Technical Memorandum

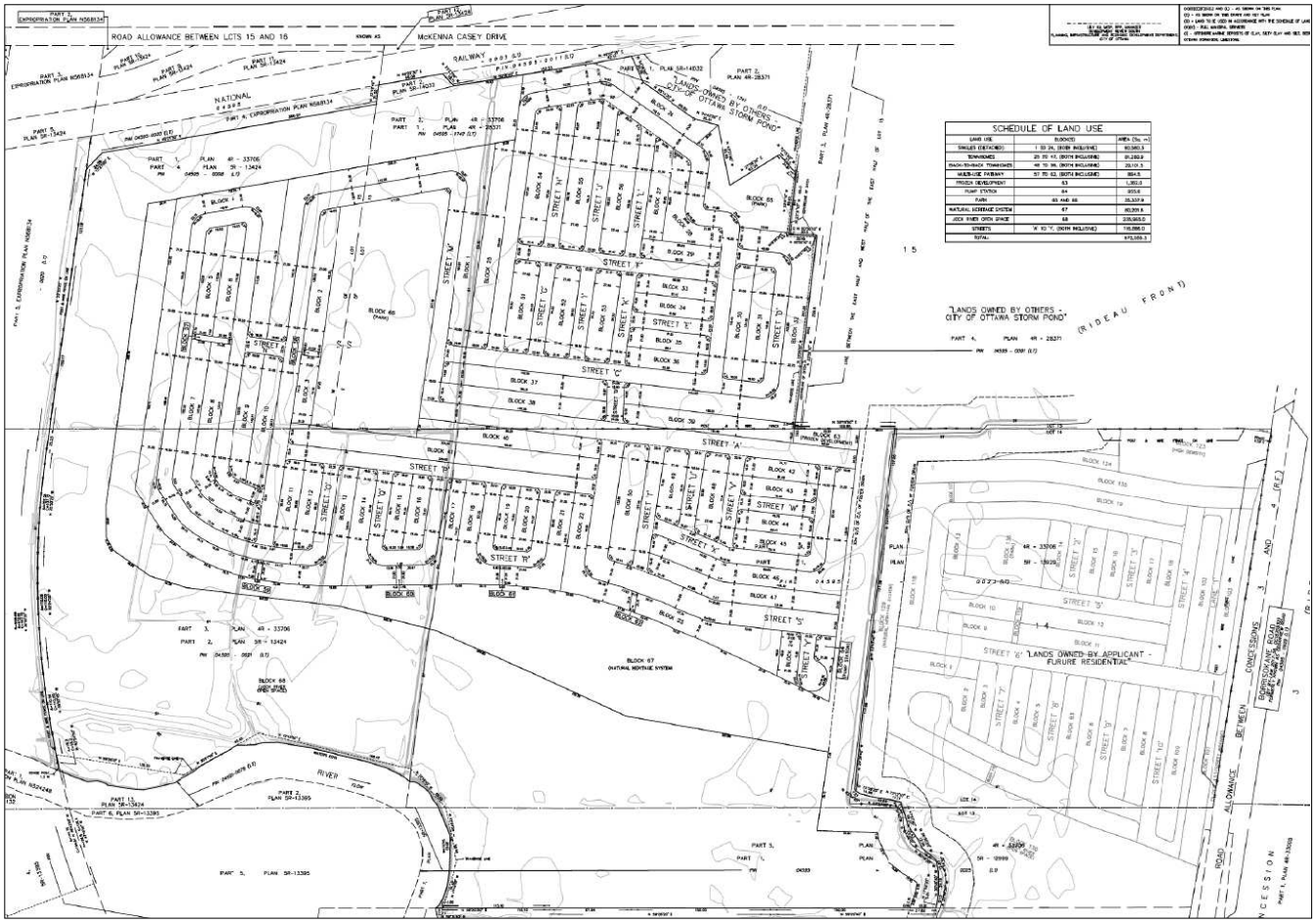
To:	Hugo Lalonde – Caivan	Date:	2022-12-07
Cc:			
From:	John Kingsley, Chris Gordon – CGH	Project Number:	2020-110

Re: Conservancy West – City BRT Comment Response

Background

The Conservancy West (3288 and 3300 Borrisokane Road, 4205, 4345 and 4375 McKenna Casey Drive) Transportation Impact Assessment, supporting zoning and draft plan of subdivision applications for the proposed development (Figure 1), was submitted in October of 2021.

Figure 1: Conservancy West Draft Plan of Subdivision

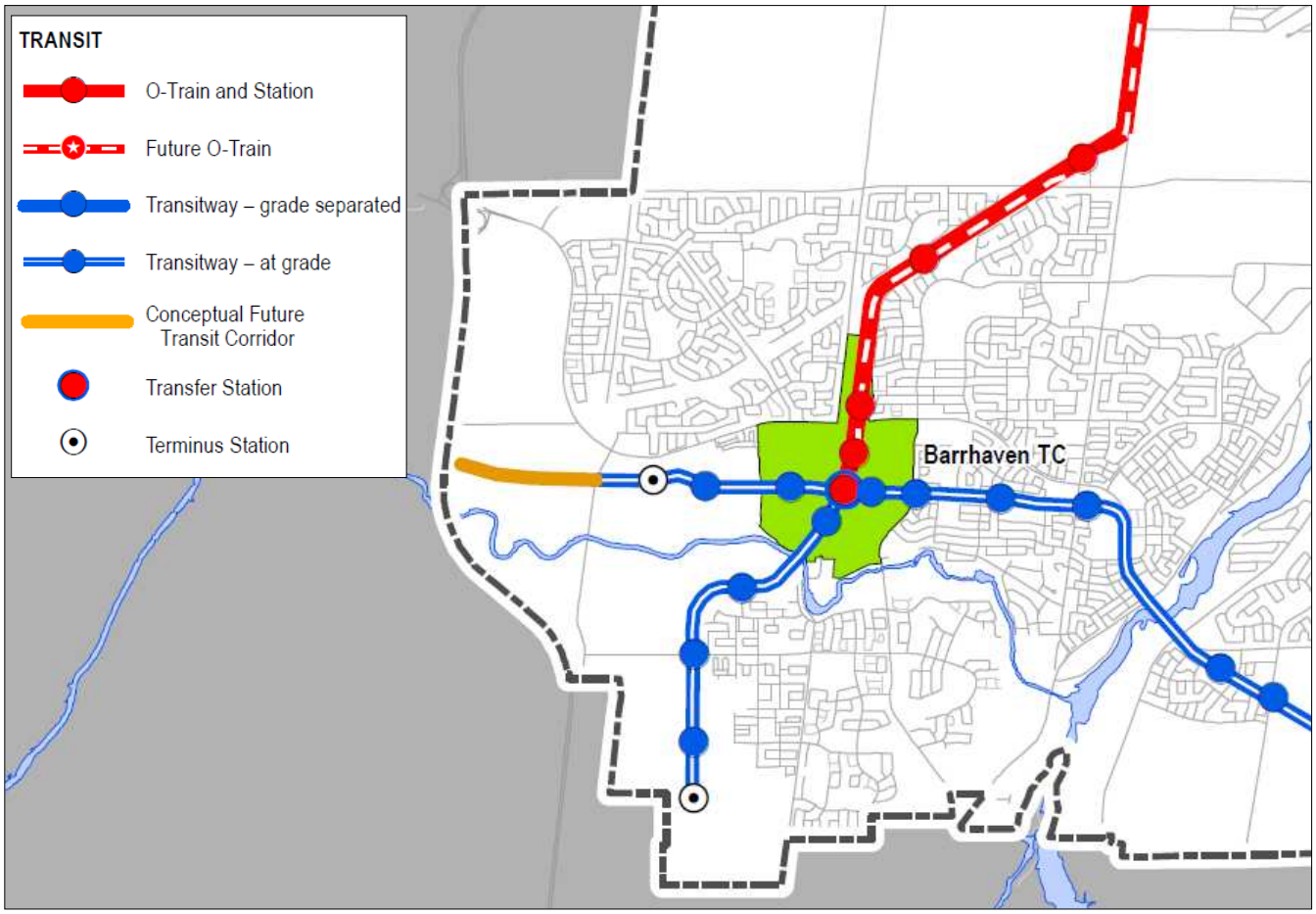


The City of Ottawa provided comments on the overall submission, of which two specifically relate to the protection for a BRT corridor through the site area.

Context

The New Official Plan identifies a conceptual future transit corridor that was carried over from the previous OP and the TMP. This corridor passes through the Conservancy West community, from Borrisokane Road to the urban boundary at Highway 416. It is this corridor that is the subject of the two City comments. The conceptual corridor in the New OP is illustrated by the orange line in Figure 2.

Figure 2: Study Area in Schedule C1 of New Official Plan



It is noted that the implementation timeline for this connection is identified beyond the planning horizon in both the previous and new Official Plans (2031 and 2046, respectively) and the intention of the link is to connect the Barrhaven and Kanata communities.

While the Conservancy West TIA does indicate that transit will be an important part of the transportation solution of the community, the conceptual BRT corridor depicted in Figure 1 is not a prerequisite for the community. However, it has been assumed that it will generally be located between Borrisokane and Highway 416 in the vicinity of the Conservancy West development. As such, the City provided the following comments.

Comments

2. Transportation

2.1. A right of way protection of 23.5 m is required through the property from Borrisokane to Highway 416 (at a point where the BRT can travel under the existing 416 bridge structure). The horizontal and vertical alignment must be as per BRT standards and be placed at such a grade-matching development grades so that retaining walls at the edge of the 23.5m ROW will not be required in the future to complete the BRT. Access to and from the subdivision by way of active transportation connections needs to be identified at station locations yet to be determined through site plan.

6. Planning

6.3. Transportation Services needs to keep the extension of the BRT, it cannot be converted to a local road. A secondary vehicle access to Borrisokane Rd must be provided given the size of this subdivision. This is a safety concern as the subdivision is too large to rely on only one access on Borrisokane Rd.

It is noted that the comments are consistent with the OP Schedule C1 facility, and may be viewed as requirements for achieving the desired corridor protection. It is the goal of this memo to respond to these comments by exploring viable corridor options, and to arrive at a recommendation that best satisfies design requirements and evaluation criteria for the BRT corridor with view to satisfying both City transportation and development objectives and draft conditions for the subject lands.

The following sections outline various design criteria and alignment options considering the various criteria. As well, supporting the response to the City's comments, Morrison Hershfield was retained to undertake an evaluation of the alternatives to ensure the preferred options can be recommended based on an analysis and evaluation, which follows the spirit of an EA process. Given the process undertaken, the preferred options can be incorporated in the upcoming Transportation Master Plan update.

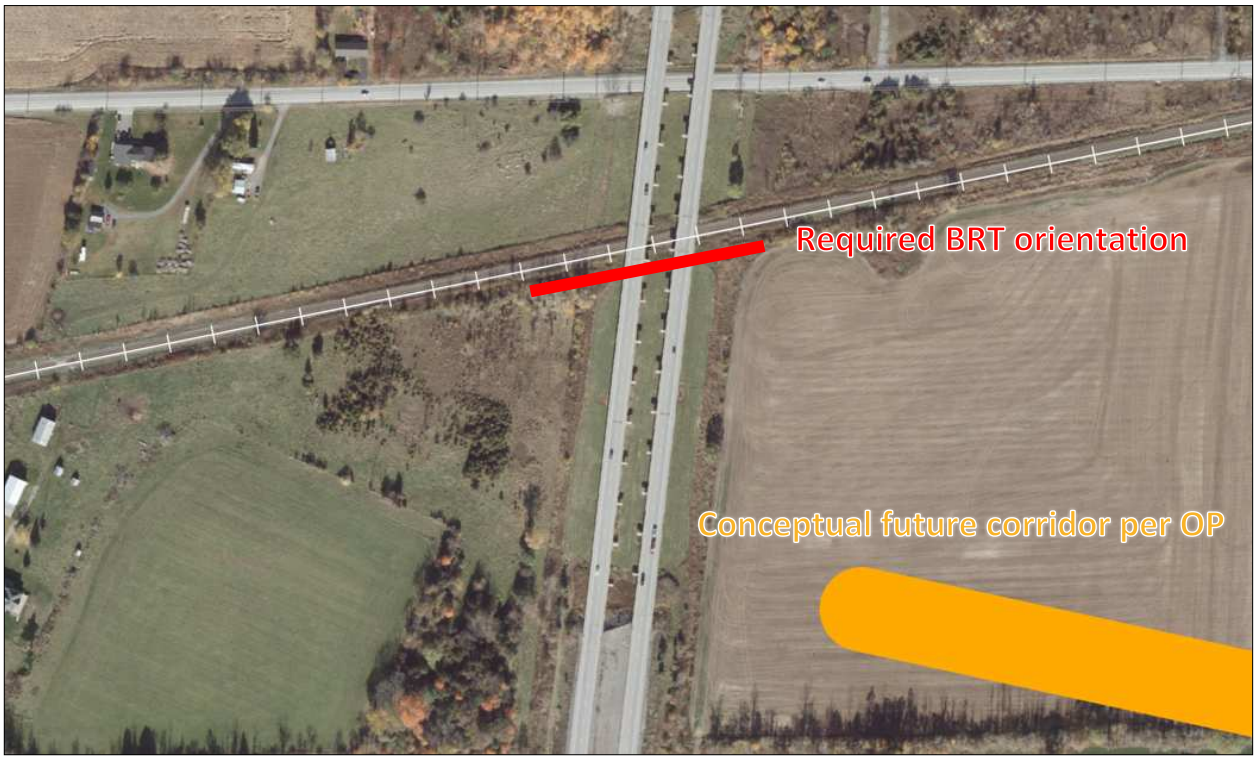
Transportation Design Criteria

With respect to the horizontal alignment, aside from the application of BRT standards, the largest constraining factor for any proposed alignment of the BRT facility west of Borrisokane Road is:

to arrive at a point where it can travel underneath the existing 416 bridge structure.

The pillars for the Highway 416 bridge structure are oriented along the existing rail alignment and the overhead clearance requirements for BRT alignments create a set of conditions where, given the minimum BRT horizontal curve radii, adequate corridor protection cannot be achieved in the vicinity of the orange line from the New OP. Therefore, the alignment with the greatest potential of achieving the above design criteria, is that illustrated in red in Figure 3.

Figure 3: Conceptual Future Corridor vs Highway Pillar Orientation and Vertical Clearance

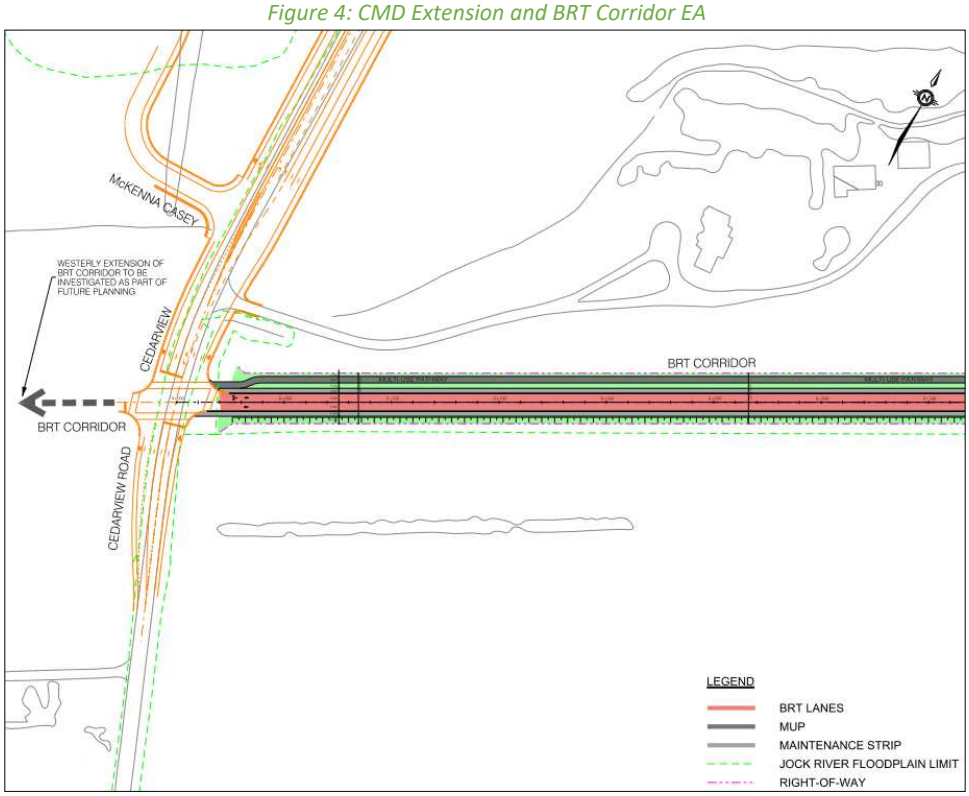


Furthermore, the transportation design criteria governs the location of the alignment to the east:

from Borrisokane to Highway 416

As such, the corridor protection starting at Borrisokane Road is required to connect to the Chapman Mills Drive Extension and BRT Corridor EA Study BRT alignment, as excerpted in Figure 4.

Figure 4: CMD Extension and BRT Corridor EA



The inclusion of higher order transit servicing the City lands creates potential for future TOD and mixed-use areas to be built out by such time as the corridor is implemented. Opportunities for transit integration with the City lands should be considered as part of any future corridor protection. Additionally, inclusion of Park and Ride and BRT Station within the City lands should be explored regardless of the ultimate transit alignment. A Park and Ride at this location would provide Barrhaven South residents, particularly in the western neighbourhoods flanking Highway 416, access to rapid transit.

Design Alternative A

An alignment alternative that passes between the City land blocks could also make use of the Strandherd Drive detour and McKenna Casey Drive roadbeds, synergizing function and cost. Active facilities connecting the surrounding development to the City lands would further be synergized with access to rapid transit. Potential for the inclusion of a Park and Ride at the southwest corner of the Strandherd Drive at Borrisokane Road intersection would result from such an alignment. A station serving the City lands would also be in closer proximity to Strandherd Drive, allowing for connections from local bus service west of Borrisokane to regional bus service to the east. Where the former McKenna Casey Drive intersects the rail track, the alignment may continue along the rail line, similarly to the east between Fallowfield Road and Longfields Drive, where the Transitway is parallel to the rail track. From this alignment, the BRT corridor may arrive at a point where it may pass under the existing Highway 416 Bridge Structure. Figure 5 illustrates Alternative A which is responsive to the design criteria and capitalizes on the opportunities discussed.

Figure 5: Proposed Future BRT Corridor Concept – Alternative A

The intersection of this BRT corridor with Borrisokane Road and the east BRT facility is proposed as accommodating auto traffic with a westbound receiving lane and eastbound turn lanes on the new west leg, thereby serving as a secondary vehicle access to/from the subdivision. By separating the transit component close to Borrisokane Road, the alignment would not bisect the community and would not restrict access between two resultant halves to signalized intersections along its length as other potential alternatives might, similarly to along Chapman Mills Drive.

Design Alternative B

An alignment alternative satisfying the above design criteria may include a station on the west side of the City lands. Potential for the inclusion of a Park and Ride exists with this alternative as well, although with less immediate access to/from the arterial network. The station under this alternative would exclusively serve the Conservancy West community and the City lands. As in the Alternative A, the alignment would continue parallel to the rail track beyond the City lands to arrive at a point where it may pass under the existing Highway 416 Bridge Structure. Figure 6 illustrates Alternative B which is responsive to the design criteria.

Figure 6: Proposed Future BRT Corridor Concept – Alternative B

Unlike Alternative A, given the length of the alignment through the community, median BRT is proposed as continuing through the Conservancy West community intersecting the transit only lanes connecting to the station. The secondary vehicle access to/from the subdivision is conserved under this alternative. Access will need to be restricted to signalized intersections east of the separation of the transit facility, where median BRT is proposed to be present.

Design Alternative C (OP Alignment)

While the alignment illustrated in Figure 2 and Figure 3 from the OP is intended to be conceptual and not likely to be constructed given the transportation design criteria noted above, it has been carried forward in the analysis and evaluation process for comparison. Figure 7 illustrates the alignment considered for Alternative C.

Figure 7: Proposed Future BRT Corridor Concept – Alternative C

Potential Future Opportunity for Increased Connectivity

It is noted that grade-separating the BRT and rail corridors is an important feature of a future facility. Considering the spatial constraints inherent to the area, an opportunity resultant from the inclusion of the station serving the City lands that is recommended for further exploration by the City, is for the transit alignment to cross the tracks along McKenna Casey Drive. While the angle between the facilities is low in Alternative A and additional space constraints may be present in Alternative B, as the BRT alignment will otherwise need to cross the tracks west of Highway 416, this crossing location may prove preferable to other locations from both a service and feasibility perspective. BRT service associated with crossing at McKenna Casey Drive may be expanded to Citigate through inclusion of a station at the south end of the development on McKenna Casey Drive. Feasibility of an alternative crossing location would be impacted by the proximity to the rail line at which the BRT corridor must pass under

the Highway, and the minimum radii requirements from the Transitway Design Guidelines to diverge and return to cross.

Evaluation of Proposed Alternatives

CGH retained Morrison Hershfield Limited to conduct a review of the alignment alternatives both forming the basis for an environmental assessment and being conducted in the spirit of one. The report is provided in Attachment 1. Based upon the multifactorial evaluation incorporating Transportation, Natural, Social and Cultural environments, and economic factors, Alternative A was selected as the preferred option.

Context for Full Corridor Protection

In the preceding sections, this memo has been responding to the comments received as written. However, the intent of the comments need also be examined to ensure that the City objectives informing the comments are met through the preferred solution.

Having prepared a memo to this effect in 2020, CGH Transportation has maintained the position that the conceptual future corridor, as depicted in the 2011 Official Plan and 2013 Transportation Master Plan does not adequately protect for a future connection between the Barrhaven and Kanata communities due to a number of constraints. In response to the concerns raised within this initial memo, the City responded with a memo in 2021 clarifying the intent of the corridor as ultimately connecting to Moodie Drive via McKenna Casey Drive, proceeding to propose several sample alignments to illustrate what were considered possible solutions. These alignments are illustrated in Figure 8 and Figure 9.

Figure 8: City Alignment Option 1

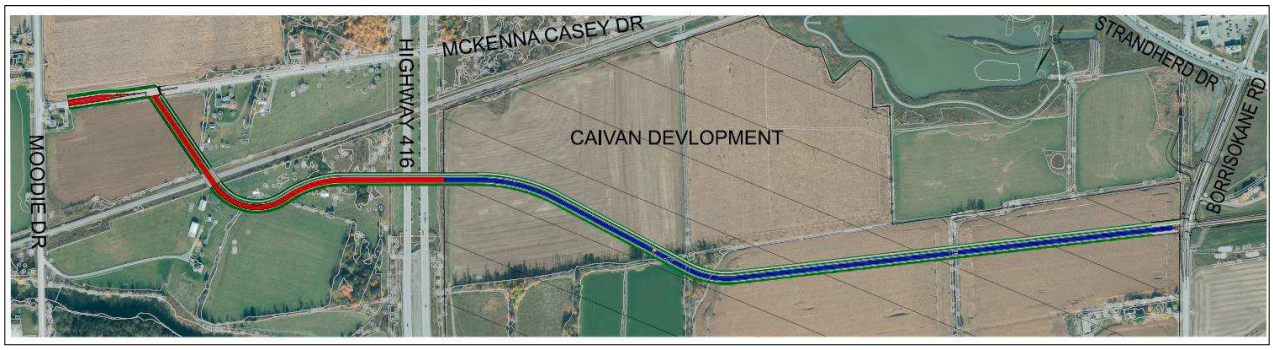
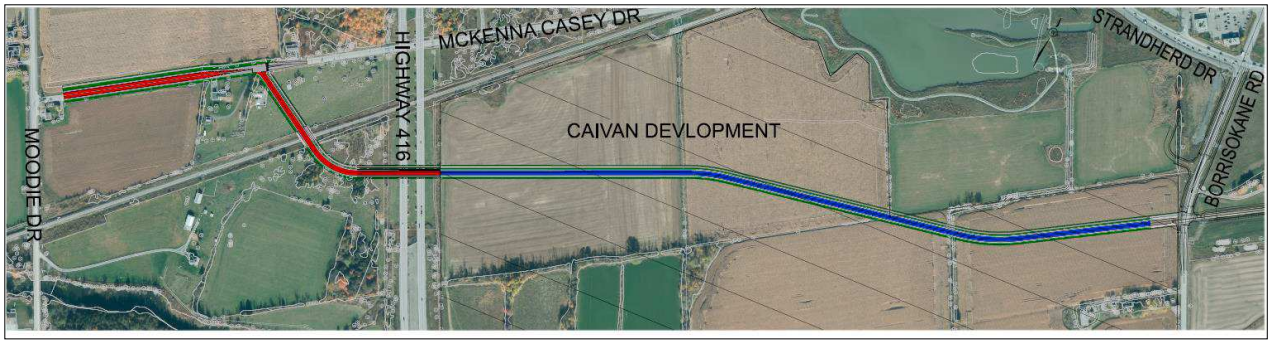


Figure 9: City Alignment Option 2



In response to the City's memo, CGH prepared a further memo in 2021 evaluating the City's propose alignments and similar concepts. The findings of this memo were that no alignment that passes under Highway 416 south of the rail line is able to meet Transitway design standards, and all of these options are here noted to be land-intensive in the area west of Highway 416. It was also noted that the above-illustrated City alignments would not

be able to pass under the Highway as depicted. The memo concluded that a viable means to protect for a future BRT connection between Barrhaven and Kanata should be explored as necessary due diligence.

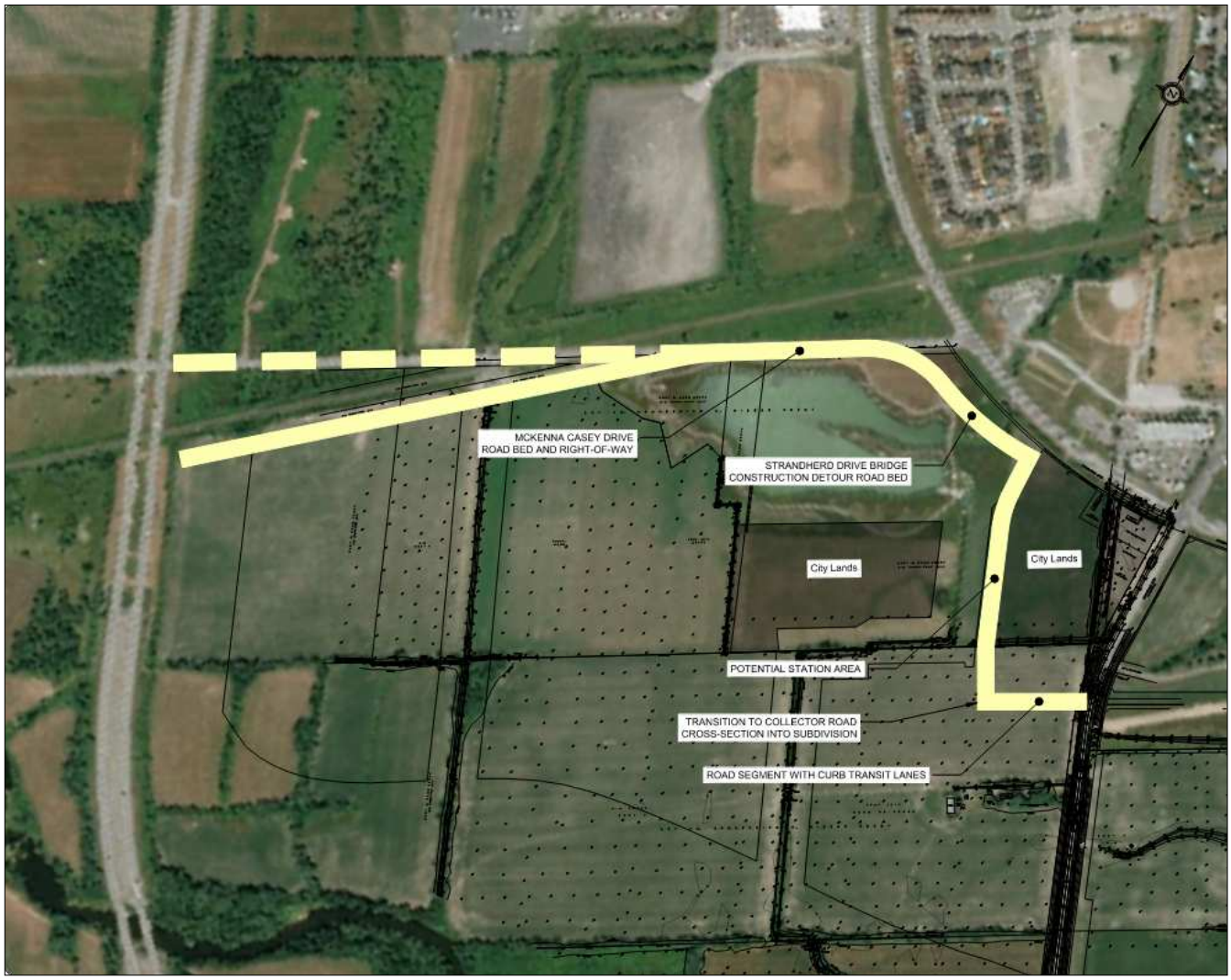
Further to this conclusion, an alternative corridor which accomplishes the requisite protection and addresses the above-noted challenges may be arrived at through refining the subject memo's Alternative A concept.

Alternative A Refinements

Refinements to the concept of Alternative A to accomplish the desired protection of a full corridor would involve crossing the rail track through the McKenna Casey Drive right-of-way instead of veering southwest parallel to the rail track. Of concern to the interpretation of the comments to which this memo responds, the refined alignment crosses the tracks east of Highway 416, negating the need to cross to the west as in all other alternatives. The result is a continuous corridor between the Chapman Mills Drive BRT extension and Moodie Drive via McKenna Casey Drive, which is noted as fulfilling the City's stated intention.

The annotated, refined Alternative A concept is illustrated in Figure 10, and a full-resolution plot is provided in Attachment 2. The dashed line indicates the refined alignment.

Figure 10: Alternative A – Features



Refined Alternative A Evaluation

As previously discussed, from the perspective of the protection of a future corridor, Alternative A satisfies the area requirements for the regional network connection that underlie the comments that are the subject of this memo. These refinements also offer additional benefits to a variety of technical considerations.

From a network connectivity perspective, connecting to McKenna Casey Drive north of the rail line would provide service between the Citigate development and Kanata as well as the remainder of Barrhaven. Active transportation facilities would also be included in this corridor, thus facilitating active mode connections between the Conservancy subdivision and the Citigate lands.

From an infrastructure perspective, using the existing roadbeds would limit the cost and environmental impacts of the project and make use of existing infrastructure.

Similarly, from a land perspective, using the existing municipal rights-of-way limits the land requirements of this facility both east and west of Highway 416, and use lands between the rail line, the grading of Strandherd Drive, and the stormwater management pond.

While subject to further planning and design efforts, the alignment would require geometry suitable for rapid transit.

Refined Alternative A Scoring

When examining the evaluation matrix from the Morrison Hershfield report, it is noted that these refinements to Alternative A result in changes to the following evaluation criteria where green typeface denotes unchanged descriptions, red denotes descriptions which no longer apply, and black denote the newly proposed descriptions:

Table 1: Proposed Changes to Alternative Evaluation

Criteria	Sub Criteria	Proposed Changes to MH Evaluation Matrix
Transportation and Transit	Intersection with Highway 416	~~Passes under the highway at grade parallel to existing structure~~ Passes under the highway at grade using an existing corridor
	Connectivity between Communities	Does not limit the connectivity between the communities Additionally creates new connections between adjacent communities of Barrhaven Conservancy and Citigate
Natural Environment	Soil Erosion	~~Highest potential for soil erosion – longest length~~ Lowest potential for soil erosion – shortest length

As noted in the above table, improvements beyond the conditions noted in the MH report are resultant from the refinements. No other criteria have changed. Thus, as Alternative A was the preferred option from that evaluation and has been improved, the refined concept constitutes the newly preferred alternative.

Conclusion

Based upon the foregoing memo and the MH analysis and evaluation results, the preferred alignment Alternative A, as depicted in Attachment 2 and using the McKenna Casey corridor to cross the rail line, best responds to the City's comments and overall objectives. It should therefore be reflected in Caivan Conservancy East and West draft plans, and based upon the analysis and evaluation provided, should be reflected in the City's OP and upcoming TMP.

Attachment 1

Morrison Hershfield Alignment Review

CGH TRANSPORTATION

MORRISON HERSHFIELD

DRAFT REPORT

Conservancy Transit Corridor Protection

Evaluation of Alternatives

Presented to:

Chris Gordon
CGH Transportation Inc.

6 Plaza Court
Ottawa, Ontario K2H 7W1

Report No.: 2203334.00
Date: October 19, 2022

Photo Source: Google Maps

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1. INTRODUCTION

CGH Transportation Inc. retained Morrison Hershfield to analyze and evaluate various transit alignment alternatives, as part of the Conservancy land use development plan. Responding to City comments, CGH has produced a memo, titled Conservancy Transit Comment Response (2022 10 03) that this report accompanies.

The Conservancy Lands, located at 3288 and 3300 Borrisokane Road and 4305, 4345 and 4375 McKenna Casey Drive, is zoned as Development Reserve Zone (DR).

The Conservancy lands are within the urban boundary of the City of Ottawa. The primary land designation is General Urban which allows for a variety of uses including residential, employment commercial and recreational. Based upon the South Nepean Secondary Plan, OPA 212, this property is planned to be developed for urban residential purposes consisting of a mix of residential product types, totaling approximately 702 townhomes and 334 single detached homes. As part of the development process the City of Ottawa has requested the identification and protection of a transit corridor from Borrisokane to Highway 416. The request is based on the Conceptual Transit Corridor noted in the City's conceptual plan, which is described in CGH's memo.

Three different transit corridors were identified (Figure 1) and have been evaluated on a comparative basis to identify a preferred corridor. The corridor options were assessed based on their impacts to environmental criteria that considered the natural and cultural environment, transportation considerations, and cost.

Figure 1: Alternatives A, B, and C

2. ALTERNATIVE ROUTES

2.1 Alternative A

Beginning at Borrisokane, this alternative passes between the City-owned blocks of the development, connects and makes use of the existing Strandherd Drive bridge construction detour and remnant McKenna Casey Drive roadbeds. Where the former McKenna Casey Drive intersects the rail track, the alignment could continue along the rail line, similarly to the east between Fallowfield Road and Longfields Drive, where the Transitway is parallel to the rail track. From this alignment, the BRT corridor would arrive at a point where it would pass under the existing Highway 416 Bridge Structure.

2.2 Alternative B

As in Alternative A, the alignment continues west from Borrisokane but stays to the south side of the stormwater management pond and City Lands. On the west side of the City Lands, this alternative heads north to the rail tracks where it veers west and would continue parallel to the rail track to the existing Highway 416 Bridge.

2.3 Alternative C

Alternative C (Official Plan Conceptual Future Transit Corridor) generally reflects the alignment presented in the City's Official Plan. It consists of a westerly alignment, west of Borriokane, similar to Alternatives A and B, but intersects with Highway 416 further south than Alternatives A and B and at a different angle of approach.

3. TRANSPORTATION ENVIRONMENT

3.1 Existing Conditions

The main arterial road network (CGH, 2021) includes:

- Borrisokane Road: arterial; two-lane rural cross-section; gravel shoulders; and 80 km/h posted speed limit. South of Cambrian Road, Borrisokane Road becomes a collector road with a 37.5 m ROW.
- Strandherd Drive*: arterial; four-lane urban cross-section; sidewalks and cycle tracks; 44.5 metres ROW; and 80 km/h posted speed limit. (*updated to reflect recent construction)
- Kennevale Drive: collector; urban two-lane cross-section; 20 m ROW; parking and sidewalks on both sides; and speed limit is 40 km/h.
- Dealership Way: collector; urban two-lane cross-section; 24 m ROW; parking and sidewalks on both sides; and the speed limit is 40 km/h.
- Tartan Drive: collector; two-lane rural cross-section; gravel shoulders; 26 m ROW; and 40 km/h posted speed limit.

- McKenna Casey Drive: local road; two-lane rural cross-section; gravel shoulders; speed limit 60 km/h to 80 km/h; and a 20 m ROW.

The area transit service is provided by routes #170, 173 and 273 within 800 metres of the proposed development. Primary stops are located on Tartan Dive north of Strandherd Drive. Future transit services were identified in the 2016 Environmental Assessment for the Chapman Mills Drive Extensions and Bus Rapid Transit corridor between Strandherd Drive and Longfields Drive, with the BRT corridor continuing separately to Borrisokane Road. A high-density development block may be integrated into the City lands with the potential for Transit-Oriented Development (TOD) as it will be within proximity to the proposed higher-order transit hub (NAK 2020). A detailed assessment of area transportation is outlined in the Transportation Impact Assessment (CGH 2021).

The lands surrounding the proposed development are:

- Citigate Business Park to the North
- Residential development to the east
- Jock River and agricultural lands to the south
- Highway 416 and agricultural lands to the west

Connectivity throughout the community (Figure 2) and to the surrounding areas will be achieved through a series of sidewalks, transit nodes and park amenities (JFSA 2021). Traffic calming measures will be built into the road design and local streets will be lined with trees and include reduced posted speed limits. Overall, there will be a pedestrian network along the local and collector roads connecting to the parks and Jock River corridor. Direct connections have been made from the of the pedestrian and cycling networks to the Chapman Mills Bus Rapid Transit (BRT). The overall transportation network (active and automotive) is illustrated in Figure 2 will connect the communities, amenities and the future park and ride at Strandherd Drive and Borrisokane Road.

Figure 3 shows McKenna Casey Drive under Highway 416, which is a 400 series highway that abuts the development area in the west. Figure 4 is a view from Highway 416 over railroad tracks.

3.2 Transportation

Making use of the existing roadbeds, Alternative A can be constructed at a reduced cost. Active transportation facilities connecting the surrounding development to the City lands would further benefit with more direct access to rapid transit. Potential for the inclusion of a Park and Ride at the southwest corner of the Strandherd Drive at Borrisokane Road intersection would result from such an alignment. A station serving the City lands would be near Strandherd Drive, allowing for connections from local bus service west of Borrisokane Road to regional bus service to the east.

Alternative B could include a station on the west side of the City Lands. The potential for the inclusion of a Park and Ride exists with this alternative as well, although with less immediate access to/from the arterial network. The station under this alternative would exclusively serve the Conservancy West community and the City Lands.

Instead of crossing the Highway parallel to the rail tracks beyond the City Lands, Alternative C will cross perpendicularly to the highway and will not pass under the existing Highway 416 Bridge Structure, requiring a new structure. This would result in additional approvals, costs and more complex construction.

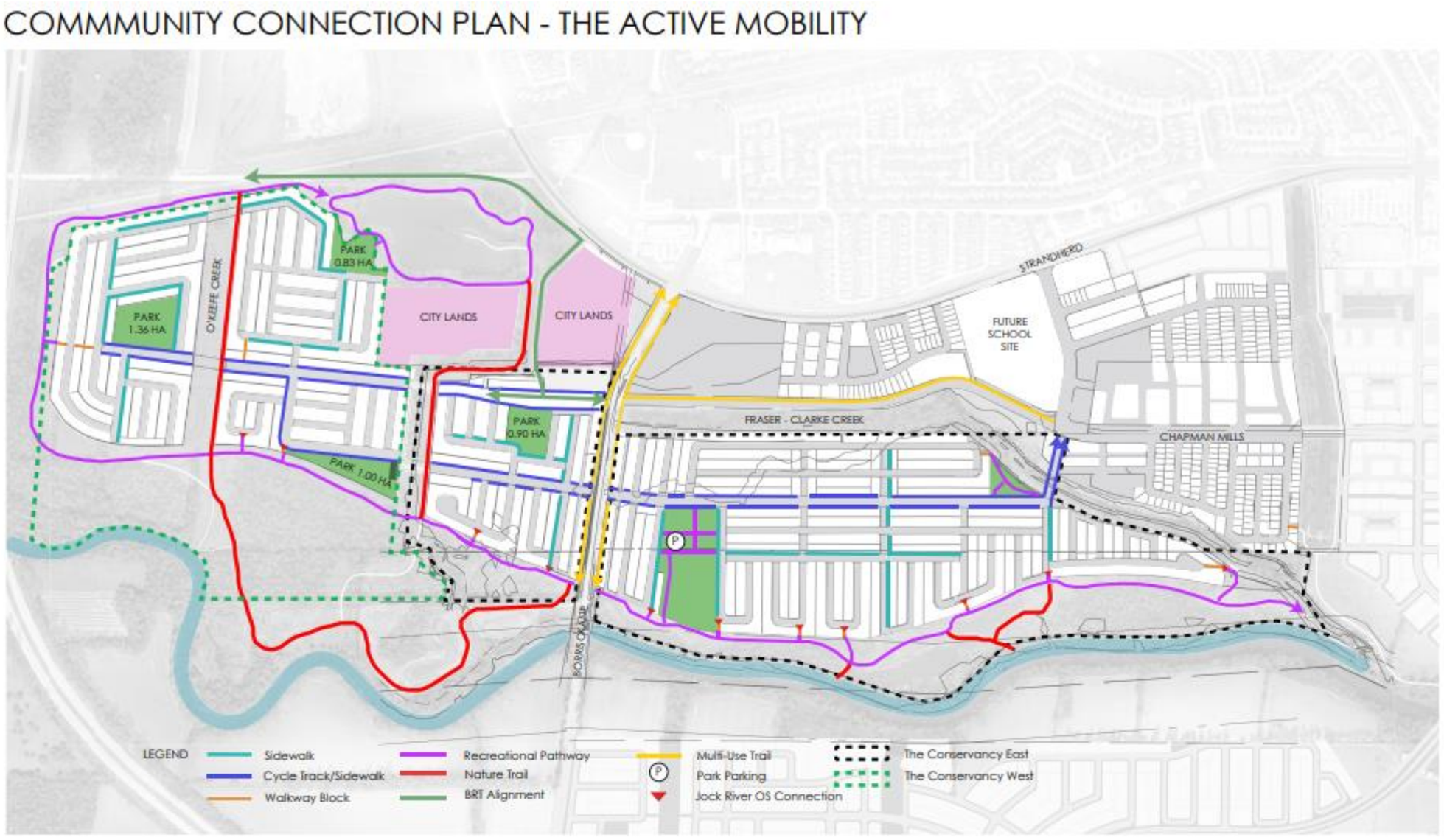

Figure 2: Map Showing Connectivity Throughout the Community

Figure 3: McKenna Casey Drive Under Highway 416 (Photo Source: Google Maps)

Figure 4: Highway 416 over Railroad Tracks (Photo Source: Google Maps)

3.2 Economics

Alternative A is the longest alignment, though permits the reuse of existing roadbeds from both the Strandherd Drive bridge construction detour and the McKenna Casey Drive closure. Alternative B's alignment is longer than alternative C's. Alternative B's costs include signalization of intersections along the City lands and eastward. Alternative C's costs include the requirement for signalized intersections along the entire length of the corridor as well as structures to cross the highway.

3.3 Park and Ride

Both alternative A and B have an opportunity for a park and ride integration within the City lands, alternative C does not.

3.4 Active Transportation

It is assumed that all alternatives will include the same cross-sectional elements and provide the same pedestrian and cycling connectivity through the development.

4. NATURAL ENVIRONMENT

4.1 Species at Risk

Kilgour & Associates Limited's Environmental Impact Statement (2021), states that there were five species at risk were identified as having some (limited) potential to interact with the proposed development project, including Bank swallows, Barn Swallows, Northern Map Turtle, Snapping Turtle, and Blanding's Turtle. They have not been observed as occupying the site (KAL, 2021). No significant negative impacts are anticipated to species-at-risk or their habitats. See **Figure 5** for the current biological existing conditions.

- Bank Swallow has not been observed nesting on the Site. However, landscape conditions created during the Cut and Fill Program and subsequent construction activities may result in suitable nesting habitats. This would require mitigation during construction.
- Barn Swallow nests have not been observed on or adjacent to the Site, though some individuals were observed feeding over the northwestern most corner of the Site (i.e., beyond the protected 200 m from likely nest locations off-site.)
- Northern Map Turtles, Snapping Turtles and Blanding's Turtles have been observed in the Jock River, outside the project study area.
- The observed butternut population is clustered withing the floodplain of the Jock River, out of the way of the project study area.

There are no discernable differences between Alternatives A, B and C.

4.2 Soil Erosion

Kilgour & Associates Limited's Environmental Impact Statement (2021), states that the property is located within the Ottawa Valley Clay Plains which are composed of Champlain Sea deposits, and specifically the Piperville, North Gower and Dalhousie soil associations. These soils are poorly drained Orthic Humic Gleysols found on level to very gently sloping topography (between 0% to 2%).

Alternative A has the highest potential for soil erosion due to its longer length compared to the other two. The longer the track the higher the risk is to impact the natural environment and the structural integrity of the soil. Alternative C has the lowest risk of soil erosion due to the shorter length, whereas alternative B resides between alternative A and C. **Figure 6** shows the area's physiography and soils.

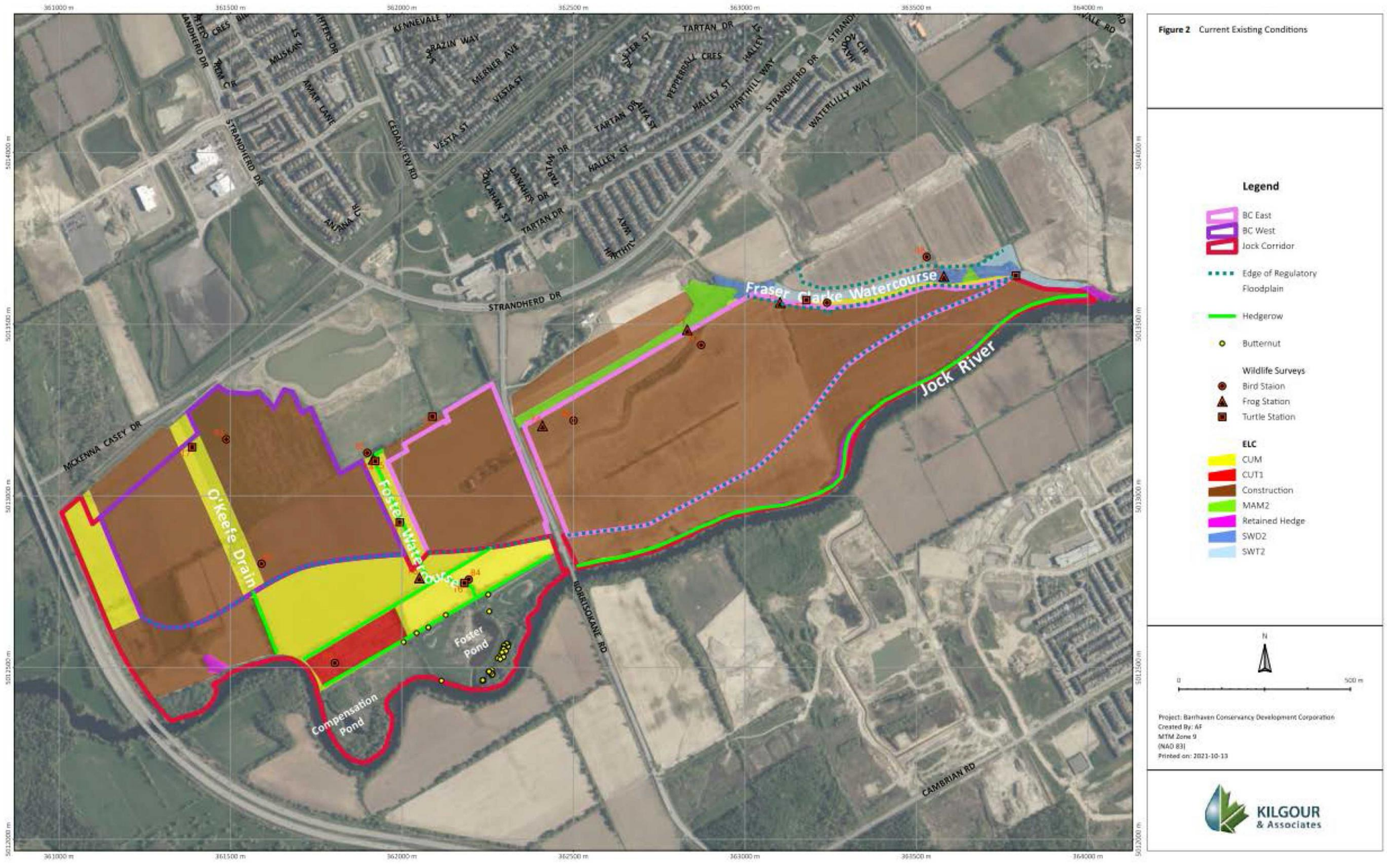

Figure 5: Current Biological Existing Conditions

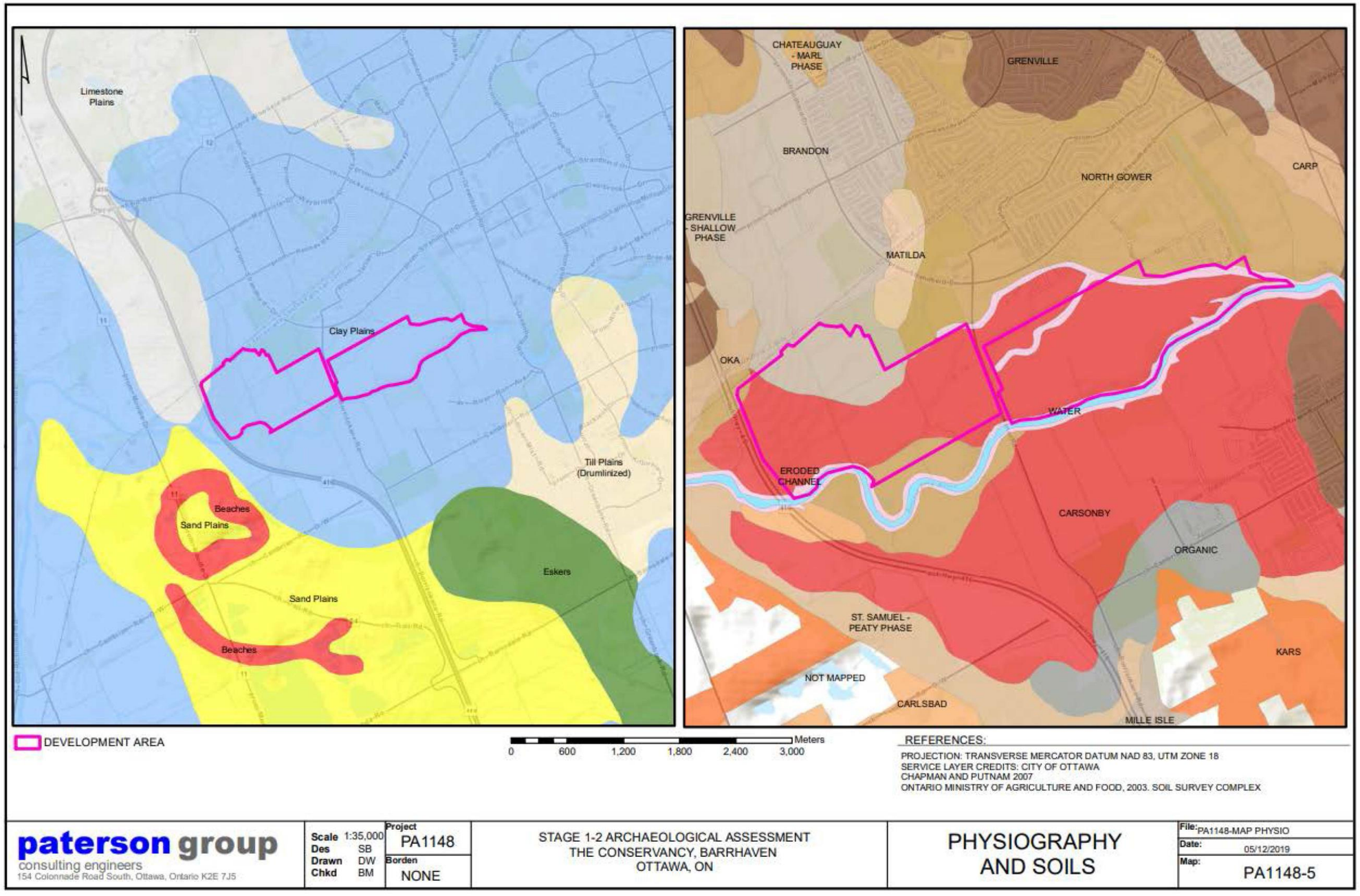

Figure 6: Physiography and Soils

4.3 Fish and Fish Habitat

Kilgour & Associates Limited's Environmental Impact Statement (2021), states that development will be at least 30 m from any water feature and is not anticipated to alter any of Foster and the Fraser-Clarke Watercourses and amphibian habitat.

There are no predicted negative impacts to surface water features on or adjacent to the Site related to site development given application of conventional construction-phase mitigations, proposed stormwater treatment, and proposed enhancements to the corridor adjacent to the Jock River and associated tributaries.

The development does not aggravate the flood hazard or create a new flood risk including ensuring that drainage connections for the foundation are arranged so that surcharging of the sump pump discharge or connections to the storm sewer do not result in flooding of the lower levels of the building and changes to site grading shall not result in appreciable lowering of lands adjacent to the building. Refer to Figure 7 for a map showing site context and waterways.

Considering the fish habitat documented, Alternative A ranks highest given it will only impact the O'Keefe Drain, Alternative B is ranked moderately as it impacts the O'Keefe and Foster Drains and Alternative C ranks lowest as it impacts both drains along with various tributaries.

4.4 General Wildlife

Species common to the Ottawa area were observed on site during the field surveys. These species may continue to use or cross the Site. The riparian forest along the Jock River functions as a wildlife corridor and will remain in place during and after site development. This is consistent with all three alternatives.

5. SOCIAL & CULTURAL ENVIRONMENT

5.1 Noise

Gradient Wind Engineers and Scientist's Traffic Noise Feasibility Assessment (2021) states that, levels due to roadway traffic over the site will range between approximately 52 and 70 dBA during the daytime period (07:00-23:00). The highest roadway traffic noise levels will occur nearest to the intersection of Borrisokane Road and the proposed minor collector and adjacent lands may require noise control measures. Alternative C has the highest potential for noise disturbance due to it going through the center of the new development. Alternative A has the lowest potential for long term noise disturbance by minimizing the travelled path through and around the new development by going around the outside of the pond and parallel to McKenna Casey Drive.

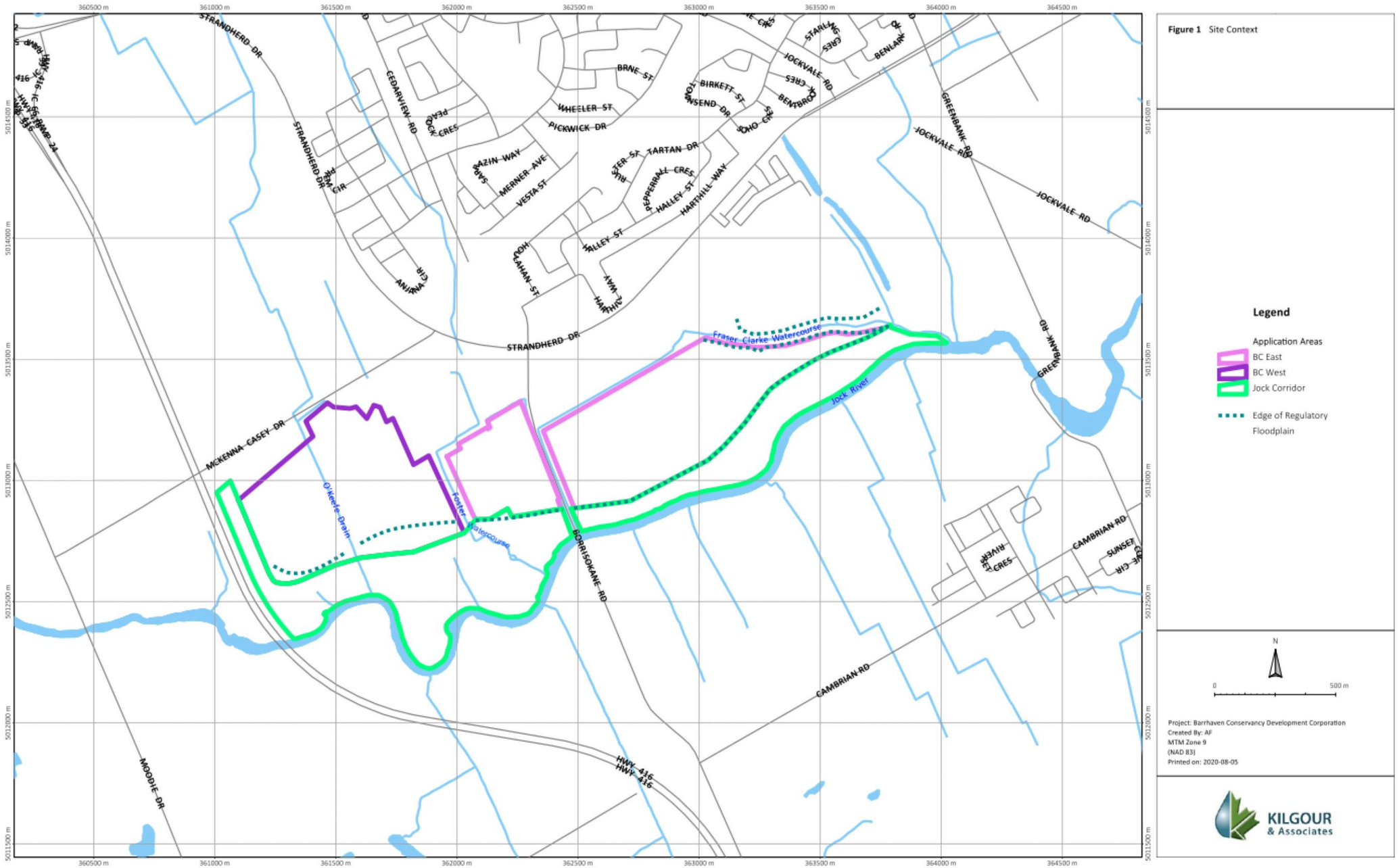

Figure 7: Site Context and Waterways

5.2 Archaeological Potential

Paterson Group's Stage 1-2 Archaeological Assessment states that the Stage 1 assessment indicated that there was archaeological potential for the study area based on nearby historic activity in the 19th century, proximity to the Jock River, and registered archaeological sites in the near vicinity. However, the Stage 2 assessment did not find any significant archaeological resources present in the study area.

Though there is no risk of archaeological potential on the east side of highway 416, there is a greater likelihood that Alternative C could cross into the City's designated archaeological potential boarder surrounding the Jock River further to the west. Refer to Figure 8 for the archaeological assessment area.

6. GEOTECHNICAL

According to the Paterson Group's Geotechnical Investigation (2021), the site consists of mainly agricultural fields, bordering the Forster Drain to the west, and the Jock River to the south. The existing ground surface across the site is relatively level with approximate ground surface elevation varying between 91 to 92 m. The bedrock in the area consists of interbedded limestone and dolomite of the Gull River formations with overburden drift thicknesses ranging between 5 and 15 m.

Geotechnical considerations are consistent between alternatives A, B, and C.

7. PHASE 1 ENVIRONMENTAL SITE ASSESSMENT

In the report provided by Golder (2021), given that the Phase One Property has been used for agricultural and residential purposes and is to be redeveloped with residential dwellings, a stormwater management pond, schools and community parks, there will be no change in the land use from less sensitive to more sensitive. As such, there is no mandatory requirement for a Record of Site Condition to be filed for the site.

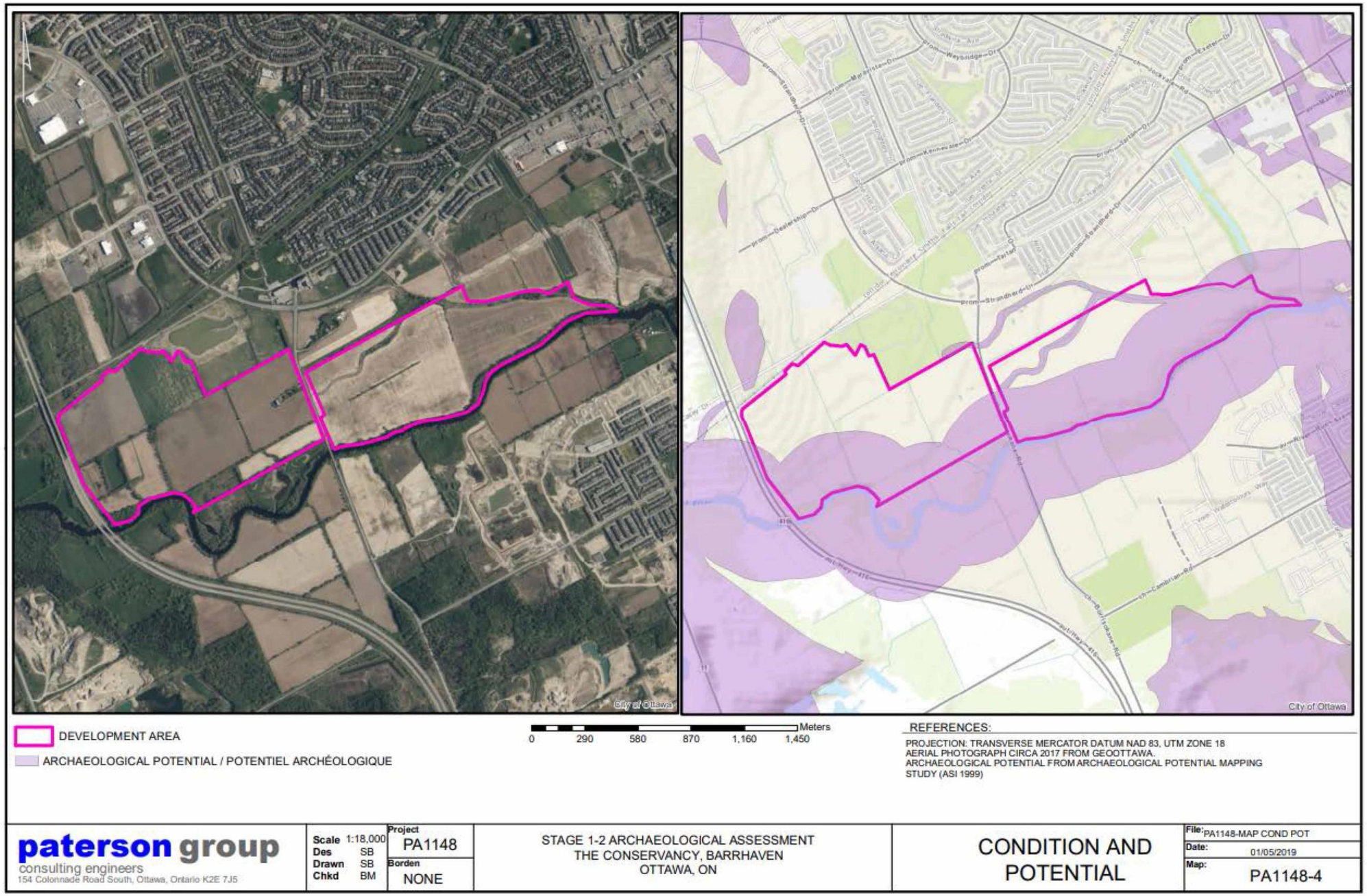

Figure 8: Archaeological Assessment Area

Table 1: Highlights of the Comparative Impact Evaluation Study of the 3 Shortlisted Alternatives

CRITERIA	SUB CRITERIA	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C	PREFERRED OPTIONS
Transportation and Transit	Service to TOD Area	Services the whole of the TOD area	Serves the western TOD area	Does not directly serve the TOD area	A
	Intersection with Highway 416	Passes under the highway at grade parallel to existing structure	Passes under the highway at grade parallel to existing structure	Intersects with Highway 416 at grade	A/B
	Connectivity between Communities	Does not limit the connection between the communities	The median BRT limits connection between communities to the north and south on the east side of the community	Limits the connection between the entire north and south communities	A
	Park and Ride	Opportunity for a park and ride integration	Opportunity for a park and ride integration	No opportunity for a park and ride integration	A/B
Natural Environment	SAR Bird: Barn Swallow (Nesting)	None present (manage during construction)	None present (manage during construction)	None present (manage during construction)	Not Distinguishing
	SAR Bird: Barn Swallow	May impact foraging	May impact foraging	No impact anticipated	C

CRITERIA	SUB CRITERIA	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C	PREFERRED OPTIONS
Natural Environment	SAR Turtles	None (none present within alignment)	None (none present within alignment)	None (none present within alignment)	Not Distinguishing
	SAR Vegetation: Butternut Tree	None (none present within alignment)	None (none present within alignment)	None (none present within alignment)	Not Distinguishing
	Soil Erosion	Highest potential for soil erosion – longest length	Medium potential for soil erosion	Lowest potential for soil erosion – shortest length	C
	Fish and Fish Habitat	Crosses the O'Keefe drain and may possibly affect the Foster Drain	Crosses the O'Keefe drain and the Foster Drain	Crosses both the O'Keefe drain and the Foster Drain, with added potential of affecting a side branch of the Jock River on the west side of Highway 416	A
Social & Cultural Environment	Noise	Lowest potential for noise disturbance due to distance from the development	Medium potential for noise disturbance, new development to the south	Highest potential for noise disturbance due to it going through the centre of the new development	A

CRITERIA	SUB CRITERIA	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C	PREFERRED OPTIONS
Social & Cultural Environment	Archaeological Potential	No impact on lands with archaeological potential	No impact on lands with archaeological potential	Impact on lands with archaeological potential border surrounding the Jock River further to the west	A/B
Cost	Cost Options	Lowest cost due to roadbed reuse, limited signals	Medium cost with multiple signalized intersections	Highest due to crossing of Highway 416 at grade, most signals	A

LEGEND

= Low = Medium = High

8. SUMMARY

Overall, the preferred alternative is Alternative A.

This conclusion is based on the following:

- Alternative A provides the best opportunity for integration with the City Lands, which are an excellent opportunity for TOD and accompanying station. In the interim the City Lands, as part of Alternative A, can incorporate a Park and Ride.
- Alternative A will use the existing Strandherd detour and McKenna Casey road bed and will cross under Highway 416 at an appropriate angle. These elements result in an economic advantage for this alternative.
- Potential station locations along Alternative A capture a significant amount of development, both existing and new, in the 400 metre to 600 metre radii.
- Alternative A ranks highest for the natural, social and economic environments

9. CLOSURE

CGH Transportation Inc. retained Morrison Hershfield to conduct the work described in this report, and this report has been prepared solely for this purpose.

This document, the information it contains, the information and basis on which it relies, and factors associated with implementation of suggestions contained in this report are subject to changes that are beyond the control of the author. The information provided by others is believed to be accurate and may not have been verified.

Morrison Hershfield does not accept responsibility for the use of this report for any purpose other than that stated above and does not accept responsibility to any third party for the use, in whole or in part, of the contents of this document. This report should be understood in its entirety, since sections taken out of context could lead to misinterpretation.

We trust the information presented in this report meets Client's requirements. If you have any questions or need addition details, please do not hesitate to contact one of the undersigned.

Morrison Hershfield Limited

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10. REFERENCES

Golder Associates Ltd., 2021. Phase One Environmental Site Assessment for the Barrhaven Conservancy Development. October 25, 2021.

Gradient Wind Engineers and Scientists, 2021. Traffic Noise Feasibility Assessment, Barrhaven Conservancy Subdivision. July 15, 2021.

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Kilgour & Associates Limited. (KAL), 2021. City of Ottawa Environmental Impact Statement for the Barrhaven Conservancy Development, October 21, 2021.

NAK, 2020. The Conservancy Urban Design Brief August 2020.

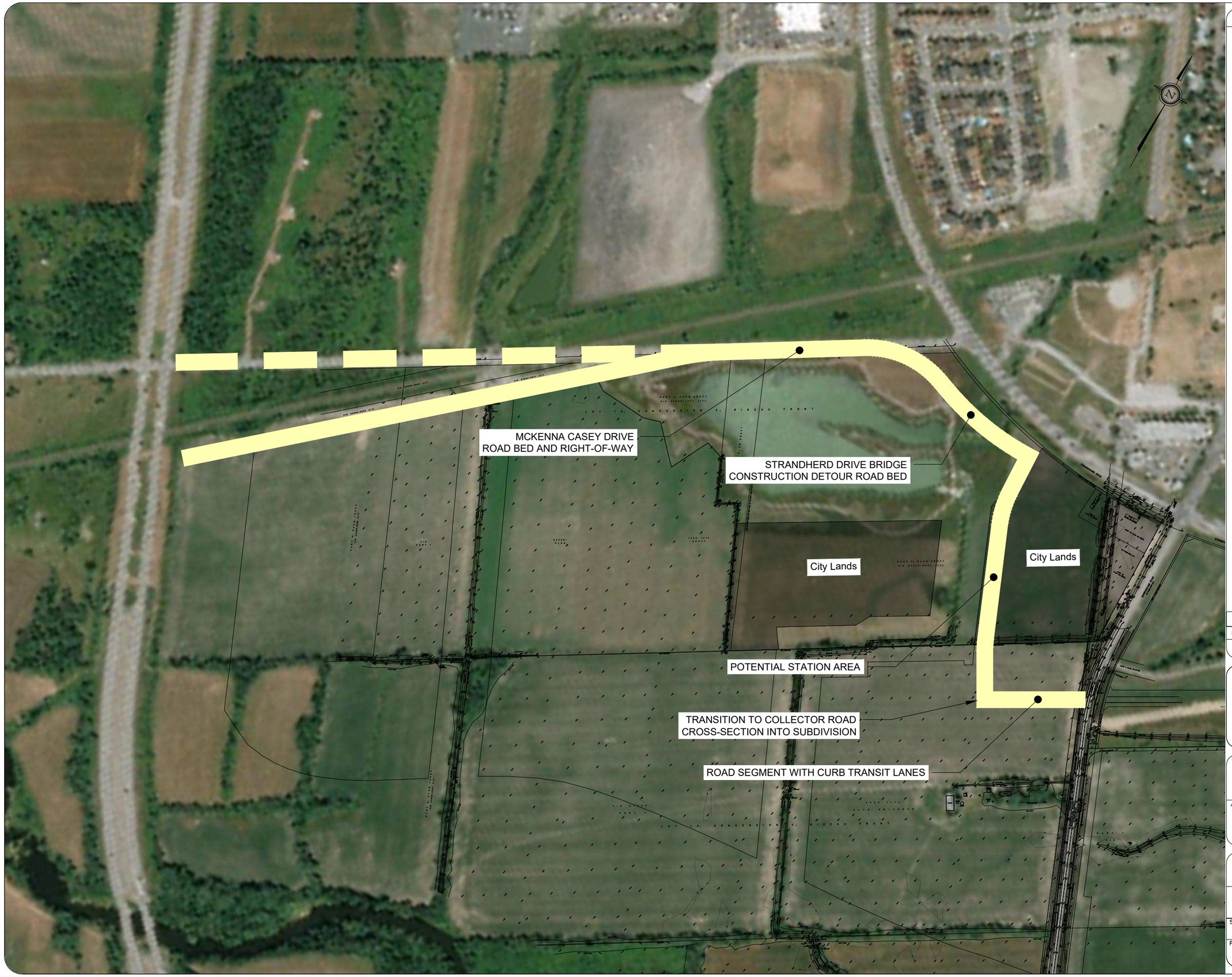
Paterson Group. 2021. Stage 1-2 Archaeological Assessment for the Barrhaven Conservancy Development. October 25, 2021.

Paterson Group. 2021. Geotechnical Investigation for the Proposed Residential Development Conservancy East Ottawa. October 25, 2021.

Attachment 2

Alignment A Full-Resolution Plot

CGH TRANSPORTATION



Notes:

ALTERNATIVE A

REV:	DESCRIPTION:	BY:	DATE:

STATUS:

CGH Transportation
6 Plaza Court
Ottawa, ON
K2H 7W1
(343) 999-9117

CLIENT: Caivan Communites

ARCHITECT:

SITE: Conservancy

TITLE: Conserancy
Alternative A - Features

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
NTS	2022-12-02		
PROJECT NO:	DRAWING NO:		REVISION:
2020-110			