190-216 Arkell Road, Guelph

Environmental Impact Study Addendum

Prepared for:

Nitin Jain
3-180 Frobisher Drive
Waterloo, ON
N2V 2A2

Project No. 1771 | July 2024

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

190-216 Arkell Road, Guelph

Environmental Impact Study Addendum

Project Team

Tara Brenton	Senior Manager, Terrestrial & Wetland Biologist / Certified Arborist
Kaitlin Filippov	G.I.S. Specialist

Report submitted on July 11, 2024

Tara Brenton

Project Manager

Senior Manager, Terrestrial & Wetland Biologist / Certified Arborist

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1.0 Introduction

This Environmental Impact Study (EIS) Addendum has been prepared in response to comments received from the City of Guelph and Grand River Conservation Authority (GRCA) following their review of the Arkell Road Properties resubmission documents, including:

- Draft Plan of Subdivision (MHBC, May 2023);
- Environmental Impact Study (NRSI, December 2021);
- Environmental Impact Study Addendum (NRSI, May 2023);
- Preliminary Stormwater Management Report (MTE, Revised May 4, 2023);
- Functional Servicing Report (MTE, Revised May 4, 2023)

This EIS Addendum is to be read in conjunction with the December 2021 EIS (NRSI) and Section 2.0: Natural Feature Sensitivity Analysis in the May 2023 EIS Addendum (NRSI). The following EIS Addendum provides an updated summary of the proposed stormwater management strategy and hydrologic changes as described in the Preliminary Stormwater Management Report (MTE 2024a) and Functional Servicing Report (2024b). An impact analysis has been completed to ensure that the revised stormwater management strategy does not have a negative impact on the wetland and overall Torrance Creek Wetland Complex.

Since submission of the 2021 EIS and Tree Inventory and Preservation Plan (TIPP NRSI 2021), minor changes have been made by the team to the overall plan of development. The limit of development and buffers to the natural features as outlined in the 2021 EIS and TIPP have been maintained. The reader is referred to these documents for a full description of existing conditions, analysis of impacts and recommended mitigation. This EIS Addendum includes updated mapping of the natural feature constraints (Map 1) and habitat stewardship plan (Map 2) for reference to reflect the revised development plan layout.

2.0 Stormwater Management Plan and Water Balance Approach

MTE prepared a revised Preliminary Stormwater Management Plan (2024a) and Functional Servicing Report (2024b) that are provided under separate cover and are part of this resubmission package.

As detailed in the Preliminary Stormwater Management Plan and Functional Servicing Report, storm drainage for the proposed development will be provided through a combination of minor (piped) and major (overland) drainage systems, with several catchments conveyed to the stormwater management facility (SWMF). The majority of the on-site conveyance will be collected via a storm sewer network and constructed drainage swales. The proposed street-fronting townhouse units will have individual service connections to sump pumps. Roofed areas from Blocks 1 and 3 will be directed to infiltration galleries prior to any overflow being released to the SWMF.

The stormwater management plan for the subject property includes water quality, quantity, and erosion and sedimentation control. Water quality and quantity control will be provided by a 2-cell SWMF, consisting of a wet cell and an infiltration cell, as well as infiltration galleries. The reader is referred to the MTE reports for a fulsome description of the stormwater and functional services strategy (MTE 2024a, 2024b).

Discharge from the SWMF will be controlled via a multi-staged outlet. The infiltration cell downstream of the wet cell is sized to infiltrate the 25mm-4hr storm. Larger storms, up to and including the 100-year events, are infiltrated as much as possible up to the elevation of the overflow weir at the SWMF outlet. Any flows that cannot be infiltrated will be discharged to the Torrance Creek Wetland. Table 5.6 in the Preliminary Stormwater Management Report (MTE 2024a) identifies pre- and post-development discharges to the Torrance Creek Wetland. Table 1 summarizes this information. Post-development peak runoff to the wetland will be less than the existing condition.

Table 1. Pre- & Post-Development Peak Runoff Rates (MTE 2024a)

	25mm	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	Regional
Pre-development								
Total Discharge to Wetland (m^3/s)	0.038	0.069	0.122	0.166	0.213	0.252	0.302	0.392
Post-development								
Total Discharge to Wetland (m^3/s)	0.015	0.027	0.061	0.097	0.147	0.195	0.253	0.328

Stormwater runoff will drain internally for the majority of the subject property through the use of constructed drainage swales and the proposed storm sewer network. However, runoff from a small portion of the developed area, consisting of sloped pervious areas, will flow uncontrolled elsewhere (MTE 2024a). A high point is present along Arkell Road near the entrance to 202 Arkell Road. East of the high point, flows are directed towards storm sewers that are connected to an existing infiltration gallery in the boulevard adjacent to the Arkell Meadows subdivision SWMF. On the western side of the high point, flows will be directed to an existing side inlet catch-basin, through a stone energy dissipater, and eventually into the Torrance Creek wetland complex. As such, flow generated from uncontrolled portions of the subject lands will ultimately contribute to recharging surface water inputs to the wetland feature and subsurface water inputs to the local groundwater table. These measures will provide quality and quantity control of runoff prior to discharge into the adjacent Torrance Creek wetland.

2.1 Monthly Water Balance

A detailed description of the monthly water balance is provided in MTE's Preliminary Stormwater Management Plan report (2024a). The following provides a brief summary of the results.

2.1.1 Infiltration Volumes

Under pre-development conditions, the subject property infiltrates 6,616m^3/year (212.9mm). The post-development subject property has a passive infiltration of 5,320m^3/year (171.1mm). With the proposed stormwater management plan, which uses infiltration galleries and an end-of-pipe infiltration cell, the post-development total annual infiltration rate during non-winter months is 7,346^3/year (236.2mm). This provides a volume surplus of 730m^3/year (35mm/year) over pre-development conditions.

Infiltration occurring during from December to the end of March will only occur over pervious area as the infiltration galleries are conservatively assumed to be non-functioning during the

winter months (MTE 2024a). Pervious area infiltration over the winter months is considered to be negligible when compared to the total annual infiltration volume.

Infiltration volumes increase from pre-development to post-development through implementation of the on-site infiltration galleries, with an annual increase of 730m^3 (MTE 2024a). Infiltration from the subject property contributes to the shallow groundwater table that flows from the north to the south/southwest, toward Burke Well and ultimately the overall wetland complex west of the subject property. Figure 5.4 provided in MTE 2024a, summarizes the pre- and post-infiltration volumes throughout a year. The TCSS states that baseflow enhancement is encouraged on lands within this zone and the proposed SWM strategy satisfies this criterion.

2.1.2 Surface Runoff Volumes

Under pre-development conditions, runoff from the subject property drains to the northwest and provides surface water inputs to the Torrance Creek wetland complex. The subject property currently generates 5,413m^3/year (174.2mm) in runoff, based on an imperviousness of 13.8%. Under post-development conditions, the catchment area from within the Arkell Road subject property draining to the wetland is 2.99ha (Catchment 201, 202, 203 and 204-2) with the impervious coverage increasing to 35%. Approximately 67,021m^3/year (234.7mm) of runoff is generated by the development area under post-development conditions, which equates to an annual surplus of 1,608m^3/year (60.5mm) of surface runoff volume to the wetland complex. Figure 5.5 in MTE 2024a illustrates the distribution of excess runoff over the course of a year relative to the existing runoff conditions and patterns.

During the year, June, July and August are estimated to have the highest increase in monthly post-development runoff volumes compared to pre-development volumes, with a volume surplus of 237, 231 and 220m^3, respectively. The overall runoff volume to the wetland will be distributed over the larger Torrance Creek PSW complex that is approximately 1,060ha. The runoff volumes will also be distributed to the wetland during different rainfall events throughout each month. The runoff volume increase to the wetland in post-development conditions, compared to pre-development is estimated to be a 10-237m^3/month.

Runoff from the stormwater management facility to the wetland will outlet through a gabion mat and overland flow path where additional evapotranspiration and infiltration may occur over the 30m buffer to the wetland. To take a conservation approach, the water balance analysis

completed by MTE (2024a) does not include the additional evapotranspiration or infiltration that may occur within the wetland buffer.

2.1.3 Overall Recharge Volumes to the Wetland

MTE completed an existing conditions assessment (pre-development) that considered the entire existing site surface and groundwater flow to the wetland, which included a drainage area of 3.11ha and was inclusive of Catchment 101, 102, 103, 104 and 105. Under post-development conditions, the surface drainage area to the wetland will be reduced to 2.89ha, with the remaining surface area out-letting to Arkell Road uncontrolled. The catchments out-letting surface water to the wetland will include 201, 202, 203 and 204-2. The catchments that outlet surface water uncontrolled to Arkell Road will include 204-1 and 205 (MTE 2024a, 2024b).

The post-development runoff volume to the wetland was calculated to consider the 2.89ha surface drainage area to the wetland. The post-development infiltration augmentation was calculated considering the entire site area (surface and groundwater) of 3.11ha. Through this method, MTE was able to calculate monthly runoff volumes to the wetland and monthly infiltration over the site. The total increase in recharge and runoff from pre-development to post development is 84mm annually and has been designed to meet the TCSS baseflow criteria through infiltration augmentation (rooftop galleries and infiltration cell downstream of the SWM facility) while reducing surplus runoff to the wetland. A comparison of the pre and post development recharge volumes to the wetland is shown in Table 2 (MTE 2024a, MTE 2024b).

Table 2. Pre- & Post-Development Recharge Volume to the Wetland Comparison (MTE 2024a)

	Pre-Development Water Balance to Wetland		Post-Development Water Balance to Wetland		Value Difference	
Month	**Total Recharge & Runoff (mm)**	**Total Recharge & Runoff (m^3)**	**Total Recharge & Runoff (mm)**	**Total Recharge & Runoff (m^3)**	**Depth (mm)**	**Volume (m^3)**
Jan	3.7	114	4.9	147	1.2	34
Feb	1.8	57	2.4	74	0.6	17
Mar	0.9	28	1.2	37	0.3	8
Apr	51.1	1,587	56.9	1.738	5.8	151
May	134	4,166	122.0	3,712	-12.0	-454
Jun	74.2	2,305	94.0	2,872	19.9	568
Jul	42.1	1,309	60.4	1,845	18.3	537
Aug	25.7	800	42.7	1,303	16.9	503
Sept	16.2	505	30.3	927	14.1	422
Oct	9.8	305	19.7	601	9.9	296
Nov	18.3	570	24.8	757	6.4	187
Dec	9.1	284	11.6	355	2.5	71
Total	**386.9**	**12,030**	**470.9**	**14,368**	**83.9**	**2,338**

**All data and calculations in table are extracted from MTE 2024a.*

3.0 Impact Analysis

3.1 Management of Stormwater Quantity

The approach to stormwater management for the proposed redevelopment is summarized in the Preliminary Stormwater Management Report (MTE 2024a) and Functional Servicing Report (MTE 2024b).

Under the proposed stormwater management strategy there will be an overall increase in the amount of infiltration within the development area (an additional 730m^3/year) (MTE 2024a). The infiltrated water will contribute to the shallow groundwater system, flowing away from the wetland, and no negative impacts to the wetland will occur based on the increased infiltration volumes.

The post-development monthly runoff volumes and rates reflect the existing runoff cycle to the wetland, with an overall increase in runoff volume occurring in all months (an additional 1,406m^3/year) (MTE 2024a). The overall runoff volumes represent a small component of the broader hydrology of the Torrance Creek Subwatershed area (1,060ha), given that the subject property represents approximately 0.24% of the Torrance Creek Subwatershed area (Totten Sims Hubicki et al. 1999, Dougan and Associates 2009). An analysis of local impacts to the wetland based on increases in runoff volumes was completed to fully assess impacts to the Provincially Significant Wetland (PSW). A wetland water balance risk evaluation was also conducted to assess the hydrological and ecological capacity of the wetland to assimilate the proposed changes. The risk evaluation that was detailed in the 2023 EIS (NRSI) is summarized below.

3.2 Wetland Water Balance Risk Evaluation

A Wetland Water Balance Risk Evaluation (TRCA 2017) was completed for the proposed development. The Risk Evaluation uses information about the proposed development, proposed changes to the hydrology of the wetland, and natural heritage information about the wetland to assign a level of risk for:

1. The potential magnitude of hydrological change; and,
2. The sensitivity of the wetland to hydrological change.

The assigned level of risk for these two factors are then evaluated together using a Wetland Risk Evaluation Decision Tree to assign an overall risk to the wetland from the proposed development and determine monitoring needs.

The criteria used to evaluate the probability and magnitude of hydrological change as a result of the proposed development are shown in Table 3 in TRCA 2017. The criteria used to Evaluate the Sensitivity of the Wetland to Hydrological Change are provided in Table 4 in TRCA 2017.

According to the completed Wetland Water Balance Risk Evaluation (TRCA 2017), the proposed development is considered to have an overall 'Medium to High' risk to the wetland due to an increase in impervious surfaces and change in catchment area. The stormwater management plan has been prepared to provide a balance between the surplus pre- and post-development runoff and infiltration volumes to the wetland. The stormwater management plan uses infiltration galleries throughout the development and an end-of-pipe infiltration cell in the SWMF to provide enhancement of infiltration, thereby reducing surplus runoff to the wetland.

While the risk to the wetland is considered 'Medium to High' the runoff out-letting to the wetland throughout the year generally reflects pre-development conditions in terms of volumes and patterns of seasonal highs and lows as summarized in Table 2 above.

3.3 Impact Assessment

MTE's monthly water balance estimates that the proposed development, and associated stormwater management design, will result in a 25.8% increase in annual runoff volume, contributing to an estimated 1,394m^3 increase in the annual depth of runoff discharged to the wetland. A surplus of runoff will outlet to the wetland throughout the year; however, this is not anticipated to impact the duration of ponding in the PSW as surplus runoff will be distributed to the wetland during different rainfall events throughout each month. Some surface ponding may occur in pockets throughout the PSW based on local topography; however, the gentle slope of the wetlands towards Torrance Creek and the permeability, hydraulic conductivity and infiltration rates of local soils will prevent ponding from occurring for excessive durations. As a result, changes to the wetland hydroperiod and composition of the vegetation community are not anticipated to occur post development.

The proposed water balance generally maintains the distribution of wet and dry periods throughout the year, which will maintain the existing hydroperiod of the wetland. An increase in the runoff volumes to the wetland will occur post-development; however, due to the size of the

overall Torrance Creek Wetland Complex and catchment associated with the wetland, the volume and depths will not be sufficient to change the overall hydroperiod that Tree frogs and American toads rely on. As such, the proposed development is not anticipated to have a negative impact on the life cycle of these anuran species or other common anurans known to occur in the area.

A couple of vegetation species (Riverbank Grape and Redtop) in the wetland observed by NRSI biologists in 2017 are sensitive to flood conditions lasting greater than three months (NRSI 2023). Based on MTE's groundwater elevation observations in the wetland, hydraulic conductivity tests, and in-situ infiltration testing, ponding greater than three months is not anticipated to occur, since the groundwater table drops by over 1m following early spring (March and April) freshet conditions. Based on the sensitivity analysis and background review (NRSI 2023), the composition of the vegetation community is moderately sensitive to changes in hydrology. The dominant tree species in the wetland (Trembling Aspen (*Populus tremuloides*), Silver Maple (*Acer saccharinum*), and Green Ash (*Fraxinus pennsylvanica*)) are known to inhabit locations with substantial fluctuations in water levels. Swamp communities tend to have fluctuating water levels with periods of inundation and dry periods. Swamp communities rely on both of these periods to maintain their vegetation communities and their ecological function. This vegetation community is tolerant of the proposed wetland water balance changes post-development. It is anticipated that the duration of additional ponding (if any) will be temporary and will not impact the ecological or hydrological function of the wetland or the vegetation composition.

The detailed monthly runoff and infiltration volumes provided by MTE (2024a) and summarized in Table 2 above, were used to determine whether the proposed changes in local hydrology will significantly alter the form or function of the Torrance Creek Wetland Complex from its pre-development condition. According to the sensitivity analysis completed, which focused on the wetland vegetation community and anuran species documented within the study area, no negative impacts are anticipated to occur due to the proposed development and resulting changes in local hydrology.

4.0 Recommendations

It is recommended that wetland water level monitoring, anuran call survey monitoring, and vegetation monitoring is implemented before (baseline) and after construction of the proposed development to determine whether the stormwater management design is functioning as anticipated. These recommendations can be addressed through conditions of approval.

A detailed monitoring program to track changes to the PSW and provide recommendations for suitable mitigation measures (i.e., SWM runoff alterations, etc.) should be provided in the Environmental Implementation Report. The EIR should be required as a condition of approval.

In conclusion, the EIS Addendum has addressed comments received from the City and GRCA and the Terms of Reference for the EIS have been addressed. The proposed applications are supported by the EIS, subject to the recommendations of this EIS Addendum.

5.0 References

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Maps

565100 565200 565300

4819900

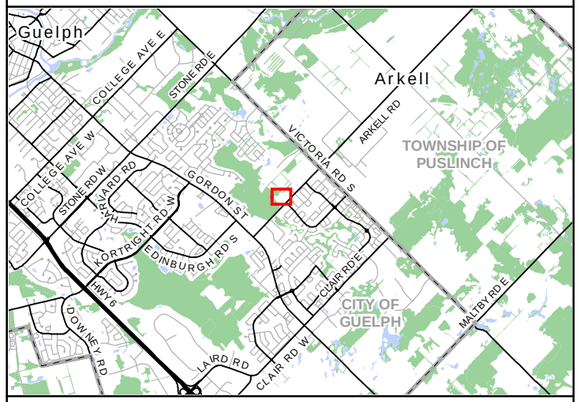
4818800

SWD4
SWD3-2
SWD4
SWM1-1
H
FOD8-1
CUM
CUT
Residential
DAWES AVE
AMOS DR
ARKELL ROAD
SUMMERFIELD DRIVE

Map 1

Arkell Road Properties Environmental Impact Study

Natural Heritage Constraints



Legend

- Subject Property
- Proposed Development
- Proposed Retaining Wall
- Significant Woodland Dripline (NRSI Flagged, City Approved July 22, 2016)
- Significant Woodland Buffer (10m)
- Wetland Boundary (NRSI Flagged, GRCA Approved July 22, 2016)
- Wetland Buffer (30m)

Significant Wildlife Habitat

- Special Concern and Rare Wildlife (Eastern Wood-Pewee)
- Deer Winter Congregation Area

Species at Risk Habitat

- Little Brown Myotis - Candidate Foraging Habitat
- Ecological Land Classification (ELC)

(CUM) Cultural Meadow
(CUT) Cultural Thicket
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(H) Hedgerow
(SWD3-2) Silver Maple Mineral Deciduous Swamp Type
(SWD4) Mineral Deciduous Swamp Ecosite
(SWM1-1) White Cedar Mineral Mixed Swamp Ecosite

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Project: 1771
Date: June 5, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:1,000

0 10 20 30 40 50 60 Metres

N

Path: X:\1771_ArkellRoadPropertiesEIS\NRSI_1771_Map1_Constraints_1K_2024_06_05_KB.mxd

565100 565200 565300

4819900

4818800

SWD4

SWD3-2

Torrence Creek Provincially Significant Wetland Complex

SWD4

H

FOD8-1

CUM

CUT

Residential

SWM1-1

DAWES AVE

AMOS DR

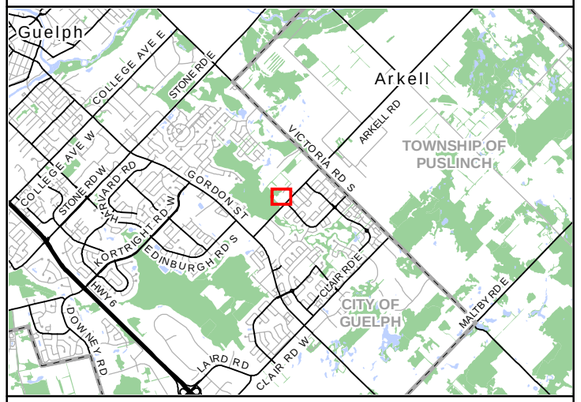
ARKELL ROAD

SUMMERFIELD DRIVE

Map 2

Arkell Road Properties Environmental Impact Study

Habitat Stewardship Plan



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