Environmental Study Report

Grand River Transit Northfield Drive Facility – Municipal Class Environmental Assessment, Schedule ‘C’ and Preliminary Design

Prepared for Region of Waterloo by IBI Group
March 9, 2017
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<td>REPORT TITLE:</td>
<td>Grand River Transit Northfield Drive Facility – Municipal Class Environmental Assessment, Schedule ‘C’ and Preliminary Design</td>
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<td>24RX14.0430</td>
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<td>CIRCULATION LIST:</td>
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<tr>
<td>HISTORY:</td>
<td>Version 1 – December 2016</td>
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<td></td>
<td>Version 2 – January 2017</td>
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<td>Version 3,4 – February 2017</td>
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EXECUTIVE SUMMARY

1 Introduction

The Region of Waterloo retained IBI Group to undertake the Class Environmental Assessment (Class EA) Study ‘Schedule ‘C’ and Preliminary Design for a new transit facility at 300 and 350 Northfield Drive in the City of Waterloo. The study was conducted in accordance with the planning and design process as outlined in the Municipal Engineers Association "Municipal Class Environmental Assessment," (October 2000, as amended in 2007, 2011 and 2015). The Class EA considered options for the site layouts of a new facility that will be used to deploy, service, maintain and store Grand River Transit’s (GRT) conventional and specialized transit vehicles.

2 Objective

The Region adopted the Regional Transportation Master Plan (RTMP) “Moving Forward 2031” (2011) which established increased public transit ridership targets. Achieving these targets will require a significant expansion of the Region’s public transit services, GRT and MobilityPLUS, in the immediate and longer-term. A Transit Facilities Update Study (2012) identified that in order to achieve this level of transit service expansion as per the RTMP, the Region’s fleet of conventional and specialized transit vehicles will need to grow rapidly along with the addition of articulated buses and Light Rail Transit (LRT). Consequently, additional facility resources will be required to maintain and store the growing GRT fleet, as well as accommodate administrative and operations functions of the transit system.

3 Environmental Assessment Process

This Class EA was conducted as a Schedule “C” Municipal Class EA because the study involves:

“Construction of new maintenance facilities in or adjacent to residential land-use or an environmentally sensitive area including natural heritage features, cultural heritage and archaeological resources, recreational or other sensitive land-uses.”

The Part II Order provisions of the Environmental Assessment Act provide an opportunity to have the EA reviewed by the Ontario Minister of the Environment and Climate Change if any issues or concerns remain unresolved through the EA process.

4 Public Consultation

The Notice of Study Commencement was published in The Record on November 17 and 24, 2015. Notice of Public Consultation Centre (PCC) #1 was published in The Record on February 9 and 16, 2016, and in the Waterloo Chronicle on February 18, 2016. Notice of PCC #2 was
published in the Waterloo Chronicle on November 10 and 17, 2016, and pointer ads were published in The Record November 8 and 15, 2016.

The first PCC was held February 24, 2016 and introduced the project and outline the issues to be addressed by the Class EA. At the request of City of Waterloo Councillor Diane Freeman, a second informal PCC was held on March 20, 2016.

The second PCC was held on November 24, 2016 and received public input, comments and concerns on the preliminary preferred site layout concept.

5 Existing Conditions

The study area is situated at the northern boundary of the City of Waterloo. It is bounded to the south by light density industrial areas and residential suburbs beyond. To the north, the study area is surrounded by rural lands with agricultural land use. The study area consists of a former industrial facility (at 300 Northfield Drive, formally Waterloo North Hydro) and associated grounds (parking areas, stormwater management areas, and utility yards) in the west, and a triangular area of green-space that is current fallow scrublands in the east (350 Northfield Drive). The study area immediately on the north and south is bounded by the ROWs of University Avenue and Northfield Drive, respectively. Adjacent to the site are the RIM Technology Park, industrial lands and residential quarters.

5.1 Natural Heritage

There are no aquatic features in the study area. The manicured and early successional character of the site vegetation, coupled with the close proximity of busy roads and other human activity, contributes to an assessment of very low likelihood of Species at Risk (SAR) plant or wildlife occurrence.

The former Waterloo North Hydro building could support incidental summer roosting by endangered bats such as Little Brown (Myotis), but it is not considered to be a potential overwintering site.

5.2 Archaeology and Cultural Heritage

Stage 1 and 2 archaeological assessments were completed and concluded that although two pre-contact Aboriginal findspots were discovered, they did not meet the Standards and Guidelines for Consultant Archeologists for cultural heritage value or interest. It was concluded that the study area had been fully documented and no further archaeological assessments were required.

A Cultural Heritage Resource Assessment was undertaken and concluded there were no properties located in or adjacent to the study area. In addition, there were no resources of cultural heritage interest located within or adjacent to the study area.

5.3 Geotechnical and Hydrogeology

The underlying soils consist of granular deposits of sand, silty sand and sand and gravel layers and are in compact to dense compactness condition. This is followed by hard grey silty clay till. The groundwater table is between 1.52 and 2.29 m below the ground surface. It follows the surficial topography, dropping to the north and west.
5.4 Contaminants

A Phase 1 Environmental Site Assessment (ESA) was completed for the study area and identified areas of potential environmental concern. A Phase 2 ESA identified site impacts of sodium and chloride in overburden groundwater and five areas of impacted soil and/or groundwater. In 2011 and 2012, remedial actions were undertaken at some locations within the study area. Additional remedial action is required.

5.5 Municipal Infrastructure

The westerly portion of the study (the former Waterloo North Hydro building) had a sanitary connection to the Frobisher Pumping Station via a servicing easement over 295 Frobisher Drive and 2700 University Avenue. In addition this location was serviced by a water connection on the same municipal easement as the sanitary sewer at the rear of 295 Frobisher Drive. As well, there exists a 300 mm diameter watermain along Northfield Drive for the entire frontage of the subject site, and approximately 60 m of 300 mm diameter watermain westerly along University Avenue from Northfield Drive.

Stormwater from the northwest part of the property drains north overland toward an existing storm sewer on University Avenue, and then enters an outlet channel to the north of University Avenue, which drains north to the Conestoga River. Flows from the east part of the property drain southeast overland toward Northfield Drive, and then enter an existing storm sewer system.

Within the adjacent municipal ROWs, both University Avenue and Northfield Drive, there exists Bell infrastructure, including conduits in the northerly and southerly boulevards of Northfield Drive along with buried cables in the northerly boulevard of Northfield Drive in the northerly boulevard of University Avenue.

There is overhead hydro along the southerly boulevard of the Northfield Drive ROW and along the northerly limit of the University Avenue ROW.

6 Preferred Solution

In early 2012, a number of locations in the City of Waterloo were considered for the transit facility. The search included both properties being actively marketed and those not on the market but which fit select criteria. The site at 300-350 Northfield Drive was selected as the property has frontage along both streets with industrial use abutting its southwest property line. In addition, the site also offered:

- Proximity to major thoroughfares;
- Operationally, efficiently located close to Conestoga Mall transit platforms;
- Proximity to LRT and Waterloo bus routes;
- Size of the property allows for future expansion;
- Existing connections to municipal services; and
- Available for purchase.
7 Preferred Site Layout Concept

The preferred site layout concept includes:

- Perimeter landscaping with naturalized open space to buffer the development along both frontages;
- Employee parking area with a bridge to main facility entrance;
- LEED Silver target applicable to design and construction;
- Building mounted and pole mounted lighting to limit light trespass into neighbouring properties;
- Outdoor patio;
- Indoor storage, maintenance and servicing of 250 equivalent buses;
- Single storey facility with a 2 storey administrative block; and
- One main and one alternate driveway entrance.
1 Introduction

1.1 Study Purpose

The Regional Municipality of Waterloo (the Region) retained IBI Group to undertake the Municipal Class Environmental Assessment (Class EA) Schedule ‘C’ and Preliminary Design for a new transit facility at 300 and 350 Northfield Drive East (Northfield Drive) in the City of Waterloo (Exhibit 1-1). The proposed site is a triangular shaped parcel of land, bordered by University Avenue East (University Avenue) to the north, Northfield Drive to the east and private developments to the south-west. The property is approximately 69,127 m² in area.

Exhibit 1-1 Study Area

The Class EA considered options for the site layouts of a new facility that will be used to deploy, service, maintain and store Grand River Transit’s (GRT) conventional and specialized transit vehicles.

The study was conducted in accordance with the planning and design process for Schedule ‘C’ projects as outlined in the Municipal Engineers Association “Municipal Class Environmental Assessment,” (October 2000, as amended in 2007, 2011 and 2015).
1.2 Study Objective

The Region adopted the Regional Transportation Master Plan (RTMP) “Moving Forward 2031” (2011) which established increased public transit ridership targets. Achieving these targets will require a significant expansion of the Region’s public transit services, GRT and MobilityPLUS, in the immediate and longer-term. A Transit Facilities Update Study (2012) identified that in order to achieve this level of transit service expansion as per the RTMP, the Region’s fleet of conventional and specialized transit vehicles will need to grow rapidly along with the addition of articulated buses and Light Rail Transit (LRT). Consequently, additional facility resources will be required to maintain and store the growing GRT fleet, as well as accommodate administrative and operations functions of the transit system.

1.3 Related Studies

1.3.1 Region of Waterloo Transportation Master Plan

The RTMP (2011) provides strategies and planning policies to direct transportation growth and change in the Region. The RTMP forecasts transit ridership for 2031 to be 53.6 million, a significant increase from the 20.2 million estimated for 2016.

1.3.2 Northfield Drive Corridor Study, Davenport Road to University Avenue, Class Environmental Assessment, Schedule ‘C’

The Region completed the Northfield Drive Corridor Study Class EA, Schedule ‘C’ (2012) to consider transportation improvements to Northfield Drive from King Street to University Avenue in the City of Waterloo. The recommended solution for Northfield Drive, within the study area, included:

- Widening Northfield Drive from two-lanes to four-lanes;
- Constructing on-road cycling lanes;
- A multi-use trail on the south side of Northfield Drive;
- A sidewalk on the north side of Northfield Drive;
- An underground plan for new traffic control signals at the intersection of Toman Drive when recommended in the future; and
- Improve traffic signal operations at the intersection of Northfield Drive and University Avenue.

1.3.3 City of Waterloo Official Plan

The City of Waterloo Official Plan (2012) designates a portion of the study area as “Designated Greenfield Areas” (Schedule ‘B3’). For the remainder of the study area, Schedule ‘A’ has the land use designation as “Employment”. Schedule ‘A2’ further classifies the study area as “Business Employment”. Land use in this location can include:

- Offices;
- Data centres;
- Training facilities and communication production uses;
- Light assembly/light manufacturing operations relating to the production of high value, high technology products;
• Repair and servicing operations related to the production of high value, high technology products, to a maximum of 25% of the total floor area of any building;
• Indoor storage and warehousing related to the production of high value, high technology products, to a maximum of 25% of the total floor area of any building;
• Printing and publishing; and
• Parking facilities.

There was a Holding (H) Provision applied to the study area to disallow a building permit to be issued for an addition to the existing building (i.e. increase of the floor area of the building) or any new buildings or structure within the study area and to prohibit the use of any portion of the site as an outdoor storage area or any portion of the building for indoor servicing and repair of equipment related to an office of a masonry business. The site specific by-law does permit a range of uses, including a Municipal Facility, along with a parking facility.

The General Provisions of the Zoning By-law 1418 exempts the use of land or buildings for the purpose of a public service or services by the Region from the provisions of the Zoning By-law provided that any building and lands used shall be in substantial compliance with the regulations prescribed in the zone.

1.4 Municipal Class Environmental Assessment Process

The Municipal Class EA Process followed as the approval method for this project is a five-phase planning procedure under the Ontario Environmental Assessment Act, which applies to public infrastructure projects. Projects undertaken through this planning process are classified as one of four “Schedule” types ranging from Schedule ‘A’ and ‘A+’, through to Schedule ‘B’ and ‘C’ in accordance with their degree of anticipated environmental impact and magnitude. Key features of the Class EA process, as well as a detailed outline of the process are shown in Exhibit 1-2 and Exhibit 1-3 respectively. The Class EA process is broken down into five phases:

• Phase 1 – Identify the problem or opportunity
• Phase 2 – Identify alternative solutions, evaluate and select preferred solution
• Phase 3 – Identify alternative design concepts, evaluate and select the preferred design concept
• Phase 4 – Document in an Environmental Study Report the rationale, planning, design and consultation process and place it on public record
• Phase 5 – Project implementation, complete contract drawings and tender documents and proceed to construction and operation of the project.
A Schedule ‘C’ Class EA generally includes the construction of new facilities and major expansions to existing facilities. The GRT Northfield Drive Facility Class EA is being conducted as a Schedule ‘C’ EA because:

“Construction of new maintenance facilities in or adjacent to residential land-use or an environmentally sensitive area including natural heritage features, cultural heritage and archaeological resources, recreational or other sensitive land-uses.”

### 1.4.1 Part II Order Process

As part of the Class EA process, it is suggested that all stakeholders work together to determine the preferred means of dealing with a problem or opportunity. If concerns regarding a project cannot be resolved in discussion with the proponent, members of the public, interest groups or technical review agencies may request the Ontario Minister of the Environment and Climate Change (MOECC) to require a proponent comply with Part II of the Environmental Assessment Act before proceeding with the proposed undertaking. The Minister of the Environment and Climate Change then decides whether to deny the request, refer the matter to mediation or require the proponent to comply with Part II of the Environmental Assessment Act.

The procedures for dealing with concerns are outlined as follows:

1. For Schedule ‘C’ projects, a person or party with a concern should bring it to the attention of the Region of Waterloo (the proponent) in Phase 4 of the planning process.
2. If a concern is not resolved through discussion with the proponent, the person or party raising the objection may request the Region of Waterloo to voluntarily elevate the Schedule ‘C’ project to an Individual Environmental Assessment.

3. If the Region of Waterloo declines, and the person or party with the concern wishes to pursue the matter, they may write the Minister of the Environment and Climate Change, or delegate to request a Part II Order. These requests shall be copied by the requestor to the Region of Waterloo and the Director of the Environmental Approvals Branch at MOECC at the same time they are submitted to the Minister, or delegate. For a Schedule ‘C’ project, a written request must be submitted to the Minister or delegate within the 30 day review period after the Notice of Completion has been issued.

1.5 Study Team

The study organization reflects the general administrative and technical needs of the study as well as the study’s consultation program. The latter has been developed to ensure that all of those with a potential interest in the study will have the opportunity to participate and provide input during the process.

The study was carried out under the direction of the Project Team comprised of staff from the Region of Waterloo and IBI Group:

Jerry Biersteker, Senior Project Manager, Region of Waterloo
Peter Zinck, Assistant Director, Transit Services, Region of Waterloo
Paul McKinnon, Project Engineer, Region of Waterloo
Eric Czerniak, Consultant Project Manager, IBI Group
Don Drackley, Senior Associate, IBI Group
Marianne Alden-Radue, Environmental Planner, IBI Group

1.6 Problem/Opportunity Statement

GRT continues to expand transit services. As a result, GRT must expand their fleet of conventional and specialized transit vehicles. This includes adding buses and providing higher capacity feeder service for LRT. The two existing transit facilities at Strasburg Road in Kitchener and Conestoga Boulevard in Cambridge cannot accommodate additional buses. As a result the Region has identified the need for another transit facility to store and maintain the additional buses.
2 Existing Conditions

2.1 Natural Heritage
This section summarizes the existing natural heritage conditions within the study area. The full report is in Appendix A.

2.1.1 Aquatic
There are no aquatic features within the study area.

2.1.2 Terrestrial
A botanical inventory identified the following four plant communities according to the Ecological Land Classification for Southern Ontario (ELC):

- Manicured vegetation, including lawn and planted trees and shrubs that were being maintained at the time of the site visit on 300 Northfield Drive;
- Cultural Meadow, in a border around a former artificial pond at the north end of 300 Northfield Drive;
- Willow Swamp Thicket, within the now dry former artificial pond at the north end of 300 Northfield Drive; and
- Cultural Savannah, comprising the meadow and scattered young trees on 350 Northfield Drive.

Each of the latter three plant communities is the result of passive successional revegetation of previously disturbed areas on the site. None are sensitive or worthy of conservation. None represent constraints to site development.

The plant species inventory identified a total of 86 species of trees, shrubs, vines, herbaceous forbs and grasses. Of these, only 37 species are native to Ontario. The 49 non-native species include trees and shrubs planted at 300 Northfield Drive East and a host of weeds that have colonized successional plant communities at the site.

A total of 138 trees were identified on the site, 2 were dead and 136 were alive. Six native and six non-native tree species occur on the site, reflecting the artificial landscape plantings on 300 Northfield Drive East and the naturally-occurring native trees, mostly Trembling Aspen, of the Cultural Savannah on 350 Northfield Drive East. Trees on site are largely young.

2.1.3 Wildlife
Wildlife observations were limited to incidental common songbirds and numerous Woodchuck (Groundhog) burrows around the building and across the entire site, and signs of White-tailed Deer within the Cultural Savannah.

2.1.4 Species at Risk
The manicured and early successional character of the site vegetation, coupled with the close proximity of busy roads and other human activity, contributes to an assessment of very low likelihood of Species at Risk (SAR) plant or wildlife occurrence.

The building could support incidental summer roosting by endangered bats such as Little Brown (Myotis), but it is not considered to be a potential overwintering site.
2.2 Cultural Heritage

2.2.1 Archaeology

The Stage 1 archeological assessment determined that the majority of the study area had been subjected to deep and extensive disturbance associated with previous right-of-way (ROW) construction, utility installation and construction of the former Waterloo North Hydro facility. However a portion of the study area located at 350 Northfield Drive was deemed to need a Stage 2 archaeological assessment.

The Stage 2 archaeological assessment was completed and although two pre-contact Aboriginal findspots were discovered, they did not meet the Standards and Guidelines for Consultant Archeologists for cultural heritage value or interest. It was concluded that the study area had been fully documented and no further archeological assessments were required. The Stage 1 and Stage 2 reports can be found in Appendix B.

2.2.2 Built Heritage and Heritage Landscapes

A Cultural Heritage Resource Assessment was undertaken and determined there were no properties located in or adjacent to the study area. In addition, there were no resources of cultural heritage interest located within or adjacent to the study area and therefore the site redevelopment will not impact any built heritage resources or cultural heritage landscapes. The full report is in Appendix C.

2.3 Socio-Economic Environment

The study area is situated at the northern boundary of the City of Waterloo. The study area is bounded to the south by light density industrial areas and residential suburbs beyond. To the north, the study area is surrounded by rural lands with agricultural land use. The study area consists of a former industrial facility (at 300 Northfield Drive, formally Waterloo North Hydro) and associated grounds (parking areas, stormwater management areas, and utility yards) in the west, and a triangular area of green-space that is current fallow scrublands in the east (350 Northfield Drive). The study area immediately on the north and south is bounded by the ROWs of University Avenue and Northfield Drive, respectively. Adjacent to the site are the RIM Technology Park, industrial lands and residential quarters (Exhibit 2-1).

2.3.1 Former Waterloo North Hydro Building

The former Waterloo North Hydro building, located at 300 Northfield Drive, is a single story 3,150 m² building, which consists of various office, shop and storage areas, and was originally constructed in 1981 with alterations and renovations occurring in 1988 and 1993. Waterloo North Hydro vacated the site in 2012 and the building has been vacant since that time. There is a paved parking lot at the southwest corner of the property.
### 2.4 Noise
The study area is currently vacant and noise from the site is negligible.

### 2.5 Geotechnical and Hydrogeology
A geotechnical and hydrogeological investigation was conducted as part of this Class EA study to determine the subsurface conditions of the study area. The investigation included the installation of 12 boreholes. The findings are summarized below and the full report is in Appendix D.

#### 2.5.1 Geotechnical
The underlying soils consist of granular deposits of sand, silty sand and sand and gravel layers and are in compact to dense compactness condition. This is followed by hard grey silty clay till.

#### 2.5.2 Hydrogeology
The groundwater table is between 1.52 and 2.29 m below the ground surface. It follows the surficial topography, dropping to the north and west.

### 2.6 Contaminants
A Phase 1 Environmental Site Assessment (ESA) was completed for the study area and identified areas of potential environmental concern. A Phase 2 ESA identified site impacts of sodium and chloride in overburden groundwater and five areas of impacted soil and/or groundwater:

1. The soil sample taken at the location of the former fuel pumps of the Waterloo North Hydro building contained ethylbenzene, toluene, total xylenes, and petroleum
hydrocarbons (PHC) F1 at concentrations exceeding acceptable levels. Groundwater samples from MW11-11 contained concentrations of benzene, ethylbenzene, toluene, total xylenes, hexane, PHC F1, and PHC F2 exceeding acceptable standards.

2. The groundwater samples from the loading dock area contained concentrations of benzene, ethylbenzene, toluene, total xylenes, hexane, PHC F1, and PHC F2 exceeding acceptable standards.

3. The groundwater sample taken at the northern edge of the vehicle garage contained PHC F4 at concentrations exceeding acceptable standards.

4. Soil samples collected from the stockpile of soil located on the 350 Northfield Drive East portion of the property contained polycyclic aromatic hydrocarbons (PAH) exceeding acceptable standards.

5. A sample taken between the current fuel pumps and the gasoline and diesel USTSs detected the Sodium Adsorption Ratio (SAR) at concentrations exceeding acceptable standards.

In 2011 and 2012, remedial actions were undertaken at the sites listed in #1, #2, #3, and #4 above to reduce the concentrations of contaminants in the soil and groundwater. Additional remedial action is required, as detailed in Section 8.9. The Phase 1 and 2 ESAs are in Appendix E and F, respectively.

2.7 Municipal Infrastructure

2.7.1 Municipal Sanitary

The westerly portion of the subject site (the former Waterloo North Hydro building) had a sanitary connection to the Frobisher Pumping Station via a servicing easement over 295 Frobisher Drive and 2700 University Avenue. The existing 150 mm diameter sanitary sewer is approximately 1.8 m deep and discharges to the Frobisher Drive pumping station where it is pumped via forcemain along Frobisher Drive eventually outletting to the existing 200 mm diameter sanitary sewer on Frobisher Drive west of Bridge Street. As illustrated Exhibit 2-4, flows from the northwest part of the property (Areas 202, 204) drain north overland toward an existing storm sewer on University Avenue, and then enters an outlet channel to the north of University Avenue, which drains north to the Conestoga River. Flows from the east part of the property (Areas 302, 303, 304) drain southeast overland toward Northfield Drive, and then enter an existing storm sewer system. The full report is in Appendix G.

2.7.2 Municipal Water

The westerly portion of the subject property was serviced by a water connection on the same municipal easement as the sanitary sewer at the rear of 295 Frobisher Drive. As well, there exists a 300 mm diameter watermain along Northfield Drive for the entire frontage of the subject site, and approximately 60 m of 300 mm diameter watermain westerly along University Avenue from Northfield Drive (Exhibit 2-3).

2.7.3 Stormwater

As illustrated Exhibit 2-4, flows from the northwest part of the property (Areas 202, 204) drain north overland toward an existing storm sewer on University Avenue, and then enters an outlet channel to the north of University Avenue, which drains north to the Conestoga River. Flows from the east part of the property (Areas 302, 303, 304) drain southeast overland toward Northfield Drive, and then enter an existing storm sewer system. The full report is in Appendix G.
2.7.4 Other

Within the adjacent municipal ROWs, both University Avenue and Northfield Drive, there exists Bell infrastructure, including conduits in the northerly and southerly boulevards of Northfield Drive along with buried cables in the northerly boulevard of Northfield Drive in the northerly boulevard of University Avenue.

There is currently no natural gas infrastructure in the University Avenue ROW, however there are buried natural gas distribution pipes in both the northerly and southerly boulevards in the Northfield Drive ROW.

Finally, there exists overhead hydro along the southerly boulevard of the Northfield Drive ROW and along the northerly limit of the University Avenue ROW.
Exhibit 2-2 Existing Sanitary
Exhibit 2-3 Existing Watermain
Exhibit 2-4 Existing Storm Catchment Areas
3 Transportation/Traffic

3.1 Existing Conditions

3.1.1 Transportation

The following road network is adjacent to the study area:

- **Northfield Drive East (Regional Road No.22)** is a Neighbourhood Connector-Avenue that operates as a two lane rural cross section within the study area. The posted speed limit of Northfield Drive is 60 km/h;

- **Bridge Street West (Regional Road 52)** is a Neighbourhood Connector-Avenue east of Northfield Drive and a collector road west of Northfield Drive. It has a posted speed limit of 50 km/h;

- **University Avenue East** is a four lane cross-section City of Waterloo Arterial road. It connects from the study area to the middle of the City where both University of Waterloo and University of Laurier campuses are located; and

- **Toman Drive** is a City of Waterloo Local road for employment land uses that connects to Northfield Drive at a stop-controlled T-intersection. There is a now defunct private access into the proposed site at the intersection of Toman Drive and Northfield Drive.

3.1.2 Traffic

3.1.2.1 Traffic Volumes

Traffic volumes were obtained from the Region and new turning movement counts were conducted. Traffic counts from 2013 were scaled up to 2016 levels by 2% net/year to account for background traffic growth. Given that the latter counts were conducted in late 2015, they were assumed to be a representation of spring 2016 traffic volumes. The 2016 traffic volumes in the proposed study area are shown in
Exhibit 3-1 (a.m. peak hours) and Exhibit 3-2 (p.m. peak hours). The count dates and raw traffic data can be found in Appendix H.

Traffic volumes are not balanced along Bridge Street between Northfield Drive and University Avenue, particularly westbound in the a.m. peak hour and eastbound in the p.m. peak hour. This is the result of two intermediate intersections on Bridge Street at Bathurst Drive and Frobisher Drive where both provide access to industrial/commercial areas. These intermediate intersections were not included in the analysis as they were both two-way stop controlled side streets which are minimally impacted by the proposed development.
Exhibit 3-1 Existing AM Peak Hour Volumes

IBI GROUP ENVIRONMENTAL STUDY REPORT
GRAND RIVER TRANSIT NORTHFIELD DRIVE FACILITY – MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT, SCHEDULE ‘C’ AND PRELIMINARY DESIGN
Prepared for Region of Waterloo

March 2017

16
Exhibit 3-2 Existing PM Peak Hour Volumes

<table>
<thead>
<tr>
<th>Street</th>
<th>Northfield Drive East</th>
<th>University Ave East</th>
<th>Private Access</th>
<th>Toman Drive</th>
<th>Bridge Street West</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>132</td>
<td>31</td>
<td>334</td>
<td>0</td>
<td>201</td>
</tr>
<tr>
<td></td>
<td>262</td>
<td>262</td>
<td>4</td>
<td>0</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>88</td>
<td>88</td>
<td>4</td>
<td>0</td>
<td>169</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60</td>
<td>0</td>
<td>30</td>
<td>172</td>
</tr>
<tr>
<td></td>
<td></td>
<td>94</td>
<td>0</td>
<td>4</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>362</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>137</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>137</td>
<td>30</td>
<td>137</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>463</td>
<td>463</td>
</tr>
<tr>
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<td></td>
<td></td>
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<td>47</td>
<td>47</td>
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<td></td>
<td></td>
<td></td>
<td>148</td>
<td>148</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>315</td>
<td>315</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>552</td>
<td>552</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td>12</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>38</td>
<td>38</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>541</td>
<td>541</td>
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<td></td>
<td></td>
<td></td>
<td>516</td>
<td>516</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>67</td>
<td>67</td>
</tr>
</tbody>
</table>
3.1.2.2 Traffic Operations

Intersection operations analysis was conducted using Synchro 9, which utilizes the Highway Capacity Manual (HCM) 2010 methodology to evaluate overall intersection and individual movement performances. The level-of-service (LOS) is a measure of performance based on the average delay per vehicle in seconds (s); see Exhibit 3-3.

**Exhibit 3-3 Intersection LOS Reference**

<table>
<thead>
<tr>
<th>HCM</th>
<th>Control Delay per Vehicle (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS</td>
<td>Signalized</td>
</tr>
<tr>
<td>A</td>
<td>≤10</td>
</tr>
<tr>
<td>B</td>
<td>&gt;10 and ≤20</td>
</tr>
<tr>
<td>C</td>
<td>&gt;20 and ≤35</td>
</tr>
<tr>
<td>D</td>
<td>&gt;35 and ≤55</td>
</tr>
<tr>
<td>E</td>
<td>&gt;55 and ≤80</td>
</tr>
<tr>
<td>F</td>
<td>&gt;80</td>
</tr>
</tbody>
</table>

Based on the Region of Waterloo Transportation Impact Study Guidelines, the following criteria were used for determining critical movements.

- The average control delay for individual movements is greater than 55 seconds; and
- Estimated 95th percentile queue length exceeds available storage, blocks available storage for an adjacent lane or blocks an existing access.

There are some critical movements at the intersection of Northfield Drive and Bridge Street in the a.m. and p.m. peak hour (Exhibit 3-4). In the a.m. peak hour, the only noted critical movement is the westbound left where the queue length exceeds the storage capacity. The critical movements in the p.m. peak hour are the westbound left and northbound right with v/c ratios of 1.17 and 0.96 respectively. Furthermore, the eastbound through movement on Bridge Street could block the adjacent intersection of Frobisher Drive. Although this shows some congestion, the overall intersection operates at a LOS D. As a result, given the urban/suburban characteristics of this area, the delays are acceptable. All other intersections operate well with no critical movements in both peak hours.
Exhibit 3-4 Existing Conditions Analysis Summary

<table>
<thead>
<tr>
<th>Analysis Period</th>
<th>Intersection</th>
<th>Control Type</th>
<th>Overall LOS</th>
<th>Critical/Stop Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM Peak</td>
<td>Northfield Drive East &amp; Bridge Street West</td>
<td>Signalized</td>
<td>C</td>
<td>WBL² D 0.87 #95</td>
</tr>
<tr>
<td></td>
<td>Northfield Drive East &amp; University Avenue East</td>
<td>Signalized</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bridge Street West &amp; University Avenue East</td>
<td>TWSC¹</td>
<td>n/a</td>
<td>SB³ B 0.14 4</td>
</tr>
<tr>
<td></td>
<td>Northfield Drive East &amp; Toman Drive</td>
<td>TWSC</td>
<td>n/a</td>
<td>WB⁴ B 0.03 1</td>
</tr>
<tr>
<td>PM Peak</td>
<td>Northfield Drive East &amp; Bridge Street West</td>
<td>Signalized</td>
<td>D</td>
<td>EBTR⁵ WBL F 0.87 1.17 #124 #97 80</td>
</tr>
<tr>
<td></td>
<td>Northfield Drive East &amp; University Avenue East</td>
<td>Signalized</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bridge Street West &amp; University Avenue East</td>
<td>TWSC</td>
<td>n/a</td>
<td>SB B 0.13 4</td>
</tr>
<tr>
<td></td>
<td>Northfield Drive East &amp; Toman Drive</td>
<td>TWSC</td>
<td>n/a</td>
<td>WB C 0.16 4</td>
</tr>
</tbody>
</table>

¹Two-way stop controlled, ²West Bound Left, ³South Bound, ⁴West Bound, ⁵East Bound Through Right, ⁶North Bound Right

3.1.3 Transit and Active Transportation

GRT operates three routes with a transit stop at the intersection of Bridge Street and Northfield Drive near the proposed site as shown in Exhibit 3-5. Other stops include:

- The iXpress 202 in the RIM Technology Park across Northfield Drive with scheduled service every 15 minutes during peak hours and every 30 minutes during off-peak hours. Service runs from approximately 6:00 a.m. to midnight;

- Route 6 travels along Northfield Drive and turns onto/from Bridge Street. It serves this stop between approximately 6 a.m. to 11 p.m. on weekdays dependant on the direction of travel with more limited operating hours during weekends. This route is served approximately every 30 minutes on weekdays and 60 minutes on weekends.

- Route 31 travels along Lexington Road/Columbia Street turning into the Eastbridge community to collect local residents and terminates at Conestoga Mall. The route is only available Monday to Friday between 6:00 a.m. and 11:00 p.m. operating with headways of 30 minutes throughout the day.

Concerning active transportation, Northfield Drive does not have dedicated cycling facilities or sidewalks within the study area. Exhibit 3-5 illustrates existing and proposed active transportation routes.
3.2 Future Conditions

The future road network along the Northfield Drive corridor is based on the Northfield Drive Class EA (Section 1.3.2). Widening of the section between Bridge Street and University Avenue is expected to occur in 2020 or later. Since the timing and funding is not yet confirmed, it was assumed that the widening would occur before the future horizon of 2026 and would involve the following list of changes.

- **Northfield Drive (Regional Road No.22)** is to be widened to a 4 lane arterial within the study area (Bridge Street to University Avenue) as per Northfield Drive EA (2012).
- **Bridge Street West (Regional Road 52)** is expected to remain the same as existing conditions except minor changes at the intersection such as; the optimization of traffic signal times and future review of storage length for auxiliary lanes.
- **University Avenue** is expected to remain the same as existing conditions except minor changes at the intersection such as; the optimization of traffic signal times and future review of storage length for auxiliary lanes.
- **Toman Drive** is expected to become signalized as per the Northfield Drive Class EA.
Transit: GRT is in the process of developing a new route that would extend across Northfield Drive and most likely turn at Northfield Drive and University Avenue. Exact routing and timelines for implementation have yet to be confirmed but GRT is working on options as a part the transit network changes and ION integration. Exact stop locations also need to be determined. However, potential stops include Northfield Drive at University Avenue, Northfield Drive at Toman Drive and Northfield Drive at Bridge Street; and

Active Transportation: Cycling lanes will be added to Northfield Drive along the study area (Exhibit 3-5). This will connect this section of Northfield Drive with active transportation facilities along Bridge Street, University Avenue and Northfield Drive west of Wissler Road. Overall improvements to the Region of Waterloo walking and cycling network are anticipated as per recommendations of the Region of Waterloo Active Transportation Master Plan (ATMP).

3.2.1 Site Traffic

The horizon year was agreed upon with the Region per the pre-study conference, and is to be 5 years from the completion of the facility. The bus facility is expected to be operational in 2021, placing the future analysis horizon to be 2026. Two peak periods are analysed for the purposes of this study, the a.m. peak hour and p.m. peak hour.

3.2.1.1 Trip Generation

As the planned operation of the facility is known, staffing and operations provided a basis for trip generation that is superior to the Institute of Transportation Engineers rates which depend on square footage or other metrics. Staffing and operations were developed as a separate memorandum and reviewed by GRT staff. The projections are provided in Appendix H. The estimates accounted for growth between the openings of the site in 2021 to 2035. However in order to remain conservative, the 2035 ultimate horizon numbers were used to determine the site generated traffic.

The projections for traffic were separated into 4 categories, staff positions where 1 shift was expected, staff positions where 2 shifts were expected, bus operators and bus fleet vehicles. To remain conservative, it was assumed that each employee would use a vehicle due to the fact that many of the employees cannot utilize transit as they are the transit operators and thus would need to arrive outside transit operation times. However in reality not all the employees are bus operators and therefore would have the opportunity to take transit or use alternative modes of travel. The following assumptions were used to convert employees to trips during the peak hour.

- Positions where a single shift is required such as administration, Information Technology and others were assumed to enter during the a.m. peak hour and leave during the p.m. peak hour;
- Positions where two shifts were required such as maintenance, security and others, it was assumed that the first shift would arrive during the a.m. peak hour and leave during the p.m. peak hour, while a second shift would enter during the p.m. peak hour and leave outside of peak hours later in the evening;
- Approximately 80% of buses leave for peak hour operations and 40% of buses begin to return towards the end of the peak hour. There is assumed to be 203 total buses and thus 81 vehicles are assumed to begin returning during the peak hours. It was assumed that 1/3 of these vehicles (27) return during the peak hour of adjacent traffic while the remaining vehicles return at a time that does not overlap; and
Bus operators were assumed to arrive outside of peak hours. The operators that return from their routes near the end of each peak hour (assumed 27) will also leave during the peak hour.

As a result of the stated assumptions, the traffic generated by the site is shown in **Exhibit 3-6**. Total traffic is approximately 176 vehicles of all types with a peak in the p.m. peak hour including buses entering, and passenger vehicles entering and exiting.

**Exhibit 3-6 Site Generated Traffic**

<table>
<thead>
<tr>
<th>Traffic Volume Generator</th>
<th>AM Enter</th>
<th>AM Exit</th>
<th>PM Enter</th>
<th>PM Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Shift Positions</td>
<td>22</td>
<td>0</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>Two Shift Positions</td>
<td>50</td>
<td>0</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Bus Operators</td>
<td>0</td>
<td>27</td>
<td>0</td>
<td>27</td>
</tr>
<tr>
<td><strong>Total Passenger Vehicles</strong></td>
<td><strong>72</strong></td>
<td><strong>27</strong></td>
<td><strong>50</strong></td>
<td><strong>99</strong></td>
</tr>
<tr>
<td><strong>Bus Traffic</strong></td>
<td><strong>27</strong></td>
<td><strong>0</strong></td>
<td><strong>27</strong></td>
<td><strong>0</strong></td>
</tr>
</tbody>
</table>

### 3.2.1.2 Trip Distribution

There are three proposed accesses to the site, two for buses and one for passenger vehicles. Given that the ultimate operations of the facility will be up to GRT, buses would utilize the access that has the least number of left turn movements required. All passenger vehicles must use the entrance opposite to Toman Drive on Northfield Drive.

Directional percentage split of site passenger vehicle traffic is based on the engineering judgement from nearby residential areas as shown in **Exhibit 3-7**. The resultant passenger vehicle site traffic distribution for the a.m. and p.m. peak hours are shown in **Exhibit 3-8** and **Exhibit 3-9**.

**Exhibit 3-7 Passenger Vehicle Traffic Splits Per Direction**

<table>
<thead>
<tr>
<th>Origin/Destination</th>
<th>Percent Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>To / From the North</td>
<td>AM Peak Hour</td>
</tr>
<tr>
<td>via Northfield Drive</td>
<td>In</td>
</tr>
<tr>
<td>To / From the South</td>
<td>In</td>
</tr>
<tr>
<td>Via Northfield Drive</td>
<td>5%</td>
</tr>
<tr>
<td>To / From the East</td>
<td>In</td>
</tr>
<tr>
<td>Via Bridge Street</td>
<td>25%</td>
</tr>
<tr>
<td>Via University Avenue</td>
<td>15%</td>
</tr>
<tr>
<td>To / From the West</td>
<td>In</td>
</tr>
<tr>
<td>Via Bridge Street</td>
<td>5%</td>
</tr>
</tbody>
</table>
Exhibit 3-8 AM Passenger Vehicle Site Traffic
Exhibit 3-9 PM Passenger Vehicle Site Traffic
Bus traffic is assumed to follow a different distribution due to the fact that buses operate on fixed routes and are not always related to passenger vehicle traffic. With the primary bus access to Northfield Drive, the distribution reflects routes that would prioritize reducing turning movements. Due to the conversion of the Highway 85 and Northfield Drive interchange to right-in, right-out, any buses destined to Highway 85 southbound will need to do so via King Street. The assumed bus distribution is shown in Exhibit 3-10, it is expected to be the same in both peak hours. The actual site generated bus traffic is shown in Exhibit 3-11.

**Exhibit 3-10 Bus Percentage Splits Per Direction**

<table>
<thead>
<tr>
<th>Origin/Destination</th>
<th>Percent Distribution AM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>To / From the North</td>
<td>In</td>
</tr>
<tr>
<td>via Northfield Drive</td>
<td>0%</td>
</tr>
<tr>
<td>to / From the South</td>
<td>In</td>
</tr>
<tr>
<td>Via Northfield Drive</td>
<td>40%</td>
</tr>
<tr>
<td>To / From the East</td>
<td>In</td>
</tr>
<tr>
<td>Via Bridge Street</td>
<td>30%</td>
</tr>
<tr>
<td>Via University Avenue</td>
<td>30%</td>
</tr>
<tr>
<td>To / From the West</td>
<td>In</td>
</tr>
<tr>
<td>Via Bridge Street</td>
<td>0%</td>
</tr>
</tbody>
</table>
Exhibit 3-11 Projected Site Generated Bus Traffic

- Northfield Drive East
- University Ave East
- Bridge Street West
- Northfield Drive East
- Private Access
- Bus Access
- Toman Drive
- Bridge Street West

Flows:
- Enter
- Exit

Numbers indicate traffic volumes.
3.2.2 Future 2026 Background Traffic Volumes

The Northfield Drive Class EA was reviewed in order to establish background growth rates. Based on the report the annual compound growth rates range from 3.3% to 6.6%.

Since the completion of the Class EA, there have been several changes within the study area. The primary change is reduced employment at the Blackberry Limited site, and this significantly alters the growth potential of the RIM Technology Park located on University Avenue just west of Northfield Drive.

As a result, the Region was consulted to establish more appropriate annual growth volumes. It was determined that a more appropriate figure would be 2% compound annual growth. However, in order to ensure that the worst case scenario is also analyzed, a sensitivity scenario with 3% growth was also evaluated. The traffic volumes for the background conditions scenario with 2% and 3% compound annual growths are in Appendix H.

With the increased traffic volumes from background growth, the LOS of Northfield Drive and Bridge Street deteriorated to an overall LOS E from D. The introduction of the northbound right turn channelization at Northfield Drive and Bridge Street as per the Northfield Drive Class EA has helped relieve the congestion for that movement in the p.m. peak. The westbound left movement is still the critical movement and has operational issues in both the a.m. and p.m. peak hours.

All other intersections continue to operate well with no critical movements in both peak hours as shown in Exhibit 3-12.

Exhibit 3-12: 2026 Background Traffic Analysis Summary

<table>
<thead>
<tr>
<th>Analysis Period</th>
<th>Intersection</th>
<th>Control Type</th>
<th>Overall LOS</th>
<th>Critical/Stop Controlled</th>
<th>Mvmt</th>
<th>LOS</th>
<th>V/C</th>
<th>95 %tile Que (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM Peak</td>
<td>Northfield Drive East &amp; Bridge Street West</td>
<td>Signalized</td>
<td>C</td>
<td>WBL² B</td>
<td>1.02</td>
<td>#134</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Northfield Drive East &amp; University Avenue East</td>
<td>Signalized</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bridge Street West &amp; University Avenue East</td>
<td>TWSC¹ n/a</td>
<td>SB³ B</td>
<td>0.19 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Northfield Drive East &amp; Toman Drive</td>
<td>TWSC n/a</td>
<td>WBL WBR⁴ C  A</td>
<td>0.03 0.01 1 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM Peak</td>
<td>Northfield Drive East &amp; Bridge Street West</td>
<td>Signalized</td>
<td>E</td>
<td>EBTR² E WBL B</td>
<td>0.98</td>
<td>#163</td>
<td>1.44</td>
<td>#131</td>
</tr>
<tr>
<td></td>
<td>Northfield Drive East &amp; University Avenue East</td>
<td>Signalized</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bridge Street West &amp; University Avenue East</td>
<td>TWSC n/a</td>
<td>SB B</td>
<td>0.19 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Northfield Drive East &amp; Toman Drive</td>
<td>TWSC n/a</td>
<td>WBL WBR C  B</td>
<td>0.16 0.04 4 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹Two-way stop controlled, ²West Bound Left, ³South Bound, ⁴West Bound Right, ⁵East Bound Through Right

If background traffic growth was to be 3% rather than two, the expected traffic conditions would further deteriorate as expected. The intersection of Northfield Drive and Bridge Street would operate at LOS D and E in the a.m. and p.m. peaks respectively. Critical movements would remain the same ones with further deterioration in v/c ratio and increases in total delay. Details can be found in Appendix H.
### 3.2.3 2026 Total Conditions

With the site traffic volumes added (see Appendix H), Northfield Drive and Bridge Street are minimally impacted, however the critical and failing movements previously identified are still an issue. The new site accesses are all able to operate effectively. Note that the intersection of Toman Drive and Northfield Drive operates acceptably without signals, however signals were also analyzed as they were recommended in the Northfield Drive Class EA. Bus volumes are generally outside of the peak hour of the adjacent road and as a result have minimal impacts. The access at Northfield Drive and Toman Drive is able to operate effectively given the proposed configuration in the Northfield Drive EA. All other intersections operate similarly to future background conditions as shown in Exhibit 3-13.

#### Exhibit 3-13 2026 Total Traffic Analysis Summary

<table>
<thead>
<tr>
<th>Analysis Period</th>
<th>Intersection</th>
<th>Control Type</th>
<th>Overall LOS</th>
<th>Critical/Stop Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM Peak</td>
<td>Northfield Drive East &amp; Bridge Street West</td>
<td>Signaled</td>
<td>C</td>
<td>WBL² F 1.01 #134</td>
</tr>
<tr>
<td></td>
<td>Northfield Drive East &amp; University Avenue East</td>
<td>Signaled</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bridge Street West &amp; University Avenue East</td>
<td>TWSC</td>
<td>n/a</td>
<td>SB³ B 0.19 5</td>
</tr>
<tr>
<td></td>
<td>Northfield Drive East &amp; Toman Drive</td>
<td>Signaled</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TWSC</td>
<td>n/a</td>
<td>WBL C 0.04 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University Avenue &amp; Second Access</td>
<td>TWSC</td>
<td>n/a</td>
<td>NB⁴ A 0.00 0</td>
</tr>
<tr>
<td></td>
<td>Northfield Drive &amp; Bus Access</td>
<td>TWSC</td>
<td>n/a</td>
<td>NBL⁵ B 0.02 1</td>
</tr>
<tr>
<td>PM Peak</td>
<td>Northfield Drive East &amp; Bridge Street West</td>
<td>Signaled</td>
<td>E</td>
<td>EBTR⁶ E 0.98 #163</td>
</tr>
<tr>
<td></td>
<td>Northfield Drive East &amp; University Avenue East</td>
<td>Signaled</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bridge Street West &amp; University Avenue East</td>
<td>TWSC</td>
<td>n/a</td>
<td>SB B 0.19 5</td>
</tr>
<tr>
<td></td>
<td>Northfield Drive East &amp; Toman Drive</td>
<td>Signaled</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TWSC</td>
<td>n/a</td>
<td>WBL D 0.21 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University Avenue &amp; Second Access</td>
<td>TWSC</td>
<td>n/a</td>
<td>NB A 0.00 0</td>
</tr>
<tr>
<td></td>
<td>Northfield Drive &amp; Bus Access</td>
<td>TWSC</td>
<td>n/a</td>
<td>NBL B 0.02 1</td>
</tr>
</tbody>
</table>

¹Two-way stop controlled, ²West Bound Left, ³South Bound, ⁴North Bound, ⁵North Bound Left, ⁶East Bound Through Right

Using a 3% traffic growth, there are minimal impacts due to the site traffic volumes. However the westbound left and eastbound through movements are still critical at the intersection of Northfield Drive and Bridge Street. A summary can be found in Appendix H.

#### 3.2.4 Site Access

The passenger vehicle entrance to the facility is opposite of Toman Drive. The analysis indicates that traffic operations are acceptable without signals though both traffic operations and safety would benefit from the signal (signalization was recommended in the Northfield Drive Class EA).
For the bus access on Northfield Drive, a northbound left turn lane is proposed since the proposed site access meets MTO’s left turn storage lane warrant. Additional storage length than the minimum recommendation of 15 m is recommended given the size and exclusive nature of the vehicles utilizing this access. There is sufficient space for back-to-back left turns with a 20 m storage capacity for the northbound left, given an 80 km/h design speed with a 70 m taper to accommodate the buses. If lower design speeds are acceptable, up to 40 m of storage capacity may be achieved to accommodate two buses in the storage lane and thereby minimize impacts to northbound general traffic.

The third site access to University Avenue on the north side of the development site is anticipated to operate well in the design horizon.
4 Alternative Solutions

4.1 Requirement of a Maintenance Facility

As detailed in Section 1.3.1, the RTMP (2011) envisions an increase of transit ridership, and in order to achieve this the Region’s fleet of conventional and specialized transit vehicles must grow. The two existing transit facilities in Kitchener and Cambridge are close to capacity, and therefore a new transit facility is necessary to meet these demands.

4.2 Location of the Maintenance Facility

In early 2012, a number of locations in the City of Waterloo (Exhibit 4-1) were considered for the transit facility using the following criteria:

- Proximity to Conestoga Mall where many routes start and finish;
- 10 – 20 acres in size;
- Appropriate land use zoning and designation;
- Access to major roadways;
- Capability for two separate entrances/exits off separate streets;
- Properties that can be acquired, developed and adapted within a reasonable timeframe; and
- Properties that can be acquired and adapted economically and cost effectively.

Exhibit 4-1 Potential Transit Facility Site Locations

![Exhibit 4-1 Potential Transit Facility Site Locations](image)
4.3 Properties Under Evaluation

The search included both properties being actively marketed and those not on the market but which fit the criteria. Potential properties in the City of Waterloo were reviewed and evaluated in detail against the criteria in Section 4.2. Below is a list of the properties that were evaluated, and main pros and cons of each. It should be noted that the search included properties owned by BlackBerry in 2013 however, none were short listed.

1. **1001 Erb’s Road** – Region owned land (40 acres)
   - Vacant land fronting Erb’s Road at the Waterloo Region Emergency Services Training and Research Complex
   - Within Source Water Protection Area and a transit facility of this size would have significant negative impact on adjacent wells
   - On western edge of service area and operationally less attractive

2. **440 – 460 Philip Street** – Blackberry buildings (34.9 acres)
   - Due to adjacent high tech occupancies, a transit facility would not be an appropriate use for these properties
   - Property is now for sale but grouped amongst other Blackberry properties to be sold as a packaged portfolio

3. **580 Weber Street North** – former NCR site (37 acres)
   - Not currently on the market for sale
   - Multi-use development now planned for this site
   - Developer will only allow a short term lease for a portion of property at the rear of the site

4. **518 Dutton Drive** – Region owned land (16.9 acres)
   - Land purchased for LRT maintenance facility
   - Property size is too small for the addition of a GRT maintenance facility

5. **435 King Street North** – vacant land fronting Weber Street (11.6 acres)
   - Not currently on the market for sale
   - Preliminary conceptual site layouts demonstrated site size is too restrictive
   - Due to prime commercial frontage along Weber Street, a transit facility would not be an appropriate use for this property
   - Price per acre would not be cost effective due to proximity to downtown core

6. **380 Weber Street North** – vacant Manulife building (14.5 acres)
   - Not currently on the market for sale
   - Owner is unsure of their future requirements for property and not willing to discuss sale
   - Known environmental contamination issues with property
   - Price per acre would not be cost effective due to proximity to downtown core

7. **300 – 350 Northfield Drive** – former headquarters for Waterloo North Hydro (17.09 acres)
   - Proximity to major thoroughfares (Northfield Drive & University Avenue)
• Operationally, efficiently located close to Conestoga Mall transit platforms
• Proximity to LRT and Waterloo bus routes
• Size of the property allows for future expansion
• Existing connections to municipal services
• Available for purchase

8. **325 Northfield Drive** – vacant Blackberry land (11.4 acres)
  - Minimal frontage and site size is too restrictive for transit vehicle flow
  - Property is now for sale but grouped amongst other Blackberry properties to be sold as a packaged portfolio

9. **435 Country Squire Road** – vacant City of Waterloo land (25 acres)
  - Not currently on the market for sale
  - On northern fringe of service area therefore not operationally feasible

10. **720 Country Squire Road** – vacant Blackberry land (37 acres)
    - Property is now for sale but grouped amongst other Blackberry properties to be sold as a packaged portfolio
    - On northern fringe of service area therefore not operationally feasible

### 4.4 Preferred Property

The 69,127 m² site at 300-350 Northfield Drive (property #7) is a triangular shaped lot at the southwesterly quadrant of the intersection of Northfield Drive and University Avenue. The property has frontage along both streets with industrial use abutting its southwest property line. The Region has confirmed with the City of Waterloo that a bus transit facility with vehicle storage and related maintenance, operations and administrative areas is permitted under By-law 2013-085 and is zoned Industrial One (H – Holding).

## 5 Alternative Site Layout Concepts

### 5.1 Former Waterloo Hydro Headquarters Building

The Northfield site has a significant variation in grade levels which fall approximately 6 m from the high point at the south west corner of the site to the low point towards the centre of the site. The existing building is situated at the west end of the site with office spaces located at the west side of the building and storage and shop areas at the eastern end of the building. The main entrance to the existing building faces an existing vehicle parking area located at the south west corner of the site. The existing single story building consists of multiple levels following the existing site grades. Each level is separated from adjacent levels by a series of short stairs. Bus facilities, for the most part, are required to be on a single level plain. In order to reuse all or part of this building would require the design of the new bus facility to conform to the location, orientation and grades of the existing structure which would restrict design options and constitute a potential detriment to the design and overall planning of any new facility.

The size and nature of the majority of the existing building spaces does not comply with the space requirements as outlined in the approved Northfield Bus Facility Space Program. The existing structure has much more office space than required and has too few storage and shop
areas. In addition the structural grid and clear heights of the existing building does not lend itself to the requirements of a bus facility for storage and maintenance functions.

Given the age of the existing building, it is assumed that most if not all of the mechanical, electrical and life safety systems have exceeded their normal life expectancy and would need to be replaced and upgraded to comply with current codes. Due mainly to being vacant for an extended period of time, much of the existing building was found to be deteriorating and in a state of disrepair which would also require upgrading.

Based upon observations taken during the visual review conducted in the fall of 2015 and the issues noted above it was recommended that none of the existing building be retained and that it be totally demolished in order to allow for the proper planning and construction of the proposed new GRT Northfield Transit Facility.

5.2 Evaluation Methodology and Criteria

The “Reasoned Arguments” methodology was used to evaluate the alternatives for this Class EA. This involved identifying the advantages and disadvantages of each alternative against a set of evaluation criteria representing social, natural, economic environments and site requirement and access needs. The evaluation criteria used is shown in Exhibit 5-1.

Exhibit 5-1 Evaluation Criteria

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>EVALUATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Environment</td>
<td>Impacts on natural features (e.g. vegetation, wildlife).</td>
</tr>
<tr>
<td>Social-Cultural Environment</td>
<td>Impacts on surrounding properties, potential archaeological resources,</td>
</tr>
<tr>
<td></td>
<td>built heritage features and visual character</td>
</tr>
<tr>
<td>Economic Environment</td>
<td>Comparative cost to construct each alternative layout solution</td>
</tr>
<tr>
<td>Operation/Building Siting</td>
<td>Placement of parking lot; building orientation; location of bus entrances</td>
</tr>
<tr>
<td></td>
<td>and exits; location of bus storage</td>
</tr>
<tr>
<td>User Needs</td>
<td>Size, location, and shape of stores; shape and location of offices; size</td>
</tr>
<tr>
<td></td>
<td>of bus storage; adequate number of parking spaces; location of patio;</td>
</tr>
<tr>
<td></td>
<td>maintenance bay sufficient</td>
</tr>
<tr>
<td>Operational Flow</td>
<td>Location of transit bay maintenance office; location of direct access to</td>
</tr>
<tr>
<td></td>
<td>bus storage; location of parts office; distance for courier deliveries;</td>
</tr>
<tr>
<td></td>
<td>length of bus storage lane; walking distance for bus drivers to buses;</td>
</tr>
<tr>
<td></td>
<td>direct access from secondary exit to bus storage; crossing vehicular</td>
</tr>
<tr>
<td></td>
<td>flow</td>
</tr>
<tr>
<td>On Site Flow / Site Access</td>
<td>Interrupted / uninterrupted flow; location of main bus entrance; location</td>
</tr>
<tr>
<td></td>
<td>of secondary exit; turning radii; access to maintenance bays; access to</td>
</tr>
<tr>
<td></td>
<td>circulation area</td>
</tr>
<tr>
<td>Car Flow</td>
<td>Parking lot separate from bus; car access interfering with bus queuing;</td>
</tr>
<tr>
<td></td>
<td>direct in / out access from Northfield Drive; utilize existing entrance to</td>
</tr>
<tr>
<td></td>
<td>parking lot</td>
</tr>
<tr>
<td>Pedestrian Flow</td>
<td>Location of parking to administration offices; crossing live bus lanes</td>
</tr>
</tbody>
</table>
Access to Service Lanes | Service lanes accessible; enclosed by-pass service lane; secondary exit from service lane / turning area to by-pass storage area
---|---
Zoning Compliance | In compliance with setback from Northfield Drive; meets greenspace criteria; compliance with landscape set back around site perimeter

The site plan layout concept alternatives and evaluations are in Exhibits 5-2 to 5-7.
Exhibit 5-2 Option A Site Plan Layout Concept
## Exhibit 5-3 Option A Site Plan Layout Concept Evaluation

<table>
<thead>
<tr>
<th>Points</th>
<th>OPTIMAL</th>
<th>AVERAGE</th>
<th>UNDESIRABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL ENVIRONMENT</td>
<td>SOCIAL-CULTURAL ENVIRONMENT</td>
<td>ECONOMIC ENVIRONMENT</td>
<td>ORIENTATION/BUILDING SITING</td>
</tr>
<tr>
<td>Manicured grasses and early successional vegetation. None are sensitive or require conservation.</td>
<td>No archaeological resources within the study area.</td>
<td>No cultural heritage features within or adjacent to the study area.</td>
<td>Parking is discretely placed at side yard.</td>
</tr>
<tr>
<td>Wildlife habitat limited.</td>
<td>No cultural heritage features within or adjacent to the study area.</td>
<td>No cultural heritage features within or adjacent to the study area.</td>
<td>Bus approach onto Northfield Drive East is perpendicular to the road and offers good visibility.</td>
</tr>
<tr>
<td>SAR concerns limited to unconfirmed possibility of the Little Brown Myotis bat occurrence within existing building.</td>
<td>Bus Storage is good distance away to Northfield Drive East and University Avenue East.</td>
<td>Bus Storage meets requirements (203).</td>
<td>Bus Storage wall is facing Front Yard.</td>
</tr>
<tr>
<td>Requires demolition of existing building.</td>
<td>Articulated bus maintenance bay quantity is sufficient.</td>
<td>Secondary access to bus storage from exterior is needed.</td>
<td>Exit onto Northfield Drive East has good alignment for left and right turns onto road.</td>
</tr>
<tr>
<td>Exit onto Northfield Drive East has good alignment for left and right turns onto road.</td>
<td>Dedicated cleaning space with sufficient space.</td>
<td>Bus storage lanes length is 15-16 busses based on standard bus length.</td>
<td>Bus operators do not cross vehicle flow but walk through maintenance area.</td>
</tr>
<tr>
<td>Wildscape features are within or adjacent to the study area.</td>
<td>Bus Storage is good distance away to Northfield Drive East and University Avenue East.</td>
<td>Bus Storage meets requirements (203).</td>
<td>Bus Storage wall is facing Front Yard.</td>
</tr>
<tr>
<td>No cultural heritage features within or adjacent to the study area.</td>
<td>Bus Storage is good distance away to Northfield Drive East and University Avenue East.</td>
<td>Bus Storage meets requirements (203).</td>
<td>Bus Storage wall is facing Front Yard.</td>
</tr>
<tr>
<td>Fine cultural heritage features are within or adjacent to the study area.</td>
<td>Bus Storage is good distance away to Northfield Drive East and University Avenue East.</td>
<td>Bus Storage meets requirements (203).</td>
<td>Bus Storage wall is facing Front Yard.</td>
</tr>
</tbody>
</table>
Exhibit 5-4 Option B Site Plan Layout Concept
<table>
<thead>
<tr>
<th>NATURAL ENVIRONMENT</th>
<th>SOCIO-CULTURAL ENVIRONMENT</th>
<th>ECONOMIC ENVIRONMENT</th>
<th>ORIENTATION/BUILDING SITING</th>
<th>USER NEEDS</th>
<th>OPERATIONAL FLOW</th>
<th>ON SITE FLOW/SITE ACCESS</th>
<th>CAR FLOW</th>
<th>PEDESTRIAN FLOW</th>
<th>ACCESS TO SERVICE LANES</th>
<th>ZONING COMPLIANCE</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manicured grasses and early successional vegetation. None are sensitive or require conservation.</td>
<td></td>
<td></td>
<td>Parking is highly visible at front edge/most public corner of site</td>
<td>Stores is undersized</td>
<td>Satisfies operational flow</td>
<td>Good counter clockwise flow</td>
<td>Dedicated car parking lot separate from bus circulation</td>
<td>Pedestrians walk a short distance to Admin Offices but required to take stairs or elevator. They exit parking from one gate</td>
<td>Services Lane is poorly accessible</td>
<td>In compliance with 10m setbacks from Northfield Drive East and University Avenue East</td>
<td>2 54</td>
</tr>
<tr>
<td>Wildlife habitat limited. No cultural heritage features within or adjacent to the study area.</td>
<td></td>
<td></td>
<td>Bus approach onto Northfield Drive East Exit is parallel to the road and creating poor visibility. Bus Storage is undersized 201 vs 203. Bus Storage wall is facing rear yard. Articulated bus maintenance bay quantity is sufficient.</td>
<td>Bus Parking meets user needs.</td>
<td></td>
<td></td>
<td>Car access does not interfere with bus access</td>
<td></td>
<td></td>
<td></td>
<td>2 5</td>
</tr>
<tr>
<td>No archaeological resources within the study area.</td>
<td></td>
<td></td>
<td>Bus Entrance is close to Northfield and University intersection. Bus Storage is undersized 201 vs 203.</td>
<td>Articulated bus maintenance bay quantity is sufficient. Bus Storage wall is facing rear yard.</td>
<td></td>
<td></td>
<td></td>
<td>No by-pass lane</td>
<td></td>
<td>0 7</td>
<td></td>
</tr>
<tr>
<td>Requires demolition of existing building.</td>
<td></td>
<td></td>
<td>Articulated bus maintenance bay quantity is sufficient.</td>
<td>Dedicated cleaning lane with sufficient space.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0 2</td>
<td></td>
</tr>
<tr>
<td>Exit onto Northfield Drive East offers potential conflict of buses turning left exceeding buses turning right.</td>
<td></td>
<td></td>
<td>Articulated bus bays require 90 degree turns resulting in longer access.</td>
<td>Dedicated cleaning lane with sufficient space.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 2</td>
<td></td>
</tr>
<tr>
<td>Stores' rectangular shape is optimal for spatial utilization.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 2</td>
<td></td>
</tr>
</tbody>
</table>

**Exhibit 5-5 Option B Site Plan Layout Concept Evaluation**
Exhibit 5-6 Option C Site Plan Layout Concept
## Exhibit 5-7 Option C Site Plan Layout Concept Evaluation

<table>
<thead>
<tr>
<th>OPTIMAL</th>
<th>AVERAGE</th>
<th>UNDESIRABLE</th>
<th>POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>0</td>
<td>40</td>
</tr>
</tbody>
</table>

### NATURAL ENVIRONMENT
- Manicured grasses and early successional vegetation. None are sensitive or require conservation.
- No archaeological resources within the study area.
- No cultural heritage features within or adjacent to the study area.
- Wildlife habitat limited.
- No cultural heritage features within or adjacent to the study area.
- Wildlife concerns limited to unconfirmed possibility of Little Brown Myotis bat occurrence within existing building.
- No cultural heritage features within or adjacent to the study area.
- SAR concerns limited to unconfirmed possibility of Little Brown Myotis bat occurrence within existing building.
- Wildfire concerns limited to unconfirmed possibility of Little Brown Myotis bat occurrence within existing building.
- No cultural heritage features within or adjacent to the study area.
- Wildlife concerns limited to unconfirmed possibility of Little Brown Myotis bat occurrence within existing building.
- No cultural heritage features within or adjacent to the study area.
- Wildlife concerns limited to unconfirmed possibility of Little Brown Myotis bat occurrence within existing building.

### SOCIO-CULTURAL ENVIRONMENT
- Parking is highly visible at front edge/most public corner of site.
- No archaeological resources within the study area.
- No cultural heritage features within or adjacent to the study area.
- Parking is highly visible at front edge/most public corner of site.
- No archaeological resources within the study area.
- No cultural heritage features within or adjacent to the study area.
- Parking is highly visible at front edge/most public corner of site.
- No archaeological resources within the study area.
- No cultural heritage features within or adjacent to the study area.
- Parking is highly visible at front edge/most public corner of site.
- No archaeological resources within the study area.
- No cultural heritage features within or adjacent to the study area.

### ECONOMIC ENVIRONMENT
- High capital cost.
- No archaeological resources within the study area.
- No cultural heritage features within or adjacent to the study area.
- High capital cost.
- No archaeological resources within the study area.
- No cultural heritage features within or adjacent to the study area.
- High capital cost.
- No archaeological resources within the study area.
- No cultural heritage features within or adjacent to the study area.
- High capital cost.
- No archaeological resources within the study area.
- No cultural heritage features within or adjacent to the study area.

### ORIENTATION/ BUILDING SITING
- No parking at site.
- Parking is not in the optimal location.
- No parking at site.
- Parking is not in the optimal location.
- No parking at site.
- Parking is not in the optimal location.
- No parking at site.
- Parking is not in the optimal location.
- No parking at site.
- Parking is not in the optimal location.
- No parking at site.
- Parking is not in the optimal location.

### USER NEEDS
- Access is the correct size.
- Bus entrance is close to Northfield and University Intersection.
- No bus entrance.
- Bus entrance is close to Northfield and University Intersection.
- No bus entrance.
- Bus entrance is close to Northfield and University Intersection.
- No bus entrance.
- Bus entrance is close to Northfield and University Intersection.
- No bus entrance.
- Bus entrance is close to Northfield and University Intersection.
- No bus entrance.
- Bus entrance is close to Northfield and University Intersection.

### OPERATIONAL FLOW
- Good counter clockwise flow.
- Bus Storage wall is facing side yard.
- Articulated bus maintenance bay quantity is not sufficient.
- Articulated bus bays do not require 90 degree turns.
- Dedicated cleaning lane without sufficient space.
- Storage lane length is 1.0 bus length based on standard bus length.
- Articulated bus access is not optimal.
- Parts delivery access not optimal.
- Storage lane length is 1.0 bus length based on standard bus length.
- Articulated bus access is not optimal.
- Parts delivery access not optimal.
- Storage lane length is 1.0 bus length based on standard bus length.

### ON SITE FLOW/ SITE ACCESS
- Dedicated car parking at separate from bus circulation.
- Bus entrance from Northfield Drive East.
- Dedicated car parking at separate from bus circulation.
- Bus entrance from Northfield Drive East.
- Dedicated car parking at separate from bus circulation.
- Bus entrance from Northfield Drive East.
- Dedicated car parking at separate from bus circulation.
- Bus entrance from Northfield Drive East.
- Dedicated car parking at separate from bus circulation.
- Bus entrance from Northfield Drive East.
- Dedicated car parking at separate from bus circulation.
- Bus entrance from Northfield Drive East.

### CAR FLOW
- Pedestrians walk a short distance to Admin Offices through a gate.
- Service Lanes are easily accessible.
- Pedestrians walk a short distance to Admin Offices through a gate.
- Service Lanes are easily accessible.
- Pedestrians walk a short distance to Admin Offices through a gate.
- Service Lanes are easily accessible.
- Pedestrians walk a short distance to Admin Offices through a gate.
- Service Lanes are easily accessible.
- Pedestrians walk a short distance to Admin Offices through a gate.
- Service Lanes are easily accessible.
- Pedestrians walk a short distance to Admin Offices through a gate.
- Service Lanes are easily accessible.

### PEDESTRIAN FLOW
- Bus Storage is undersized.
- Transit Maintenance office is located next to Stores.
- Bus Storage is undersized.
- Transit Maintenance office is located next to Stores.
- Bus Storage is undersized.
- Transit Maintenance office is located next to Stores.
- Bus Storage is undersized.
- Transit Maintenance office is located next to Stores.
- Bus Storage is undersized.
- Transit Maintenance office is located next to Stores.
- Bus Storage is undersized.
- Transit Maintenance office is located next to Stores.

### ACCESS TO SERVICE LANES
- No secondary exit off University Avenue East requires long path of travel to service lane around perimeter if main entrance is obstructed.
- No secondary exit off University Avenue East requires long path of travel to service lane around perimeter if main entrance is obstructed.
- No secondary exit off University Avenue East requires long path of travel to service lane around perimeter if main entrance is obstructed.
- No secondary exit off University Avenue East requires long path of travel to service lane around perimeter if main entrance is obstructed.
- No secondary exit off University Avenue East requires long path of travel to service lane around perimeter if main entrance is obstructed.
- No secondary exit off University Avenue East requires long path of travel to service lane around perimeter if main entrance is obstructed.
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- No secondary exit off University Avenue East requires long path of travel to service lane around perimeter if main entrance is obstructed.
- No secondary exit off University Avenue East requires long path of travel to service lane around perimeter if main entrance is obstructed.
- No secondary exit off University Avenue East requires long path of travel to service lane around perimeter if main entrance is obstructed.
- No secondary exit off University Avenue East requires long path of travel to service lane around perimeter if main entrance is obstructed.
- No secondary exit off University Avenue East requires long path of travel to service lane around perimeter if main entrance is obstructed.

### ZONING COMPLIANCE
- In compliance with 10m setback from Northfield Drive East and University Avenue East.
- In compliance with 10m setback from Northfield Drive East and University Avenue East.
- In compliance with 10m setback from Northfield Drive East and University Avenue East.
- In compliance with 10m setback from Northfield Drive East and University Avenue East.
- In compliance with 10m setback from Northfield Drive East and University Avenue East.
- In compliance with 10m setback from Northfield Drive East and University Avenue East.
- In compliance with 10m setback from Northfield Drive East and University Avenue East.
- In compliance with 10m setback from Northfield Drive East and University Avenue East.
- In compliance with 10m setback from Northfield Drive East and University Avenue East.
- In compliance with 10m setback from Northfield Drive East and University Avenue East.
- In compliance with 10m setback from Northfield Drive East and University Avenue East.
- In compliance with 10m setback from Northfield Drive East and University Avenue East.

### TOTALS
- 64
5.3 Evaluation Results

The descriptive and numerical evaluations were presented in Section 5.2. Exhibit 5-8 summarizes each alternative evaluation against the evaluation criteria using the values from Section 5.2. As a result, Option A is the preferred alternative.

**Exhibit 5-8 Comparison of Alternatives Evaluation**

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Option A</th>
<th>Option B</th>
<th>Option C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Environment</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Socio-Cultural Environment</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Economic Environment</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Orientation/Building Siting</td>
<td>●</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>User Needs</td>
<td>●</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Operational Flow</td>
<td>•</td>
<td>•</td>
<td>●</td>
</tr>
<tr>
<td>On Site Flow / Site Access</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Car Flow</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Pedestrian Flow</td>
<td>○</td>
<td>○</td>
<td>•</td>
</tr>
<tr>
<td>Access to Service Lanes</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Zoning Compliance</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

**RECOMMENDATION**

- **RECOMMENDED**
- **NOT RECOMMENDED**

- **Good**
- **Fair**
- **Poor**
6  Recommended Site Layout Concept

Site Layout Option A was chosen as the preferred site layout concept (Exhibit 6-1). A summary of attributes of the concept include:

- Perimeter landscaping with naturalized open space to buffer the development along both frontages;
- Employee parking area with a bridge to main facility entrance;
- LEED Silver target applicable to design and construction;
- Building mounted and pole mounted lighting to limit light trespass into neighbouring properties;
- Outdoor patio;
- Indoor storage, maintenance and servicing of 250 equivalent buses;
- Single storey facility with a 2 storey administrative block; and
- One main and one alternate driveway entrance.

6.1  Stormwater

The proposed development will outlet to the existing storm sewer infrastructure on University Avenue. To accommodate the proposed building’s floor elevation, it is recommended that a portion of the existing storm sewer on University Avenue be removed and reinstalled at a lower elevation.

Given that the site is constrained and there is no available area for aboveground stormwater quality management, a Stormceptor model STC-6000 will be utilized to treat stormwater.

Similarly, given site constraints, there is not enough area/volume for aboveground stormwater retention. Accordingly, an underground stormwater storage facility with approximately 2,400 m$^3$ of storage will be utilised to address storm water quantity requirements. The site has been designed with 0.15 m (maximum) deep spill elevations from catchbasin to catchbasin throughout the bus maintenance areas, and 0.30 m (maximum) deep spill elevations in the vehicular parking area adjacent to Northfield Drive, both to facilitate an overland flow route along with some surface storage in larger storm events. For an expanded discussion of the proposed stormwater management design and controls, refer to Appendix G.

6.2  Noise

The MOECC noise criteria require noise levels at all receivers to be no greater than 50 dBA during daytime hours, and no greater than 45 dBA during nighttime hours. Assessed noise levels at the subject site during the day range between 34.3 dBA and 42 dBA. Assessed noise levels at night ranged between 29.5 dBA and 36 dBA. As summarized in the Preliminary Acoustical Report (Appendix I), noise mitigation is not required to bring on-site noise sources within this development into compliance with the MOECC noise criteria.
Exhibit 6-1 Preferred Site Layout Concept
6.3 Air Quality

The MOECC standard for new sources of Nitrogen, NOx, emissions is a maximum of 500 μg NOx/m³. Assessed concentration at the site boundary is well below the standard for NOx, 280 μg NOx/m³ (56%). There is a sufficient margin between the estimated levels and the standards to suggest the facility is unlikely to have undue air quality impacts on the environment. See Appendix J for the full report.

6.4 City of Waterloo Official Plan Integration

The City of Waterloo Official Plan was reviewed during the development of the site layout concept. The overall framework and individual policies of the Plan formed a strategic set of objectives to help define a level of investment required by the Region to satisfy transit needs.

A portion of subject site, 300 Northfield Drive, falls within a Designated Greenfield Area and within a Minor corridor. The design integrates with existing communities and supports growth objectives. Proposed development falls within the height constraints in Schedule ‘B1’ – Height and Density of 20 m to 81 m. There is compatibility and integration with surrounding land uses and this contributes to a vibrant streetscape through the utilization of appropriate height, mixing of uses, massing, architectural design, character, setbacks, siting and landscaping, parking and public spaces. Parking provisions have been addressed including maximum limits on surface parking. Visitor and drop-off routes are provided. Long and short-term bicycle parking as applicable to facility function is being considered.

Both municipal site addresses, 300 and 350 Northfield Drive East are also designated within the Official Plan as Specific Provision Area 53 as shown on Schedule ‘A6’ – Specific Provision Areas.

The building and green space provided creates an iconic corner and buffer zone to the major intersection of Northfield Drive and University Avenue.

Enhancement of the transit facility will be reviewed with both the City and the Region during planning applications. Protection of existing site features is achieved through a generous open space at the corner of University Avenue and Northfield Drive. The existing building, having been deemed unsuitable to contribute to proposed development, will be demolished. Tree compensating measures will be implemented during planning applications to account for loss of several trees that cannot be saved.
7 Public, Agency and Stakeholder Consultation

Public, stakeholder and agency consultation is a key feature of the Municipal Class EA process. Through an effective consultation program, the Region was able to generate meaningful dialogue between the Project Team and the agencies, stakeholders and the public, resulting in an exchange of ideas recorded in this Environmental Study Report, and the broadening of the information base leading to better decision making.

7.1 Notice of Study Commencement

The Notice of Study Commencement (Appendix K) was published in The Record on November 17 and 24, 2015. The newspaper advertisement provided residents and stakeholders with information on how to participate actively in the study. The Notice was also posted on the Region of Waterloo website (http://www.regionofwaterloo.ca/en/regionalgovernment/publicnotices.asp) which was accessible to all external stakeholders and members of the public. Property owners within the study area were mailed a notice via tax roll information obtained from the Region. Technical agencies, utilities, stakeholders, special interest groups and First Nations were notified of this EA process by mail on November 9, 2016 by IBI Group. The notification letter included the Notice of Study Commencement and a response request sheet inviting participation in the Class EA. The list of agencies, utilities, stakeholders, special interest groups and First Nations contacted are summarized below. A complete mailing list can be found in Appendix K.

- Ministry of the Environment and Climate Change
- Ministry of Natural Resources and Forestry
- Ministry of Indigenous Relations and Reconciliation
- Ministry of Tourism, Culture and Sport
- Infrastructure Ontario
- Region of Waterloo
- City of Waterloo
- Township of Woolwich
- Waterloo Regional Police Services
- Grand River Conservation Authority
- Grand River Accessibility Advisory Committee
- Waterloo Region District School Board
- Waterloo Catholic District School Board
- Student Transportation Services of Waterloo Region
- Métis Nation of Ontario
- Mississaugas of the New Credit First Nation
- Six Nations of the Grand River
- Haudenosaunee Development Institute
- Haudenosaunee Resource Centre
- Rogers
7.2 Public Consultation Centre #1

The Notice of Public Consultation Centre (PCC) #1 (Appendix K) was published in The Record on February 9 and 16, 2016, and in the Waterloo Chronicle on February 18, 2016. The PCC was a drop-in format where members of the project team were available to answer questions and address concerns. Nine individuals attended the PCC. The session was held as follows:

**Date:** Wednesday February 24, 2016
**Time:** 4:30 to 7:30 p.m.
**Location:** RIM Park – Room 202
2001 University Avenue East
Waterloo, ON

At the request of City of Waterloo Councillor Diane Freeman, a second informal PCC was held as follows:

**Date:** Sunday March 20, 2016
**Time:** 12:00 p.m. – 3:30 p.m.
**Location:** RIM Park – Outside the Lion’s Ice Pad
2001 University Avenue East
Waterloo, ON

This PCC was held in conjunction with the Eastbridge Neighbourhood Association’s free skate. The displays were set up outside the Lion’s ice pad. A total of three individuals (including Councillor Diane Freeman) signed in.

A summary of comments received can be found in Exhibit 7-1. For a complete record of the written comments and concerns received, see Appendix K.

**Exhibit 7-1 PCC #1 Comment Summary**

<table>
<thead>
<tr>
<th>E-MAILS RECEIVED</th>
<th>1. Traffic/Transportation:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Suggests diverting bus traffic to Frobisher Drive from 8 p.m. to 7 a.m. instead of using Northfield Drive in order to reduce noise. Would reduce buses performing risky left turns from Northfield Drive into the facility without a stop light.</td>
</tr>
<tr>
<td></td>
<td>• Glare of sunlight and its impact on the bus drivers.</td>
</tr>
<tr>
<td></td>
<td>• Prepare a traffic impact study.</td>
</tr>
<tr>
<td></td>
<td>2. Site Location/Layout:</td>
</tr>
<tr>
<td></td>
<td>• Site was acquired prior to presenting the evaluation criteria and site alternatives to the public. Compatibility, design and traffic related matters should have been considered in selecting the site and in evaluating design options.</td>
</tr>
</tbody>
</table>
• Consider flipping the building design so that the transit maintenance doors and parking lot are orientated toward University Avenue.
• Consideration to building elevations and screening of rooftop equipment.

3. Noise/Odour:
• Increase in the number and frequency of buses.
• Idling buses.
• Noise within maintenance area.
• Complete a noise and odour impact study.

4. Fuel/Oil Spills and water protection:
• Maintain safety levels.
• On-going monitoring.

5. Aesthetics:
• Requesting a parkette or a row of trees.
• LED lighting in the trees.
• LED lighting in the parking lot.
• At the northwestern corner of University Avenue and Northfield Drive, consideration should be given to enhance landscaping at this location and in recognition of the significance of Northfield Drive as an entrance to the City of Waterloo, residential uses in the vicinity and the corporate office park on the opposite side of Northfield Drive. Berming should also be considered particularly if the driveway around the proposed building continues as a design element.

6. Amenities:
• Buy transit media at the facility.
• Place administrative offices at the corner of University Avenue and Northfield Drive.

7. Existing Building:
• Reuse existing building.

8. Wildlife:
• Snapping turtle found in the study area by a resident. Wonders if it’s a Species at Risk.

9. Problem/Opportunity Statement
• Be more clearly articulated.

10. Capital Forecast:
• When are Northfield Drive, University Avenue and the transit facility scheduled in the capital forecasts?
7.3 Public Consultation Centre #2

The Notice of PCC #2 (Appendix K) was published in the Waterloo Chronicle on November 10 and 17, 2016, and pointer ads were published in The Record November 8 and 15, 2016. The PCC was a drop-in format where members of the project team were available to answer questions and address concerns. Seven individuals attended the PCC. The session was held as follows:

- **Date:** Thursday November 24, 2016
- **Time:** 5:00 to 7:30 p.m.
- **Location:** RIM Park – Room 104
  
  2001 University Avenue East
  
  Waterloo, ON

A summary of the comments received can be found in Exhibit 7-2. For a complete record see Appendix K.

**Exhibit 7-2 PCC #2 Comment Summary**

<table>
<thead>
<tr>
<th>COMMENT RECEIVED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise coming out of the doors of the east side of the building (e.g., P.A. system, horns sounding, air brakes releasing) after hours, 12:00 a.m. to 6:00 a.m.</td>
</tr>
</tbody>
</table>

7.4 Agency and Stakeholder Consultation

In response to the notifications, a number of comments were received. The consultation summary table and full record of communication is included in Appendix K.

Requests to be kept informed came from the Ministry of Tourism, Culture and Sport, and direct involvement in the study was made by the City of Waterloo. Grand River Conservation Authority had no concerns and did not require further contact.

Correspondence was received by the City of Waterloo Councillor Diane Freeman as summarized below:

- Consider selling transit media;
- Create an entrance feature to the City of Waterloo;
- Have bike lockers for transit users; and
- Have a bus stop/connection to the LRT.

7.4.1 Pre-Consultation Meeting with the City of Waterloo

A Pre-Consultation meeting, part of Site Plan Approval process, was held on February 8, 2017 with the City of Waterloo to provide the City with project background and context and to obtain planning, engineering and transportation Staff feedback for future consideration during design stages. Minutes of this meeting can be found in Appendix K.

7.5 First Nations Consultation

To assist with developing a meaningful First Nations consultation list for the project, and to fulfill the requirements of the Class EA process, correspondence was initiated with the Ministry of Aboriginal Affairs, and the Environmental Assessment and Approvals Branch of the Ministry of
the Environment and Climate Change to identify which First Nations might have a local interest in the project.

As part of the Class EA process, potentially affected First Nations were contacted directly by IBI Group during project commencement, and were also informed of the Public Consultation Centres. The letter encouraged First Nations to provide relevant comments related to the study, and pertaining to areas of Aboriginal uses and/or activities.

Correspondence was received from the Mississaugas of the New Credit First Nation requesting to be involved in the study and for a copy of the Stage 1 archaeological assessment and natural heritage report which IBI Group provided. For the Stage 2 archaeological assessment they requested two field liaison representatives to be present for the fieldwork. The two field liaison representatives attended the Stage 2 which was completed in the Spring of 2016. A full record of communication is included in Appendix K.

7.6 Notice of Study Completion

The Notice of Study Completion (Appendix K) was published in the Waterloo Chronicle on March 30 and April 6, 2017 and in The Record on April 4 and 11, 2017. The 30-day public review period runs from March 30 to April 28, 2017.
8 Environmental Impacts, Mitigation and Commitments

8.1 LEED

In accordance with the Region of Waterloo policy, new Region buildings will be designed to satisfy the requirements of LEED Silver level of sustainable design. The strategy of achieving each credit will be part of detailed design of the facility.

8.2 Natural Heritage

Tree removal and clearing of any vegetation will comply with the Migratory Birds Convention Act (MBCA) that protects the nests, eggs and young of migratory birds. Compliance measures will include seasonal avoidance of bird nesting season (approximately March 25 – end of August) or nest surveys by a qualified biologist to search for and avoid active nests.

Recommended mitigation of potential impact to bats includes avoiding the summer season for building demolition and/or building inspection prior to demolition to confirm that no bats and bat young-of-the-year are roosting within it.

8.3 Municipal Sanitary

The proposed development will have an on-site sanitary collection system and will discharge the site via the servicing easement through 295 Frobisher Drive and 2700 University Avenue eventually discharging to the Frobisher Pumping Station. To accommodate the increased flows from the proposed site, the existing 150 mm diameter sewer will need to be removed and replaced with a 200 mm diameter sewer. Further, due to the negative elevation difference between the invert of the sanitary sewer in the municipal easement and the required invert of the outlet sewer at the proposed building, a mechanical lift station will be required on the subject site.

8.4 Municipal Water

A single 200mm diameter watermain service connecting to the exiting 300 mm diameter watermain on Northfield Drive is proposed. At the property line, the water service will split into a 100mm diameter domestic service and a 200 mm diameter fire service. Hydrants will be located on site at a separation distance of 90 m. All water distribution systems are to be constructed per City of Waterloo standards.

8.5 Stormwater Management

Stormwater quality control for parking areas will be provided using an oil/grit separator (OGS) unit. The use of underground storage tanks will be explored during detailed design to provide stormwater quantity control. A final stormwater management report should be prepared to support the engineering drawings at the detailed design stage.

8.6 Geotechnical – Pavement/Foundation Requirements

The main area of excavation for the removal of impacted soil was at the loading dock for the abandoned building. There are no records of in-situ density testing to confirm the geotechnical competency of the backfill for support of future building and parking structures. Further evaluation of the compactness for this backfill should be carried out.

Where excavations for the removal of impacted soils have been carried out, the footings should be founded below the excavations on competent native granular deposits unless the backfill was
systematically compacted to a high degree of density which should be confirmed by additional testing. Alternatively, the footing excavations can be backfilled with lean concrete under the supervision of a geotechnical engineer to ensure the integrity of the future footings are not compromised.

Additional details can be found in Appendix D.

8.7 Transportation

The proposed site is located outside the traffic lanes of adjacent roadways, and impacts to traffic operations are expected to be limited during the majority of construction. Generally, construction can utilize existing accesses on Northfield Drive at Toman Drive and on University Avenue. There would likely be increased truck volumes on Northfield Drive due to construction operations. Time of day restrictions for construction vehicle ingress and egress can be considered at the detailed design stage to limit the impacts.

Short-term closures of lanes along Northfield Drive and University Avenue may be required from time to time to support construction of site accesses, utilities and/or other works. Traffic management and staging will be assessed during detailed design to minimize impacts to roadways where possible. Coordination with the planned Northfield Drive widening will be considered during detailed design to utilize synergies in construction timings where possible.

It is recommended the intersection of Bridge Street and Northfield Drive following the Northfield Drive widening is further studied and monitored. This would provide better insight into verifying traffic growth projections and evaluating various alternatives such as double left turns and/or network changes to encourage traffic to divert to a different road/movement.

It is noted that additional widening of Northfield Drive beyond what is shown in the Class EA would be required in this area. Dimensions of the available space for a left turn bay is shown in Exhibit 8-1. The ultimate design of this segment of Northfield Drive needs to be reviewed and updated by the Region.
8.8 Noise Mitigation
At final design, the on-site noise sources and assumptions described in the Preliminary Acoustical Report will be confirmed and revised accordingly. If the revised on-site noise sources are found to generate noise levels in excess of the maximum allowable MOECC levels for existing off-site receivers, appropriate on-site mitigation measures are to be provided.

8.9 Contaminants
A Risk Assessment or additional remediation is required to address SAR in soil, petroleum impacted overburden groundwater in the loading dock area, and site-wide sodium and chloride impacted overburden groundwater, prior to filing a Record of Site Condition.

8.10 Air Quality
The air quality results are associated with specific activities on site and an emission arrangement that accounts for all the emissions, but does not address the specific configuration of stacks and vents. The predicted emissions and impacts can be adjusted when the facility’s detailed design is completed and all equipment is identified.

8.11 Landscaping
The site is conceptually designed with a balanced distribution of hard and soft landscaping that contributes toward a coordinated and enhanced site design and streetscape character. The plantings and landscape buffers create a sense of place and an aesthetically pleasing, comfortable pedestrian environment. The landscape buffers promote land use compatibility while large canopy trees provide respite from the sun and enhance streetscape character.
A component of Public Art is yet to be defined and will be part of detailed design definition and coordination.