

Appendix A

Natural Heritage Investigations



November 18, 2016

Matrix 24321- 514

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Subject: Natural Heritage Assessment Study Update for the Hamlet of Colgan, Township of Adjala-Tosorontio, County of Simcoe

Dear Mr. Jain:

1 INTRODUCTION

A Natural Heritage Assessment Study (NHAS) was prepared by PLAN B Natural Heritage in June of 2015, in conjunction with the Master Servicing Plan, to address the natural heritage features surrounding the proposed sanitary sewer system and new waste water treatment plant (WWTP). To accommodate the anticipated future growth in Colgan, the existing municipal services requires upgrading to meet the current surface water and groundwater quality protection targets within the province of Ontario. Private residences within Colgan are currently on individual septic systems. The proposed upgrades would connect these homes, to centralized sanitary sewer system and a new WWTP which would provide for improved groundwater and surface water quality conditions within the local sub-catchment area (PLAN B, 2015).

Since the NHAS was released in 2015, changes have been made to the location of the proposed WWTP and sanitary forcemain. The following memo was completed as an update to the 2015 NHAS which will discuss the natural heritage features surrounding the original WWTP and forcemain location as well as the new alternate location.

2 BACKGROUND

Previous studies and information sources that are relevant to the subject lands and have been reviewed for this study and include the following documents:

- PLAN B Natural Heritage (2015) Natural Heritage Assessment Study Colgan Master Servicing Plan. Township of Adjala-Tosorontio, County of Simcoe (PLAN B, 2015)
- Natural Heritage Information Centre (NHIC) database (MNRF, 2016)
- County of Simcoe Official Plan (County of Simcoe, 2007)

2.1 Waste Water Treatment Plant

The original proposed WWTP is located just south of County Road 14 and west of 8th Concession Road (Figure 1). This design also included a Sanitary Pumping Station (SPS) which was located north of County Road 14 and west of 8th Concession Road. The natural areas surrounding these proposed facilities are mostly comprised of agricultural lands with a few hedgerows. The natural valley corridor of Keenansville Creek is located along the westerly limits of the proposed SPS development (PLAN B, 2015).

The new proposed WWTP site is located in the same location as the original SPS location (north of County Road 14 and west of 8th Concession Road). The area is mostly comprised of agricultural lands with a few natural hedgerows. As previously stated, the natural valley corridor of Keenansville Creek is located along the westerly limits of the proposed development. The corridor is largely forested with a mix of coniferous and deciduous tree species. The new WWTP does not require a separate location for a SPS (PLAN B, 2015).

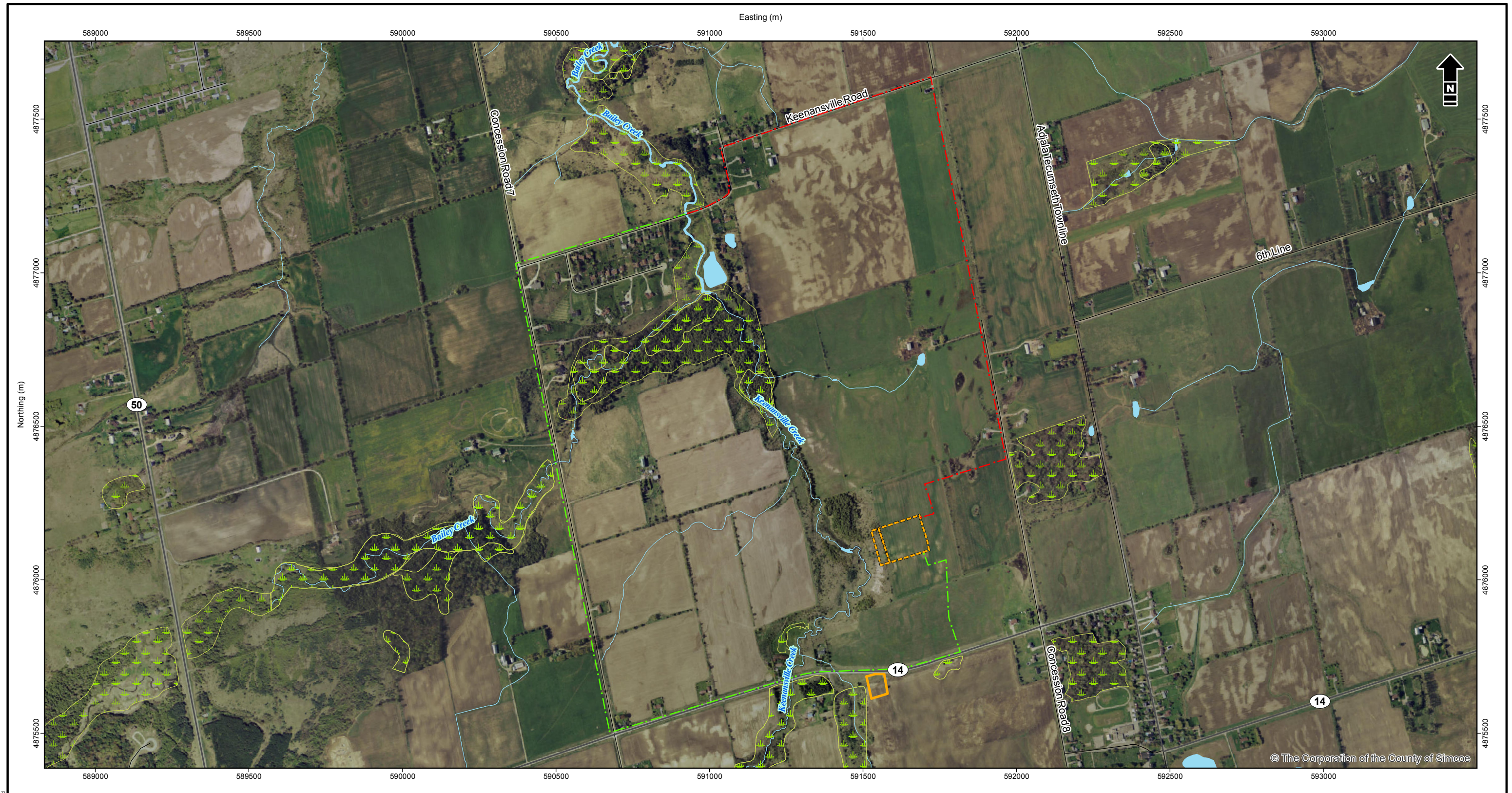
2.2 Forcemain

The original route would connect to the original WWTP locations and would then travel west along County Road 14, north along Concession road 7, and east along Keenansville Road. This route intersects three existing watercourses as well as the corresponding valley corridors (PLAN B, 2015).










The new proposed route would connect to the new proposed WWTP and would then travel north along Concession 8, through the unopened road allowance, and then travel west along Keenansville Road. This route does not intersect any existing waterbodies or valley corridors; however, it appears to be adjacent to an existing wetland complex.

2.3 Outfall

The outfall location has remained the same despite the potential change in WWTP locations and forcemain route. The flows will outlet into Bailey Creek from either the right bank or the left bank depending on the bank suitability.



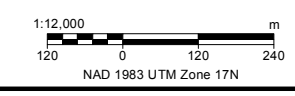
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-  Proposed WWTP Location
-  Original WWTP Location
-  Wetland
-  Water Body
-  Watercourse
-  Highway
-  Road
-  Original Forcemain
-  Proposed Forcemain



EXP Service Inc.
Natural Heritage Assessment Study Update for the Hamlet of Colgan

Study Area



Date: 16 Nov 2016	Project: 24321	Technical: K. Reis	Reviewer: A. Fausto	Drawn: C. Curry
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I:\Colgan\24321\Figures and Tables\GMI\2016\Report\Figure 1 - Study Area.mxd

Reference: Data obtained from NVCA, Simcoe County, Ontario Base Mapping, Geobase used under license. Imagery from County of Simcoe (2002) used under license.

3 EXISTING CONDITIONS

3.1 Terrestrial Environment

3.1.1 Species-at-Risk

The Natural Heritage Information Centre (NHIC) database was reviewed to determine the presence/absence of species-at-risk within the study area. Additional information was collected from the existing NHAS (PLAN B, 2015) as well as correspondence with local landowners provided by Nottawasaga Valley Conservation Authority (NVCA). Based on our review of the background data for the study area the following species have been previously recorded within the study area:

- Bobolink (*Dolichonyx oryzivorus*) based on NHIC
- Eastern Meadowlark (*Sturnella magna*) based on NHIC
- Butternut (*Juglans cinerea*) based on (PLAN B, 2015)
- Common Snapping Turtle (*Chelydra serpentina*) based on NVCA correspondence

The Bobolink and Eastern Meadowlark have both been designated as ‘Threatened’ under the *Endangered Species Act 2007 (ESA)*. These species both rely upon grasslands for breeding and have similar breeding distributions in Ontario. Potential habitat for these species occurs in scattered patches across the landscape. Breeding bird surveys are recommended to be completed at the detailed design stage in order to address areas of suitable or confirmed habitat of these species (PLAN B, 2015).

The Butternut tree has been designated as ‘Endangered’ under the ESA due to the Butternut canker disease. No butternut trees were recorded from the municipal right-of-ways during the field visits completed by PLAN B, however, suitable habitat for this species does occur in adjacent forested areas that flank municipal roads. Butternut has been previously recorded from the Oak Ridges Moraine to the southwest of the study area (PLAN B, 2015).

The Common Snapping Turtle has been designated as ‘Special Concern’ under the ESA. This species requires aquatic habitat, such as wetland or pools, as well as appropriate nesting habitat with gravel and sand substrates. No Snapping turtles were recorded during the field visits performed by PLAN B; however, local landowners have observed this species crossing 8th Concession Road. This species may have nesting habitat along 8th Concession Road and may also be supported by the local wetland on the east side of 8th Concession Road (NVCA, 2016).

3.1.2 Wildlife

There are a number of connected riparian forests and wetland habitats within the study area which likely support a variety of important functions for wildlife including overwintering habitat, habitat for area sensitive birds, and habitat for wetland species such as amphibians and reptiles, as well as species movement corridor. No formal wildlife surveys were completed as part of this study. Wildlife field inventories are recommended to be completed at the detailed design stage to confirm and identify potential impacts and mitigating measures (PLAN B, 2015).

3.1.3 Environmentally Significant Areas

The study area does not contain provincially, federally, or locally designated sensitive features or areas such as PSWs, ESAs or ANSIs (PLAN B, 2015). However a section of the Bailey Creek ravine located was identified as a County Greenland within Simcoe County. County Greenland's are areas which have been identified as having natural heritage features and linkages (County of Simcoe, 2007).

3.1.4 Vegetation

The study area is largely comprised of agricultural lands with little tree cover. Natural vegetation and habitat is limited to the valley corridors. These natural corridors within the study area provide an important linkage between the Oak Ridges Moraine to the south and the Nottawasaga River to the northeast.

No rare tree species or specimen trees were recorded along the original pipe routes during the field inventory completed by PLAN B Natural Heritage (PLAN B, 2015).

The extent of the vegetation removal and the impacts to residual vegetation will be addressed in more detail at the design stage.

3.2 Aquatic Environment

The study area is located within the Innisfil Creek Subwatershed, and includes Keenansville Creek, Bailey Creek (Camplin Branch) and tributaries to both watercourses. These watercourses have exhibited poor attributes due to intensive agricultural land use and lack of riparian cover. The impaired water quality and lack of good quality habitat has limited the fisheries potential within these watercourses. Although Keenansville Creek has exhibited degraded conditions, it has been classified as is a cold water stream which provides habitat for Brook Trout (*Salvelinus fontinalis*). No designated aquatic species at risk were documented in water bodies or ponds near the existing Colgan Wells (PLAN B, 2015).

It is recommended that a fluvial geomorphological analysis be completed for the outfall to Bailey Creek to ensure that erosion concerns are not exacerbated.

3.2.1 Wetlands

There are several low lying wetland communities within the study area. The wetlands within the study area are regulated by the NVCA under their *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses* regulation. The majority of wetland habitats observed within the area are associated with the valley lands of Baileys Creek and Keenansville Creek which occur in low lying areas and floodplains, and consist primarily of deciduous/mixed swamp communities. These wetlands are part of a larger core natural area and corridor which provides linkages between the Oak Ridges Moraine and the Nottawasaga River. Separate from the valley land wetland communities, upland wetland communities were also noted along 8th Concession Road (PLAN B, 2015).

4 EVALUATION

An evaluation summary of the ecological constraints for the original and the new proposed area of the WWTP, forcemain, and outfall are provided in Table 1.

Table 1 - Evaluation of ecological constraints

Ecological Constraints	Original Proposed Area		New Proposed Area		Both Routes
	WWTP	Forcemain	WWTP	Forcemain	Outfall
Area/Length	Includes WWTP and SPS	Approximately 3.9 km	Only requires WWTP	Approximately 2.9 km	N/A
Surrounding Land Use	Agricultural fields and private residence.	Agricultural fields, private residence, and two natural valley corridors.	Agricultural fields and natural valley corridor.	Agricultural fields, private residence, and one wetland complex.	Natural valley corridor.
Species at Risk Habitat	Potential Bobolink and Eastern Meadowlark habitat.	N/A	Potential Bobolink and Eastern Meadowlark habitat.	N/A	N/A
Watercourse Crossing /Valley Corridor	None	Three	None	None	One
Wetlands	None	One	None	One	One

5 RESULTS

The locations of the original and newly proposed WWTP both contain ecological constraints. The original WWTP and SPS are located in an area which has been identified as potential Bobolink and Eastern Meadowlark habitat. Furthermore, the SPS is located adjacent to a natural valley corridor which is sensitive to disturbance and will require appropriate setbacks in order to limit the level of disturbance.

The new location exhibits the same ecological constraints; however, this option does not include a SPS and therefore would require less land during the development phase.

The original and newly proposed forcemain routes are both anticipated to occur along the existing roads as well as road allowances which will likely result in the removal of some trees and vegetation within the Right of Way. The original route is approximately 3.9 km in length and will intersect three watercourses as well as the surrounding valley corridors. The Bailey Creek ravine also includes a wetland community, and has been designated as part of the County Greenland's for Simcoe County. Construction within these sensitive areas may result in several short term and long term effects.

The new forcemain route is approximately 2.9 km in length and will not intersect any watercourses or ravines; however, it is proposed to run adjacent to an existing wetland. Special measures will need to be taken to ensure that the features and functions of the wetland are not negatively impacted.

The proposed outlet to Bailey Creek has remained the same regardless of the location of the WWTP or forcemain. A fluvial geomorphological analysis will be completed for the outfall to Bailey Creek to help determine the optimal location for the outfall placement.

Based on the desktop evaluation of ecological constraints, the new WWTP location and forcemain route would have the least ecological impact to the natural environment. The new WWTP would require less land for development and the new forcemain route would avoid major creek and valley land crossings.

6 NEXT STEPS

An investigation of the newly proposed WWTP location, forcemain route and the original outfall location will take place in the fall of 2016. This field assessment will work to better understand the ecological constraints within the area as well as mitigation measures that should take place.

We trust that this letter report suits your present requirements. If you have any questions or comments, please call either of the undersigned at 519.772.3777.

Yours truly,

MATRIX SOLUTIONS INC.



Karen Reis, B.E.S
Ecologist

KR/ap
Attachments

Reviewed by



Arnel Fausto, M.Sc
Senior Ecologist

DISCLAIMER

We certify that this letter report is accurate and complete and accords with the information available during the site investigation. Information obtained during the site investigation or provided by third parties is believed to be accurate but is not guaranteed. We have exercised reasonable skill, care, and diligence in assessing the information obtained during the preparation of this letter report.

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REFERENCES

County of Simcoe. 2007. *The County of Simcoe Official Plan*. Consolidated August 2007.

<http://www.simcoe.ca/Planning/Documents/SCOP.pdf>

Ontario Ministry of Natural Resources and Forestry (MNRF). 2016. *Natural Heritage Information Centre*. Species of conservation concern, rare and exemplary plant communities, wildlife concentrations areas, and natural areas database.

<http://www.ontario.ca/environment-and-energy/natural-heritage-information-centre>

Nottawasaga Valley Conservation Authority (NVCA). 2016. Personal communication.

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**SCHEDULE C MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT
PHASES 3 & 4 COMMUNITY OF COLGAN WASTEWATER TREATMENT PLANT
ECOLOGY AND FLUVIAL GEOMORPHOLOGY FIELD ASSESSMENT**

Report Prepared for:
EXP SERVICES INC

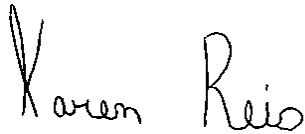
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MATRIX SOLUTIONS INC.

March 2017
Mississauga, Ontario

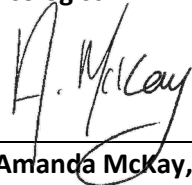
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**SCHEDULE C MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT
PHASES 3 & 4, COMMUNITY OF COLGAN WASTE WATER TREATMENT PLANT
ECOLOGY AND FLUVIAL GEOMORPHOLOGICAL FIELD ASSESSMENT**

Report prepared for exp Services Inc., March 2017



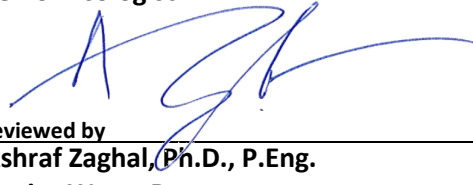
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**reviewed by
Arnel Fausto, M.Sc
Senior Ecologist**



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Ashraf Zaghaf, Ph.D., P.Eng.
Senior Water Resources
Engineer**

John Parish, P.Geo., Principal Geomorphologist, also contributed to the review of this draft report.

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1 INTRODUCTION

To accommodate the anticipated future growth in the community of Colgan, the existing municipal services require upgrading to meet the current Ontario surface water and groundwater quality protection targets. Private residences within Colgan are currently on individual septic systems. The proposed upgrades would connect these homes to a centralized sanitary sewer system and a new Wastewater Treatment Plant (WWTP); improving groundwater and surface water quality conditions within the local subcatchment area (PLAN B, 2015).

A Master Servicing Plan (MSP) was completed in 2010 which identified the preferred option for water and sanitary servicing in Colgan (Burnside, 2010). Additional sanitary and water serving options were investigated in an MSP amendment in January 2016. The amendment identified a preferred option (Option WWT-3) with an outfall to Bailey Creek (Greenland 2016). The MSP amendment was completed as a Schedule 'B' Class Environmental Assessment (EA). Part II order requests were received including bump-up requests regarding the location of the WWTP site and forcemain outfall. exp Services Inc. was retained to address these requests as part of the Phases 3 and 4 of the Municipal Class - Schedule 'C' EA process.

Since the completion of Phase 2 of the EA, changes have been made to the property ownership, allowing for more flexibility in the location of the proposed WWTP, outfall, and sanitary forcemain. Matrix Solutions Inc. was retained by exp to provide a Phase 2 level natural heritage evaluation of the WWTP location, forcemain, and outfall, as well as an initial field assessment of the ecologic and geomorphic features surrounding the new proposed location for Phases 3 and 4.

The initial Phase 2 level natural heritage memo was prepared and provided to exp in November 2016. The report provided a desktop level comparison of the environmental constraints associated with the original and newly proposed WWTP, forcemain, and outfall locations (Matrix, 2016). This report is a summary of the initial field investigation and focuses mainly on the preferred option identified by the MSP.

1.1 Study Area

The study area is located within the Innisfil Creek subwatershed, northwest of Colgan in the Township of Adjala-Tosorontio. This area is north of the Oak Ridge Moraine and regulated by the Nottawasaga Valley Conservation Authority (NVCA) and County of Simcoe. The study area encompasses of both the original and newly proposed WWTP and forcemain routes and is shown on Figure 1.

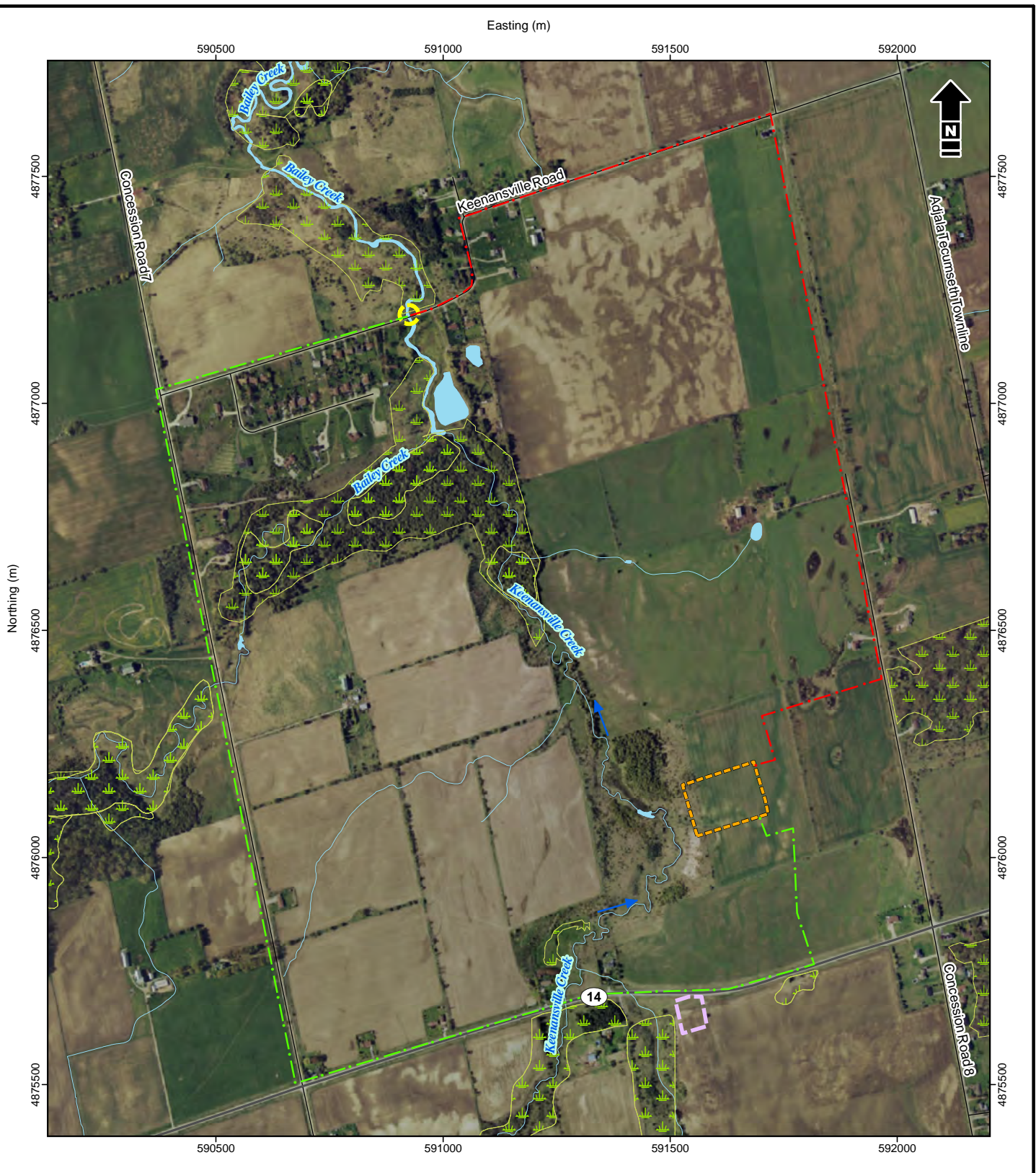
1.2 Original and Newly Proposed Waste Water Treatment Plant and Forcemain Locations

The WWTP design contains three components: the WWTP facility, forcemain route, and outfall. The purchase of additional lands by Tribute has increased the flexibility in the location of the WWTP facility and forcemain route. This has led to a new proposed configuration which provides a shorter forcemain length and contains no valley corridor or watercourse crossings.

The new proposed WWTP site is located north of County Road 14 and west of 8th Concession Road, on the east side of Keenansville Creek. The new proposed forcemain route connecting the WWTP to the outfall runs north along 8th Concession Road, through an unopened road allowance, and then west along Keenansville Road. The proposed outfall location is located at the bridge crossing of Bailey Creek at Keenansville Road.

The original proposed WWTP is located just south of County Road 14 and west of 8th Concession Road. This design also included a Sanitary Pumping Station which was located north of County Road 14 and west of 8th Concession Road (where the new proposed WWTP is located). The original forcemain route was located west along County Road 14, north along Concession Road 7, and east along Keenansville Road.

This report focuses on the field assessment surrounding the new proposed WWTP configuration.



Reference: Data obtained from NVCA, Simcoe County, Ontario, Base Mapping, Geobase used under license. Imagery from County of Simcoe (2002) used under license.

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120 0 120 240 m

NAD 1983 UTM Zone 17N

- Proposed WWTP Location
- Original WWTP Location
- Outfall Location
- Wetland
- Water Body
- Watercourse
- Flow Direction
- Highway
- Road
- Original Forcemain
- Proposed Forcemain

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EXP Service Inc.
Natural Heritage Assessment Study Update for the Hamlet of Colgan

Study Area

Date: 03 Mar 2017	Project: 24321	Technical: K. Reis	Reviewer: A. Fausto
Drawn: C. Curry			Figure 1

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2 BACKGROUND AND EXISTING CONDITIONS

A Natural Heritage Assessment Study (NHAS) was prepared by PLAN B Natural Heritage in June 2015, in conjunction with the MSP, to address the natural heritage features surrounding the original sanitary sewer system and new WWTP. Matrix Solutions provided a desktop update to the NHAS for the new proposed WWTP and forcemain locations in November 2016. This section summarizes the information found in these document, as well as additional background on the existing conditions in the study area.

2.1 Overview

The land use surrounding the proposed facilities in the study area are largely comprised of agricultural lands with a few hedgerows and natural valley corridors. Watercourses in the area include Bailey Creek, Keenansville Creek, as well as various small unnamed tributaries to both creeks. Keenansville Creek flows north through the study area and confluences with Bailey Creek south of Keenansville Road. Bailey Creek then continues to flow north, joining Beeton Creek, and then into the mainstem of Innisfil Creek.

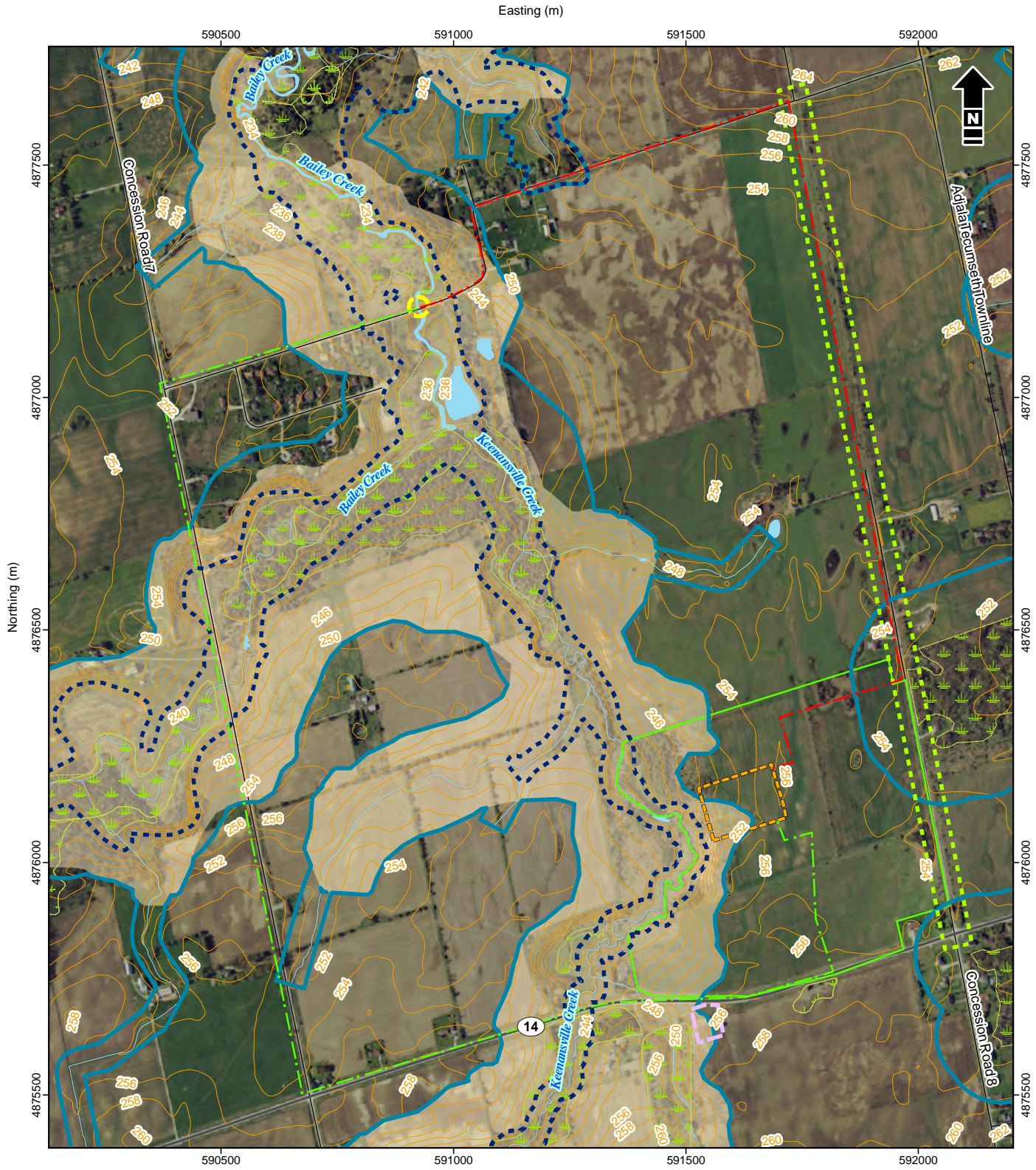
Watercourse conditions in Innisfil Creek are generally considered poor due to intense agricultural land use. The 2013 Subwatershed Health Check for Innisfil Creek (NVCA, 2013) has indicated the following conditions with respect the natural features within the subwatershed:

- Forest Conditions - Poor and declining.
- Stream Health - Poor and declining.
- Wetland Health - Fair and declining.
- Groundwater health - Very good. Groundwater in the subwatershed continues to be monitored in partnerships with the Provincial Groundwater Monitoring Program and the Ministry of the Environment. Results have indicated that the water quality in the monitored wells meets the Ontario Drinking Water Quality Standards.

The new proposed forcemain route does not intersect any existing waterbodies or valley corridors; however, it appears to be adjacent to an existing unevaluated wetland. Discharge from the WWTP will outlet into Bailey Creek on the east side of the Keenansville Road bridge. The exact location of the outfall on the north or south bank will depend on the bank suitability and corridor suitability.

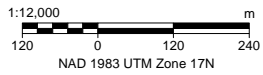
The original forcemain route intersects three existing watercourses, as well as their associated valley corridors (PLAN B, 2015). This route also contains more variation in topography, undergoing several elevation changes along the profile to the Bailey Creek outfall.

The existing conditions of the study area provided on Figure 2.



I:\EXP\Services\24321\1\FiguresandTables\GNY2016\Report\Figure-2-Existing_Conditions_and_Inventory_Overview.mxd

- ELC
- Tree Inventory (30m Buffer from ROW for extent)
- Estimated Flood Hazard (NVCA)
- Regulated Valley Extent (NVCA)
- Regulated Valley Slope (NVCA)
- Proposed WWTP Location
- Original WWTP Location
- Outfall Location
- Wetland
- Water Body
- Watercourse
- Highway
- Road
- Elevation Contour (2m)
- Original Forcemain
- Proposed Forcemain



EXP Service Inc.
Natural Heritage Assessment Study Update for the Hamlet of Colgan

Existing Conditions and Inventory Overview

Date: 03 Mar 2017	Project: 24321	Technical: K. Reis	Reviewer: A. Fausto	Drawn: C. Curry
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2.1.1 Surficial Geology

A general understanding of the geology and geography of the study area provides insight into the existing channel form. The underlying geology influences the rate of channel change, the sediment input, and the channel geometry. The proposed WWTP and forcemain route are located in the Wildfield/Kettleby Till consisting of clayey silt to silt till. Surficial material surrounding Keenansville and Bailey Creek consists of fluvial deposits including gravel, sand, silt, and clay material.

2.1.2 Topography

Topography generally exhibits low slopes, with the exception of the valley corridors around the watercourses. Elevations range from 256 masl at the WWTP facility to 234 masl at the Bailey Creek outfall. The natural valley corridor of Keenansville Creek is located along the westerly limits of the proposed WWTP facility. The corridor is largely forested with a mix of coniferous and deciduous tree species (PLAN B, 2015).

NVCA regulated areas have been mapped for wetland and watercourses and provided for the study area. The regulated areas provide a hazard limit related to flooding and erosion around natural features including watercourse, wetlands, lakes, steep slopes, and floodplains. This boundary limit is used to prevent damage and protect the surrounding and downstream environment. Regulated limits are defined for the watercourse based on the unconfined (no apparent valley) or confined (apparent valley) nature of the surrounding landscape.

Based on the topography in the area, both Bailey and Keenansville Creek are considered confined and subject to the regulatory limits based on the stability of the surrounding valley slopes. The NVCA has provided boundaries that delineate the regulated slope valley and regulated extents. A portion of the regulated slope/extent boundary falls into the proposed area of the WWTP and the outfall location.

2.2 Aquatic Environment

2.2.1 Watercourses

Keenansville Creek and Bailey Creek (Camplin Branch) have exhibited poor aquatic habitat attributes due to intensive agricultural land use and lack of riparian cover. The impaired water quality and lack of good quality habitat has limited the fisheries potential within these watercourses. Although Keenansville Creek has exhibited degraded conditions, it has been classified as a cold water stream which provides habitat for Brook Trout (*Salvelinus fontinalis*). No designated aquatic species at risk (SAR) were documented in water bodies or ponds near the existing Colgan Wells (PLAN B, 2015).

2.2.2 Wetlands

There are several low lying wetland communities within the study area. The wetlands within the study area are regulated by the NVCA under their *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses* regulation (Government of Ontario, 2016). The majority of wetland habitats observed within the area are associated with the valley lands of Baileys Creek and Keenansville Creek which occur in low lying areas and floodplains and consist primarily of deciduous/mixed swamp communities. These wetlands are part of a larger core natural area and corridor which provides linkages between the Oak Ridges Moraine and the Nottawasaga River. An unevaluated wetland community was noted along 8th Concession Road (PLAN B, 2015), separate from the valley land wetland communities.

2.3 Terrestrial Ecology

2.3.1 Species at Risk

The Natural Heritage Information Centre (NHIC) database was reviewed to determine the presence/absence of SAR within the study area (MNRF, 2016a). A Stage 1 project screening request was also sent to the Midhurst District Ministry of Natural Resources and Forestry (MNRF) on November 22, 2016. The project screening request was required to determine the likelihood of SAR and/or their habitat to occur within the study area or be impacted by the change in land use. A response was received on November 30, 2016 (MNRF 2016b, Appendix C). The NVCA was also consulted on October 24, 2016, to acquire any additional ecological information pertinent to the study area (NVCA, 2016). Based on the information provided by the agencies and a review of the background data for the study area, the following species have been previously recorded within the study area:

- Bobolink (*Dolichonyx oryzivorus*)
- Eastern Meadowlark (*Sturnella magna*)
- Butternut (*Juglans cinerea*)
- Common Snapping Turtle (*Chelydra serpentina*)

2.3.2 Wildlife

There are a number of connected riparian forests and wetland habitats within the study area which likely support a variety of important functions for wildlife. These functions include overwintering habitat, habitat for area sensitive birds, and habitat for wetland species such as amphibians and reptiles, as well as species movement corridors (PLAN B, 2015).

2.3.3 Environmentally Significant Areas

The study area does not contain provincially, federally, or locally designated sensitive features or areas such as Provincially Significant Wetlands (PSW), Environmentally Significant Areas (ESA) or Area of Natural and Scientific Interest (ANSIs) (PLAN B, 2015). However, a section of the Bailey Creek ravine was identified as a County Greenland within the County of Simcoe. County Greenlands are areas which have been identified as having natural heritage features and linkage functions (Simcoe, 2007).

2.3.4 Vegetation

The study area is largely comprised of agricultural lands with limited tree cover. Natural vegetation and habitat is limited to the valley corridors. These natural corridors within the study area provide an important linkage between the Oak Ridges Moraine to the south and the Nottawasaga River to the northeast. No rare tree species or specimen trees were recorded along the original pipe routes during the field inventory completed by PLAN B (PLAN B, 2015).

3 FIELD ASSESSMENT

A site visit was conducted on November 21, 2016 to obtain further details regarding the existing natural heritage and geomorphic conditions. The field assessment was aimed at ground-truthing the desktop information and delineating the limits of natural heritage constraints associated with the area of the proposed WWTP, forcemain, and outfall locations. The following assessments were completed:

- Ecological Land Classification (ELC)
- tree inventory
- SAR screening
- aquatic habitat assessment
- geomorphic assessment

The location of the field inventory assessments are provided on Figure 2. Site photographs are provided in Appendix A. Results from the field assessments are documented in the following sections.

3.1 Natural Heritage Assessment

This natural heritage field assessment summary examined both the terrestrial and aquatic ecology features surrounding newly proposed WWTP facility configurations. The assessment builds upon the findings from the desktop assessment completed by PLAN B (2015) and Matrix (2016).

3.1.1 Terrestrial Ecology

Ecological Land Classification

An ELC assessment took place surrounding the newly proposed WWTP location (Figure 3). Vegetation resources were characterized using ELC data collected by Matrix November 21, 2016. Individual vegetation communities were delineated and classified by Matrix according to the *Ecological Land Classification for Southern Ontario: First Approximation and Its Application* (Lee et al. 1998) and later unpublished updates to the protocol in 2008.

The natural areas surrounding the newly proposed WWTP were comprised of the following ELC polygons:

- **Dry-Fresh Deciduous Shrub Thicket Ecosite (THDM2)** - This shrub thicket is located within the valley lands adjacent to Keenansville Creek. The canopy is comprised of Crab Apple species, Buckthorn species, and Hawthorn species. The understory is predominately comprised of tall herbs, such as goldenrod species, as well as tall grasses along the creek.
- **Fresh-Moist White Cedar - Hardwood Mixed Woodland Type (WOMM4-1)** - The woodland is located within the valley lands just north of (THDM2), as well as along the top of the valley lands adjacent to the agricultural fields. The canopy is predominately comprised of Eastern White Cedar, Scotts Pine, as well as a number of hardwood species such as Maple species, Ash species, and Elm species. The sub canopy is largely comprised of Eastern White Cedar, Buckthorn species, and Crab Apple species. The understory contained a number of grasses and herbs such as goldenrod.
- **Annual Row Crops (OAGM1)** - The agricultural lands surrounding the areas consisted of soy bean crops during the 2016 assessment. The crops within this area are likely rotated and therefore it is not expected that soy bean crops will be present each year.

Tree Inventory

A tree inventory was completed along 8th Concession Road/Road allowance between County Road 14 and Keenansville Road along the proposed new forcemain route (Figure 2). Trees located or appearing to be located within the Right of Way (RoW) with a diameter at breast height greater than 10 cm were recorded. Trees located on the far side of existing fence rows (i.e., private land) were not documented. A total of 45 trees were recorded as part of the inventory (Table 1). No SAR tree species, namely Butternut, were observed. The detailed tree inventory data, including individual sizes is presented in Appendix B.

TABLE 1 Tree Inventory Summary

Species Scientific Name	Species Common Name	Number of Trees	Location
<i>Rhamnus cathartica</i>	Common Buckthorn	5	8 th Concession Road
<i>Ulmus sp.</i>	Elm sp.	1	8 th Concession Road
<i>Prunus sp.</i>	Cherry sp.	2	8 th Concession Road
<i>Populus grandidentata</i>	Large-toothed Aspen	10	8 th Concession Road
<i>Acer sp.</i>	Maple sp.	5	8 th Concession Road
<i>Robinia pseudoacacia</i>	Black Locust	4	8 th Concession Road
<i>Picea sp.</i>	Spruce sp	1	9 th Concession Road
<i>Malus sp.</i>	Crab Apple sp.	17	Road Allowance

The majority of trees tallied along 8th Concession Road were located along the east side of the road in front of residential properties, with the most prominent tree species being Large-toothed Aspen. The road allowance was comprised of a Crab Apple thicket which created a vegetated buffer between two agricultural fields. Due to the timing of the assessment, many of the trees could not be identified to species due to lack of tree foliage and difficulty observing the buds.

Species at Risk

The Bobolink (*Dolichonyx oryzivorus*) and Eastern Meadowlark (*Sturnella magna*) have been identified through the NHIC database as a SAR within study area. Both these species have been designated as ‘Threatened’ under the *Endangered Species Act 2007 (ESA)* (Government of Ontario, 2008).

The Bobolink and Eastern Meadowlark rely upon grasslands for breeding and have similar breeding distributions in Ontario. Potential habitat for these species occurs in scattered patches across the landscape. During the field assessment, no suitable habitat was identified within the newly proposed WWTP area. The agricultural fields contained soy bean crops which are not suitable as nesting habitat for this species. However, the current land use of soy crops does not preclude the presence of these species as agricultural crops are often rotated from year to year. It is recommended that a breeding bird survey be completed at the detailed design stage during the breeding bird season (April to August) to confirm presence/absence of SAR species and address areas of suitable or confirmed habitat of these species.

The Midhurst MNRF consultation identified that Butternut (*Juglans cinerea*) could potentially be found within the study area. The Butternut tree has been designated as ‘Endangered’ under the ESA due to the Butternut canker disease. No Butternut trees were recorded from the municipal RoW or observed elsewhere in the study area during the field visits completed by PLAN B in 2015 or by Matrix staff in 2016.

Correspondence with the NVCA indicated the presence of Common Snapping Turtle (*Chelydra serpentina*). The Common Snapping Turtle has been designated as 'Special Concern' under the ESA. This species requires aquatic habitat, such as wetland or pools, as well as appropriate nesting habitat with gravel and sand substrates. No Common Snapping Turtles were recorded during the field visits performed by PLAN B in 2015 or by Matrix staff in 2016; however, local landowners have observed this species crossing 8th Concession Road. Nesting habitat may be located along 8th Concession Road and supported by the local wetland on the east side of 8th Concession Road (NVCA, 2016).

3.1.2 Aquatic Ecology

Fish Habitat Assessment

A modified approach to the Ontario Stream Assessment Protocol (OSAP) was used to assess fish and fish habitat at the proposed outfall location shown on Figure 4 (Stanfield, 2013). This protocol assists in documenting physical characteristics of a watercourse and in evaluating habitat parameters in a consistent manner. Due to the location of the outfall within private property, the assessment took place within the RoW to a maximum of 30 m from the edge of the road. The assessment included the following parameters:

- general watercourse characteristics (i.e., stream pattern, confinement, and gradient)
- channel characteristics (i.e., wetted width, cross sectional depth, velocity profile and depth of pools/riffles/runs)
- field water quality parameters (i.e., pH, electrical conductivity, water temperature, dissolved oxygen concentration)
- substrate and bank materials
- other pertinent habitat features (i.e., fish habitat potential, barriers to fish movement, and macrophytic growth)
- photographic documentation of the crossing locations and surrounding areas

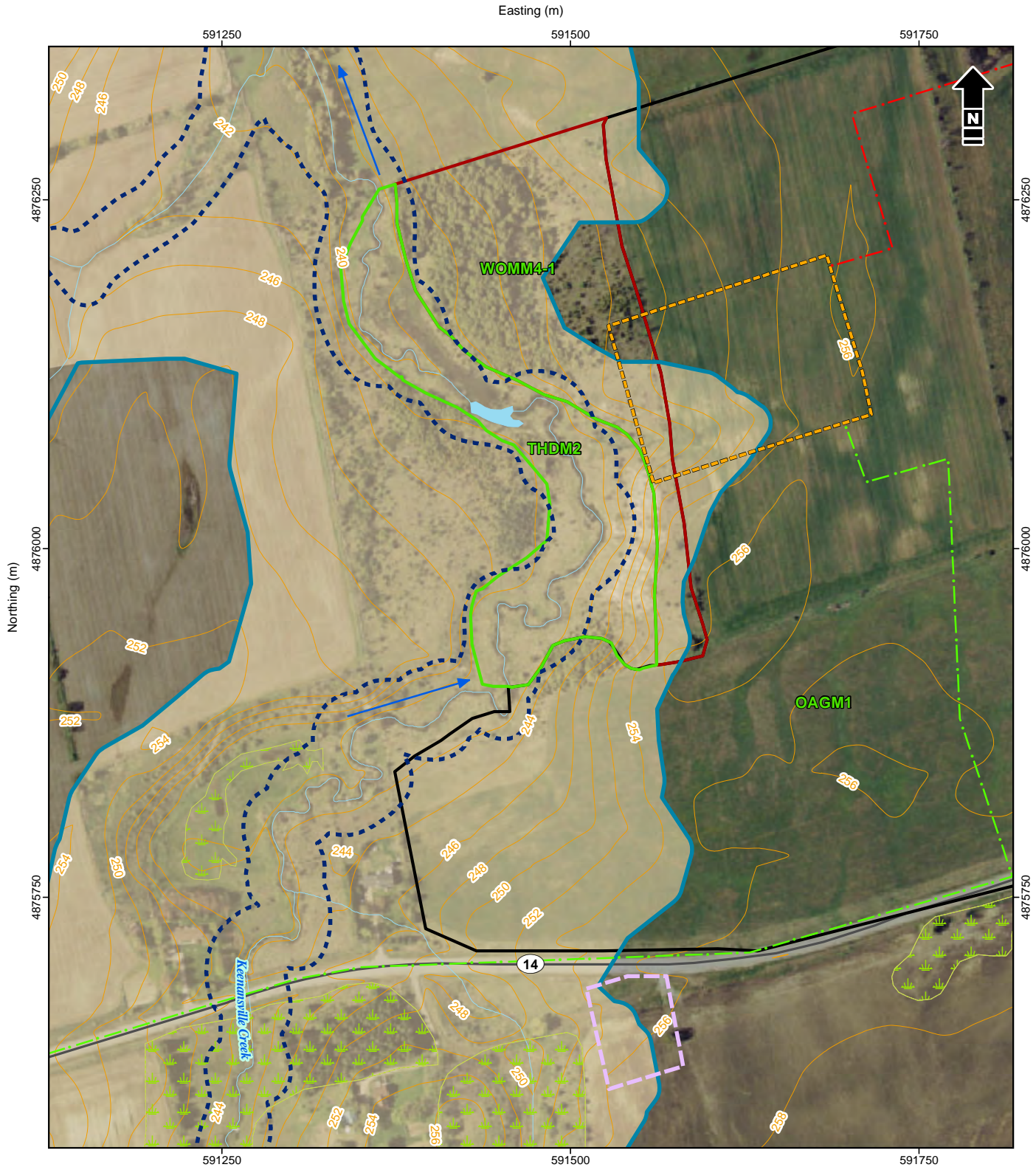
Table 2 provides a summary of the fisheries habitat assessed within the 30 m RoW.

TABLE 2 Fisheries Habitat Assessment Summary of Bailey Creek

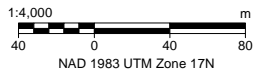
Location	30 m Upstream and Downstream of Keenansville Road Bridge
Channel Characteristics	Riffle/pool habitat Watercress present Average bankfull width = 5 m (range 4.5 to 7.0 m) Average bankfull depth = 0.8 to 1.0 m Wetted width = 4 m
Stream Bank Characteristics	Bank slope = 45 to 90° Riparian vegetation = tall grasses, herbs, and shrubs
Riffle Substrate Composition	50% small cobble, 40% gravel, 10% large cobble
Cover (%)	Canopy cover= 10% Overhanging vegetation = 10% Woody debris= 0% Undercut banks = 5% Depth of water = 30 cm Instream vegetation = 10% Boulder cover = 20%
Water Quality	pH=8.32 Temp=1.1°C Conductivity= 563us/cm Dissolved oxygen= 11.60 mg/L
Fish Habitat	The area contained important riffle habitat which may be utilized by many species for spawning and benthic production. The presence of watercress within the riffle habitat indicates potential groundwater seeps and upwelling areas which are important for Brook Trout spawning success. The bridge provides shade and thermal refugia during the summer months.

A visual assessment of the watercourse outside of the RoW was performed using field photographs and air photographs to further analyse fish habitat within the proposed outlet area. The area upstream of the bridge has a more consistent pool-riffle sequence which provides varying habitats for fisheries utilization. There is also abundant tree cover which provides shade and refugia during the summer months. The area downstream of the bridge does not contain a consistent pool-riffle sequence. This may be the result of a lower stream gradient or due to beaver dams located downstream which have created a backwatering effect. Within the meander bends, there is an accumulation of woody debris which is often utilized by fish for refugia.

Depending on the placement of the proposed outfall location, a detailed fisheries assessment beyond the RoW may be required during the detailed design phase to address potential sensitive habitats upstream and downstream of the RoW.



- Estimated Flood Hazard (NVCA)
- Regulated Valley Extent (NVCA)
- Regulated Valley Slope (NVCA)
- Proposed WWTP Location
- Original WWTP Location
- Wetland
- Water Body
- Watercourse
- Flow Direction
- Highway
- Elevation Contour (2m)
- Original Forcemain
- Proposed Forcemain
- Dry-Fresh Deciduous Shrub Thicket Ecosite (THDM2)
- Fresh-Moist White Cedar-Hardwood Mixed Woodland Type (WOMM4-1)
- Annual Row Crops (OAGM1)



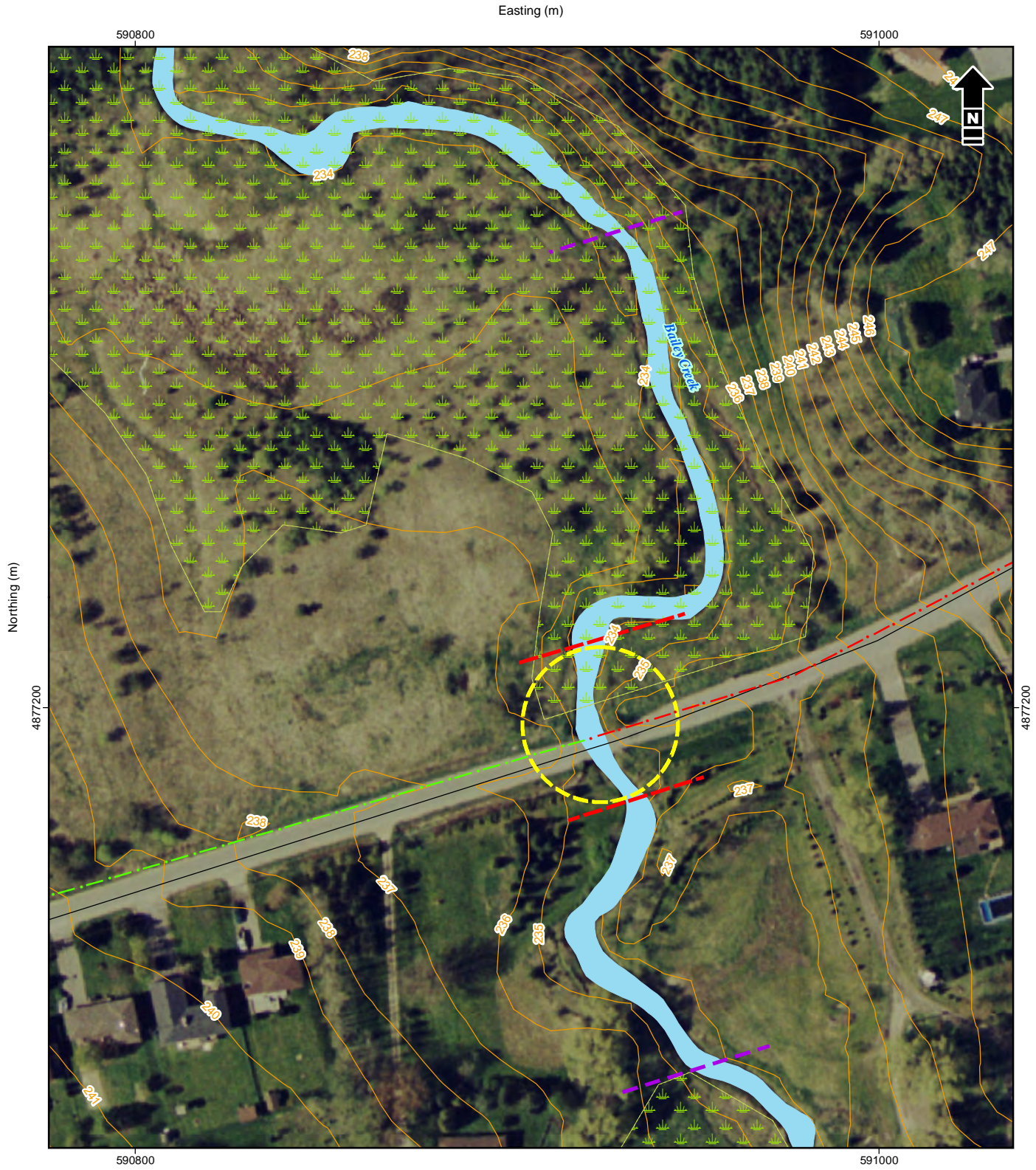
EXP Service Inc.
Natural Heritage Assessment Study Update for the Hamlet of Colgan

Proposed WWTP Location

Date: 03 Mar 2017	Project: 24321	Technical: K. Reis	Reviewer: A. Fausto	Drawn: C. Curry
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Disclaimer: The information contained herein may be compiled from numerous third party materials that are subject to periodic change without prior notification. While every effort has been made by Matrix Solutions Inc. to ensure the accuracy of the information presented at the time of publication, Matrix Solutions Inc. assumes no liability for any errors, omissions, or inaccuracies in the third party material.

Figure 3



- Outfall Location
- Wetland
- Watercourse
- Road
- Elevation Contour (1m)
- Original Forcemain
- Proposed Forcemain
- Limit of field survey (30 m from Road)
- Project assessment (100 m from Road)



EXP Service Inc.
Natural Heritage Assessment Study Update for the Hamlet of Colgan

Proposed Outfall Location

Date:	16 Dec 2016	Project:	24321	Technical:	K. Reis	Reviewer:	A. Fausto	Drawn:	C. Curry
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Reference: Data obtained from NVCA, Simcoe County, Ontario Base Mapping, Geobase used under license. Imagery from County of Simcoe (2002) used under license.

3.2 Geomorphic Assessment

A geomorphic field assessment was completed to investigate the conditions of Bailey Creek upstream and downstream of the Keenansville Road Bridge crossing. The assessment particularly focused on the recommended placement of the proposed WWTP effluent outfall (Figure 4). A brief characterization of Keenansville Creek and the surrounding valley system was also completed in the vicinity of the proposed WWTP facility (Figure 3).

Geomorphic field assessments generally aim to evaluate the creek using two established synoptic surveys: the Rapid Geomorphic Assessment and the Rapid Stream Assessment Technique. These assessment tools are applied on reach scale evaluations which can vary between 200 m and 2 km. Although the field crew planned to walk several hundred meters of Bailey Creek, the assessment was reduced due to private land ownership. Therefore, the typically reach wide field assessment could not be completed and the characterization was confined to the 30 m road RoW.

3.2.1 Bailey Creek at the Proposed Outfall

Bailey Creek was assessed approximately 30 m upstream and downstream of the Keenansville Road bridge crossing. Surrounding vegetation consisted of tall grasses, shrubs, and coniferous and deciduous tree species. There was no evidence of broken or leaning trees, and no woody debris was noted through this section of the channel. Table 2 outlines the general characteristics of the channel during the field assessments.

TABLE 3 Channel Characteristics of Bailey Creek Observed During Geomorphic Assessments

Channel Characteristic	Bailey Creek at Keenansville Road Bridge
Bankfull Width (m)	4.5 to 7.0 (average 5.0)
Bankfull Depth (m)	0.8 to 1.0
Gradient	Moderate to Low
Channel Form	Sinuuous with riffle/pool habitat
Bed Substrate	silt/fine sand (pool) - cobble/gravel/boulders
Bank Heights	1.0 to 2.0 m
Bank Angles	45° to 90°
Bank Substrate	silt/sand/pebbles
Surrounding Vegetation	Tall grasses

Bankfull widths in the channel ranged from 4.5 m to 7.0 m, with the widest section occurring underneath the existing bridge. The channel has migrated under the bridge, along the north edge of the western abutment. This migration may have occurred due to the lack of vegetation under the bridge, which causes some instability of the channel banks making them more susceptible to erosion and channel widening. No scour was noted at the edge of either abutment.

There was a wide distribution of bed substrates from silt, and fine sand in the pool features and gravel, cobble, and boulders in the riffles. The coarse riffle material may have been placed in the channel with the construction of the bridge to prevent incision around the abutments. Bank material predominantly consisted of silt, sand, and pebbles, consistent with the fluvial surficial material mapped through the area.

Steeper banks were observed on the northwest side of the channel and the transition between the floodplain appeared more abrupt than the other banks. Low bank heights were noted on the southwest side of the bridge, and the area appeared to be maintained by the property owners. On the west side of the channel and upstream of the bridge, an existing low gradient, a highly vegetated ditch was noted between the road and the edge of the adjacent forest. On the downstream west side of the bridge, a flat, open grassed area measuring approximately 15 by 50 m was noted between the top of bank and the road.

In the vicinity of the bridge, the creek channel exhibited riffle/pool morphology. The downstream side of the crossing channel appeared to be backwatered, possibly from a natural (beaver or debris jam) control that was observed through aerial imagery. Upstream of the crossing, the channel morphology exhibits a slight meander towards the east, before straightening as it enters beneath the bridge crossing. Approximately 30 m downstream of the channel, a sharp 90 degree meander forces the channel eastward before another 90 degree meander turns the channel north again. It is uncertain at this time if the channel has been historically adjusted to accommodate the road and bridge crossing.

The geomorphic conditions of Bailey Creek in the road RoW indicates that the channel is relatively stable with few indicators of active erosion. Some undercutting was noted on the outer bends and steep bank angles were observed throughout most of the reach. Bank heights appear to increase as the channel travels downstream, although the limited length of assessment cannot confirm this channel function. The combination of these factors may indicate that the dominant channel processes would be widening and/or degradation.

3.2.2 Keenansville Creek at the Proposed Waste Water Treatment Plant

Keenansville Creek was also locally examined adjacent to the proposed WWTP location. As shown on the study area mapping, Keenansville Creek is located in a confined valley that is largely vegetated with trees and shrubs. South of the WWTP facility, the eastern valley wall is exposed and contains a small area of sparse vegetation with exposed rill formations consisting of silt and sand mixed with gravel. This exposure could act as a sediment source for the channel, allowing sediment to enter the watercourse where it is in close proximity to the channel banks.

The channel morphology in these areas is sinuous, with meanders moving towards and away from the valley walls. Bankfull width at a cross-section directly west of the WWTP was estimated at 3 m with bankfull depth at 1 m. Banks were nearly vertical and vegetated with tall grasses. Pool substrate consisted of silt/fine sand and possible clay sub pavement. Downstream of the pool, substrates of pebbles and cobble material were noted.

The water depth at the time of assessment was 0.5 m and appeared to be very slow moving and potentially backwatered from an impediment downstream. Historical beaver activities were noted in the area but there is no observed evidence indicating a recent dam effort. Aerial imagery of the watercourse noted that there could be some beaver impact or woody debris jams downstream.

4 DISCUSSION AND RECOMMENDATIONS

4.1 Waste Water Treatment Plant

The surrounding natural area of the proposed WWTP is comprised of agricultural crop fields consisting of soy beans during the 2016 field visit (Figure 3). The area contains historical records of Bobolink and Eastern Meadowlark which are both designated as 'Threatened' under the ESA. Although the soy bean fields would not be classified as suitable habitat, this does not preclude the presence of this species. The top of the valley slope consists of deciduous and coniferous tree species which transitions into a thicket habitat within the valley. No SAR or significant natural heritage species were observed during the November 21, 2016 field visit. It is recommended that a breeding bird survey and incidental wildlife survey be conducted within the breeding bird season (April to August) prior to or during the detailed design phase to address areas of suitable or confirmed habitat for wildlife species including SAR.

Keenansville Creek is a low gradient, sinuous watercourse that was well connected to the surrounding floodplain within the valley corridor. The watercourse does not appear to be actively migrating or adjusting towards the location of the WWTP. Pending the placement of the facility within the proposed WWTP outline, the facility could be infringing on the NVCA regulated area and regulated slope valley. If the placement of the WWTP facility is in the northeast side of the proposed outline, it would be outside of the hazard limit and require no further assessment. If the facility is placed more towards the southwest portion of the outline, it would be within the NVCA regulated area and could potentially require a localized erosion hazard limit delineation to confirm and evaluate the potential risk.

Additionally, if there is a need for the emergency overflow from the WWTP to Keenansville Creek, a historical analysis of the watercourse planform and rate of adjustment can be examined. This information will aid in the placement of the overflow to reduce erosion in the event of an emergency.

4.2 Forcemain

The newly proposed forcemain will connect to the WWTP and travel north along 8th Concession Road and continue past the unopened road allowance where it will then travel west along Keenansville Road and outlet at Bailey Creek. The tree inventory along this route did not identify any SAR or specimen trees. The vast majority of mature trees were located along the east side of the road and were most often associated with residential properties. During the November 2016 field assessment, no active signs of Snapping Turtle habitat were observed along the road. Given that there is wetland habitat along the east side of 8th Concession Road, it is still likely that this species is present within the area. It is therefore recommended that a biologist monitor this area during the breeding season (April to October) prior to construction to ensure no Snapping Turtles or Snapping Turtle nests are disturbed during construction.

To reduce the amount of impact to the residential trees along 8th Concession Road, as well as the adjacent wetland complex, it is recommended that the forcemain be installed along the west side of the road.

There are no geomorphic constraints associated with the forcemain route as the proposed route does not intersect valley corridors or watercourse crossings.

4.3 Outfall

The proposed outfall is located adjacent to Keenansville Road and will outlet into Bailey Creek. The fisheries assessment took place within the 30 m RoW due to restrictions with private property access. The area contained riffle habitat which may be utilized by many spawning species. The presence of watercress within the riffle habitat suggests the potential for groundwater seeps which are important for Brook Trout spawning success.

The practical placement of the outfall to Bailey Creek is on the east side, where the forcemain would travel from to eliminate the need for a creek crossing. The outfall should be placed on the downstream (north) side of crossing and as far back from the creek as possible, allowing water to dissipate its energy before entering to ensure that scour is not occurring in the vicinity of the bridge. As the outfall is expected to discharge wastewater effluent flows at a maximum rate of 668 m³/day (0.008 m³/s), there is little risk of the outfall increasing erosion with proper placement and design of bank erosion control measures.

The elevation of the outfall should be positioned above the bank to prevent backwater and submerging of the outfall. Placement of the outfall away from the bank will also prevent potential undermining of the pipe and allow for some natural adjustment of the creek without risk to the outfall. A migration assessment can be completed to better understand the historical migration of Bailey Creek at the Keenansville Bridge Crossing and predict potential future adjustment. The information can further inform and confirm the placement recommendation of the outfall.

Vegetation is a stabilizing agent for the banks in the area, and allowing the continuous flow of water from the outfall over a large area may reduce growth. A small, vegetated channel can be used to convey water from the outfall to the creek. This design will prevent erosion on the banks and provide a defined flow path for the water to enter the creek. The transition to the creek should aim to be as natural as possible and aim to enter the creek on an angle parallel with the flow. A riffle is located just downstream of the bridge and may be the best location for flow to enter. The larger substrate at the riffle will again reduce the risk of potential bed scour and erosion.

5 SUMMARY

On November 21, 2016 a field assessment was completed for the natural heritage and geomorphic conditions surrounding the proposed community of Colgan WWTP including the WWTP facility, forcemain routes, and outfall location. The background and field assessment found limited constraints associated with the natural environment surrounding the new proposed facilities. Overall, the new proposed WWTP facility location and forcemain route poses less risk to the natural environment. The new proposed configuration provides a shorter forcemain length and contains no valley corridor or watercourse crossings.

The WWTP location is proposed in an existing soybean field and has flexibility in term of placement and proximity to the regulated valley slope. The proposed forcemain route is recommended to be installed on the west side of the road to avoid impacts to residential trees and the adjacent wetland complex. As discussed in Section 4.2 there are no proposed watercourse crossings along the forcemain that need to be evaluated for geomorphic or aquatic conditions. The proposed outfall location remains unchanged from the original location and poses little risk of increasing erosion with proper placement and design of bank erosion control measures.

Uncertainty still remains regarding the breeding bird habitat for the threatened species of Bobolink and Eastern Meadowlark in the vicinity of the proposed WWTP, as well as habitat of the Common Snapping Turtle along 8th Concession Road. Pending the detailed design of the Colgan WWTP, additional studies may be undertaken prior to or during detailed design to confirm the absence/presence and potential impacts to these species including breeding bird assessment and SAR assessment.

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APPENDIX A
Site Photographs



*Matrix Solutions Inc.
November 21, 2016*

1. Proposed WWTP location contains agricultural fields (soy beans) along the east and the natural valley corridor along the west.



*Matrix Solutions Inc.
November 21, 2016*

2. The valley corridor adjacent to the proposed WWTP contains an Eastern White Cedar –Hardwood mixed forest along the top of the valley as well as the northern portion of the property.



*Matrix Solutions Inc.
November 21, 2016*

3. The valley lands adjacent to the proposed WWTP contain a deciduous shrub ticket.



*Matrix Solutions Inc.
November 21, 2016*

4. Keenansville Creek located within the valley lands (adjacent to the proposed WWTP) is a low gradient creek system which meanders through this valley corridor towards Keenansville Road.



*Matrix Solutions Inc.
November 21, 2016*

5. Looking west on exposed valley slope on the east side of Keenansville Creek. South of the proposed WTP facility location.



*Matrix Solutions Inc.
November 21, 2016*

6. Looking northwest at Keenansville Creek (downstream) from the valley slope on the east side.



*Matrix Solutions Inc.
November 21, 2016*

7. Forested valley slope, looking southeast from Keenansville Creek, near the proposed WTP facility location.



*Matrix Solutions Inc.
November 21, 2016*

8. Forested east valley slope, looking east from the edge of Keenansville Creek.



*Matrix Solutions Inc.
November 21, 2016*

9. Tree Inventory along newly proposed forcemain route shows the majority of mature trees along the east side of 8th Concession Road.



*Matrix Solutions Inc.
November 21, 2016*

10. Tree inventory along the newly proposed forcemain route shows the existing vegetation within the road allowance.



*Matrix Solutions Inc.
November 21, 2016*

11. Outfall Location facing upstream towards Keenansville bridge. Riffle habitat with overhanging vegetation.



*Matrix Solutions Inc.
November 21, 2016*

12. Outfall location facing downstream towards Keenansville bridge. Watercress present along the toe of the right bank.



*Matrix Solutions Inc.
November 21, 2016*

13. Bailey Creek, looking upstream from Keenansville Road Bridge.



*Matrix Solutions Inc.
November 21, 2016*

14. Baily Creek, looking downstream from Keenansville Road Bridge



*Matrix Solutions Inc.
November 21, 2016*

15. Bailey Creek left (west) bank downstream of Keenansville Road bridge.



*Matrix Solutions Inc.
November 21, 2016*

16. Bailey Creek left (west) bank upstream of Keenansville Road bridge.



*Matrix Solutions Inc.
November 21, 2016*

17. Bailey Creek right (east) bank, downstream of Keenansville Road bridge.



*Matrix Solutions Inc.
November 21, 2016*

18. Bailey Creek right (east) bank, a few meters downstream of Keenansville Road bridge.



*Matrix Solutions Inc.
November 21, 2016*

19. Bailey Creek right (east) bank, upstream of Keenansville Creek bridge.



*Matrix Solutions Inc.
November 21, 2016*

20. North side of Keenansville Road, flat topography adjacent to Bailey Creek.



*Matrix Solutions Inc.
November 21, 2016*

21. Right bank of Bailey Creek, looking upstream. North of Keenansville Road.



*Matrix Solutions Inc.
November 21, 2016*

22. Bailey Creek, looking upstream, downstream of Keenansville Road bridge.



*Matrix Solutions Inc.
November 21, 2016*

23. Vegetated ditch, south side of Keenansville Road.



*Matrix Solutions Inc.
November 21, 2016*

24. South side of Keenansville Road, looking upstream at Bailey Creek. Low sloped and highly vegetated.

APPENDIX B

Tree Inventory

Project:	Schedule C Municipal Class EA- Phases 3 & 4 Community of Colgan Wastewater Treatment Plant				
Client:	EXP Services Inc.				
Collectors:	KR/AM				
Date:	21-Nov-16				
Location:	8 th Concession Road / Unopened Road Allowance				
Tree Count	Species Scientific Name	Species Common Name	DBH (cm)	Location	
				Street Name	Side of Street (NESW)
1	<i>Rhamnus cathartica</i>	Common Buckthorn	20	8th Concession Road	E
2	<i>Rhamnus cathartica</i>	Common Buckthorn	20	8th Concession Road	E
3	<i>Rhamnus cathartica</i>	Common Buckthorn	20	8th Concession Road	E
4	<i>Rhamnus cathartica</i>	Common Buckthorn	20	8th Concession Road	E
5	<i>Ulmus sp.</i>	Elm sp.	35	8th Concession Road	E
6	<i>Prunus sp.</i>	Cherry sp.	30	8th Concession Road	E
7	<i>Prunus sp.</i>	Cherry sp.	20	8th Concession Road	E
8	<i>Populus grandidentata</i>	Large-toothed Aspen	25	8th Concession Road	E
9	<i>Acer sp.</i>	Maple sp.	30	8th Concession Road	E
10	<i>Acer sp.</i>	Maple sp.	30	8th Concession Road	E
11	<i>Populus grandidentata</i>	Large-toothed Aspen	40	8th Concession Road	E
12	<i>Populus grandidentata</i>	Large-toothed Aspen	30	8th Concession Road	E
13	<i>Populus grandidentata</i>	Large-toothed Aspen	30	8th Concession Road	E
14	<i>Populus grandidentata</i>	Large-toothed Aspen	27	8th Concession Road	E
15	<i>Populus grandidentata</i>	Large-toothed Aspen	33	8th Concession Road	E
16	<i>Populus grandidentata</i>	Large-toothed Aspen	20	8th Concession Road	E
17	<i>Populus grandidentata</i>	Large-toothed Aspen	16	8th Concession Road	E
18	<i>Populus grandidentata</i>	Large-toothed Aspen	24	8th Concession Road	E
19	<i>Robinia pseudoacacia</i>	Black Locust	13	8th Concession Road	E
20	<i>Robinia pseudoacacia</i>	Black Locust	16	8th Concession Road	E
21	<i>Robinia pseudoacacia</i>	Black Locust	18	8th Concession Road	E
22	<i>Robinia pseudoacacia</i>	Black Locust	15	8th Concession Road	E
23	<i>Populus grandidentata</i>	Large-toothed Aspen	35	8th Concession Road	E
24	<i>Acer sp.</i>	Maple sp.	37	8th Concession Road	W
25	<i>Picea sp.</i>	Spruce sp.	13	8th Concession Road	W
26	<i>Acer sp.</i>	Maple sp.	56	8th Concession Road	E
27	<i>Acer sp.</i>	Maple sp.	58	8th Concession Road	E
28	<i>Malus sp.</i>	Crab Apple Sp.	16	Road Allowance	E
29	<i>Malus sp.</i>	Crab Apple Sp.	20	Road Allowance	E
30	<i>Malus sp.</i>	Crab Apple Sp.	25	Road Allowance	E
31	<i>Malus sp.</i>	Crab Apple Sp.	23	Road Allowance	E
32	<i>Malus sp.</i>	Crab Apple Sp.	14	Road Allowance	E
33	<i>Malus sp.</i>	Crab Apple Sp.	11	Road Allowance	E

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Tree Count	Species Scientific Name	Species Common Name	DBH (cm)	Location	
				Street Name	Side of Street (NESW)
34	<i>Malus sp.</i>	Crab Apple Sp.	16	Road Allowance	E
35	<i>Malus sp.</i>	Crab Apple Sp.	18	Road Allowance	E
36	<i>Malus sp.</i>	Crab Apple Sp.	20	Road Allowance	E
37	<i>Malus sp.</i>	Crab Apple Sp.	20	Road Allowance	E
38	<i>Malus sp.</i>	Crab Apple Sp.	22	Road Allowance	E
39	<i>Malus sp.</i>	Crab Apple Sp.	24	Road Allowance	E
40	<i>Malus sp.</i>	Crab Apple Sp.	20	Road Allowance	E
41	<i>Malus sp.</i>	Crab Apple Sp.	21	Road Allowance	E
42	<i>Malus sp.</i>	Crab Apple Sp.	22	Road Allowance	E
43	<i>Malus sp.</i>	Crab Apple Sp.	24	Road Allowance	E
44	<i>Malus sp.</i>	Crab Apple Sp.	23	Road Allowance	E
45	<i>Malus sp.</i>	Crab Apple Sp.	25	Road Allowance	E

APPENDIX C
MNRF Response Letter

From: Shirley, Brent (MNRF) <brent.shirley@ontario.ca>
Sent: Wednesday, November 30, 2016 10:57 AM
To: Karen Reis
Subject: RE: SARA screening

Hi Karen,

I have had a look at the species list that you are currently considering and it seems quite complete.

To demonstrate due diligence for species at risk (SAR), an ecological site assessment would not just consider known records of SAR but also, and most importantly, would have to consider the available habitat on the subject lands and what SAR have the potential to be present based on this habitat. As you are aware, given the private landscape in which we work and operate, it would be impossible to know all SAR that occur on private properties.

This list of species below, represents additional potential species at risk on the subject lands based on MNRF's screening /review of aerial photography of the subject lands and the available habitat on site.

- Butternut (END)

If you have any questions or concerns please feel free to contact me any time.

Best Regards,

Brent Shirley

A/ Management Biologist
Midhurst District Ministry of Natural Resources & Forestry
2284 Nursery Rd
Midhurst, ON
L0L 1X0

Phone- 705-725-7547

Fax- 705-725-7584

From: Karen Reis [<mailto:kreis@matrix-solutions.com>]
Sent: November-22-16 4:53 PM
To: Shirley, Brent (MNRF)
Subject: RE: SARA screening

Good Afternoon,

I am emailing in regards to additional species at risk information for the Colgan Schedule C EA Natural Heritage Study.

Attached is a small word document which outlines the purpose of the EA, the species at risk identified by NHIC, the natural heritage feature, and a map of the study area.

If you have any questions please feel free to contact me,

Karen Reis (Buchanan), B.E.S (Hons)
Ecologist

PARISH Aquatic Services

A Division of Matrix Solutions Inc.

31 Beacon Point Court, Breslau, Ontario N0B 1M0
Direct: 519.772.3777 ext. 138 Cell: 905.975.4842
www.matrix-solutions.com

From: Shirley, Brent (MNRF) [<mailto:brent.shirley@ontario.ca>]
Sent: Tuesday, November 01, 2016 8:38 AM
To: Karen Reis
Subject: RE: SARA screening

Hi Karen,

We request you provide the list of known SAR from NHIC, a map accurately showing the study area, a description of the habitat available in the study area (ELC communities are best) and a brief description of the project.

MNR Midhurst has an expectation that consultants have a level of SAR knowledge and access to the SARO List. As a result, given the volume of SAR information requests we receive, we require an initial SAR screening from them upfront and any additional information on what surveys they feel may be required based on that screening is also welcome. We are then happy to review this information and provide additional insight/data on species and surveys/methodology should it be available. It seems to be a common misconception that the Districts have additional data on SAR that is not in the NHIC database but this is most often not the case (with the exclusion of restricted records). As you are aware the NHIC contains known SAR occurrences only and as a result potential species need to be considered based on the available habitat at a location.

Any question please feel free to give me a call or email at any time.

Best Regards,
Brent

From: Karen Reis [<mailto:kreis@matrix-solutions.com>]
Sent: October-31-16 2:00 PM
To: Allan, Brad (MNRF)
Subject: SARA screening

Good Afternoon,

I was told to email you regarding some questions I had about SARA screening.

I am wondering if the Midhurst office has a form for species at risk screening?

If not, I am wondering what information you would require to complete a species at risk screening?

I have attached a PDF of the area which is located in Colgan Ontario. The screening is for an EA and we would like to have the MNRF's feedback to be included in the project record.

Thank you,

Karen Reis (Buchanan), B.E.S (Hons)
Ecologist

PARISH Aquatic Services

MEMORANDUM

TO: Mr. Jean-Louis Gaudet, exp Services

FROM: Arnie Fausto, M.Sc., and Erica Wilkinson, B.A., ERPG, Matrix Solutions Inc.

SUBJECT: Bobolink/Eastern Meadowlark and Snapping Turtle Assessment, Community of Colgan Schedule C Municipal Class Environmental Assessment

DATE: July 5, 2017

1 INTRODUCTION

In 2016 Matrix Solutions Inc. was retained by exp Services Inc. to conduct ecology and geomorphology field assessments to support Phases 3 and 4 of the Community of Colgan Waste Water Treatment Plant (WWTP) Schedule C Municipal Class Environmental Assessment (EA). The assessment included a natural heritage evaluation of the newly proposed WWTP location, forcemain, and outfall, as well as an initial ecologic and geomorphic field investigation. Based on information provided by the agencies and a review of the background data several Species at Risk (SAR) were identified as having the potential to occur within the study area. This included two bird, one reptile, and one flora species as follows:

- Bobolink (*Dolichonyx oryzivorus*)
- Eastern Meadowlark (*Sturnella magna*)
- Common Snapping Turtle (*Chelydra serpentina*)
- Butternut (*Juglans cinerea*)

As the initial field 2016 assessment was conducted out-of-season (November 2016), an in-season field assessment was required to confirm the presence or potential habitat for Bobolink, Eastern Meadowlark, and Snapping Turtle. Butternut was not found during the Environmental Land Classification (ELC) studies and is considered not present within the study area. This technical memo outlines the findings from the bird and turtle spring field assessment conducted on May 30, 2017 in support of the Class EA.

1.1 Species at Risk Background

Bobolink and Eastern Meadowlark are grassland birds which typically breed in open fields such as grassy meadows and pastures. With the conversion of their natural habitat from grasslands to agricultural use, these birds have adapted to nesting within hayfields. This nesting behavior has been associated with high rates of mortality due to the early mowing of hayfields which coincides with the peak of nesting season (McGauley, 2004). As a result, population declines of these birds have been widely documented.

Similarly, the snapping turtle population has also declined throughout the province as a result of mortality during the breeding season. Harvesting adults, as well as road mortality, is also responsible for their decline. Snapping turtle will reside in any freshwater habitat and prefer areas with dense vegetation and slow moving water such as wetlands. Nests are typically created in sand or gravel areas such as those along water and road ways (Ontario Nature 2016).

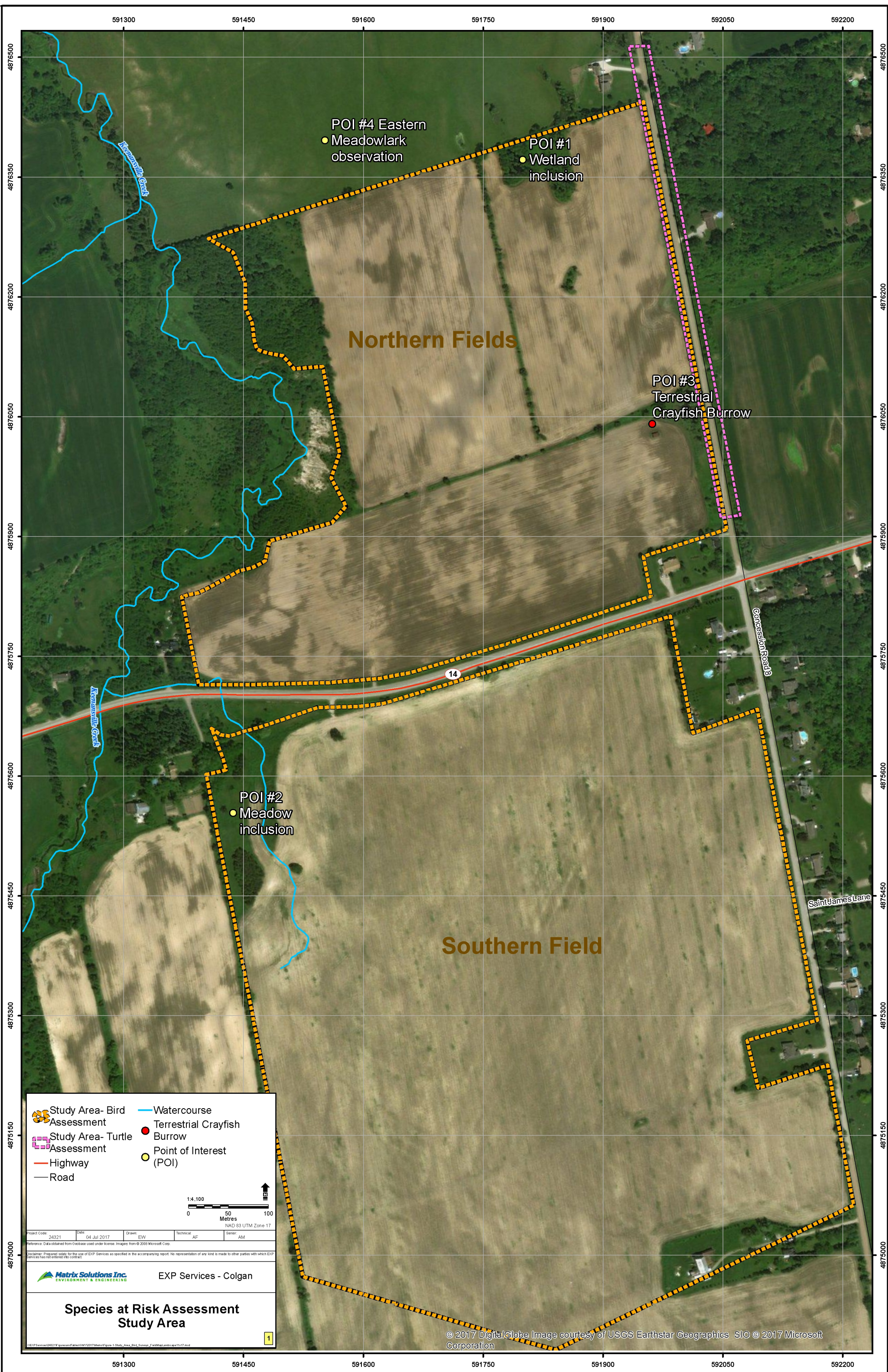
These three species are registered as SAR both federally and provincially with Bobolink designated as Threatened, Eastern Meadowlark designated as Threatened, and Snapping Turtle designated as Special Concern under the Species at Risk Act and the Endangered Species Act (ESA). Protection of the species and their habitat is required if found within the study area.

2 STUDY AREA

The study area is located within the Innisfil Creek subwatershed, northwest of Colgan in the Township of Adjala-Tosorontio. This area is north of the Oak Ridge Moraine and regulated by the Nottawasaga Valley Conservation Authority (NVCA) and County of Simcoe. The 2017 field assessment study area encompasses the original and newly proposed WWTP and forcemain routes, as well as potential development areas as shown on Figure 1.

The Natural Heritage Information Centre database search indicated that the three fields north of Highway 14 and the one large field south of Highway 14 are potential Bobolink and Eastern Meadowlark habitat. As such, this was the area targeted during the 2017 field survey. This area is approximately 85 hectares in size with the majority of its land use being agricultural with the minor addition of wooded hedgerows.

The wetland area to the east of Concession Road 8 was deemed to be potential habitat for Snapping Turtles based on NVCA correspondence and local landowner comments. As such, a roadside search was conducted to record any observations of turtle nests or the use of the gravel shoulder by turtles in any capacity. A 600 m stretch of road was examined including both the east and west sides of the road.



Northern Fields

Southern Field

POI #4 Eastern
Meadowlark
observation

POI #1
Wetland
inclusion

POI #3
Terrestrial
Crayfish Burrow

POI #2
Meadow
inclusion

	Study Area- Bird Assessment		Watercourse
	Study Area- Turtle Assessment		Terrestrial Crayfish Burrow
	Highway		Point of Interest (POI)
	Road		

14,100
0 50 100
Metres
NAD 83 UTM Zone 17

Project Code: 24321 Date: 04 Jul 2017 Drawn: EW Technical: AF Series: AM
Reference: Data obtained from O ebase used under license. Imagery from © 2008 Microsoft Corp.
Disclaimer: Prepared solely for the use of EXP Services as specified in the accompanying report. No representation of any kind is made to other parties with which EXP Services has not entered into contract.

EXP Services - Colgan

Species at Risk Assessment Study Area

3 BOBOLINK AND EASTERN MEADOWLARK ASSESSMENT

3.1 Methods

The survey was conducted beginning at 5:00 am on May 30, 2017 to capture the most active time for bird surveys. Upon arrival to the study area, it was noted that both the northern and southern fields presented a low likelihood of Bobolink and Eastern Meadowlark nesting due to the type of crop planted. Both Bobolink and Eastern Meadowlark prefer similar habitats of tall grasses and open meadow areas, such as hayfields. The dense, tall grasses greater than 1 foot are needed to create and protect their nests.

Originally a breeding bird survey using the point count method was planned; however based on the vegetation cover, it was deemed more appropriate to conduct an area search of both the northern and southern fields. To conduct an area search on the northern fields, the perimeter of the fields were walked to record bird activity in the fields, as well as the adjacent hedgerows. The southern field area search was conducted by walking the edge of the field along the road, as well as down the western edge in order to investigate the meadow inclusion. The eastern edge of the southern field was not as thoroughly investigated due to its proximity to residential/commercial properties. Due to the lack of preferred habitat it was decided that a single visit was sufficient to conclude the presence or absence of the species at risk of concern in this area.

3.2 Results

3.2.1 Northern Field

The northern fields were a combination of low lying weeds and old soy crops as seen in Figure 2 and 3. As discussed above, due to the lack of height and density of the vegetation, the field were considered inadequate habitat to support breeding for Bobolink and Eastern Meadowlark species.



FIGURE 2 Northern Field 75 m North of Highway 14- Sparse, Short, Weedy Vegetation



FIGURE 3 Northern Field near Northern Edge of Study Area Facing South - Old Soy Plants in Field

The area search of the northern field resulted in a total of 16 birds being recorded in the area, outlined in Table 1. The Horned Lark was the only bird recorded utilizing the fields, while the remaining birds were recorded using the surrounding hedgerows and wetland. None of the species found are considered federally or provincially at risk. The northern field with its sparse, low lying vegetation is not a suitable habitat for Bobolink or Eastern Meadowlark nesting.

TABLE 1 Bird Species Observations in Northern Fields, Community of Colgan

Species	Approximate Location
Grey Catbird	Hedgerow
House Wren	Hedgerow
Savannah Sparrow	Hedgerow
Vesper Sparrow	Hedgerow
Brown Thrasher	Hedgerow
Common Yellowthroat	Hedgerow
Red-winged Blackbird	Wetland inclusion/Hedgerow
European Starling	Wetland inclusion/Hedgerow
American Robin	Wetland inclusion/Hedgerow
Black-Capped Chickadee	Wetland inclusion/Hedgerow
Warbling Vireo	Wetland inclusion/Hedgerow
American Crow	Hedgerow
Song Sparrow	Hedgerow
Yellow Warbler	Hedgerow
American Goldfinch	Hedgerow
Horned Lark	In field

While completing the northern field area search, an old stable was found and investigated to confirm the presence/absence of Barn Swallow. The stable assessment resulted in the recording of two nests, most likely created by American Robin (Figure 4). No Barn Swallow nests were observed.



FIGURE 4 Old Stable Assessed for Barn Swallow Nests

3.2.1.1 Wetland Inclusion

A point of interest within the northern fields is a wetland inclusion (POI #1; Figure 5) that appears to connect to the large wetland complex on the east side of Concession Road 8. Five species of birds were audibly observed using this wetland habitat (outlined in Table 1) including European Starling, Red-winged Blackbird, American Robin, Black-capped Chickadee, and Warbling Vireo. It was initially thought that this wetland inclusion may be potential habitat for Least Bittern (a SAR listed as threatened under the ESA), but upon investigation, it was deemed inappropriate due to the lack of tall emergent vegetation. Amphibian calls were also heard within the wetland including a Green Frog.



FIGURE 5 Wetland Inclusion along Northern Boundary of the Study Area

3.2.2 Southern Field

The southern field had very recently been planted with rows of corn, as confirmed by Wayland Farms Inc. (as seen in Figure 6). Corn is not consider a grass crop and is also not suitable for Bobolink and Eastern Meadowlark nesting. Currently there is no confirmed information regarding past crops that have been planted in this field; therefore it cannot be determined if at some point in the past Bobolink and Eastern Meadowlark did utilize the study area for nesting.



FIGURE 6 Southern Field Looking South from Highway 14 - Recently Planted Rows of Corn

The area search of the southern field resulted in a total of 14 birds being recorded, as outlined in Table 2. Similar to the northern field search, the Horned Lark was the only bird recorded utilizing the field while the remaining birds were recorded using the surrounding hedgerows and meadow inclusion, shown below.

TABLE 2 Bird Species Observations in Southern Fields, Community of Colgan

Species	Approximate Location
Canada Goose	Flying overhead
Horned Lark	In field
Song Sparrow	Hedgerow
American Crow	Hedgerow
Eastern Wood Pewee ¹	Meadow Inclusion
Mourning Dove	Meadow Inclusion
Chipping Sparrow	Meadow Inclusion
Northern Cardinal	Meadow Inclusion
Barn Swallow	Meadow Inclusion
Black-Capped Chickadee	Meadow Inclusion
Grey Catbird	Meadow Inclusion
Brown Headed Cowbird	Meadow Inclusion
American Robin	Meadow Inclusion
Blue Jay	Meadow Inclusion

Notes:

1. Provincially designated as Special Concern

3.2.2.1 Meadow Inclusion

A point of interest within the southern field is a meadow area with a small quantity of trees in the north-west corner (POI #2) as seen in Figure 7. This area was further examined as it was a different habitat type than the agricultural field and due to the presence of long grasses in this area it had the potential for Bobolink and Eastern Meadowlark nesting. Upon investigation, 10 bird species were audibly observed in the meadow inclusion, including the Eastern Wood Pewee which is designated as provincially special concern. No Bobolink or Eastern Meadowlark was found utilizing the area.



FIGURE 7 Southern Field- Meadow Inclusion with Small Quantity of Trees Being Utilized by Birds

3.3 Additional Findings

3.3.1 Terrestrial Crayfish Burrow

While conducting the area search of the northern fields, a burrow created by a terrestrial crayfish (either a Meadow Crayfish or a Chimney Crayfish), was observed at 591962 E, 4876041 N; beside the old stable along the eastern edge of the northern field (POI #3; Figure 8). The adjacent area was assessed for additional burrows but just the single burrow was found.

The Significant Wildlife Habitat (SWH) Criteria Schedule for Ecoregion 6E indicates that the presence of one or more individuals or their burrows in suitable meadow marsh, swamp, or moist terrestrial sites can be considered SWH (MNR, 2015). As per the Provincial Policy Statement (MAH, 2014) if any development or site alterations are to occur within the SWH, avoidance or mitigation options must be followed. However, the terrestrial burrow is located 250 m south of the proposed WWTP and forcemain routes and currently would not trigger any mitigation requirements.



FIGURE 8 Northern Field – Burrow (Chimney) Created by Terrestrial Crayfish

3.3.2 Adjacent Northern Field- Eastern Meadowlark Observation

The field directly north of the study area (POI #4) was observed from the northern study area boundary and was found to be an area utilized as pasture for cattle. An Eastern Meadowlark was heard singing in the pasture and it was concluded that this type of habitat is more desirable for this species, compared to the northern fields.

3.3.3 Adjacent Westerly Field- Bobolink and Eastern Meadowlark Observations

An additional modified assessment was completed on a field 500 m west of the study area, south of Highway 14. The field was observed to be a grassy meadow and is believed to be a desirable habitat by Bobolink and Eastern Meadowlark. During the 10 minute roadside survey, both species were audibly and visually confirmed. This is important to note that Bobolink and Eastern Meadowlark are breeding in the regional area; however neither species has chosen to use the study area fields due to the unsuitable habitat.

4 SNAPPING TURTLE ASSESSMENT

4.1 Methodology

Female Snapping Turtles dig their nests between late May and June often in areas of loose sandy-soil. Typically, the shoulder of a road, embankment or shorelines is used for nesting areas (Ontario Nature, 2016). The 2017 field assessment was completed at the correct time of year to observe turtle nests or evidence of turtle nests.

The assessment was completed along a 600 m section of Concession Road 8, adjacent to the wetland area. Each side of the road was examined for soft spots that may be the cover-up of a nest, as well as examined for any scratch marks that may indicate a turtle attempting to determine a nesting site. Figure 9 displays the conditions on the east side of the road and Figure 10 displays the conditions on the west side of the road.



FIGURE 9 East Road Shoulder Looking South



FIGURE 10 West Road Shoulder Looking North

After examining the east and west road alignments east side of Concession Road 8, it was deemed that there is currently no evidence of Snapping Turtles utilizing the roadside for nesting. The shoulder of the road was comprised of a mix of compacted sand and gravel with only small areas of loose substrate. The ditch directly adjacent to the shoulder of the road had standing water and embankments that were saturated. These conditions do not provide desirable turtle nesting areas.

5 CONCLUSION

A field assessment was completed on May 30, 2017 to confirm the presence or absence of three SAR including Bobolink, Eastern Meadowlark, and Snapping Turtle. After an area search of both the bird and turtle assessment areas, it can be concluded that areas are not currently being used by the three above SAR. The northern and southern fields are currently considered undesirable habitat for Bobolink and Eastern Meadowlark due to the type of crop (non-grass) and low lying vegetation (less than 1 foot) planted within these fields. It is important to note that both Bobolink and Eastern Meadowlark were audibly and visually observed in adjacent lands, therefore demonstrating that these species are in the area during nesting season but are choosing to occupy land outside of the study area where more suitable habitat exists.

The roadside area search completed on Concession Road 8 for Snapping Turtle nests resulted in no evidence of use. The shoulder soils were compacted and the adjacent ditch was saturated, both creating unlikely conditions for nesting use by Snapping Turtles. A burrow created by a terrestrial crayfish was noted along the east side of the northern field. The presence of one burrow confirms the area as SWH; however the crayfish burrow is located 250 m (at the closest point) from the currently proposed WWTP and forcemain route and would not trigger additional mitigation measures.

In conclusion, the assessment completed for Bobolink, Eastern Meadowlark, and Snapping Turtle resulted in no observation of all three species within the study area.

6 REFERENCES

McGauley, E. 2004. *Birds on the Farm: A Stewardship Guide*. Published by Ontario Nature.

Ontario Ministry of Municipal Affairs and Housing (MAH). 2014. *2014 Provincial Policy Statement*. Issued under the *Planning Act*. Provincial Planning and Policy Branch. Approved by the Lieutenant Governor in Council, Order in Council No. 107/2014. Queen's Printer. Toronto, Ontario. Replaces the Provincial Policy Statement issued March 1, 2005. Effective April 30, 2014.
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Ontario Nature. 2016. *Snapping Turtle*. Accessed on June 15, 2017 from
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**NEW OUTFALL FEASIBILITY
NATURAL HERITAGE ASSESSMENT REPORT**
HAMLET OF COLGAN, TOWNSHIP OF ADJALA-TOSORONTIO,
COUNTY OF SIMCOE
152790-24321-514

Report Prepared for:
EXP SERVICES INC.

Prepared by:
MATRIX SOLUTIONS INC.

February 2018
Guelph, Ontario

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**NEW OUTFALL FEASIBILITY
NATURAL HERITAGE ASSESSMENT REPORT
HAMLET OF COLGAN, TOWNSHIP OF ADJALA-TOSORONTIO, COUNTY OF SIMCOE**

152790-24321-514

Report prepared for expr Services Inc., February 2018



**Erica Wilkinson, B.A., ERPG
Ecologist**



**reviewed by
Arnie Fausto, M.Sc.
Senior Ecologist**

DISCLAIMER

Matrix Solutions Inc. certifies that this report is accurate and complete and accords with the information available during the project. Information obtained during the project or provided by third parties is believed to be accurate but is not guaranteed. Matrix Solutions Inc. has exercised reasonable skill, care, and diligence in assessing the information obtained during the preparation of this report.

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1 INTRODUCTION

An Environmental Assessment (EA) is currently underway to evaluate the development of a Waste Water Treatment Plant (WWTP) in the community of Colgan, Ontario. To date, several alternative locations for the WWTP, forcemain, and outfall have been explored in the Keenansville and Bailey Creek subwatersheds. In 2015, a Natural Heritage Assessment Study was prepared by Plan B Natural Heritage on an original location and forcemain route in conjunction with a Master Servicing Plan (Plan B 2015). The location of the WWTP and proposed route was then modified and evaluated by Matrix Solutions in 2016 and 2017 through several updates and field studies (Matrix 2016, Matrix 2017a, and Matrix 2017b). Since the public engagement session in the fall of 2017, a new alternative outfall location and associated forcemain route was identified. This forcemain route follows Concession 8 in a northerly direction until it intercepts Bailey Creek, as seen in Figure 1, and is herein referred to as the “alternative outfall location and forcemain route.”

To evaluate the feasibility of the new route north of Keenansville Road from a natural heritage perspective, Matrix was retained to complete a desktop analysis. This included engagement with agencies such as the Nottawasaga Valley Conservation Authority (NVCA), County of Simcoe and Ministry of Natural Resources and Forestry (MNRF) to gather spatial data for the area. A high-level field reconnaissance was also completed in early December of 2017. This report provides a summary of the desktop and field reconnaissance findings including an assessment of the feasibility of the alternative outfall location and forcemain route based on the subject lands’ natural heritage features and ecological functions.

The natural heritage feasibility study was conducted to determine the potential for the alternative outfall and forcemain based on a desktop assessment and field reconnaissance. It is anticipated that if the alternative forcemain and outfall was carried forward as the preferred location during the EA, additional field studies and analysis will be conducted during the detailed design phases.

1.1 Background

Previous studies and information sources that are relevant to the subject lands and have been reviewed for this study include the following:

- Natural Heritage Information Centre database (MNRF 2016)
- County of Simcoe Official Plan (County of Simcoe 2017)
- Innisfil Creek Subwatershed Study (NVCA 2006)
- Fisheries Management Plan (NVCA 2009)
- Land Information Ontario (LIO) database (2018)
- County of Simcoe GIS data (provided December 14, 2017)
- NVCA GIS data (provided December 21, 2017)

An information request was submitted to the MNRF on December 13, 2017 regarding information on species at risk (SAR) within the study area and directly adjacent to it. Matrix is waiting on a response from MNRF and will create a follow up memo with the SAR information from MNRF when it becomes available.

In addition, data was supplied from NVCA and the County of Simcoe. Natural heritage GIS layers were obtained from public data sources such as LIO and used to analyze the landscape within the study area. Communications were made with Mr. David Featherstone, Manager of the Watershed Monitoring Program at NVCA, to inquire about additional fisheries data in January 2018.

The following subsections provide further background on the WWTP, forcemain, and outfall locations discussed during this feasibility assessment.

1.1.1 Wastewater Treatment Plant

Since the natural heritage assessments were completed in 2016 and 2017, the general location of the WWTP has not changed. The previous natural heritage and field assessment studies conducted on that land parcel remain valid as documented previously.

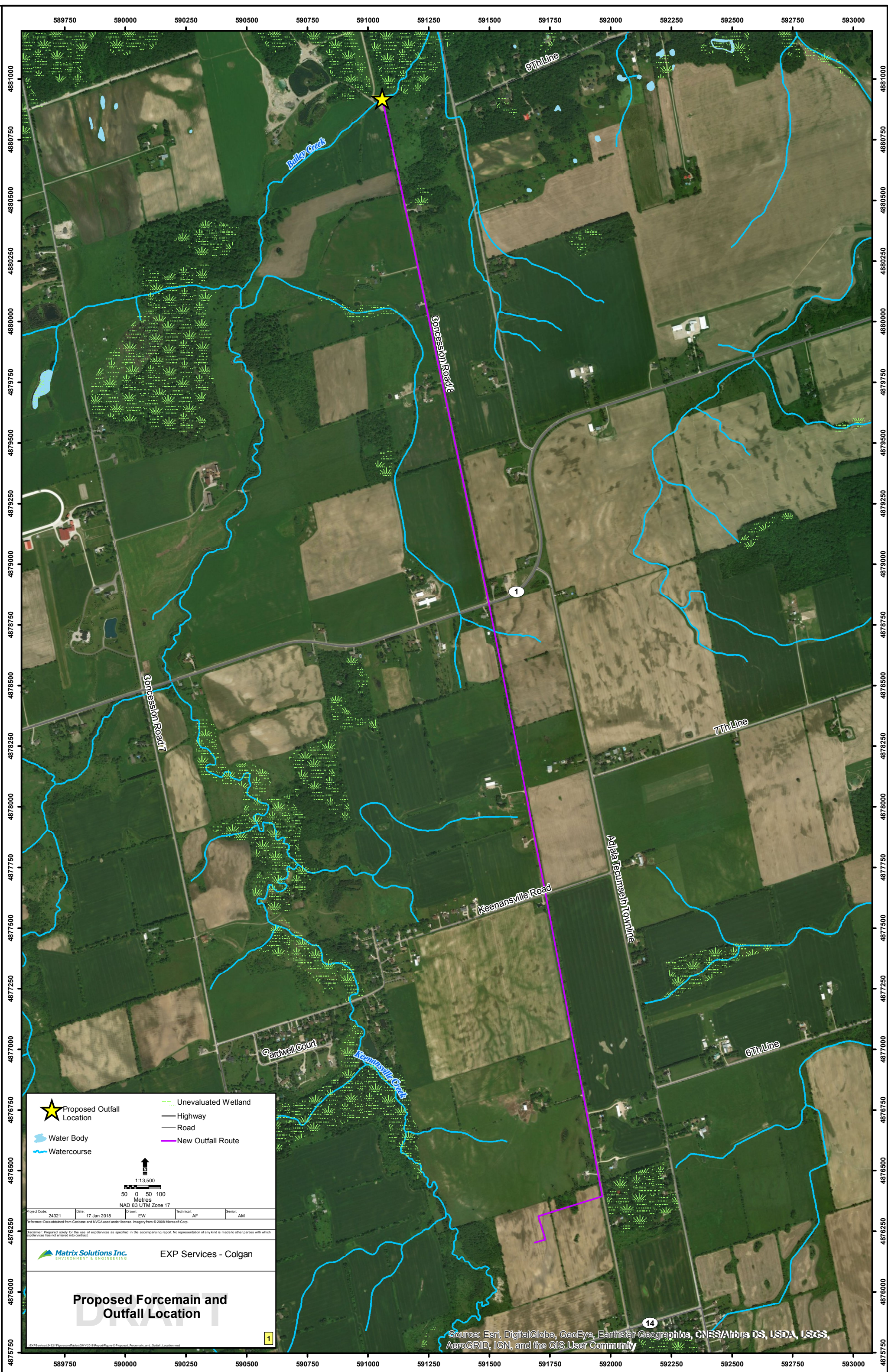
1.1.2 Alternative Outfall Location

The alternative outfall location is proposed in the vicinity of the crossing of Concession 8 and Bailey Creek. The outfall will be situated along the banks of the creek and its final placement at the proposed location will be determined through detailed design.

1.1.3 Alternative Forcemain Route

The original and secondary proposed forcemain routes were both routed to outlet into Bailey Creek. The original forcemain route travelled west along County Road 14, north along Concession Road 7, and east along Keenansville Road. The secondary proposed route travelled north along Concession 8, through the unopened road allowance, and then west along Keenansville Road. An additional section of forcemain is being investigated that follows a portion of the secondary route, but includes the additional forcemain section that eventually outlets into Bailey Creek further north of the community of Keenansville.

The alternative forcemain route is approximately 4.6 km in length, starting from the WWTP and proceeds north along Concession 8 past Keenansville Road, through sections of opened and unopened road allowances to Bailey Creek. This new route does not intersect any existing waterbodies or valley corridors; however, it is proposed to run adjacent to an existing wetland unit associated with the secondary proposed route.



	Proposed Outfall Location		Unevaluated Wetland
	Water Body		Highway
	Watercourse		Road
			New Outfall Route

1:13,500
 50 0 50 100 Metres
 NAD 83 UTM Zone 17

Project Code: 24321	Date: 17 Jan 2018	Drawn: EW	Technical: AF	Senior: AM
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Disclaimer: Prepared solely for the use of expServices as specified in the accompanying report. No representation of any kind is made to other parties with which expServices has not entered into contract.

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Proposed Forcemain and Outfall Location

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

2 EXISTING CONDITIONS

2.1 Aquatic Environment

The alternative forcemain route does not cross any waterbodies and therefore does not directly affect the aquatic environment. The alternative outfall location will be located at the banks of Bailey Creek at the terminus of Concession Road 8, and will interact with the aquatic environment at the discharge location.

2.1.1 Bailey Creek

Bailey Creek has an estimated drainage area of 65 km² and is a main tributary to Innisfil Creek. Bailey Creek's headwaters originate at the Oak Ridges Moraine and is designated as a coldwater system (NVCA 2006-Map 7). The creek is located in the Southern Clay Plain fisheries management zone and characterized by impermeable clay soils that encompass the western portion of the Schomberg Clay Plain physiographic region (NVCA 2009). This zone is dominated by agricultural land use practices, which create significant riparian impacts that quicken the deterioration of important coldwater fisheries (NVCA 2009). Accordingly, the health of the watercourse varies from reach to reach, with the areas located in the headwaters characterized as unimpaired; while areas located within the Township of Adjala-Tosorontio (which have high rates of agricultural practices) considered as below potential, and the remaining areas up to the confluence with Innisfil Creek characterized as impaired (NVCA 2006- Map 8).

As a result of the trends noted above, Bailey Creek has been identified as a high priority for habitat rehabilitation, nutrient management, and erosion control work by NVCA (2009). The proposed outfall location is approximately 85 m upstream from the channel's entry into a woodland area identified by the NVCA as wetland, and is defined as an unevaluated wetland complex by MNRF.

2.1.2 Fisheries

Bailey Creek is an important portion of the Innisfil Creek subwatershed as it provides cold water habitat, which is considered limited in other parts of the subwatershed. Currently, there is limited information on fish sampling specific to Bailey Creek, however the Fisheries Management Plan (2009) and the Innisfil Creek Subwatershed Plan (2006) discuss a variety of species within the aquatic system, as seen in Table 1 below. Information presented in Table 1 is intended to reflect the current understanding of fish assemblages known to occur within the subwatershed, based on historical records.

TABLE 1 Fish Species Recorded in Bailey Creek and Innisfil Creek Subwatersheds

Fish Species Common Name	Fish Species Scientific Name	Nottawasaga River Watershed ^{1,3}	Innisfil Creek Subwatershed ^{2,3}	Bailey Creek ^{1,3}
Northern Pike	<i>Esox lucius</i>		X	
Brook Trout (resident)	<i>Salvelinus fontinalis</i>	X	X	X
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	X	X	X
Pumpkinseed Sunfish	<i>Lepomis gibbosus</i>		X	
White Sucker	<i>Catostomus commersonii</i>		X	
Darter species (various)	<i>Percidae spp.</i>		X	
Largemouth Bass	<i>Micropterus salmoides</i>		X	
Rainbow Trout (migratory)	<i>Onocorhynchus mykiss</i>	X	X	X
Yellow Perch	<i>Perca flavescens</i>		X	
Common Carp	<i>Cyprinus carpio</i>		X	
Minnow species (various)	<i>(various)</i>	X	X	
Mottled Sculpin	<i>Cottus bairdii</i>	X		
Slimy Sculpin	<i>Cottus cognatus</i>	X		
Burbot	<i>Lota lota</i>	X		
Brook Lamprey	<i>Ichthyomyzon fossor</i>	X		X

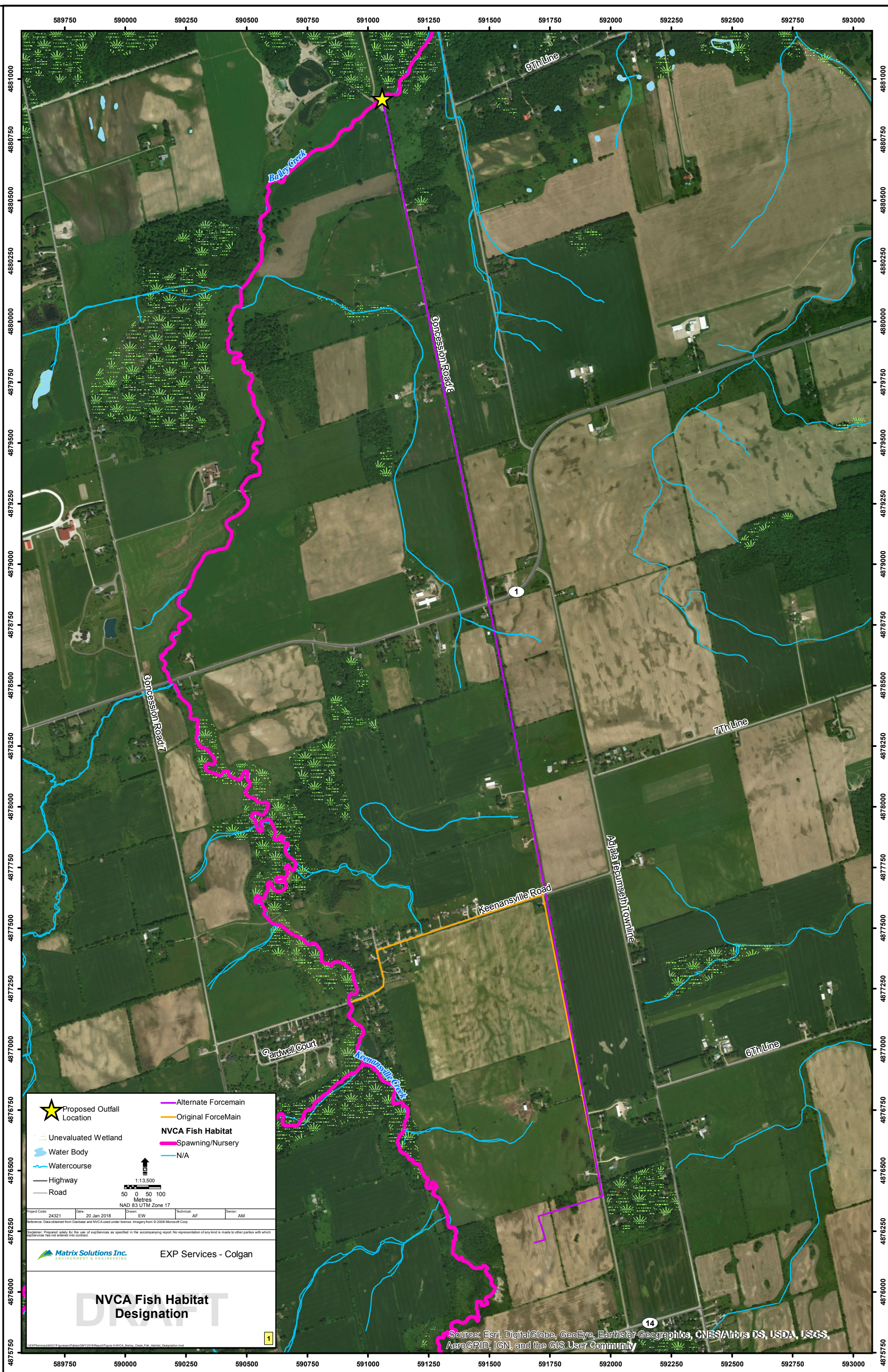
Notes:

1. NVCA 2009
2. NVCA 2006
3. DFO 2017

Matrix Solutions received GIS data files from the NVCA (2017) which included information regarding watercourses and their habitat types. The data reveals that the general area for the alternative outfall has been characterized by NVCA as spawning/nursery habitat (Figure 2). Mitigation measures should be implemented to protect these habitats.

Since the entire main branch of Bailey Creek is broadly characterized as spawning/nursery habitat, it is assumed that this is a general characterization, with the actual fish spawning locations to be determined through further site-specific studies.

It is anticipated that further investigations would be conducted during the detailed design phase to confirm the presence or absence of spawning/nursery habitat within Bailey Creek at the site of the outfall. The outfall will be placed along the streambank and will not involve in water work, and the effluent is expected to be high quality based on the best available technology. Although more detailed information would be obtained regarding the aquatic habitat within the immediate reach, the outfall construction and operation should have negligible effects when mitigation measures are employed during construction.



NVCA Fish Habitat Designation

DRAFT

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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

The Department of Fisheries and Oceans (DFO) provides mapping data regarding the distribution of aquatic SAR (2015). The SAR mapping for Innisfil subwatershed reveals records of Northern Brook Lamprey (*Ichthyomyzon fossor*) at the downstream portion of Bailey Creek located approximately 3.8 km downstream of the alternative outfall location (Appendix A). Northern Brook Lamprey is designated as Special Concern provincially and federally. Currently, it is not known if a barrier to fish movement is present between the alternative outfall location and the lamprey occupied reaches.

3 FIELD RECONNAISSANCE OBSERVATION OF THE ALTERNATIVE OUTFALL LOCATION

A field visit was conducted on December 8, 2017 to gain an understanding of natural heritage conditions at the alternative outfall location. For the purposes of the feasibility assessment, visual observations of instream conditions were conducted along the Bailey Creek channel in the approximate location of the alternative outfall location within the township Right-of-Way (RoW).

The alternative outfall to Bailey Creek would be located along a reach that exhibits moderate flow and exhibits a much larger bankfull width compared to the previous alternative outfall location, as a result of the drainage contribution provided by other tributaries of Bailey Creek. Although the immediate reach lacks overhead cover, its banks were observed to be relatively stable and well vegetated by grasses and meadow vegetation. From the alternative outfall location, Bailey Creek flows northerly to a large wooded parcel where it is surrounded by natural vegetation and assumes a natural form. This wooded parcel has been designated by both the MNRF and NVCA as an unevaluated wetland. According to the Fisheries Management Plan (2009), wetlands are generally known to provide fisheries habitat functions such as feeding, and refuge habitats in coldwater ecosystems. A photograph showing the general location of the alternative outfall location is provided in Figure 3.



FIGURE 3 Bailey Creek at Location of Alternative Outfall (View Downstream)

3.1 Terrestrial Environment

The alternative forcemain route travels through primarily agricultural land along both open and unopened road allowances. The unopened road allowances are located immediately south of Keenansville Road for 800 m, and immediately south of County Road 1 for 775 m. It is envisioned that the forcemain and corresponding construction footprint will be accommodated within the township owned RoW.

3.1.1 Vegetation

Vegetation within the RoW, along the proposed route was visually observed to record any obvious constraints or significant tree clusters that would preclude forcemain construction. Although the unopened road allowances were not investigated in detail, there is obvious evidence of past disturbance present in the form of pathways, and openings between hedgerows. Due to this previous disturbance, forcemain construction could be accommodated with minimal impacts, providing that standard mitigation measures such as adherence to timing windows and route avoidance measures (such as minimizing the extent of vegetation impacts to the extent possible) are adhered to. Trees within the unopened allowances appear to be historically planted hedgerows (unnatural), and are comprised of common species such as Apple (*Malus sp.*). During previous communications with MNRF, it was stated that there is potential for Butternut (*Juglans cinerea*) to be within the study area (PLAN B 2015). For the

alternative forcemain route, no detailed investigations for Butternut was completed during the field reconnaissance site visit as these assessments must be completed while leaves are present on the trees (May to October). It is recommended that a tree investigation be completed during the detailed design phase (in season) to identify any Butternut within the study area. Due to past disturbance and nature of the opened and unopened road allowance, it is unlikely the Butternut will be present because it is a species that is usually associated with stream banks where it grows within moist-well drained soils.

Ecological Land Classification (ELC) data was received from the NVCA (2017) and provides a broader context to land use cover in the study area. Along the alternative forcemain route the classifications include: Deciduous Forest (FOD), Agricultural (IAG & NAG), Cultural Meadow (CUM), and Cultural Woodland (CUW). Of the ELC classifications, communities classified as agricultural makes up the largest majority of land use coverage, with the remaining classifications only occurring in small isolated segments.

3.1.2 Wildlife

Due to the linear nature of the forcemain within the RoW, it is unlikely that terrestrial wildlife habitat will be negatively affected by the alternate forcemain route. The opening between the hedgerows contains disturbed habitat that is overgrown with grasses and weedy vegetation and provides ample room for installation of the forcemain without the need for removal of the adjacent hedgerows. The agricultural setting, as well as the edge habitat along the hedgerows provides habitat for non-specialized common wildlife species (including but not limited to rabbits, skunk, raccoon, squirrel, fox, coyote etc.) that are tolerant of human habitation, especially within the unopened road allowances. Although most of these wildlife species may be found on occasion, the dense foliage will likely be occupied primarily by birds during the nesting season. Multiple species of passerine birds are often found within areas of dense shrub, therefore any vegetation clearing or construction needs to be completed outside of the breeding bird season to avoid incidental harm to birds.

In the section of the proposed forcemain route previously assessed along Concession Road 8, a Snapping Turtle habitat assessment was completed along the RoW adjacent to a wetland unit. The results of this assessment reported no appropriate habitat for nesting along the RoW.

3.1.3 Field Reconnaissance Observation of the Alternative Forcemain Location

On December 8, 2017 terrestrial fieldwork was also completed including a windshield survey of the alternative forcemain route. This survey method was conducted for the purposes of feasibility, and this route had not been made public. This reconnaissance would therefore be considered out of season for proper vegetation and wildlife habitat identification.

Based on this reconnaissance, no obvious SAR or significant tree specimens were observed within the opened road allowance RoW along the alternative forcemain route. Vegetation within unopened road allowances consisted of planted overgrown hedgerow species that are considered limited in habitat

value. Additionally, evidence of historical disturbance was readily observed through the presence of a road bed in most areas.

Although the field studies were completed in December and access to trees were limited, it was evident that hedgerow trees consisted of Apple, as well as scattered groupings of Maple (*Acer sp.*), Aspen (*Populus sp.*) and Elm (*Ulmus sp.*) were observed along the RoW. Trees observed along the forcemain route varied in location between private property and within the RoW, with multiple examples of large tree lined properties bordering the roadside (likely used for privacy or wind barriers). Photographs of the RoW along the route are provided in Appendix B (Photographs 1 to 9).

After the survey was completed, it was concluded that there is no significant vegetation or wildlife constraints along the alternative forcemain route.

3.1.4 Environmentally Significant Areas

The subject lands do not contain any federally, provincially, or locally designated sensitive features or areas such as Provincially Significant Wetlands (PSW), Area of Natural or Scientific Interest (ANSI) or Environmentally Significant Areas (ESA), as stated in the Updated Natural Heritage report by Matrix (2016).

The outfall location into Bailey Creek is on the edge of the Simcoe County Greenlands. This area is considered Greenlands because it contains fish habitat and the creek corridor provides a natural linkage, which are natural heritage features included in the protection of the Simcoe County Greenland policies (Section 3.8.10). The Greenland policy does not allow development or site alteration to any listed natural heritage feature. Section 3.8.19, however, states that development and alteration is permitted for infrastructure authorized under an EA process. Additionally, Section 3.3.15.iv of the Simcoe County official plan states that development and site alteration may be permitted in fish habitat if all provincial and federal requirements are followed (County of Simcoe 2016).

4 FEASIBILITY ASSESSMENT

From a preliminary ecological perspective, the alternative forcemain route and outfall location is determined to be feasible based on the lack of obvious ecological constraints. Provided that mitigation measures such as adhering to construction timing windows outside of bird nesting and fish spawning periods, placement of the forcemain could be accommodated within the RoW along opened and unopened road allowances, and placement of the outfall should be accommodated along the creek banks.

The vegetation and wildlife habitat within the area of the alternative forcemain route is not anticipated to pose a constraint and will experience little effect if construction remains within the RoW and the disturbance footprint is kept to a minimum. While it is possible that some tree pruning or removal may be necessary, the route design could be created in order to remove the least amount of vegetation

possible by shifting the construction area away from dense vegetation and placing construction within existing open areas where possible.

It is anticipated that the outfall construction will be along the banks, where no in- water work will be required. Accordingly, there will be no direct disturbance along the bottom of the creek channel. During construction, it is anticipated that sediment and erosion control measures, such as the installation of sediment control fencing will be a requirement as part of permit conditions for outfall construction.

Provided that required permits and their conditions, as well as adherence to best management practices and mitigation measures are followed, the alternative outfall location at Bailey Creek is considered feasible. Further details on recommended mitigation measures will be provided in the Environmental Study Report (ESR).

5 SUMMARY

A desktop review, communications with appropriate agencies, and a field reconnaissance was completed to determine the feasibility of the alternative forcemain route and outfall location north of Keenansville Road. The feasibility assessment reveals that the natural heritage features within the subject lands does not provide constraints to the alternative forcemain route and outfall location. The alternative forcemain route consists of disturbed habitat and lacks significant vegetation. Sufficient room to accommodate the forcemain appears to be present within the RoW, with construction not likely to permanently affect wildlife habitat. Fisheries data in the area of the alternative outfall location is generally mapped as containing coldwater species and provides spawning/nursery habitat. Although the NVCA does not have records of lamprey species in in Bailey Creek within the Colgan area, the DFO aquatic SAR mapping has records of Special Concern Northern Brook Lamprey approximately 3.8 km downstream of the alternative outfall location. Given that no direct in water construction is anticipated for the alternative outfall, and that assimilative capacity studies conclude that this location is feasible as discharge location, no impact to fish habitat is anticipated.

Bailey Creek has been identified as high priority for habitat rehabilitation by NVCA due to existing agricultural land use impacts and water takings. To provide further habitat enhancement to the Bailey Creek system and improve water quality, minor effects resulting from the discharge of effluent can offset through landowner incentives such as

- extending the width and increase the vegetation density of the riparian zone buffer strips
- removal of cattle away from streambanks and allowing the establishment of streamside vegetation
- streambank restoration to provide bank stabilization to decrease erosion
- instituting a tree planting program to provide overhead shading
- instream habitat enhancement where possible (e.g. through addition of woody debris to increase habitat diversity and provide shelter/refuge areas for aquatic life)

5.1 Next Steps

Should the alternative forcemain route and outfall location be carried forward as the preferred alternative in the EA, further in season work is recommended before or during detailed design to obtain site-specific information to gain a better understanding of vegetation composition in the RoW, wildlife use and fish habitat information to secure permitting approvals during the detailed design stage, and to allow for future monitoring. Further information on mitigation strategies related to the outfall and forcemain construction and operation will be provided in the ESR.

6 REFERENCES

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<https://www.simcoe.ca/Planning/Documents/SimcoeOfficialPlanText.pdf>
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PLAN B Natural Heritage (PLAN B). 2015. *Natural Heritage Assessment Study Colgan Master Servicing Plan Township of Adjala-Tosorontio County of Simcoe*. Report prepared for Greenland Consulting Engineers Limited. Waterdown, Ontario. June 2015.

APPENDIX A
DFO Aquatic Species at Risk Map


Ontario South West

Map 4 of 34

Area within which Critical Habitat is found for one or more aquatic species listed under SARA as:

 Extirpated, Endangered, or Threatened

Area within which one or more species listed under SARA may be found:

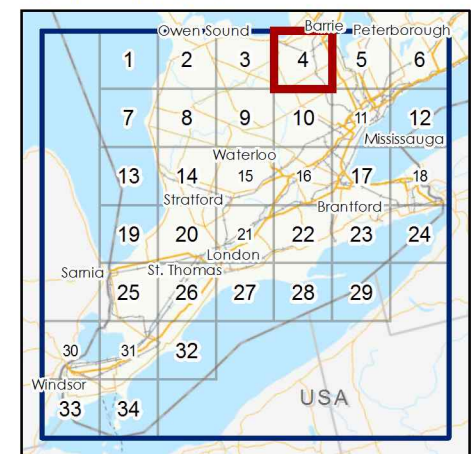
 Extirpated, Endangered, or Threatened

 Special Concern

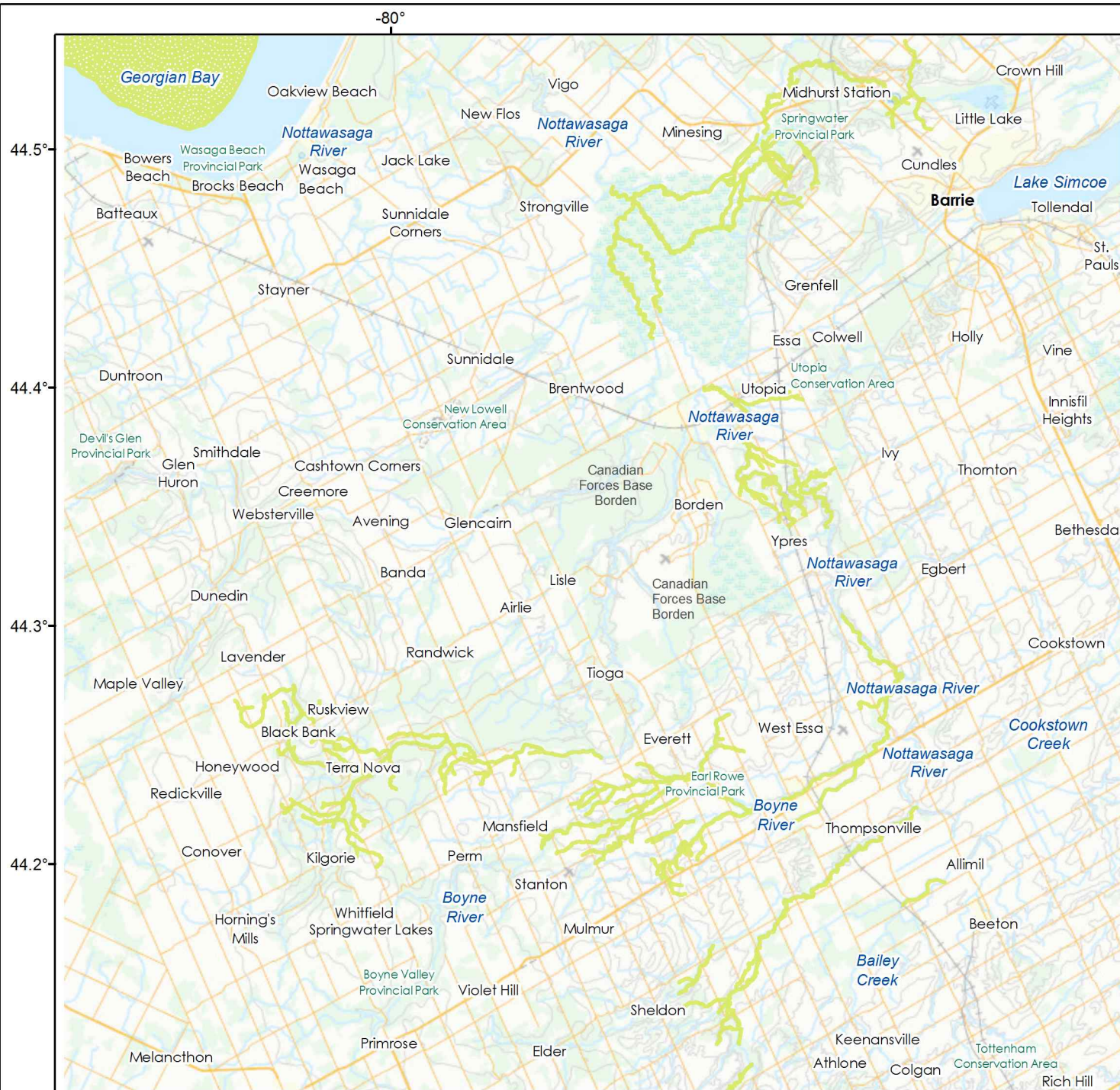
The map and table (below) are intended to provide a general overview of aquatic species at risk that may occur within the mapped area and may be used as a screening tool by proponents considering activities in these areas.

The official source of information is the Species at Risk Public Registry www.sararegistry.gc.ca

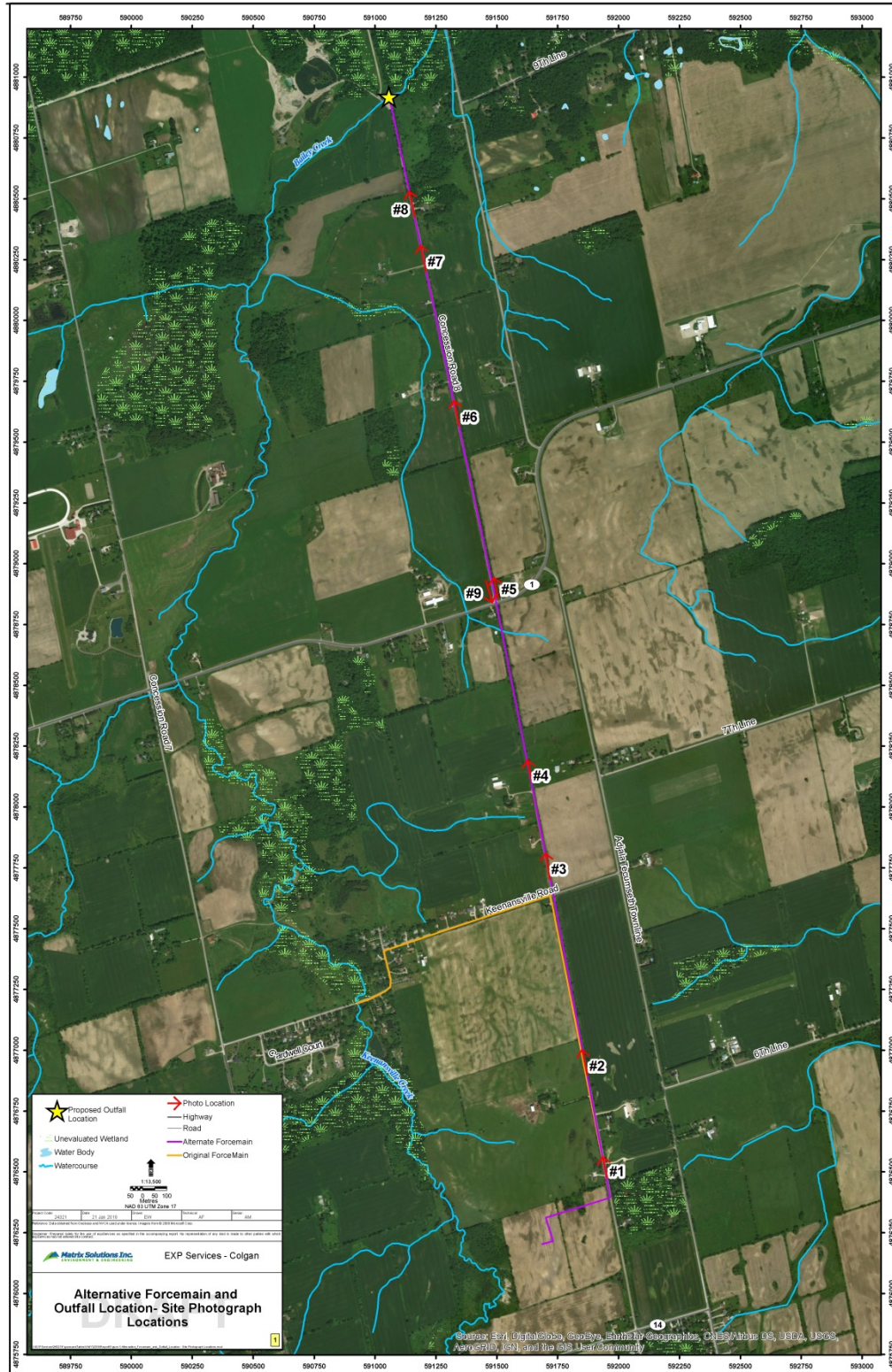
Ontario South West



Map produced July 2017



APPENDIX B
Site Photograph Summary





*Matrix Solutions Inc.
December 8, 2017*

1. View facing north on Concession Road 8 (north of Highway 14). Sporadic deciduous and coniferous trees (public and private property) on both sides of the road.



*Matrix Solutions Inc.
December 8, 2017*

2. View looking north at the terminus of Concession Road 8 (north of Highway 14) where it becomes unopened allowance. Currently unable to access area. Observed mostly scrub and grasses within immediate area.



*Matrix Solutions Inc.
December 8, 2017*

3. View looking north on Concession Road 8 (North of Keenansville Road). Both sides of road clear of notable features.



*Matrix Solutions Inc.
December 8, 2017*

4. View looking north at terminus of Concession Road 8 (north of Keenansville Road). Currently unable to access area. Observed mostly grass species with sporadic shrubs and deciduous tree species.



*Matrix Solutions Inc.
December 8, 2017*

5. View looking north on Concession Road 8 (immediately north of County Road 1). Trees on private corner property on east side of road. West side of road mostly clear due to agriculture.



*Matrix Solutions Inc.
December 8, 2017*

6. View looking north on Concession Road 8 (north of County Road 1). Thicket hedgerow along east side of road with sporadic shrubs along west side of road.



*Matrix Solutions Inc.
December 8, 2017*

7. View looking north on Concession Road 8 (north of County Road 1). Woodland along east side of road.



*Matrix Solutions Inc.
December 8, 2017*

8. View looking north on Concession Road 8 (north of County Road 1). Woodland along east side of road with hydro poles along west side of road.



*Matrix Solutions Inc.
December 8, 2017*

9. View looking south from intersection of Concession Road 8 and County Road 1. Currently unable to access area. Observed grass, shrubs, and deciduous trees (thought to be Maple).