0	0	0	0	0	391
	16:00	0	0	0	0	0	0	14	56	159	127	26	2	1	0	0	1	386
	17:00	0	0	0	0	0	0	10	77	146	86	24	2	1	0	0	0	346
	18:00	0	0	0	0	0	0	3	37	122	84	16	2	0	1	0	0	265
	19:00	0	0	0	0	0	1	8	37	92	44	10	1	0	0	0	0	193
	20:00	0	0	0	0	0	0	5	44	67	48	10	2	0	0	0	0	176
	21:00	0	0	0	0	0	0	0	19	95	52	11	1	1	0	0	0	179
	22:00	0	0	2	0	0	0	7	37	61	22	10	0	0	0	0	0	139
	23:00	0	0	0	0	0	1	1	17	36	28	5	0	1	0	0	0	89
Daily Total :		0	0	2	4	1	7	111	942	2166	1377	359	40	10	4	1	4	5028
Percent :		0%	0%	0%	0%	0%	0%	2%	19%	43%	27%	7%	1%	0%	0%	0%	0%	
Average :		0	0	0	0	0	0	5	39	90	57	15	2	0	0	0	0	258

Speeds - Average: 87.0 50% : 86.8 67% : 91.1 85% : 97.6 20kph Pace: 80.1 -100.0 (70.5%)

	(STANTEC)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16	
Date	Time	0.0 - 9.9	10.0 - 19.9	20.0 - 29.9	30.0 - 39.9	40.0 - 49.9	50.0 - 59.9	60.0 - 69.9	70.0 - 79.9	80.0 - 89.9	90.0 - 99.9	100.0 - 109.9	110.0 - 119.9	120.0 - 129.9	130.0 - 139.9	140.0 - 149.9	Other	Total
10/04/15	00:00	0	0	0	0	0	0	3	10	18	14	8	0	0	0	0	0	53
Sun	01:00	0	0	0	0	0	0	1	8	8	7	6	0	1	0	0	0	31
	02:00	0	0	0	0	0	0	1	3	6	8	2	1	0	0	0	0	21
	03:00	0	0	0	0	0	0	0	2	5	5	0	2	0	0	0	0	14
	04:00	0	0	0	0	0	0	0	1	6	4	0	0	0	0	0	0	11
	05:00	0	0	0	0	0	0	1	1	3	6	2	2	0	0	0	0	15
	06:00	0	0	0	0	0	0	2	5	10	14	14	0	1	0	0	0	46
	07:00	0	0	0	0	0	0	1	15	22	32	10	4	0	0	0	0	84
	08:00	0	0	0	0	0	1	4	30	59	38	11	1	0	0	0	0	144
	09:00	0	0	0	0	0	0	4	53	106	61	15	1	0	0	0	0	240
	10:00	0	0	0	0	0	0	6	66	111	73	21	1	0	0	0	0	278
	11:00	0	0	0	2	4	0	13	54	138	70	18	2	0	0	0	0	301
	12:00	0	0	0	2	0	3	18	74	174	85	18	0	0	0	0	0	374
	13:00	0	0	0	0	0	1	6	67	182	99	21	1	0	0	1	0	378
	14:00	0	0	0	0	0	0	6	48	182	110	17	6	0	0	1	0	370
	15:00	0	0	0	0	0	2	4	49	146	105	17	3	0	0	0	0	326
	16:00	0	0	0	1	0	0	9	61	175	107	21	2	0	0	0	1	377
	17:00	0	0	0	0	0	0	4	47	125	107	30	2	0	0	0	0	315
	18:00	0	0	0	0	0	0	4	28	123	86	19	4	0	0	0	0	264
	19:00	0	0	0	0	0	1	1	31	105	68	19	3	0	0	0	2	230
	20:00	0	0	0	0	0	0	1	19	70	72	23	5	1	0	0	0	191
	21:00	0	0	0	0	0	0	0	11	33	49	17	3	0	0	0	0	113
	22:00	0	0	0	0	0	0	0	10	20	20	14	5	1	0	0	1	71
	23:00	0	0	0	0	0	0	0	6	7	25	5	4	0	0	0	0	47
Daily Total :		0	0	0	5	4	8	89	699	1834	1265	328	52	4	0	2	4	4294
Percent :		0%	0%	0%	0%	0%	0%	2%	16%	43%	29%	8%	1%	0%	0%	0%	0%	
Average :		0	0	0	0	0	0	4	29	76	53	14	2	0	0	0	0	208

Speeds - Average: 87.6 50% : 87.3 67% : 92.1 85% : 98.0 20kph Pace: 80.1 -100.0 (72.2%)

	(STANTEC)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16	
Date	Time	0.0 - 9.9	10.0 - 19.9	20.0 - 29.9	30.0 - 39.9	40.0 - 49.9	50.0 - 59.9	60.0 - 69.9	70.0 - 79.9	80.0 - 89.9	90.0 - 99.9	100.0 - 109.9	110.0 - 119.9	120.0 - 129.9	130.0 - 139.9	140.0 - 149.9	Other	Total
10/05/15	00:00	0	0	0	0	0	0	0	2	4	4	0	2	0	0	0	0	12
Mon	01:00	0	0	0	0	0	0	1	0	3	4	1	1	0	1	0	0	11
	02:00	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	3
	03:00	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	3
	04:00	0	0	0	0	0	0	1	2	2	9	4	1	2	0	0	0	21
	05:00	0	0	0	0	0	0	1	6	18	23	20	4	3	0	0	0	75
	06:00	0	0	0	0	0	0	1	14	53	75	22	3	2	1	1	2	174
	07:00	0	0	0	0	3	11	12	53	134	90	14	3	0	0	1	0	321
	08:00	1	1	2	2	1	0	4	91	173	100	12	1	0	0	0	0	388
	09:00	0	0	0	1	1	1	10	74	136	69	19	2	0	0	0	1	314
	10:00	0	0	0	0	0	0	9	79	105	60	10	0	0	0	0	1	264
	11:00	0	0	0	0	1	2	10	72	124	63	3	0	0	0	0	0	275
	12:00	0	0	0	1	0	2	12	56	133	72	22	1	0	0	0	0	299
	13:00	1	0	1	1	0	1	8	78	149	84	11	0	1	0	1	0	336
	14:00	0	0	0	2	2	1	10	72	164	76	10	1	0	0	0	1	339
	15:00	1	2	2	6	10	6	24	115	210	74	14	0	0	0	0	1	465
	16:00	0	0	0	0	0	2	42	168	247	141	13	0	0	0	0	1	614
	17:00	0	0	0	0	0	0	11	123	278	146	19	2	1	0	0	0	580
	18:00	0	0	0	0	0	1	4	58	194	109	25	3	1	0	1	0	396
	19:00	0	0	1	0	0	0	11	49	109	76	10	2	0	1	1	0	260
	20:00	0	0	0	0	1	5	5	25	58	81	25	4	0	1	0	0	205
	21:00	0	0	0	0	0	0	0	13	62	58	22	6	1	1	0	0	163
	22:00	0	0	0	0	0	0	1	11	34	31	9	4	0	0	0	0	90
	23:00	0	0	0	0	0	0	0	3	11	23	5	3	0	0	0	0	45
Daily Total :		3	3	6	13	19	32	177	1165	2402	1470	292	43	11	5	5	7	5653
Percent :		0%	0%	0%	0%	0%	1%	3%	21%	42%	26%	5%	1%	0%	0%	0%	0%	
Average :		0	0	0	1	1	1	7	49	100	61	12	2	0	0	0	0	178

Speeds - Average: 85.6 50% : 85.9 67% : 89.9 85% : 96.8 20kph Pace: 80.1 -100.0 (68.5%)

(STANTEC)

Date	*Time*	#1 *0.0 - 9.9*	#2 *10.0 - 19.9*	#3 *20.0 - 29.9*	#4 *30.0 - 39.9*	#5 *40.0 - 49.9*	#6 *50.0 - 59.9*	#7 *60.0 - 69.9*	#8 *70.0 - 79.9*	#9 *80.0 - 89.9*	#10 *90.0 - 99.9*	#11 *100.0 - 109.9*	#12 *110.0 - 119.9*	#13 *120.0 - 129.9*	#14 *130.0 - 139.9*	#15 *140.0 - 149.9*	#16 *Other*	*Total*
10/06/15	00:00	0	0	0	0	0	0	0	4	7	4	8	0	0	0	0	0	23
Tue	01:00	0	0	0	0	0	0	0	0	2	5	2	2	2	0	0	0	13
	02:00	0	0	0	0	0	0	1	0	4	0	0	1	0	0	0	0	6
	03:00	0	0	0	0	0	1	0	1	1	1	1	1	0	0	0	0	6
	04:00	0	0	0	0	0	0	1	2	6	4	5	4	0	0	0	0	22
	05:00	0	0	0	0	0	1	0	9	17	19	12	4	0	1	1	0	64
	06:00	0	0	0	0	0	0	0	20	71	68	24	3	0	1	1	0	188
	07:00	1	1	0	0	0	6	28	69	157	68	4	3	0	0	0	2	339
	08:00	0	3	1	0	0	1	12	107	178	51	13	0	0	1	0	1	368
	09:00	0	0	0	1	0	0	19	110	100	48	7	2	0	0	0	0	287
	10:00	0	0	0	0	0	0	6	97	122	49	6	3	0	0	0	1	284
	11:00	0	0	0	0	0	0	6	73	136	71	14	0	0	0	1	0	301
	12:00	0	0	0	0	0	1	20	110	138	57	7	1	0	0	0	2	336
	13:00	0	0	0	1	0	0	16	103	182	54	11	1	0	0	1	0	369
	14:00	0	0	0	9	13	12	19	86	189	95	14	1	0	1	0	0	439
	15:00	0	1	2	3	2	3	21	86	230	81	19	0	0	0	0	0	448
	16:00	0	0	0	0	0	0	23	167	281	105	11	0	1	0	0	0	588
	17:00	0	1	1	1	0	2	26	170	253	122	10	1	0	0	0	4	591
	18:00	0	0	1	0	0	0	13	59	211	117	24	3	0	1	0	0	429
	19:00	0	0	0	0	1	0	5	56	112	110	23	2	0	0	0	1	310
	20:00	0	0	0	0	0	0	1	38	111	84	28	2	0	0	0	1	265
	21:00	0	0	0	0	0	0	6	25	53	58	10	3	0	0	0	0	155
	22:00	0	0	0	0	0	0	2	13	37	32	9	3	1	0	0	0	97
	23:00	0	0	0	0	0	0	0	2	11	12	7	3	0	0	0	0	35
Daily Total :		1	6	5	15	16	27	225	1407	2609	1315	269	43	4	5	4	12	5963
Percent :		0%	0%	0%	0%	0%	0%	4%	24%	44%	22%	5%	1%	0%	0%	0%	0%	
Average :		0	0	0	1	1	1	9	59	109	55	11	2	0	0	0	1	234

Speeds - Average: 84.6 50% : 85.0 67% : 88.8 85% : 95.8 20kph Pace: 70.1 - 90.0 (67.3%)

Date	(STANTEC) Time	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
10/07/15	00:00	0	0	0	0	0	0	0	3	8	5	3	1	0	0	0	0	20
Wed	01:00	0	0	0	0	0	0	0	2	6	0	1	2	0	0	0	0	11
	02:00	0	0	0	0	0	0	0	1	1	4	1	0	0	0	0	0	7
	03:00	0	0	0	0	0	0	0	0	2	1	3	0	0	0	0	0	6
	04:00	0	0	0	0	0	0	2	0	3	9	4	1	0	0	0	0	19
	05:00	0	0	0	0	0	0	1	10	19	24	8	3	1	1	0	0	67
	06:00	0	0	0	0	0	0	3	14	75	60	22	0	1	0	0	0	175
	07:00	1	2	1	4	0	1	6	71	148	91	17	2	0	0	0	0	344
	08:00	1	0	3	6	2	3	9	104	176	101	18	2	0	0	1	0	426
	09:00	0	0	0	0	0	0	10	55	141	59	12	1	0	0	0	3	281
	10:00	0	0	0	0	0	1	6	61	111	64	8	0	0	0	0	0	251
	11:00	0	0	0	5	3	0	4	59	136	64	15	1	0	0	0	0	287
	12:00	0	0	1	0	0	3	22	68	115	70	13	5	0	0	0	1	298
	13:00	0	0	0	0	0	1	15	93	199	53	15	1	0	0	1	0	378
	14:00	1	1	0	0	2	2	13	122	155	72	14	1	0	0	1	0	384
	15:00	0	3	3	5	8	2	33	131	200	104	11	1	0	0	1	0	502
	16:00	0	0	0	0	0	8	37	140	241	127	25	2	1	0	0	0	581
	17:00	0	0	0	0	2	2	18	142	272	139	19	1	1	0	0	1	597
	18:00	0	0	0	0	0	0	21	70	186	87	10	3	0	0	1	0	378
	19:00	0	0	1	0	0	1	14	46	144	96	15	3	0	0	1	0	321
	20:00	0	0	0	0	0	1	5	38	132	95	22	0	0	0	0	0	293
	21:00	0	0	0	0	0	0	2	29	71	67	20	2	0	0	0	0	191
	22:00	0	0	0	0	0	0	3	7	63	43	7	2	0	0	0	0	125
	23:00	0	0	0	0	0	0	0	6	9	23	15	1	1	0	0	0	55
Daily Total :		3	6	9	20	17	25	224	1272	2613	1458	298	35	5	1	6	5	5997
Percent :		0%	0%	0%	0%	0%	0%	4%	21%	44%	24%	5%	1%	0%	0%	0%	0%	
Average :		0	0	0	1	1	1	9	53	109	61	12	1	0	0	0	0	249

Speeds - Average: 85.1 50% : 85.5 67% : 89.4 85% : 96.3 20kph Pace: 80.1 -100.0 (67.9%)

Lane #3 Configuration

#	Dir.	Information	Vehicle Sensors	Sensor Spacing	Loop Length	Comment
3.		EB	Ax-Ax	150 cm	182 cm	

Lane #3 Basic Speed Classification Data From: 00:00 - 10/01/2015 To: 23:59 - 10/07/2015

(STANTEC)

Date	Time	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
10/01/15	00:00	0	0	0	0	0	0	5	8	12	4	0	0	0	0	0	0	29
Thu	01:00	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	3
	02:00	0	0	0	0	0	0	0	1	1	2	1	0	0	0	0	0	5
	03:00	0	0	0	0	0	0	0	1	1	4	0	0	0	0	0	0	6
	04:00	0	0	0	0	0	0	2	4	10	5	1	1	0	0	0	0	23
	05:00	0	0	0	0	0	1	1	22	40	7	2	0	0	0	0	1	74
	06:00	0	0	0	0	0	0	12	144	116	28	1	0	0	0	0	0	301
	07:00	0	0	0	0	0	7	40	303	170	5	0	0	1	1	0	0	527
	08:00	0	0	0	1	3	5	61	303	178	11	0	2	0	0	1	2	567
	09:00	0	0	1	0	1	3	46	207	125	10	2	2	0	0	0	0	397
	10:00	0	0	0	0	1	1	47	198	86	6	0	0	0	0	0	0	339
	11:00	0	0	0	1	5	13	70	186	66	7	0	0	1	0	0	0	349
	12:00	0	0	0	1	0	13	59	193	77	1	0	0	1	0	0	0	345
	13:00	0	1	0	0	0	3	45	192	82	5	0	0	0	0	0	0	328
	14:00	0	0	0	2	4	8	46	164	85	7	0	0	0	0	0	1	317
	15:00	0	0	0	0	0	2	43	206	142	17	1	0	0	0	0	0	411
	16:00	0	0	2	0	0	2	23	195	185	17	2	0	1	1	1	0	429
	17:00	0	0	0	0	0	6	30	206	243	21	0	0	0	1	0	2	509
	18:00	0	0	0	0	0	1	18	196	115	13	2	0	0	0	0	0	345
	19:00	0	0	1	0	2	2	26	129	96	5	1	0	0	1	0	1	264
	20:00	0	0	0	0	1	0	14	103	66	8	0	0	0	0	0	0	192
	21:00	0	0	0	0	0	0	4	53	57	11	2	0	0	0	0	0	127
	22:00	0	0	0	0	1	0	8	28	35	12	1	0	0	0	0	0	85
	23:00	0	0	0	0	0	0	3	35	39	8	1	1	0	0	0	0	87
Daily Total :		0	1	4	5	18	67	603	3078	2029	214	17	6	4	4	2	7	6059
Percent :		0%	0%	0%	0%	0%	1%	10%	51%	33%	4%	0%	0%	0%	0%	0%	0%	
Average :		0	0	0	0	1	3	25	128	85	9	1	0	0	0	0	0	248

Speeds - Average: 77.8 50% : 77.6 67% : 81.6 85% : 86.8 20kph Pace: 70.1 - 90.0 (84.3%)

(STANTEC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16	
Date	Time	0.0 - 9.9	10.0 - 19.9	20.0 - 29.9	30.0 - 39.9	40.0 - 49.9	50.0 - 59.9	60.0 - 69.9	70.0 - 79.9	80.0 - 89.9	90.0 - 99.9	100.0 - 109.9	110.0 - 119.9	120.0 - 129.9	130.0 - 139.9	140.0 - 149.9	Other	Total
10/02/15	00:00	0	0	0	0	0	0	4	13	13	4	0	0	0	0	0	0	34
Fri	01:00	0	0	0	0	0	0	0	3	8	0	0	0	0	0	0	0	11
	02:00	0	0	0	0	0	0	0	2	3	3	0	0	0	0	0	0	8
	03:00	0	0	0	0	0	0	0	2	4	0	1	0	0	0	0	0	7
	04:00	0	0	0	0	0	1	1	6	11	4	2	0	0	0	0	0	25
	05:00	0	0	0	0	0	1	2	13	29	15	4	0	0	0	0	0	64
	06:00	0	0	0	0	0	0	7	116	113	32	2	0	0	0	0	0	270
	07:00	0	0	0	0	0	0	28	254	195	25	1	0	0	1	0	0	504
	08:00	0	1	0	1	0	1	53	284	144	13	0	1	0	1	0	1	500
	09:00	0	0	1	0	1	6	49	226	95	12	0	0	0	1	0	0	391
	10:00	0	0	0	0	0	0	58	215	102	16	0	0	0	0	0	1	392
	11:00	0	0	0	1	1	0	50	222	103	11	1	1	0	0	0	1	391
	12:00	1	0	0	0	0	4	36	174	131	9	0	0	0	0	0	1	356
	13:00	0	0	0	0	0	0	28	175	112	20	1	1	0	0	1	0	338
	14:00	0	0	0	0	4	6	47	177	131	7	0	0	0	0	0	1	373
	15:00	0	0	0	0	1	2	30	227	138	19	1	0	0	0	0	0	418
	16:00	0	0	0	2	0	2	39	253	190	8	0	0	1	0	0	4	499
	17:00	0	2	0	0	1	7	39	229	164	19	2	1	0	0	0	1	465
	18:00	0	0	0	0	5	15	44	188	124	14	0	0	0	0	0	0	390
	19:00	0	0	0	0	0	1	27	119	79	12	3	1	0	0	0	0	242
	20:00	0	0	0	0	1	0	21	77	59	7	0	0	1	0	0	0	166
	21:00	0	0	0	0	0	0	19	71	73	8	2	0	0	0	0	0	173
	22:00	0	0	0	0	0	0	5	72	61	14	0	0	0	0	0	0	152
	23:00	0	0	0	0	0	1	5	28	33	10	2	0	0	0	0	0	79
Daily Total :		1	3	1	4	14	47	592	3146	2115	282	22	5	2	3	1	10	6248
Percent :		0%	0%	0%	0%	0%	1%	9%	50%	34%	5%	0%	0%	0%	0%	0%	0%	
Average :		0	0	0	0	1	2	25	131	88	12	1	0	0	0	0	0	252

Speeds - Average: 78.1 50% : 77.9 67% : 81.9 85% : 87.1 20kph Pace: 70.1 - 90.0 (84.2%)

(STANTEC)

Date	Time	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
10/03/15	00:00	0	0	0	0	0	0	9	20	26	6	0	0	0	0	0	0	61
Sat	01:00	0	0	0	0	0	0	0	5	8	7	1	0	0	0	0	0	21
	02:00	0	0	0	0	0	0	0	3	4	2	0	0	0	0	0	0	9
	03:00	0	0	0	0	0	0	0	3	4	3	0	0	0	0	0	0	10
	04:00	0	0	0	0	0	0	1	4	4	3	0	1	0	0	0	0	13
	05:00	0	0	0	0	0	0	0	9	12	3	1	0	0	0	0	0	25
	06:00	0	0	0	0	0	0	2	21	40	12	0	0	0	0	0	0	75
	07:00	0	1	0	0	0	0	6	54	59	6	2	0	0	0	0	0	128
	08:00	0	0	0	0	2	3	19	122	93	15	2	0	1	0	0	0	257
	09:00	0	0	0	0	0	1	28	206	111	7	2	1	0	0	0	1	357
	10:00	0	0	0	0	1	2	28	209	138	7	1	0	0	0	0	0	386
	11:00	0	0	0	0	0	2	39	221	111	19	1	0	0	1	0	0	394
	12:00	0	0	1	0	1	3	44	197	122	16	1	0	0	0	0	0	385
	13:00	0	0	0	0	0	1	56	241	126	11	0	0	0	1	0	1	437
	14:00	0	0	0	0	0	2	42	196	108	11	0	0	0	0	0	0	359
	15:00	0	0	2	0	0	3	56	194	96	13	1	0	1	0	0	1	367
	16:00	0	0	0	0	1	4	47	177	113	7	0	0	0	0	0	0	349
	17:00	0	0	0	0	0	0	49	139	109	10	0	0	0	0	1	0	308
	18:00	0	0	0	0	0	0	39	171	93	6	1	0	0	0	0	1	311
	19:00	0	0	0	0	2	3	28	104	62	11	0	0	0	0	0	0	210
	20:00	0	0	1	0	0	1	19	75	37	6	1	1	0	0	0	0	141
	21:00	0	0	0	0	0	3	18	71	38	5	1	0	0	0	0	0	136
	22:00	0	0	0	0	1	2	39	79	36	2	0	0	0	0	0	0	159
	23:00	0	0	0	0	0	0	7	54	28	7	2	0	0	0	0	0	98
Daily Total :		0	1	4	0	8	30	576	2575	1578	195	17	3	2	2	1	4	4996
Percent :		0%	0%	0%	0%	0%	1%	12%	52%	32%	4%	0%	0%	0%	0%	0%	0%	
Average :		0	0	0	0	0	1	24	107	66	8	1	0	0	0	0	0	260

Speeds - Average: 77.6 50% : 77.4 67% : 81.1 85% : 86.7 20kph Pace: 70.1 - 90.0 (83.1%)

(STANTEC) Date	Time	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
10/04/15	00:00	0	0	0	0	0	2	9	29	14	5	1	0	0	0	0	0	60
Sun	01:00	0	0	0	0	0	0	1	14	18	1	0	0	1	0	0	0	35
	02:00	0	0	0	0	0	0	0	4	4	3	0	0	0	0	0	0	11
	03:00	0	0	0	0	0	0	0	3	3	3	0	0	0	0	0	0	9
	04:00	0	0	0	0	0	0	0	1	4	1	1	0	0	0	0	0	7
	05:00	0	0	0	0	0	0	0	5	6	3	2	0	0	0	0	0	16
	06:00	0	0	0	0	0	0	2	14	20	16	0	1	0	0	0	0	53
	07:00	0	0	0	0	0	0	8	25	35	10	1	0	0	0	0	0	79
	08:00	0	0	0	0	0	2	8	73	75	16	0	0	0	0	0	0	174
	09:00	0	0	0	5	2	1	18	99	88	17	1	0	0	0	0	0	231
	10:00	0	0	1	2	1	1	33	161	122	9	2	0	1	0	0	0	333
	11:00	0	0	0	1	0	6	47	181	128	9	2	0	0	1	0	0	375
	12:00	0	0	0	0	1	2	49	184	133	14	3	0	0	0	0	2	388
	13:00	0	0	0	0	0	2	31	176	148	23	3	1	0	0	0	0	384
	14:00	0	0	0	0	0	3	27	132	137	27	4	1	0	1	0	1	333
	15:00	0	0	0	0	1	1	23	140	157	16	3	1	1	0	0	0	343
	16:00	0	0	0	0	0	1	34	159	120	27	2	2	0	0	0	0	345
	17:00	0	0	0	0	0	0	12	109	123	34	0	0	0	0	1	0	279
	18:00	0	0	1	0	0	0	8	81	124	24	1	0	1	0	0	0	240
	19:00	0	0	0	0	0	3	20	93	99	16	2	1	0	0	0	0	234
	20:00	0	0	0	0	0	0	3	49	91	16	3	0	0	0	0	0	162
	21:00	0	1	0	0	0	0	3	60	60	15	1	0	0	0	0	0	140
	22:00	0	0	0	0	0	0	5	28	26	10	0	0	0	0	0	0	69
	23:00	0	0	0	0	0	1	1	9	26	12	2	0	1	0	0	0	52
Daily Total :		0	1	2	8	5	25	342	1829	1761	327	34	7	5	2	1	3	4352
Percent :		0%	0%	0%	0%	0%	1%	8%	42%	40%	8%	1%	0%	0%	0%	0%	0%	
Average :		0	0	0	0	0	1	14	76	73	14	1	0	0	0	0	0	207

Speeds - Average: 79.8 50% : 79.8 67% : 84.1 85% : 88.5 20kph Pace: 70.1 - 90.0 (82.5%)

(STANTEC) Date	Time	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
10/05/15	00:00	0	0	0	0	0	0	1	4	9	4	0	0	0	0	0	0	18
Mon	01:00	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	3
	02:00	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2
	03:00	0	0	0	0	0	0	0	0	6	3	0	1	0	0	0	0	10
	04:00	0	0	0	0	0	0	1	6	8	7	4	0	1	0	0	0	27
	05:00	0	0	0	0	0	1	2	16	31	21	4	0	0	0	0	0	75
	06:00	0	0	0	0	0	0	2	85	127	39	0	0	0	0	0	0	253
	07:00	1	0	0	0	0	16	42	286	199	15	0	0	0	0	0	1	560
	08:00	0	0	0	0	3	14	62	252	158	14	1	1	0	1	0	0	506
	09:00	0	1	0	0	0	2	40	198	128	12	0	0	0	1	0	0	382
	10:00	0	0	0	0	0	0	33	192	109	7	1	0	0	0	0	0	342
	11:00	0	0	0	0	0	1	55	158	90	9	0	0	0	0	0	1	314
	12:00	0	0	0	1	1	5	28	151	128	19	1	0	0	0	0	0	334
	13:00	0	0	0	1	5	5	16	142	108	21	1	0	0	0	0	2	301
	14:00	0	1	1	1	3	0	29	161	107	9	2	0	1	1	0	1	317
	15:00	0	0	0	0	1	13	51	180	121	18	2	1	0	0	0	0	387
	16:00	0	0	0	0	1	0	41	193	170	16	0	0	0	0	1	0	422
	17:00	0	0	0	0	11	4	20	201	158	21	0	0	2	2	0	1	420
	18:00	0	0	0	0	0	2	24	145	121	25	2	0	0	1	0	0	320
	19:00	0	0	0	0	0	3	20	106	82	13	1	0	0	0	0	1	226
	20:00	0	0	0	0	0	1	6	66	60	18	1	0	0	0	0	0	152
	21:00	0	0	0	0	0	0	4	30	49	11	1	1	0	0	0	0	96
	22:00	0	0	0	4	0	2	3	14	30	6	0	0	0	0	0	0	59
	23:00	0	0	0	0	0	0	1	25	30	11	0	0	0	0	0	0	67
Daily Total :		1	2	1	7	25	69	481	2611	2031	320	23	4	4	6	1	7	5593
Percent :		0%	0%	0%	0%	0%	1%	9%	47%	36%	6%	0%	0%	0%	0%	0%	0%	
Average :		0	0	0	0	1	3	20	109	85	13	1	0	0	0	0	0	179

Speeds - Average: 78.6 50% : 78.5 67% : 82.9 85% : 87.7 20kph Pace: 70.1 - 90.0 (83.0%)

Date	(STANTEC) Time	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
10/06/15	00:00	0	0	0	0	0	0	1	6	8	2	1	0	0	0	0	0	18
Tue	01:00	0	0	0	0	0	0	1	3	4	1	0	0	0	0	0	0	9
	02:00	0	0	0	0	0	0	0	1	5	2	1	0	0	0	0	0	9
	03:00	0	0	0	0	0	0	0	3	4	0	0	0	0	0	0	0	7
	04:00	0	0	0	0	0	0	2	5	9	2	2	1	0	0	0	0	21
	05:00	0	0	0	0	0	0	6	12	38	11	4	0	0	0	0	0	71
	06:00	0	0	0	0	0	0	5	107	138	30	3	1	1	0	0	0	285
	07:00	0	0	0	0	0	7	57	310	144	7	1	0	0	1	0	0	527
	08:00	0	0	0	0	1	4	94	313	91	12	1	1	0	0	0	0	517
	09:00	0	0	0	0	1	4	69	247	77	8	0	1	0	0	0	0	407
	10:00	0	0	0	2	0	1	49	176	115	9	0	1	0	0	0	0	353
	11:00	0	0	0	0	0	4	31	151	101	13	0	0	0	0	0	1	301
	12:00	0	0	0	1	0	0	45	181	96	9	3	0	0	0	1	0	336
	13:00	0	0	0	0	1	1	34	146	106	24	1	0	1	0	0	0	314
	14:00	0	0	0	0	2	6	25	147	118	12	0	0	0	0	1	0	311
	15:00	0	0	0	0	1	5	51	216	147	17	1	0	0	0	0	0	438
	16:00	0	0	0	0	0	0	45	246	177	18	3	0	0	0	0	0	489
	17:00	0	1	1	1	1	1	12	179	213	19	0	0	0	0	0	1	429
	18:00	0	0	1	0	0	0	25	153	143	13	0	0	0	0	0	2	337
	19:00	0	0	0	0	0	0	31	99	78	12	2	0	0	1	0	0	223
	20:00	0	0	0	0	0	0	17	78	61	16	1	0	0	0	0	0	173
	21:00	0	0	0	0	0	1	8	58	47	14	1	0	0	0	0	0	129
	22:00	0	0	0	0	0	0	4	28	38	10	3	0	0	0	0	0	83
	23:00	0	0	0	0	0	0	1	9	27	8	1	1	0	0	0	0	47
Daily Total :		0	1	2	4	7	34	613	2874	1985	269	29	6	2	2	2	4	5834
Percent :		0%	0%	0%	0%	0%	1%	11%	49%	34%	5%	0%	0%	0%	0%	0%	0%	
Average :		0	0	0	0	0	1	26	120	83	11	1	0	0	0	0	0	232

Speeds - Average: 78.2 50% : 77.9 67% : 82.0 85% : 87.2 20kph Pace: 70.1 - 90.0 (83.3%)

(STANTEC)

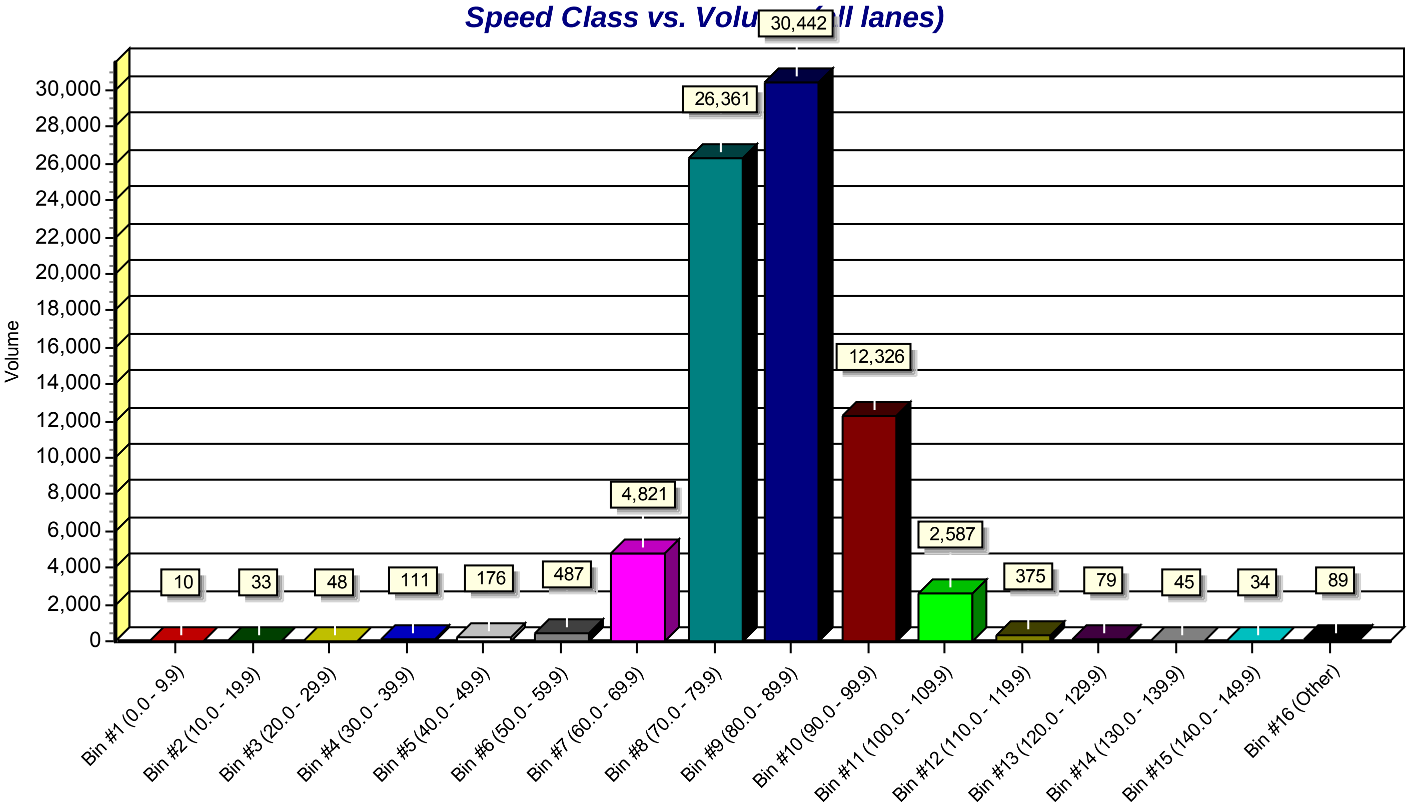
Date	Time	#1 0.0 - 9.9	#2 10.0 - 19.9	#3 20.0 - 29.9	#4 30.0 - 39.9	#5 40.0 - 49.9	#6 50.0 - 59.9	#7 60.0 - 69.9	#8 70.0 - 79.9	#9 80.0 - 89.9	#10 90.0 - 99.9	#11 100.0 - 109.9	#12 110.0 - 119.9	#13 120.0 - 129.9	#14 130.0 - 139.9	#15 140.0 - 149.9	#16 Other	Total
10/07/15	00:00	0	0	0	0	0	0	0	2	14	4	0	0	0	0	0	0	20
Wed	01:00	0	0	0	0	0	1	1	1	4	0	0	0	0	0	0	0	7
	02:00	0	0	0	0	0	0	1	0	2	2	0	0	0	0	0	0	5
	03:00	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2
	04:00	0	0	0	0	0	0	2	5	5	2	2	1	0	0	0	0	17
	05:00	0	0	0	0	0	0	2	19	30	18	1	0	0	0	0	0	70
	06:00	0	0	0	0	0	0	10	92	156	26	1	0	0	0	0	0	285
	07:00	0	0	0	0	0	2	42	254	199	18	3	0	0	0	0	0	518
	08:00	0	1	0	0	1	2	53	241	192	13	1	0	0	2	0	2	508
	09:00	0	0	1	0	2	4	30	188	164	10	1	0	0	0	1	0	401
	10:00	0	0	0	0	1	0	43	159	129	13	1	0	0	0	0	0	346
	11:00	0	0	0	0	3	3	26	163	111	15	2	1	0	0	0	0	324
	12:00	0	0	0	0	0	2	39	147	128	26	0	0	0	0	0	0	342
	13:00	0	0	0	7	6	5	27	124	114	12	2	0	0	0	0	1	298
	14:00	0	0	0	1	0	0	16	156	128	24	1	0	0	0	0	0	326
	15:00	0	0	1	1	1	9	43	180	135	12	0	0	0	1	1	0	384
	16:00	0	0	0	0	5	3	42	245	156	14	2	1	0	0	2	2	472
	17:00	0	0	1	0	3	1	24	199	186	21	2	1	0	1	0	2	441
	18:00	0	0	0	0	0	2	22	156	184	22	0	0	0	0	0	0	386
	19:00	0	0	0	0	0	2	31	94	94	23	0	0	0	0	0	0	244
	20:00	0	0	0	0	1	1	14	58	71	14	0	1	0	0	0	0	160
	21:00	0	0	0	0	0	0	9	66	60	8	0	0	0	0	0	0	143
	22:00	0	0	0	0	0	0	5	32	34	11	1	0	0	0	0	0	83
	23:00	0	0	0	0	0	0	2	20	37	13	3	1	0	0	0	0	76
Daily Total :		0	1	3	9	23	37	484	2601	2334	321	24	6	0	4	4	7	5858
Percent :		0%	0%	0%	0%	0%	1%	8%	44%	40%	5%	0%	0%	0%	0%	0%	0%	
Average :		0	0	0	0	1	2	20	108	97	13	1	0	0	0	0	0	242

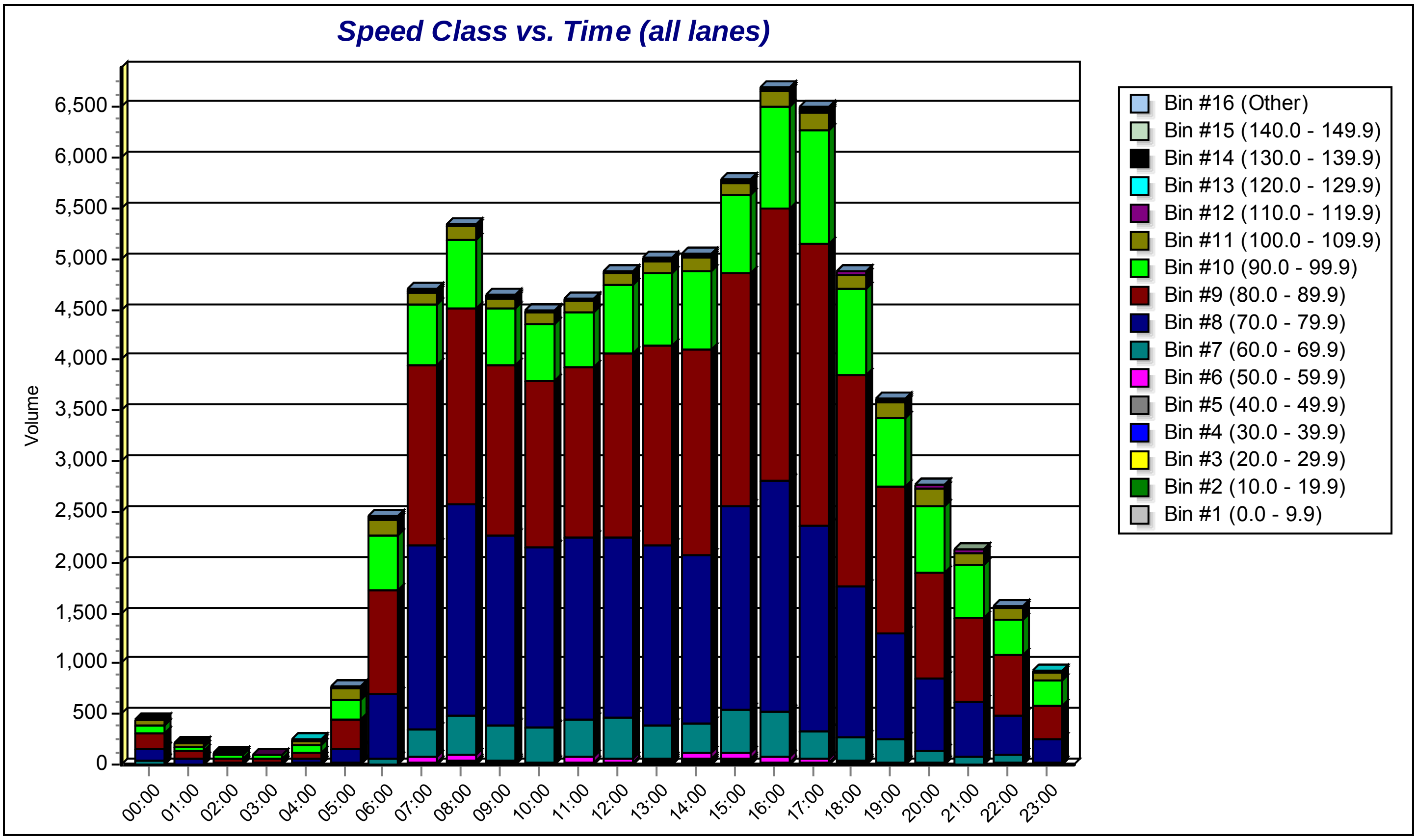
Speeds - Average: 79.0 50% : 79.2 67% : 83.4 85% : 87.8 20kph Pace: 70.1 - 90.0 (84.2%)

Basic Speed Class Summary: S03302

(STANTEC)		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16	
		0.0 -	10.0 -	20.0 -	30.0 -	40.0 -	50.0 -	60.0 -	70.0 -	80.0 -	90.0 -	100.0 -	110.0 -	120.0 -	130.0 -	140.0 -		
Description	Lane	9.9	19.9	29.9	39.9	49.9	59.9	69.9	79.9	89.9	99.9	109.9	119.9	129.9	139.9	149.9	Other	Total
TOTAL COUNT :	#1.	8	23	31	74	76	178	1130	7647	16609	10398	2421	338	60	22	22	47	39084
	#3.	2	10	17	37	100	309	3691	18714	13833	1928	166	37	19	23	12	42	38940
		10	33	48	111	176	487	4821	26361	30442	12326	2587	375	79	45	34	89	78024
Percents :	#1.	0%	0%	0%	0%	0%	0%	3%	20%	42%	27%	6%	1%	0%	0%	0%	0%	50%
	#3.	0%	0%	0%	0%	0%	1%	9%	48%	36%	5%	0%	0%	0%	0%	0%	0%	50%
		0%	0%	0%	0%	0%	1%	6%	34%	39%	16%	3%	0%	0%	0%	0%	0%	
Average :	#1.	0	0	0	0	0	1	7	46	99	62	14	2	0	0	0	0	231
	#3.	0	0	0	0	1	2	22	111	82	11	1	0	0	0	0	0	230
		0	0	0	0	1	3	29	157	181	73	15	2	0	0	0	0	461
Days & ADT :	#1.	7.0	5583															
	#3.	7.0	5562															
		7.0	11146															
Avg,50,67,85%:	#1.	86.2	86.3	90.5	97.2	80.1	-100.0	69%										
Pace (pace %)	#3.	78.4	78.2	82.5	87.5	70.1	- 90.0	84%										
		82.3	82.4	86.7	93.2	70.1	- 90.0	73%										

S03302 Speed Class Charts For Data From: 00:00 - 10/01/2015 To: 23:59 - 10/07/2015





TURNING MOVINGS AT C.R. 14 AND C.R. 38

TOTAL VEHICLES INCLUDING TRUCKS AND BUSES

	VANNECK			**JEFFERIES**			**GLENDON**						**COLDSTREAM**		
	SOUTH BOUND			NORTH BOUND			EAST BOUND			WEST BOUND			SOUTH BOUND		NORTH
	LEFT	THROUGH	RIGHT	LEFT	THROUGH	RIGHT	LEFT	THROUGH	RIGHT	LEFT	THROUGH	RIGHT	LEFT	RIGHT	ONTO *
7-8am	82	20	94	49	110	63	95	428	29	33	265	54	0	31	31
8-9am	79	45	89	67	43	56	140	313	12	45	224	51	1	52	30
9-10am	60	14	86	37	28	26	52	303	27	41	107	50	3	23	30
10-11am	47	15	71	25	53	10	63	605	10	39	285	39	1	9	39
11-12am	51	21	70	21	19	22	57	204	15	26	200	42	1	19	26
12-1pm	58	29	76	39	34	21	74	196	10	47	217	48	1	18	32
1-2pm	46	37	93	21	61	28	50	207	16	24	210	37	1	11	19
2-3pm	70	48	91	66	48	41	76	210	17	45	293	37	0	30	33
3-4pm	98	46	104	42	75	38	74	273	35	59	413	55	1	38	30
4-5pm	121	77	122	50	102	33	92	301	43	68	435	63	0	22	38
5-6pm	118	69	74	53	109	33	90	326	35	93	569	65	1	19	47

* Note: Left and Right turns onto Coldstream where not counted. Only the amount of turning onto Coldstream

TRUCKS AND BUSES

	VANNECK			**JEFFERIES**			**GLENDON**					
	SOUTH BOUND			NORTH BOUND			EAST BOUND			WEST BOUND		
	LEFT	THROUGH	RIGHT	LEFT	THROUGH	RIGHT	LEFT	THROUGH	RIGHT	LEFT	THROUGH	RIGHT
7-8am	2	2	5	1	5	0	4	4	4	2	3	1
8-9am	2	0	4	6	0	4	4	3	0	3	5	6
9-10am	2	0	5	1	0	0	6	2	2	2	4	0
10-11am	1	0	4	2	1	1	3	7	0	3	4	0
11-12am	2	0	6	1	0	1	0	3	0	0	7	3
12-1pm	0	1	2	0	0	0	3	0	0	1	2	1
1-2pm	1	0	4	1	0	0	0	3	0	0	2	0
2-3pm	3	3	4	8	2	1	7	2	3	0	1	2
3-4pm	4	0	8	3	2	1	6	5	2	2	2	0
4-5pm	1	0	3	2	0	0	9	4	2	0	5	5
5-6pm	2	0	0	0	0	0	1	0	0	0	1	1

Glendon Drive & Springfield Way

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

Municipality: London
Site #: 0000002401
Intersection: Glendon Drive & Springfield Way
TFR File #: 6
Count date: 22-May-2013

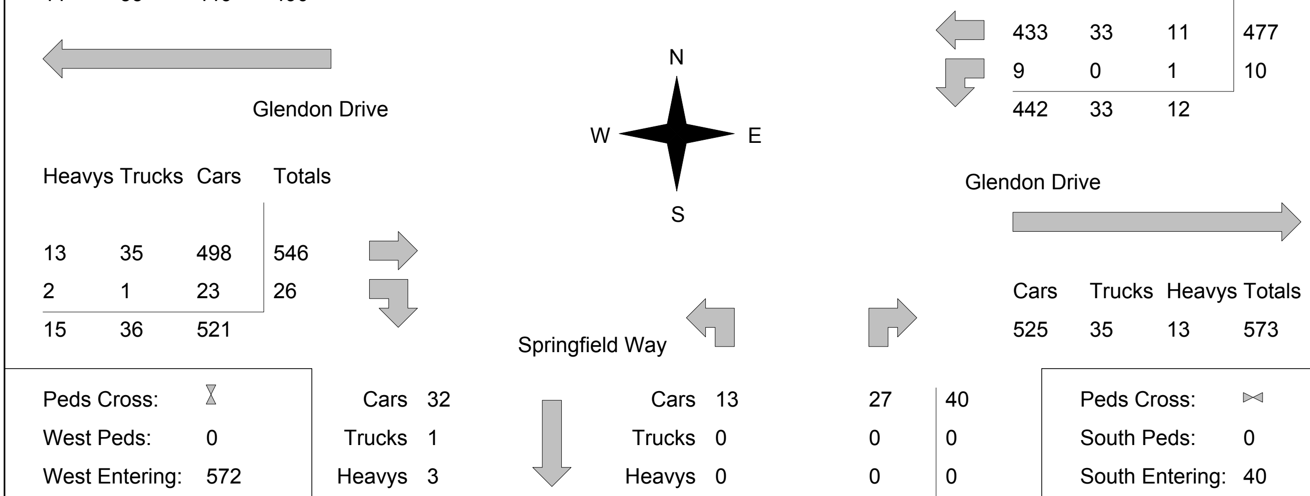
Weather conditions:
Clear

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E

East Leg Total: 1060
East Entering: 487
East Peds: 0
Peds Cross: ⧗



Heavys	Trucks	Cars	Totals
11	33	446	490

Heavys	Trucks	Cars	Totals
13	35	498	546
2	1	23	26
15	36	521	

Cars	Trucks	Heavys	Totals
433	33	11	477
9	0	1	10
442	33	12	

Cars	Trucks	Heavys	Totals
525	35	13	573

Peds Cross: ⧗
West Peds: 0
West Entering: 572
West Leg Total: 1062

Cars	32
Trucks	1
Heavys	3
Totals	36

Cars	13	27	40
Trucks	0	0	0
Heavys	0	0	0
Totals	13	27	

Peds Cross: ⋈
South Peds: 0
South Entering: 40
South Leg Total: 76

Comments

Glendon Drive & Springfield Way

Mid-day Peak Diagram

Specified Period
From: 11:30:00
To: 13:30:00

One Hour Peak
From: 12:15:00
To: 13:15:00

Municipality: London
Site #: 0000002401
Intersection: Glendon Drive & Springfield Way
TFR File #: 6
Count date: 22-May-2013

Weather conditions:
Clear

Person(s) who counted:

**** Non-Signalized Intersection ****

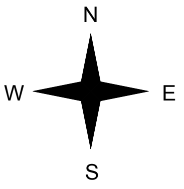
Major Road: Glendon Drive runs W/E

East Leg Total: 751
East Entering: 351
East Peds: 0
Peds Cross: ⧗

Glendon Drive

Heavys	Trucks	Cars	Totals
7	40	301	348

Heavys	Trucks	Cars	Totals
4	44	343	391
0	1	11	12
4	45	354	



Glendon Drive

Cars	Trucks	Heavys	Totals
288	39	7	334
17	0	0	17
305	39	7	

Cars	Trucks	Heavys	Totals
352	44	4	400

Springfield Way

Peds Cross: ⧗
West Peds: 0
West Entering: 403
West Leg Total: 751

Cars	28
Trucks	1
Heavys	0
Totals	29

Cars	13	9	22
Trucks	1	0	1
Heavys	0	0	0
Totals	14	9	

Peds Cross: ⋈
South Peds: 0
South Entering: 23
South Leg Total: 52

Comments

Glendon Drive & Springfield Way

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:30:00
To: 17:30:00

Municipality: London
Site #: 0000002401
Intersection: Glendon Drive & Springfield Way
TFR File #: 6
Count date: 22-May-2013

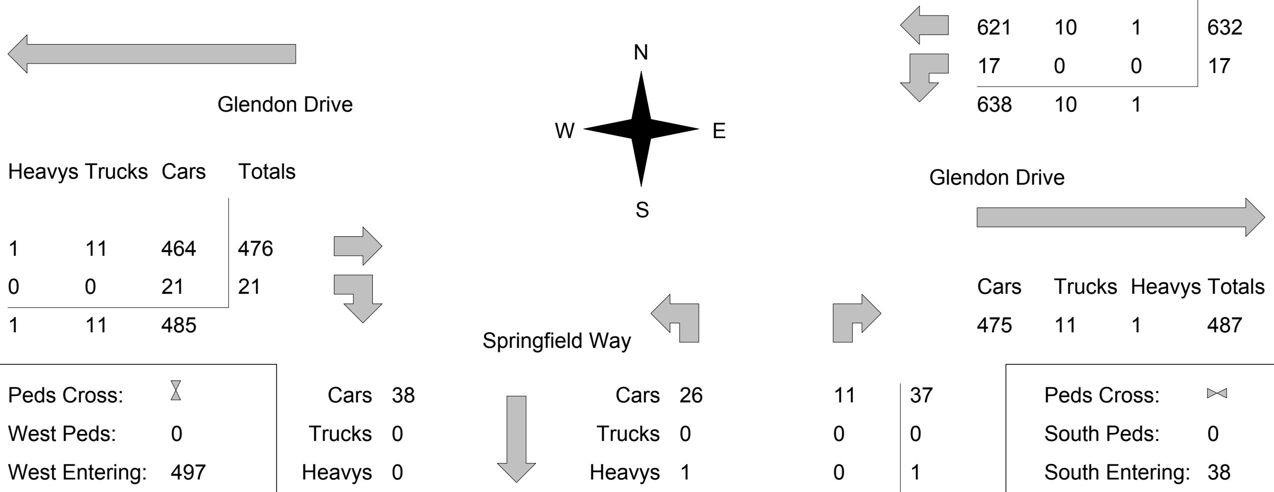
Weather conditions:
Clear

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E

East Leg Total: 1136
East Entering: 649
East Peds: 0
Peds Cross: ⧗



Heavys	Trucks	Cars	Totals
2	10	647	659

Cars	Trucks	Heavys	Totals
621	10	1	632
17	0	0	17
638	10	1	

Heavys	Trucks	Cars	Totals
1	11	464	476
0	0	21	21
1	11	485	

Cars	Trucks	Heavys	Totals
475	11	1	487

Peds Cross: ⧗
West Peds: 0
West Entering: 497
West Leg Total: 1156

Cars	38
Trucks	0
Heavys	0
Totals	38

Cars	26	11	37
Trucks	0	0	0
Heavys	1	0	1
Totals	27	11	

Peds Cross: ⋈
South Peds: 0
South Entering: 38
South Leg Total: 76

Comments

Glendon Drive & Springfield Way

Total Count Diagram

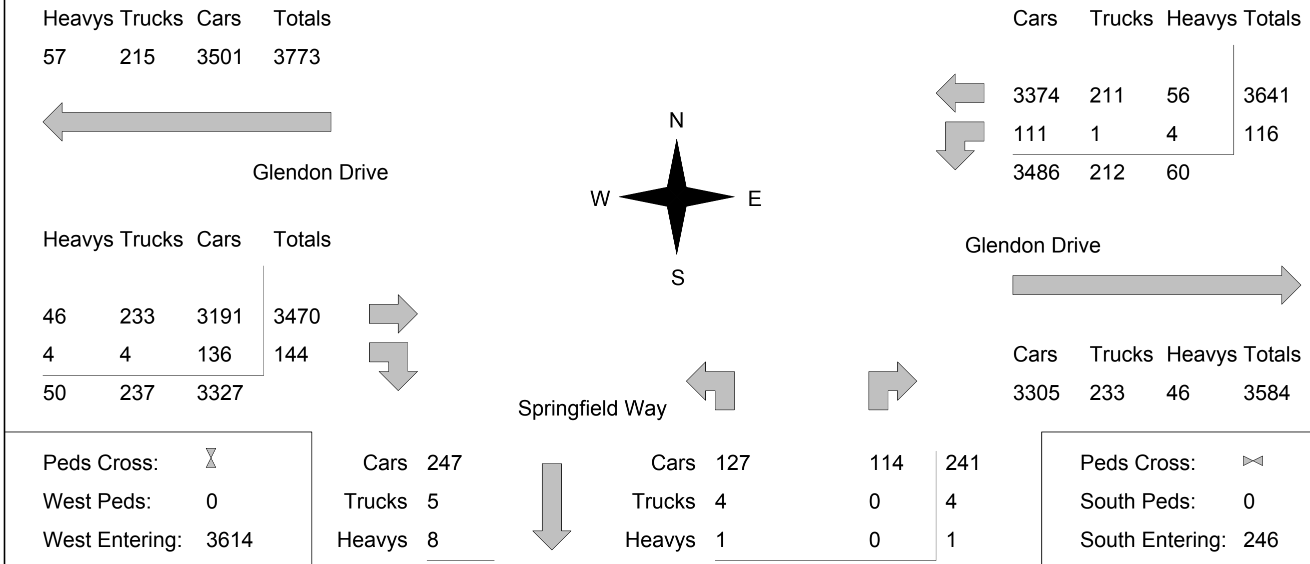
Municipality: London
Site #: 0000002401
Intersection: Glendon Drive & Springfield Way
TFR File #: 6
Count date: 22-May-2013

Weather conditions:
Clear
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Glendon Drive runs W/E

East Leg Total:	7342
East Entering:	3758
East Peds:	0
Peds Cross:	⧗



Heavys	Trucks	Cars	Totals
57	215	3501	3773

Cars	Trucks	Heavys	Totals
3374	211	56	3641
111	1	4	116
3486	212	60	

Heavys	Trucks	Cars	Totals
46	233	3191	3470
4	4	136	144
50	237	3327	

Cars	Trucks	Heavys	Totals
3305	233	46	3584

Peds Cross:	⧗
West Peds:	0
West Entering:	3614
West Leg Total:	7387

Cars	247
Trucks	5
Heavys	8
Totals	260

Cars	127	114	241
Trucks	4	0	4
Heavys	1	0	1
Totals	132	114	

Peds Cross:	⋈
South Peds:	0
South Entering:	246
South Leg Total:	506

Comments

Glendon Drive & Springfield Way
Traffic Count Summary

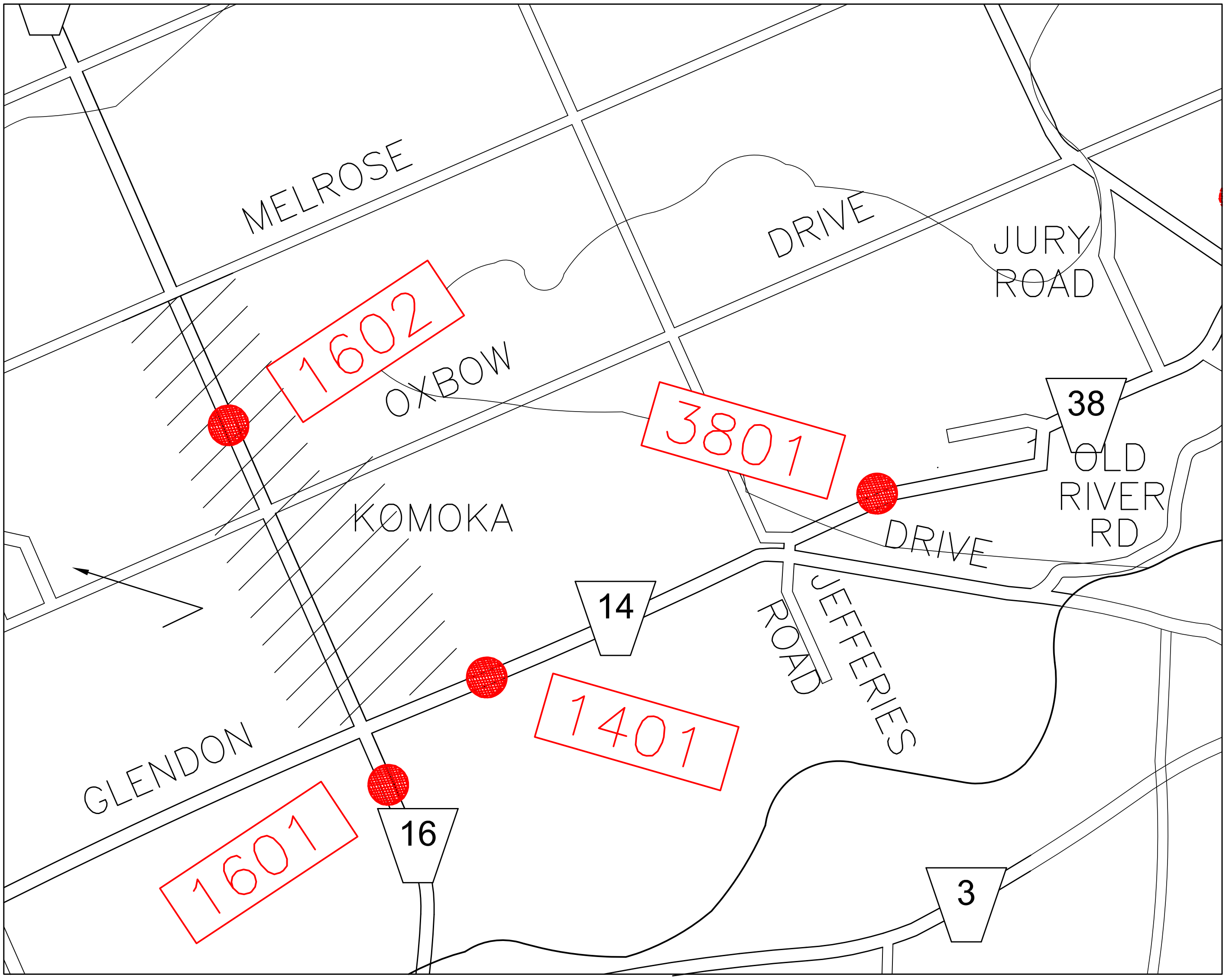
Intersection: Glendon Drive & Springfield Way	Count Date: 22-May-2013	Municipality: London

North Approach Totals						North/South Total Approaches	South Approach Totals					
	Includes Cars, Trucks, & Heavys							Includes Cars, Trucks, & Heavys				
Hour Ending	Left	Thru	Right	Grand Total	Total Peds		Hour Ending	Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	0	0	0	0	0	34	8:00:00	10	0	24	34	0
9:00:00	0	0	0	0	0	45	9:00:00	21	0	24	45	0
10:00:00	0	0	0	0	0	29	10:00:00	12	0	17	29	0
12:00:00	0	0	0	0	0	7	12:00:00	4	0	3	7	0
13:00:00	0	0	0	0	0	21	13:00:00	16	0	5	21	0
15:00:00	0	0	0	0	0	14	15:00:00	5	0	9	14	0
16:00:00	0	0	0	0	0	26	16:00:00	20	0	6	26	0
17:00:00	0	0	0	0	0	44	17:00:00	27	0	17	44	0
18:00:00	0	0	0	0	0	26	18:00:00	17	0	9	26	0
Totals:	0	0	0	0	0	246		132	0	114	246	0

East Approach Totals						East/West Total Approaches	West Approach Totals					
	Includes Cars, Trucks, & Heavys							Includes Cars, Trucks, & Heavys				
Hour Ending	Left	Thru	Right	Grand Total	Total Peds		Hour Ending	Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	8	412	1	421	0	979	8:00:00	0	537	21	558	0
9:00:00	7	418	0	425	0	977	9:00:00	0	518	34	552	0
10:00:00	15	363	0	378	0	794	10:00:00	0	401	15	416	0
12:00:00	4	182	0	186	0	344	12:00:00	0	154	4	158	0
13:00:00	15	335	0	350	0	736	13:00:00	0	375	11	386	0
15:00:00	7	173	0	180	0	365	15:00:00	0	174	11	185	0
16:00:00	17	535	0	552	0	977	16:00:00	0	412	13	425	0
17:00:00	20	608	0	628	0	1095	17:00:00	0	444	23	467	0
18:00:00	23	615	0	638	0	1105	18:00:00	0	455	12	467	0
Totals:	116	3641	1	3758	0	7372		0	3470	144	3614	0

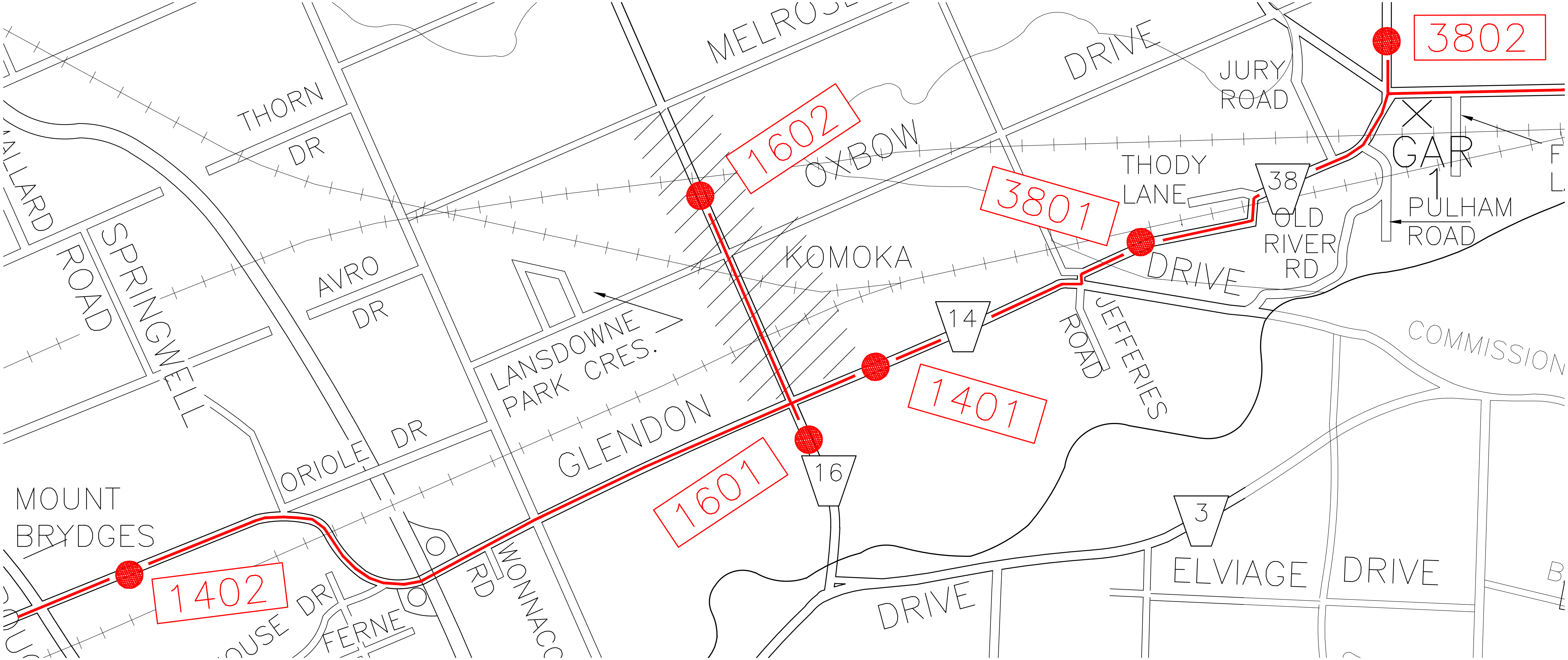
Calculated Values for Traffic Crossing Major Street

Hours Ending:	8:00	9:00	10:00	13:00	15:00	16:00	17:00	18:00
Crossing Values:	10	21	12	16	5	20	27	17



ID	AADT				
	2003	2005	2007	2009	2011
1401	9425	10691	10400	9545	12454
1601	2706	3005	2861	3302	3441
1602	1847	3235	1789	1487	1573
3801	3331	3111	3112	4264	3774

TRAFFIC DATA FOR GLENDEN / JEFFERIES AREA


3802
1602
3801
1401
1601
1402
38
14
16
3
MELROSE
DRIVE
JURY
ROAD
THORN
DR
OXBOW
THODY
LANE
GAR
1
PULHAM
ROAD
OLD
RIVER
RD
MALLARD
ROAD
SPRINGWELL
AVRO
DR
KOMOKA
DRIVE
LANSDOWNE
PARK CRES.
JEFFERIES
ROAD
COMMISSION
GLENDON
ORIOLE
DR
MOUNT
BRYDGES
FERNE
DR
RD
WONNACO
ELVIAGE
DRIVE
DRIVE

TRAFFIC ON MIDDLESEX COUNTY HIGHWAYS - 2013

ROAD NO.	LOCATION	AVERAGE TRAFFIC COUNT	LENGTH (Km)	BOUNDARY LENGTH	EQUIVALENT LENGTH	DAILY VEH-(KM)
1	LAMBTON BOUNDARY TO NEWBURY	892	3.8	1.6	3	2676
1	NEWBURY TO CR#14	2148	1.7		1.7	3652
1	CR#14 TO THE THAMES RIVER	1300	4.7		4.7	6110
2	LONDON TO CR#32	15927	2.1		2.1	33447
2	CR#32 TO CR#73	12500	4.7		4.7	58750
2	CR#73 TO THE OXFORD COUNTY BOUNDARY	12671	2.9	1.4	2.2	27876
2	LONDON TO HIGHWAY #402	6022	7.2		7.2	43358
2	HIGHWAY #402 TO CR#9	3408	13.9		13.9	47371
2	CR#9 TO CR#1	3035	24.9		24.9	75572
2	CR#1 TO THE KENT COUNTY BOUNDARY	1749	8.6		8.6	15041
3	DELAWARE TO CR#16	1955	3.2		3.2	6256
3	CR#16 TO LONDON	3510	3.7		3.7	12987
5	HIGHWAY #4 TO MT. CARMEL	1426	12.4	12.4	6.2	8841
5	HURON CR#2 TO CR#81	1154	6.5	6.5	3.25	3751
5	CR#81 TO TRI-COUNTY BRIDGE	1104	5	5	2.5	2760
6	CR#10 TO CR#77	740	6.4		6.4	4736
6	CR#77 TO KERWOOD BOUNDARY SOUTH	1572	4.1		4.1	6445
6	KERWOOD BOUNDARY SOUTH TO CR#22	1409	6.9		6.9	9722
6	CR#22 TO CR#12	873	6.0		6.0	5238
6	CR#12 TO CR#7	871	9.4		9.4	8187

ROAD NO.	LOCATION	AVERAGE TRAFFIC COUNT	LENGTH (Km)	BOUNDARY LENGTH	EQUIVALENT LENGTH	DAILY VEH-(KM)
7	HIGHWAY #4 TO CR#19	4705	15.4		15.4	72457
7	CR#19 TO EAST JUNCTION CR#81	2478	12.2		12.2	30232
7	EAST JUNCTION CR#81 TO MAIN STREET PARKHILL	5032	2.1		2.1	10567
7	MAIN STREET PARKHILL TO LAMBTON COUNTY BOUNDARY	1902	11.5		11.5	21873
8	CR#6 TO CR#10	426	0.9		0.9	383
8	CR#10 TO CR#2	1134	14.2		14.2	16103
8	CR#2 TO THE THAMES RIVER	837	5.7		5.7	4771
9	CR#39 TO PARK STREET IN STRATHROY	4989	0.8		0.8	3991
9	PARK STREET IN STRATHROY TO CR#77	2836	6.8		6.8	19285
9	CR#77 TO CR#14	2287	10.1		10.1	23099
9	CR#14 TO CR#2 MELBOURNE	2153	4.2		4.2	9043
9	CR#2 TO THE THAMES RIVER	2104	9.7		9.7	20409
10	CR#80 TO CR#8	1092	8.3	0.8	7.9	8627
10	CR#8 TO CR#9 CAIRNGORM	1681	7.3		7.3	12271
11	CR#2 TO MUNCEY	1128	8.1		8.1	9137
12	LAMBTON COUNTY BOUNDARY TO CR #81	2233	10	1.6	9.2	20544
13	CR#20 TO LUCAN WEST LIMITS	1066	3.2		3.2	3411
13	LUCAN WEST LIMITS TO HIGHWAY #4 ALICE STREET	1544	1.1		1.1	1698
14	LONDON TO CR#16	11448	4.3		4.3	49226
14	CR#16 TO CR#81	6621	7.1		7.1	47009

ROAD NO.	LOCATION	AVERAGE TRAFFIC COUNT	LENGTH (Km)	BOUNDARY LENGTH	EQUIVALENT LENGTH	DAILY VEH-(KM)
14	CR#81 TO CR#9	*3425*	10.6		10.6	36305
14	CR#9 APPIN TO CR#8	*2717*	7.5		7.5	20378
14	CR#8 APPIN TO CR#80	*2898*	7.3		7.3	21155
14	CR#80 GLENCOE TO CR#1 NEWBURY	*2558*	10.1		10.1	25836
14	CR#1 TO THE KENT COUNTY BOUNDARY	*1532*	9.7	4.4	7.5	11490
15	CR#2 TO CR#35	*1123*	8		8	8984
16	CR#3 TO CR #14	*3152*	1.7		1.7	5358
16	CR#14 TO CR#22	*2210*	9.4		9.4	20774
16	CR#22 TO CR#17	*2260*	5.8		5.8	13108
16	CR#17 TO CR#20 SOUTH	*3551*	9.5		9.5	33735
16	CR#20 SOUTH TO HIGHWAY #4	*4532*	5		5	22660
16	HIGHWAY #4 TO CR#23	*2918*	5		5	14590
16	CR#23 TO CR#27	*2644*	7.8		7.8	20623
16	CR#27 TO CR#31	*3016*	2.8		2.8	8445
16	CR#31 TO THE OXFORD COUNTY BOUNDARY	*2673*	4.3		4.3	11494
17	LONDON TO CR#22	*5536*	6.5		6.5	35984
17	CR#22 TO CR#16	*2324*	5.8		5.8	13479
17	CR#16 TO CR#19	*2579*	10.3		10.3	26564
17	CR#19 TO CR#81	*2340*	9.6		9.6	22464
17	CR#81 TO CR#7	*1164*	2.7		2.7	3143

ROAD NO.	LOCATION	AVERAGE TRAFFIC COUNT	LENGTH (Km)	BOUNDARY LENGTH	EQUIVALENT LENGTH	DAILY VEH-(KM)
18	CR#81 TO THE LAMBTON COUNTY BOUNDARY	1129	11.4		11.4	12871
19	CR#7 TO CR#17	3105	5.6		5.6	17388
19	CR#17 TO CR#81	2698	9.3		9.3	25091
20	LONDON TO CR#16	6334	6.4		6.4	40538
20	CR#16 TO CR#7	2019	8.4		8.4	16960
20	CR#7 TO HIGHWAY #4	2663	6.4		6.4	17043
21	CR#7 TO CR#24	868	6.1		6.1	5295
22	LAMBTON COUNTY BOUNDARY TO CR#81	1925	13.4		13.4	25795
22	CR#81 TO CR#39	2437	6.1		6.1	14866
22	CR#39 TO CR#16 SOUTH	7870	3.8		3.8	29906
22	CR#16 SOUTH TO CR#17	7989	7.4		7.4	59119
22	CR#17 TO LONDON	10575	5.3		5.3	56048
23	HIGHWAY #7 TO CR#16 ILDERTON ROAD	7840	8.2		8.2	64288
23	CR#16 TO LONDON	7491	6.4		6.4	47942
24	HIGHWAY #4 TO CR#21	802	8.4		8.4	6737
24	CR#21 TO CR#81	1007	10		10	10070
25	LONDON TO CR#32	3350	0.7		0.7	2345
25	CR#32 TO OXFORD COUNTY BOUNDARY	2596	7.5		7.5	19470
26	LONDON TO CR#74	3244	0.8		0.8	2595
27	CR#2 TO CR#28	3830	9.3		9.3	35619

ROAD NO.	LOCATION	AVERAGE TRAFFIC COUNT	LENGTH (Km)	BOUNDARY LENGTH	EQUIVALENT LENGTH	DAILY VEH-(KM)
27	CR#28 TO CR#16	2285	6.2		6.2	14167
27	CR#16 TO HIGHWAY #7	3771	7		7	26397
28	OXFORD COUNTY BOUNDARY TO CR#27	4613	7.1		7.1	32752
28	CR#27 TO CR#23	6168	8.4		8.4	51811
28	CR#23 TO HIGHWAY #4	5845	5		5	29225
28	HIGHWAY #4 TO CR#20	4670	5		5	23350
29	LONDON TO CR#74	7851	0.8		0.8	6281
29	CR#74 TO CR#32 DORCHESTER	5495	4.7		4.7	25827
29	BRIDGE ST. IN DORCHESTER TO DORCHESTER ROAD	6328	0.2		0.2	1266
29	CR#32 DORCHESTER TO CR#73	4665	3.4		3.4	15861
29	CR#73 TO OXFORD COUNTY BOUNDARY	3915	8		8	31320
30	OXFORD COUNTY BOUNDARY TO CR#29	1551	1.3		1.3	2016
30	CR#29 PUTNAM TO HIGHWAY #401	2561	1.7		1.7	4354
30	HIGHWAY #401 TO ELGIN COUNTY BOUNDARY AVON	3002	7.8		7.8	23416
31	CR#28 TO CR#16	762	6.2		6.2	4724
32	HIGHWAY #401 TO CR#29	4140	4.3		4.3	17802
32	CR#49 TO CR#2	3173	4.3		4.3	13644
32	HIGHWAY #401 TO CROMARTY DRIVE	1557	0.7		0.7	1090
33	CR#81 TO CR#39	4224	3.3		3.3	13939
35	ONEIDA TO CR#15	2531	1.5		1.5	3797
35	CR#15 TO LONDON	1899	6.8		6.8	12913

ROAD NO.	LOCATION	AVERAGE TRAFFIC COUNT	LENGTH (Km)	BOUNDARY LENGTH	EQUIVALENT LENGTH	DAILY VEH-(KM)
38	CR#14 TO CR#17	4575	3.3		3.3	15098
38	CR#17 TO CR#22	3491	1.9		1.9	6633
39	LAMBTON COUNTY BOUNDARY TO WEST LIMITS OF STRATHROY	2086	12		12	25032
39	WEST LIMIT OF STRATHROY TO CR#81	8788	1.8		1.8	15818
39	CR#81 TO QUEEN STREET	9298	0.4		0.4	3719
39	QUEEN STREET TO HWY#402	6430	4.7		4.7	30221
39	HIGHWAY #402 TO CR#22	5978	2.8		2.8	16738
41	LONDON TO CR#28	5079	0.8		0.8	4063
41	CR#28 TO CR#16	2742	5.6		5.6	15355
42	LONDON TO CR#28	4660	0.8		0.8	3728
44	CR#9 TO CR#81	2659	1.1		1.1	2925
47	HIGHWAY #4 TO CR#47 EAST	1757	1.5		1.5	2636
47	CR#47 SOUTH TO HIGHWAY #23	849	4.1		4.1	3481
49	CR#73 TO BRIDGE STREET DORCHESTER	1235	2.7		2.7	3335
49	BRIDGE STREET DORCHESTER TO CR#32	4112	2.3		2.3	9458
49	CR#32 TO LONDON	3371	3.9		3.9	13147
50	HIGHWAY #7 TO PERTH COUNTY BOUNDARY	2237	1.4		1.4	3132
56	LONDON TO CR#28	4357	0.8		0.8	3486
56	CR#28 TO CR#16	2528	5.6		5.6	14157
59	PERTH COUNTY BOUNDARY TO FALLON DRIVE	1285	2.3		2.3	2956

ROAD NO.	LOCATION	AVERAGE TRAFFIC COUNT	LENGTH (Km)	BOUNDARY LENGTH	EQUIVALENT LENGTH	DAILY VEH-(KM)
59	CR#47 FALLON DRIVE TO HIGHWAY #7	1473	4		4	5892
73	ELGIN COUNTY BOUNDARY TO HIGHWAY #401	6129	7.8		7.8	47806
73	HIGHWAY #401 TO CR#29	5369	1.6		1.6	8590
73	CR#29 TO CR#2	5151	7.5		7.5	38633
74	BELMONT TO HIGHWAY #401	6669	6.5		6.5	43349
74	HIGHWAY #401 TO CR#29 NILESTOWN	4435	2.9		2.9	12862
74	CR#29 NILESTOWN TO CR#49	2604	1.4		1.4	3646
76	CR#2 TO THE THAMES RIVER	1292	2.1		2.1	2713
77	CR#6 TO CR#9	448	5.8		5.8	2598
80	CR#2 TO CR#14 WEST	2817	4.1		4.1	11550
80	CR#14 WEST TO THE LAMBTON COUNTY BOUNDARY	2262	13.4		13.4	30311
81	CR#2 TO CR#14	4073	6.2		6.2	25253
81	CR#14 TO SOUTH LIMITS OF STRATHROY	8064	10.9		10.9	87898
81	SOUTH LIMITS OF STRATHROY TO CR#39	14222	1.4		1.4	19911
81	CR#39 TO CR#22	8877	5.7		5.7	50599
81	CR#22 TO CR#12	5871	9.1		9.1	53426
81	CR#12 TO CR#17	2365	9.4		9.4	22231
81	CR#17 TO CR#7	3434	2.1		2.1	7211
81	CR#7 TO CR#5	3228	13.1		13.1	42287
			829.9	33.7	813.1	2721296

Count Location No.: 1401	Location:	East of County Road # 16		
Road No.: 14	2015 AADT	12161	2013 AADT	11448
DATE	Time of Reading	Meter Reading	Length of Interval	Remarks
May 4 2015	8:31 AM	10926	24hr	A10
May 27 2015	11:53 AM	12456		A9
June 18 2015	12:10 PM	13100		A11

Count Location No.: 1402	Location:	East of Mount Brydges		
Road No.: 14	2015 AADT	7073	2013 AADT	6621
DATE	Time of Reading	Meter Reading	Length of Interval	Remarks
May 4 2015	9:08 AM	6238	24hr	A14
May 27 2015	12:22 PM	7163		A8
June 18 2015	12:36 PM	7818		A15

Count Location No.: 1601	Location:	South of County Road # 14		
Road No.: 16	2015 AADT	3515	2013 AADT	3152
DATE	Time of Reading	Meter Reading	Length of Interval	Remarks
May 4 2015	8:50 AM	3190	24hr	A8
May 27 2015	12:11 PM	3877		A7
June 18 2015	12:27 PM	3478		A12

Count Location No.: 1602	Location:	North of Oxbow Drive		
Road No.: 16	2015 AADT	1852	2013 AADT	2210
DATE	Time of Reading	Meter Reading	Length of Interval	Remarks
May 27 2015	12:02 PM	1933		A12
July 21 2015	11:48:00 AM	1800		A4
August 13 2015	8:37	1822		A8

Count Location No.: 3801	Location:	South of Railway Overpass		
Road No.: 38	2015 AADT	5138	2013 AADT	4575
DATE	Time of Reading	Meter Reading	Length of Interval	Remarks
June 18 2015	12:05 PM	5155	24 hr	A7
July 21 2015	11:37	5189		A15
August 13 2015	8:27	5069		A9

Count Location No.: 3802	Location:	North of County Road # 17		
Road No.: 38	2015 AADT	3966	2013 AADT	3491
DATE	Time of Reading	Meter Reading	Length of Interval	Remarks
May 4 2015	7:37 AM	3725	24hr	A7
May 27 2015	11:38 AM	3973		A14
June 18 2015	12:00pm	4200		

Location	Year						Total	Average	PM Peak	Est. Daily Vol Ent	Length (m)	Avg Rate / MVE
	2010	2011	2012	2013	2014	2015						
Glendon Drive @ HWY 402 East Terminal	0	1	0	1	1	0	3	1		0	-	#DIV/0!
Glendon Drive @ Amiens Road	0	1	0	0	1	0	2	0	988	10,739	-	0.1
Glendon Drive @ Tim Horton's D/W	0	0	0	1	0	0	1	0		0	-	#DIV/0!
Glendon Drive @ Komoka Road	3	1	0	4	2	0	10	2	1,431	15,554	-	0.4
Glendon Drive @ BMO D/W	1	1	0	0	0	0	2	0		0	-	#DIV/0!
Glendon Drive @ Jefferies Road-Vanneck Road	1	1	5	1	4	0	12	2	1,667	18,120	-	0.4
Vanneck Road @ Coldstream Road	0	0	1	1	0	0	2	0	490	5,326	-	0.2
Glendon Drive @ Kilworth Park Drive	1	0	1	0	1	0	3	1	1,332	14,478	-	0.1
Glendon Drive @ Old River Road	11	5	5	5	6	0	32	6	1,442	15,674	-	1.3
Glendon Drive @ Komoka Provincial Park D/W	0	0	0	0	1	0	1	0		0	-	#DIV/0!
	17	10	12	13	16		68					
Glendon Drive Mid-Block Collisions												
Highway 402 West - Highway 402 East	0	1	0	0	0	0	1	0		0		#DIV/0!
Highway 402 East - Amiens Road	0	0	0	0	0		0	0	995	11,988	940	0.00
Amiens Road - Komoka Road	2	2	6	0	4		14	3	984	11,855	2,430	0.31
Komoka Road - Queen Street	2	2	1	0	0		5	1	1,185	13,167	634	0.39
Queen Street - Tunks Lane	0	0	0	0	0		0	0	1,243	13,811	373	0.00
Tunks Lane - Jefferies Road/Vanneck Road	1	2	1	0	1		5	1	1,204	13,378	1,390	0.17
Jefferies Road/Vanneck Road - Kilworth Park Drive	0	0	3	0	0		3	1	1,154	12,822	873	0.17
Kilworth Park Drive - Old River Road	0	1	1	0	0		2	0	1,288	14,311	644	0.14
	5	8	12	0	5		30	6		0		#DIV/0!

Notes:
Average collision rate does not include 2015
Daily volume based on ATR counts, PM peak hour comprising 9.2% of daily volume (Location 1=9.3%, Location 2=9.1%, Location 3=9.2%)

Collision Summary - January 1, 2010 to December 31, 2014

Location	Year						Total	Average		Environment Condition								Light Condition									
	2010	2011	2012	2013	2014	2015			Clear	Clear	Rain	Rain	Snow	Snow	Other	Other		Daylight	Daylight	Dark	Dark	Dusk	Dusk	Dawn	Dawn	Other	Other
Glendon Drive @ HWY 402 East Terminal	0	1	0	1	1	0	3	1	1	33%	2	67%	0	0%	0	0%		2	67%	1	33%	0	0%	0	0%	0	0%
Glendon Drive @ Amiens Road	0	1	0	0	1	0	2	0	1	50%	0	0%	0	0%	1	50%		1	50%	1	50%	0	0%	0	0%	0	0%
Glendon Drive @ Tim Horton's D/W	0	0	0	1	0	0	1	0	1	100%	0	0%	0	0%	0	0%		1	100%	0	0%	0	0%	0	0%	0	0%
Glendon Drive @ Komoka Road	3	1	0	4	2	0	10	2	7	70%	0	0%	3	30%	0	0%		9	90%	0	0%	1	10%	0	0%	0	0%
Glendon Drive @ BMO D/W	1	1	0	0	0	0	2	0	2	100%	0	0%	0	0%	0	0%		1	50%	1	50%	0	0%	0	0%	0	0%
Glendon Drive @ Jefferies Road-Vanneck Road	1	1	5	1	4	0	12	2	10	83%	0	0%	2	17%	0	0%		10	83%	2	17%	0	0%	0	0%	0	0%
Vanneck Road @ Coldstream Road	0	0	1	1	0	0	2	0	1	50%	0	0%	1	50%	0	0%		1	50%	1	50%	0	0%	0	0%	0	0%
Glendon Drive @ Kilworth Park Drive	1	0	1	0	1	0	3	1	2	67%	1	33%	0	0%	0	0%		3	100%	0	0%	0	0%	0	0%	0	0%
Glendon Drive @ Old River Road	11	5	5	5	6	0	32	6	26	81%	6	19%	0	0%	0	0%		22	69%	8	25%	1	3%	1	3%	0	0%
Glendon Drive @ Komoka Provincial Park D/W	0	0	0	0	1	0	1	0	0	0%	0	0%	1	100%	0	0%		1	100%	0	0%	0	0%	0	0%	0	0%
	17	10	12	13	16		68																				
Glendon Drive Mid-Block Collisions																											
Highway 402 West - Highway 402 East	0	1	0	0	0	0	1	0	1	100%	0	0%	0	0%	0	0%		1	100%	0	0%	0	0%	0	0%	0	0%
Highway 402 East - Amiens Road	0	0	0	0	0		0	0	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!		0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!
Amiens Road - Komoka Road	2	2	6	0	4		14	3	10	71%	2	14%	2	14%	0	0%		9	64%	3	21%	0	0%	2	14%	0	0%
Komoka Road - Queen Street	2	2	1	0	0		5	1	3	60%	1	20%	1	20%	0	0%		3	60%	1	20%	1	20%	0	0%	0	0%
Queen Street - Tunks Lane	0	0	0	0	0		0	0	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!		0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!
Tunks Lane - Jefferies Road/Vanneck Road	1	2	1	0	1		5	1	4	80%	0	0%	1	20%	0	0%		3	60%	1	20%	1	20%	0	0%	0	0%
Jefferies Road/Vanneck Road - Kilworth Park Drive	0	0	3	0	0		3	1	3	100%	0	0%	0	0%	0	0%		1	33%	1	33%	0	0%	1	33%	0	0%
Kilworth Park Drive - Old River Road	0	1	1	0	0		2	0	1	50%	0	0%	1	50%	0	0%		2	100%	0	0%	0	0%	0%	0%	0	0%
	5	8	12	0	5		30	6		0%		0%		0%		0%			0%		0%		0%				0%

Notes:

Average collision rate does not include 2015

Daily volume based on ATR counts, PM peak hour comprising 9.2% of daily volume (Location 1=9.3%, Location 2=9.1%, Location 3=9.2%

Collision Summary - January 1, 2010 to December 31, 2014

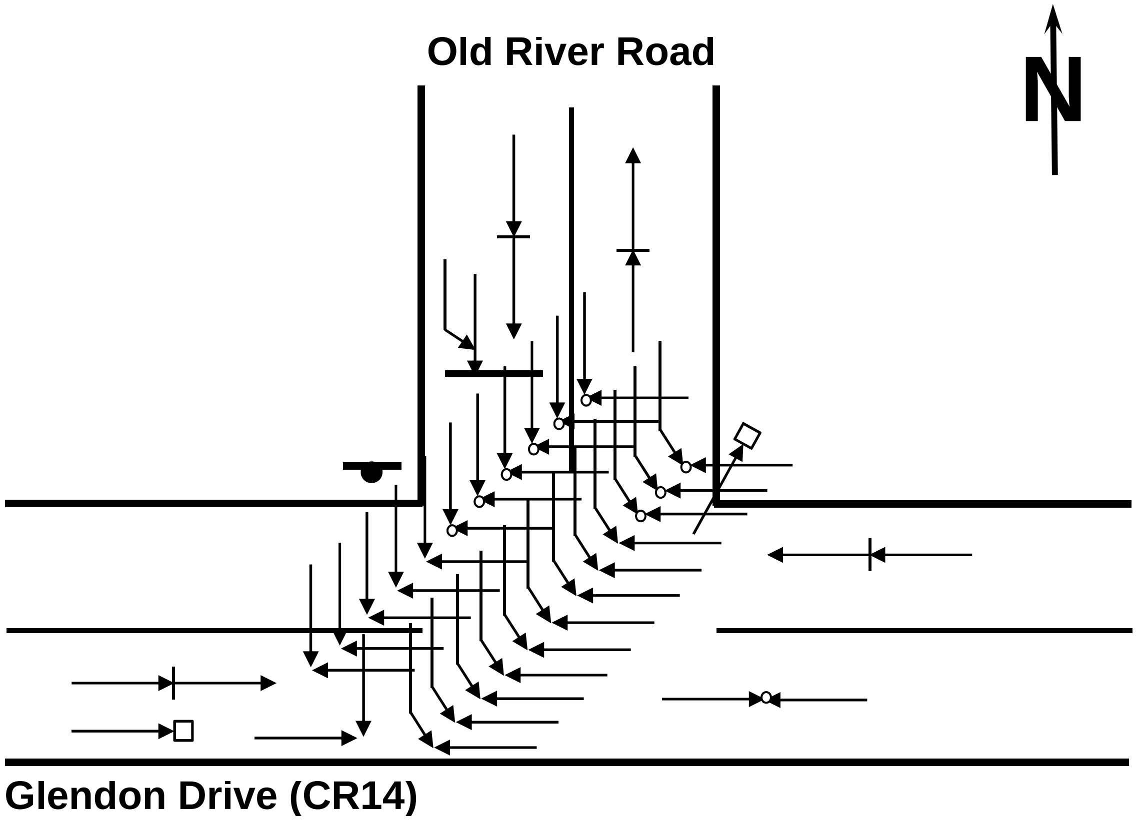
Location	Year						Total	Average	Initial Impact Type														Classification							
	2010	2011	2012	2013	2014	2015			Approaching	Approaching	Angle	Angle	Rear end	Rear end	Sideswipe	Sideswipe	Turning	Turning	SMV	SMV	Other	Other	Fatal	Fatal	Inj	Inj	PD	PD	Other	Other
Glendon Drive @ HWY 402 East Terminal	0	1	0	1	1	0	3	1	0	0%	0	0%	0	0%	0	0%	1	33%	2	67%	0	0%	0	0%	1	33%	2	67%	0	0%
Glendon Drive @ Amiens Road	0	1	0	0	1	0	2	0	0	0%	0	0%	0	0%	0	0%	1	50%	1	50%	0	0%	0	0%	0	0%	2	100%	0	0%
Glendon Drive @ Tim Horton's D/W	0	0	0	1	0	0	1	0	0	0%	1	100%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	100%	0	0%	0	0%
Glendon Drive @ Komoka Road	3	1	0	4	2	0	10	2	0	0%	2	20%	7	70%	0	0%	1	10%	0	0%	0	0%	0	0%	2	20%	8	80%	0	0%
Glendon Drive @ BMO D/W	1	1	0	0	0	0	2	0	0	0%	1	50%	0	0%	0	0%	1	50%	0	0%	0	0%	0	0%	2	100%	0	0%	0	0%
Glendon Drive @ Jefferies Road-Vanneck Road	1	1	5	1	4	0	12	2	0	0%	0	0%	6	50%	1	8%	4	33%	1	8%	0	0%	0	0%	5	42%	7	58%	0	0%
Vanneck Road @ Coldstream Road	0	0	1	1	0	0	2	0	0	0%	0	0%	1	50%	0	0%	0	0%	1	50%	0	0%	0	0%	0	0%	2	100%	0	0%
Glendon Drive @ Kilworth Park Drive	1	0	1	0	1	0	3	1	0	0%	1	33%	0	0%	2	67%	0	0%	0	0%	0	0%	0	0%	1	33%	2	67%	0	0%
Glendon Drive @ Old River Road	11	5	5	5	6	0	32	6	1	3%	12	38%	4	13%	1	3%	12	38%	2	6%	0	0%	0	0%	10	31%	22	69%	0	0%
Glendon Drive @ Komoka Provincial Park D/W	0	0	0	0	1	0	1	0	0	0%	0	0%	1	100%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	100%	0	0%
	17	10	12	13	16		68		1		17		19		4		20		7		68				22		46		68	
Glendon Drive Mid-Block Collisions																														
Highway 402 West - Highway 402 East	0	1	0	0	0	0	1	0	0	0%	0	0%	1	100%	0	0%	0	0%	0	0%	0	0%	0	0%	1	100%	0	0%	0	0%
Highway 402 East - Amiens Road	0	0	0	0	0		0	0	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!
Amiens Road - Komoka Road	2	2	6	0	4		14	3	0	0%	0	0%	1	7%	2	14%	0	0%	11	79%	0	0%	0	0%	2	14%	12	86%	0	0%
Komoka Road - Queen Street	2	2	1	0	0		5	1	0	0%	0	0%	1	20%	1	20%	0	0%	3	60%	0	0%	0	0%	1	20%	4	80%	0	0%
Queen Street - Tunks Lane	0	0	0	0	0		0	0	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!	0	#DIV/0!
Tunks Lane - Jefferies Road/Vanneck Road	1	2	1	0	1		5	1	0	0%	0	0%	1	20%	1	20%	0	0%	3	60%	0	0%	0	0%	1	20%	4	80%	0	0%
Jefferies Road/Vanneck Road - Kilworth Park Drive	0	0	3	0	0		3	1	0	0%	0	0%	0	0%	0	0%	0	0%	3	100%	0	0%	0	0%	0	0%	3	100%	0	0%
Kilworth Park Drive - Old River Road	0	1	1	0	0		2	0	0	0%	1	50%	0	0%	0	0%	0	0%	1	50%	0	0%	0	0%	0	0%	2	100%	0	0%
	5	8	12	0	5		30	6		0%		0%		0%		0%		0%		0%		0%		0%		0%		0%		0%
									0		1		4		4		0		21		0		0		5		25		0	

Notes:

Average collision rate does not include 2015

Daily volume based on ATR counts, PM peak hour comprising 9.2% of daily volume (Location 1=9.3%, Location 2=9.1%, Location 3=9.2%)

Glendon Drive (CR14) at Old River Road



UNSIGNALIZED INTERSECTION
N.T.S.

ACCIDENT TOTALS BY TYPE	
TYPE	# OF COLLISIONS
FATAL	0
NON-FATAL	10
PDO	22
OTHER	0
TOTAL	**32**

ACCIDENT TOTALS BY IMPACT	
TYPE	# OF COLLISIONS
Head On	1
Right Angle	12
Rear End	4
Sideswipe	1
Turning Movement	12
SMV	2
Other	0
TOTAL	**32**

COLLISIONS BY YEAR	
YEAR	# OF COLLISIONS
2010	11
2011	5
2012	5
2013	5
2014	6
TOTAL	**32**

LEGEND

→ ←	Head On
↱	Right Angle
→|→	Rear End
⇉	Sideswipe
→↙	Turning Movement
↱⋯	SMV / Unattended
□←	SMV / Other
→	Other
○	Injury
●	Fatal

APPENDIX B

EXISTING SYNCHRO ANALYSIS

HCM Unsignalized Intersection Capacity Analysis
8: Glendon Drive & Amiens Road

	↗	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Volume (veh/h)	11	456	404	31	42	27
Future Volume (Veh/h)	11	456	404	31	42	27
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	11	475	421	32	44	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	453				934	437
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	453				934	437
tC, single (s)	4.3				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.4				3.5	3.3
p0 queue free %	99				85	95
cM capacity (veh/h)	1028				294	615

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	486	453	72
Volume Left	11	0	44
Volume Right	0	32	28
cSH	1028	1700	369
Volume to Capacity	0.01	0.27	0.20
Queue Length 95th (m)	0.2	0.0	5.4
Control Delay (s)	0.3	0.0	17.1
Lane LOS	A		C
Approach Delay (s)	0.3	0.0	17.1
Approach LOS			C

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	43.5%	ICU Level of Service	A
Analysis Period (min)	15		

Queues
9: Komoka Road & Glendon Drive

10/22/2015

	↗	→	↙	←	↖	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	48	489	40	364	48	32	107	60	125
v/c Ratio	0.15	0.70	0.17	0.51	0.07	0.07	0.17	0.12	0.19
Control Delay	13.6	22.0	16.2	18.8	5.2	12.3	6.2	12.9	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.6	22.0	16.2	18.8	5.2	12.3	6.2	12.9	6.1
Queue Length 50th (m)	3.3	43.3	3.0	30.7	0.1	2.2	2.3	4.1	2.6
Queue Length 95th (m)	9.3	73.0	m7.5	m45.1	m3.9	6.7	10.2	10.6	11.2
Internal Link Dist (m)		391.2		237.7			183.9		242.3
Turn Bay Length (m)	30.0		45.0		45.0	25.0		25.0	
Base Capacity (vph)	329	700	233	714	646	466	643	482	653
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.70	0.17	0.51	0.07	0.07	0.17	0.12	0.19

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
9: Komoka Road & Glendon Drive

10/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑	↱	↰	↑↱		↰	↑↱	
Traffic Volume (vph)	46	448	16	38	346	46	30	32	69	57	37	82
Future Volume (vph)	46	448	16	38	346	46	30	32	69	57	37	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.90		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1674	1819		1690	1865	1570	1706	1561		1738	1565	
Flt Permitted	0.49	1.00		0.34	1.00	1.00	0.68	1.00		0.69	1.00	
Satd. Flow (perm)	860	1819		608	1865	1570	1215	1561		1259	1565	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	48	472	17	40	364	48	32	34	73	60	39	86
RTOR Reduction (vph)	0	2	0	0	0	30	0	45	0	0	53	0
Lane Group Flow (vph)	48	487	0	40	364	18	32	62	0	60	72	0
Heavy Vehicles (%)	9%	5%	6%	8%	3%	4%	7%	3%	14%	5%	19%	6%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)	23.0	23.0		23.0	23.0	23.0	23.0	23.0		23.0	23.0	
Effective Green, g (s)	23.0	23.0		23.0	23.0	23.0	23.0	23.0		23.0	23.0	
Actuated g/C Ratio	0.38	0.38		0.38	0.38	0.38	0.38	0.38		0.38	0.38	
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Lane Grp Cap (vph)	329	697		233	714	601	465	598		482	599	
v/s Ratio Prot		c0.27			0.20			0.04			0.05	
v/s Ratio Perm	0.06			0.07		0.01	0.03			c0.05		
v/c Ratio	0.15	0.70		0.17	0.51	0.03	0.07	0.10		0.12	0.12	
Uniform Delay, d1	12.1	15.6		12.2	14.2	11.5	11.7	11.9		12.0	12.0	
Progression Factor	1.00	1.00		1.13	1.11	2.35	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	5.7		1.5	2.4	0.1	0.3	0.3		0.5	0.4	
Delay (s)	13.0	21.3		15.3	18.2	27.2	12.0	12.2		12.5	12.4	
Level of Service	B	C		B	B	C	B	B		B	B	
Approach Delay (s)		20.6			18.9			12.2			12.4	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
12: Glendon Drive & Queen Street

10/22/2015

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↑	↱	↰↱	
Traffic Volume (veh/h)	6	606	412	17	50	7
Future Volume (Veh/h)	6	606	412	17	50	7
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)	7	659	448	18	54	8
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	466				1121	448
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	466				1121	448
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				76	99
cM capacity (veh/h)	1106				229	615

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	666	448	18	62
Volume Left	7	0	0	54
Volume Right	0	0	18	8
cSH	1106	1700	1700	249
Volume to Capacity	0.01	0.26	0.01	0.25
Queue Length 95th (m)	0.1	0.0	0.0	7.3
Control Delay (s)	0.2	0.0	0.0	24.2
Lane LOS	A			C
Approach Delay (s)	0.2	0.0		24.2
Approach LOS				C

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
15: Glendon Drive & Tunks Lane

10/22/2015

	↗	→	←	↖	↘	↙
Movement	**EBL**	**EBT**	**WBT**	**WBR**	**SBL**	**SBR**
Lane Configurations	↰	↑	↑	↱	↰	↱
Traffic Volume (veh/h)	15	619	429	11	20	11
Future Volume (Veh/h)	15	619	429	11	20	11
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	16	659	456	12	21	12
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	468				1147	456
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	468				1147	456
tC, single (s)	4.5				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.6				3.6	3.4
p0 queue free %	98				90	98
cM capacity (veh/h)	921				209	590

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	16	659	456	12	21	12
Volume Left	16	0	0	0	21	0
Volume Right	0	0	0	12	0	12
cSH	921	1700	1700	1700	209	590
Volume to Capacity	0.02	0.39	0.27	0.01	0.10	0.02
Queue Length 95th (m)	0.4	0.0	0.0	0.0	2.5	0.5
Control Delay (s)	9.0	0.0	0.0	0.0	24.2	11.2
Lane LOS	A				C	B
Approach Delay (s)	0.2		0.0		19.5	
Approach LOS					C	

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		

Queues
16: Jefferies Road/Vanneck Road & Glendon Drive

10/22/2015

	↗	→	↙	←	↖	↑	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	186	500	50	394	54	174	265
v/c Ratio	0.35	0.50	0.11	0.40	0.23	0.40	0.84
Control Delay	8.1	7.8	7.3	8.4	22.3	14.2	44.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.1	7.8	7.3	8.4	22.3	14.2	44.6
Queue Length 50th (m)	6.5	17.4	2.4	19.7	4.9	8.2	23.3
Queue Length 95th (m)	m15.4	38.5	6.6	35.1	13.1	22.3	#59.6
Internal Link Dist (m)		269.5		256.5		153.1	13.5
Turn Bay Length (m)	45.0		60.0		40.0		
Base Capacity (vph)	528	1009	446	997	238	436	317
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.50	0.11	0.40	0.23	0.40	0.84

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
16: Jefferies Road/Vanneck Road & Glendon Drive

10/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱			✥	
Traffic Volume (vph)	179	445	35	48	292	86	52	80	87	118	43	93
Future Volume (vph)	179	445	35	48	292	86	52	80	87	118	43	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		7.0	7.0			7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	0.97		1.00	0.92			0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)	1755	1827		1789	1780		1755	1712			1660	
Flt Permitted	0.52	1.00		0.43	1.00		0.60	1.00			0.77	
Satd. Flow (perm)	961	1827		812	1780		1101	1712			1304	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	186	464	36	50	304	90	54	83	91	123	45	97
RTOR Reduction (vph)	0	5	0	0	18	0	0	66	0	0	34	0
Lane Group Flow (vph)	186	496	0	50	376	0	54	108	0	0	231	0
Heavy Vehicles (%)	4%	3%	17%	2%	4%	5%	4%	6%	1%	8%	5%	8%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	33.0	33.0		33.0	33.0		13.0	13.0			13.0	
Effective Green, g (s)	33.0	33.0		33.0	33.0		13.0	13.0			13.0	
Actuated g/C Ratio	0.55	0.55		0.55	0.55		0.22	0.22			0.22	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.0	7.0			7.0	
Lane Grp Cap (vph)	528	1004		446	979		238	370			282	
v/s Ratio Prot		c0.27			0.21			0.06				
v/s Ratio Perm	0.19			0.06			0.05				c0.18	
v/c Ratio	0.35	0.49		0.11	0.38		0.23	0.29			0.82	
Uniform Delay, d1	7.5	8.3		6.5	7.7		19.4	19.7			22.4	
Progression Factor	0.79	0.73		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	1.7	1.6		0.5	1.1		2.2	2.0			22.5	
Delay (s)	7.7	7.7		7.0	8.8		21.6	21.7			44.8	
Level of Service	A	A		A	A		C	C			D	
Approach Delay (s)		7.7			8.6			21.6			44.8	
Approach LOS		A			A			C			D	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	97.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
20: Vanneck Road & Coldstream Road

10/22/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↰↑	↑↱	
Traffic Volume (veh/h)	1	93	76	270	161	1
Future Volume (Veh/h)	1	93	76	270	161	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	1	109	89	318	189	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				37		
pX, platoon unblocked	0.95					
vC, conflicting volume	686	190	190			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	645	190	190			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	87	94			
cM capacity (veh/h)	392	847	1378			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	110	407	190
Volume Left	1	89	0
Volume Right	109	0	1
cSH	838	1378	1700
Volume to Capacity	0.13	0.06	0.11
Queue Length 95th (m)	3.4	1.6	0.0
Control Delay (s)	9.9	2.2	0.0
Lane LOS	A	A	
Approach Delay (s)	9.9	2.2	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
24: Kilworth Park Drive & Glendon Drive

10/22/2015

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰↱	
Traffic Volume (veh/h)	635	16	26	404	18	120
Future Volume (Veh/h)	635	16	26	404	18	120
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	683	17	28	434	19	129
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			700		1173	683
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			700		1173	683
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		91	72
cM capacity (veh/h)			888		208	453

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	683	17	28	434	148
Volume Left	0	0	28	0	19
Volume Right	0	17	0	0	129
cSH	1700	1700	888	1700	393
Volume to Capacity	0.40	0.01	0.03	0.26	0.38
Queue Length 95th (m)	0.0	0.0	0.7	0.0	13.0
Control Delay (s)	0.0	0.0	9.2	0.0	19.6
Lane LOS			A		C
Approach Delay (s)	0.0		0.6		19.6
Approach LOS					C

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		↰↱	
Traffic Volume (veh/h)	2	768	432	50	60	0
Future Volume (Veh/h)	2	768	432	50	60	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	2	800	450	52	63	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	502				1280	476
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	502				1280	476
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				65	100
cM capacity (veh/h)	1073				183	593

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	802	502	63
Volume Left	2	0	63
Volume Right	0	52	0
cSH	1073	1700	183
Volume to Capacity	0.00	0.30	0.35
Queue Length 95th (m)	0.0	0.0	11.0
Control Delay (s)	0.1	0.0	34.8
Lane LOS	A		D
Approach Delay (s)	0.1	0.0	34.8
Approach LOS			D

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
34: Springfield Way & Glendon Drive

10/22/2015

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	Y	
Traffic Volume (veh/h)	596	26	10	427	13	27
Future Volume (Veh/h)	596	26	10	427	13	27
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	634	28	11	454	14	29
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				390		
pX, platoon unblocked						
vC, conflicting volume			662		1110	634
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			662		1110	634
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		94	94
cM capacity (veh/h)			890		231	483

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	634	28	11	454	43
Volume Left	0	0	11	0	14
Volume Right	0	28	0	0	29
cSH	1700	1700	890	1700	356
Volume to Capacity	0.37	0.02	0.01	0.27	0.12
Queue Length 95th (m)	0.0	0.0	0.3	0.0	3.1
Control Delay (s)	0.0	0.0	9.1	0.0	16.5
Lane LOS			A		C
Approach Delay (s)	0.0		0.2		16.5
Approach LOS					C

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	41.4%	ICU Level of Service	A
Analysis Period (min)	15		

8: Glendon Drive & Amiens Road

	↰	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Volume (veh/h)	22	427	458	32	24	25
Future Volume (Veh/h)	22	427	458	32	24	25
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	23	454	487	34	26	27
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	521				1004	504
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	521				1004	504
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				90	95
cM capacity (veh/h)	1030				264	564

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	477	521	53
Volume Left	23	0	26
Volume Right	0	34	27
cSH	1030	1700	362
Volume to Capacity	0.02	0.31	0.15
Queue Length 95th (m)	0.5	0.0	3.9
Control Delay (s)	0.7	0.0	16.6
Lane LOS	A		C
Approach Delay (s)	0.7	0.0	16.6
Approach LOS			C

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		

Queues
9: Komoka Road & Glendon Drive

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	55	429	93	440	86	29	165	69	94
v/c Ratio	0.20	0.60	0.32	0.60	0.13	0.06	0.23	0.14	0.14
Control Delay	14.6	19.0	17.8	20.2	6.6	12.3	7.0	13.2	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.6	19.0	17.8	20.2	6.6	12.3	7.0	13.2	7.4
Queue Length 50th (m)	3.9	36.1	7.8	37.4	1.3	2.0	4.8	4.8	2.9
Queue Length 95th (m)	10.7	61.1	m12.8	m54.3	m5.7	6.2	15.0	11.9	10.4
Internal Link Dist (m)		391.2		237.7			183.9		242.3
Turn Bay Length (m)	30.0		45.0		45.0	25.0		25.0	
Base Capacity (vph)	281	716	288	729	654	461	704	476	653
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.60	0.32	0.60	0.13	0.06	0.23	0.14	0.14

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
9: Komoka Road & Glendon Drive

10/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↑	↱	↰	↱		↰	↱	
Traffic Volume (vph)	54	407	14	91	431	84	28	69	93	68	42	50
Future Volume (vph)	54	407	14	91	431	84	28	69	93	68	42	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.91		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	1863		1738	1902	1570	1644	1685		1807	1623	
Flt Permitted	0.40	1.00		0.41	1.00	1.00	0.70	1.00		0.65	1.00	
Satd. Flow (perm)	735	1863		751	1902	1570	1205	1685		1241	1623	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	55	415	14	93	440	86	29	70	95	69	43	51
RTOR Reduction (vph)	0	2	0	0	0	53	0	59	0	0	31	0
Lane Group Flow (vph)	55	427	0	93	440	33	29	106	0	69	63	0
Heavy Vehicles (%)	4%	2%	21%	5%	1%	4%	11%	3%	5%	1%	12%	6%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)	23.0	23.0		23.0	23.0	23.0	23.0	23.0		23.0	23.0	
Effective Green, g (s)	23.0	23.0		23.0	23.0	23.0	23.0	23.0		23.0	23.0	
Actuated g/C Ratio	0.38	0.38		0.38	0.38	0.38	0.38	0.38		0.38	0.38	
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Lane Grp Cap (vph)	281	714		287	729	601	461	645		475	622	
v/s Ratio Prot		0.23			c0.23			c0.06			0.04	
v/s Ratio Perm	0.07			0.12		0.02	0.02			0.06		
v/c Ratio	0.20	0.60		0.32	0.60	0.05	0.06	0.16		0.15	0.10	
Uniform Delay, d1	12.3	14.8		13.0	14.8	11.7	11.7	12.2		12.1	11.9	
Progression Factor	1.00	1.00		1.09	1.11	1.74	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	3.7		2.5	3.1	0.1	0.3	0.6		0.6	0.3	
Delay (s)	13.9	18.5		16.7	19.5	20.5	12.0	12.7		12.7	12.2	
Level of Service	B	B		B	B	C	B	B		B	B	
Approach Delay (s)		18.0			19.2			12.6			12.4	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	87.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
12: Glendon Drive & Queen Street

10/22/2015

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↑	↱	Y	
Traffic Volume (veh/h)	3	562	611	41	17	6
Future Volume (Veh/h)	3	562	611	41	17	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	3	579	630	42	18	6
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	672				1215	630
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	672				1215	630
tC, single (s)	4.4				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.5				3.5	3.3
p0 queue free %	100				91	99
cM capacity (veh/h)	789				201	485

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	582	630	42	24
Volume Left	3	0	0	18
Volume Right	0	0	42	6
cSH	789	1700	1700	236
Volume to Capacity	0.00	0.37	0.02	0.10
Queue Length 95th (m)	0.1	0.0	0.0	2.6
Control Delay (s)	0.1	0.0	0.0	22.0
Lane LOS	A			C
Approach Delay (s)	0.1	0.0		22.0
Approach LOS				C

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	42.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
15: Glendon Drive & Tunks Lane

10/22/2015

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↑	↱	↰	↱
Traffic Volume (veh/h)	71	500	623	44	23	41
Future Volume (Veh/h)	71	500	623	44	23	41
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	73	515	642	45	24	42
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	687				1303	642
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	687				1303	642
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				85	91
cM capacity (veh/h)	902				164	469

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	73	515	642	45	24	42
Volume Left	73	0	0	0	24	0
Volume Right	0	0	0	45	0	42
cSH	902	1700	1700	1700	164	469
Volume to Capacity	0.08	0.30	0.38	0.03	0.15	0.09
Queue Length 95th (m)	2.0	0.0	0.0	0.0	3.8	2.2
Control Delay (s)	9.3	0.0	0.0	0.0	30.6	13.4
Lane LOS	A				D	B
Approach Delay (s)	1.2		0.0		19.7	
Approach LOS					C	

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		

16: Jefferies Road/Vanneck Road & Glendon Drive

	↗	→	↙	←	↖	↑	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	140	417	99	554	55	105	403
v/c Ratio	0.42	0.44	0.21	0.59	0.23	0.21	0.90
Control Delay	12.2	9.1	10.0	13.3	20.2	10.2	45.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.2	9.1	10.0	13.3	20.2	10.2	45.3
Queue Length 50th (m)	6.1	17.4	5.6	37.7	4.7	3.7	35.3
Queue Length 95th (m)	m15.9	37.6	13.2	63.9	12.6	13.4	#82.0
Internal Link Dist (m)		269.5		256.5		153.1	13.5
Turn Bay Length (m)	45.0		60.0		40.0		
Base Capacity (vph)	335	942	464	935	240	502	446
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.44	0.21	0.59	0.23	0.21	0.90

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
16: Jefferies Road/Vanneck Road & Glendon Drive

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱			✥	
Traffic Volume (vph)	132	351	41	93	422	99	52	42	56	129	73	177
Future Volume (vph)	132	351	41	93	422	99	52	42	56	129	73	177
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		7.0	7.0			7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.98		1.00	0.97		1.00	0.91			0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)	1772	1870		1825	1841		1825	1722			1720	
Flt Permitted	0.36	1.00		0.48	1.00		0.47	1.00			0.85	
Satd. Flow (perm)	672	1870		928	1841		901	1722			1479	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	140	373	44	99	449	105	55	45	60	137	78	188
RTOR Reduction (vph)	0	7	0	0	14	0	0	44	0	0	53	0
Lane Group Flow (vph)	140	410	0	99	540	0	55	61	0	0	350	0
Heavy Vehicles (%)	3%	1%	2%	0%	1%	3%	0%	2%	2%	3%	0%	4%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	30.0	30.0		30.0	30.0		16.0	16.0			16.0	
Effective Green, g (s)	30.0	30.0		30.0	30.0		16.0	16.0			16.0	
Actuated g/C Ratio	0.50	0.50		0.50	0.50		0.27	0.27			0.27	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.0	7.0			7.0	
Lane Grp Cap (vph)	336	935		464	920		240	459			394	
v/s Ratio Prot		0.22			c0.29			0.04				
v/s Ratio Perm	0.21			0.11			0.06				c0.24	
v/c Ratio	0.42	0.44		0.21	0.59		0.23	0.13			0.89	
Uniform Delay, d1	9.5	9.6		8.4	10.6		17.2	16.7			21.1	
Progression Factor	0.82	0.80		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	3.5	1.4		1.0	2.7		2.2	0.6			24.5	
Delay (s)	11.3	9.1		9.4	13.4		19.4	17.3			45.7	
Level of Service	B	A		A	B		B	B			D	
Approach Delay (s)		9.6			12.8			18.0			45.7	
Approach LOS		A			B			B			D	

Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	99.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
20: Vanneck Road & Coldstream Road

	↗	↘	↖	↑	↓	↙
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↰	↱	
Traffic Volume (veh/h)	1	88	73	200	291	2
Future Volume (Veh/h)	1	88	73	200	291	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	1	94	78	213	310	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				37		
pX, platoon unblocked	0.96					
vC, conflicting volume	680	311	312			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	649	311	312			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	87	94			
cM capacity (veh/h)	395	734	1260			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	95	291	312
Volume Left	1	78	0
Volume Right	94	0	2
cSH	727	1260	1700
Volume to Capacity	0.13	0.06	0.18
Queue Length 95th (m)	3.4	1.5	0.0
Control Delay (s)	10.7	2.6	0.0
Lane LOS	B	A	
Approach Delay (s)	10.7	2.6	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰↱	
Traffic Volume (veh/h)	508	31	119	583	32	59
Future Volume (Veh/h)	508	31	119	583	32	59
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	524	32	123	601	33	61
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			556		1371	524
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			556		1371	524
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			88		77	89
cM capacity (veh/h)			1025		143	557

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	524	32	123	601	94
Volume Left	0	0	123	0	33
Volume Right	0	32	0	0	61
cSH	1700	1700	1025	1700	277
Volume to Capacity	0.31	0.02	0.12	0.35	0.34
Queue Length 95th (m)	0.0	0.0	3.1	0.0	11.0
Control Delay (s)	0.0	0.0	9.0	0.0	24.6
Lane LOS			A		C
Approach Delay (s)	0.0		1.5		24.6
Approach LOS					C

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		

27: Glendon Drive & Old River Road

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		⅄	
Traffic Volume (veh/h)	1	570	711	86	68	6
Future Volume (Veh/h)	1	570	711	86	68	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	1	594	741	90	71	6
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	831				1382	786
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	831				1382	786
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				56	98
cM capacity (veh/h)	810				160	395

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	595	831	77
Volume Left	1	0	71
Volume Right	0	90	6
cSH	810	1700	168
Volume to Capacity	0.00	0.49	0.46
Queue Length 95th (m)	0.0	0.0	16.3
Control Delay (s)	0.0	0.0	43.4
Lane LOS	A		E
Approach Delay (s)	0.0	0.0	43.4
Approach LOS			E

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
33: Springfield Way & Glendon Drive

10/22/2015

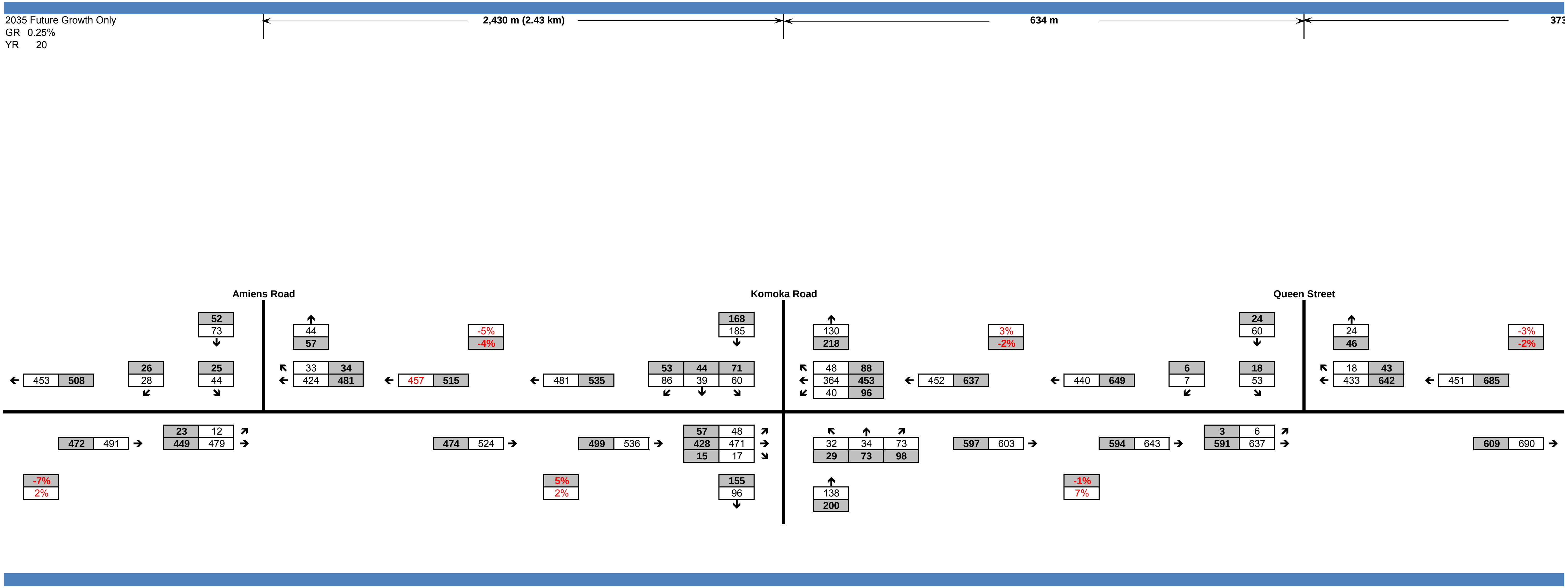
	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰↱	
Traffic Volume (veh/h)	526	21	17	632	27	11
Future Volume (Veh/h)	526	21	17	632	27	11
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	566	23	18	680	29	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				391		
pX, platoon unblocked					0.91	
vC, conflicting volume			589		1282	566
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			589		1261	566
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		83	98
cM capacity (veh/h)			996		167	528

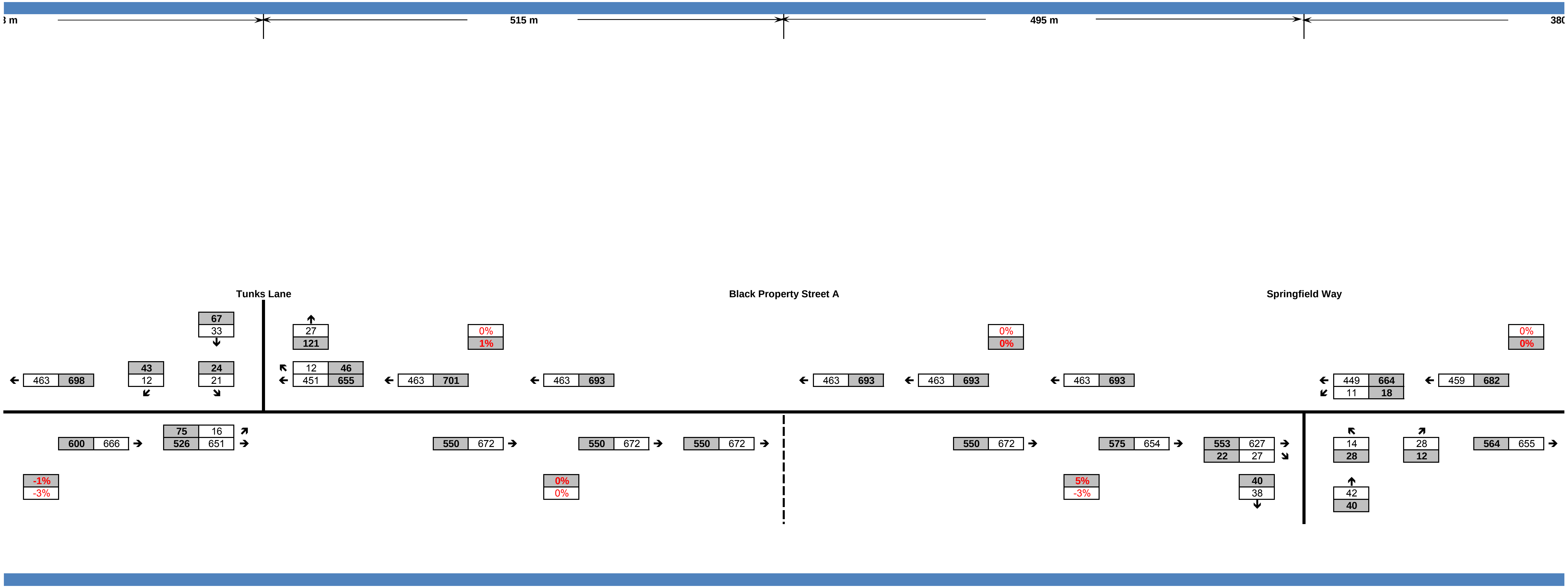
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	566	23	18	680	41
Volume Left	0	0	18	0	29
Volume Right	0	23	0	0	12
cSH	1700	1700	996	1700	208
Volume to Capacity	0.33	0.01	0.02	0.40	0.20
Queue Length 95th (m)	0.0	0.0	0.4	0.0	5.4
Control Delay (s)	0.0	0.0	8.7	0.0	26.5
Lane LOS			A		D
Approach Delay (s)	0.0		0.2		26.5
Approach LOS					D

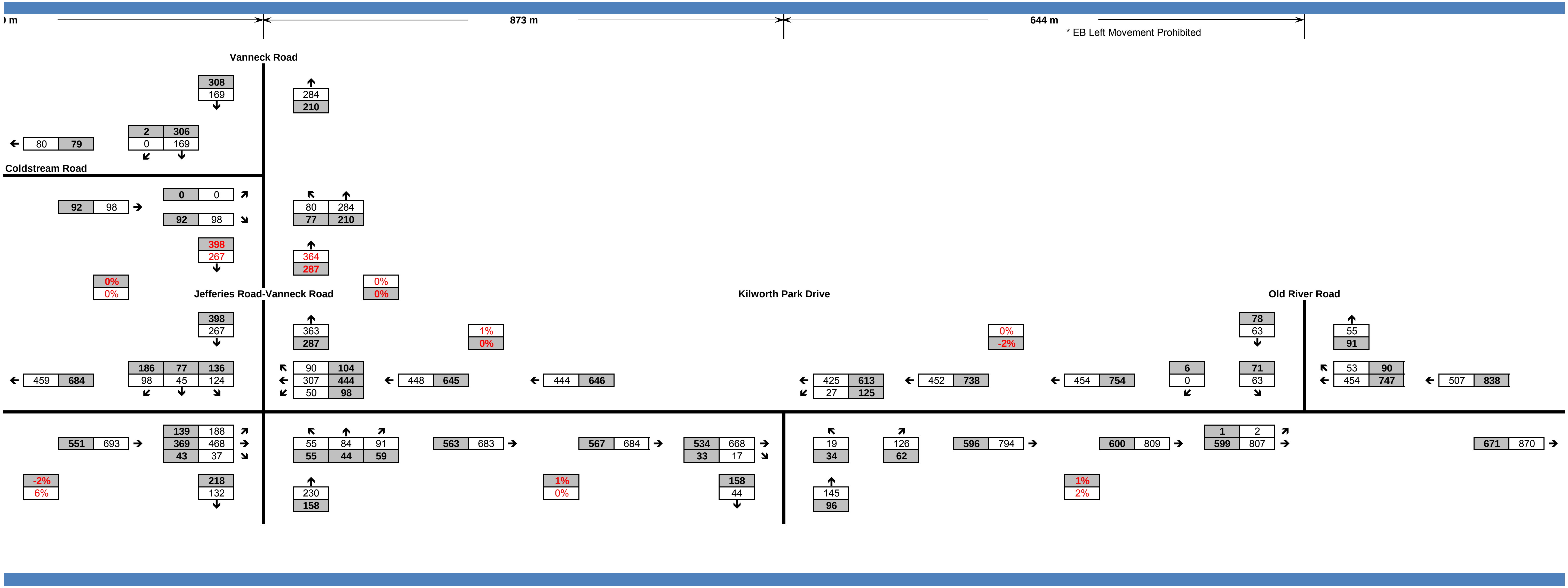
Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX C

BACKGROUND DEVELOPMENTS
SITE TRAFFIC


2035 Future Growth Only
GR 0.25%
YR 20
2,430 m (2.43 km)
634 m
373
Amiens Road
Komoka Road
Queen Street
52
73
26
28
25
44
453
508
44
57
33
34
424
481
-5%
-4%
457
515
481
535
168
185
53
44
71
86
39
60
130
218
48
88
364
453
40
96
3%
-2%
452
637
440
649
6
7
24
60
18
53
24
46
18
43
433
642
-3%
-2%
451
685
472
491
23
12
449
479
-7%
2%
474
524
499
536
5%
2%
57
48
428
471
15
17
155
96
32
34
73
29
73
98
138
200
597
603
-1%
7%
594
643
3
6
591
637
609
690


m
515 m
495 m
38
Tunks Lane
Black Property Street A
Springfield Way
67
33
27
121
0%
1%
0%
0%
0%
0%
463
698
43
12
24
21
12
46
451
655
463
701
463
693
463
693
463
693
463
693
449
664
11
18
459
682
600
666
75
16
526
651
550
672
550
672
550
672
550
672
575
654
553
627
22
27
14
28
28
12
564
655
-1%
-3%
0%
0%
5%
-3%
40
38
42
40



m
873 m
644 m
* EB Left Movement Prohibited
Vanneck Road
308
169
284
210
2 306
0 169
80 79
Coldstream Road
0 0
92 98
92 98
80 284
77 210
398
267
364
287
0%
0%
0%
0%
Jefferies Road-Vanneck Road
Kilworth Park Drive
Old River Road
398
267
363
287
1%
0%
0%
-2%
78
63
55
91
186 77 136
98 45 124
459 684
90 104
307 444
50 98
448 645
444 646
425 613
27 125
452 738
454 754
6
0
71
63
53 90
454 747
507 838
139 188
369 468
43 37
551 693
55 84 91
55 44 59
563 683
567 684
534 668
33 17
19
34
126
62
596 794
600 809
1 2
599 807
671 870
-2%
6%
218
132
230
158
1%
0%
158
44
145
96
1%
2%

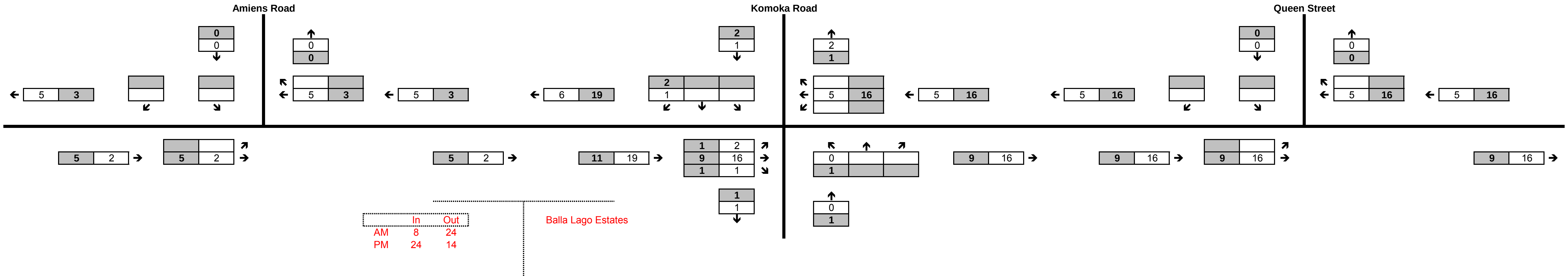
2,430 m (2.43 km) 634 m 373

1 Background Development
9879 Glendon Drive
Balla Lago Estates
1/3

	Balla Lago Estates Development		
Total	In	Out	Total
AM	8	24	32
PM	24	14	38

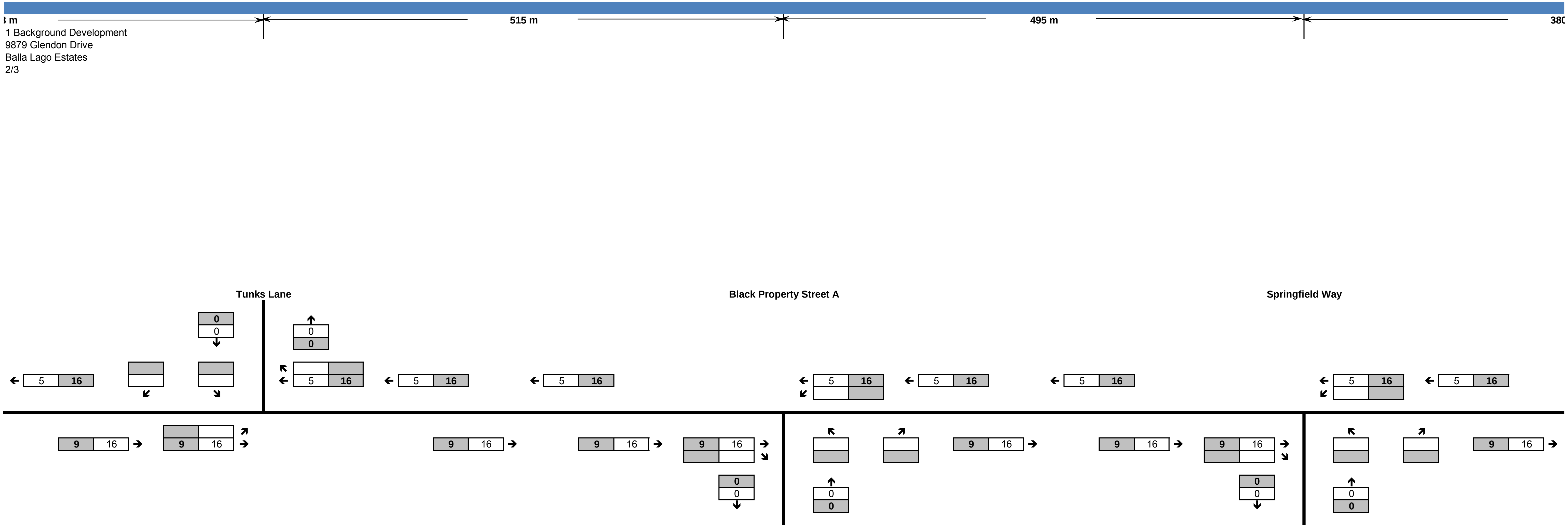
32 Units Single Family Detached

To/From	Via	%
North	Komoka	10%
South	Komoka	5%
East	Glendon	55%
	Vanneck	10%
West	Glendon	20%
		100%

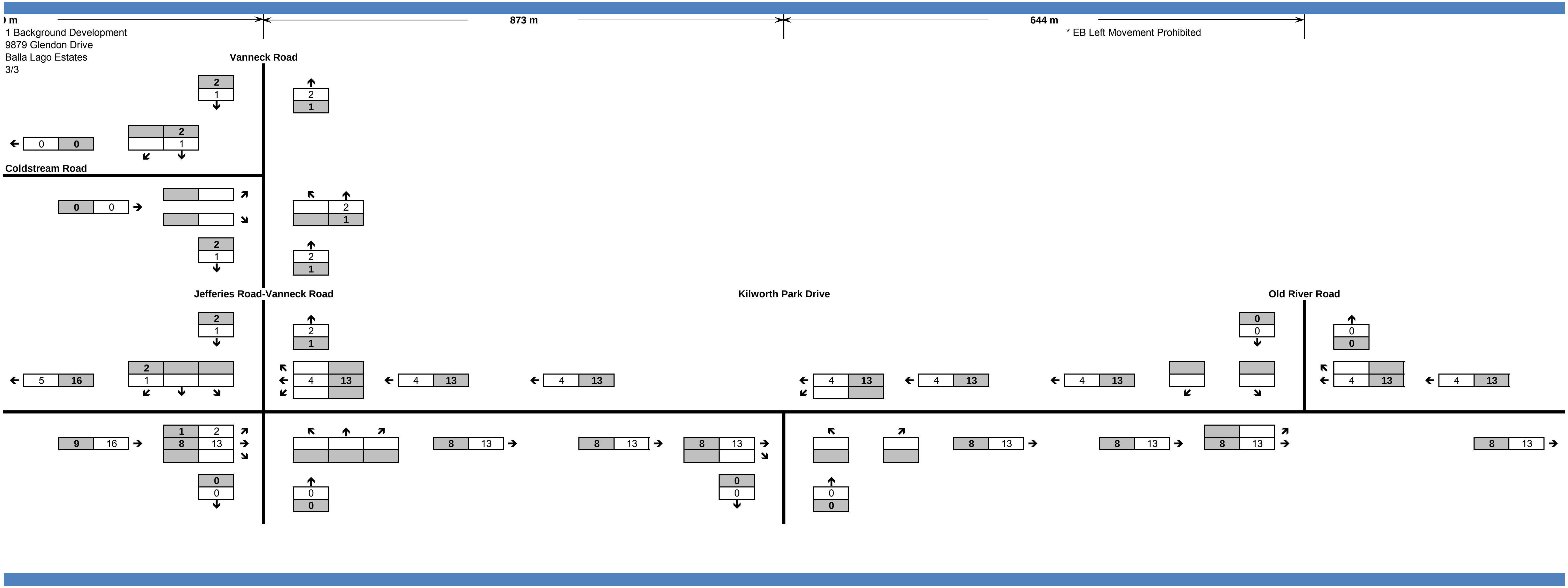


	In	Out
AM	8	24
PM	24	14

1 Background Development
9879 Glendon Drive
Balla Lago Estates
2/3



1 Background Development
9879 Glendon Drive
Balla Lago Estates
3/3



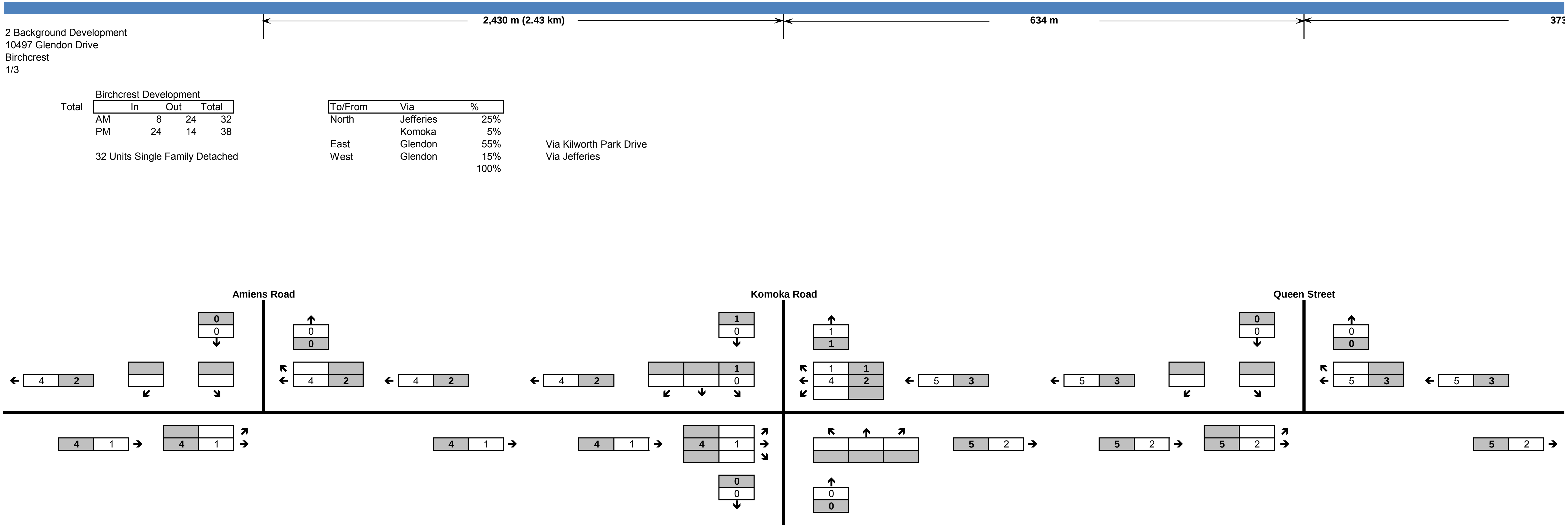
2 Background Development
10497 Glendon Drive
Birchcrest
1/3

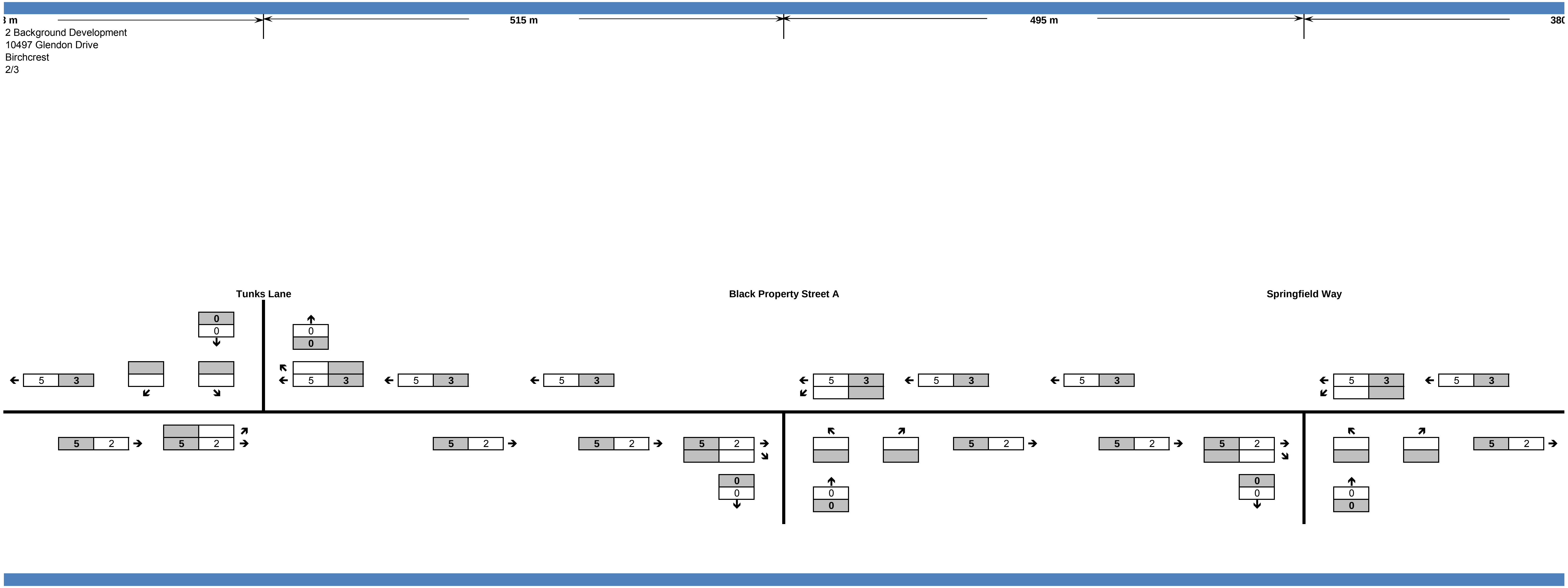
Birchcrest Development

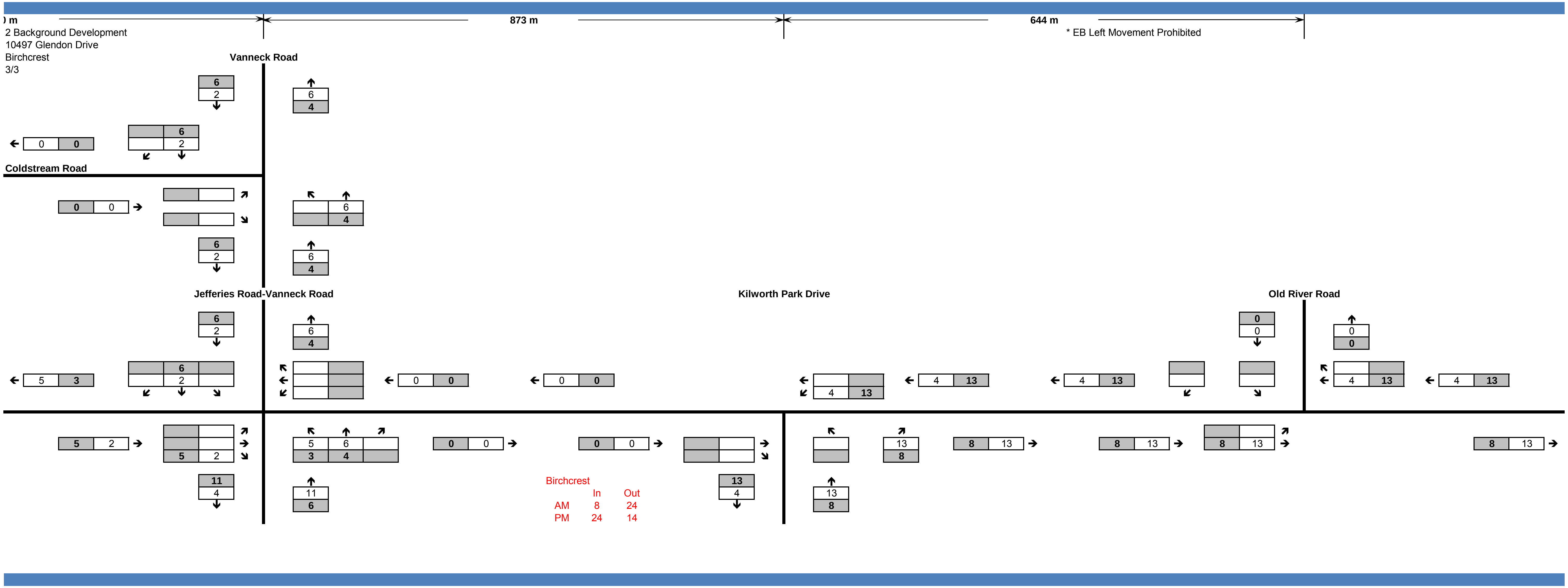
Total	In	Out	Total
AM	8	24	32
PM	24	14	38

32 Units Single Family Detached

To/From	Via	%	
North	Jefferies	25%	
	Komoka	5%	
East	Glendon	55%	Via Kilworth Park Drive
West	Glendon	15%	Via Jefferies
		100%	




3 m
515 m
495 m
380
2 Background Development
10497 Glendon Drive
Birchcrest
2/3
Tunks Lane
Black Property Street A
Springfield Way
5
3
5
2
0


) m
2 Background Development
10497 Glendon Drive
Birchcrest
3/3
873 m
644 m
* EB Left Movement Prohibited
Vanneck Road
6
2
6
4
6
2
0
0
Coldstream Road
0
0
6
4
6
2
6
4
Jefferies Road-Vanneck Road
6
2
6
4
5
3
6
2
0
0
0
0
5
2
5
2
5
6
3
4
0
0
0
0
11
4
11
6
Birchcrest
In
Out
AM
8
24
PM
24
14
13
4
Kilworth Park Drive
4
13
4
13
4
13
13
8
8
13
8
13
13
8
8
13
Old River Road
0
0
0
0
4
13
4
13
8
13

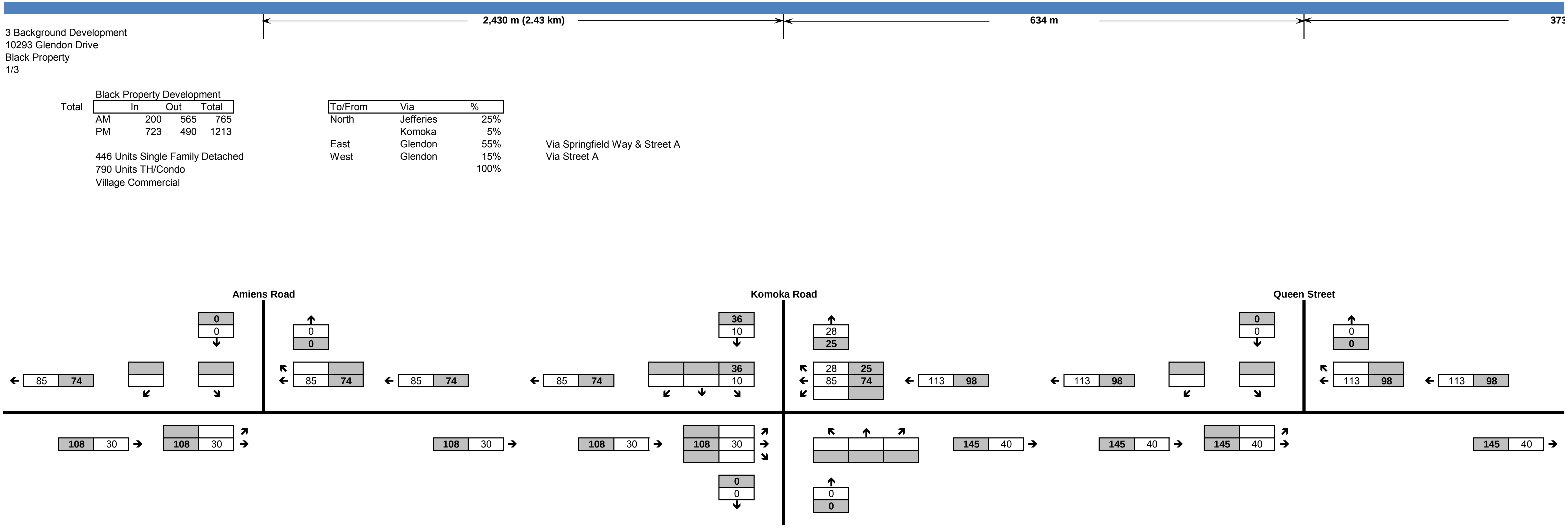
3 Background Development
10293 Glendon Drive
Black Property
1/3

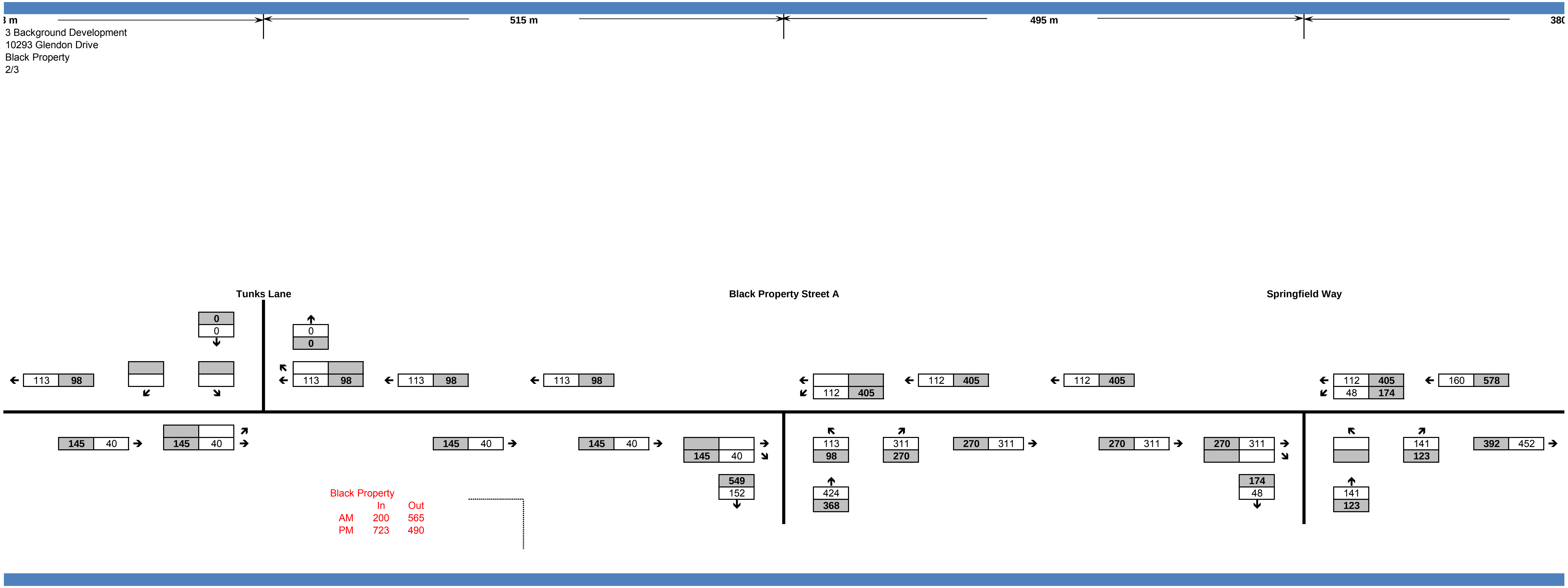
Black Property Development

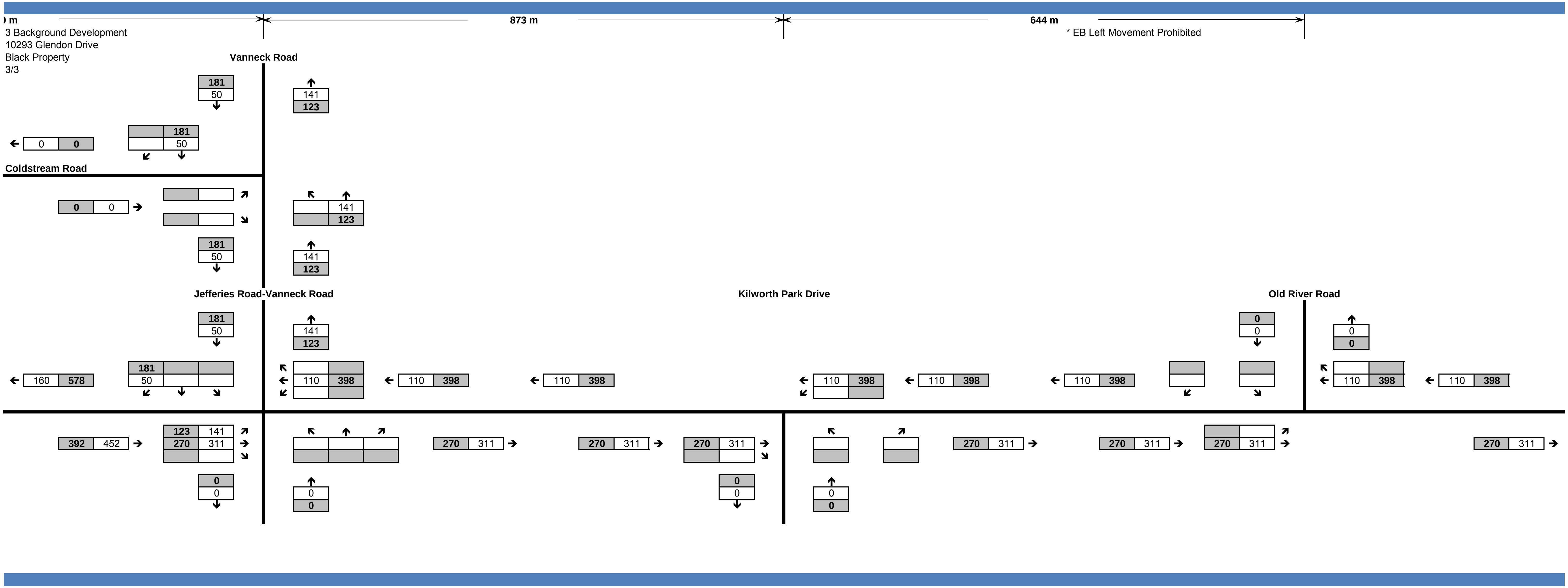
Total	In	Out	Total
AM	200	565	765
PM	723	490	1213

446 Units Single Family Detached
790 Units TH/Condo
Village Commercial

To/From	Via	%	
North	Jefferies	25%	
	Komoka	5%	
East	Glendon	55%	Via Springfield Way & Street A
West	Glendon	15%	Via Street A
		100%	




3 m
515 m
495 m
380
3 Background Development
10293 Glendon Drive
Black Property
2/3
Tunks Lane
Black Property Street A
Springfield Way
0
0
0
0
113 98
113 98
113 98
113 98
112 405
112 405
112 405
112 405
48 174
160 578
145 40
145 40
145 40
145 40
145 40
549
152
113
98
311
270
424
368
270 311
270 311
270 311
174
48
141
123
141
123
392 452
Black Property
In Out
AM 200 565
PM 723 490


0 m
873 m
644 m
3 Background Development
10293 Glendon Drive
Black Property
3/3
* EB Left Movement Prohibited
Vanneck Road
Coldstream Road
Jefferies Road-Vanneck Road
Kilworth Park Drive
Old River Road
181
50
141
123
0
160
578
110
398
392
452
270
311

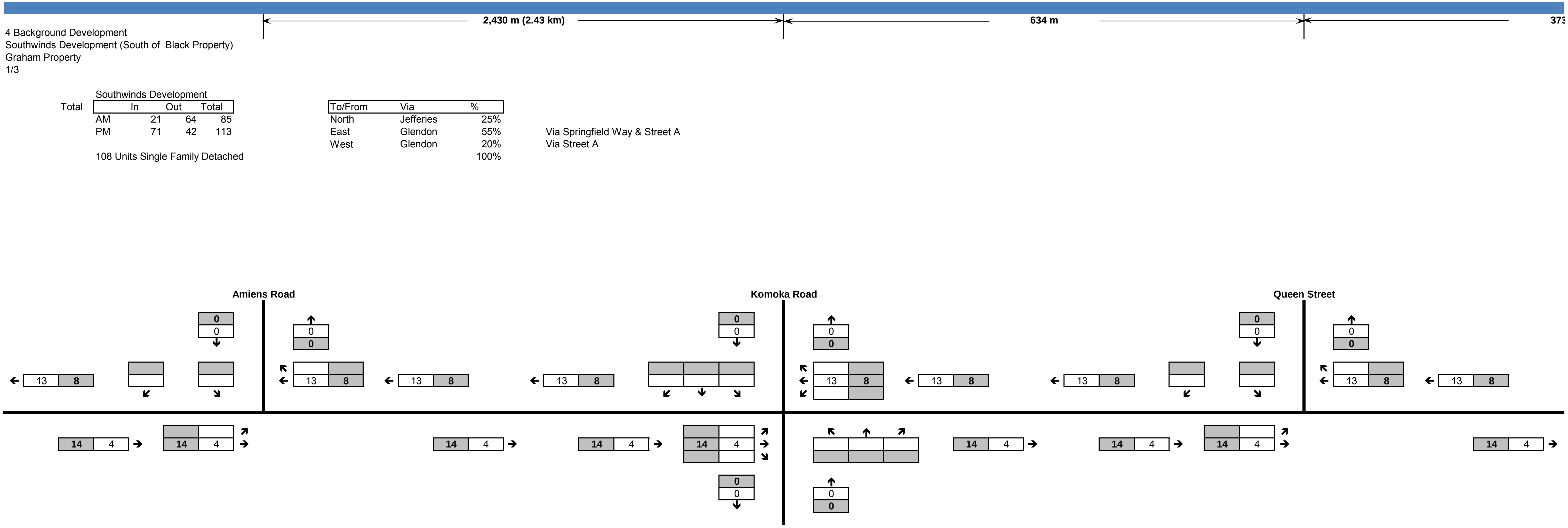
4 Background Development
Southwinds Development (South of Black Property)
Graham Property
1/3

Southwinds Development

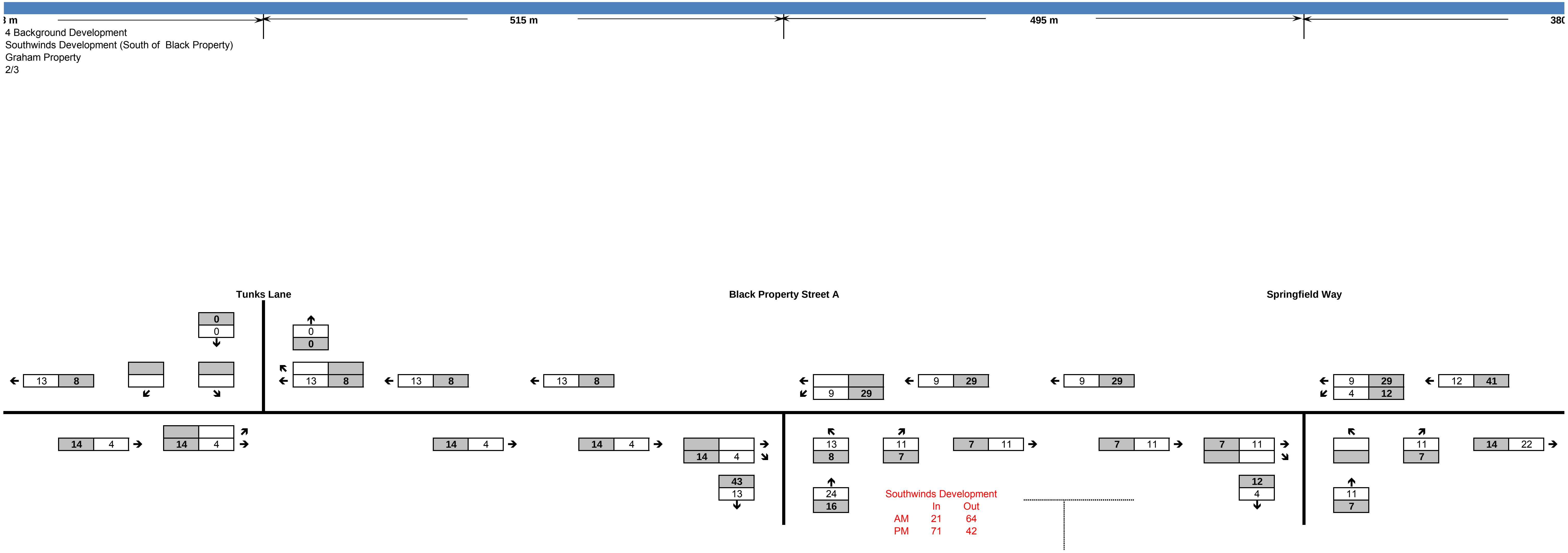
Total	In	Out	Total
AM	21	64	85
PM	71	42	113

108 Units Single Family Detached

To/From	Via	%	
North	Jefferies	25%	
East	Glendon	55%	Via Springfield Way & Street A
West	Glendon	20%	Via Street A
		100%	

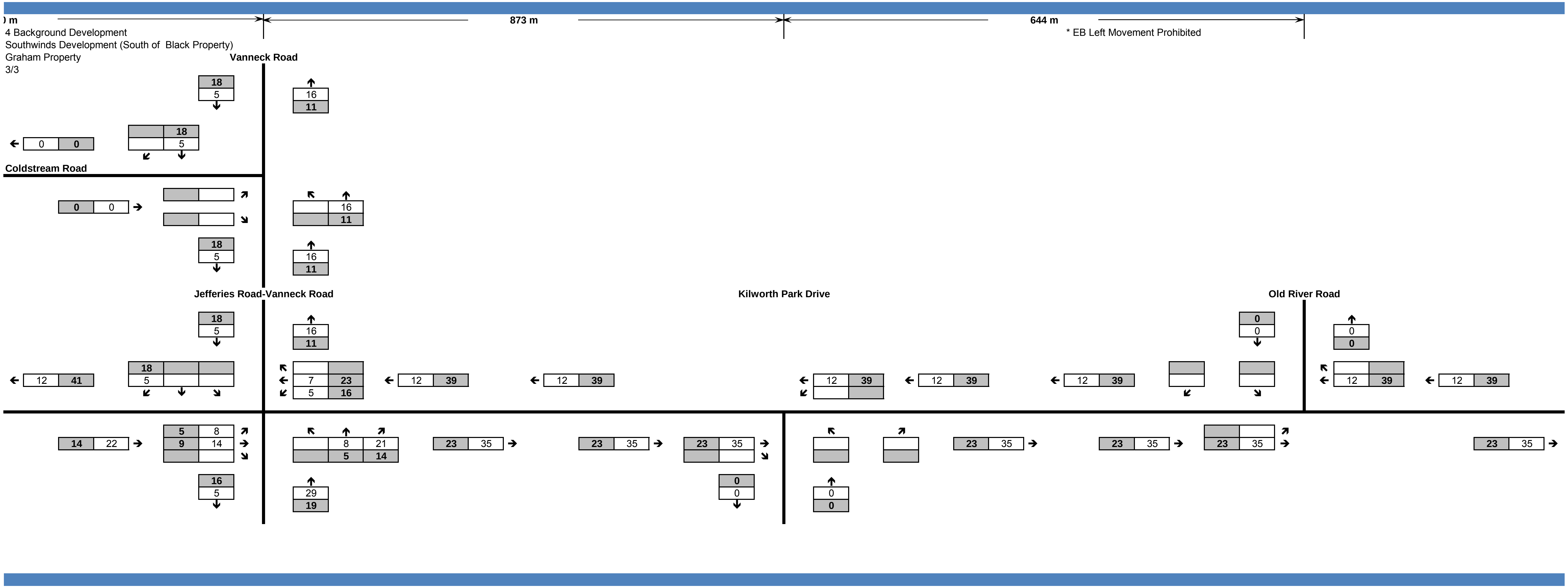


4 Background Development
Southwinds Development (South of Black Property)
Graham Property
2/3



Southwinds Development

	In	Out
AM	21	64
PM	71	42



4 Background Development
Southwinds Development (South of Black Property)
Graham Property
3/3

* EB Left Movement Prohibited

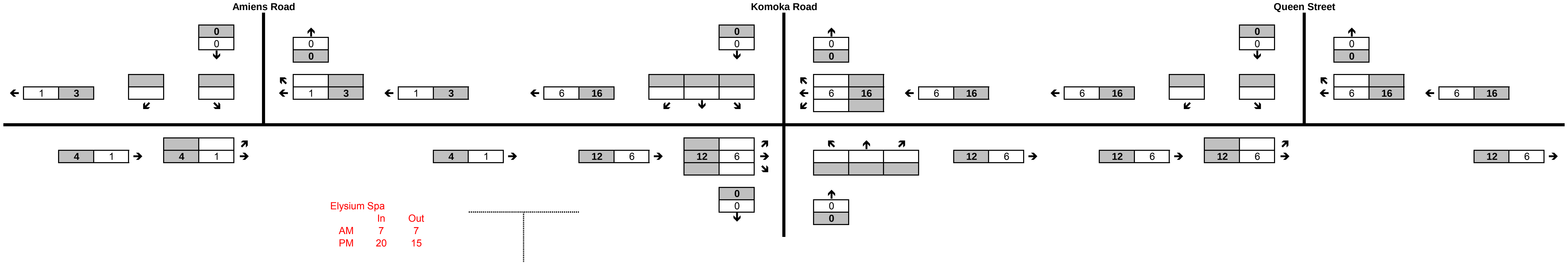
2,430 m (2.43 km) 634 m 37

5 Background Development
9763 Glendon Drive
Elysium Spa
1/3

	Elysium Spa		
Total	In	Out	Total
AM	7	7	14
PM	20	15	35

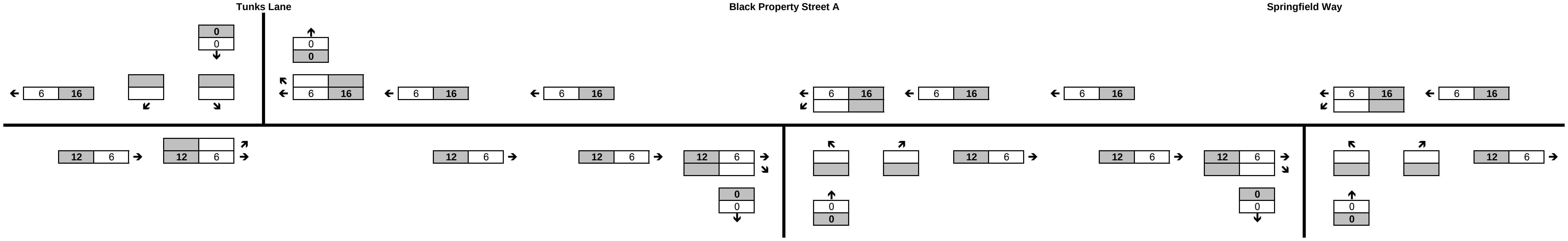
865 SM = 9311 SF Buildings

To/From	Via	%
North	Jefferies	25%
East	Glendon	55%
West	Glendon	20%
		100%

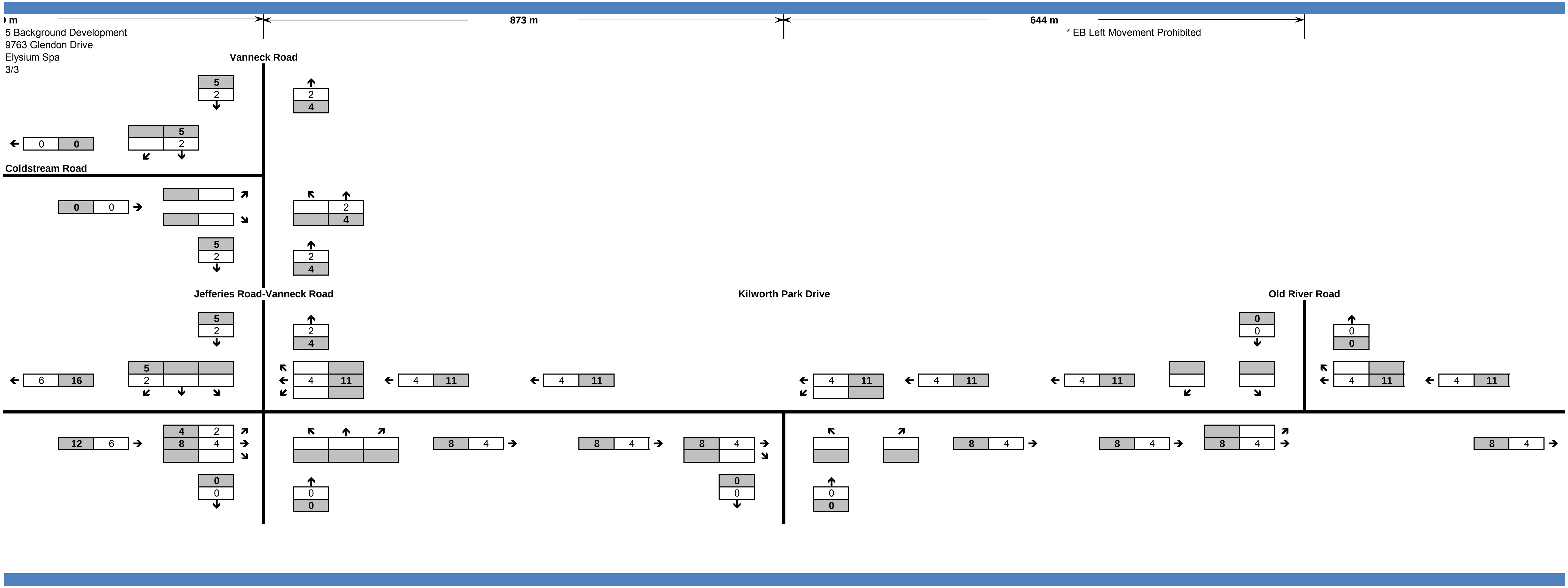


3 m 515 m 495 m 380

5 Background Development
9763 Glendon Drive
Elysium Spa
2/3



5 Background Development
9763 Glendon Drive
Elysium Spa
3/3



2,430 m (2.43 km) 634 m 373

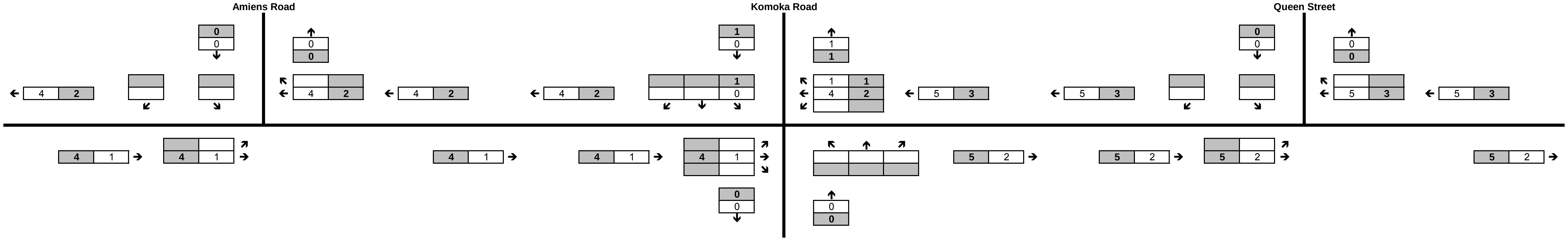
6 Background Development
Kilworth Mews
9 Dausett Drive
1/3

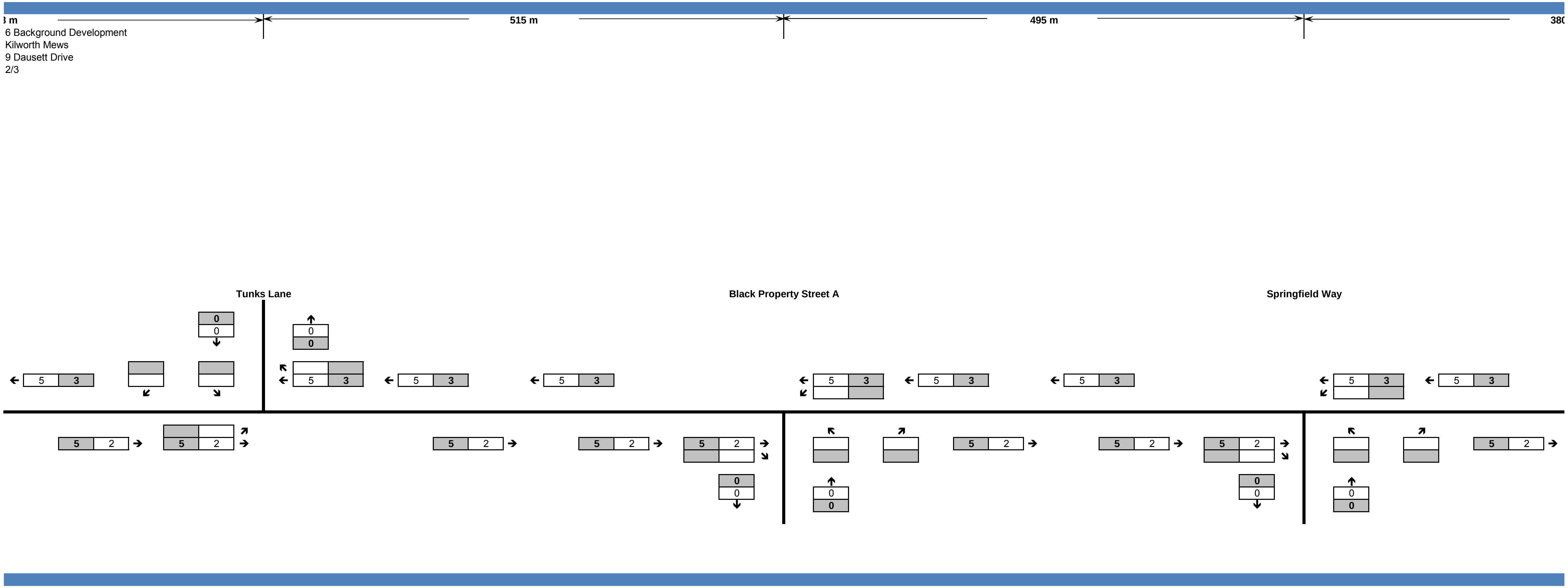
Kilworth Mews Development

Total	In	Out	Total
AM	8	27	35
PM	24	13	37

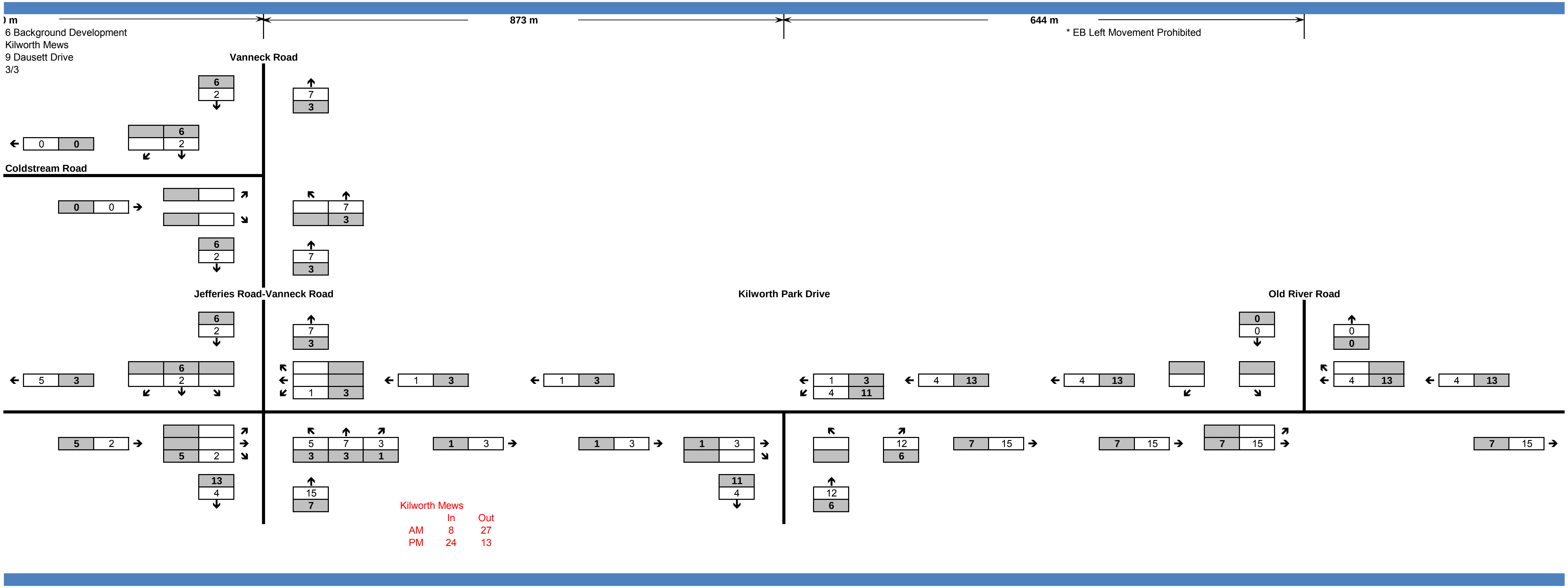
19 Units Single Family Detached
16 Units Townhouse

To/From	Via	%	
North	Jefferies	25%	
	Komoka	5%	
East	Glendon	55%	Via Kilworth Park Drive & Jefferies (80/20)
West	Glendon	15%	Via Jefferies
		100%	





6 Background Development
Kilworth Mews
9 Dausett Drive
2/3



Kilworth Mews

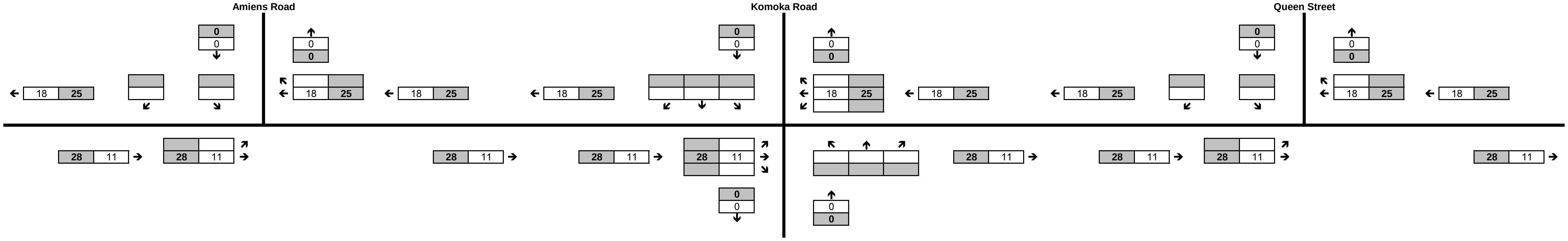
	In	Out
AM	8	27
PM	24	13

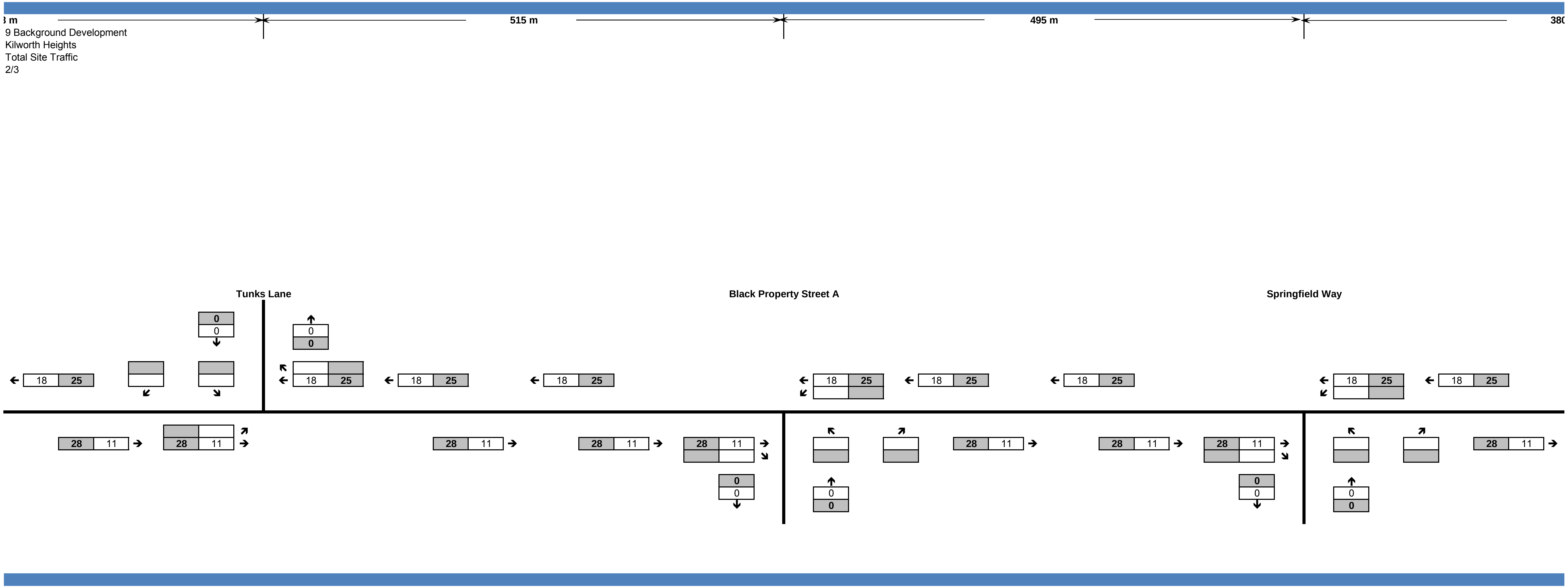
9 Background Development
Kilworth Heights
Total Site Traffic
1/3

Kilworth Residential Development

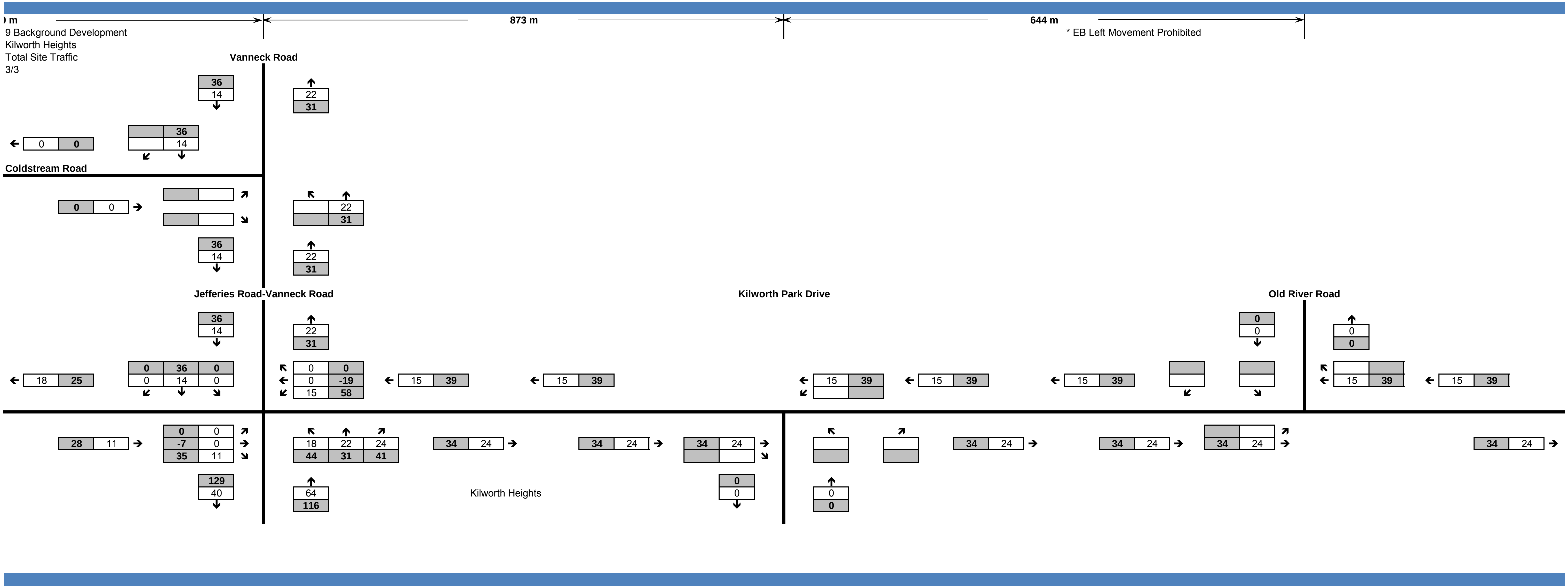
Total	In	Out	Total
AM	56	89	145
PM	177	158	335

To/From	Via	%
North	Jefferies	25%
East	Glendon	55%
West	Glendon	20%
		100%





3 m
9 Background Development
Kilworth Heights
Total Site Traffic
2/3
515 m
495 m
380
Tunks Lane
Black Property Street A
Springfield Way
18
25
28
11
0


0 m
873 m
644 m
9 Background Development
Kilworth Heights
Total Site Traffic
3/3
* EB Left Movement Prohibited
Vanneck Road
Coldstream Road
Jefferies Road-Vanneck Road
Kilworth Park Drive
Old River Road
Kilworth Heights

2,430 m (2.43 km) 634 m 373

10 Background Development
Segway
1/3

Segway Residential Development

	In	Out	Total
AM	100	295	395
PM	335	195	530

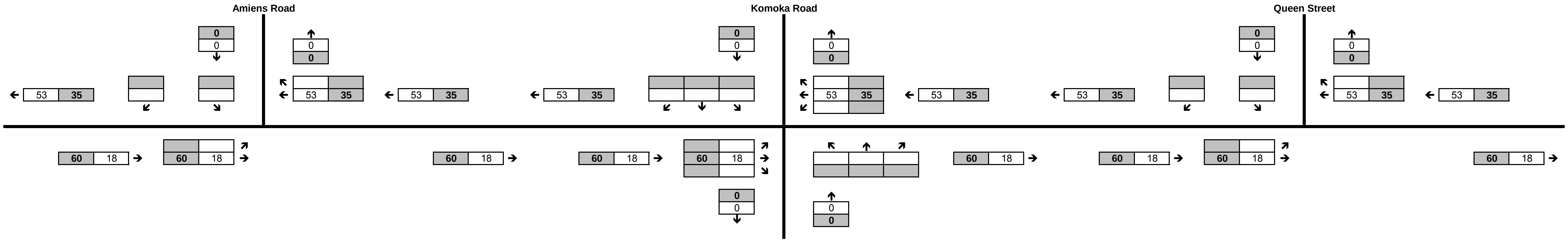
AM	In	Out	Total
Westbrook	55	161	216
North-South	34	101	135
Street I	11	33	44
Total	100	295	395

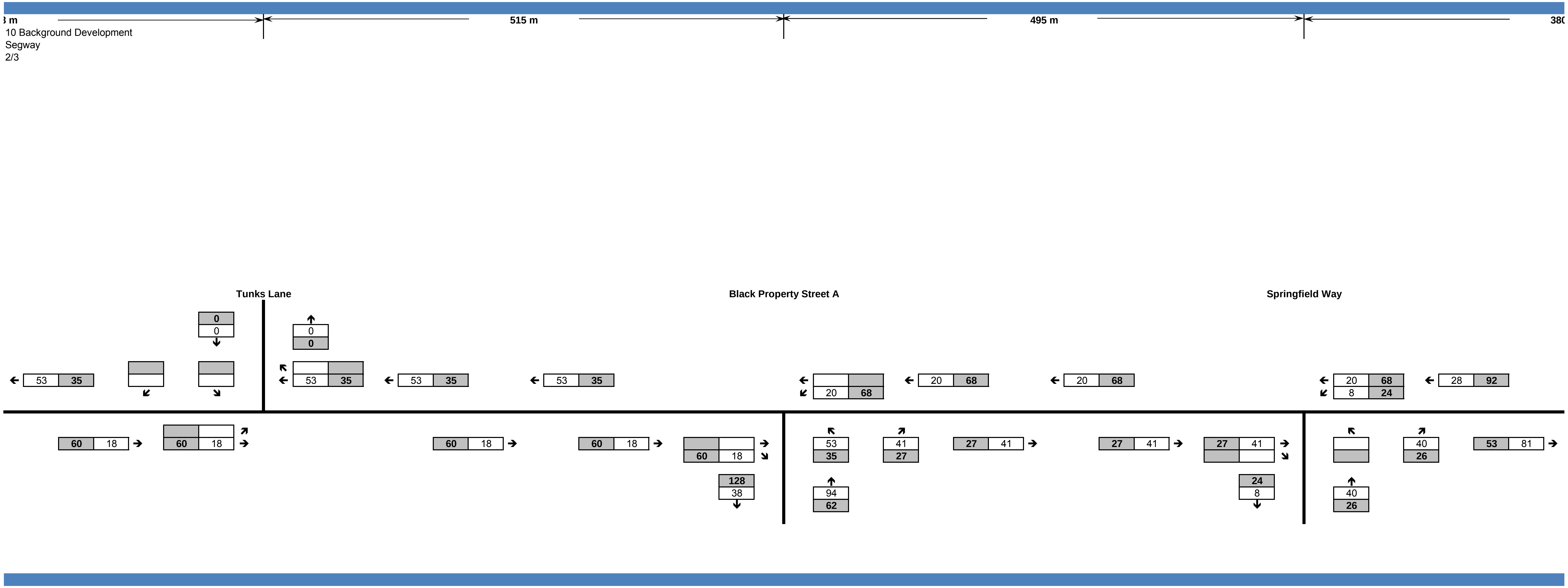
Distribution as Frank Berry

PM	In	Out	Total
Westbrook	183	107	290
North-South	114	66	180
Street I	38	22	60
Total	335	195	530

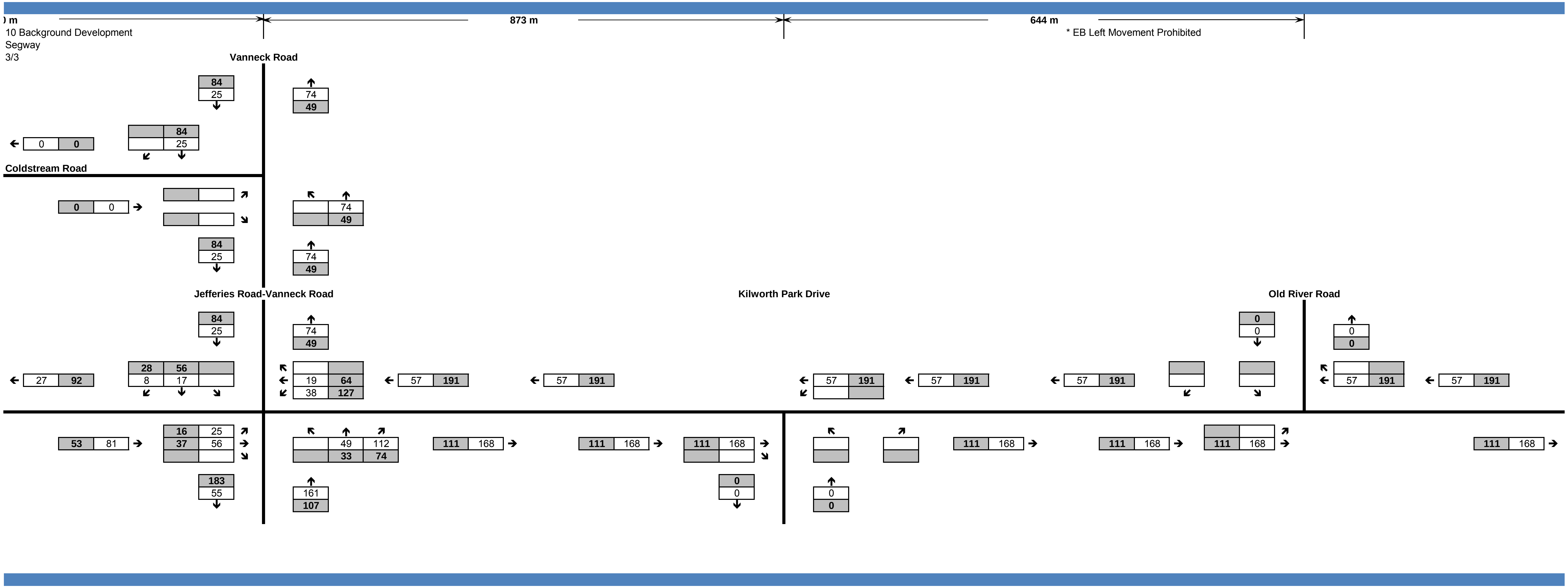
- Revise previous Segway traffic assignments to account for most of their traffic accessing Glendon Drive via Street A, the N-S collector has been removed

75% Use their N-S collector
25% Use Street I




3 m
515 m
495 m
380
10 Background Development
Segway
2/3
Tunks Lane
Black Property Street A
Springfield Way
0
0
0
0
53 35
53 35
53 35
53 35
20 68
20 68
20 68
20 68
8 24
28 92
60 18
60 18
60 18
60 18
60 18
53 35
41 27
27 41
27 41
27 41
40 26
53 81
128 38
94 62
24 8
40 26

10 Background Development
Segway
3/3



2,430 m (2.43 km) 634 m 37

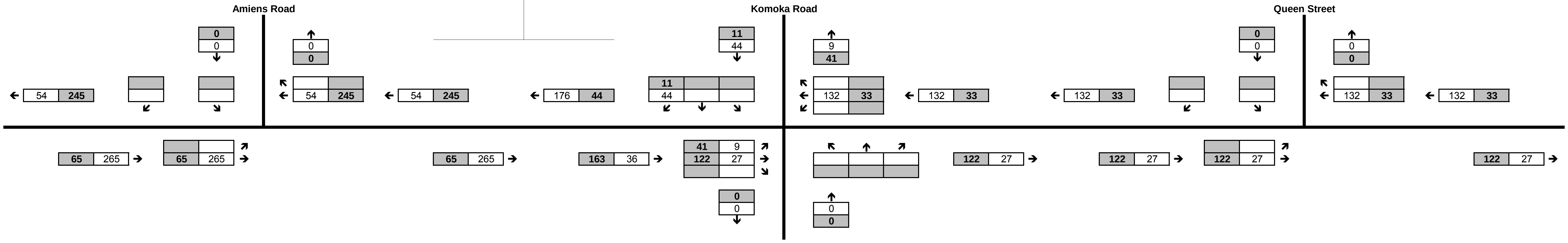
11 Background Development
Industrial Lands
1/3

	Employment Lands		
Total	In	Out	Total
AM	441	90	531
PM	109	408	517

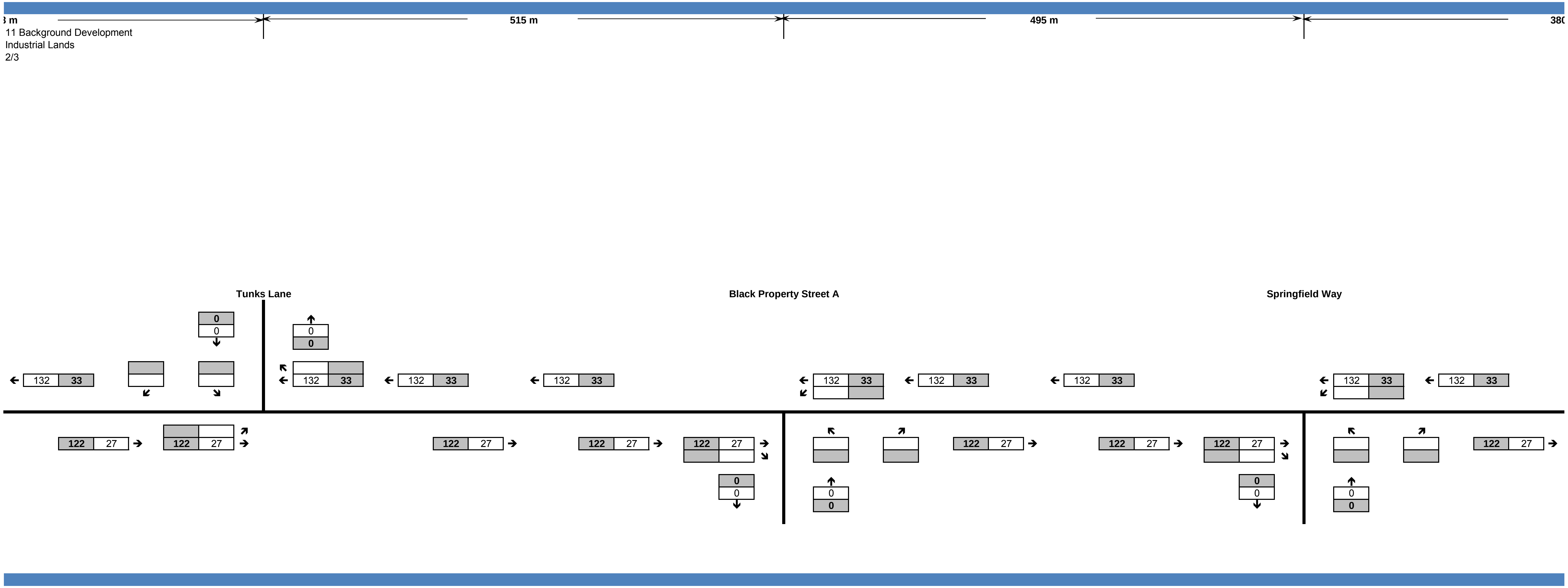
To/From	Via	%
North	Komoka	10%
East	Glendon	30%
West	Glendon	60%
		100%

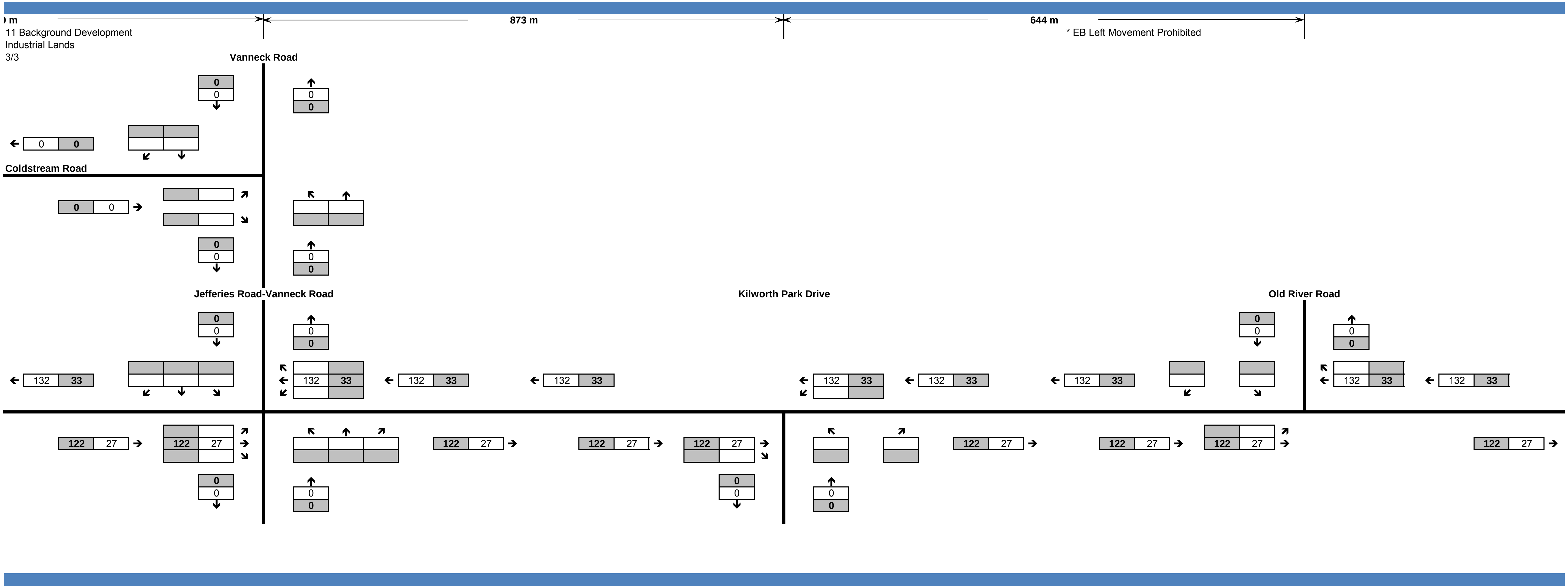
Industrial Employment Lands

	In	Out
AM	441	90
PM	109	408

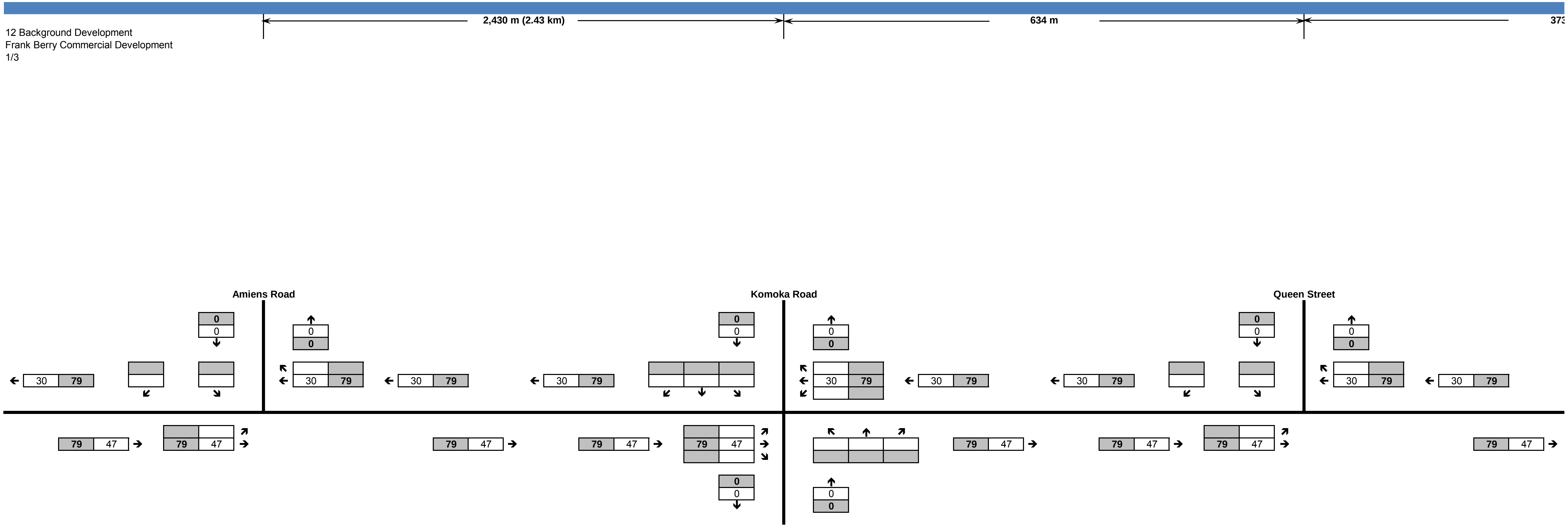


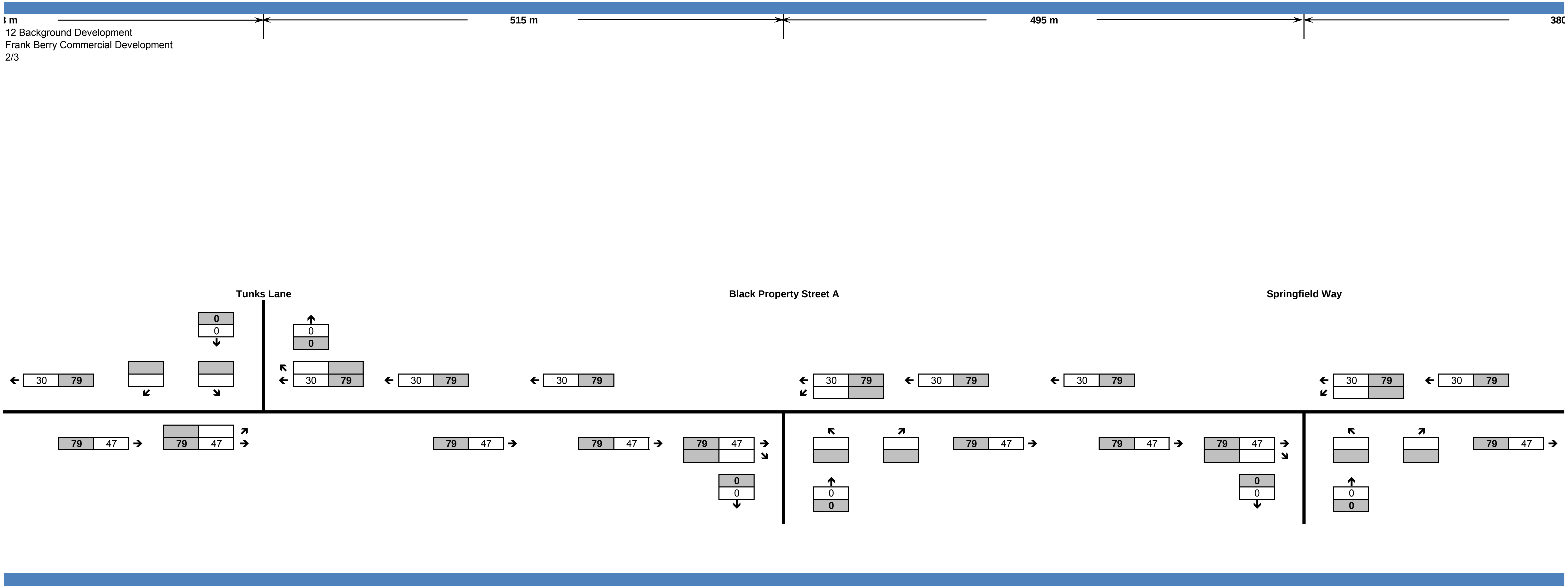
3 m
11 Background Development
Industrial Lands
2/3



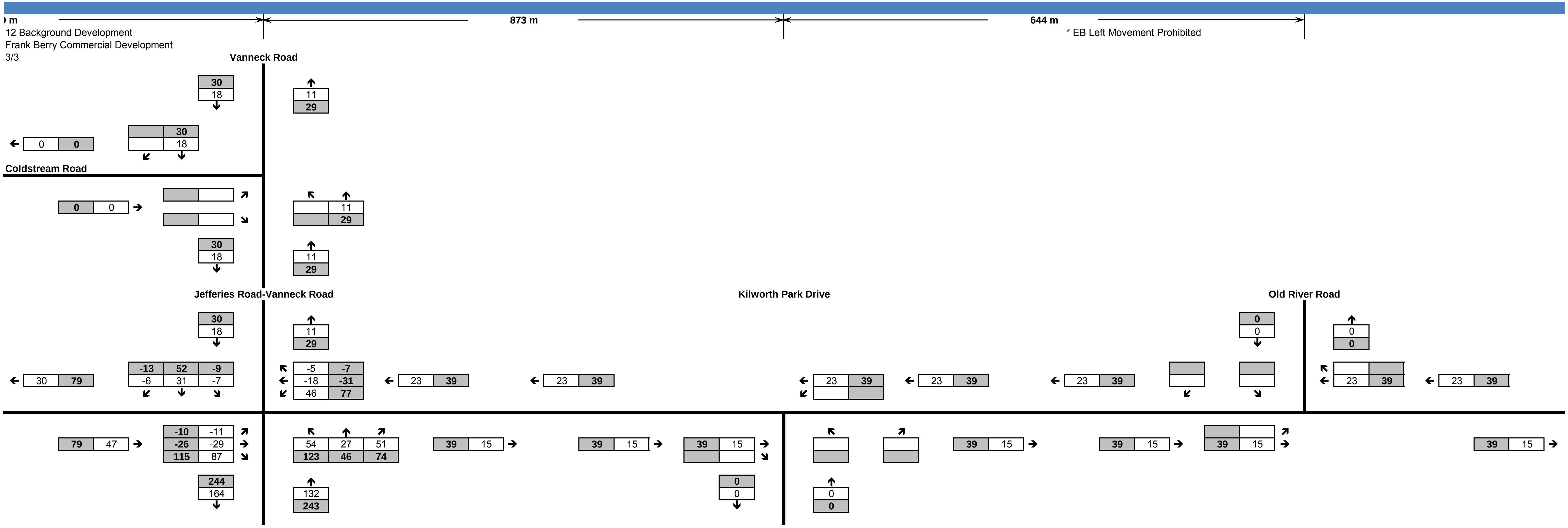
) m
873 m
644 m
11 Background Development
Industrial Lands
3/3
* EB Left Movement Prohibited
Vanneck Road
Coldstream Road
Jefferies Road-Vanneck Road
Kilworth Park Drive
Old River Road
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
132
33
132
33
132
33
132
33
132
33
132
33
132
33
132
33
132
33
132
33
122
27
122
27
122
27
122
27
122
27
122
27
122
27
122
27
122
27
122
27
0
0
0
0
0
0
0
0
0
0
0
0
0
0

12 Background Development
Frank Berry Commercial Development
1/3

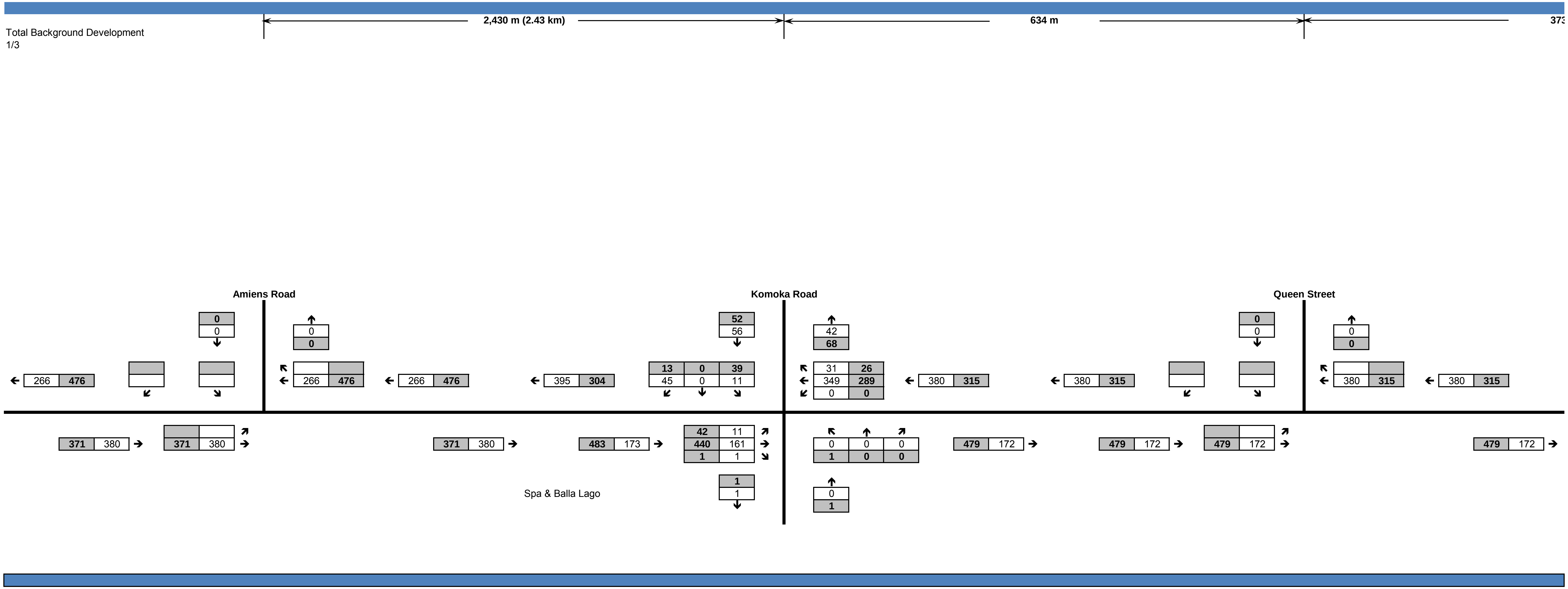


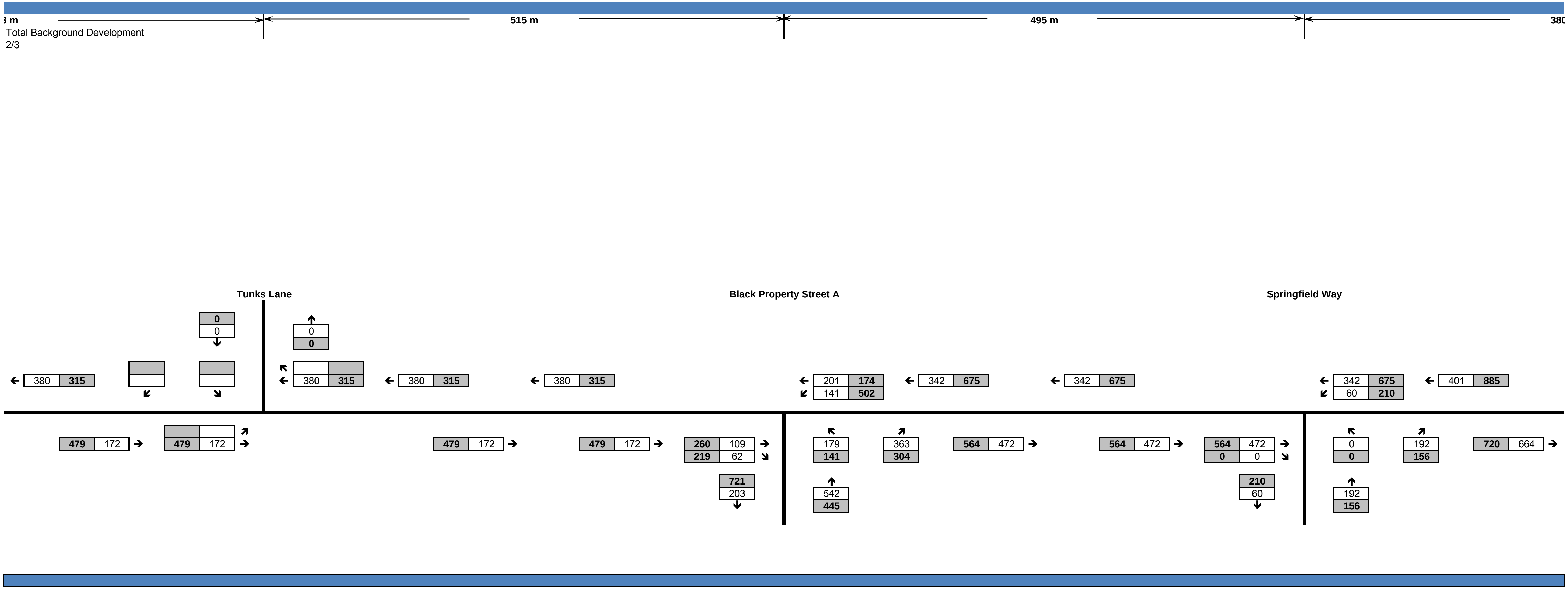

3 m
515 m
495 m
380
12 Background Development
Frank Berry Commercial Development
2/3
Tunks Lane
Black Property Street A
Springfield Way
30
79
47
0

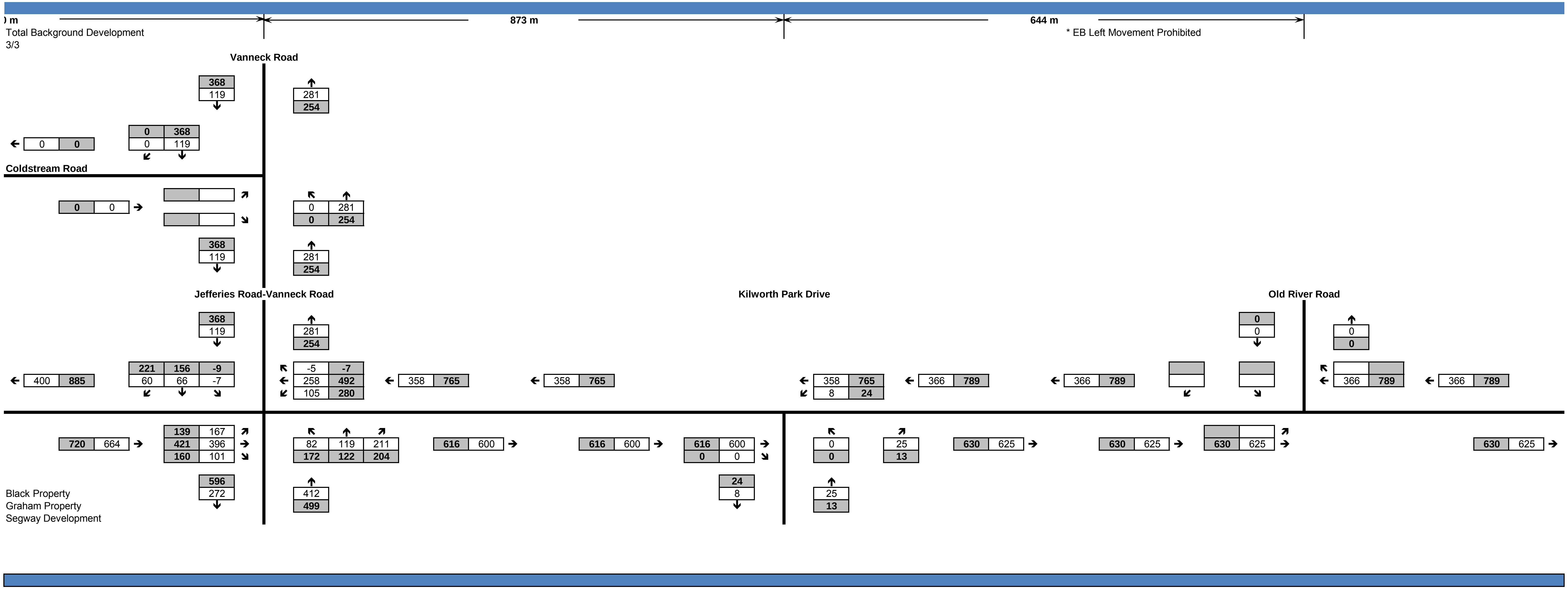
12 Background Development
Frank Berry Commercial Development
3/3



Total Background Development
1/3




m
515 m
495 m
380
Total Background Development
2/3
Tunks Lane
Black Property Street A
Springfield Way
0
0
0
0
380 315
380 315
380 315
380 315
201 174
141 502
342 675
342 675
342 675
60 210
401 885
479 172
479 172
479 172
479 172
260 109
219 62
721
203
179
141
363
304
542
445
564 472
564 472
564 472
0 0
210
60
0
0
192
156
192
156
720 664


Total Background Development
3/3
* EB Left Movement Prohibited
Black Property
Graham Property
Segway Development

APPENDIX D

FUTURE SYNCHRO ANALYSIS OUTPUT

HCM Unsignalized Intersection Capacity Analysis
8: Glendon Drive & Amiens Road

8/31/2016

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑	↑↱		↰↱	
Traffic Volume (veh/h)	12	860	691	33	44	28
Future Volume (Veh/h)	12	860	691	33	44	28
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	13	896	720	34	46	29
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	754				1211	377
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	754				1211	377
tC, single (s)	4.5				6.8	7.0
tC, 2 stage (s)						
tF (s)	2.4				3.5	3.3
p0 queue free %	98				74	95
cM capacity (veh/h)	755				175	615

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	13	448	448	480	274	75
Volume Left	13	0	0	0	0	46
Volume Right	0	0	0	0	34	29
cSH	755	1700	1700	1700	1700	241
Volume to Capacity	0.02	0.26	0.26	0.28	0.16	0.31
Queue Length 95th (m)	0.4	0.0	0.0	0.0	0.0	9.7
Control Delay (s)	9.9	0.0	0.0	0.0	0.0	26.5
Lane LOS	A					D
Approach Delay (s)	0.1			0.0		26.5
Approach LOS						D

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	34.6%	ICU Level of Service	A
Analysis Period (min)	15		

Queues
9: Komoka Road & Glendon Drive

8/31/2016

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	63	684	42	751	83	34	113	96	179
v/c Ratio	0.25	0.46	0.15	0.49	0.11	0.09	0.20	0.23	0.30
Control Delay	14.1	13.1	12.0	13.6	3.4	14.6	7.3	16.3	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.1	13.1	12.0	13.6	3.4	14.6	7.3	16.3	8.1
Queue Length 50th (m)	4.2	26.2	2.7	29.6	0.0	2.5	2.6	7.5	5.2
Queue Length 95th (m)	11.7	38.4	8.1	42.7	6.1	7.6	11.6	17.0	16.9
Internal Link Dist (m)		391.2		237.7			183.9		242.3
Turn Bay Length (m)	30.0		45.0		45.0	25.0		25.0	
Base Capacity (vph)	252	1503	284	1535	727	385	571	417	592
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.46	0.15	0.49	0.11	0.09	0.20	0.23	0.30

Intersection Summary

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↑	↱	↰	↱		↰	↱	
Traffic Volume (vph)	60	632	18	40	713	79	32	34	73	91	39	131
Future Volume (vph)	60	632	18	40	713	79	32	34	73	91	39	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.90		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1674	3461		1690	3544	1570	1706	1561		1738	1559	
Flt Permitted	0.33	1.00		0.37	1.00	1.00	0.64	1.00		0.68	1.00	
Satd. Flow (perm)	582	3461		656	3544	1570	1157	1561		1252	1559	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	665	19	42	751	83	34	36	77	96	41	138
RTOR Reduction (vph)	0	3	0	0	0	47	0	51	0	0	73	0
Lane Group Flow (vph)	63	681	0	42	751	36	34	62	0	96	106	0
Heavy Vehicles (%)	9%	5%	6%	8%	3%	4%	7%	3%	14%	5%	19%	6%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)	26.0	26.0		26.0	26.0	26.0	20.0	20.0		20.0	20.0	
Effective Green, g (s)	26.0	26.0		26.0	26.0	26.0	20.0	20.0		20.0	20.0	
Actuated g/C Ratio	0.43	0.43		0.43	0.43	0.43	0.33	0.33		0.33	0.33	
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Lane Grp Cap (vph)	252	1499		284	1535	680	385	520		417	519	
v/s Ratio Prot		0.20			c0.21			0.04			0.07	
v/s Ratio Perm	0.11			0.06		0.02	0.03			c0.08		
v/c Ratio	0.25	0.45		0.15	0.49	0.05	0.09	0.12		0.23	0.20	
Uniform Delay, d1	10.8	12.0		10.3	12.2	9.9	13.7	13.9		14.4	14.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.4	1.0		1.1	1.1	0.1	0.5	0.5		1.3	0.9	
Delay (s)	13.2	13.0		11.4	13.3	10.0	14.2	14.3		15.7	15.2	
Level of Service	B	B		B	B	B	B	B		B	B	
Approach Delay (s)		13.0			12.9			14.3			15.4	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
12: Glendon Drive & Queen Street

8/31/2016

	↗	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑	↑↑	↱	↰↱	
Traffic Volume (veh/h)	6	809	813	18	53	7
Future Volume (Veh/h)	6	809	813	18	53	7
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)	7	879	884	20	58	8
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	904				1338	442
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	904				1338	442
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				60	99
cM capacity (veh/h)	761				146	569

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1
Volume Total	7	440	440	442	442	20	66
Volume Left	7	0	0	0	0	0	58
Volume Right	0	0	0	0	0	20	8
cSH	761	1700	1700	1700	1700	1700	160
Volume to Capacity	0.01	0.26	0.26	0.26	0.26	0.01	0.41
Queue Length 95th (m)	0.2	0.0	0.0	0.0	0.0	0.0	13.9
Control Delay (s)	9.8	0.0	0.0	0.0	0.0	0.0	42.4
Lane LOS	A						E
Approach Delay (s)	0.1			0.0			42.4
Approach LOS							E

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	32.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
15: Glendon Drive & Tunks Lane

8/31/2016

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑	↑↑	↱	↰	↱
Traffic Volume (veh/h)	16	822	831	12	21	12
Future Volume (Veh/h)	16	822	831	12	21	12
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	17	874	884	13	22	13
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	897				1355	442
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	897				1355	442
tC, single (s)	4.9				7.0	7.1
tC, 2 stage (s)						
tF (s)	2.6				3.6	3.4
p0 queue free %	97				83	98
cM capacity (veh/h)	555				127	544

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1	SB 2
Volume Total	17	437	437	442	442	13	22	13
Volume Left	17	0	0	0	0	0	22	0
Volume Right	0	0	0	0	0	13	0	13
cSH	555	1700	1700	1700	1700	1700	127	544
Volume to Capacity	0.03	0.26	0.26	0.26	0.26	0.01	0.17	0.02
Queue Length 95th (m)	0.7	0.0	0.0	0.0	0.0	0.0	4.6	0.6
Control Delay (s)	11.7	0.0	0.0	0.0	0.0	0.0	39.2	11.8
Lane LOS	B						E	B
Approach Delay (s)	0.2			0.0			29.0	
Approach LOS							D	

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	33.0%	ICU Level of Service	A
Analysis Period (min)	15		

Queues

16: Jefferies Road/Vanneck Road & Glendon Drive

	↗	→	↘	↙	←	↖	↖	↑	↘	↓
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	371	900	144	161	589	89	143	527	122	281
v/c Ratio	0.89	0.56	0.21	0.80	0.49	0.15	0.48	0.99	0.50	0.40
Control Delay	43.9	20.0	10.1	57.6	24.9	4.6	33.3	66.5	22.5	15.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.9	20.0	10.1	57.6	24.9	4.6	33.3	66.5	22.5	15.0
Queue Length 50th (m)	46.6	59.4	8.4	24.9	41.6	0.0	20.5	78.7	12.2	22.1
Queue Length 95th (m)	#79.8	79.2	21.3	#59.3	56.8	8.3	38.4	#143.7	22.7	42.2
Internal Link Dist (m)		269.5			256.5			153.1		13.5
Turn Bay Length (m)	45.0		15.0	60.0		25.0	40.0			
Base Capacity (vph)	417	1614	675	201	1209	599	301	531	243	695
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	0.89	0.56	0.21	0.80	0.49	0.15	0.48	0.99	0.50	0.40

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
16: Jefferies Road/Vanneck Road & Glendon Drive

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↱		↰	↱	
Traffic Volume (vph)	356	864	138	155	565	85	137	203	303	117	111	158
Future Volume (vph)	356	864	138	155	565	85	137	203	303	117	111	158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		2.0	7.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	3544	1396	1789	3510	1555	1755	1697		1690	1641	
Flt Permitted	0.33	1.00	1.00	0.31	1.00	1.00	0.59	1.00		0.15	1.00	
Satd. Flow (perm)	619	3544	1396	586	3510	1555	1085	1697		264	1641	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	371	900	144	161	589	89	143	211	316	122	116	165
RTOR Reduction (vph)	0	0	40	0	0	58	0	60	0	0	57	0
Lane Group Flow (vph)	371	900	104	161	589	31	143	467	0	122	224	0
Heavy Vehicles (%)	4%	3%	17%	2%	4%	5%	4%	6%	1%	8%	5%	8%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	41.0	41.0	41.0	31.0	31.0	31.0	25.0	25.0		35.0	35.0	
Effective Green, g (s)	41.0	41.0	41.0	31.0	31.0	31.0	25.0	25.0		35.0	35.0	
Actuated g/C Ratio	0.46	0.46	0.46	0.34	0.34	0.34	0.28	0.28		0.39	0.39	
Clearance Time (s)	2.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		2.0	7.0	
Lane Grp Cap (vph)	382	1614	635	201	1209	535	301	471		229	638	
v/s Ratio Prot	c0.09	0.25			0.17			c0.28		c0.05	0.14	
v/s Ratio Perm	0.36		0.07	c0.27		0.02	0.13			0.16		
v/c Ratio	0.97	0.56	0.16	0.80	0.49	0.06	0.48	0.99		0.53	0.35	
Uniform Delay, d1	21.6	17.9	14.4	26.7	23.2	19.7	27.0	32.4		21.0	19.5	
Progression Factor	1.30	1.04	1.22	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	36.1	1.2	0.5	27.6	1.4	0.2	5.3	39.5		8.6	1.5	
Delay (s)	64.2	19.8	18.0	54.3	24.6	19.9	32.3	71.9		29.6	21.0	
Level of Service	E	B	B	D	C	B	C	E		C	C	
Approach Delay (s)		31.2			29.8			63.4			23.6	
Approach LOS		C			C			E			C	

Intersection Summary			
HCM 2000 Control Delay	36.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	106.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
20: Vanneck Road & Coldstream Road

8/31/2016

	↗	↘	↖	↑	↓	↙
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↰	↱	
Traffic Volume (veh/h)	1	98	80	565	288	1
Future Volume (Veh/h)	1	98	80	565	288	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	1	115	94	665	339	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				37		
pX, platoon unblocked	0.85					
vC, conflicting volume	1192	340	340			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1140	340	340			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	84	92			
cM capacity (veh/h)	177	698	1214			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	116	759	340
Volume Left	1	94	0
Volume Right	115	0	1
cSH	681	1214	1700
Volume to Capacity	0.17	0.08	0.20
Queue Length 95th (m)	4.6	1.9	0.0
Control Delay (s)	11.4	1.9	0.0
Lane LOS	B	A	
Approach Delay (s)	11.4	1.9	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰	↑↑	↰↱	
Traffic Volume (veh/h)	1267	17	35	783	19	151
Future Volume (Veh/h)	1267	17	35	783	19	151
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	1362	18	38	842	20	162
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			1380		1859	681
vC1, stage 1 conf vol					1362	
vC2, stage 2 conf vol					497	
vCu, unblocked vol			1380		1859	681
tC, single (s)			4.2		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			92		90	59
cM capacity (veh/h)			482		192	398

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1
Volume Total	681	681	18	38	421	421	182
Volume Left	0	0	0	38	0	0	20
Volume Right	0	0	18	0	0	0	162
cSH	1700	1700	1700	482	1700	1700	356
Volume to Capacity	0.40	0.40	0.01	0.08	0.25	0.25	0.51
Queue Length 95th (m)	0.0	0.0	0.0	1.9	0.0	0.0	21.2
Control Delay (s)	0.0	0.0	0.0	13.1	0.0	0.0	25.2
Lane LOS				B			D
Approach Delay (s)	0.0			0.6			25.2
Approach LOS							D

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
27: Glendon Drive & Old River Road

8/31/2016

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		Y	
Traffic Volume (veh/h)	2	1432	820	53	63	1
Future Volume (Veh/h)	2	1432	820	53	63	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	2	1492	854	55	66	1
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	909				2378	882
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	909				2378	882
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				0	100
cM capacity (veh/h)	757				38	348

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1494	909	67
Volume Left	2	0	66
Volume Right	0	55	1
cSH	757	1700	38
Volume to Capacity	0.00	0.53	1.75
Queue Length 95th (m)	0.1	0.0	54.0
Control Delay (s)	0.2	0.0	585.5
Lane LOS	A		F
Approach Delay (s)	0.2	0.0	585.5
Approach LOS			F

Intersection Summary			
Average Delay	16.0		
Intersection Capacity Utilization	87.2%	ICU Level of Service	E
Analysis Period (min)	15		

33: Springfield Way & Glendon Drive

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1169	29	74	841	15	235
v/c Ratio	0.54	0.03	0.36	0.39	0.03	0.48
Control Delay	8.4	1.6	10.8	6.3	24.8	21.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.4	1.6	10.8	6.3	24.8	21.6
Queue Length 50th (m)	38.1	0.0	4.2	26.0	1.9	21.5
Queue Length 95th (m)	42.5	m0.9	9.7	32.6	6.5	43.1
Internal Link Dist (m)	256.9			72.0	185.1	
Turn Bay Length (m)		50.0	50.0			
Base Capacity (vph)	2147	972	208	2147	477	487
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.03	0.36	0.39	0.03	0.48

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
33: Springfield Way & Glendon Drive

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰	↑↑	↰	↱
Traffic Volume (vph)	1099	27	70	791	14	221
Future Volume (vph)	1099	27	70	791	14	221
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3579	1601	1789	3579	1789	1601
Flt Permitted	1.00	1.00	0.19	1.00	0.95	1.00
Satd. Flow (perm)	3579	1601	349	3579	1789	1601
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1169	29	74	841	15	235
RTOR Reduction (vph)	0	12	0	0	0	60
Lane Group Flow (vph)	1169	17	74	841	15	175
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	54.0	54.0	54.0	54.0	24.0	24.0
Effective Green, g (s)	54.0	54.0	54.0	54.0	24.0	24.0
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.27	0.27
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Grp Cap (vph)	2147	960	209	2147	477	426
v/s Ratio Prot	c0.33			0.24	0.01	
v/s Ratio Perm		0.01	0.21			c0.11
v/c Ratio	0.54	0.02	0.35	0.39	0.03	0.41
Uniform Delay, d1	10.7	7.3	9.1	9.4	24.4	27.2
Progression Factor	0.69	0.53	0.62	0.61	1.00	1.00
Incremental Delay, d2	0.9	0.0	4.2	0.5	0.1	2.9
Delay (s)	8.3	3.9	9.9	6.2	24.5	30.1
Level of Service	A	A	A	A	C	C
Approach Delay (s)	8.2			6.5	29.8	
Approach LOS	A			A	C	

Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Queues

35: Black Property Street A & Glendon Drive

8/31/2016

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	849	67	153	722	195	395
v/c Ratio	0.43	0.07	0.51	0.36	0.35	0.66
Control Delay	12.5	2.7	28.5	20.3	26.2	22.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.5	2.7	28.5	20.3	26.2	22.7
Queue Length 50th (m)	42.1	0.0	18.9	46.7	25.9	36.7
Queue Length 95th (m)	55.2	5.3	31.2	57.8	43.7	67.9
Internal Link Dist (m)	503.1			263.6	181.4	
Turn Bay Length (m)		50.0	50.0			
Base Capacity (vph)	1988	919	298	1988	556	598
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.07	0.51	0.36	0.35	0.66

Intersection Summary

HCM Signalized Intersection Capacity Analysis
35: Black Property Street A & Glendon Drive

8/31/2016

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰	↑↑	↰	↱
Traffic Volume (vph)	781	62	141	664	179	363
Future Volume (vph)	781	62	141	664	179	363
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3579	1601	1789	3579	1789	1601
Flt Permitted	1.00	1.00	0.28	1.00	0.95	1.00
Satd. Flow (perm)	3579	1601	537	3579	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	849	67	153	722	195	395
RTOR Reduction (vph)	0	30	0	0	0	101
Lane Group Flow (vph)	849	37	153	722	195	294
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	50.0	50.0	50.0	50.0	28.0	28.0
Effective Green, g (s)	50.0	50.0	50.0	50.0	28.0	28.0
Actuated g/C Ratio	0.56	0.56	0.56	0.56	0.31	0.31
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Grp Cap (vph)	1988	889	298	1988	556	498
v/s Ratio Prot	0.24			0.20	0.11	
v/s Ratio Perm		0.02	c0.29			c0.18
v/c Ratio	0.43	0.04	0.51	0.36	0.35	0.59
Uniform Delay, d1	11.7	9.1	12.4	11.1	24.0	26.2
Progression Factor	1.00	1.00	1.63	1.76	1.00	1.00
Incremental Delay, d2	0.7	0.1	5.9	0.5	1.7	5.1
Delay (s)	12.3	9.2	26.1	20.1	25.7	31.3
Level of Service	B	A	C	C	C	C
Approach Delay (s)	12.1			21.1	29.4	
Approach LOS	B			C	C	

Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
8: Glendon Drive & Amiens Road

	↗	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑	↑↱		↰↱	
Traffic Volume (veh/h)	23	820	957	34	25	26
Future Volume (Veh/h)	23	820	957	34	25	26
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	24	872	1018	36	27	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	1054				1520	527
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1054				1520	527
tC, single (s)	4.2				6.8	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				75	94
cM capacity (veh/h)	639				107	491

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	24	436	436	679	375	55
Volume Left	24	0	0	0	0	27
Volume Right	0	0	0	0	36	28
cSH	639	1700	1700	1700	1700	178
Volume to Capacity	0.04	0.26	0.26	0.40	0.22	0.31
Queue Length 95th (m)	0.9	0.0	0.0	0.0	0.0	9.4
Control Delay (s)	10.9	0.0	0.0	0.0	0.0	34.0
Lane LOS	B					D
Approach Delay (s)	0.3			0.0		34.0
Approach LOS						D

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	37.5%	ICU Level of Service	A
Analysis Period (min)	15		

Queues
9: Komoka Road & Glendon Drive

8/31/2016

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	101	901	98	757	116	32	174	112	112
v/c Ratio	0.35	0.54	0.43	0.45	0.15	0.09	0.31	0.30	0.21
Control Delay	14.6	12.9	18.2	11.9	2.7	16.0	10.4	19.0	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.6	12.9	18.2	11.9	2.7	16.0	10.4	19.0	9.0
Queue Length 50th (m)	6.6	34.6	6.7	27.6	0.0	2.5	7.0	9.4	3.5
Queue Length 95th (m)	16.9	49.2	19.0	39.7	6.6	7.8	19.3	20.6	13.0
Internal Link Dist (m)		391.2		237.7			183.9		242.3
Turn Bay Length (m)	30.0		45.0		45.0	25.0		25.0	
Base Capacity (vph)	290	1663	227	1686	794	355	566	369	530
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.54	0.43	0.45	0.15	0.09	0.31	0.30	0.21

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↑	↱	↰	↱		↰	↱	
Traffic Volume (vph)	99	868	15	96	742	114	31	73	98	110	44	66
Future Volume (vph)	99	868	15	96	742	114	31	73	98	110	44	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.91		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1755	3559		1738	3614	1570	1644	1686		1807	1613	
Flt Permitted	0.34	1.00		0.27	1.00	1.00	0.68	1.00		0.65	1.00	
Satd. Flow (perm)	623	3559		487	3614	1570	1185	1686		1231	1613	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	101	886	15	98	757	116	32	74	100	112	45	67
RTOR Reduction (vph)	0	2	0	0	0	62	0	61	0	0	47	0
Lane Group Flow (vph)	101	899	0	98	757	54	32	113	0	112	65	0
Heavy Vehicles (%)	4%	2%	21%	5%	1%	4%	11%	3%	5%	1%	12%	6%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6		6	8			4		
Actuated Green, G (s)	28.0	28.0		28.0	28.0	28.0	18.0	18.0		18.0	18.0	
Effective Green, g (s)	28.0	28.0		28.0	28.0	28.0	18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.47	0.47		0.47	0.47	0.47	0.30	0.30		0.30	0.30	
Clearance Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Lane Grp Cap (vph)	290	1660		227	1686	732	355	505		369	483	
v/s Ratio Prot		c0.25			0.21			0.07			0.04	
v/s Ratio Perm	0.16			0.20		0.03	0.03			c0.09		
v/c Ratio	0.35	0.54		0.43	0.45	0.07	0.09	0.22		0.30	0.13	
Uniform Delay, d1	10.2	11.4		10.7	10.8	8.8	15.1	15.8		16.2	15.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.3	1.3		5.9	0.9	0.2	0.5	1.0		2.1	0.6	
Delay (s)	13.5	12.7		16.6	11.7	9.0	15.6	16.8		18.3	15.9	
Level of Service	B	B		B	B	A	B	B		B	B	
Approach Delay (s)		12.8			11.8			16.6			17.1	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	89.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑	↑↑	↱	↰↱	
Traffic Volume (veh/h)	3	1070	957	43	18	6
Future Volume (Veh/h)	3	1070	957	43	18	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	3	1103	987	44	19	6
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	1031				1544	494
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1031				1544	494
tC, single (s)	4.8				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.5				3.5	3.3
p0 queue free %	99				82	99
cM capacity (veh/h)	512				107	527

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1
Volume Total	3	552	552	494	494	44	25
Volume Left	3	0	0	0	0	0	19
Volume Right	0	0	0	0	0	44	6
cSH	512	1700	1700	1700	1700	1700	132
Volume to Capacity	0.01	0.32	0.32	0.29	0.29	0.03	0.19
Queue Length 95th (m)	0.1	0.0	0.0	0.0	0.0	0.0	5.1
Control Delay (s)	12.1	0.0	0.0	0.0	0.0	0.0	38.5
Lane LOS	B						E
Approach Delay (s)	0.0			0.0			38.5
Approach LOS							E

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑	↑↑	↱	↰	↱
Traffic Volume (veh/h)	75	1005	970	46	24	43
Future Volume (Veh/h)	75	1005	970	46	24	43
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	77	1036	1000	47	25	44
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	1047				1672	500
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1047				1672	500
tC, single (s)	4.2				6.8	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	88				68	91
cM capacity (veh/h)	654				78	508

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1	SB 2
Volume Total	77	518	518	500	500	47	25	44
Volume Left	77	0	0	0	0	0	25	0
Volume Right	0	0	0	0	0	47	0	44
cSH	654	1700	1700	1700	1700	1700	78	508
Volume to Capacity	0.12	0.30	0.30	0.29	0.29	0.03	0.32	0.09
Queue Length 95th (m)	3.0	0.0	0.0	0.0	0.0	0.0	9.1	2.2
Control Delay (s)	11.2	0.0	0.0	0.0	0.0	0.0	71.5	12.8
Lane LOS	B						F	B
Approach Delay (s)	0.8			0.0			34.0	
Approach LOS							D	

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

Queues
16: Jefferies Road/Vanneck Road & Glendon Drive

8/31/2016

	↗	→	↘	↙	←	↖	↖	↑	↘	↓
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	296	840	216	402	996	103	241	457	135	681
v/c Ratio	1.17	0.70	0.35	1.23	0.80	0.17	1.19	0.77	0.50	1.14
Control Delay	136.7	36.9	20.6	146.9	32.6	5.9	148.4	32.3	22.7	109.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	136.7	36.9	20.6	146.9	32.6	5.9	148.4	32.3	22.7	109.8
Queue Length 50th (m)	~55.0	58.4	13.3	~59.6	80.9	0.7	~31.6	57.3	13.6	~126.5
Queue Length 95th (m)	m#90.5	78.5	m30.7	#114.6	104.8	10.8	#77.3	#101.9	24.6	#191.9
Internal Link Dist (m)		269.5			256.5			153.1		13.5
Turn Bay Length (m)	45.0		25.0	60.0		35.0	40.0			
Base Capacity (vph)	253	1204	617	327	1244	609	202	595	268	596
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	1.17	0.70	0.35	1.23	0.80	0.17	1.19	0.77	0.50	1.14

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
16: Jefferies Road/Vanneck Road & Glendon Drive

8/31/2016

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↱		↰	↱	
Traffic Volume (vph)	278	790	203	378	936	97	227	166	263	127	233	407
Future Volume (vph)	278	790	203	378	936	97	227	166	263	127	233	407
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	7.0	7.0	2.0	7.0	7.0	2.0	7.0		2.0	7.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1772	3614	1601	1825	3614	1585	1825	1710		1772	1695	
Flt Permitted	0.13	1.00	1.00	0.19	1.00	1.00	0.14	1.00		0.25	1.00	
Satd. Flow (perm)	249	3614	1601	363	3614	1585	274	1710		463	1695	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	296	840	216	402	996	103	241	177	280	135	248	433
RTOR Reduction (vph)	0	0	84	0	0	64	0	63	0	0	70	0
Lane Group Flow (vph)	296	840	132	402	996	39	241	394	0	135	611	0
Heavy Vehicles (%)	3%	1%	2%	0%	1%	3%	0%	2%	2%	3%	0%	4%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	38.0	30.0	30.0	40.0	31.0	31.0	33.0	28.0		33.0	28.0	
Effective Green, g (s)	38.0	30.0	30.0	40.0	31.0	31.0	33.0	28.0		33.0	28.0	
Actuated g/C Ratio	0.42	0.33	0.33	0.44	0.34	0.34	0.37	0.31		0.37	0.31	
Clearance Time (s)	2.0	7.0	7.0	2.0	7.0	7.0	2.0	7.0		2.0	7.0	
Lane Grp Cap (vph)	240	1204	533	307	1244	545	186	532		242	527	
v/s Ratio Prot	0.11	0.23		c0.13	0.28		c0.07	0.23		0.03	c0.36	
v/s Ratio Perm	c0.41		0.08	0.45		0.02	0.40			0.17		
v/c Ratio	1.23	0.70	0.25	1.31	0.80	0.07	1.30	0.74		0.56	1.16	
Uniform Delay, d1	20.3	26.1	21.8	20.3	26.7	19.8	27.5	27.7		20.8	31.0	
Progression Factor	2.23	1.30	1.96	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	128.6	2.5	0.8	160.7	5.5	0.3	166.9	8.9		9.0	91.6	
Delay (s)	173.8	36.4	43.6	181.1	32.2	20.1	194.3	36.7		29.8	122.6	
Level of Service	F	D	D	F	C	C	F	D		C	F	
Approach Delay (s)		67.7			71.2			91.1			107.2	
Approach LOS		E			E			F			F	

Intersection Summary			
HCM 2000 Control Delay	80.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	114.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
20: Vanneck Road & Coldstream Road

8/31/2016

	↗	↘	↖	↑	↓	↙
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↰	↱	
Traffic Volume (veh/h)	1	92	77	464	674	2
Future Volume (Veh/h)	1	92	77	464	674	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	1	98	82	494	717	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)				37		
pX, platoon unblocked	0.87					
vC, conflicting volume	1376	718	719			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1357	718	719			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	77	91			
cM capacity (veh/h)	131	432	892			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	99	576	719
Volume Left	1	82	0
Volume Right	98	0	2
cSH	423	892	1700
Volume to Capacity	0.23	0.09	0.42
Queue Length 95th (m)	6.8	2.3	0.0
Control Delay (s)	16.1	2.4	0.0
Lane LOS	C	A	
Approach Delay (s)	16.1	2.4	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
24: Kilworth Park Drive & Glendon Drive

8/31/2016

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰	↑↑	Y	
Traffic Volume (veh/h)	1150	33	149	1378	34	75
Future Volume (Veh/h)	1150	33	149	1378	34	75
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	1186	34	154	1421	35	77
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			1220		2204	593
vC1, stage 1 conf vol					1186	
vC2, stage 2 conf vol					1018	
vCu, unblocked vol			1220		2204	593
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			73		79	83
cM capacity (veh/h)			579		167	454

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1
Volume Total	593	593	34	154	710	710	112
Volume Left	0	0	0	154	0	0	35
Volume Right	0	0	34	0	0	0	77
cSH	1700	1700	1700	579	1700	1700	295
Volume to Capacity	0.35	0.35	0.02	0.27	0.42	0.42	0.38
Queue Length 95th (m)	0.0	0.0	0.0	8.1	0.0	0.0	13.0
Control Delay (s)	0.0	0.0	0.0	13.5	0.0	0.0	24.4
Lane LOS				B			C
Approach Delay (s)	0.0			1.3			24.4
Approach LOS							C

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
27: Glendon Drive & Old River Road

8/31/2016

	↗	→	←	↖	↘	↙
Movement	**EBL**	**EBT**	**WBT**	**WBR**	**SBL**	**SBR**
Lane Configurations		↰	↱		Y	
Traffic Volume (veh/h)	1	1229	1536	90	71	6
Future Volume (Veh/h)	1	1229	1536	90	71	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	1	1280	1600	94	74	6
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	1694				2929	1647
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1694				2929	1647
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				0	95
cM capacity (veh/h)	382				17	124

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1281	1694	80
Volume Left	1	0	74
Volume Right	0	94	6
cSH	382	1700	18
Volume to Capacity	0.00	1.00	4.40
Queue Length 95th (m)	0.1	0.0	Err
Control Delay (s)	0.2	0.0	Err
Lane LOS	A		F
Approach Delay (s)	0.2	0.0	Err
Approach LOS			F

Intersection Summary			
Average Delay	261.9		
Intersection Capacity Utilization	97.3%	ICU Level of Service	F
Analysis Period (min)	15		

Queues
33: Springfield Way & Glendon Drive

8/31/2016

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1201	24	245	1441	30	180
v/c Ratio	0.72	0.03	0.56	0.60	0.08	0.39
Control Delay	31.8	16.0	17.5	9.5	30.1	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.8	16.0	17.5	9.5	30.1	7.7
Queue Length 50th (m)	80.6	1.4	23.4	57.0	4.3	0.0
Queue Length 95th (m)	104.7	m1.9	m27.1	m78.8	11.4	16.2
Internal Link Dist (m)	255.5			73.4	186.9	
Turn Bay Length (m)		50.0	50.0			
Base Capacity (vph)	1670	758	435	2386	357	464
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.03	0.56	0.60	0.08	0.39

Intersection Summary
m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
33: Springfield Way & Glendon Drive

8/31/2016

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰	↑↑	↰	↱
Traffic Volume (vph)	1117	22	228	1340	28	167
Future Volume (vph)	1117	22	228	1340	28	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	2.0	6.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3579	1601	1789	3579	1789	1601
Flt Permitted	1.00	1.00	0.12	1.00	0.95	1.00
Satd. Flow (perm)	3579	1601	221	3579	1789	1601
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	1201	24	245	1441	30	180
RTOR Reduction (vph)	0	12	0	0	0	144
Lane Group Flow (vph)	1201	12	245	1441	30	36
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	42.0	42.0	60.0	60.0	18.0	18.0
Effective Green, g (s)	42.0	42.0	60.0	60.0	18.0	18.0
Actuated g/C Ratio	0.47	0.47	0.67	0.67	0.20	0.20
Clearance Time (s)	6.0	6.0	2.0	6.0	6.0	6.0
Lane Grp Cap (vph)	1670	747	426	2386	357	320
v/s Ratio Prot	c0.34		0.10	c0.40	0.02	
v/s Ratio Perm		0.01	0.28			c0.02
v/c Ratio	0.72	0.02	0.58	0.60	0.08	0.11
Uniform Delay, d1	19.3	12.9	13.4	8.4	29.3	29.5
Progression Factor	1.53	2.67	1.44	1.06	1.00	1.00
Incremental Delay, d2	1.8	0.0	2.0	0.4	0.5	0.7
Delay (s)	31.3	34.5	21.2	9.2	29.8	30.2
Level of Service	C	C	C	A	C	C
Approach Delay (s)	31.3			11.0	30.1	
Approach LOS	C			B	C	

Intersection Summary			
HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues

35: Black Property Street A & Glendon Drive

8/31/2016

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	880	238	546	941	153	330
v/c Ratio	0.79	0.36	0.79	0.39	0.43	0.57
Control Delay	34.5	5.7	33.5	6.8	35.8	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.5	5.7	33.5	6.8	35.8	7.9
Queue Length 50th (m)	72.6	1.4	90.3	15.0	23.3	0.0
Queue Length 95th (m)	95.0	17.2	#126.9	59.3	41.3	21.1
Internal Link Dist (m)	503.8			262.9	180.1	
Turn Bay Length (m)		50.0	50.0			
Base Capacity (vph)	1113	653	692	2386	357	584
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.36	0.79	0.39	0.43	0.57

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰	↑↑	↰	↱
Traffic Volume (vph)	810	219	502	866	141	304
Future Volume (vph)	810	219	502	866	141	304
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	2.0	6.0	6.0	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3579	1601	1789	3579	1789	1601
Flt Permitted	1.00	1.00	0.13	1.00	0.95	1.00
Satd. Flow (perm)	3579	1601	254	3579	1789	1601
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	880	238	546	941	153	330
RTOR Reduction (vph)	0	156	0	0	0	264
Lane Group Flow (vph)	880	82	546	941	153	66
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2	6			8
Actuated Green, G (s)	28.0	28.0	60.0	60.0	18.0	18.0
Effective Green, g (s)	28.0	28.0	60.0	60.0	18.0	18.0
Actuated g/C Ratio	0.31	0.31	0.67	0.67	0.20	0.20
Clearance Time (s)	6.0	6.0	2.0	6.0	6.0	6.0
Lane Grp Cap (vph)	1113	498	681	2386	357	320
v/s Ratio Prot	c0.25		c0.27	0.26	c0.09	
v/s Ratio Perm		0.05	0.27			0.04
v/c Ratio	0.79	0.17	0.80	0.39	0.43	0.21
Uniform Delay, d1	28.3	22.5	19.6	6.8	31.5	30.0
Progression Factor	1.00	1.00	1.45	0.93	1.00	1.00
Incremental Delay, d2	5.8	0.7	8.0	0.4	3.7	1.5
Delay (s)	34.1	23.2	36.4	6.7	35.2	31.5
Level of Service	C	C	D	A	D	C
Approach Delay (s)	31.8			17.6	32.7	
Approach LOS	C			B	C	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

E.1 OLD RIVER ROAD

From: Bartlett, Isaac
To: Bergman, Stephanie
Subject: FW: Glendon Drive EA - Additional Scope - Old River Road
Date: Thursday, September 08, 2016 3:48:22 PM
Attachments: Figure 1 - Existing Peak Hour Volumes.pdf
Figure 2 - Existing 8-Hour Volumes.pdf

From: Pappin, Garry
Sent: March-04-16 1:26 PM
To: Bartlett, Isaac; Marr, Corri
Subject: FW: Glendon Drive EA - Additional Scope - Old River Road

The results of the traffic counts are attached with Figure 1 showing the a.m. and p.m. peak hour traffic volumes and Figure 2 showing the total counted volumes over the 8-hour period (sum of 7-10 a.m., 11:30 a.m. to 1:30 p.m., and 3-6 p.m.). The Figures also have an inset showing the a.m. and p.m. peak hour trip generation that would be expected from the local residential development along Pulham Road and Old River Road.

The traffic volumes show that the total volume entering during a.m. and p.m. peak hour is 78 and 120, respectively. If there was no non-local through traffic, the expected inbound trips would be 7 and 18 for the a.m. and p.m. peak hour, respectively. Therefore, it can be deduced that the non-local through traffic entering this area is approximately 70 in the a.m. peak hour and 100 in the p.m. peak hour.

Similarly the total volume exiting during the a.m. and p.m. peak hour is 78 and 117, respectively. If there was no non-local through traffic, the expected outbound trips would be 20 and 11 for the a.m. and p.m. peak hour, respectively. Therefore, it can be deduced that the non-local through traffic exiting this area is approximately 60 in the a.m. peak hour and 105 in the p.m. peak hour.

Therefore, the estimated two-way non-local through traffic volume would be 130 during the a.m. peak hour (approximately 2 trips per minute) and 205 during the p.m. peak hour (approximately 3 trips per minute). This information can be compared with the licence plate traces as required to refine the estimate of non-local through traffic using the Old River Road-Pulham Road route between Glendon Drive and Vanneck Road.

The traffic counts also show a distinct through movement pattern from Vanneck Road to Glendon Drive with the volume of Vanneck Road to Pulham Road left turns virtually matching the volume of Old River Road to Glendon Drive left turns during both the a.m. and p.m. peak hour – approximately 40 vehicles during the a.m. peak hour and 50 vehicles during the p.m. peak hour. The comparable right turn volumes at each end of the Old River Road-Pulham Road route are negligible in either peak hour (less than 5 vehicles turning right from Vanneck Road to Pulham Road and less than 5 vehicles turning right from Old River Road to Glendon Drive).

Similarly, there is a distinct through movement pattern from Glendon Drive to Vanneck Road with the volume of Glendon Drive to Old River Road right turns virtually matching the volume of Pulham Road to Vanneck Road right turns during both the a.m. and p.m. peak hour – approximately 35 vehicles during the a.m. peak hour and approximately 65 vehicles during the p.m. peak hour. The comparable left turn volumes at each end of the Old River Road-Pulham Road route are negligible in either peak hour (no vehicles making the prohibited left turn from Glendon Road to Old River Road and less than 5 vehicles turning left from Pulham Road to Vanneck Road).

The total volume in the eight hour period studied has similar results and patterns. Over the course of the eight hour period, the estimated two-way non-local through traffic deduced from the traffic counts is approximately 540 vehicle trips. Based on a rule of thumb where the factor between an eight hour count and a daily count is typically in the order of 1.8 to 2, it is estimated that the Old River Road-Pulham Road route is accommodating approximately 1,000 non-local trips on a weekday.

The preliminary conclusions that can be drawn from the count data are as follows:

- Even with the amount of non-local traffic on the Old River Road-Pulham Road route, both of these roads are operating well within capacity
- The estimated daily traffic on this route is comparable to the typical upper end of the threshold for a road with a local street classification (i.e. 1,000 to 1,500 vehicles per day)
- If this route had restrictions placed on it (e.g. time of day turn prohibitions that would apply to both local and non-local traffic) or if it was closed as a through route (i.e. cul-de-sacs within the area served by these roads), the rerouting of the non-local peak hour traffic would have negligible impacts on other parts of the road network (such as the Glendon Drive/Jefferies Road-Vanneck Road intersection) since the hourly through volumes are relatively low.

Once you have the results of the licence plate trace, please pass them on and we can incorporate that information in a short report. Alternatively, if your staff would like to prepare the report, let us know what inputs you need from us. Although it is logically a bit of overkill, we could include a peak hour operational analysis of the three intersections counted for existing conditions as well as an analysis of the Glendon Drive/Jefferies Road-Vanneck Road intersection with all or part of the non-local through traffic rerouted away from the Old River Road-Pulham Road route (depending on a full or partial closure scenario).

Regards,

Garry Pappin, BES, LEL, ENV SP
Senior Associate, Transportation
Stantec
300W-675 Cochrane Drive Markham ON L3R 0B8
Phone: (905) 944-4803
Cell: (647) 298-8261
Fax: (905) 474-9889
Garry.Pappin@stantec.com

From: Soo, Adrian
Sent: Friday, March 04, 2016 12:41 PM
To: Pappin, Garry
Subject: Glendon Drive EA - Additional Scope - Old River Road

As requested. Traffic volume figures for discussion.

Figure 1 – Existing Peak Hour Traffic Volumes;
Figure 2 – Existing 8-Hour Traffic Volumes;

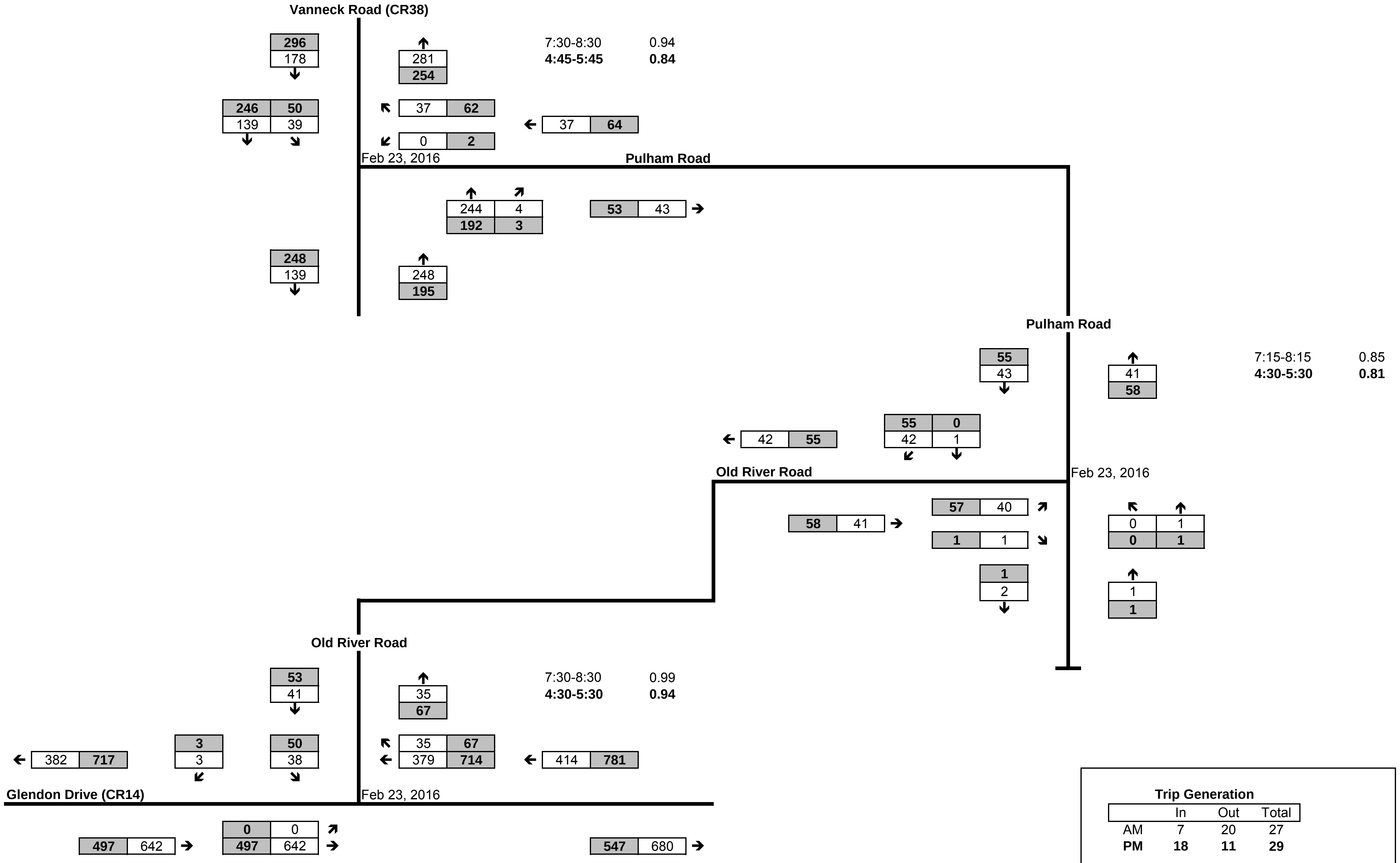
As predicted the 8-hour count volumes confirm the findings of the peak hour counts. That being, the majority of entering/exiting volumes are through commuter traffic.

Regards,

Adrian Soo, P. Eng.

Transportation Engineer
Stantec
300W-675 Cochrane Drive Markham ON L3R 0B8
Phone: (905) 944 - 6192
Adrian.Soo@stantec.com

Scenario 1
Do Nothing
Raw Count Data
AM/PM Peak Hour



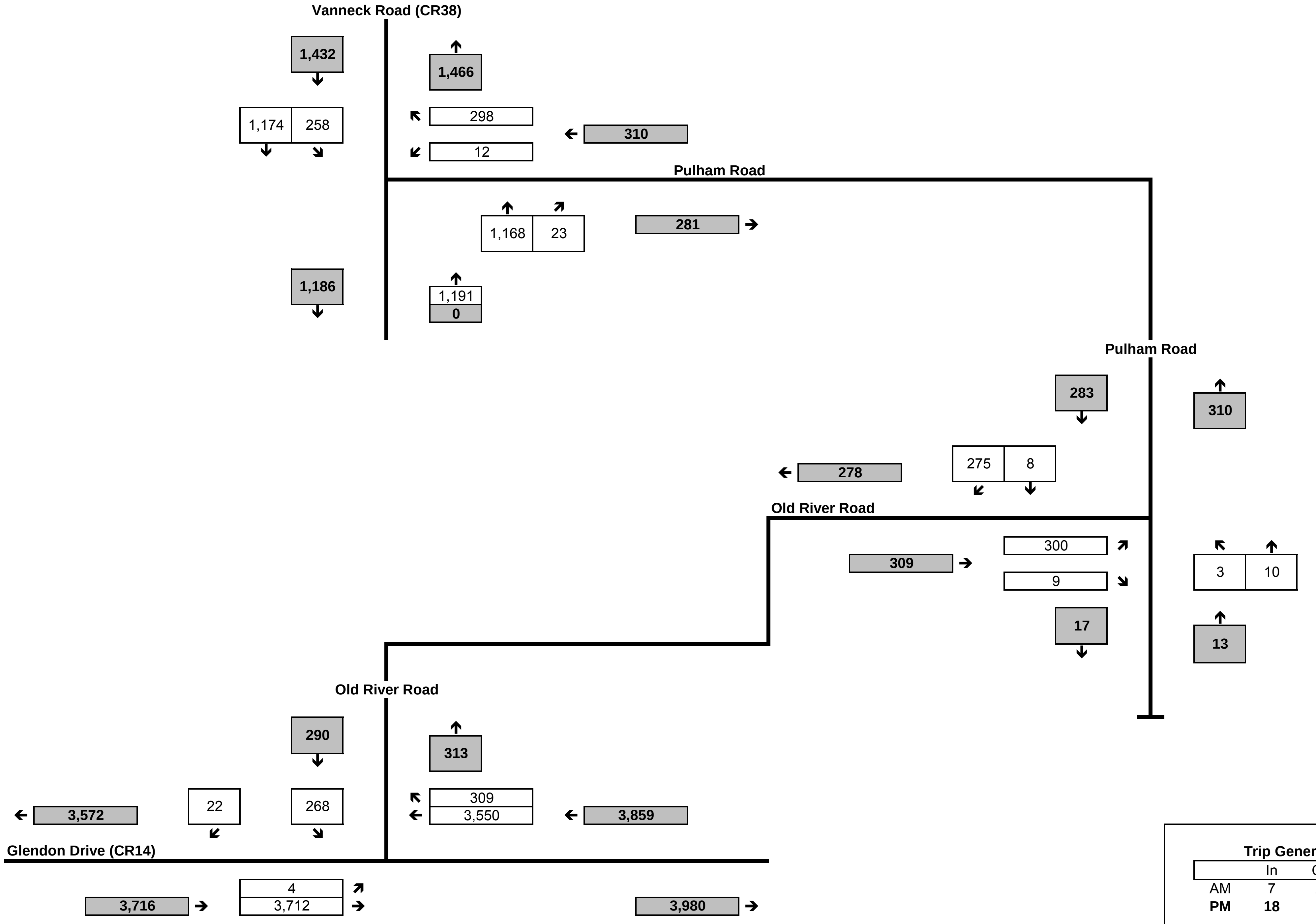
Trip Generation

	In	Out	Total
AM	7	20	27
PM	**18**	**11**	**29**

5 Residences located on Pulham Road
19 Residences located on Old River Road

Figure 1
Existing Peak Hour Traffic Volumes

Scenario 1
Do Nothing
Raw Count Data
8-Hour Traffic Count



Trip Generation

	In	Out	Total
AM	7	20	27
PM	**18**	**11**	**29**

5 Residences located on Pulham Road
19 Residences located on Old River Road

Figure 2
Existing 8-Hour Traffic Volumes

Old River Road Through Traffic Summary - License Plate Tracking - Feb 2016

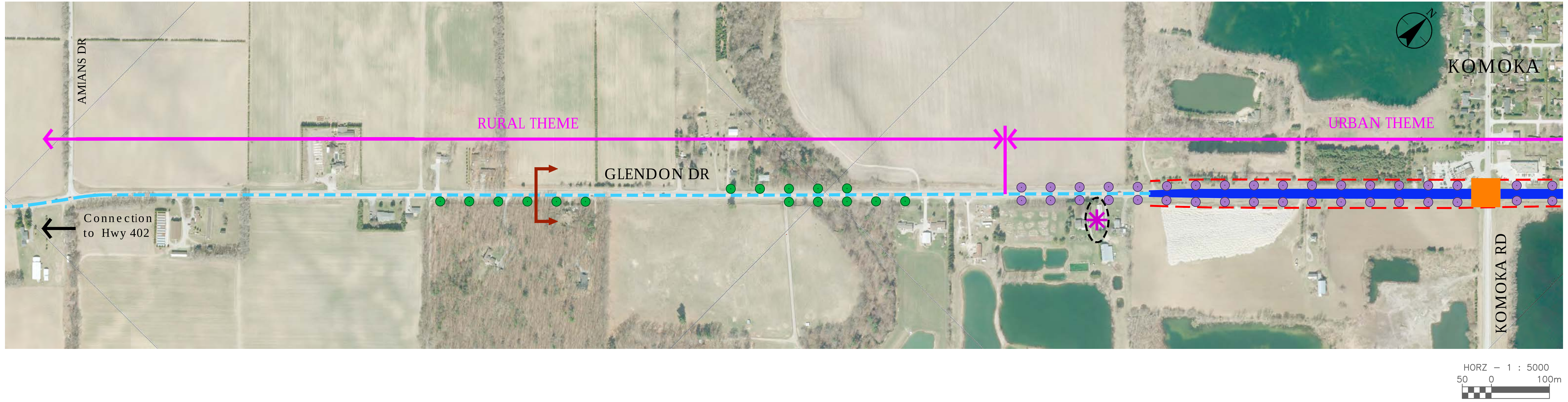
Time	0700-0800	0800-0900	0900-1000	1130-1230	1230-1330	1500-1600	1600-1700	1700-1800	Total
Cars	71	66	59	54	56	66	99	110	581
Thru	59	55	52	52	51	63	89	97	518
% Thru	83%	83%	88%	96%	91%	95%	90%	88%	89%

Glendon Drive Streetscape
Schedule C Municipal Class Environmental Assessment
Draft - June 2018

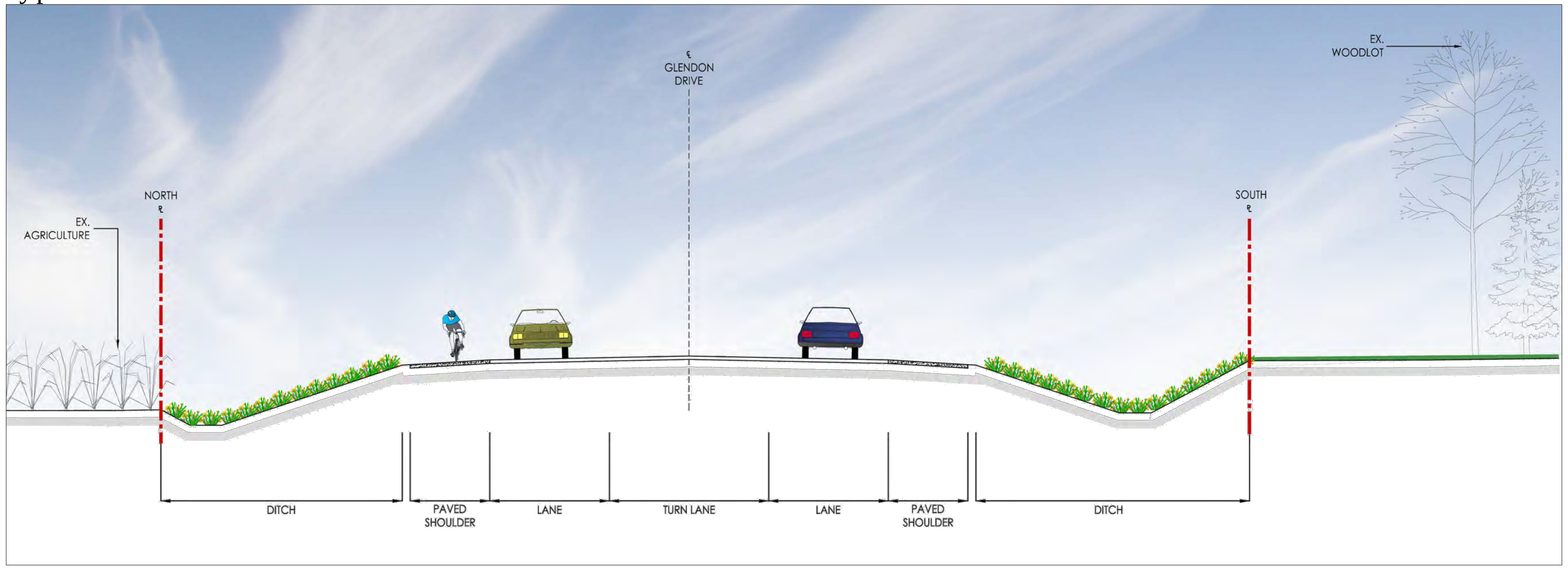
Stantec

APPENDIX F: URBAN DESIGN

Plan



Typical Cross Section



Opportunities:

1. Implement a Komoka community entry sign at the west community boundary.
2. Enhance the Komoka community entry sign with decorative paving, ornamental tree and landscaping to create a gateway feature.
3. Add a distinctive streetscape treatment to key intersections to facilitate and highlight pedestrian connectivity.
4. Add landscaped medians. Medians, in conjunction with the Komoka community entry sign and associated gateway features will visually communicate 'you are entering a community' to vehicular, cyclist and pedestrian traffic.
5. Plant a continuous row of ornamental trees as part of the gateway feature, at key intersections and along the Komoka-Kilworth corridor to create a continuous, aesthetically connected streetscape. Ornamental trees could be flowering, have a unique fall colour and/or distinctive form.
6. Implement distinctive street lighting along the Komoka-Kilworth streetscape corridor.
7. Plant large, native shade trees on private property along Glendon Drive from the west limit of Komoka to Highway 402. In addition, add groupings of native shrub species where feasible.

Glendon Drive

paving the way for an active community

middlesex centre
in the centre of it all

middlesex county

Legend

✳	MUNICIPAL ENTRY SIGN
✳	COMMUNITY ENTRY SIGN
◯	FEATURE / ORNAMENTAL PLANTING AREA
🟧	INTERSECTION IMPROVEMENT
🟦	LANDSCAPED MEDIAN
●	ORNAMENTAL STREET TREE
●	LARGE NATIVE STREET TREE
– – –	MULTI-USE TRAIL
- - - - -	ON-ROAD CYCLING
▨	MAINTAIN EX. WOODLAND EDGE
⊔	APPROXIMATE LOCATION OF TYPICAL CROSS SECTION
↔	DELINEATION OF THEME ZONES

Notes

June 2016

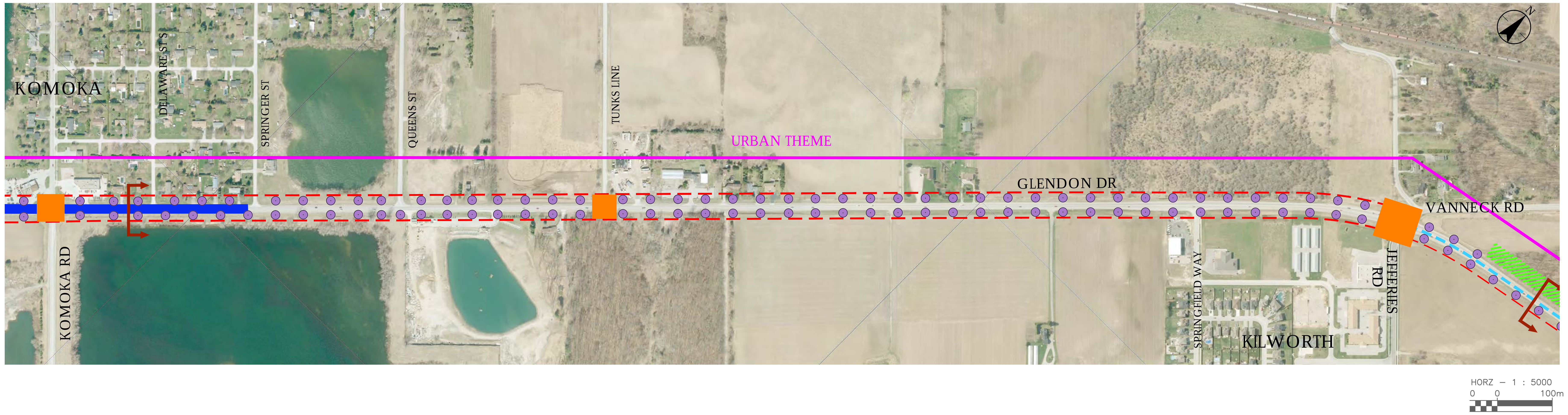
Stantec

Urban Design Concept Highway 402 to Komoka Road

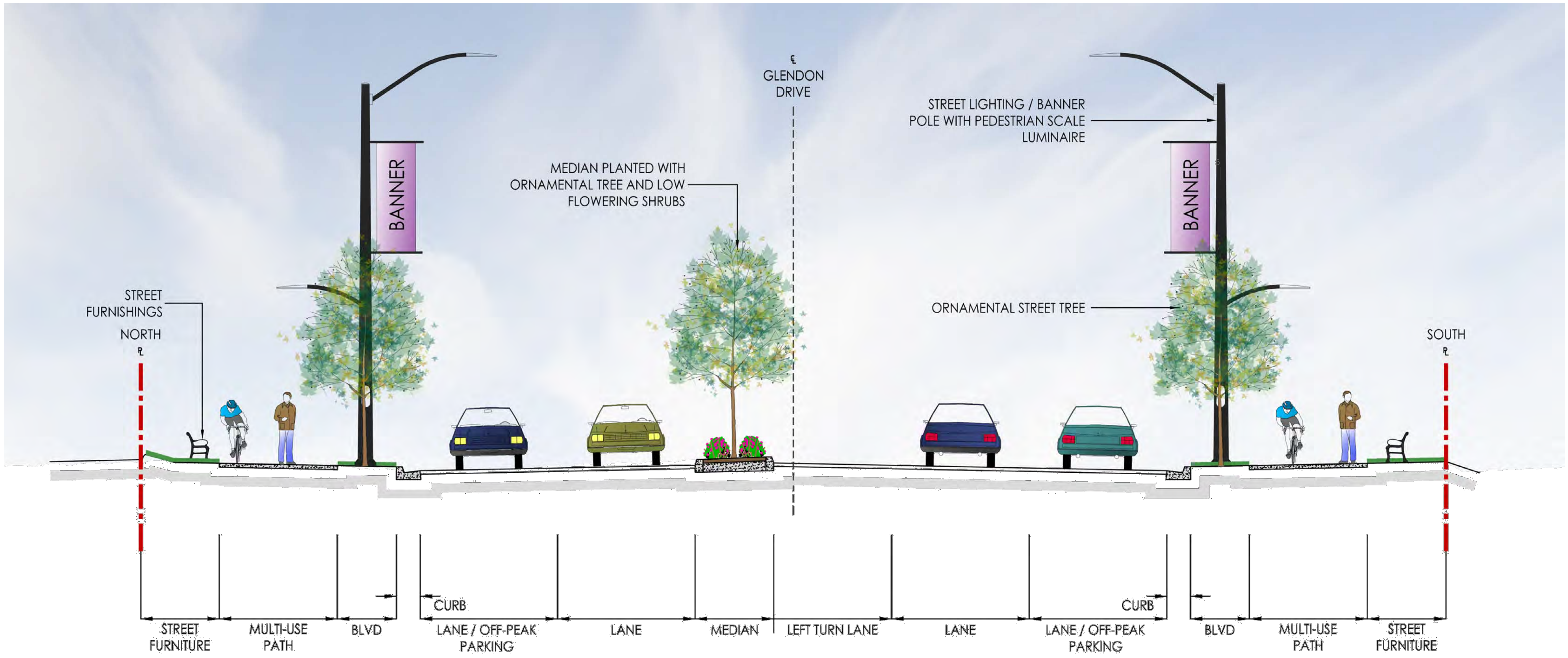
V:\01614\active\161413164\planning\Class EA\Urban Design\PIC#2\Drawings\161413164_LC.dwg
2016-6-22 2:33 PM by: Hossfeld, Alexandra

ORIGINAL SHEET - ANSI D

Plan



Typical Cross Section



V:\01614\active\161413164\planning\Class EA\Urban Design\PIC#2\Drawings\161413164_LC.dwg
2016-6-23 4:47 PM by: Hossfeld, Alexandra

ORIGINAL SHEET - ANSI D

Glendon Drive

paving the way for an active community

middlesex centre
in the centre of it all

middlesex county

Legend

✳	MUNICIPAL ENTRY SIGN
✳	COMMUNITY ENTRY SIGN
◌	FEATURE / ORNAMENTAL PLANTING AREA
🟧	INTERSECTION IMPROVEMENT
🟦	LANDSCAPED MEDIAN
●	ORNAMENTAL STREET TREE
●	LARGE NATIVE STREET TREE
- - -	MULTI-USE TRAIL
- - -	ON-ROAD CYCLING
▨	MAINTAIN EX. WOODLAND EDGE
⊔	APPROXIMATE LOCATION OF TYPICAL CROSS SECTION
↔	DELINEATION OF THEME ZONES

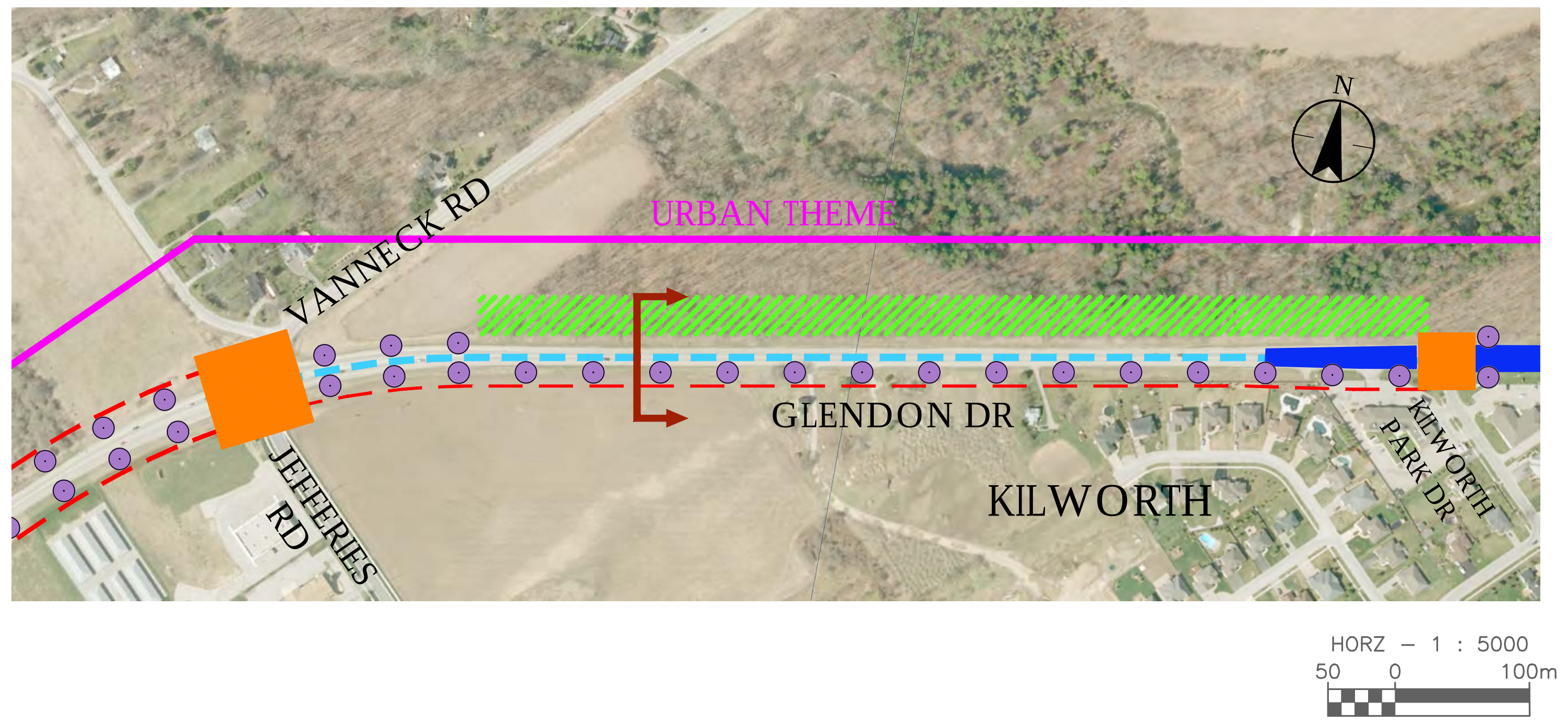
Notes

June 2016

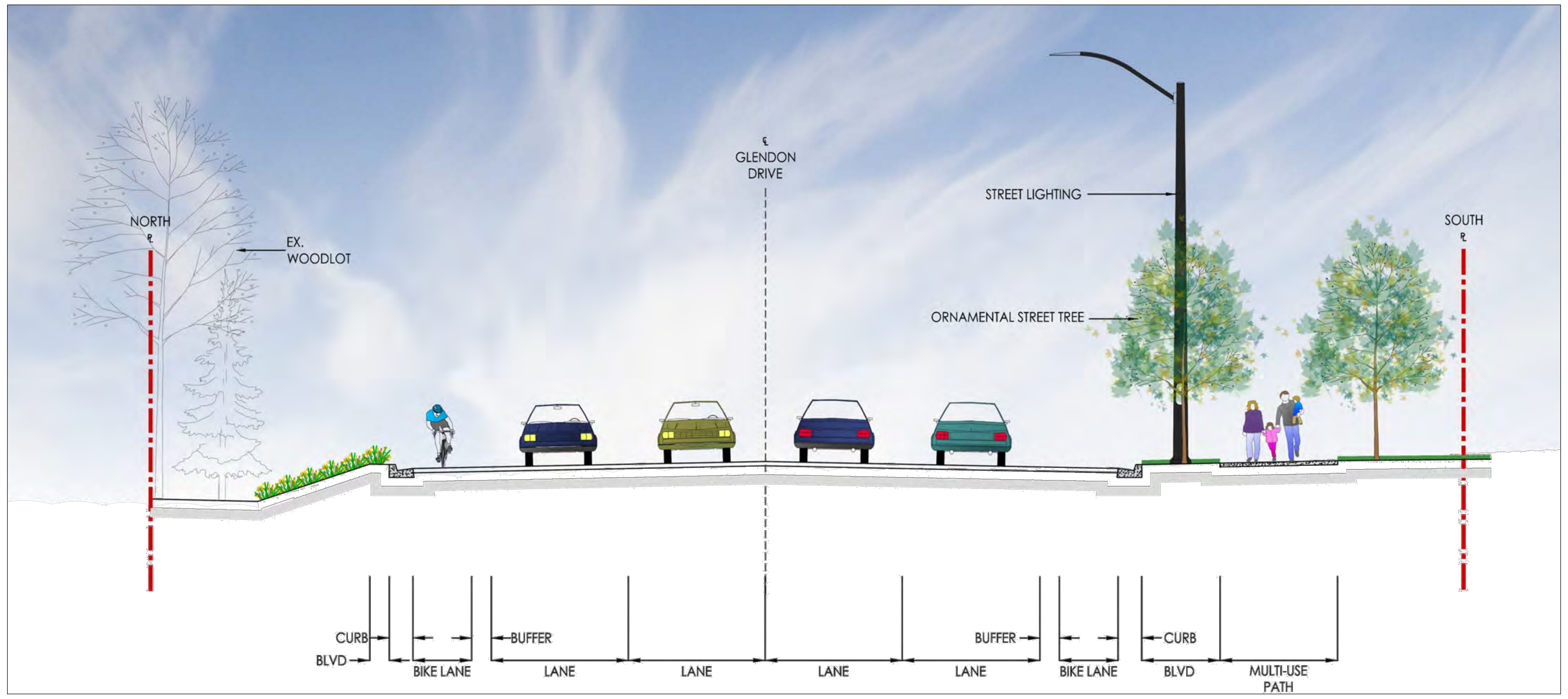
Stantec

Urban Design Concept
Komoka Road to Vanneck Road

Plan



Typical Cross Section



Opportunities:

1. Add a distinctive streetscape treatment to proposed roundabout, similar to the design applied to key intersections, to facilitate and highlight pedestrian connectivity and maintain continuity within the Komoka-Kilworth streetscape corridor.
2. Add a distinctive streetscape treatment to the newly signalized Kilworth Park Drive and Glendon Drive intersection to facilitate and highlight pedestrian connectivity.
3. Plant a continuous row of ornamental trees as part of the gateway feature, at key intersections and along the Komoka-Kilworth corridor to create a continuous, aesthetically connected streetscape. Ornamental trees could be flowering, have a unique fall colour and/or distinctive form.
4. Preserve and emphasize the natural edge of the existing woodlot located on the north side of Glendon Drive.
5. Implement distinctive street lighting along the Komoka-Kilworth streetscape corridor.

V:\01614\active\161413164\planning\Class EA\Urban Design\PIC#2\Drawings\161413164_LC.dwg
2016-6-23 4:47 PM by: Hossfeld, Alexandra

ORIGINAL SHEET - ANSI D

Glendon Drive

paving the way for an active community

middlesex centre
in the centre of it all

middlesex county

Legend

✳	MUNICIPAL ENTRY SIGN
✳	COMMUNITY ENTRY SIGN
◌	FEATURE / ORNAMENTAL PLANTING AREA
🟧	INTERSECTION IMPROVEMENT
🟦	LANDSCAPED MEDIAN
●	ORNAMENTAL STREET TREE
●	LARGE NATIVE STREET TREE
– – –	MULTI-USE TRAIL
- - -	ON-ROAD CYCLING
▨	MAINTAIN EX. WOODLAND EDGE
⊔	APPROXIMATE LOCATION OF TYPICAL CROSS SECTION
↔	DELINEATION OF THEME ZONES

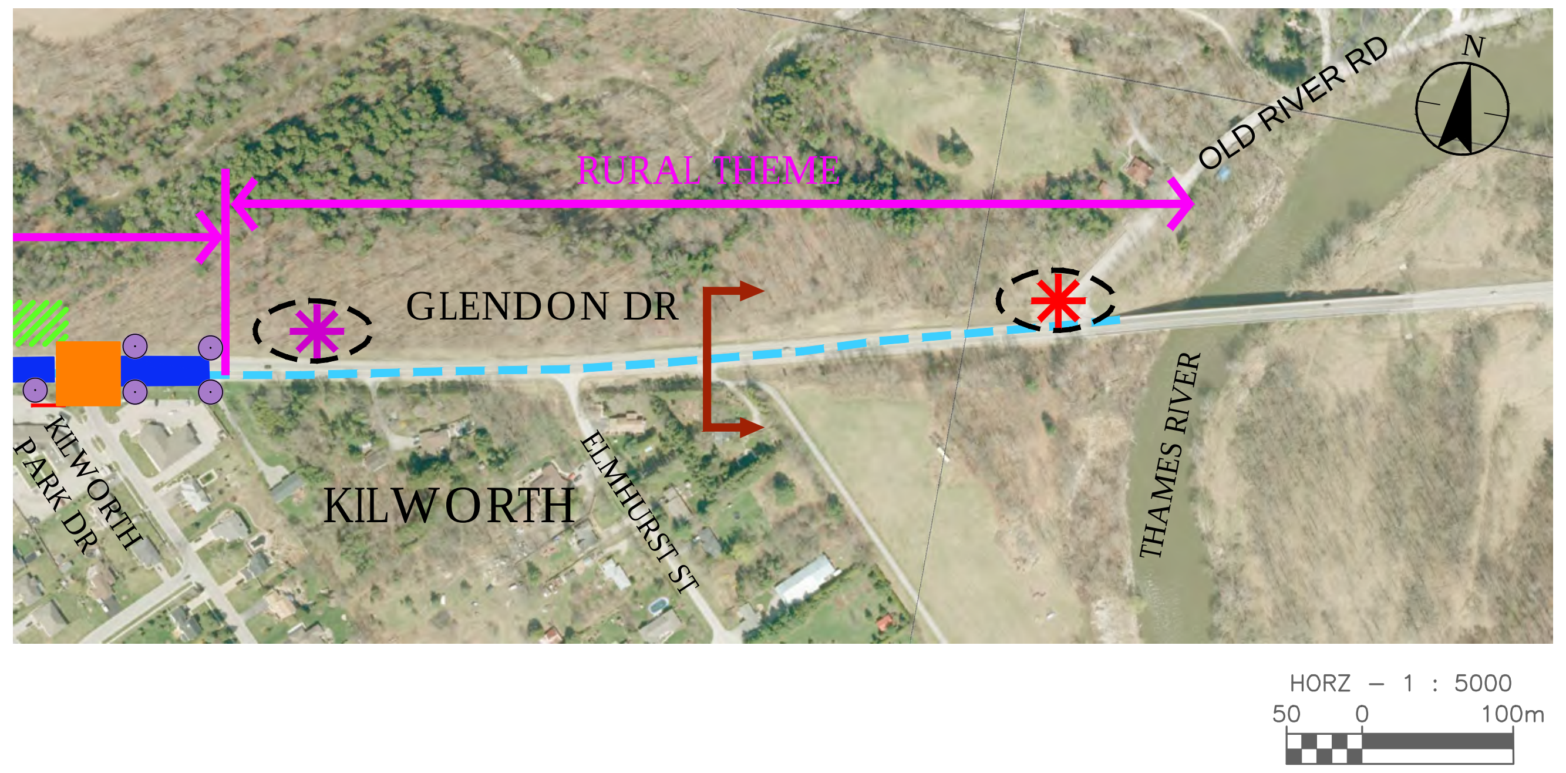
Notes

June 2016

Stantec

Urban Design Concept
Vanneck Road to Kilworth Drive

Plan



Typical Cross Section

Opportunities:

1. Enhance the Kilworth community entry sign with decorative paving, ornamental tree and landscaping to create a gateway feature.
2. Create a Middlesex Centre gateway feature on the west side of the bridge including a significant signage feature, ornamental trees and landscaping.
3. Plant a continuous row of ornamental trees as part of the gateway feature, at key intersections and along the Komoka-Kilworth corridor to create a continuous, aesthetically connected streetscape. Ornamental trees could be flowering, have a unique fall colour and/or distinctive form.
4. Implement distinctive street lighting along the Komoka-Kilworth streetscape corridor.
5. Preserve and emphasize the natural edge of the existing woodlot located on the north side of Glendon Drive.
6. Plant ornamental trees along Glendon Drive from the east limit of Kilworth to the bridge. In addition, add groupings of native shrub species where feasible.

V:\01614\active\161413164\planning\Class EA\Urban Design\PIC#2\Drawings\161413164_LC.dwg
2016-6-22 2:46 PM by: Hossfeld, Alexandra

ORIGINAL SHEET - ANSI D

Glendon Drive
paving the way for an active community

middlesex centre
in the centre of it all

middlesex county

Legend

✳ MUNICIPAL ENTRY SIGN
✳ COMMUNITY ENTRY SIGN
◌ FEATURE / ORNAMENTAL PLANTING AREA
🟧 INTERSECTION IMPROVEMENT
🟦 LANDSCAPED MEDIAN
● ORNAMENTAL STREET TREE
● LARGE NATIVE STREET TREE
– – MULTI-USE TRAIL
- - - ON-ROAD CYCLING
▨ MAINTAIN EX. WOODLAND EDGE
⊔ APPROXIMATE LOCATION OF TYPICAL CROSS SECTION
⟷ DELINEATION OF THEME ZONES

Notes

June 2016

Stantec

Urban Design Concept
Kilworth Drive to the Bridge

Glendon Drive
paving the way for an active community

middlesex county

middlesex centre
in the centre of it all

MIDDLESEX ZONE CONTEXTS

Middlesex **Urban** Theme **attributes** include:

- Sidewalks, street trees, street furniture and manicured turf within boulevards;
- Ornamental trees, planting and natural stone accents within median islands and at key intersections;
- Signature roadway lighting with banners and/or pedestrian fixtures;
- Apply existing County 'agricultural heritage' theme in design elements where appropriate;
- Landscaping to highlight village signage and proposed cycling facilities;
- Stamped / coloured asphalt cross-walks;
- Consideration for sustainability in design elements.


Grass boulevard with Street Trees


Concrete median with Trees

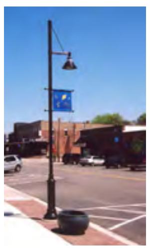

Median with Perennials and Trees


Tree Grates


Banners


Community Identification Sign


Stamped asphalt crosswalks


LED Lighting


Trash receptacle


Benches

Middlesex **Rural** Theme **attributes** include:

- Maintain a rural streetscape cross-section including ditches, no sidewalks, and naturalized plantings (large native shade trees and shrubs) where appropriate on road sides;
- Promote tree planting on private property (outside of the ROW) to create windbreaks;
- No cross-walks or lighting;
- Consideration for sustainability in design elements.


Road section at Vanneck Road


Road section at Old River Road


Road section at Komoka Creek


Naturalized plantings


Grassed ditches

Visit the website to get involved

glendondrive.mindmixer.com

Stantec

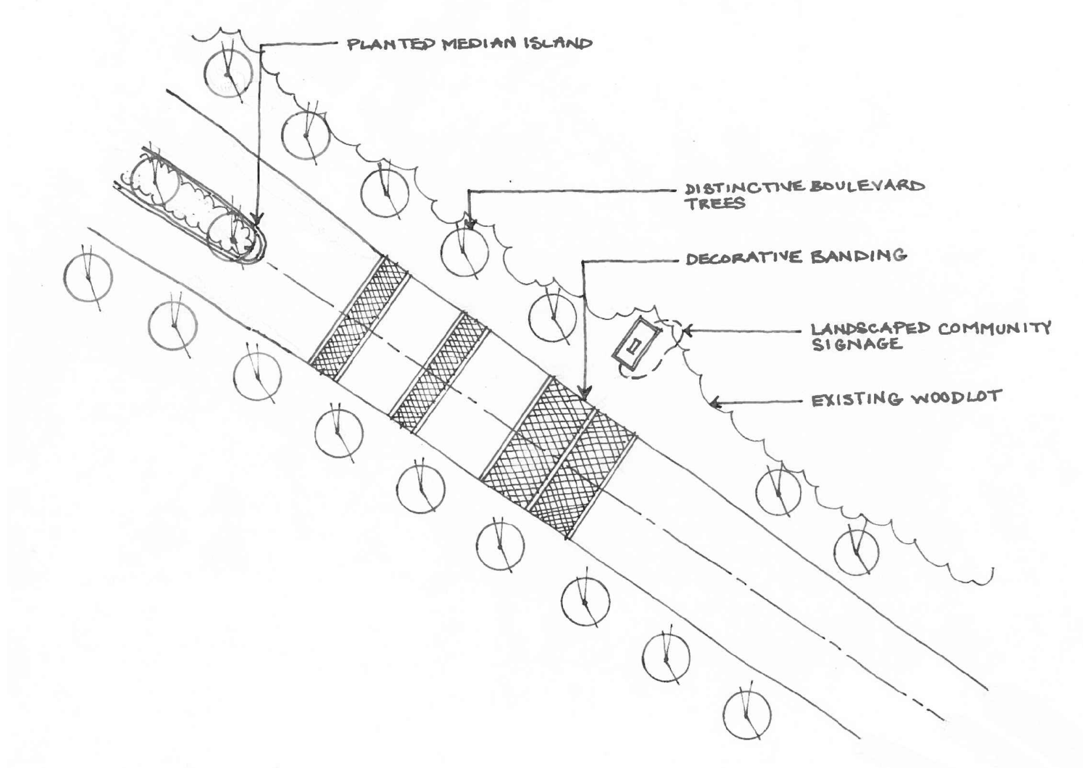
STREETSCAPE OPPORTUNITIES

Median Island Treatment Options

Decorative Pedestrian Crosswalk Pavement Style Options

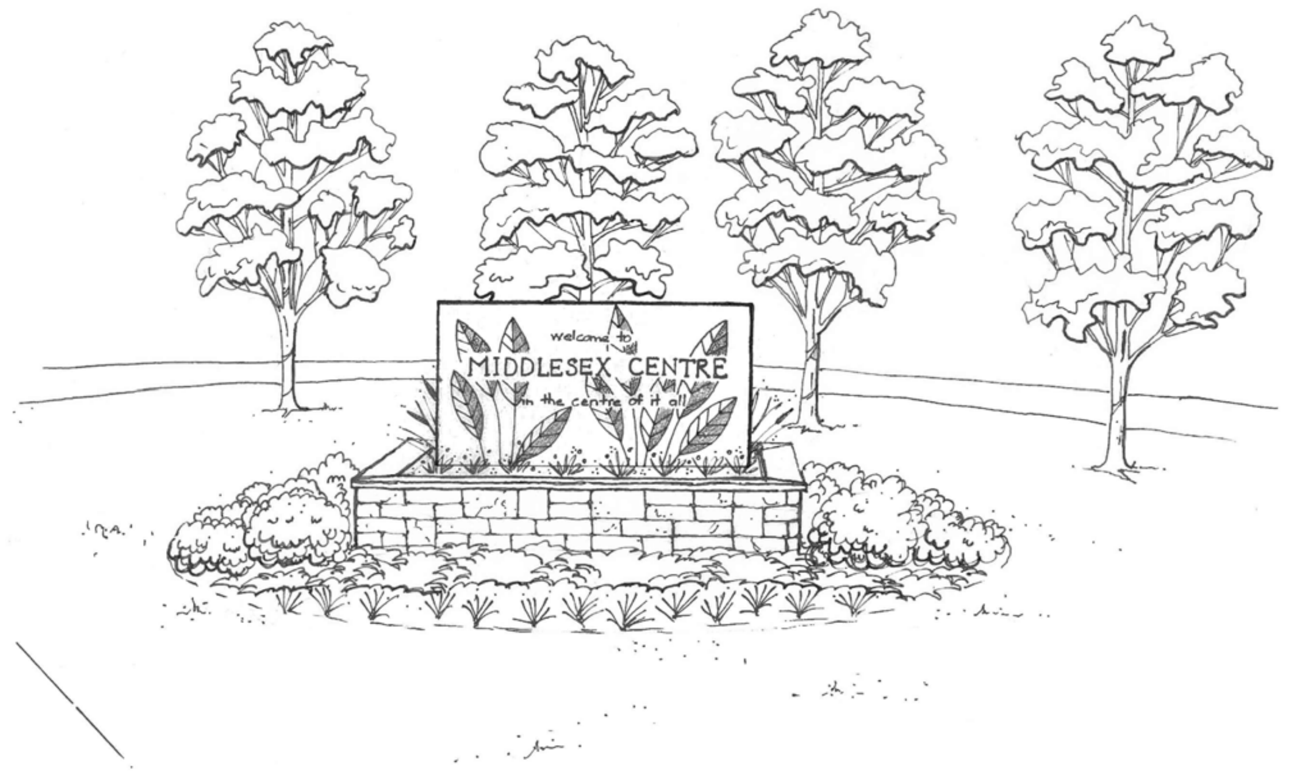
Roundabout Landscape Options

Ornamental Street Tree Allee Options

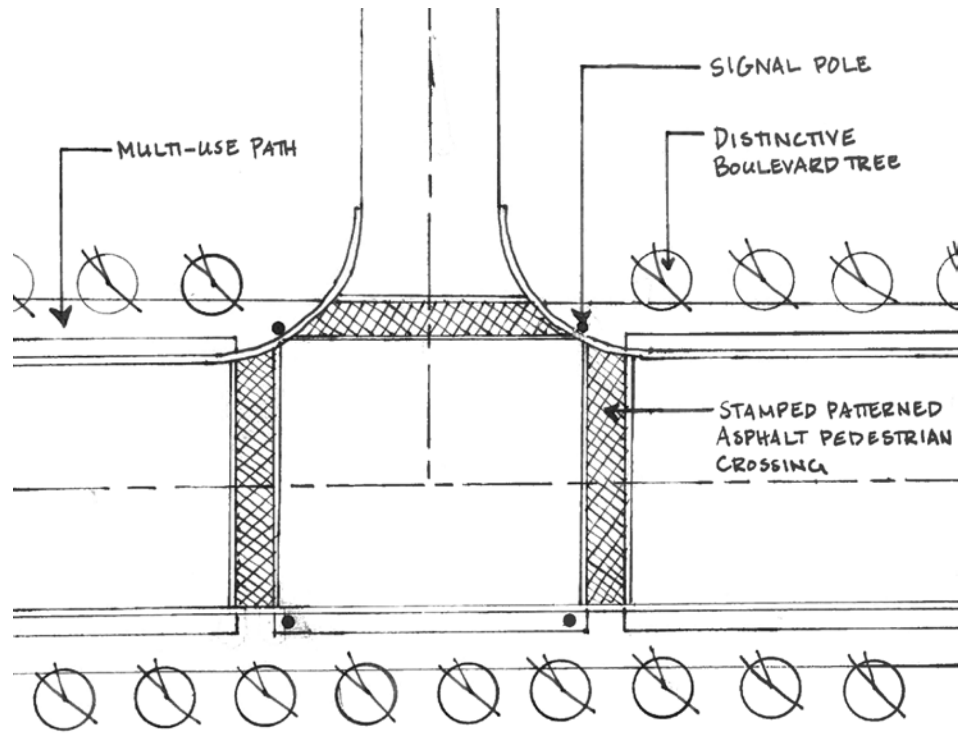


Gateway Treatment

Enhanced Community Entry Signage



Municipal Entry Signage



Enhanced Pedestrian Realm at Intersection

Design Concepts

V:\01614\active\161413164\planning\Class EA\Urban Design\PIC#2\Drawings\161413164_LC.dwg
2016-6-22 2:46 PM by: Hossfeld, Alexandra

ORIGINAL SHEET - ANSI D

Glendon Drive
paving the way for an active community

middlesex centre
in the centre of it all

middlesex
county

Legend

Notes

June 2016

Stantec

Urban Zone Streetscape Opportunities

URBAN ZONE STREETSCAPE FURNISHING OPTION A: TRADITIONAL THEME

HARD SURFACES


NATURAL CONCRETE


EXPOSED AGGREGATE PAVING


STAMPED, PATTERNED ASHPALT
IN BRICK PATTERN


CROSSWALK
ASPHALT COLOUR

SITE FURNISHINGS


TRASH RECEPTACLE


BENCH

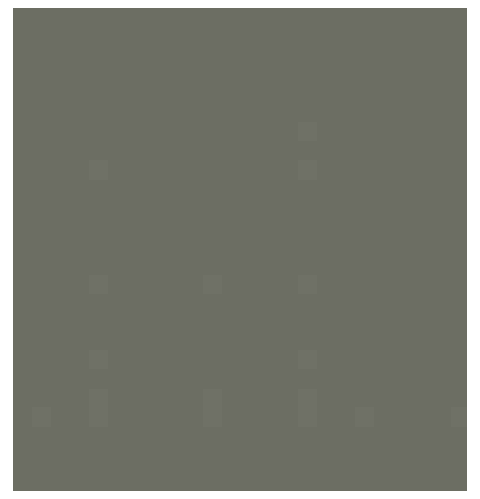

RECYCLING STATION


BIKE RACK

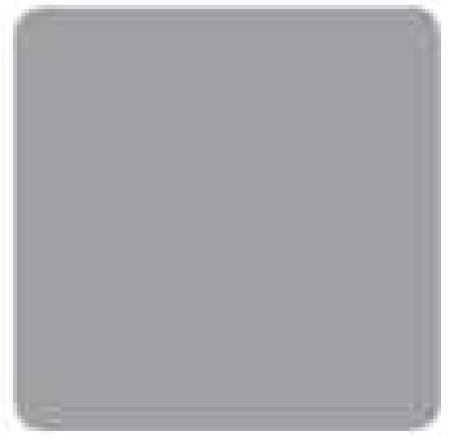
URBAN ZONE STREETSCAPE FURNISHING OPTION B: CONTEMPORARY THEME

HARD SURFACES


NATURAL CONCRETE


COLOURED CONCRETE

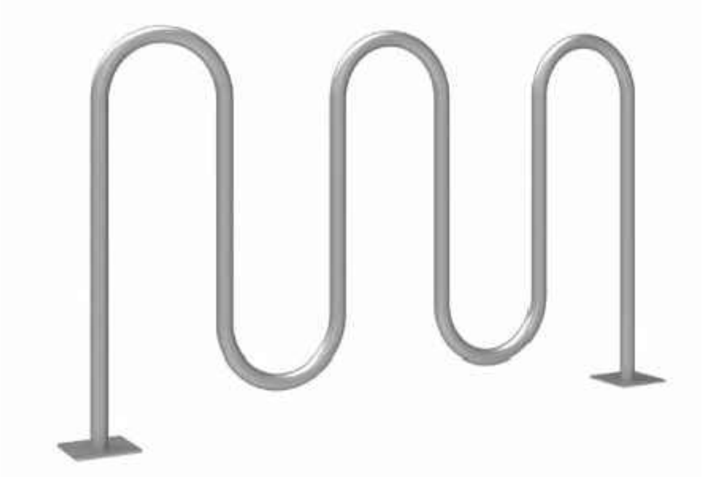

STAMPED, PATTERNED ASHPALT IN
ANGULAR PATTERN


CROSSWALK
ASPHALT COLOUR

SITE FURNISHINGS


TRASH RECEPTACLE


BENCH


BIKE RACK

V:\01614\active\161413164\planning\Class EA\Urban Design\PIC#2\Drawings\Urban Zone Themes.dwg
2016-6-22 10:55 AM by: Hossfeld, Alexandra

ORIGINAL SHEET - ANSI D

Glendon Drive
paving the way for an active community

middlesex centre
in the centre of it all

middlesex county

Legend

Notes

June 2016

Stantec

Urban Streetscape Themes