

# MMMGROUP

Prepared for: Grand Niagara

### GRAND NIAGARA TRANSPORTATION IMPACT STUDY DRAFT

### CITY OF NIAGARA FALLS

1415039-001-TR1 | January 2017



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#### **EXECUTIVE SUMMARY**

#### Introduction

WSP|MMM Group has been commissioned by Grand Niagara to provide a number of services in preparation of a Secondary Plan for the lands bounded by the Welland Canal to the north, Biggar Road to the south, Montrose Road to the east and Crowland Avenue to the west. This Transportation Impact Study (TIS) provides a multi-modal transportation assessment of existing and future traffic conditions in the study area. The study area and scope of the TIS was agreed to with the City of Niagara Falls and Niagara Region through a pre-consultation meeting and follow up dialogue.

#### **Existing Transportation Conditions**

Traffic volumes at a number of intersections in the study area were collected and analyzed. Existing intersections within the subject site are presently rural in nature and exhibit adequate levels of service and adequate capacity. On the northern and eastern edge of the study area in the urbanized portion of the City of Niagara Falls, select movements during select peak hours are approaching capacity. Most intersections in the study area are within capacity.

#### **Future Background Traffic Conditions**

The analysis of future background traffic conditions in the year 2031 considers growth in existing traffic volumes in addition to new traffic forecast to be generated by two developments: the Thundering Waters mixed used development to the northeast and the Warren Woods residential development to the north.

Most of the study intersections are projected to operate at Levels of Service "E" or better based on background traffic volumes and network conditions during the weekday a.m. and p.m. peak hours and Saturday peak hour. There are number of movements that operate at v/c of above 1.0 at intersections along McLeod Road and Lyons Creek Road. This is mainly due to the additional traffic volumes anticipated under the background conditions.



#### **Proposed Development**

The Grand Niagara development contains a mix of residential and commercial land uses. The development is expected to be fully constructed and occupied by the year 2031. The development is expected to accommodate a total population of about 11,600 people. This includes:

- 1,390 freehold residential units (4,300 residents);
- 1,600 medium density residential units (2700 residents); and
- 27.5 Ha of employment lands (4,600 employees).

The internal transportation network is planned to focus on the pedestrian and active transportation but still provide functionality for automobiles. Most of the roads will be local roads, with a few collector roads that connect to the external arterial road network. Appropriate active transportation facilities will be nominated for all roads at the appropriate stage of the design process.

#### Traffic Related to the Proposed Development

Trips were generated for the Grand Niagara development using industry best practices. The trips then were distributed based on the likely direction of origin and destination. Some trips are expected to be by modes other than the personal automobile. Trips were reduced by 10% to account for transit, active transportation and other measures in order to arrive at vehicle trips. The vehicle trips then were assigned to the road network.

#### Analysis of Future Total Traffic Conditions

The analysis of future total traffic conditions considered traffic forecast to be generated by the Grand Niagara development in addition to background traffic from other developments and background corridor traffic volumes.

Even with road improvements, if the amount of development considered in this report were to be constructed, select intersections at select peak hours would be expected to experience long delays and some movements would be expected to be approaching or exceed their theoretical capacity;

Willodell Road at Lyons Creek Road exhibits LOS F due to the delays incurred to the northbound turning movements. This is a relatively small number of vehicles that appear during the Peak Hour.

Carl Road at Montrose Road exhibits LOS F during the p.m. peak hour due to the increased traffic in the southbound direction. A traffic signal is not warranted at this location since this is



due to a small number eastbound left-turning of vehicles appearing during the peak hour hindered by the southbound through movements

Overall, most intersections within the study area exhibit reduced levels of service compared to the 2031 background traffic development results, due to road improvements recommended and applied to the analysis.

Intersections directly related to the Grand Niagara site and associated Secondary Plan area are forecast to exhibit LOS C or better during weekday a.m., p.m., and Saturday peak hours with only one exception. All site-related intersections are forecast to have all movements within capacity.

The intersection of Biggar Road and the Mixed Used Access is forecast to exhibit LOS D and LOS F for the a.m. and p.m. weekday peak hours, respectively, due to delays to southbound left turn movements waiting for a gap in east-west through traffic. If forecast delays become too long, some drivers may choose to re-route from this intersection along Street D towards Street A in order to utilize the traffic signal planned at Biggar Road and Street A.

#### **Conclusions and Recommendations**

The following conclusions are drawn from the analysis of existing and future traffic conditions in the Grand Niagara study area:

- Most intersections in the study area today exhibit adequate levels of service in existing conditions, with all movements within capacity;
  - Select unsignalized intersections report long delays or capacity constraints in a peak hour. These intersections may need to be signalized;
- In 2031 future background conditions, road improvements are needed to accommodate new developments and background traffic growth. With the road improvements in place, the majority of intersections are forecast to be within capacity with acceptable levels of service. Select turning movements may be approaching or over capacity in select peak hours. Given the long range nature of this analysis, the results are considered acceptable given the recommended road improvements;
- In the 2031 total traffic conditions including the Grand Niagara development, most intersections in the study area are forecast to operate with acceptable levels of service once the recommended road network improvements are implemented. The vast majority of individual movements are expected to be within capacity. At select intersections during select peak hours, certain movements may be approaching or theoretically above capacity;
- In studying the new intersections that are specific to the Grand Niagara site and Secondary Plan area, the majority of intersections can be stop controlled and unsignalized, with select intersections recommended to be signalized in order to



facilitate movement in and out of the hospital and commercial areas along Biggar Road; and

 The findings of this report are based on land use assumptions available at this time. As development progresses and as specific site development applications are submitted, the findings of this report should be confirmed and updated, as appropriate.

The following improvements to the road network are recommended to accommodate the forecast traffic volumes analyzed in this report:

- Road widening to accommodate two through lanes in each direction, southbound dual left turn lanes, westbound dual left turn lanes, eastbound left and right turn lanes and northbound left and right turn lanes at the intersection of Montrose Road & Biggar Road/Lyons Creek Road, along with adjusted signal timing plans;
- Signalization of the Lyons Creek Road at QEW Southbound Off-ramp intersection and an addition of left-right turning lane. Signal Timing plans may vary to satisfy a.m. and p.m. peak periods;
- Signalization of the intersection of Montrose Road & Chippawa Creek Road to facilitate eastbound turning movements;
- Replacement of shared through-left lane with an individual left turn lane and through lane with adjustments to the signal timing plan at the intersection of McLeod Road & QEW Southbound Off-ramp;
- Addition of new signal phases and a westbound right turn lane at the intersection of Montrose Road & McLeod Road; and
- Signalization of the Montrose Road & Grassy Brook Road intersection to facilitate eastbound turning movements, and the addition of right turn lane and a left turn lane in the northbound and southbound directions.

The recommended improvements to the transportation network shown in the study should be reconfirmed in the future when applications are submitted to develop specific properties.



#### **1.0 INTRODUCTION**

#### 1.1 Background

The Grand Niagara development is a new residential community that will provide housing for full-time residents of Niagara Falls in a neighbourhood marked by sustainable transportation infrastructure such as multi-use trails, sidewalks and bike lanes. Given the neighbourhood's proximity to the proposed Niagara South Hospital, the neighbourhood also will include medical-related office buildings and commercial development to service the hospital and Grand Niagara neighbourhood.

The Grand Niagara development is bounded by the Welland River on the north, Biggar Road to the south, the Montrose Road to the east and Crowland Avenue to the west. In the southeast corner of the site on land owned by others is the proposed Niagara South Hospital. The site location is shown in Figure 1.

WSP|MMM Group is providing Grand Niagara with a comprehensive set of services to prepare the site for development. One of these services is the analysis of transportation impacts as included in this Transportation Impact Study (TIS).

#### 1.2 Study Approach

A pre-consultation meeting has been held with staff from the City of Niagara Falls and Niagara Region. This TIS follows the methodology agreed to at the pre-consultation meeting and through the e-mail dialogue that ensued following the meeting. The final scope of work is included in **Appendix A**.

#### **1.3 Proposed Development**

The Grand Niagara development contains a mix of land uses. The primary land use is residential and there are some office and commercial land uses near the Niagara South Hospital in the southeastern portion of the site. The overall development is expected to be constructed in phases but to be completely developed and occupied by the year 2031. The proposed development's combination of residential homes as well as employment opportunities is expected to accommodate a total population of about 11,600 people. This includes:

- 1,390 freehold residential units (4,300 residents);
- 1,600 medium density residential units (2700 residents); and
- 27.5 Ha of employment lands (4,600 employees).



While separate from the Grand Niagara development, the proposed Niagara South Hospital has been included as part of the overall development of this portion of the city and included in the analysis of total traffic conditions. It has been assumed that the hospital will employ 3,100 people. The site plan is shown in **Figure 2**.







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### Schedule A to the Official Plan Land Use

## GRAND NIAGARA SECONDARY PLAN

#### Legend

|     | Grand Niagara Secondary Plan                |
|-----|---|
| []] | Urban Area Boundary                         |
|     | Lands within the Built Boundary             |
|     | residential low / medium density            |
|     | mixed use                                   |
| ES  | proposed elementary school                  |
| P   | open space / parkland                       |
|     | tourist commercial                          |
|     | hospital employment campus                  |
|     | employment                                  |
|     | natural heritage system<br>(see Appendix C) |
| N1  | neighbourhoods                              |
|     | roads                                       |
|     | rail line                                   |
|     | utility corridor                            |
|     | pipeline easement                           |
|     | DRAFT                                       |
|     | Scale 1:8,000                               |
| 0   | 100 200 300 400 500m                        |
|     | <br>December 2016                           |

#### 2.0 EXISTING TRANSPORTATION CONDITIONS

The Existing Transportation Conditions chapter documents the existing multi-modal transportation infrastructure in place in the study area and analyzes the performance of study area intersections, using recent data collected for this study. The existing transportation network is described in the sub-sections below.

#### 2.1 Road Network

There are six main roads in the study area:

- **Grassy Brook Road** is a two-lane east-west road that will provide access through the northern portion of the Grand Niagara development. The speed limit in the study area is posted at 40 kilometres per hour (km/h);
- **Biggar Road / Lyons Creek Road** is a rural two-lane east-west road that forms the southern boundary of the Grand Niagara development. It provides a connection to the QEW. It has a posted speed limit of 80 km/h;
- **Carl Road** is a rural two-lane east-west road that forms the southern boundary of the study area. It is posted 70 km/h;
- The Queen Elizabeth Way is a Provincial Highway that connects the Canada / United States border at Fort Erie with Toronto. The highway includes two lanes in each direction and is posted 100 km/h;
- **Montrose Road** is a two-lane north-south road that forms the eastern boundary of the development. Its speed limit is posted at 80 km/h; and
- **Crowland Avenue** is a rural two-lane north-south road with a posted speed limit of 50 km/h. Crowland Avenue forms the western boundary of the study area.

#### 2.2 Transit Routes

The study area lies approximately 2.5 km south of Niagara Square, a shopping centre and transit hub. Niagara Square provides a platform for transit users to connect to other areas of Niagara Falls. The study area is served by the following transit operators:

- Niagara Region Transit: The transit service operates Route 60 / 65: Welland Niagara Falls along Montrose Road, a route which would likely have stops added to serve the proposed development. The route connects Wellington to Niagara Falls, stopping at Niagara Square to provide opportunities to transfer to Niagara Falls Transit routes; and
- Niagara Falls Transit: Niagara Falls Transit does not currently operate routes in the vicinity of the study area; however, the transit service runs the TransCab service which shuttles passengers from areas in the proposed development to the bus terminal at Niagara Square.



#### 2.3 Active Transportation Facilities

No major multi-use trails or active transportation facilities exist in the study area. The Regional Niagara Bicycling Committee has emphasized Chippawa Creek Road and Oakville Drive as roads equipped with cycling facilities due to their paved shoulders. The Bicycling Committee has also published various popular cycling routes that utilize the paved rural roads within the vicinity of the study area; however, these routes are not officially recognized by Niagara Region or the City of Niagara Falls and the availability or suitability of the route is not guaranteed.

#### 2.4 Traffic Data Collection

Traffic data collection took place between August and October 2015. Turning movement counts were conducted at 18 intersections in the study area for the weekday a.m. and p.m. peak hours as well as the Saturday weekend peak hour. The dates of the counts and the determined peak hour after review of count data are provided in **Table 1**. The study area intersections are shown in **Figure 3**.

| Intersection                                       | Number | Date(s)                      | Weekday<br>AM           | Weekday<br>PM | Weekend<br>SAT          |
|--|--------|------------------------------|-------------------------|---------------|-------------------------|
| Grassy Brook Road at Morris Road                   | 1      | Sep 17, 2015<br>Oct 31, 2015 | 8:00-9:00               | 16:00-17:00   | 11:15-12:15             |
| Biggar Road at Morris Road                         | 2      | Sep 17, 2015<br>Oct 31, 2015 | 7:30-8:30               | 16:30-17:30   | 11:30-12:30             |
| Biggar Road at Crowland Avenue                     | 3      | Sep 17, 2015<br>Oct 31, 2015 | 7:30-8:30               | 16:15-17:15   | 11:30-12:30             |
| Lyons Creek Road at Willodell Road                 | 4      | Sep 17, 2015<br>Oct 31, 2015 | 7:30-8:30               | 16:30-17:30   | 12:00-13:00             |
| McLeod Road at Montrose Road                       | 5      | Sep 02, 2015<br>Sep 05, 2015 | 8:00-9:00               | 16:15-17:15   | 11:45-12:45             |
| McLeod Road at Oakwood Drive                       | 6      | Sep 02, 2015<br>Sep 05, 2015 | Estimated <sup>1.</sup> | 16:00-17:00   | 12:45-13:45             |
| Niagara Square Drive at Montrose Road              | 7      | Sep 03, 2015                 | 7:45-8:45               | 16:00-17:00   | Estimated <sup>1.</sup> |
| Chippawa Creek Road at Montrose Road               | 8      | Sep 03, 2015<br>Sep 05, 2015 | 7:30-8:30               | 16:15-17:15   | 12:15-13:15             |
| Oakwood Drive at Montrose Road                     | 9      | Sep 03, 2015<br>Sep 05, 2015 | 7:15-8:15               | 16:30-17:30   | 11:45-12:45             |
| Grassy Brook Road at Montrose Road                 | 10     | Sep 17, 2015<br>Oct 31, 2015 | 7:45-8:45               | 16:30-17:30   | 12:15-13:15             |
| Biggar Road / Lyons Creek Road at<br>Montrose Road | 11     | Aug 26, 2015<br>Sep 05, 2015 | 7:30-8:30               | 16:30-17:30   | 12:30-13:30             |
| Lyons Creek Road at Stanley Avenue                 | 12     | Sep 03, 2015<br>Sep 05, 2015 | 7:30-8:30               | 16:15-17:15   | 12:00-13:00             |
| Carl Road at Montrose Road                         | 13     | Sep 17, 2015<br>Oct 31, 2015 | 7:30-8:30               | 16:45-17:45   | 12:00-13:00             |

#### TABLE 1: INTERSECTION PEAK DEMAND HOURS



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| Intersection                                   | Number | Date(s)                      | Weekday<br>AM | Weekday<br>PM | Weekend<br>SAT |
|--|--------|------------------------------|---------------|---------------|----------------|
| McLeod Road at QEQ Southbound Off-<br>Ramp     | 14     | Aug 29, 2015<br>Sep 02, 2015 | 8:00-9:00     | 16:00-17:00   | 13:00-14:00    |
| McLeod Road at QEW Northbound Off-<br>Ramp     | 15     | Aug 29, 2015<br>Sep 02, 2015 | 8:00-9:00     | 16:00-17:00   | 13:00-14:00    |
| Lyons Creek Road at QEW Southbound<br>Off-Ramp | 16     | Aug 29, 2015<br>Sep 02, 2015 | 7:30-8:30     | 16:15-17:15   | 12:15-13:15    |
| Lyons Creek Road at QEW Northbound<br>Off-Ramp | 17     | Aug 29, 2015<br>Sep 02, 2015 | 7:30-8:30     | 16:15-17:15   | 12:15-13:15    |
| Carl Road at Crowland Avenue                   | 18     | Sep 30, 2015<br>Oct 31, 2015 | 7:45-8:45     | 16:30-17:30   | 12:30-13:30    |

Note: 1. Due to equipment error, these counts were estimated based on surrounding intersections and other peak period trends

#### 2.1 Traffic Analysis Methodology

Intersections are the critical capacity control points for a transportation network. Key intersections in the study area have been analyzed to determine the average vehicle delay (level of service) as well as capacity constraints in select traffic movements (as measured by volume to capacity ratio).

#### 2.1.1 Intersection Capacity Analysis

Intersection capacity analysis has been undertaken using Synchro 9 traffic analysis software. The collected traffic count data as well as signal timing and phasing plans that were received from the City of Niagara Falls and Niagara Region were input into the software for the intersection analysis. The overall level of service has been reported for each intersection. Individual turning movements with volume to capacity ratios of 0.85 or greater have been reported at intersections on the arterial road network. At QEW highway off-ramps, individual turning movements with volume to capacity ratios of 0.75 or greater have been reported.

#### 2.2 Existing Traffic Conditions

Existing traffic volume data and signal timing and phasing plans were analyzed to set a baseline to help determine the impacts of the proposed Grand Niagara development on the existing transportation network. The existing lane configurations are shown in **Figure 4**. Existing traffic volumes used in the analysis are shown in **Figure 5**.

The analysis of existing conditions is summarized in **Table 2**. Synchro output sheets detailing the analyses are provided in **Appendix B**.





### **Study Area Intersections**

(1) Grassy Brook Road at Morris Road Biggar Road at Morris Road <sup>3</sup> Biggar Road at Crowland Avenue (4) Lyons creek Road at Willodell Road

(5) McLeod Road at Montrose Road 6 McLeod Road at Oakwood Drive Regional Road 98 at Montrose Road Chippawa Creek Road at Montrose Road Oakwood Drive at Montrose Road Grassy Brook Road at Montrose Road Biggar Road / Lyons Creek Road at Montrose Road Lyons Creek Road at Stanley Avenue Carl Road at Montrose Road

#### **Ministry of Transportation Ontario Intersections**

<sup>(14)</sup> McLeod Road at QEW Southbound off-ramp <sup>15</sup> McLeod Road at QEW Northbound off-ramp Lyons Creek at QEW Southbound off-ramp 17) Lyons Creek at QEW Northbound off-ramp





|  |              | AM Peak Hour                              |                                    | PM Peak Hour                              |                                      | SAT Peak Hour                             |                                    |
|--|--------------|---|------------------------------------|---|--------------------------------------|---|------------------------------------|
| Intersection                                       | Control Type | LOS<br>(Delay in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup> | LOS<br>(Delay in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup>   | LOS<br>(Delay in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup> |
| Montrose Road &<br>McLeod Road                     | Signalized   | B (19)                                    |                                    | B(19)                                     |                                      | B (17)                                    |                                    |
| Oakwood Drive &<br>McLeod Road                     | Signalized   | B (18)                                    |                                    | B(20)                                     | NB-L (0.87)                          | C (34)                                    | NB-L (1.18)                        |
| Regional Road 98 &<br>Montrose Road                | Signalized   | A (6)                                     |                                    | A (6)                                     |                                      | A (6)                                     |                                    |
| Montrose Road &<br>Biggar Road/Lyons<br>Creek Road | Signalized   | C (20)                                    |                                    | D (54)                                    | WB-LTR<br>(0.99)<br>SB-LTR<br>(1.12) | B (18)                                    |                                    |
| McLeod Road & QEW<br>Southbound Off-ramp           | Signalized   | B (17)                                    |                                    | C (22)                                    | EB-T (0.88)                          | B (17)                                    |                                    |
| McLeod Road & QEW<br>Northbound Off-ramp           | Signalized   | B (15)                                    |                                    | B (14)                                    | EB-T (0.79)                          | B (12)                                    |                                    |
| Morris Road & Grassy<br>Brook Road                 | Unsignalized | A (8)                                     |                                    | A (8)                                     |                                      | A (8)                                     |                                    |
| Biggar Road & Morris<br>Road                       | Unsignalized | B (11)                                    |                                    | B (11)                                    |                                      | A (10)                                    |                                    |
| Crowland Avenue &<br>Biggar Road                   | Unsignalized | A (9)                                     |                                    | A (10)                                    |                                      | A (9)                                     |                                    |
| Willodell Road &<br>Lyons Creek Road               | Unsignalized | B (11)                                    |                                    | B (12)                                    |                                      | B (10)                                    |                                    |
| Montrose Road &<br>Chippawa Creek Road             | Unsignalized | B (11)                                    |                                    | B (12)                                    |                                      | B (11)                                    |                                    |
| Montrose Road &<br>Oakwood Drive                   | Unsignalized | B (11)                                    |                                    | B (14)                                    |                                      | B (13)                                    |                                    |
| Montrose Road &<br>Grassy Brook Road               | Unsignalized | B (10)                                    |                                    | B (13)                                    |                                      | B (12)                                    |                                    |

#### TABLE 2: LEVEL OF SERVICE ANALYSIS FOR EXISTING TRAFFIC CONDITIONS



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|   |              | AM Pe                                     | AM Peak Hour                       |   | PM Peak Hour                       |   | SAT Peak Hour                      |  |
|---|--------------|---|------------------------------------|---|------------------------------------|---|------------------------------------|--|
| Intersection                                      | Control Type | LOS<br>(Delay in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup> | LOS<br>(Delay in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup> | LOS<br>(Delay in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup> |  |
| Lyons Creek Road &<br>Stanley Avenue              | Unsignalized | B (15)                                    |                                    | F (75)                                    | EB-T (1.03)<br>SB-R (0.93)         | B (11)                                    |                                    |  |
| Carl Road & Montrose<br>Road                      | Unsignalized | C (19)                                    |                                    | C (19)                                    |                                    | C (16)                                    |                                    |  |
| QEW Southbound Off-<br>ramp & Lyons Creek<br>Road | Unsignalized | B (14)                                    |                                    | C (19)                                    |                                    | B (12)                                    |                                    |  |
| QEW Northbound Off-<br>ramp & Lyons Creek<br>Road | Unsignalized | C (20)                                    |                                    | F (90)                                    | NB-L (0.99)                        | B (12)                                    |                                    |  |
| Crowland Avenue & Carl Road                       | Unsignalized | A (7)                                     |                                    | A (7)                                     |                                    | A (7)                                     |                                    |  |

Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay.

2. Critical movements are those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection, 0.75 for an intersection at highway ramp or with an LOS of 'E' or 'F' for an unsignalized intersection.

The analysis of existing conditions indicates that:

- Most existing intersections exhibit acceptable delays and acceptable levels of service (LOS), defined as LOS D or better and with reserve capacity in the weekday a.m., p.m., and Saturday midday peak hours;
- The intersection of McLeod Road at Oakwood Drive is reported to have movements which are approaching or theoretically exceed capacity in the p.m. and Saturday peak hours. This suggests that there is a considerable queue of vehicles leaving the shopping plaza accessed from Oakwood Drive and attempting to turn left onto McLeod Road. In peak hours, this movement is approaching capacity but the overall average delay for all vehicles at the intersection is considered acceptable for urban conditions;
- Capacity concerns at the intersections of Lyons Creek Road and the QEW Northbound Off-ramp and Lyons Creek Road at Stanley Avenue suggest that these intersections may need to be signalized to regulate traffic flow as development and subsequent traffic volumes increase;
- Turning lanes or road widening may be required for the intersection of Biggar Road/Lyons Creek Road at Montrose Road as develop occurs, as this intersection already is reported to be approaching capacity for individual movements in the p.m. peak hour; and
- No intersections in the study area exhibit capacity constraints in the weekday a.m. peak hour.



#### **3.0 FUTURE BACKGROUND TRAFFIC CONDITIONS**

#### **3.1 Future Transportation Network**

The future transportation network will build upon the existing system and will be expected to be enhanced to accommodate future developments in the study area.

It is expected that transit will be extended to service the planned Niagara South Hospital. This may also open the possibility of transit servicing the Grand Niagara development, especially the portion of the development near Montrose Road. Given the planned development in this part of the city, additional future transportation network improvements may be needed in the study area.

#### 3.2 Background Developments

There are two background developments in the vicinity of the Grand Niagara development that, if constructed, would be expected to add vehicle traffic volumes to the arterial road network. These developments are the proposed Thundering Waters development northeast of Grand Niagara and the Warren Woods residential development north of the site. Available information on each of these proposed developments is provided in this chapter. The proposed Niagara South Hospital on the southeast border of the Grand Niagara site has been considered as part of the secondary plan area for Grand Niagara and is assessed as part of the total traffic conditions in **Section 6.0**.

#### 3.2.1 Thundering Waters

A transportation master plan has been prepared for the Thundering Waters Secondary Plan area. The area proposed for development is generally bounded by Oldfield Road to the north, Thundering Waters Golf Course and Stanley Avenue Industrial Business Park to the east, the Welland River to the south, and the Ontario Power Generation (OPG) Canal to the west. The secondary plan area is envisioned to include a mix of commercial (retail shops, nursing homes, sports complexes and fields, a school and hotels), residential (single family homes, townhouses, and apartment building/condo minimum units both low and high rise), park lands (green space) and office business park. Thundering Waters development-related traffic that is forecast to use the roads in the Grand Niagara study area has been added to the analysis of background traffic conditions in **Section 3.4** and also included in total traffic conditions (**Section 6.2**).

#### 3.2.2 Warren Woods

Warren Woods is a primarily residential development of 1,300 townhomes and detached homes located near the intersection of McLeod Road and Kalar Road in the City of Niagara Falls, north of the Grand Niagara site. Warren Woods traffic that was analyzed in the Thundering Waters Transportation Master Plan has also been incorporated into the Grand Niagara traffic analysis.



#### 3.3 Future Background Transportation Assumptions

Background information and assumptions for future improvements to the transportation network have been factored into the analysis of traffic conditions.

#### 3.3.1 Planned Road Network Improvements

Niagara Region presently is undertaking their Transportation Master Plan. Preliminary transportation plans in the Grand Niagara study area include additional capacity on the Regional Road 47 (Lyons Creek Road) – 98 (Montrose Road) – 27 (Schisler Road) corridor. The nature of these additional capacity improvements has not been defined as of the writing of this report. These improvements are to be incorporated to future studies when they become available.

Network improvements within the vicinity of our study area were extracted from the Thundering Waters Secondary Plan report and incorporated in the analysis. These improvements include:

- McLeod Road widened to three lanes in each direction, with an additional westbound left turn lane at Oakwood Drive;
- The signalization of the intersection of Montrose Road and Oakwood Drive, with added left turn lanes at Montrose Road;
- A southbound left turn lane, and westbound right turn lane and left turn lane at the intersection of Montrose Road and Biggar Road/Lyons Creek Road;
- The signalization of the QEW northbound and southbound off-ramp terminals at Lyons Creek Road; and
- The signalization of Stanley Avenue at Lyons Creek Road.

These improvements are reflected in **Figure 7**.

#### 3.3.2 Planned Transit Improvements

While public transit presently does not serve the Grand Niagara area, it would be recommended and expected that transit routes would be modified to provide access to Grand Niagara or that new transit routes would be established to service the area. Hospitals are major trip generators and construction of the proposed new hospital would be expected to include provision for a transit stop.

#### 3.3.3 Planned Pedestrian and Cycling Amenities

The Grand Niagara development is envisioned as a complete community. This vision extends to transportation and a series of pedestrian paths and on- and off-road cycling amenities is envisioned along all arterial and collector roads. Local roads will have appropriate active transportation facilities, given the length and nature of the local road. Local roads will be examined in more detail at a future stage of the design process.



#### 3.3.4 Background Traffic Growth Rate

In addition to the traffic forecast to be generated by the three background developments included in this study, existing traffic volumes also have been increased by 1% per year for each year to the 2031 horizon year, to account for any other developments or growth in traffic volumes that may occur from the present day until the horizon year.

#### 3.4 Background Traffic Conditions Analysis – Horizon Year 2031

The Grand Niagara development is expected to be constructed and fully occupied by the year 2031. Traffic impacts have been assessed for background traffic conditions and total traffic conditions for this horizon year.

Background traffic conditions include traffic expected to be on the road from background developments in addition to corridor traffic volumes that have been increased from current levels to forecast year 2031 levels, per the discussion in **Section 3.3**. Background traffic volumes, which include traffic related to the three background developments as well as the growth in existing traffic volumes are shown in **Figure 6**. These volumes were input into the Synchro 9 traffic analysis software using the lane configurations shown in **Figure 7**. The summary of the results of this analysis are shown in **Table 3**. More detailed information included in the Synchro output sheets is provided in **Appendix C**.

|  |              | AM Peak Hour                              |                                    | PM Peak Hour                              |  | SAT Peak Hour                             |                                    |
|--|--------------|---|------------------------------------|---|--|---|------------------------------------|
| Intersections                                      | Control Type | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup> | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup>             | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup> |
| Montrose Road &<br>McLeod Road                     | Signalized   | C (22)                                    | EB-L (0.90)                        | D (44)                                    | EB-L (1.57)<br>SB-L (1.31)                     | D (36)                                    | EB-L (1.29)<br>NB-L (1.31)         |
| Oakwood Drive &<br>McLeod Road                     | Signalized   | E (62)                                    | EB-L (2.48)<br>EB-T (0.86)         | C (30)                                    | EB-T (0.99)<br>WB-TR<br>(0.93)                 | D (45)                                    | EB-T (1.14)<br>NB-L (0.87)         |
| Regional Road 98 &<br>Montrose Road                | Signalized   | A (5)                                     |                                    | A (6)                                     |  | A (6)                                     |                                    |
| Montrose Road &<br>Biggar Road/Lyons<br>Creek Road | Signalized   | C (24)                                    | NB-LTR<br>(0.88)                   | D (45)                                    | WB-L (1.03)<br>NB-LTR<br>(0.98)<br>SB-L (0.85) | C (31)                                    | NB-LTR<br>(0.96)                   |

### TABLE 3: INTERSECTION CAPACITY ANALYSIS – BACKGROUND TRAFFIC CONDITIONS – HORIZON YEAR 2031



# Transportation Impact Study - Draft Grand Niagara Development January 2017

|   |              | AM Peak Hour                              |                                    | PM Pe                                     | ak Hour                                    | SAT Peak Hour                             |  |  |
|---|--------------|---|------------------------------------|---|--|---|--|--|
| Intersections                                     | Control Type | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup> | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup>         | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup>         |  |
| McLeod Road & QEW<br>Southbound Off-ramp          | Signalized   | C (22)                                    | EB-T (0.81)                        | E (66)                                    | EB-T (1.20)<br>SB-L (0.87)<br>SB-TL (0.85) | C (29)                                    | EB-T (0.91)<br>SB-L (0.85)<br>SB-TL (0.85) |  |
| McLeod Road & QEW<br>Northbound Off-ramp          | Signalized   | B (16)                                    | EB-T (0.78)                        | D (38)                                    | EB-T<br>(1.06)                             | B (18)                                    | EB-T (0.87)                                |  |
| Morris Road & Grassy<br>Brook Road                | Unsignalized | A (8)                                     |                                    | C (17)                                    |  | A (9)                                     |  |  |
| Biggar Road & Morris<br>Road                      | Unsignalized | B (10)                                    |                                    | B (11)                                    |  | A (10)                                    |  |  |
| Crowland Avenue &<br>Biggar Road                  | Unsignalized | A (10)                                    |                                    | B (10)                                    |  | A (9)                                     |  |  |
| Willodell Road &<br>Lyons Creek Road              | Unsignalized | B (12)                                    |                                    | B (12)                                    |  | B (10)                                    |  |  |
| Montrose Road &<br>Chippawa Creek Road            | Unsignalized | B (14)                                    |                                    | C (20)                                    |  | C (16)                                    |  |  |
| Montrose Road &<br>Oakwood Drive                  | Signalized   | A (4)                                     |                                    | A (6)                                     |  | A (6)                                     |  |  |
| Montrose Road &<br>Grassy Brook Road              | Unsignalized | B (12)                                    |                                    | C (17)                                    |  | C (17)                                    |  |  |
| Lyons Creek Road &<br>Stanley Avenue              | Signalized   | B (15)                                    | EB-L (0.89)                        | C (21)                                    | EB-L (1.01)                                | B (19)                                    | EB-L (0.97)                                |  |
| Carl Road & Montrose<br>Road                      | Unsignalized | D (32)                                    |                                    | D (32)                                    |  | C (23)                                    |  |  |
| QEW Southbound Off-<br>ramp & Lyons Creek<br>Road | Signalized   | A (10)                                    |                                    | B (10)                                    |  | A (8)                                     |  |  |



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|   |              | AM Peak Hour                              |                                    | PM Peak Hour                              |                                    | SAT Peak Hour                             |                                    |
|---|--------------|---|------------------------------------|---|------------------------------------|---|------------------------------------|
| Intersections                                     | Control Type | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup> | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup> | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup> |
| QEW Northbound Off-<br>ramp & Lyons Creek<br>Road | Signalized   | A (10)                                    |                                    | B (14)                                    | WB-T (0.79)                        | A (10)                                    |                                    |
| Crowland Avenue &<br>Carl Road                    | Unsignalized | A (7)                                     |                                    | A (7)                                     |                                    | A (7)                                     |                                    |

Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay.

2. Critical movements are those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection, 0.75 for an intersection at highway ramp or with an LOS of 'E' or 'F' for an unsignalized intersection.

The analysis of the background traffic conditions indicates that:

- Most of the study intersections are projected to operate at Levels of Service "D" or better based on background traffic volumes and network conditions during the weekday a.m. and p.m. peak hours and Saturday peak hour;
- Intersections along McLeod Road and Lyons Creek Road that were identified with concerns in existing conditions report these conditions exacerbated in the 2031 background conditions. This is mainly due to the additional traffic volumes anticipated under the background conditions. Signal timing plans have been optimized but select movement, usually left turns, still are forecast to approach or theoretically exceed capacity; and
  - Even with some movements approaching capacity, average delays at intersections are within the realm of what is considered acceptable for urban conditions.







#### 4.0 PROPOSED DEVELOPMENT

#### 4.1 Description of Proposed Development

The Grand Niagara development contains a mix of residential and commercial land uses. The development is expected to be fully constructed and occupied by the year 2031. The development is expected to accommodate a total population of about 11,600 people. This includes:

- 1,390 freehold residential units (4,300 residents);
- 1,600 medium density residential units (2700 residents); and
- 27.5 Ha of employment lands (4,600 employees).

#### 4.2 Phasing Plan

The proposed Grand Niagara development will be developed in phases. For the purposes of this Secondary Plan analysis, however, it is assumed that all phases will be constructed and all units occupied by the year 2031. The year 2031 has been used for the transportation impact analyses as well as other types of analysis (water, wastewater, for instance) in the development application.

#### 4.3 Internal Road Network

The Grand Niagara development transportation network is planned to focus on the pedestrian and active transportation but still provides functionality for automobiles. Most of the roads will be local roads, with a few collector roads that connect to the external arterial road network that bounds the development. Appropriate active transportation facilities will be nominated for all roads at the appropriate stage of the design process.

#### 4.4 Site Access

Site access is facilitated via collector roads that connect to the boundary arterial road network. The hierarchy of arterial, collector and local roads is illustrated in **Figure 8**.





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### Schedule A to the Official Plan Land Use

### GRAND NIAGARA SECONDARY PLAN

#### Legend

|    | Grand Niagara Secondary Plan                |  |  |  |  |  |  |  |  |  |
|----|---|--|--|--|--|--|--|--|--|--|
|    | Urban Area Boundary                         |  |  |  |  |  |  |  |  |  |
|    | Lands within the Built Boundary             |  |  |  |  |  |  |  |  |  |
|    | residential low / medium density            |  |  |  |  |  |  |  |  |  |
|    | mixed use                                   |  |  |  |  |  |  |  |  |  |
| ES | proposed elementary school                  |  |  |  |  |  |  |  |  |  |
| P  | open space / parkland                       |  |  |  |  |  |  |  |  |  |
|    | tourist commercial                          |  |  |  |  |  |  |  |  |  |
|    | hospital employment campus                  |  |  |  |  |  |  |  |  |  |
|    | employment                                  |  |  |  |  |  |  |  |  |  |
|    | natural heritage system<br>(see Appendix C) |  |  |  |  |  |  |  |  |  |
| N1 | neighbourhoods                              |  |  |  |  |  |  |  |  |  |
|    | roads                                       |  |  |  |  |  |  |  |  |  |
|    | rail line                                   |  |  |  |  |  |  |  |  |  |
|    | utility corridor                            |  |  |  |  |  |  |  |  |  |
|    | pipeline easement                           |  |  |  |  |  |  |  |  |  |
|    |   |  |  |  |  |  |  |  |  |  |
|    |   |  |  |  |  |  |  |  |  |  |
|    | DRAFT                                       |  |  |  |  |  |  |  |  |  |
|    |   |  |  |  |  |  |  |  |  |  |
|    |   |  |  |  |  |  |  |  |  |  |
|    |   |  |  |  |  |  |  |  |  |  |
|    | Scale 1:8,000                               |  |  |  |  |  |  |  |  |  |
| 0  | 100 200 300 400 500m                        |  |  |  |  |  |  |  |  |  |
|    |   |  |  |  |  |  |  |  |  |  |

#### 5.0 TRAFFIC RELATED TO THE PROPOSED DEVELOPMENT

#### 5.1 Trip Generation

The number of residential, employment, school, and hospital trip generating units were assumed based on anticipated development parameters for the secondary plan area. These are detailed in **Table 4** and summarized in **Table 5**.

| Residential Development |                  |            |  |  |  |  |
|-------------------------|------------------|------------|--|--|--|--|
| Development             | Maxim            | um # Units |  |  |  |  |
| Phase 1 Residential     |                  | 500        |  |  |  |  |
| Phase 2 Residential     |                  | 630        |  |  |  |  |
| Phase 3 Residential     |                  | 260        |  |  |  |  |
|                         | Employment Lands |            |  |  |  |  |
| Development Area        | #                | Jobs       |  |  |  |  |
| 0                       |                  | 2243       |  |  |  |  |
| U                       |                  | 100        |  |  |  |  |
| V                       | 29               |            |  |  |  |  |
| Т                       |                  | 200        |  |  |  |  |
|                         | Mixed Use        |            |  |  |  |  |
| Development Area        | # Units          | # Jobs     |  |  |  |  |
| K-N                     | 671              | 852        |  |  |  |  |
| I                       | 84               | 107        |  |  |  |  |
| Q                       | 848              | 1077       |  |  |  |  |
| Hospital                |                  |            |  |  |  |  |
| Employment              | t 3100           |            |  |  |  |  |
|                         | Schools          |            |  |  |  |  |
| Number of Students      |                  | 1000       |  |  |  |  |

#### TABLE 5: DEVELOPMENT UNITS SUMMARY

| Development Aspect                     | Units |
|--|-------|
| Total Single Family Homes              | 1,390 |
| Total Hospital Employment              | 3,100 |
| Total Employment (Excluding Hospital)  | 4,607 |
| Total Students                         | 1,000 |
| Total Medium Density Residential Units | 1,603 |

The trip generation associated with the proposed development was based on information provided in the Institute of Transportation Engineers' (ITE) Trip Generation (9<sup>th</sup> Edition). The following Land Use codes were used to estimate the number of trips generated by each parcel of the site for weekday AM and PM peak hours, and Saturday peak hours:



- Code 210: Single-Family Detached Housing;
- Code 610: Hospital;
- Code 710: General Office Building;
- Code 520: Elementary School; and
- Code 221: Low-Rise Apartments.

The trip generation for the pure residential and employment lands were estimated using Land Use codes 210 and 710, respectively. The mixed-used lands are assumed to be comprised of commercial units and medium density residential units and use codes 710 and 221.

The trip generation calculations for the site are provided in **Table 6**. Using these calculations, the trip generation by land use and the total trip generation are presented in **Table 7**.

|               | ITE                                     |                                       | Statistics           |   |       |                      |                         |       |                    |                   |       |  |
|---------------|---|---------------------------------------|----------------------|---|-------|----------------------|-------------------------|-------|--------------------|-------------------|-------|--|
| I and Use     | Category                                | Variable                              | Weekday AM Peak Hour |   |       | Weekday PM Peak Hour |                         |       | Saturday Peak Hour |                   |       |  |
|               | Used (ITE<br>Code)                      | , and be                              | In                   | Out   | Total | In                   | Out                     | Total | In                 | Out               | Total |  |
| Residential   | Single<br>Family<br>Detached<br>Housing | Equation                              | T                    | T = 0.7 X + 9.74                                |       |                      | Ln T = 0.9 Ln X + 0.51  |       |                    | T = 0.89 X + 8.77 |       |  |
| Single Homes  |   | (x = # units)                         |                      |   |       |                      |                         |       |                    |                   |       |  |
|               | 210                                     | Directional<br>Split                  | 25%                  | 75%   | 100%  | 63%                  | 37%                     | 100%  | 54%                | 46%               | 100%  |  |
|               | General<br>Office<br>Building           | Equation                              | Ln T =               | Ln T = 0.86 Ln X + 0.24                         |       |                      | T = 0.37 X + 60.08      |       |                    | T = 0.09 X + 0    |       |  |
| Employment    |   | (x = # Jobs)                          |                      |   |       |                      |                         |       |                    |                   |       |  |
|               | 710                                     | Directional<br>Split                  | 88%                  | 12%   | 100%  | 17%                  | 83%                     | 100%  | 54%                | 46%               | 100%  |  |
|               | Hospital                                | Equation                              |                      |   |       | · · ·                |                         |       |                    |                   |       |  |
| Hospital      | 610                                     | (x = #<br>Employees)                  | Т                    | T = 0.26 X + 78 Ln T = 0.83 Ln X + 0            |       |                      | T = 1.12 X + 78.45      |       |                    |                   |       |  |
|               | 610                                     | Directional<br>Split                  | 72%                  | 28%   | 100%  | 29%                  | 71%                     | 100%  | 49%                | 51%               | 100%  |  |
|               | Elementary<br>School                    | Equation                              | Т                    | = 0.45 X  | + 0   | T = 0.28 X + 0       |                         |       | T = 0.15 X + 0     |                   |       |  |
| Schools       |   | (x = # units)                         |                      | 1   |       |                      | n                       | r     |                    | n                 |       |  |
|               | 520                                     | Directional<br>Split                  | 55%                  | 45%   | 100%  | 45%                  | 55%                     | 100%  | 49%                | 51%               | 100%  |  |
| Medium        | Low Rise-<br>Apartments                 | Equation                              | Ln T =               | Ln T = 0.82 Ln X + 0.23 Ln T = 0.88 Ln X + 0.16 |       | X + 0.16             | Ln T = 0.82 Ln X + 0.41 |       |                    |                   |       |  |
| Density Units | 221                                     | (x = # units)<br>Directional<br>Split | 21%                  | 79%   | 100%  | 65%                  | 35%                     | 100%  | 54%                | 46%               | 100%  |  |

#### TABLE 6: SITE TRIP GENERATION



| Orreged Nilsenses   | 11    | Peak   | Trips   |          |       |  |  |
|---------------------|-------|--------|---------|----------|-------|--|--|
| Grand Niagara       | Units | Period | Inbound | Outbound | Total |  |  |
| Destination         |       | AM     | 246     | 737      | 983   |  |  |
|                     | 1,390 | PM     | 707     | 415      | 1,122 |  |  |
| Single Homes        |       | SAT    | 673     | 805      | 1,478 |  |  |
|                     |       | AM     | 1,582   | 216      | 1,798 |  |  |
| Employment          | 4,607 | PM     | 300     | 1,465    | 1,765 |  |  |
|                     |       | SAT    | 224     | 191      | 415   |  |  |
|                     |       | AM     | 692     | 269      | 961   |  |  |
| Hospital            | 3,100 | PM     | 229     | 561      | 790   |  |  |
|                     |       | SAT    | 805     | 838      | 1643  |  |  |
|                     |       | AM     | 248     | 203      | 451   |  |  |
| Schools             | 1,000 | PM     | 126     | 154      | 280   |  |  |
|                     |       | SAT    | 74      | 77       | 151   |  |  |
|                     |       | AM     | 112     | 422      | 534   |  |  |
| Low Rise Apartments | 1,603 | PM     | 604     | 325      | 929   |  |  |
|                     |       | SAT    | 502     | 428      | 930   |  |  |
|                     | AM    | 2,880  | 1,847   | 4,727    |       |  |  |
| Total               |       | PM     | 1,966   | 2,920    | 4,886 |  |  |
|                     |       | SAT    | 2,278   | 2,339    | 4,617 |  |  |

#### TABLE 7: TRIP GENERATION BY LAND USE

#### 5.2 Trip Distribution

The projected distribution for the trips generated by the Grand Niagara development is based on the Transportation Tomorrow Survey (TTS). The trip distribution derived from the TTS data was adjusted based on considerations relating to the local road network, specific land uses in the area and the planned connections to the area road network.

The following conclusions are drawn from the TTS:

- 65%-67% of the inflow and outflow trips are concerned with northern districts while 17%-19% of trips are between the Eastern neighbourhoods near Niagara Falls;
- 11%-14% of trips are western which travel towards the western districts of the Niagara Regional Municipality;
- A small portion of trips (2%-4%) has been captured by the TTS moving to-and-from the south; and
- Overall, the trip distribution for the study area is fairly consistent for the weekday AM and PM Peak hours as well as the Saturday peak hour.

The trip distribution is summarized in **Table 8**.



| TTS Trip Distribution Summary |                                  | АМ   |      | РМ   |      | SAT  |      |
|-------------------------------|----------------------------------|------|------|------|------|------|------|
| Direction                     | Planning Districts               | In   | Out  | In   | Out  | In   | Out  |
| North                         | 54,55,57 (Niagara Falls)         | 65%  | 67%  | 65%  | 66%  | 66%  | 67%  |
| South                         | 59,60                            | 4%   | 2%   | 3%   | 3%   | 4%   | 4%   |
| East                          | 57 (Niagara Falls)               | 18%  | 18%  | 17%  | 18%  | 19%  | 19%  |
| West                          | 44,53,61,62,45,46,51,52<br>,1-43 | 13%  | 14%  | 14%  | 13%  | 12%  | 11%  |
| Total                         |                                  | 100% | 100% | 100% | 100% | 100% | 100% |

#### TABLE 8: GRAND NIAGARA TRIP DISTRIBUTION

#### 5.3 Modal Split

Provincial, Regional and City policy all work to support travel modes besides the single occupant vehicle (SOV). The Grand Niagara development envisions walking and cycling as viable modes of transportation within the development and has planned for appropriate infrastructure to support these modes.

While transit presently does not serve the site, it is expected that transit routes will be extended or new routes started that would provide service to Grand Niagara and the Niagara South Hospital.

For the purposes of this analysis, a 10% modal split has been used to account for transit, cycling, walking, car pooling and any other form of non-SOV trip.

#### 5.4 Net Vehicular Trips

The 10% modal split reduction factor is applied to the trip generation to account for future transit developments in the study area, as well as options for active transportation and carsharing. The final trip generation after mode split reduction is summarized in **Table 9**.

As existing transit and active transportation networks are planned to be enhanced in coming years and attitudes and behavioural patterns regarding vehicle travel change, the modal split may also shift away from single occupant vehicle travel. More people may use transit and active transportation for daily trips than reported in this study.



| Types of  | Weekday AM Peak Hour Weekday PM Peak Hour Saturday Peak Hou |       |       |       |       | kday AM Peak Hour Weekday PM Peak Hour |       |       |       |
|---|---|-------|-------|-------|-------|--|-------|-------|-------|
| trips   | In  | Out   | Total | In    | Out   | Total                                  | In    | Out   | Total |
| Total Site<br>Generated                             | 2,880   | 1847  | 4,727 | 1,966 | 2,920 | 4,886                                  | 2,278 | 2,339 | 4,617 |
| Overall<br>Modal<br>Split %                         | 10%   | 10%   | 10%   | 10%   | 10%   | 10%                                    | 10%   | 10%   | 10%   |
| Pure New<br>Site<br>Generated<br>Vehicular<br>Trips | 2,592   | 1,662 | 4,254 | 1,769 | 2,628 | 4,397                                  | 2,050 | 2,105 | 4,155 |

| TABLE 9: GRAND NIAGARA VEH | ICULAR TRAFFIC TRIPS |
|----------------------------|----------------------|
|----------------------------|----------------------|

#### 5.5 Trip Assignment

The pure new site generated trips were then assigned to individual roads in the road network in line with the distribution described in **Section 5.2**. External trips to-and-from the north are expected to use the QEW at its interchanges at Montrose Road and Lyons Creek Road while local trips within Niagara Falls will use Montrose Road. Eastern Trips may arrive from the intersection of Stanley Avenue and Lyons Creek Road as well as from the intersection of McLeod Road and Oakwood Drive. Eastern trips from the McLeod Road and Oakwood Drive intersection have the option to travel south on the QEW as well as Oakwood Drive, depending the nature of the trip.

Vehicular traffic will search out the most appropriate path. West traffic is expected to enter and exit the network through the intersection of Biggar Road at Morris Road, and is assigned to the internal road network based on relative distance from the intersection to the trip origin or destination. The majority of southern traffic is expected to use the QEW and access the development through the intersection of Montrose Road and Biggar Road.

Vehicular traffic has been assigned for inbound and outbound vehicle trips with respect to the above assumptions and TTS trip distribution. The resulting trip assignment for development-related traffic recognizing the aforementioned travel routes is shown in **Figure 9**.







#### **6.0 ANALYSIS OF FUTURE TOTAL TRAFFIC CONDITIONS**

This chapter describes how future transportation conditions were forecast and analyzed by first providing information on future multi-modal transportation improvements, then considering background corridor growth as well as numerous new developments that are expected to add traffic to the study area and then adding the proposed development's traffic.

#### 6.1 Niagara South Hospital

A hospital has been proposed to be located on the northwest corner of the intersection of Montrose Road and Biggar Road. Based on reports in the media, it is assumed that this hospital would be 1.3 million square feet in size and employ 3,100 people. The hospital would be regional in nature and would serve not only the City of Niagara Falls but also the greater Niagara Region. The Niagara South Hospital has been included in the total traffic analysis contained in this chapter.

#### 6.2 2031 Total Traffic Conditions

The 2031 total traffic conditions include all of the traffic reported in **Section 3.4** in addition to the Grand Niagara development traffic volumes. The 2031 total traffic analysis showed traffic volumes that would require timing and geometric improvements at some intersections in order to ensure satisfactory intersection performance. Major intersection modifications are summarized in the following subsections.

#### Montrose Road & Biggar Road/Lyons Creek Road

Road improvements added to this intersection include widening to accommodate two through lanes in each direction, southbound dual left turn lanes, westbound dual left turn lanes, eastbound left and right turn lanes and northbound left and right turn lanes. The signal timing plan was also altered to include new phases for left turn movements and allow more green time for the eastbound through movement. The resulting LOS for this intersection becomes D or better for the Weekday a.m., p.m. and Saturday peak hours.

#### Lyons Creek Road & QEW Southbound Off-ramp

The added traffic volumes to the signalized intersection of Lyons Creek Road & QEW Southbound Off-ramp may result in the movements exiting the QEW onto Lyons Creek Road to operate over capacity. Recognizing that eastbound through movements are greater during the p.m. peak period, and that MTO requires its movements to have a v/c ratio of 0.75 or lower, the ramp terminal was signalized and a left-right turning lane was added to the QEW ramp. In addition, the existing right turn lane was un-channelized. The resulting LOS for this intersection becomes LOS C or better for the weekday a.m. and p.m. peak hours and Saturday peak hour.

To address v/c deficiencies on the QEW ramp for the a.m. peak period, it recommended to develop a signal timing plan specifically for the a.m. peak as opposed to using universal



timing for all peak periods. This will be revisited at later stages subject to site specific studies in the study area.

#### Montrose Road & Chippawa Creek Road

The intersection was signalized to allow the eastbound movements the opportunity to clear the intersection. The Intersection now performs at LOS B or better for the weekday a.m. and p.m. peak hours and Saturday peak hour.

#### McLeod Road & QEW Southbound Off-ramp

Road improvements included in the analysis incorporate a southbound left turn lane and through lane, and adjustments were made to the signal timing plan. As a result, the intersection may operate at LOS D or better during the weekday a.m. and p.m. peak hours and Saturday peak hour.

#### Montrose Road & McLeod Road

To accommodate background traffic and site traffic, new signal phases were added to the signal timing plan, and a westbound right turn lane was added as a capacity improvement. The resulting LOS for this intersection is still E or better, but with improved operational performance at all intersection legs.

#### Montrose Road & Grassy Brook Road

Similar to the Montrose Road and Chippawa Creek Road intersection, the increased volume on the northbound and southbound through movements delay the eastbound turning movements at the intersection of Montrose Road and Grassy Brook Road. This was addressed by signalizing the intersection to allow the eastbound movements the opportunity to clear the intersection. To further improve operations on Montrose Road, a right turn lane and a left turn lane were added to the northbound and southbound legs of the intersection, respectively. The intersection is forecast to perform at LOS B or better for the weekday a.m. and p.m. peak hours and Saturday peak hours.

The lane configurations used in this analysis reflect the aforementioned intersection improvements and are shown in **Figure 11** and the total traffic volumes used in the analysis are provided in **Figure 12**. The analysis of total traffic conditions in the year 2031 is summarized in **Table 10**. More detailed information included in the Synchro output sheets is provided in **Appendix D**.







### TABLE 10: INTERSECTION CAPACITY ANALYSIS – TOTAL TRAFFIC CONDITIONS – HORIZON YEAR 2031

|  |              | AM Peak Hour                              |                                    | PM Pe                                     | ak Hour   | SAT Peak Hour                             |   |  |
|--|--------------|---|------------------------------------|---|---|---|---|--|
| Intersections                                      | Control Type | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup> | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup>                                      | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup>                        |  |
| Montrose Road &<br>McLeod Road                     | Signalized   | D (37)                                    | WB-L (1.08)                        | E (59)                                    | EB-T (0.91)<br>WB-L (1.22)<br>WB-T (1.03)<br>NB-R (1.05)<br>SB-L (1.02) | E (56)                                    | WB-L (1.19)<br>WB-T (0.98)<br>NB-L (1.17)<br>SB-TR (1.00) |  |
| Oakwood Drive &<br>McLeod Road                     | Signalized   | E (61)                                    | EB-L (2.59)<br>EB-T (0.92)         | E (56)                                    | EB-T (1.15)<br>WB-TR<br>(1.01)  | E (55)                                    | EB-T (1.19)<br>WB-TR (0.88)<br>NB-L (0.92)                |  |
| Regional Road 98 &<br>Montrose Road                | Signalized   | B (12)                                    |                                    | B (16)                                    |   | B (16)                                    |   |  |
| Montrose Road &<br>Biggar Road/Lyons<br>Creek Road | Signalized   | C (26)                                    |                                    | D (43)                                    | EB-T (0.99)<br>WB-L (0.97)<br>SB-L (0.96)                               | C (28)                                    | NB-L (0.92)   |  |
| McLeod Road & QEW<br>Southbound Off-ramp           | Signalized   | C (28)                                    | EB-T (0.80)<br>WB-L (0.80)         | D (40)                                    | EB-T (0.95)<br>WB-L (1.08)<br>SB-L (0.87)<br>SB-T (0.99)                | D (37)                                    | EB-T (0.81)<br>WB-L (1.17)<br>SB-L (0.81)<br>SB-T (0.75)  |  |
| McLeod Road & QEW<br>Northbound Off-ramp           | Signalized   | B (18)                                    | EB-T (0.79)                        | D (54)                                    | EB-T (1.07)<br>WB-T (0.81)<br>NB-R (1.30)                               | C (22)                                    | EB-T (0.88)<br>NB-R (0.93)                                |  |
| Morris Road & Grassy<br>Brook Road                 | Unsignalized | A (8)                                     | -                                  | A (8)                                     |   | A (9)                                     |   |  |
| Biggar Road & Morris<br>Road                       | Unsignalized | C (22)                                    |                                    | C (20)                                    |   | C (15)                                    |   |  |
| Crowland Avenue &<br>Biggar Road                   | Unsignalized | B (14)                                    |                                    | C (17)                                    |   | B (12)                                    |   |  |
| Willodell Road &<br>Lyons Creek Road               | Unsignalized | E (50)                                    |                                    | F (9999)                                  | EB-T (1.07)<br>NB-LR (7.88)   | F (92)                                    |   |  |
| Montrose Road &<br>Chippawa Creek Road             | Signalized   | B (10)                                    |                                    | B (10)                                    |   | B (11)                                    |   |  |



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|   |              | AM Peak Hour                              |   | PM Pe                                     | ak Hour                            | SAT Peak Hour                             |  |  |
|---|--------------|---|---|---|------------------------------------|---|--|--|
| Intersections                                     | Control Type | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup>              | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup> | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup>         |  |
| Montrose Road &<br>Oakwood Drive                  | Signalized   | A (7)                                     |   | B (12)                                    |                                    | B (13)                                    |  |  |
| Montrose Road &<br>Grassy Brook Road              | Signalized   | B (15)                                    | SB-T (0.85)                                     | B (15)                                    | SB-T (0.85)                        | B (13)                                    |  |  |
| Lyons Creek Road &<br>Stanley Avenue              | Signalized   | C (25)                                    | WB-T (0.90)                                     | C (21)                                    |                                    | B (19)                                    |  |  |
| Carl Road & Montrose<br>Road                      | Unsignalized | E (41)                                    |   | F (62)                                    |                                    | D (27)                                    |  |  |
| QEW Southbound Off-<br>ramp & Lyons Creek<br>Road | Signalized   | C (22)                                    | EB-T (0.81)<br>SB-LR<br>(0.96dr)<br>SB-R (1.02) | C (27)                                    | EB-T (1.01)<br>SB-LR<br>(0.80)     | C (21)                                    | EB-T (0.88)<br>SB-LR (0.98)<br>SB-R (0.75) |  |
| QEW Northbound Off-<br>ramp & Lyons Creek<br>Road | Signalized   | B (11)                                    |   | B (17)                                    | WB-T (0.84)<br>NB-R (0.79)         | B (11)                                    |  |  |
| Crowland Avenue & Carl Road                       | Unsignalized | A (7)                                     |   | A (7)                                     |                                    | A (7)                                     |  |  |

Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay.

2. Critical movements are those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection, 0.75 for an intersection at highway ramp or with an LOS of 'E' or 'F' for an unsignalized intersection.

The analysis shows that:

- Even with road improvements, if the amount of development considered in this report were to be constructed, select intersections at select peak hours would be expected to experience long delays and some movements would be expected to approach or exceed their theoretical capacity;
- Intersections on McLeod Road would be expected to continue to exhibit movements close to, or theoretically over, capacity in the peak travel hours;
- Willodell Road at Lyons Creek Road exhibits LOS F due to the delays incurred to the northbound turning movements. This is a relatively small number of vehicles that appear during the peak hour. Over time, these vehicles may reroute to a different travel route to avoid this intersection. The intersection is too close to other intersections in order to signalize it. If development proceeds such as is considered in this report, Willodell Road might be considered to be realigned to the west to intersect with Montrose Road and the



segment of the road connecting to Lyons Creek Road could be removed. This solution is recommended to be reconfirmed in the future as development progresses in order to validate the appropriateness of this action;

- Carl Road at Montrose Road exhibits LOS F during the p.m. peak hour due to the increased traffic in the southbound direction. A traffic signal is not warranted at this location since this is due to a small number left-turning of vehicles appearing during the peak hour which are hindered by the southbound through movements; and
- Overall, most intersections within the study area exhibit reduced levels of service compared to the 2031 background traffic development results, due to road improvements recommended and applied to the analysis.

#### 6.2.1 New Intersections

Twelve new intersections on the arterial and collector road network are resulting from the development based on the road network schematic in **Figure 8**. Among these, five intersections form at the site boundary on Montrose Road and Biggar Road. The hospital accesses have been signalized to prioritize movement in and out of the hospital driveways and to accommodate traffic generated by the adjacent employment lands.

Biggar Road & Street A has been signalized to accommodate westbound right turning traffic during the a.m. peak hour, and southbound left turning traffic during the p.m. peak hour. Since these turning volumes are relatively high, an exclusive westbound right turn lane has been provided along with dual southbound left turn lanes. The majority of this traffic is concerned with accessing the employment area west of the hospital via Street D. For the same reason, the intersection of Street A and Street D has also been signalized with an exclusive westbound left turn lane to facilitate traffic exiting the employment area towards Biggar Road.

Street B intersects Montrose Road south of Grassy Brook Road. This intersection performs satisfactorily as a stop controlled intersection with Montrose Road as the major road. All other new intersections within the site boundary perform adequately as stop controlled intersections. The resulting lane configuration for the site road network as per the aforementioned recommendations are present in **Figure 13** and the total traffic volumes used for the site analysis are show in **Figure 14**. The analysis of the new intersections are summarized below in **Table 11** and the detailed Synchro summary output sheets for the site road network are provided in **Appendix E**.

These recommended lane configurations and signalized intersections on the site road network should be reconfirmed in the future when applications are submitted to develop specific properties.



#### TABLE 11: INTERSECTION CAPACITY ANALYSIS OF NEW INTERSECTIONS (SITE)

| Intersections                                | Control Type | AM Peak Hour                              |                                    | PM Peak Hour                              |                                    | SAT Peak Hour                             |                                    |
|--|--------------|---|------------------------------------|---|------------------------------------|---|------------------------------------|
|  |              | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup> | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup> | LOS (Delay<br>in<br>seconds) <sup>1</sup> | Critical<br>Movements <sup>2</sup> |
| Street A & Mixed Use<br>Access/Street D      | Signalized   | B (10)                                    |                                    | C (21)                                    |                                    | A (6)                                     |                                    |
| Montrose Rd &<br>Hospital 2/Resort<br>Access | Signalized   | B (19)                                    |                                    | C (22)                                    |                                    | B (15)                                    |                                    |
| Biggar Rd & Street A                         | Signalized   | B (10)                                    |                                    | B (13)                                    |                                    | B (11)                                    |                                    |
| Biggar Rd & Hospital<br>Access 1             | Signalized   | B (10)                                    |                                    | B (13)                                    |                                    | B (12)                                    |                                    |
| Street A & Grassy<br>Brook Rd                | Unsignalized | C (16)                                    |                                    | C (19)                                    |                                    | C (18)                                    |                                    |
| Grassy Brook Rd &<br>Street C                | Unsignalized | B (13)                                    |                                    | B (14)                                    |                                    | B (13)                                    |                                    |
| Mid-Block Access &<br>Grassy Brook Rd        | Unsignalized | B (10)                                    |                                    | A (10)                                    |                                    | A (10)                                    |                                    |
| Grassy Brook Rd &<br>Street A-2              | Unsignalized | C (16)                                    |                                    | C (19)                                    |                                    | C (15)                                    |                                    |
| Street A & Street B                          | Unsignalized | B (14)                                    |                                    | B (12)                                    |                                    | B (12)                                    |                                    |
| Montrose Rd & Street<br>B                    | Unsignalized | C (24)                                    |                                    | C (20)                                    |                                    | C (20)                                    |                                    |
| Biggar Rd & Mixed<br>Use Access              | Unsignalized | D (27)                                    |                                    | F (71)                                    | SB-L (0.95)                        | C (18)                                    |                                    |
| Street A & School and<br>Development         | Unsignalized | B (12)                                    |                                    | B (11)                                    |                                    | B (11)                                    |                                    |



Intersections directly related to the Grand Niagara site and associated Secondary Plan area are forecast to exhibit LOS C or better during weekday a.m., p.m., and Saturday peak hours with only one exception. The intersection of Biggar Road and the Mixed Used Access, which is forecast to exhibit LOS D and LOS F for the a.m. and p.m. weekday peak hours, respectively, is forecasting longer delays than other intersections because of the queue of southbound left turn movements waiting for a gap in east-west through traffic. This intersection does not warrant a traffic signal and is constrained to implement a traffic signal by its proximity to the signalized intersection of Street A and Biggar Road. If forecast delays become too long, some drivers may choose to re-route from this intersection along Street D towards Street A in order to utilize the traffic signal planned at Biggar Road and Street A.

All intersections recommended for signalization are forecast to have all movements within a volume to capacity ratio of 0.85 due to road improvements, such as signalization, recommended and applied to the analysis.







#### 7.0 CONCLUSIONS AND RECOMMENDATIONS

#### 7.1 Conclusions

The following conclusions are drawn from the analysis of existing and future traffic conditions in the Grand Niagara study area:

- Most intersections in the study area today exhibit adequate levels of service in existing conditions, with all movements within capacity;
  - Select unsignalized intersections report long delays or capacity constraints in a peak hour. These intersections may need to be signalized;
- In 2031 future background conditions, road improvements are needed to accommodate new developments and background traffic growth. With the road improvements in place, the majority of intersections are forecast to be within capacity with acceptable levels of service. Select turning movements may be approaching or over capacity in select peak hours. Given the long range nature of this analysis, the results are considered acceptable given the recommended road improvements;
- In the 2031 total traffic conditions including the Grand Niagara development, most intersections in the study area are forecast to operate with acceptable levels of service once the recommended road network improvements are implemented. The vast majority of individual movements are expected to be within capacity. At select intersections during select peak hours, certain movements may be approaching or theoretically above capacity;
- In studying the new intersections that are specific to the Grand Niagara site and Secondary Plan area, the majority of intersections can be stop controlled and unsignalized, with select intersections recommended to be signalized in order to facilitate movement in and out of the hospital and commercial areas along Biggar Road; and
- The findings of this report are based on land use assumptions available at this time. As development progresses and as specific site development applications are submitted, the findings of this report should be confirmed and updated, as appropriate.

#### 7.2 Recommendations

Based on the results obtained for the assumptions used in this study, the following improvements to the intersections are listed in conjunction with **Section 6.2**.

- Road widening to accommodate two through lanes in each direction, southbound dual left turn lanes, westbound dual left turn lanes, eastbound left and right turn lanes and northbound left and right turn lanes at the intersection of Montrose Road & Biggar Road/Lyons Creek Road, along with adjusted signal timing plans;
- Signalization of the Lyons Creek Road at QEW Southbound Off-ramp intersection and an addition of left-right turning lane. Signal Timing plans may vary to satisfy a.m. and p.m. peak periods;



- Signalization of the intersection of Montrose Road & Chippawa Creek Road to facilitate eastbound turning movements;
- Replacement of shared through-left lane with an individual left turn lane and through lane with adjustments to the signal timing plan at the intersection of McLeod Road & QEW Southbound Off-ramp;
- Addition of new signal phases and a westbound right turn lane at the intersection of Montrose Road & McLeod Road; and
- Signalization of the Montrose Road & Grassy Brook Road intersection to facilitate eastbound turning movements, and the addition of right turn lane and a left turn lane in the northbound and southbound directions.

The recommended improvements to the transportation network shown in the study should be reconfirmed in the future when applications are submitted to develop specific properties.

