

City of Hamilton

Hamilton Airport Employment Growth District (AEGD) – Proposed Collector 6N at HSR – Corridor Protection Study

Evaluation of Alignment Alternatives



Prepared for City of Hamilton
by Arcadis IBI Group
October 4, 2023

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**Appendix C: Draft Class Environmental Assessment Characterization and
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Appendix D: Cultural Heritage Report Addendum (Golder & Associates)

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1 Introduction

1.1 Purpose of this Study

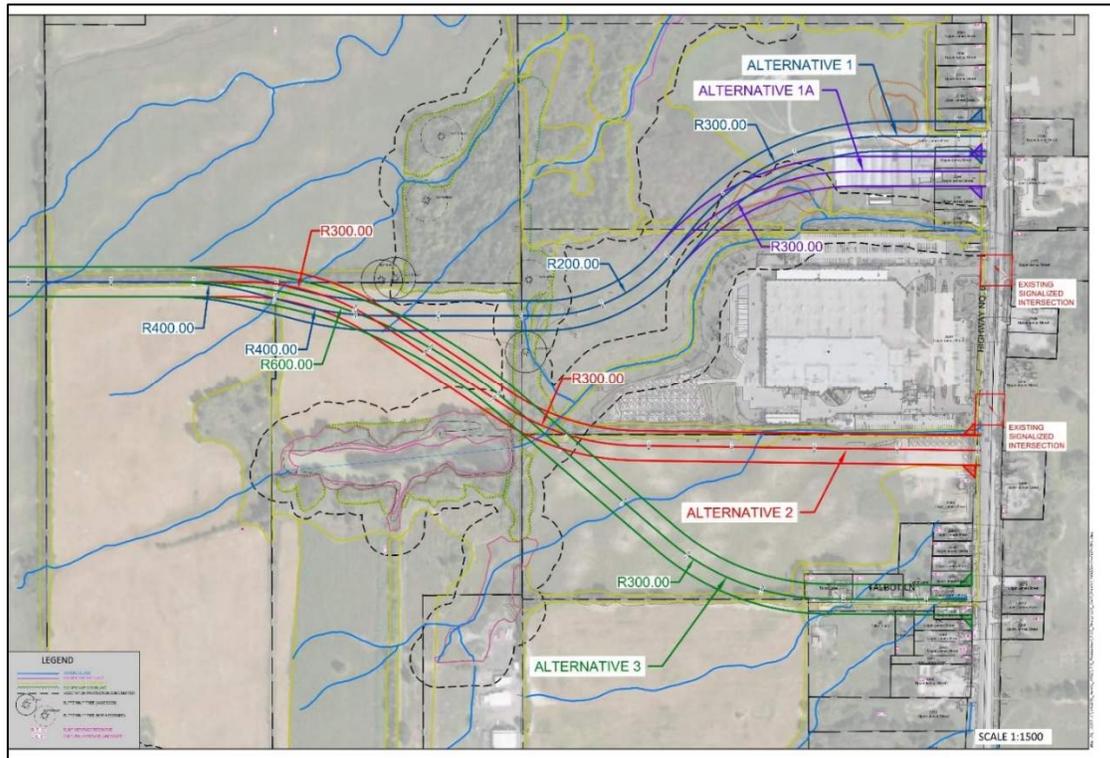
The Collector 6N Corridor runs between Glancaster Road and Upper James Street within the Airport Employment Growth District. Section 1.2 (Background Studies) of this Study, provides an overview of the background studies that led to this study, including the *Airport Employment Growth District Secondary Plan*, and the *Hamilton Airport Employment Growth District: Transportation Master Plan*.

The purpose of this Corridor Protection Study is to evaluate and assess the feasibility of connecting Collector 6N to Upper James Street along three (3) alternative alignments.

The evaluation considers the existing constraints associated with each alternative alignment, and the potential impacts on the physical and operational aspects of the nearby Hamilton Street Railway (HSR) Facility and other adjacent lands. The impacts on utilities, natural heritage system features and cultural heritage features were also identified and evaluated. Modeling completed by the city showed that this road is needed for the transport of goods, especially as this area undergoes growth as outlined in the Airport Employment Growth District Transportation Master Plan.

Exhibit 1.1 below shows the alternative alignments to be evaluated. A full-sized scaled version of the alignment alternatives is provided in Appendix A. The outcome of this study is a preferred alignment of Collector 6N based on the available information. A detailed evaluation of the alternatives can be found in Appendix B: Evaluation of Alignment Alternatives. The scope of work does not include public and indigenous consultation. Following this report, further design refinements of the preferred alternative will be undertaken through follow-up processes to meet the remaining requirements of an Environmental Assessment (EA).

Exhibit 1-1: Collector 6N Alignment Alternatives



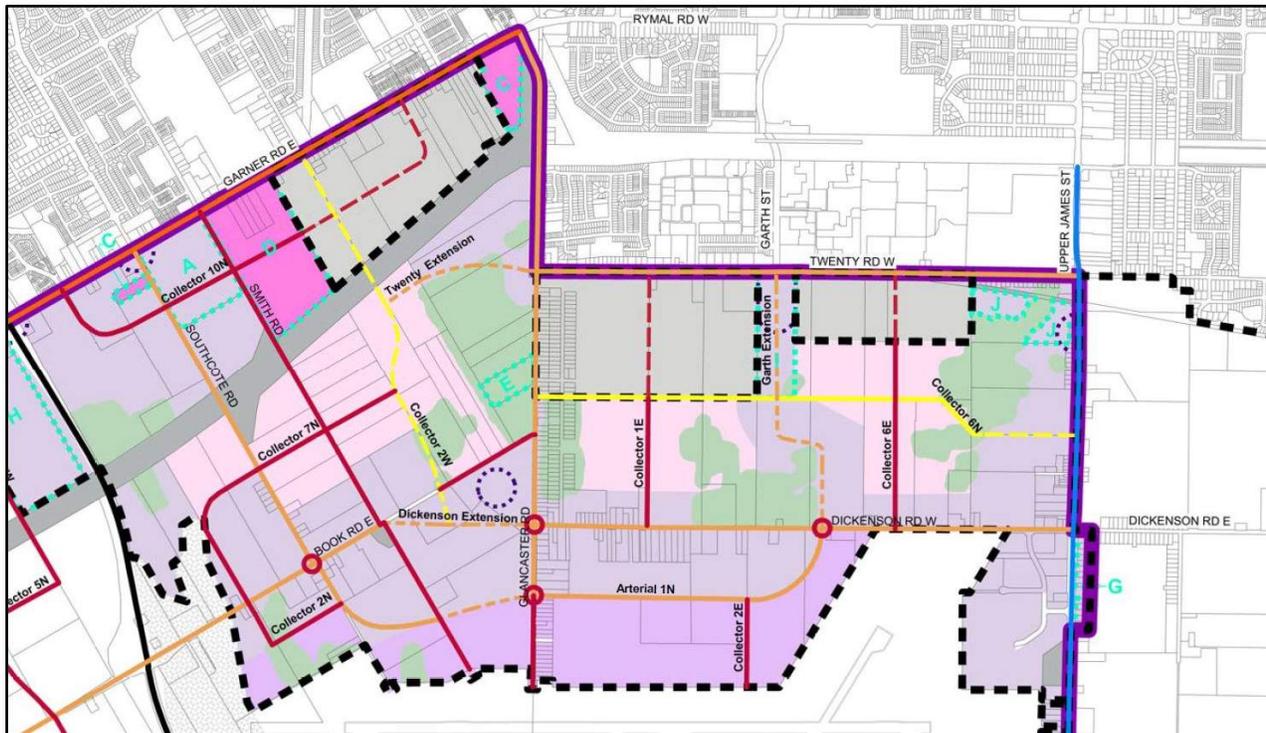
1.2 Background Studies

1.2.1 Airport Employment Growth District

In 2015, the Ontario Municipal Board provided a ruling on the *Airport Employment Growth District (AEGD) Secondary Plan*. The AEGD Secondary Plan established the phasing, specific land uses, transportation network, infrastructure requirements, design principles and development standards to guide the development and/or redevelopment of lands in the AEGD Secondary Plan Area. As determined in the AEGD Secondary Plan, “The transportation system in the Airport Employment Growth District is intended to promote a variety of modes of travel, including automobiles, transit, and active transportation (e.g., cycling and walking) for people to access the employment area, for the safe and efficient movement of goods, and for employees to access the amenities provided within the employment area, in accordance with the Transportation Master Plan for the Airport Employment Growth District”. The Collector 6N corridor between Upper James St. and Glancaster Road falls within the AEGD area.

In 2011, the *Hamilton Airport Employment Growth District: Transportation Master Plan (AEGD TMP)* was completed, and an Implementation Update was completed in 2016 to reflect changes proposed in the AEGD Secondary Plan. By 2031, planned growth in the Hamilton Airport Employment Growth District is expected to reach over 28,000 employees. The AEGD TMP provided a transportation strategy that supported employment projections for the AEGD and the City of Hamilton’s long-term vision. The AEGD TMP recommended construction of a new 4-lane collector road from Upper James Street to Glancaster Road, running in parallel to Dickenson Road and Twenty Road West.

Exhibit 1-2: AEGD Preferred Road Network



1.2.2 2240 Upper James Street Traffic Impact Study

In June 2022, a draft Traffic Impact Study (TIS) was submitted for the Panattoni Development Company proposed industrial development at 2240 Upper James Street. The site is located on the west side of Upper James Street, south of the HSR MTC. The proposed development consists of a single building with 383,872 sq. Ft of industrial space. The report also includes a review of three alternative alignments for the east end of Collector 6N, which are different from the alignments currently under consideration. The alignments that were analyzed are as follows:

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- Collector 6N aligned with the south HSR Driveway;
- Collector 6N aligned with the north HSR Driveway; and
- Collector 6N aligned with the existing driveway to the greenhouse development north of HSR.

The TIS report assesses existing conditions (2022), background traffic conditions (2025 and 2030) and total future conditions considering the proposed development site traffic impact on the adjacent roadways. The analysis includes a review of the following intersections:

- Upper James Street & Dickenson Road;
- Upper James Street & HSR South Driveway;
- Upper James Street & HSR North Driveway;
- Upper James Street & Collector 6N

The site access configuration that was analyzed for each Collector 6N alignment alternative was tailored to each alignment alternative considered. The study also includes a scenario analysis for an interim condition under existing infrastructure with no Collector 6N constructed.

The overall conclusion of the study was that the proposed industrial development will not result in any operational issues or additional notable delay on the local roadway network. The operations analysis presented in the study was used as a reference in this report for assessment of intersection operations under the various alternatives.

The AEGD TMP update approval does not provide automatic approval of any parts, or the total application package as a whole, for the 2240 Upper James Street site plan application.

2 Existing Conditions

2.1 Overview of HSR Facilities Operations

The Mountain Transit Centre (MTC) located at 2200 Upper James is the operations and maintenance centre for all Hamilton Street Railway (HSR) transit functions. It includes offices for administration, operations and maintenance staff; maintenance and overhaul areas for the transit fleet; servicing, cleaning and fuelling (diesel and compressed natural gas (CNG) area for all transit revenue and support vehicles; and storage area (indoor and outdoor) for the transit fleet). An overview of activities and vehicle and employee movements at the facility was prepared by HSR for the MTC operations. It did not, however, capture the activity for the transit Hub.

There are currently some 280 buses, both 230 standard 12.2m (40 foot) and 49 articulated 18.3m (60 foot) buses, operating from the facility with an employee complement of over 800 including bus operators, maintenance and administrative staff.¹

Operations and maintenance activities are carried out on a 24/7 basis year-round. Employees and transit vehicles enter and exit the facility from Upper James essentially from 4:30 am to 2am. On site and in addition to the vehicle storage areas are two separate parking areas for employees and visitors totalling approximately 357 spaces – 215 in the north parking lot (which may be reduced in size by ~50 spaces); 62 in the park and ride area adjacent to the transit Hub, and 80 in the south lot used by maintenance and administrative staff.

In addition to the MTC activities, there is a transit Hub (terminal / park 'n ride) located in front of the facility between the main transit building and Upper James where transit routes enter and exit to facilitate transfers for transit users between routes. This Hub also serves as a passenger drop-off location and transfer point for the city's accessible transit service, DARTS, and for a taxi-based demand-response service. Parking space for some 40 cars is located adjacent to the Hub. Access to the transit hub is through the south driveway. Lastly, the MTC also receives frequent (daily) deliveries into the facility. Delivery vehicles utilize the south driveway and access the loading docks which are

¹ Source: CUTA 2021 Conventional Transit Statistics.

located on the south side of the facility, just west of the maintenance bay entrances into the facility.

Fuelling of transit buses occur primarily during the evening and overnight hours from approximately 6pm to 4am although some refuelling can take place during the day. The CNG fuelling area is located outside the main building on the south boundary. Fuelling of the diesel buses occurs inside as part of the vehicle clearing and washing process. Buses circulate on the property between the fuelling area, service lane and storage area during the evening and overnight with other movements occurring between the maintenance and storage areas. In addition, testing of transit buses can occur on the property outside of the main building using the paved areas.

There are two access points, driveways, to the MTC property, one on the north side from Upper James and a second on the south perimeter of the property. Both access driveway intersections with Upper James are signalized and allow for all-way turns.

Buses returning from revenue service enter the facility via the north driveway. Similarly, employees accessing the employee vehicle-parking area on the north side of the facility, also enter via the north driveway. Employee vehicles exit via this driveway. As well, buses accessing the Hub and buses exiting from the Hub use the north driveway.

Buses exiting the MTC property to enter revenue service throughout the city utilize the south driveway. Employees entering and existing the facility to access the employee vehicle parking area located on the south perimeter of the property also use the south driveway. Buses entering and exiting the transit Hub (Park 'n Ride) along with private vehicles and taxis accessing the transit Hub also use the south driveway. Exhibit 2-1 provides an overview of the MTC Facility and key areas within the site.

Exhibit 2-2 shows the typical vehicular movement patters within the MTC.

Exhibit 2-1: Overview of the MTC Facility and Key Site Areas (Source: City of Hamilton)

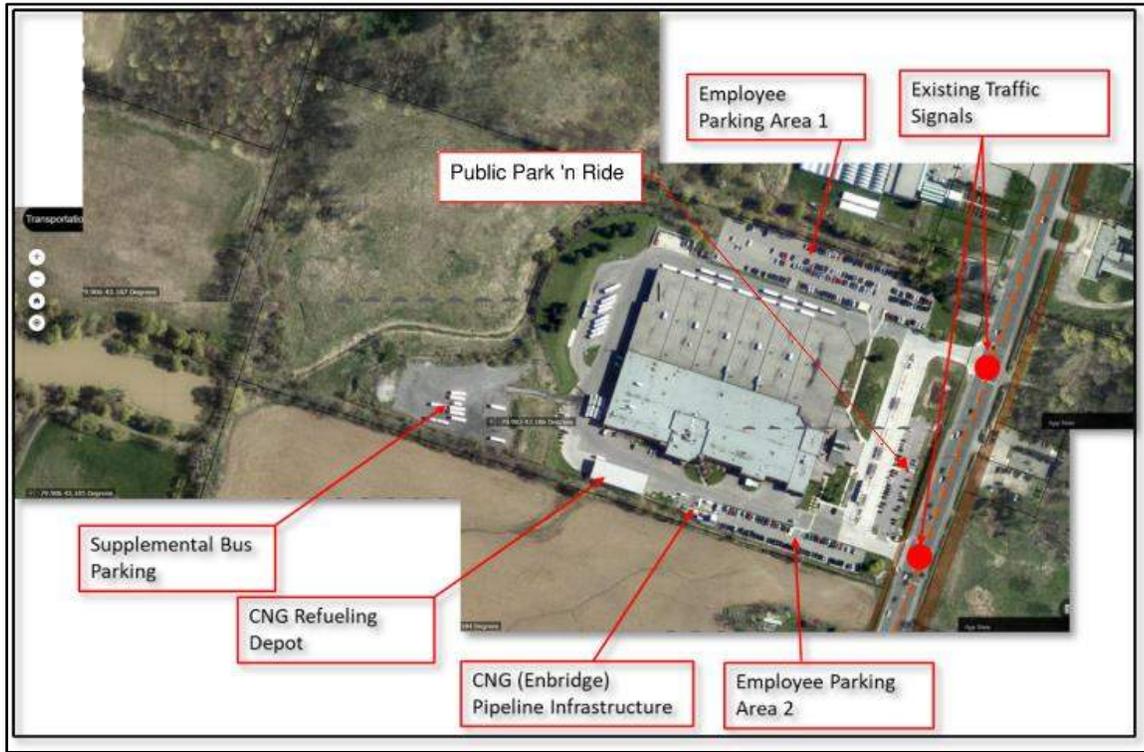
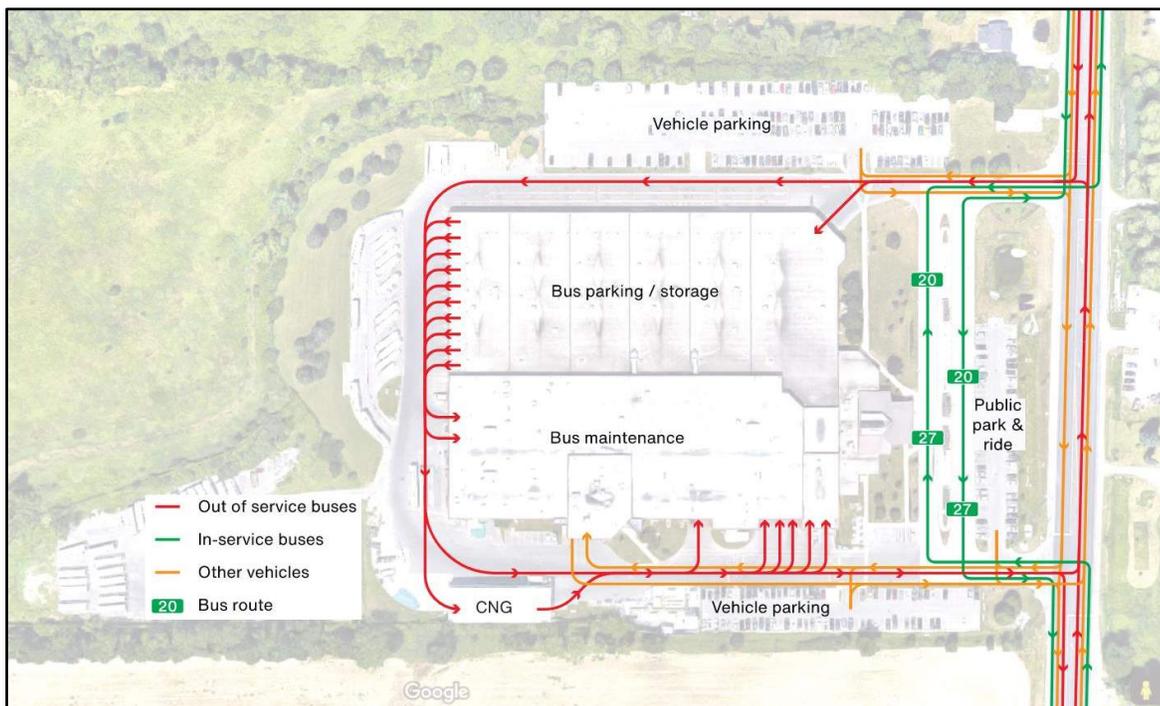


Exhibit 2-2: Vehicular Movement Patterns on the Mountain Transit Centre



Bus movements occur at five primary time periods during the day:

- Early morning between approximately 4 and 7am, buses go into revenue service. Approximately 220 buses will exit the facility during these hours using the south driveway
- Mid morning, between approximately 9:00 and 10am, some 75 buses return to the facility after the morning peak using the north driveway
- Early afternoon, between approximately 2:30 to 4pm, some 75 buses depart to go into revenue service using the south driveway
- Early evening, between approximately 5:30 and 7:30, some 100 buses return to the facility as transit service levels are reduced using the north driveway
- Late Night, between approximately 10:30pm and 1:30am, the remaining in-service buses, approximately 50, return to the facility using the north driveway.

With approximately 280 buses and over 800 employees operating from the facility, the facility is well beyond its design capacity of 200 buses and 650 employees. In consideration of this situation and with plans to improve and expand public transit service in the coming years leading to an increase in the transit fleet size and number of employees, the City has completed the design for a second transit facility for up to 300 buses in the downtown area. Slated for opening by 2026, it will relieve the over-capacity issue at MTC by which time the number of buses at MTC would be reduced to its original design capacity (200) along with a reduction in employees working from the facility. However, this reduced capacity will not change the scope of operations and the associated vehicle movements, or vehicle maintenance and servicing activities at the MTC. The reduction in capacity will also not affect the days and hours of operations.

Of critical consideration with regard to any impact on and potential re-configuration of the MTC facility operation are:

- the location of the CNG fuelling station along the south perimeter. This infrastructure and activity which would be difficult and costly to move or replace,
- maintaining and minimizing the time for buses to enter and exit the property (more time can translate into an increase in operating cost), and
- the functionality of the transit Hub. Buses need to enter and exit the Hub from all directions

2.2 Overview of Traffic Operations

The Traffic Impact Study for the Panattoni Development at 2240 & 2254 Upper James Street (JD Northcote Engineering Inc., June 2022) provides the existing condition context for the study area.

Existing Road Characteristics

Upper James Street is a major arterial road under the jurisdiction of the City. It consists of a four-lane cross section (two lanes per direction), gravel shoulders and a posted speed limit of 70km/h. There are also several private driveways connecting onto Upper James Street.

The HSR MTC facility also has two signalized driveways onto Upper James Street to facilitate bus movement to/from the facility, as well as visitor and staff vehicle access. The private driveways and land-uses along Upper James Street are a challenging context for planning in the study area.

Transit Access

The Hamilton Street Railway (HSR) operates two routes within the study area. Route 20 (A-Line Express) and Route 27 (Upper James) both provide service along Upper James Street. The main bus stop/terminal for the study area is the HSR MTC facility.

Route 20 operates all days of the week with weekday peak hour service every 10 minutes. It provides connections from the study area to the Hamilton International Airport, Mohawk College, downtown Hamilton, two GO Stations, and the Hamilton waterfront. Route 20 is one of Hamilton's key rapid transit routes.

Route 27 operates weekdays and weekends with weekday peak hour service every 15 minutes and weekend peak hour service every 30 minutes. This route provides connections between downtown Hamilton and the HSR MTC facility.

Active Transportation

The existing conditions active transportation facilities within the study area are currently limited. There is an existing asphalt sidewalk on the west side of Upper James Street, north of Talbot Lane, but no other active transportation facilities on Upper James Street south of Talbot Lane and Dickenson Road. There are proposed plans to implement multi-use trails, and/or bike lanes and sidewalks on Upper James Street.

Truck Transportation

Upper James Street is a full-time truck route as identified in the City's Truck Route Map (April 2022). This truck route has connections to the south towards Hamilton International Airport, as well as to the north to the Lincoln M. Alexander Parkway. Dickenson Road is also identified as a future truck route link in the City's Long-term Truck Route Network as part of the AEGD Secondary Plan Area development.

Existing Traffic Operations

Based on the existing conditions traffic analysis of the Panattoni Development (2240 Upper James Street), the intersections along Upper James Street are estimated to be operating within roadway capacity with all volume-to-capacity (v/c) ratios less than 1.0 during the A.M. and P.M. peak hours (increased delays). However, there are a few findings to note, including the following:

- Upper James Street is operating at a critical v/c ratio of 0.89 at Dickenson Road but remains at an acceptable Level of Service (LOS) D or better (reliable travel time).
- The eastbound (outbound) movements from the signalized HSR MTC facility north driveway at Upper James Street are estimated to be operating at an acceptable v/c ratio of 0.72, but experiences delay at an LOS F level during the A.M. peak hour (increased delays).

There are no improvements that would need to be recommended for the existing conditions, based on the findings of this traffic analysis outlined in the Panattoni Development TIS.

2.3 Overview of Natural Environment Features

Arcadis IBI Group was provided a Draft Class Environmental Assessment Characterization and Constraints Report that was produced on January 27, 2023, by Dougan & Associates that classified some of the natural areas within the project area and evaluated the natural constraints. This report was provided to the City by the owners of 2240 Upper James Street to assist in advancing the road alignment locating. The full Dougan report is available in Appendix C: . The inventory data from this report was used by Arcadis IBI Group to define the impacts of each road alignment on the natural heritage features.

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Through the inventories completed by Dougan and Associates, the following Core Areas were identified within the Study Area: Significant Woodland, Upper Twenty Mile Creek Provincially Significant Wetland (PSW), Significant Wildlife Habitat, Significant Habitat for Threatened and Endangered Species, unevaluated wetlands, and watercourses. In addition, Linkages were also identified.

Several field surveys were completed by Dougan & Associates between 2019 and 2022 as part of this study: including vegetation surveys, breeding bird surveys, amphibian call surveys, reptile surveys, bat surveys and targeted butternut trees survey and documenting any incidental wildlife. Vegetation communities within the study area were characterized by Dougan & associates according to the Ecological Land Classification (ELC) System protocol for Southern Ontario, 1st approximation (Lee et al., 1998). ELC classification and mapping was produced via high quality aerial photo interpretation and confirmation through field surveys. The field surveys confirmed the presence of woodlands meeting the criteria for Significant Wildlife Habitat (polygons 7 and 14) and several wetlands (polygons 3, 5, 9, 22, 28, 29). One of these wetlands (polygon 5) was determined to be a provincially significant wetland. A linkage assessment was also completed.

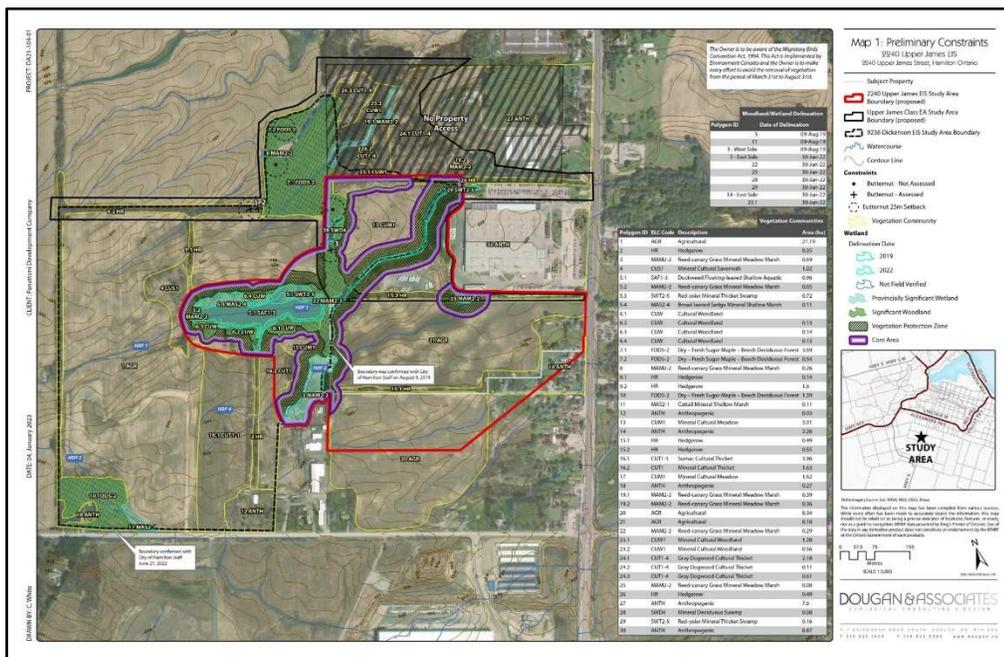
Though polygon 13 was originally identified as being wetland field surveys completed by Dougan & Associates assessed this polygon as a Mineral Cultural Meadow (CUM1). The boundaries of existing wetlands were assessed on site with staff from the Niagara Conservation Authority and it was confirmed the wetland community in this area was restricted to polygon 22. As a result polygon 13 was thus removed from the wetland mapping after that assessment.

There were changes to the Ontario Wetland Evaluation System (OWES) in 2022. These changes removed the ability to group small wetlands into a wetland complex. Our analysis occurred after these changes came into effect and this consideration was accounted for in our analysis. Based on the available information from the data at the time the only wetlands mapped as PSWs were polygons 5, 3 and 19.1. The only PSW in proximity to the alignments was polygon 5 (as shown in the Dougan & Associates report mapping). All non-PSW wetlands are still considered Core Areas.

Access was not granted to areas north of the HSR MTC facility (2136 Upper James St) therefore this area was unable to be accessed for full field surveys. These areas were assessed for ELC classification via air-photo interpretation and surveys from adjacent lands by Dougan & Associates. The property to the north was later accessed by Natural

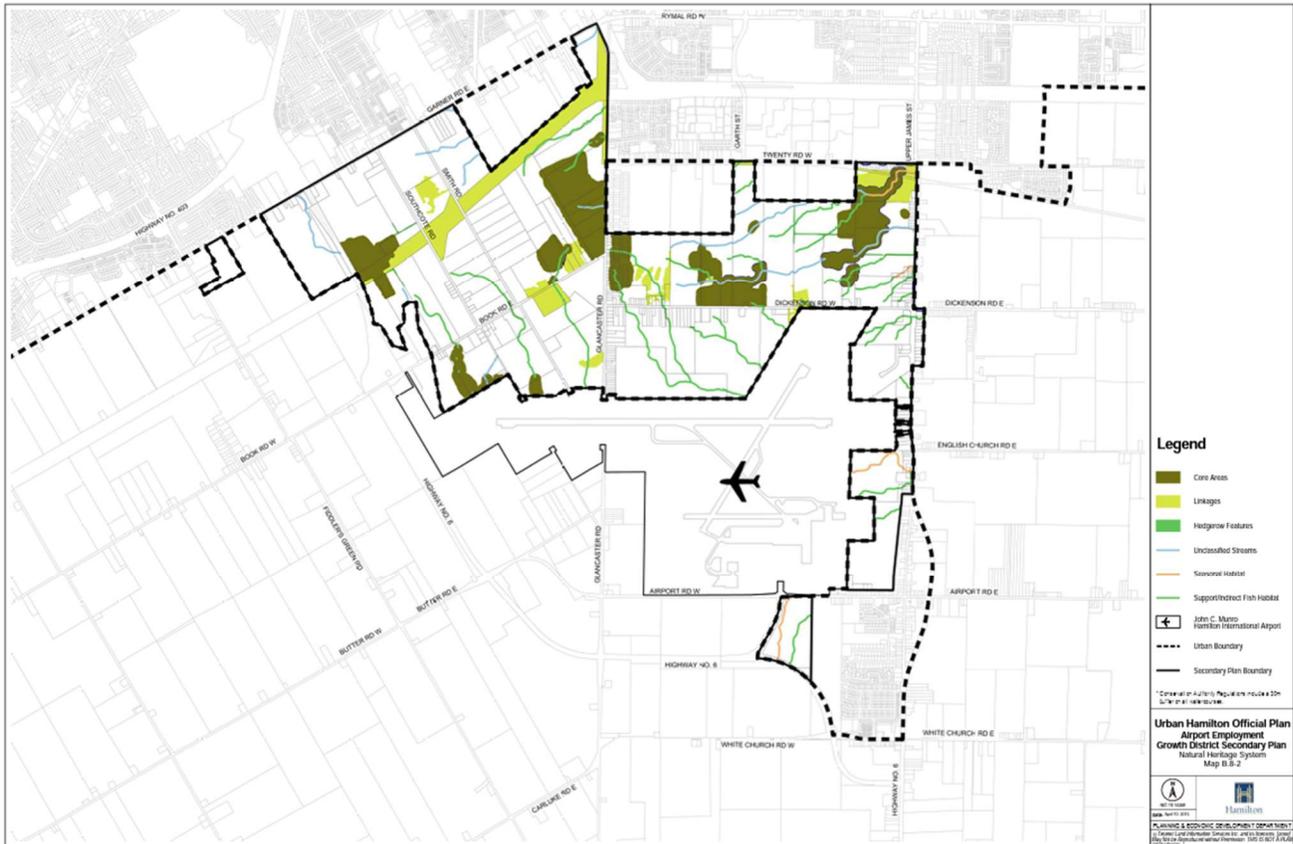
Resource Solutions Inc for a preliminary survey (September 2022) where the wetlands were confirmed to be present but further wildlife surveys are still required for a full characterization and assessment of that property. As a result of the limitations to the information available a full assessment of the route through this property could not be completed. Exhibit 2-3 below shows the Preliminary Environmental Constraints identified by Dougan and Associates.

Exhibit 2-3: Preliminary Environmental Constraints (Dougan)



The City of Hamilton’s Official Plan shows their Natural Heritage Community System mapping for this area covers the natural areas with the woodlands and wetlands making up the ‘core’ areas of the Natural Heritage System and the hedgerows and narrow natural habitats making ‘linkage’ areas. The Airport Employment Growth District Secondary Plan Natural Heritage System Map (Urban Hamilton Official Plan Volume 2 Map B.8-2) has identified and mapped Core Areas and Linkages within the Study Area. Exhibit 2-4 below shows the City of Hamilton’s Official Plan mapping of Core Areas and Linkage Areas

Exhibit 2-4: Core and Linkage Areas as per Airport Employment Growth District Secondary Plan Natural Heritage System Map (Urban Hamilton Official Plan Volume 2 Map B.8-2)



2.4 Overview of Cultural Heritage

A copy of a Cultural Heritage Report (and subsequent Addendum) was provided to Arcadis IBI Group that was completed by Golder Associates, a member of WSP. The Report describes the existing conditions and a preliminary impact assessment for the AEGD TMP Update. A copy of the Cultural Heritage Report Addendum is provided in Appendix D.

In the Cultural Heritage Report Addendum, impacts of “Do Nothing” and “Amended Road Network” alternatives were assessed for identified Built Heritage Resources (BHR) and Cultural Heritage Landscapes (CHL). If the Amended Road Network alternative were to be selected, it was recommended that the alignment of the new roads and expansion of existing roads seek to avoid direct and indirect impacts to BHRs and CHLs where feasible. The preferred alignments should require as little property acquisition as possible.

The CHLs impacted by the proposed alignments consist of farmscapes and the Talbot Lane streetscape:

- CHL 52 (9236 Dickenson Road) is a farmscape with a farmhouse built in 1892. All alternatives will pass through the northeast corner of the property. Demolition for this site is pending. The house is included on the City's Inventory of Buildings of Architectural and/or Historical Interest and as such a Documentation and Salvage Report has been prepared (Megan Hobson, 2020).
- CHL65 (2240 Upper James Street) is a farmscape with a residential bungalow. The residence is boarded and vacant and redevelopment of the property appears to have begun. All the BHRs and many of the landscape elements that comprised the 19th century farmscape have been demolished. Only a vacant, post-war bungalow remains.
- CHL 66 (Talbot Lane west of Upper James Street) is a late-nineteenth and early-twentieth century residential streetscape included in the North Glanford Historic Settlement Area. It is a narrow, single lane, tar and chip local road constructed to a rural cross-section that extends approximately 200m west from Upper James Street before terminating. The streetscape is lined with a small number of large and small lot residences dating to the nineteenth and twentieth century.

The BHRs which will be impacted by the proposed alignments are as follows:

- BHR 60 (2274 Upper James Street) is a residence constructed in 1958. The residence was constructed in the post-war boom and is a remnant of the development of the area as it transitioned from rural properties and farm complexes to a peri-urban landscape with commercial enterprises.
- BHR 61 (19 Talbot Lane) is a residence constructed in 1954 in the North Glanford Historic Settlement Area.
- BHR 62 (24 Talbot Lane) is a residence constructed in 1896 in the North Glanford Historic Settlement Area. Both the original structure and a constructed addition appear to be in a state of disrepair.
- BHR 63 (38 Talbot Lane) is a residence noted in the City's Inventory to have been constructed in 1871, however it is unclear if the extant residence is the original structure, heavily modified, or a new building. Two stone or brick buildings on the property are illustrated on the 1907 topographic map of the area.
- BHR 65 (2280 Upper James Street) is a residence constructed in 1931. It is a remnant of the development of the area as it transitioned from rural properties and farm complexes to a peri-urban landscape with commercial enterprises

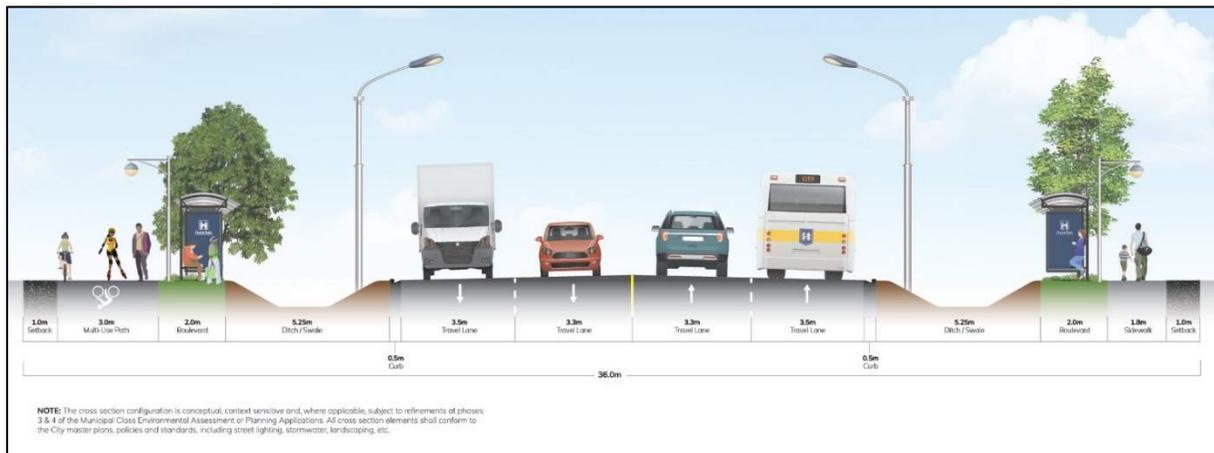
- Indirect impacts are anticipated to BHR 58 (2272 Upper James Street), a residence constructed in 1951.
- Indirect impacts are anticipated to BHR 66 (2284 Upper James Street), a residence constructed in 1954.

3 Development of Alternatives

3.1 General Overview of Design

The four alignment alternatives proposed through this study were originally identified through the AEGD Transportation Master Plan (2011), which proposed a new 4-lane road connecting Upper James Street (Highway No. 6) to Glancaster Road. A brief description of these alternatives is provided in Sections 3.1.2 through 3.1.5 and illustrated in Exhibit 3-2: Collector 6N Alignment Alternatives. All alternatives follow the same path at the west end from Glancaster Road parallel to Dickenson Road West and Twenty Road West before diverging approximately 950 m west of Upper James Street.

Exhibit 3-1: AEGD Typical cross-section with 36m Right of Way



3.1.1 Road Design Criteria

The Design Criteria were developed by referencing the City of Hamilton Development Engineering Guidelines (COHDEG), the TAC Geometric Design Guide for Canadian Roads, and the AEGD Transportation Masterplan. A summary of the Proposed Standards from the Design Criteria are as follows:

- Classification: Collector, Urban Residential
- Design Speed: 60 km/hr
- Posted Speed: 60 km/hr
- ROW Width: 36.0 m
- Lane Widths:
 - Curb Lanes: 3.5 m
 - Through Lanes: 3.3 m

The full Design Criteria can be found in Appendix E: AEGD Collector 6N Design Criteria.

3.1.2 Description of Alternative 1

Alternative 1 curves south slightly before continuing parallel to the east/west property line for approximately 250 m. It then curves north around several butternut trees and the HSR Facility, connecting to Upper James Street approximately 160 m north of the existing northern HSR Facility entrance. A southbound right-turn lane on Upper James Street at Collector 6N would be required, given the volumes expected for this movement.

3.1.3 Alternative 1A

Alternative 1A follows a similar path but connects with Upper James Street approximately 118 m north of the existing northern HSR Facility entrance. This places the intersection in line with the existing driveway of the property on the other side of Upper James Street.

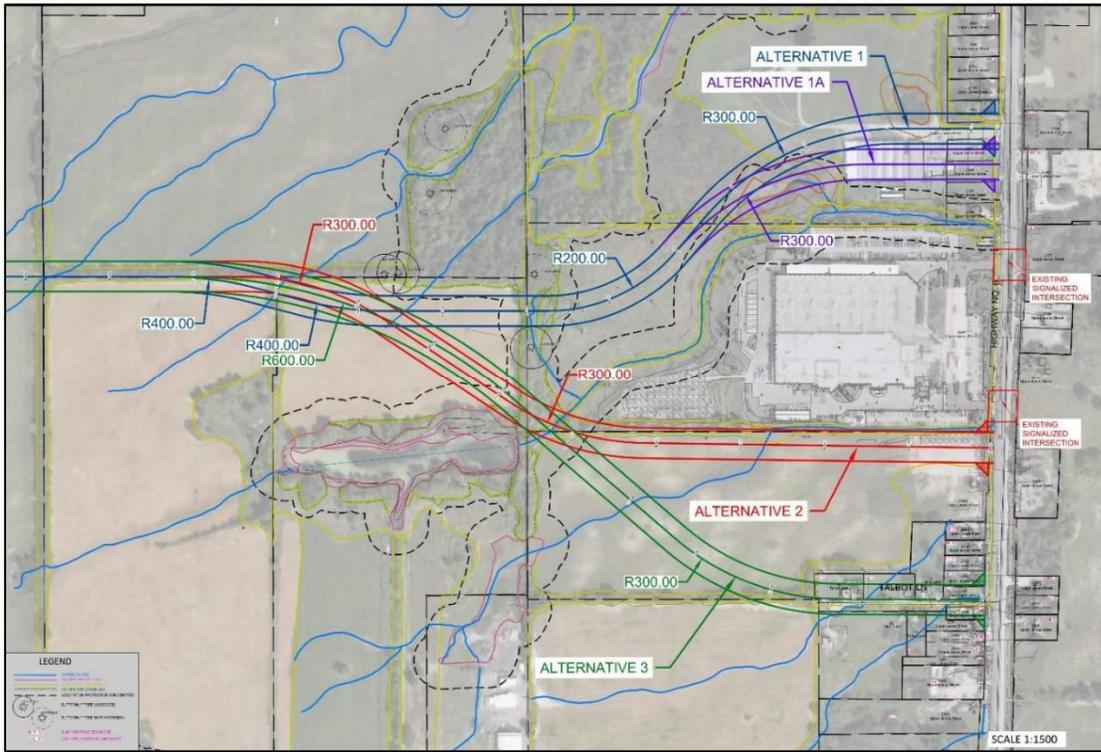
3.1.4 Description of Alternative 2

Alternative 2 curves south around several butternut trees and the HSR Facility, connecting to Upper James Street approximately 50 m south of the existing southern HSR Facility entrance.

3.1.5 Description of Alternative 3

Alternative 3 curves south around several butternut trees and the HSR Facility, connecting to Upper James Street at the current location of Talbot Lane.

Exhibit 3-2: Collector 6N Alignment Alternatives



4 Evaluation Criteria Overview

4.1 Evaluation Criteria

The alternatives were evaluated using the key criteria outlined in Sections 4.1.1 to 4.1.7 below.

4.1.1 Transportation and Traffic

This category identifies and evaluates traffic and transportation related criteria. Each alternative is evaluated on the extent to which an alternative can provide reasonable transportation services. The indicators within the group are defined as follows:

- *Traffic Operations (Future Conditions – 2030)* – The traffic operation of each alternative is evaluated using performance metrics such as Level of Service (LOS), delay and queue length based on the draft traffic analysis prepared for the

Panattoni Development Company proposed industrial development at 2240 & 2254 Upper James Street.

- *Compatibility with adjacent signalized intersections* – Signal spacing is a key issue due to the proximity to the HSR facility where two signalized intersections are located close to each other. OTM book 12 recommends signals be spaced at least 215 m apart to allow for drivers to distinguish between each signal. Each alternative is evaluated based on the centre-to-centre distance between adjacent intersections. In addition, storage lanes with taper lengths are reviewed for spacing conflicts and queue lengths are reviewed for spill back to adjacent intersections.
- *Compatibility with nearby private driveways* – Each alternative is evaluated for impacts to private driveways. Driveway configurations may be incompatible with the proposed intersection layout and may require relocation or consolidation.
- *Safety: Design Speed and Posted Speed Limit*– Identifies if alternatives require design speed/posted speed limit changes and justification to why the design speed should be changed.
- *Safety: Connection to Upper James Street* – Evaluates the geometric features of the intersection of Upper James Street and Collector 6N from a traffic safety perspective.
- *Safety: Active Transportation* – Evaluates each alternative from an active transportation safety perspective. This includes modify existing active transportation infrastructure that reduce safety to active transportation users.
- Other traffic implications:
 - *HSR Facility Entrances and traffic control measures* – Identifies if the Collector 6N alternative requires modifications to the HSR facility entrance driveway configuration or existing traffic control measures in place.
 - *Panattoni Site (2240 Upper James Street)* – Identifies if the Collector 6N alternative impacts the proposed development site from traffic/transportation perspective.

4.1.2 HSR Facility Impacts

This category evaluates the potential impact of the alignment alternatives on the operation of the HSR Mountain Transit facility from the perspective of the various functions associated with the facility.

- *Bus access to/from the HSR facility* – evaluates the impact on the movement of buses entering and exiting the site via the two access driveways on the north and south perimeters of the site. The timely and unimpeded movement of buses to and from the site is critical to the efficient delivery of HSR services as delays or increased travel distances and times for buses to enter or return from revenue-service can have a negative impact on HSRs operating costs and, in turn, the net cost to the municipality. As noted in the background discussion, bus movements are occurring on and around the site 24 hours per day, seven days a week. Service movements occur approximately 20 hours a day, seven days a week.
- *Deliveries of vehicle parts and supplies, office supplies, couriers* – evaluates the impact on the delivery of goods and services to the HSR facility which includes parts supplies for maintenance and office functions. Delivery trucks, particularly large trucks, require unimpeded and direct access to specific locations within the facility complex and must follow designated routings on site for safety and security reasons.
- *Fuel delivery* – this criterion evaluates of each alternative on the impact on the delivery, by trucks, of fuel of the bus and support vehicle fleet and their ability to enter and exit the site and to access the fuel storage tanks. Diesel fuel is required for a majority of the bus fleet assigned to the facility, although this will decline over time, along with gasoline fuel for operations and maintenance support vehicles. Fuel delivery is typically provided by tandem trailer trucks which have limited flexibility for turning and positioning and must follow designed routes on site to access the fuel storage tanks which are located on the south side of the facility. An increasing percentage of the bus fleet is powered by compressed natural gas (CNG), although the city is considering transitioning to electric buses in the longer term. CNG fuel is provide via a pipeline to the site and the fuelling system including both a high-pressure compressor and storage tanks, all located along the south perimeter of the site.
- *Fuelling of buses* – this criterion assesses the impact of each alignment alternative on the fuelling process for the bus fleet. Refuelling of buses, either

with diesel or CNG, and the support vehicle fleet with either gasoline or diesel, occurs primarily in the evening, between approximately 6pm and 4am but may also occur during daytime hours as required. Fuelling of CNG buses occurs outside at the CNG fuel station as does the fuelling of gasoline vehicles, while the diesel buses (and other diesel-fuelled vehicles) are fuelled inside the facility as part of the nightly vehicle servicing function via the service lane accessed from drive aisle along the south perimeter of the facility.

- *Flow of vehicles on the site* – this criterion addresses any impact on the movement of buses and other vehicles including support vehicles on the site. Vehicle movements include buses returning from or departing for revenue service, vehicles entering the storage area or the service lane, vehicles moving between the storage area and the service lane or to the maintenance which requires outdoor movements and the use of the north driveway from Upper James for accessing the site, and the south driveway for exiting the site. Vehicle movements also include employee and visitor vehicles which proceed to designated parking areas on the north or south side of the site. Northbound in services buses also enter the south driveway to access the platforms and make a right-hand turn movement. Except for employee and visitor vehicles entering and exiting the site, all vehicle movements on the site follow the “left-hand” (counter-clockwise) circulation rule for optimum visibility and safety.
- *Emergency Access* – this assesses any impact or infringement on the ability of vehicles to enter or exit the site quickly in an emergency especially under circumstances where prompt and unimpeded movement is required.
- *Public and staff parking* – employee vehicles park in designated areas on the north and south perimeters of the site. Access to these parking areas is aligned with the north and south driveways. Visitor parking is accessed via the south driveway from Upper James. On site circulation of private vehicles is not permitted. This criterion, therefore, assesses any impact on the ability of vehicles to access the parking areas.
- *Bus Terminal access/egress* – a bus terminal, or transfer hub, is located on the east side of the HSR site between the main building entrance and Upper James. Several bus routes service this terminal each originating from Upper James. The terminal is also where transit users can transfer between routes as well as serving as a kiss and ride (passenger drop off) location. Access to the terminal requires

the use of both driveways and all-way turns to/from Upper James. This criterion considers the impact of the alternative alignments on the ability of vehicle to enter/exit the terminal.

- *Employee and public access* – this criterion evaluates the impact of the alignment alternatives on the ability of employees and the public to access the parking areas on the HSR site.

4.1.3 Socio-Economic Environment

This grouping addresses effects of the alternatives on the existing properties. It also assesses whether the alternatives support the future land use of the adjacent properties. The factors within the grouping are defined as follows:

- *Property Impacts* – Identifies the impact to properties along the corridor and how much property would be required;
- *Access Impacts* – Identifies the impact the alternatives will have on traffic access to properties;
- *Fragmentation of Developable Lands* – Identifies the resulting developable land parcels for each alignment alternative, i.e. where an alignment bisects a property it will be divided into multiple parcels – the size and shapes of which may not be conducive to future development; and
- *Access Impacts to Developable Lands* – Identifies how access to properties will be impacted as a result of the proposed alternatives due to design considerations including but not limited to horizontal alignment, vertical profile, median conditions, and other ROW considerations such as boulevards, active transportation facilities, utility relocates, and SWM and drainage requirements.

4.1.4 Natural Environment

This grouping addresses effects of the alternative on the natural environmental features. The factors within the grouping are defined as follows:

- *Policy Areas* – Identifies if provincially designated natural environmental features / areas (e.g. Natural Heritage Systems, Greenbelt Plan areas, Niagara Escarpment Plan areas, Environmentally Sensitive Areas, and Endangered Species habitats, among others) are impacted.

- *Terrestrial Environments* – Identifies impacts to the Natural Heritage System (NHS), and to vegetation within the NHS, considering sensitivity, quality and significance of vegetation and relative magnitude of potential effect. In the case of the SAR Butternut then the impact to the individual tree is identified. A summary of key terrestrial features considered is as follows:
 - NHS Core Areas
 - General - Identifies the overall impact to the City of Hamilton’s NHS core areas as defined by the City;
 - Unevaluated Wetlands – Impacts or removal unevaluated wetlands;
 - Provincially Significant Wetlands – impacts on wetlands that have been evaluated to be Provincially Significant;
 - Significant Woodlands – Identifies impacts to areas that have been determined to be significant woodlands;
 - Species at Risk: Butternut – Looks at if Butternut trees are affected;
 - Significant Wildlife Habitat (SWH) and candidate Significant Wildlife Habitat
 - NHS Linkages
 - General – Identifies the overall impacts to the linkages as defined by the city in the NHS mapping;
 - Hedgerows and thickets – Looks at impacts to hedgerows and regeneration areas;
- *Watercourses and Aquatic Environments* – While watercourses are considered Core Areas within the NHS the impacts to fish habitat and aquatic environments were considered as a separately. Identifies the effects of the alternatives to fish and fish habitat considering sensitivity and relative magnitude of potential effects pertaining to:
 - Watercourses (identifiable channel with permanent flow) and Contributing Fish Habitat (drainage features)
- *Wildlife* – Identifies impact to the wildlife in the study area, including impacts to species of conservation concern (federally and provincially), and impacts on habitats and impacts to wildlife movement opportunities, including:
 - Species at Risk; and
 - Wildlife crossings.
- *Surface Water Quality and Quantity* – Identifies potential to affect surface and ground water quality in adjacent areas

4.1.5 Cultural Heritage

This grouping is a measure of the cultural effects on community features. The factors within the grouping are defined as follows:

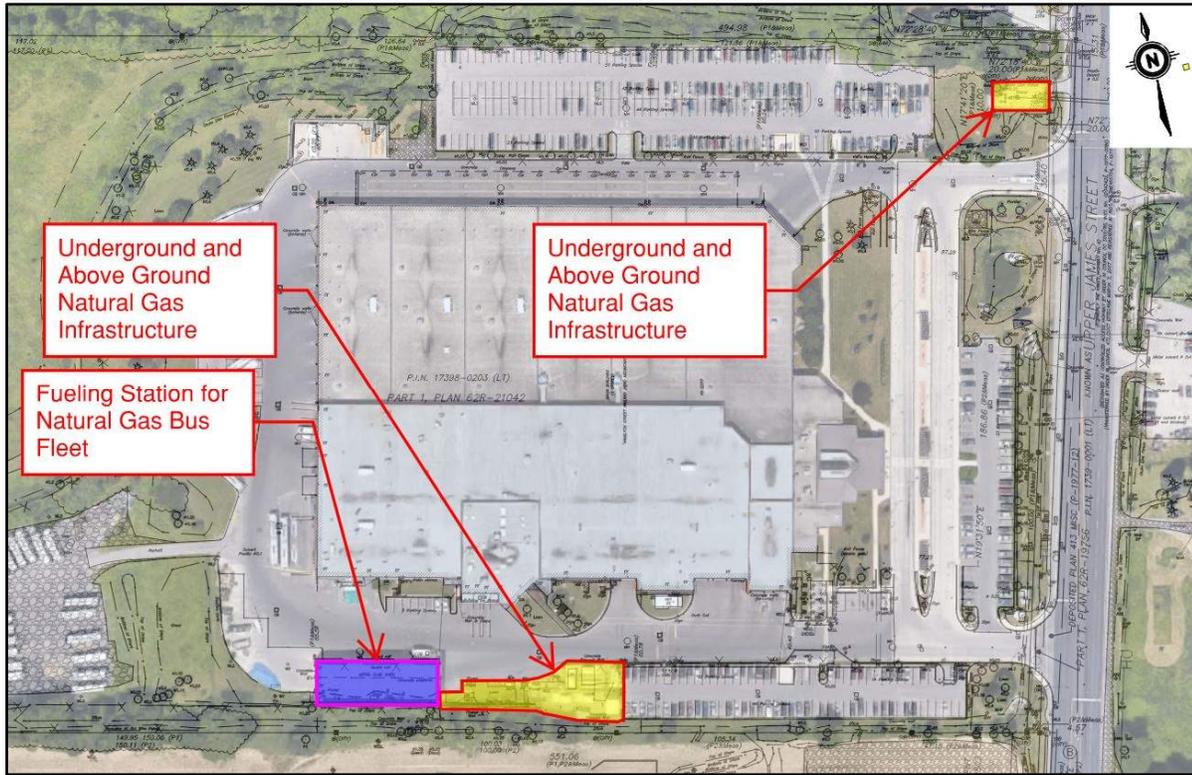
- *Cultural Heritage Landscapes and Built Heritage Resources* – Identifies impact to built heritage resources in the study area based on the Cultural Heritage Report (WSP Golder, 2023) completed as part of the AEGD TMP Update; and
- *Archeological Resources* – Identifies impact to archaeological resources in the study area based on the AEGD Stage 1 Archaeological Report (ASI, 2008)

4.1.6 Utilities

Existing utilities within the study area are illustrated in Exhibit 4-1 and include the following:

- Gas infrastructure near north entrance to HSR Facility;
- Gas infrastructure within the HSR Facility Site (fuelling station and associated underground and above ground infrastructure); and
- Hydro and Telecommunications: Various providers and locations; to be confirmed through consultation during subsequent detailed design phase.

Exhibit 4-1: Existing gas infrastructure at HSR facility



4.1.7 Cost and Constructability

This grouping identifies the order of magnitude cost required to build the alternative, including:

- *Capital Construction Cost* – Construction, access modifications, etc. Consideration of cost for each alternative in terms of order of magnitude;
- *Property Cost* – Total estimated area and relative magnitude of costs to acquire private lands (fully or partially) in which alignment alternatives cross. Exact values would be subject to further review during detailed design; and
- *Constructability and Construction Staging* – Consideration of staging and detour requirements, as well as geotechnical and foundation conditions.

5 Evaluation of Alternatives

5.1 Evaluation Results

The alternatives were screened using the factors outlined in 4.1, above. Detailed results of this evaluation are provided in Appendix B: Evaluation of Alignment Alternatives, with summaries of key factors groups provided in the sections that follow.

5.1.1 Transportation and Traffic

Alternative 1

Traffic Operations²

The Alternative 1/1A alignment for Collector 6N generally operates well from a traffic operations perspective. At the Collector 6N intersection with Upper James Street, there are no queues expected to exceed storage on Upper James Street, though the eastbound left turn queue on Collector 6N may exceed storage. The Intersection delay remains within acceptable City standard level-of-service limits of LOS A and B for the A.M. and P.M. peak hours, respectively.

Compatibility with Signalized Intersection Spacing and HSR Driveways

The distance to the nearest signalized intersection (existing HSR north driveway) is 160 m (centre to centre) for Alternative 1 and 118 m (centre to centre) for Alternative 1A, which are both less than the 215 m signalized intersection spacing requirement per OTM Book 12 and City standards.

Based on the 2240 Upper James Street Traffic Analysis, a northbound left-turn lane on Upper James Street at Collector 6N would require a storage length of 52 m and an assumed taper length of 60 m (3 m lane width, 80km/h design speed, 20:1 taper ratio). This is a total length of 112 m. The traffic analysis also indicated that the northbound through 95th percentile queues at Collector 6N would be 85 m. Alternative 1 has 125 m of space available (stop-bar to stop-bar) from the HSR north driveway, while Alternative 1A has 82 m of space available.

² Based on analysis in the Traffic Impact Study for the Panattoni Development at 2240 & 2254 Upper James Street (JD Northcote Engineering Inc., June 2022)

There is flexibility with this alternative to potentially provide an exception to the signalized spacing requirement. This is because there is low or no southbound left-turn volumes (into the 2173 Upper James St single private driveway) and queues at the HSR north driveway, as shown in the 2240 Upper James Street Traffic Analysis. Therefore, back-to-back left turn queues are not considered an issue at this location. A future decision will be required to determine whether the reduced spacing between signalized intersections will be allowed or if alternative measures will be implemented.

As a result, sufficient space should be available between the proposed Collector 6N intersection and HSR north driveway for a northbound left-turn lane on Upper James Street at Collector 6N without long queues. Signal coordination is also an option to allow for improved traffic progression along Upper James Street. For Alternative 1A, a reduced northbound left-turn lane taper length may need to be considered by the City, and there is the possibility of long queues. However, mitigation measures (e.g. signal coordination) can be used to manage queues,

If it is critical to meet the spacing requirement, then the signal at the HSR north driveway would need to be converted to a stop controlled, right-in/right-out (RIRO) access with a stop sign added to the outbound movements from the HSR facility. Left turns out of an unsignalized driveway would not be safe given the vehicle speed on Upper James Street and number of lanes needed to be crossed. As a result, a new signalized connection/driveway to Collector 6N for the HSR would be required to facilitate bus and employee vehicle access to the north.

A future decision regarding providing an exception on closely spaced signals or converting the HSR north driveway access to RIRO would follow from future consultation and studies to be completed as part of the design or future EA/consultation process.

Compatibility with nearby private driveways

A new southbound right turn lane from Upper James Street to Collector 6N is expected to be required given the volume of traffic anticipated for this movement. The storage length and taper of this lane will likely conflict with several private driveways north of the intersection.

Connection to Upper James Street

The Alternative 1/1A alignment connection to Upper James Street is directly opposite the existing private driveway of the church at 2149 Upper James Street. This driveway

will likely need to be consolidated into a single driveway and included as the east leg of the new intersection.

Impacts to Active Transportation

No impacts to existing Active Transportation infrastructure are expected from Alternative 1/1A.

Speed Limit Modification

Alternative 1/1A does not require the speed limit on Upper James Street to be reduced, however, a reduction in the posted speed limit from 70km/h to 60km/h could be considered beneficial in anticipation of development along the corridor and a shift in the road type from rural highway to urban arterial road.

Overall Assessment

Alternative 1/1A is a moderately preferred option for Collector 6N. It would operate well from a traffic operations perspective and is manageable in terms of impacts to nearby driveways along Upper James Street. It also offers flexibility to the City for future decisions related to intersection spacing.

Alternative 2

Traffic Operations³

The Alternative 2 alignment for Collector 6N would operate well from a traffic operations perspective. All signalized intersections perform acceptably without queues exceeding storage lengths or delays above City level-of-service standards (LOS A and B for A.M. and P.M. peak hours, respectively).

Compatibility with Signalized Intersection Spacing and HSR Driveways

The intersection of the Collector 6N with Upper James Street, at approximately 30m north of the new intersection, conflicts with the existing HSR south driveway. This spacing is too large for a combined intersection, but too small for separate intersection. As a result, the HSR south driveway would need to be closed or at best converted into a right-in only.

³ Based on analysis in the Traffic Impact Study for the Panattoni Development at 2240 & 2254 Upper James Street (JD Northcote Engineering Inc., June 2022)

Intersection spacing requirements are met if the HSR south driveway is closed. The closest intersection from Collector 6N would be 220m to the north, centre-to-centre (HSR north driveway), which is sufficient for the existing northbound left lane at the HSR north driveway with 80 m storage and 40 m taper. There would also not be any southbound queues spillback to the HSR north driveway² (based on 2240 Upper James Street Traffic Analysis).

With the closure of the HSR south driveway, new access points onto Collector 6N would need to be created to accommodate vehicle traffic on the south side of the HSR facility. This would include a new driveway from Collector 6N constructed at the southwest end of the HSR property to be used by exiting buses and by visitor/employee vehicles going to parking areas at the east end of property. Given the volume of buses exiting the property, this would likely need to be a signalized access. This in turn could create a signal spacing issue along 6N.

Compatibility with nearby private driveways

New northbound left and southbound right turning lanes on Upper James Street to Collector 6N do not conflict with any nearby private driveways.

Connection to Upper James Street

The Alternative 2 alignment connection to Upper James Street does not pose any additional impacts other than the conflict with the HSR south driveway, previously identified.

Impacts to Active Transportation

No impacts to existing Active Transportation infrastructure are expected from Alternative 2.

Speed Limit Modification

Alternative 2 does not require the speed limit on Upper James Street to be reduced, however, a reduction in the posted speed limit from 70km/h to 60km/h could be considered beneficial in anticipation of development along the corridor and a shift in the road type from rural highway to urban arterial road.

Overall Assessment

From a traffic perspective, Alternative 2 is a less preferred design option, because for it to work it would require closure of the HSR south driveway and a new driveway from the HSR facility to Collector 6N. This new driveway could likely operate poorly or, if

signalized, violate intersection spacing standards, as it would be close to the signalized intersection at Upper James Street. Alternative 2 also has second order impacts related to impacts to the HSR facility internal operations, which are captured separately in this report.

Alternative 3

Traffic Operations⁴

The Alternative 3 alignment for Collector 6N is feasible from an overall traffic operations and intersection spacing perspective. All signalized intersections would operate acceptably with without queues exceeding storage lengths or delays above City level-of-service standards (LOS A and B for A.M. and P.M. peak hours, respectively).

Compatibility with Signalized Intersection Spacing and HSR Driveways

Signalized intersection spacing requirements between the Collector 6N intersection and nearby intersections are met. There are no impacts to the HSR facility driveways or operations, and no queues are expected to spillback onto neighbouring intersections.

Compatibility with nearby private driveways

The storage length and taper of the southbound right turn lane at Collector 6N/Upper James Street will likely conflict with several private driveways north of the intersection.

Connection to Upper James Street

The Alternative 3 alignment connection to Upper James Street is opposite the existing private driveways of 2273, 2277 and 2285 Upper James Street. These driveways would need to be maintained and a solution would need to be developed to integrate them with the new Collector 6N intersection at Upper James Street.

Impacts to Active Transportation

No impacts to existing Active Transportation infrastructure are expected from Alternative 3.

Speed Limit Modification

Alternative 3 does not require the speed limit on Upper James Street to be reduced, however, a reduction in the posted speed limit from 70km/h to 60km/h could be

⁴ Based on analysis in the Traffic Impact Study for the Panattoni Development at 2240 & 2254 Upper James Street (JD Northcote Engineering Inc., June 2022)

considered beneficial in anticipation of development along the corridor and a shift in the road type from rural highway to urban arterial road.

Overall Assessment

Alternative 3 is a moderately preferred design option for Collector 6N. It operates well from a traffic perspective and the impacts to surrounding private driveways are manageable. It also presents the opportunity of providing the proposed 2240 Upper James Street Panattoni development with direct access to Collector 6N rather than Upper James Street. However, this alternative impacts the size of developable land for the Panattoni development site, which is captured separately in this evaluation/report.

5.1.2 HSR Facility Operations

This section reviews the impact on the HSR facility operation and required modifications, if feasible, for each alternative. As noted previously, the HSR facility is highly active operating 24 hours a day, seven days a week, its functionality includes vehicle fuelling, service, maintenance and storage for, currently, 280 buses and office areas for over 800 employees and employee and visitor parking areas for some 360 vehicles. As well, a transit Hub facility is located on the east part of the site fronting on Upper James which requires access to and from Upper James for buses and private vehicles. The two driveways to the HSR facility from Upper James are signalized.

Alternative 1

This alternative, with the intersection spacing between the HSR facility's north driveway and the proposed 6N roadway intersection with Upper James permitted, would have no impact on the HSR facility's operation and functionality.

Alternative 2

This alternative, particularly if the proposed alignment straddled and used a portion of the HSR south property line, would have a significant impact on the HSR facility's operations and functionality. In addition to a requirement and cost associated with constructing a new entrance and exit roadway to replace the current south driveway, there are environmental considerations given the existence of a waterway (creek) along the south property line. However, the primary constraint would be the requirement and significant cost and logistics associated with relocating and rebuilding the existing CNG fuelling station adjacent to the south property line. This fuel station was last rebuilt in 2013 at a cost of approximately \$13 million and any similar rebuild and relocation today could be considerably higher. But, more critically, with a greater proportion of the HSR

fleet fuelled by CNG today compared to 2013, a temporary refuelling station would be required while the permanent fuelling station was being relocated in order to ensure uninterrupted HSR operations and the delivery of transit services in the city. A temporary facility could be expected to have a significant capital cost impact as well as added operating costs to the HSR in order to refuel buses. Further, if the HSR facility south driveway is closed and replaced by the new driveway further west (connected to the new Collector 6N), the transit Hub and the employee, visitor, and park and ride operation vehicle access and parking area, would need to be re-designed to allow operation from the north driveway. This would involve additional capital cost.

In view of these logistical and capital and operating cost implications, Alternative 2 cannot be supported.

Alternative 3

This alternative, located well south of the HSR facility, would have no impact on the HSR facility's operation and functionality.

5.1.3 Socio-Economic

- Alternative 1 is moderately preferred as it would require the smallest total area of property acquisitions, result in the least number of access impacts, and both directly and indirectly impact the least number of private properties. The resulting developable land parcels* would also be more conducive to future development and open up the south-most fragmented portion of 2130 Upper James Street to possible acquisition by the City for future expansion of the HSR facility.
- Alternative 2 is more preferred as it would both directly and indirectly impact the least number of private properties. While it would require the greatest total area of property acquisitions, it would only fragment one developable land parcel and result in direct access impacts to two private properties.
- Alternative 3 is less preferred as it would directly impact the greatest number of private properties and require the greatest total area of property acquisitions. This alternative would also likely require the most modifications to existing residential accesses to accommodate the new intersection at Upper James Street (e.g. potential new consolidated access roads).

*As noted above, this evaluation included details on potential fragmentation of developable lands for each alternative. The resulting developable land parcels (along with approximate sizes in hectares) for each alternative are illustrated in Exhibit 5-1 to

Exhibit 5-4, below. These are considered estimates at this stage for illustrative purposes only, with exact limits and areas of impacts and acquisitions to be determined through detailed design.

Exhibit 5-1: Fragmentation of developable lands by Alternative 1

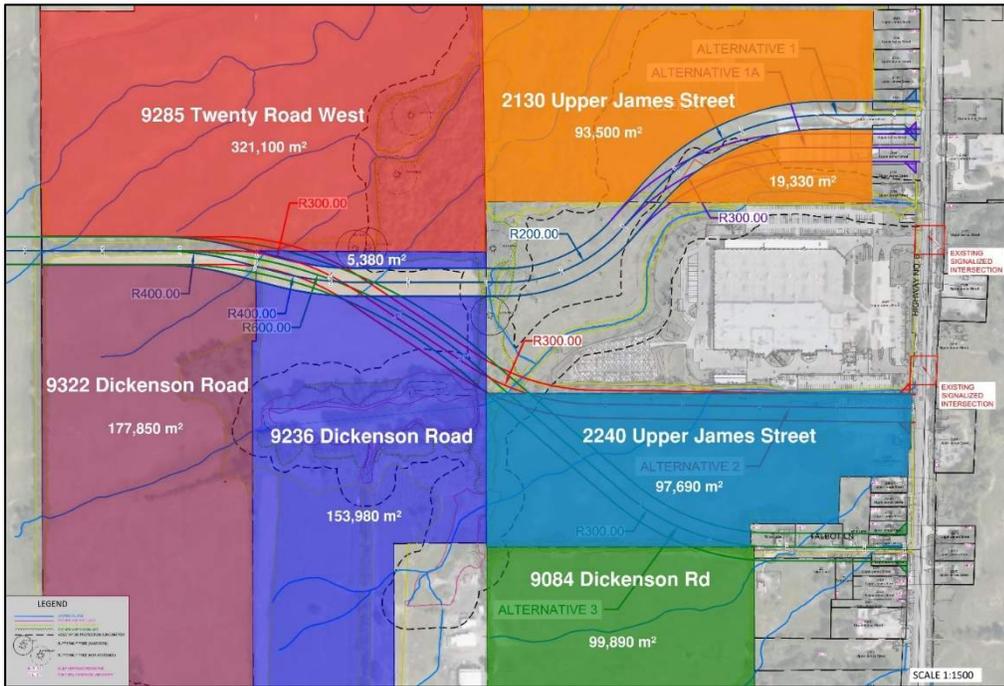


Exhibit 5-2: Fragmentation of developable lands by Alternative 1A

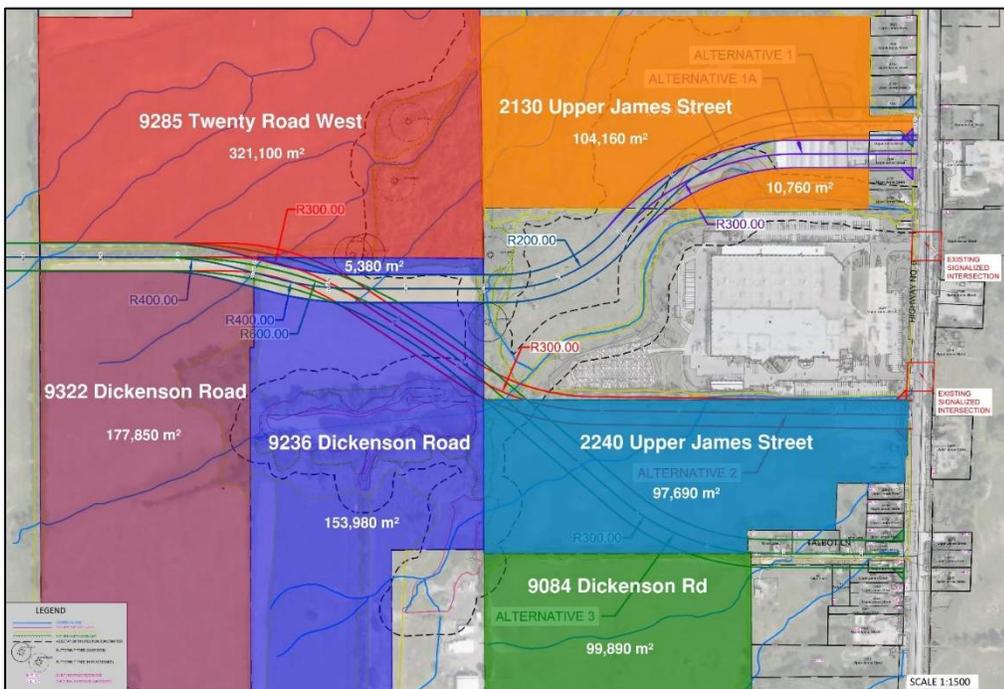


Exhibit 5-3: Fragmentation of developable lands by Alternative 2

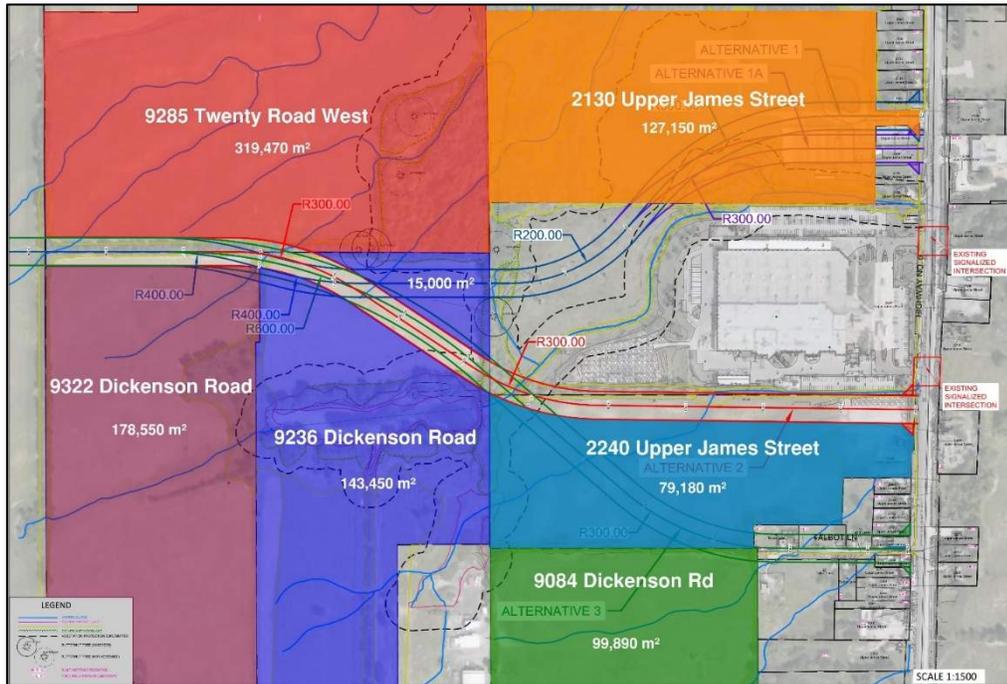
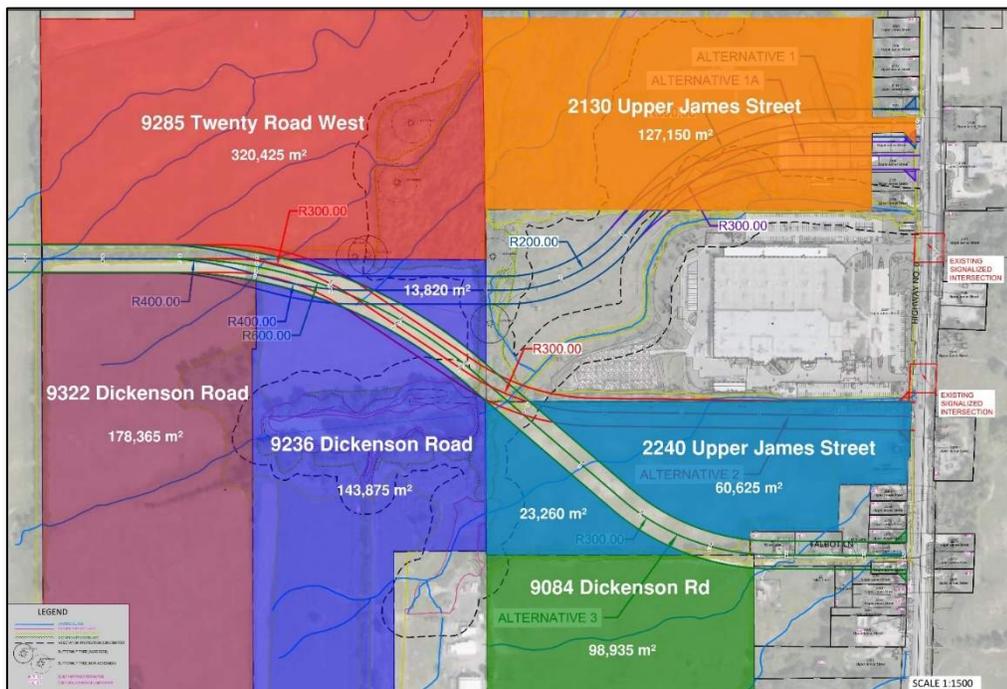


Exhibit 5-4: Fragmentation of developable lands by Alternative 3



5.1.4 Natural Environment

Alternative 1

Based on this evaluation Alternative 1 is less preferred as it was deemed to have the biggest environmental impact. Alternative 1 would cause the removal of two small wetlands (polygon 28 and 19.2 in the Dougan Report), one of which (polygon 19.2) has not been evaluated for wildlife usage yet due to lack of property access at the time of initial assessment. This route would remove portions of the NHS and the largest area of Core Areas and vegetation protection zones (VPZ) compared to the other options (affecting approximately 3,600m² Core Area and approximately 2,200m² VPZ). This route crosses the smaller forested stream in polygon 28 and 14. At this location, the stream crossing should be designed to allow wildlife passage and also strive to reduce vegetation clearing and grading impacts within the NHS. This route travels parallel to the woodland Core Area (polygon 7, 23, 24) and main watercourse Core Area (polygon 22) thus creating opportunity for wildlife to cross uncontrolled along a long portion of the route. Multiple wildlife passages and fencing would be recommended along this route to help mitigate wildlife casualties on the new roadway. The route traveling parallel to the woodland Core Area could also mean higher noise and light impacts to the woodland and wildlife that utilize the woodland Core Area. This alternative also passes through some areas that are regenerating as natural meadows, thicket, and young woodlands. One of these regenerating areas (polygon 13) was documented to have milkweed plants and thus provide habitat for the Monarch butterfly, a provincial Species at Risk (status Special Concern). The property to the north has yet to be fully surveyed leaving some uncertainties. However, if this route were chosen the possibility for habitat compensation options could be assessed to offset the loss of some habitats.

Alternative 2

Alternative 2 was moderately preferred as it was impacting less of the NHS and would cause the removal of one small wetland (polygon 25). This alignment would cause the removal of one of the hedgerows (polygon 15.2), but the hedgerow had been evaluated as having a lack of connection to any existing NHS features on the east end. This route does not directly affect the Provincially Significant Wetland (polygon 5), but it does pass closest to it and may impact its VPZ. We are assuming all impacts are confined to the proposed right of way, and care should be taken in the detailed design stage to ensure no grading or other impacts are made to the PSW. This alignment would bisect the NHS in a narrow zone (at polygon 14 and 22) and limit the area of NHS impacted (affecting approximately 1700 m² Core Area and 2,600 m² VPZ). Proper road crossing

design at the stream crossing should include adequate wildlife passage combined with fencing to direct wildlife to this passage. This should provide an ideal wildlife crossing location at a confined portion of the roadway thus reducing uncontrolled wildlife crossing elsewhere along the route. Design of the stream crossing should also strive to reduce vegetation clearing and grading impacts within the NHS.

Alternative 3

Alternative 3 was most preferred as it was evaluated to have the least environmental impact and affected the least amount of area of the NHS. This alignment would bisect the NHS in a narrow zone and limit the area impacted (affecting approximately 1,700 m² Core Area and approximately 2,500 m² VPZ). This route does not directly affect any wetlands, but it does pass closest to the Provincially Significant Wetland (polygon 5) and may impact its VPZ. We are assuming all impacts are confined to the proposed right of way, and care should be taken in the detailed design stage to ensure no grading or other impacts are made to the PSW. Proper road crossing design at the stream crossing should include adequate wildlife passage and combined with fencing to direct wildlife to this passage. This should provide an ideal wildlife crossing location at a confined portion of the roadway thus reducing uncontrolled wildlife crossing elsewhere along the route. Design of the stream crossing should also strive to reduce vegetation clearing and grading impacts within the NHS.

Natural Environment Summary

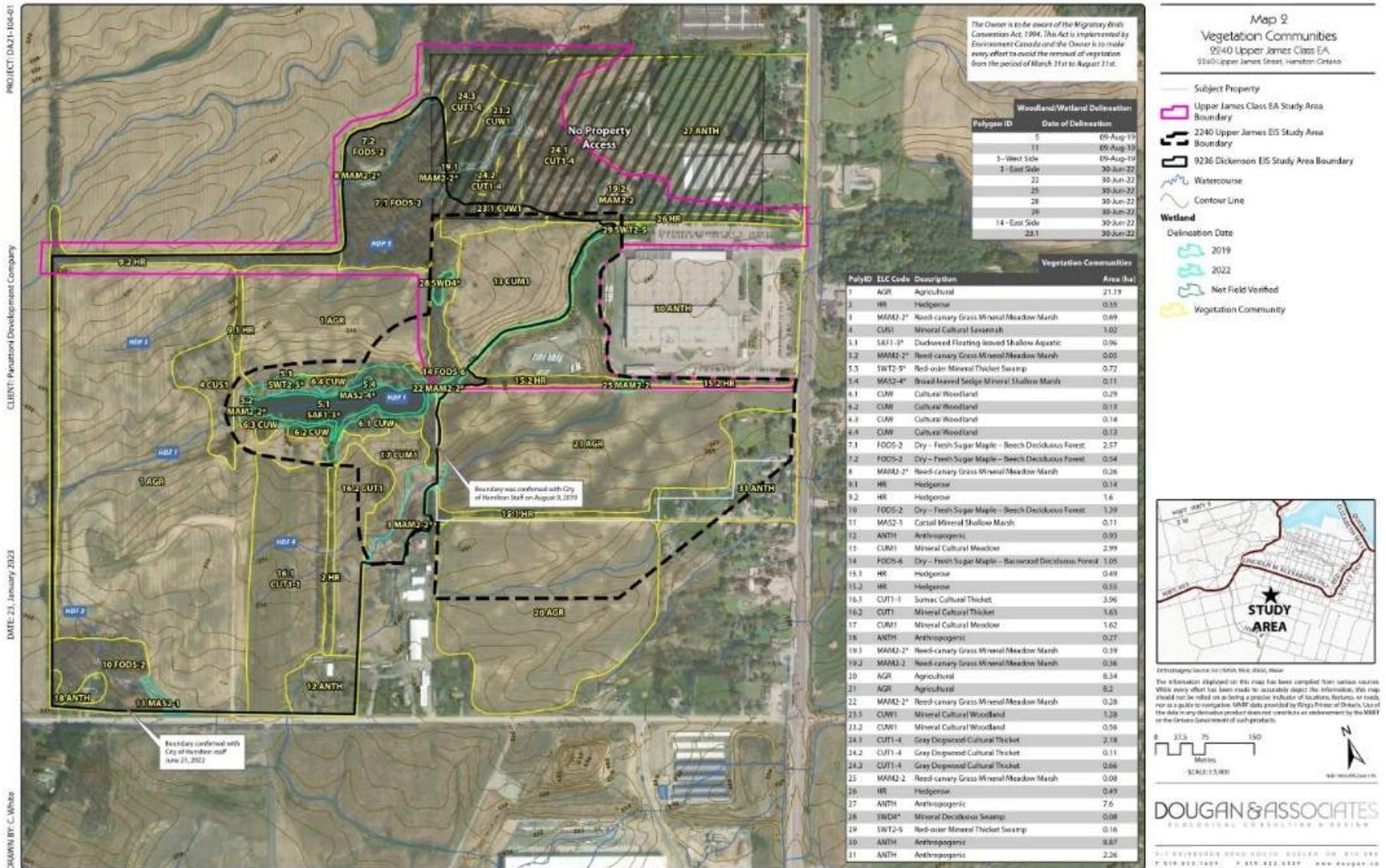
All options have impacts on the NHS. The potential for opportunities for mitigation or compensation to offset some of these impacts should be explored. Whatever route is chosen, mitigation measures should be implemented to help improve the overall long-term integrity of the City's NHS and improve the system as a whole. Compensations should improve and expand the NHS and its connectivity while protecting it from future development impacts (as much as possible). We are assuming all impacts are confined to the proposed right of way, and if this is not possible impacts to the areas outside the road base (such as grading or other construction impacts) should be reduced as much as possible through the detailed design of the route layout so it has the least impact on the NHS as possible.

While Alternative 1 is least preferred with respect to the Natural Heritage criteria due to the larger area of impact, some of the impacts can be mitigated. Mitigation measures could include remediations after construction, compensations for lost vegetation through new native vegetation plantings, compensation for lost habitat through new

habitat creations offsite (or compensation through a reputable organization that restores habitat), or physical mitigation, such as enhanced native landscaping onsite, installation of wildlife barriers to prevent wildlife access to the road and the provision of wildlife crossing structures, installation of sound barriers along the core areas, etc. If Alternative 1 is selected as the preferred Alternative, it is recommended that commitments to these mitigations be made as part of the protection for this Alternative.

This analysis was completed based on the existing natural heritage conditions and biological information available at the time. City staff have indicated that there may be environmental implications associated with other planning decisions that have been made or ongoing Planning Studies near the project area, which may include a new multi-use trail along the northern portion of 9236 and 9322 Dickenson Road West. This proposed multi-use trail, and outcomes of any other Planning Studies will need to be considered during future studies and subsequent detailed design of the Collector 6N corridor. Because this report is based on the current existing conditions, there may other be planning decisions that affect the final choice of route.

Exhibit 6: Map of Existing Conditions from Dougan



5.1.5 Cultural and Built Heritage

The alternatives were evaluated based on their impacts to identified CHLs and BHRs as noted in Section 4.1.5. A detailed summary of these factors as they pertain to each of the alternatives is provided in Appendix B: Evaluation of Alignment Alternatives.

Based on this evaluation Alternative 1 is preferred from a cultural heritage perspective for the following reasons:

- Alternative 1 will not result in any additional impacts to BHRs or CHLs
- Alternative 2 will have some impacts to CHL 52 and CHL 65
- Alternative 3 is anticipated to result in direct impacts to two CHLs and five BHRs, including: CHL 65, CHL 66, BHR 60, BHR 61, BHR 62, BHR 63, BHR 65; and potential indirect impacts to two BHRs: BHR58 and BHR 66.

If portions of the subject BHRs and CHLs are acquired and impacted, discussions should be had with the City's Heritage Planners to determine if a Cultural Heritage Evaluation Report (CHER) is recommended to evaluate the property's Cultural Heritage Value or Interest (CHVI) using Ontario Regulation 9/06. All road alignment alternatives may cause temporary impact to some areas of the BHR and CHL properties. The landscape should be returned to pre-construction conditions, resulting in minimal irreversible negative impacts.

Alternative 1 results in the fewest impacts to BHRs and CHLs, followed by Alternative 2, with Alternative 3 representing the least preferred alignment due to the high number of cultural heritage resources with the potential to be directly and indirectly impacted.

5.1.6 Utilities

Hydro and telecommunications utilities were not reviewed as part of this study. It is assumed that hydro impacts/scope would be relatively equal among the 3 alternatives, with minor relocations of telecommunications equipment possibly being required at the new intersection with Upper James Street for each alternative.

Regarding potential impacts to gas infrastructure within the HSR Facility Site – i.e. fueling station and associated underground and above ground infrastructure:

- Alternatives 1 and 3 are more preferred as they have no anticipated impacts to gas utilities.

- Alternative 2 is least preferred as it would result in significant impacts to existing gas infrastructure, particularly if the proposed alignment straddles the south property line. In this circumstance, a temporary fuelling station would be required while a new fueling station is built at a new location (the existing fueling station was last rebuilt in 2013 at a cost of approximately \$13M).

5.1.7 Cost and Constructability

- Alternative 1 is moderately preferred. It would require several wildlife crossing features and fencing, and cross several headwater features for which watercourse crossings will need to be assessed for structural requirements. This alternative would also have the second most direct impacts to properties and most indirect impacts that would require mitigation measures (such as noise walls). From a constructability perspective this alternative would require the greatest consideration for geotechnical, environmental, and grading needs due to number and size of wetland features crossed.
- Alternative 2 is moderately preferred. It would require some fencing along the corridor for wildlife, and cross several headwater features for which watercourse crossings will need to be assessed for structural requirements. This alternative would also have the fewest direct impacts to properties and moderate area of property acquisition requirements. From a constructability perspective this alternative may require modification to the existing south access for HSR facility.
- Alternative 3 is least preferred. It is the longest roadway of the three alternatives and would require additional grading needs, utilities, and on-going maintenance costs. It would require some fencing along the corridor for wildlife, and cross the most headwater features for which watercourse crossings will need to be assessed for structural requirements. This alternative would also have the most direct impacts to properties and greatest area of property acquisition requirements. This alternative would have the fewest constructability and staging concerns, assuming all properties along Talbot Lane are acquired.

5.1.8 Overall

Based on findings from the analysis and evaluation of alternatives in Appendix B: Evaluation of Alignment Alternatives, Alternative 1 is considered More Preferred, Alternative 2 is considered Less Preferred, and Alternative 3 is considered Moderately Preferred. A summary of the evaluation across the various criteria is provided in Exhibit 5-5. The rankings for each criteria were based on relative comparison of each alternative to one another with respect to each of the specific evaluation criteria. Refer to Appendix B: Evaluation of Alignment Alternatives.

Exhibit 5-5: Summary of Evaluation of Alternatives

Evaluation Criteria	Alternative 1	Alternative 2	Alternative 3
Transportation and Traffic	Moderately Preferred	Less Preferred	Moderately Preferred
HSR Facility Impacts	More Preferred	Least Preferred	Moderately Preferred
Socio-Economic Environment	Moderately Preferred	More Preferred	Less Preferred
Natural Environment	Less Preferred	Moderately Preferred	More Preferred
Cultural Heritage	More Preferred	Moderately Preferred	Least Preferred
Utilities	More Preferred	Least Preferred	More Preferred
Cost and Constructability	Moderately Preferred	Moderately Preferred	Less Preferred
Overall Rank	More Preferred	Less Preferred	Moderately Preferred

6 Recommendations and Next Steps

Based on findings from the analysis and evaluation of alternatives, Alternative 1 has been identified as the recommended solution. If this alternative is carried forward, further design refinements should be undertaken through follow-up processes to meet the remaining requirements the Municipal Class Environmental Assessment process and to identify key mitigation measures for consideration as detailed design work progresses.

While Alternative 1 is least preferred in the Natural Heritage criteria due to the larger area of impact, the impacts can be mitigated through remediations, compensation, or other physical mitigation, such as ; enhanced native landscaping, installation of wildlife fencing, provision of wildlife crossings, compensation plantings or contributions of funds to reputable organization who does habitat restoration, installation of sound barriers in areas adjacent to natural heritage features, etc. (details of which should be identified at detailed design). If Alternative 1 is selected as the preferred Alternative, the City is recommended to commit to these mitigations as part of the protection for this Alternative.

This analysis was completed based on the existing natural heritage conditions and biological information available at the time. City staff have indicated that there may be environmental implications associated with other ongoing Planning Studies near the project area, which may include a new multi-use trail along the northern portion of 9236 and 9322 Dickenson Road West. Development applications for 9236 and 9222 Dickenson Road were approved by Planning Committee on May 30, 2023 (Report PED23111), and Council on June 7, 2023. This proposed multi-use trail, and outcomes of any other Planning Studies will need to be considered during future studies and subsequent detailed design of the Collector 6N corridor. Because this report is based on the current existing conditions, there may other be planning decisions that affect the final roadway location.