Tullamore North

Fluvial Geomorphic Assessment of Salt Creek

Caledon, Ontario

Submitted to:
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Issues and Revisions Registry

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First Submission	January 2023	

Statement of Conditions

This Report / Study (the “Work”) has been prepared at the request of, and for the exclusive use of, the Owner / Client, Municipality and its affiliates (the “Intended User”). No one other than the Intended User has the right to use and rely on the Work without first obtaining the written authorization of GEI Consultants Ltd. and its Owner. GEI Consultants Ltd. expressly excludes liability to any party except the Intended User for any use of, and/or reliance upon, the work.

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1. Introduction

GEI Consultants Ltd. (GEI) has been retained by Rice Commercial Group Limited to complete a geomorphic assessment within and adjacent to the property generally located north of Mayfield Road, west of Airport Road, and east of Torbram Road (herein referred to as the Study Area; **Figure 1, Appendix A**). The study area is located within the Town of Caledon, Ontario. Salt Creek, a tributary of the Humber River traverses the central portion of the property. This watercourse falls under the jurisdiction of the Toronto and Region Conservation Authority (TRCA).

Presently, land use within the study area consists of agricultural fields on the western portion of the site, an old residential dwelling with several shed structures on the eastern portion of the site, and Salt Creek separating the eastern and western portions of the property. It is understood that the western portion of the property, currently occupied by agricultural fields, is proposed to be developed.

Salt Creek was identified as occupied Redside Dace (*Clinostomus elongatus*) habitat through Fisheries and Oceans Canada (DFO) mapping (DFO 2023). Under Ontario Regulation 242/08 of the Endangered Species Act (2007), the definition of regulated habitat for Redside Dace includes the meander belt width, plus vegetated areas or agricultural lands within 30 metres of the meander belt.

As such, the purpose of this fluvial geomorphic study is to assist the development of environmental constraint limits in relation to the subject property, through the delineation of the meander belt. This meander belt can then be used to delineate the regulated habitat limits for Redside Dace (i.e., 30 m from the meander belt).

The following tasks were completed for this study:

- Background review of available materials, including topographic, soil, and geology mapping, as well as a review of pertinent watershed reports, and historic aerial imagery;
- A desktop approach to delineating reaches based on geomorphic form and processes;
- A historic assessment to provide insight into past channel adjustments and modifications.
- A field assessment to confirm the results of the desktop assessment, as well as to characterize existing conditions and document active channel processes;
- Delineate the meander belt widths on a reach basis, following applicable policies and guidelines; and
- Delineate regulated habitat limits of Redside Dace, following Ontario Regulation 242/08 (i.e., 30 m from the meander belt).

2. Natural Heritage Planning Considerations

2.1 Endangered Species Act

Ontario's *Endangered Species Act*, *2007* (ESA; July 2020 Consolidation) was developed to:

- Identify Species at Risk (SAR), based upon best available science;
- Protect SAR and their habitats and to promote the recovery of the SAR; and
- Promote stewardship activities that would support those protection and recovery efforts.

The ESA protects all threatened, endangered, and extirpated species listed on the Species at Risk in Ontario (SARO) list. These species are legally protected from harm or harassment, and their associated habitats are also protected from damage or destruction, as defined under the ESA.

2.2 Provincial Policy Statement

The Provincial Policy Statement (PPS; MMAH 2020) provides guidance on matters of provincial interest surrounding land-use planning and development. One principle behind the policy statement is the reduction of public cost and risk to Ontario's residents by directing development away from areas where there is a risk to public health or safety or risk of property damage. The *Technical Guide – Rivers and Streams: Erosion Hazard Limit* (MNR 2002) was developed in support of the PPS, to assist members of the public and planning authorities in understanding the PPS, particularly, Section 3.1, relating to natural hazards. The guide is based on a standard and simplistic methodology, intended to be applied to two generalized landform systems through which river and stream systems flow: confined and unconfined systems. In the case of unconfined systems, the erosion hazard allowance consists of the meander belt and an access allowance. In the case of confined systems, the erosion hazard allowance consists of the stable slope allowance, toe erosion allowance, in addition to the access allowance.

2.3 Town of Caledon Official Plan

The Study Area is designated within the Prime Agricultural Area of the Town of Caledon Official Plan (OP; Town of Caledon 2018).

The area surrounding Salt Creek on the Study Area is designated as an Environmental Policy Area (EPA) (Schedule A; Land Use Plan). As discussed within section 5.7 of the Town of Caledon OP, EPAs are all Natural Core Areas and Natural Corridors, including:

- All Woodland Core Areas;
- All Wetland Core Areas;
- All Niagara Escarpment Natural Areas;

- Oak Ridges Moraine Key Natural Heritage Features (as defined by the Oak Ridges Moraine Conservation Plan (ORMCP));
- Oak Ridges Moraine Hydrologically Sensitive Features (as defined by the ORMCP);
- Greenbelt Key Natural Heritage Features (as defined by the Greenbelt Plan);
- Greenbelt Key Hydrologic Features (as defined by the Greenbelt Plan);
- All Environmentally Significant Areas;
- All Life Science Areas of Natural and Scientific Interest (ANSIs);
- All Significant Habitats of Threatened and Endangered Species;
- All Significant Wildlife Habitat;
- All Core Fishery Resource Areas; and
- All Valley and Stream Corridors.

New development is prohibited within areas designated EPA. Proposed new development adjacent to an EPA will be required to complete a Comprehensive Environmental Impact Study and Management Plan to the satisfaction of the Town and other relevant agencies.

2.4 Peel Region Official Plan

Like the Town of Caledon OP, the Region of Peel OP has certain policies and designations that can affect land-uses permitted within the Subject Land boundaries (Peel Region 2018).

The Study Area is also shown as being part of the Prime Agricultural Area on Schedule B (Prime Agricultural Area), as mentioned in the Town of Caledon OP, and the Rural System on Schedule D (Regional Structure). The Rural System has diverse natural and rural landscapes, contains attractive and dynamic rural communities, and contributes toward overall social qualities and economic viability of the region. The Rural System included land identified as Core Areas of the Greenlands System and Prime Agricultural Areas.

Salt Creek is designated as a Core Area of the Greenlands System on Schedule A (Core Areas of the Greenlands System in Peel). The Greenland System consists of Core Areas, Natural Areas and Corridors, and includes similar natural heritage feature types as the Town of Caledon OP Environmental Policy Areas (e.g., ANSIs, Environmentally Significant Areas, fish and wildlife habitat, wetlands, etc.).

The municipalities are directed to adopt appropriate policies to demonstrate that development or site alteration is directed away from the Core Area features, any impact is minimized and if its functions cannot be avoided then mitigation through restoration and enhancement is done to the greatest extent possible.

2.5 Toronto and Region Conservation Authority

The Toronto and Region Conservation Authority (TRCA) conducts reviews of planning processes associated with future development of properties within its jurisdictional boundaries. TRCA provides planning and technical advice to planning authorities to assist them in fulfilling their responsibilities regarding natural hazards, natural heritage and other relevant policy areas pursuant to the Planning Act. In addition to their regulatory

responsibilities, TRCA provides advice as both a watershed-based resource management agency and through planning advisory services.

TRCA administers the Development, Interference with Wetlands, Alterations to Shorelines and Watercourses Regulation, Ontario Regulation (O. Reg.) 166/06, which defines the areas of interest that allow TRCA to:

- Prohibit, regulate, or provide permission for straightening, changing, diverting or interfering in any way with the existing channel of a river, creek, stream, watercourse or changing or interfering with a wetland; and
- Prohibit, regulate, or provide permission for development if the control of flooding, erosion, dynamic beaches, pollution or the conservation of land may be affected by the development.

The Regulation Limit delineates hazardous lands, wetlands, shorelines and areas susceptible to flooding and associated allowances. A Tributary of the West Humber River (Salt Creek) is found on the Study Area and is identified by the TRCA as a regulated area. The regulated area also contains unevaluated wetlands, locally significant wetlands, meander belt, flooding hazards and crest of slope.

Pursuant to the Development, Interference with Wetland and Alterations to Shorelines and Watercourse Regulation (TRCA; O. Reg. 166/06), any development in or on areas defined in the Regulation (e.g., river or stream valleys, hazardous land, wetlands) requires permission from the Conservation Authority. The Conservation Authority may grant permission for development in or on these areas if, in its opinion, the control of flooding, erosion, dynamic beaches, pollution or the conservation of land will not be affected by the development.

The TRCA's Living Cities Policies (2014) contains the principles, goals, objectives, and policies approved by the TRCA for their planning and development approvals process. This document outlines policies related to the determination of the Natural System and recommends buffer widths for natural heritage features such as woodlands, wetlands, and valley and stream corridors.

The erosion hazard within River or Stream Valleys includes both the erosion potential of the actual river or stream bank, as well as the potential for erosion or slope stability issues associated with the valley walls. Ultimately, the identification of the hazard depends on whether there is a well-defined valley corridor that is part of a confined system or a relatively flat landscape that is not bounded by valley walls and is part of an unconfined system.

The TRCA's Living Cities Policies (2014) document states that for purposes of implementing TRCA's Environmental Planning policies:

- Confined River or Stream Valleys are considered Valley Corridors
- Unconfined River or Stream Valleys are considered Stream Corridors.

The limits of Valley and Stream Corridors shall be defined by the greater of the long-term stable top of slope/bank, toe of slope, Regulatory flood plain, meander belt, and any

contiguous natural features and areas plus an applicable buffer. Development within a regulated area shall be set back a further 10 m from this limit of Valley and Stream Corridor.

3. Background Review

A background review was completed for the study area to gain an understanding of the watercourse in the study area and a general context of the study area. Under existing conditions, land use generally consists of agricultural lands on the west side of the property, and some old residential buildings to the east.

3.1 Watershed Characteristics

Salt Creek traverses the study area, which is a tributary of the Humber River, and is located within the jurisdiction of the TRCA. The Humber River watershed is the largest in the TRCA's jurisdiction, spanning over 900 km^2 and includes portions of local municipalities within the Regional Municipality of York, the Regional Municipality of Peel, the City of Toronto, and Simcoe County (TRCA 2008a). Salt Creek, at the downstream extent of the study area, has an upstream drainage area of 17.7 km^2 (OWIT 2022). Climate and geology play an important role to influence the form and processes of the watercourse. Geological influences on patterns and rates of river change include landscape configuration, material availability, and erodibility of the substrate. Climatic fluctuations influence water balance and vegetation patterns, which impact flow regimes and the production, supply, and transport of sediment. The following sections provide an understanding of the physical setting of Salt Creek and provide context to the active fluvial geomorphological processes in the study area.

3.1.1 Geology

The study area lies within the South Slope physiographic region (Chapman & Putnam 2007). This is a sloping plain that extends from the boundary with the Oak Ridges Moraine, southwards, and is underlain by glacial till. The soil types in this physiographic region are predominantly clay with some clay loam, and loam. The topography is relatively smooth, and infiltration is low due to the clay content. As a result, runoff rates are high. Surficial geology consists of clay to silt-textured till. Within the channel corridor, the surficial materials consist of modern alluvial deposits (OGS 2010).

3.1.2 Climate

Precipitation was calculated from climate normals (1981-2010) recorded at the Albion Field Centre (Environment Canada Climate ID 6150103), approximately 13 km northeast of the study area. Precipitation averaged 63 mm in the winter (November to February, inclusive) and 78 mm in summer (June to August, inclusive; Environment Canada 2023). For most streams in Southern Ontario, the highest instream flows typically occur during the spring freshet due to snowmelt, as well as rain-on-snow events. Convective thunderstorms are likely to be the cause of higher amounts of precipitation in the summer. Typically, these events do not result in extreme flow events, unless when sustained intense rainstorms occur.

3.2 Summary of Relevant Studies

The TRCA prepared a State of the Watershed Report (TRCA 2008b) for the Humber River to provide a summary of available information on current conditions within the watershed, establishing baseline conditions for a number or reaches. The report also described emerging trends and identified potential watershed management issues and opportunities in the Humber River relating to fluvial geomorphology. This study divided the Humber River watershed into five subwatersheds: Main Humber, East Humber, West Humber, Lower Humber, and Black Creek. The study area lies within the West Humber subwatershed (TRCA, 2008b).

Salt Creek within the study area was classified as a third order stream. While there were no monitoring stations near the study area, the TRCA established Station GHU-15 on Salt Creek several kilometres downstream, near McVean Drive. Additionally, the State of the Watershed Report (TRCA 2008b) noted that the reaches of the West Humber watershed upstream of Mayfield Road were dominated by local disturbances in riparian vegetation and channel hydraulics from livestock, agricultural processes and drainage works.

A Humber River Fisheries Management Plan was developed by the Ontario Ministry of Natural Resources and TRCA (2005) and was intended to characterize the existing conditions of seven aquatic habitat types found in the watershed and assess their habitat potential. Specific management directions and rehabilitation priorities are provided for the five subwatersheds. The Humber River Fisheries Management Plan identifies target fish species for management: Brook Trout, Redside Dace, Rainbow Trout, Brown Trout, Atlantic Salmon, and Darters. Management in support of these species will provide conditions that are suitable for other species that require stable, cold, or cool water habitats (TRCA 2008a).

The TRCA delineated twelve Fish Management Zones (FMZs) within the Humber River watershed, evaluating fish communities in the context of a river continuum, where similar physiographic and hydrologic conditions give rise to habitats that support similar fish communities in a specific zone. The study area falls within Fish Management Zone 7, where target species are Redside Dace, Rainbow Darter, and Smallmouth Bass (TRCA 2008a).

3.3 Historical Assessment

Historical aerial photographs of the watercourse in the vicinity of the study area were reviewed, to determine changes to the channel and surrounding land use and land cover. Historic analyses provide insight into how past channel adjustments and modifications have contributed to current channel form and processes.

Aerial photographs from 1946, 1964, 1974, and 1988, obtained from the National Air Photo Library, were compared with digital imagery from 2002, 2011, and 2022, obtained from First Base Solutions (**Appendix B**).

Land use in 1946 was predominantly agricultural with some rural residences noted along Airport Road in the vicinity of the study area. Salt Creek could be discerned as a single-thread, meandering channel within the study area. An informal crossing could be seen within

the study area, approximately 140 m west of Airport Road. A bypass channel was visible immediately upstream of this crossing. Riparian vegetation appeared to be mainly non-woody vegetation, with trees observed within hedgerows and a small, isolated pocket of tree cover along the banks of Salt Creek approximately 200 m upstream of the study area.

Land use remained unchanged by 1964. Salt Creek was noted to be a single thread meandering channel, with some areas of ponding water within the channel. The informal crossing remained in place, but the bypass channel did not appear to be active in the aerial image.

Land use in 1974 remained predominantly agricultural, with some rural residential dwellings along the main roads near the study area (i.e., Airport Road and Mayfield Road). Salt Creek had been straightened within the study area, with flow directed through the former bypass channel. The sinuous section of Salt Creek in this area was not observed, with a dug pond noted in the space formerly occupied by the creek. Another pond was noted south of the creek, immediately west of Airport Road. Tree cover remained sparse, generally limited to hedgerows. However, an increase in tree cover was noted along the banks of Salt Creek, upstream of the study area.

Minimal changes were observed in land use and channel planform between 1974 and 1988. However, the amount of tree cover north of the study area had increased significantly, with a well-defined woodlot observed in the area.

Changes in land use in the surrounding area had started to occur by 2002. The commercial and industrial buildings that currently exist along Airport Road were starting to be constructed. The residential subdivision south of Countryside Drive was noted to be under construction. Land use within the study area remained unchanged, however. The channel planform also remained largely unchanged. Evidence of multiple flow paths and cutoff channels could be seen. The two previously dug ponds remained, as did the woodlot to the north of the study area. The former informal crossing could not be discerned and had likely been decommissioned at some point in the past.

By 2011, the residential subdivision south of Mayfield Road had been constructed. The industrial and commercial development along Airport Road had also expanded, with additional warehouses and structures observed. Minimal changes in land use and channel planform were observed between 2002 and 2011.

The commercial and industrial development along Airport Road continued to expand by 2022, as did the residential development to the south. Land use and channel planform within the study area remained unchanged.

4. Existing Conditions

4.1 Reach Delineation

Reaches are defined as sections of river along which boundary conditions are sufficiently uniform such that the river maintains a near consistent structure (Brierley and Fryirs 2005). Reaches are typically delineated based on changes in channel planform, gradient, valley form, physiography, land cover, flow inputs, channel disturbances, and past channel modifications. Due to spatial variability in the modifying and controlling influences of channel form, two reaches situated immediately upstream or downstream of each other could show a marked difference in planform (TRCA 2004).

Based on a desktop assessment, there was limited change in channel geometry, planform, valley form, gradient, and vegetation cover within the study area. As a result, a single reach was delineated for Salt Creek within the study area – SC-1 (**Figure 2, Appendix A**). The reach delineation was subsequently verified during the field investigation (noted below).

4.2 Field Investigation

4.2.1 Methods

A field assessment was completed for reach SC-1 of Salt Creek on December 9, 2022 and consisted of a Rapid Geomorphic Assessment (RGA), a modified Rapid Stream Assessment Technique (RSAT) and classification of the reach using the Downs method.

The RGA (MOE, 2003) documents observed indicators of channel instability. Observations made during the field investigation are quantified using an index that identifies channel sensitivity based on evidence of aggradation, degradation, channel widening, and planform adjustment. The index produces values that indicate whether the channel is stable/in regime (score <0.20), stressed/transitional (score 0.21-0.40), or adjusting (score >0.41).

The RSAT (Galli, 1996) provides an assessment of the channel by also considering the ecological function of the stream. Observations under the modified RSAT include channel stability, channel scouring/sediment deposition, physical instream habitat, water quality, and riparian habitat condition. The RSAT scores rank the channel as maintaining a poor (<13), fair (13-24), good (25-34), or excellent (35-42) degree of stream health.

The Downs method, as outlined in Thorne et al. (1997), was developed based on adjustment processes and trends of channel change and links these processes and trends to the fluvial and sediment processes responsible for driving channel change. This system classifies streams as stable, depositional, laterally migrating, enlarging, compound, recovering, or undercutting.

4.2.2 Results

Reach SC-1 was an intermittently defined watercourse, with low gradient and moderate sinuosity, situated in a confined valley setting. Channel geometry was found to vary within the assessed length of the reach, due to the presence of flow obstructions like wood debris. Occasionally, multiple flow paths were present, as well as cut-off channels. Adjacent land use consisted of agricultural uses, with old residential buildings and shed structures present. An old crossing was noted within the property. The structure was in poor condition, with wood paneling on the deck absent and the metal frame was rusted. The abutments of the structure remained in place, but the structure was not impeding flow. Riparian vegetation consisted of mainly grasses and herbaceous species, with occasional trees present. The riparian buffer extended >5 channel widths in dimension.

Distinct riffles, pools and runs could be discerned, but the dominant habitat type consisted of runs. Where defined, bankfull widths ranged between 2.5-3.0 m for the riffles and 3.0-4.0 m for the pools. Bankfull depths ranged between 0.7-0.9 m for the riffles and 0.9-1.2 m for the pools. Observed bank materials consisted of clay, silt and sand. Pool substrate was composed of clay, silt, sand, and gravel, with occasional small boulders. Riffles consisted of sand, gravel, cobbles, and occasional boulders. Undercuts averaging 0.1 m were noted on the outer bends of some meanders. Bank angles were steep, ranging between 60-90° and erosion was noted on approximately 5-30% of banks.

The RGA produced a score of 0.23, which indicated that the reach was in transition/stressed. Widening was the dominant geomorphic process, with evidence of planform adjustment also observed. The RSAT score of 29 indicated that this reach was in a good state of ecological health. Riparian habitat conditions were noted to be the main limiting factor, due to the absence of mature trees. The Downs method classified this reach as M – lateral migration, which is characterized by migration of most bends, but the cross-sectional dimensions are preserved.

Rapid assessment results are summarized in Table 1 below. A photographic record of existing conditions is provided in **Appendix C**.

Table 1 – Summary of Rapid Assessment Results for Salt Creek

Reach	RGA Score and Condition	Dominant Mode of Adjustment	RSAT Score and Condition	Limiting Factor	Downs Method
SC-1	0.23 In Transition	Widening and Planform Adjustment	29 Good	Riparian Habitat Conditions	M – Lateral Migration

5. Meander Belt Delineation

Streams and rivers are dynamic features on the landscape, and their configuration and position on the floodplain changes as part of meander evolution, development and migration processes. When development or other activities are contemplated near a watercourse, it is desirable to designate a corridor that is intended to contain all of the natural meander and migration tendencies of the channel. The space that a meandering watercourse occupies on its floodplain, and in which all of these natural processes occur, is referred to as the meander belt (TRCA 2004). In the case of unconfined systems, the erosion hazard allowance consists of the meander belt and an access allowance. In the case of confined systems, the erosion hazard allowance consists of the stable slope allowance and toe erosion allowance, in addition to the access allowance.

As Salt Creek in the study area was situated in a confined valley, the meander belt width cannot be used to delineate the erosion hazard, which would be governed by geotechnical considerations. However, Ontario Regulation 242/08 of the Endangered Species Act defines Redside Dace habitat to be the meander belt width, plus vegetated areas or agricultural lands within 30 metres of the meander belt. Therefore, the belt width was delineated to identify the limits of Redside Dace habitat.

The TRCA (2004) *Belt Width Delineation Procedures* document was created to recommend a protocol for delineation of meander belt for river systems within the TRCA's jurisdiction but is accepted by Conservation Authorities throughout Ontario as a primary method for delineating the belt width. As Salt Creek within the study area is classified as a confined system, the method involves drawing lines tangential to the outside meander bends of the planform, following the valley trend. The perpendicular distance between these two lines represents the meander belt width. The meander belt width obtained through this method was 56 m, and the limits of the meander belt are shown in **Figure 2, Appendix A**.

5.1 Redside Dace Habitat

Figure 2 illustrates the extents of regulated Redside Dace habitat, i.e., vegetated or agricultural lands within 30 m of the meander belt.

6. Conclusions and Recommendations

GEI Consultants Inc. (GEI) was retained by Rice Commercial Group to undertake a geomorphic assessment for the property generally located north of Mayfield Road, west of Airport Road and east of Torbram Road. The purpose of the geomorphic assessment was to assist the development of environmental constraint limits in relation to the subject property, through the delineation of the meander belt. A portion of Salt Creek traverses the study area, which was identified as occupied Redside Dace habitat. As such, the meander belt would be used to delineate the limits of habitat (i.e., 30 m from the meander belt).

The following summarizes the key findings of the geomorphic assessment:

- Reach SC-1 of Salt Creek was characterized as an intermittently defined channel within a confined valley setting. Channel geometry was found to vary within the assessed length of the reach, due to the presence of flow obstructions like wood debris. Occasionally, multiple flow paths were present, as well as cut-off channels.
- The RGA classified the reach as transitional, with a score of 0.23. The RSAT characterized this reach as displaying a good degree of ecological health. The Downs method classified this reach as M – lateral migration.
- The TRCA (2004) belt width delineation procedures were followed to delineate the meander belt width for this reach, and resulted in a meander belt width of 56 m. Given the confined nature of this reach, the meander belt does not define the erosion hazard limits.
- The meander belt was used to delineate habitat limits for Redside Dace, defined as the meander belt width, plus vegetated areas or agricultural lands within 30 metres of the meander belt.

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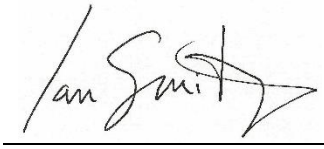

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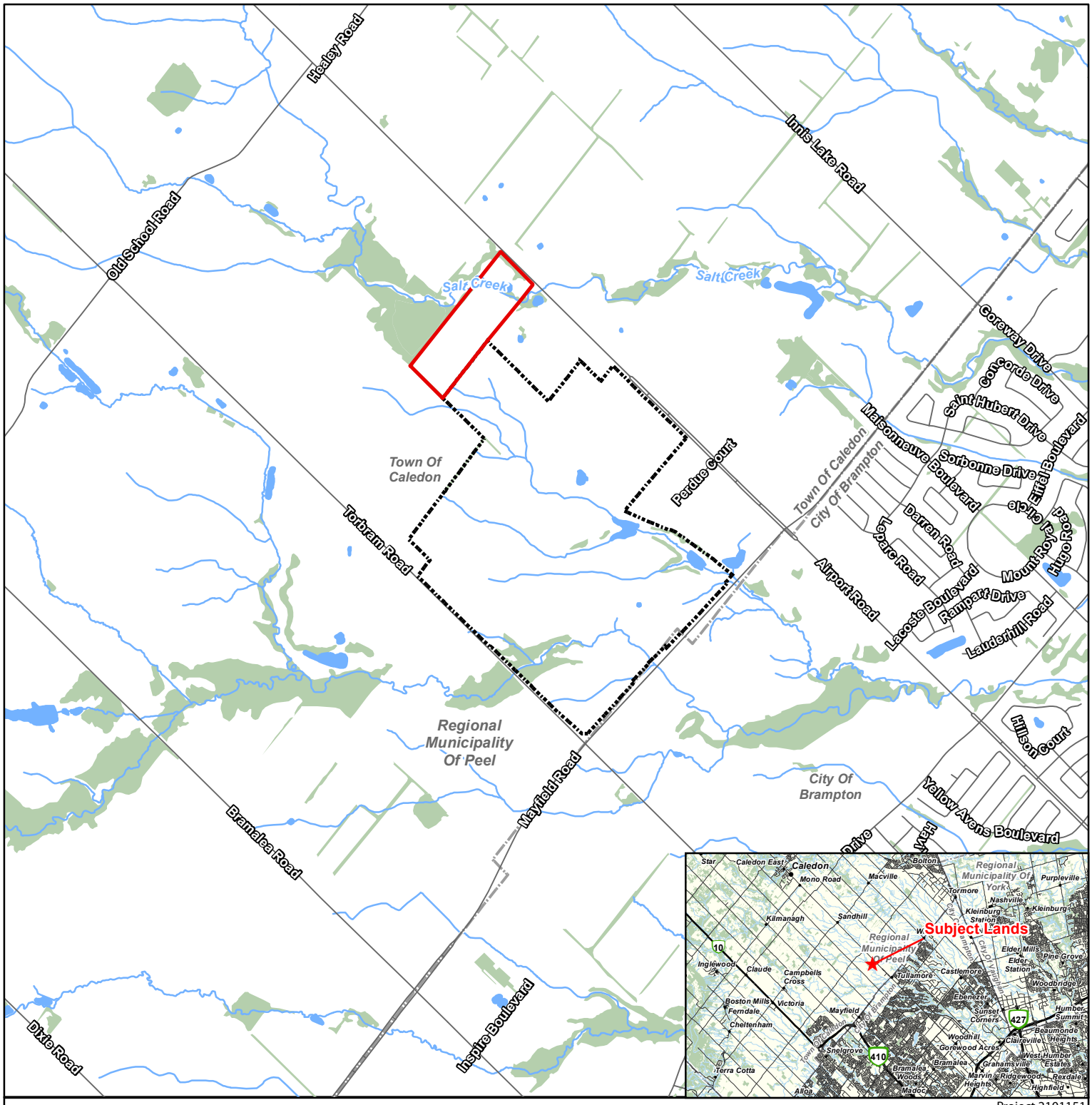
TRCA. 2008b. Humber River State of the Watershed Report

Appendix A

Figures



NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2023.

Legend

- Subject Property
- Tullamore Employment Lands (Current)
- Road
- Municipal Boundary, Lower/Single Tier
- Municipal Boundary, Upper Tier
- Watercourse (LIO)
- Waterbody (LIO)
- Wooded Area (LIO)

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Fluvial Geomorphic Assessment for Salt Creek, Tullamore North Rice Group

Figure 1
Location of Subject Lands

0 500 m
1:25,000

N

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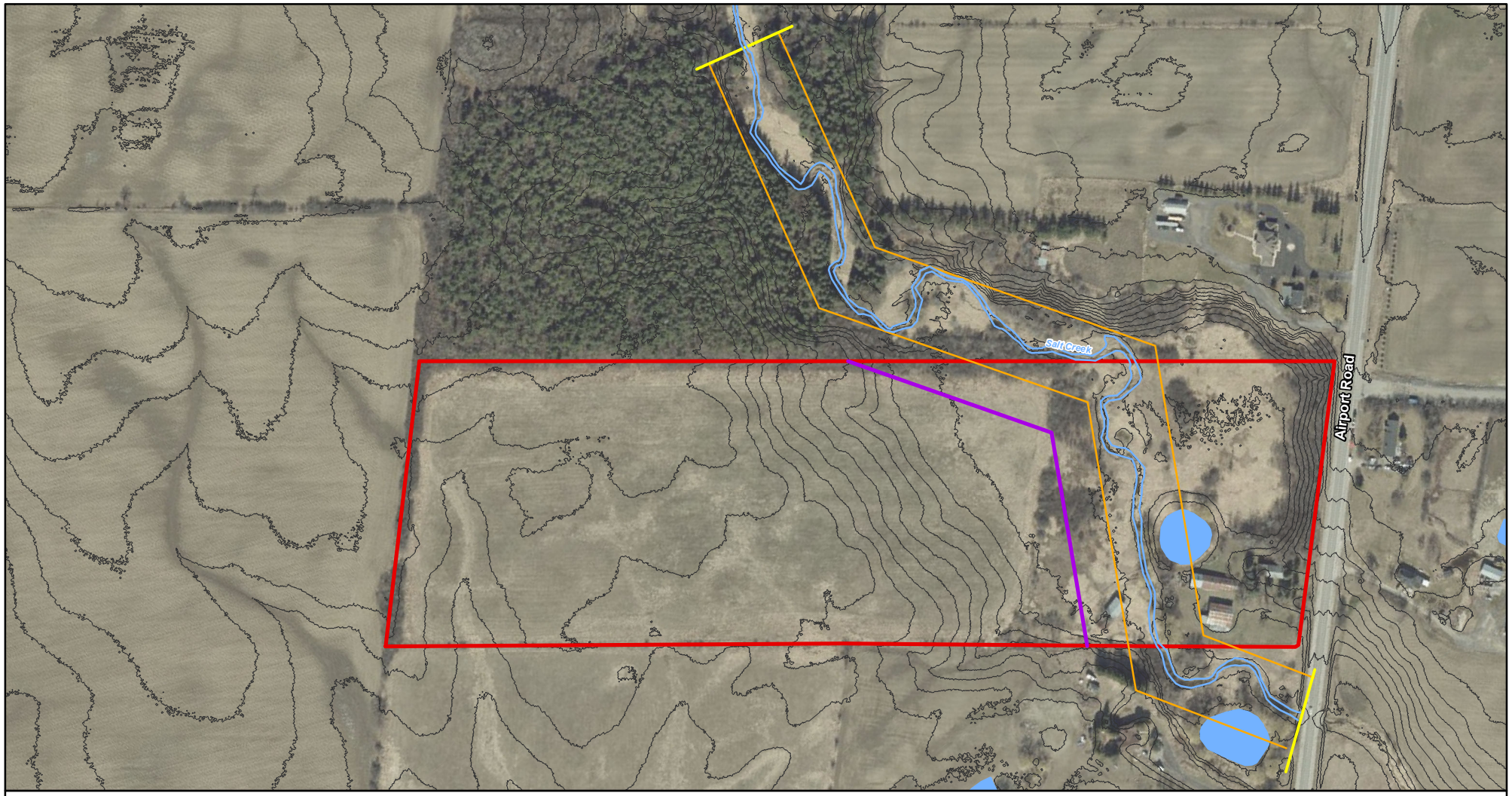

NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2023.
3. Orthoimagery © First Base Solutions, 2023. Imagery taken in 2021.

Legend

- Subject Property
- Waterbody (LIO)
- Watercourse Trace - 2022
- Reach Break
- Meander Belt (56 m)
- Redside Dace Habitat Limits (Meander Belt + 30 m)
- Contour (LIO, 1m)

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Fluvial Geomorphic Assessment for Salt Creek, Tullamore North Rice Group

Figure 2
Reach Delineation, Meander Belt, and Redside Dace Habitat Limits

0 50 m

1:4,200

N

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Appendix B

Historical Aerial Imagery

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NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Airphoto Source: National Airphoto Library

Legend

Subject Property

Fluvial Geomorphic Assessment for Salt Creek, Tullamore North
Rice Group

1946 Aerial Photo

0 50 m

1:4,000

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NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Airphoto Source: National Airphoto Library

Legend

Subject Property

Fluvial Geomorphic Assessment for Salt Creek, Tullamore North
Rice Group

1951 Aerial Photo

0 50 m
1:8,000

N

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NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Airphoto Source: National Airphoto Library

Legend

Subject Property

Fluvial Geomorphic Assessment for Salt Creek, Tullamore North
Rice Group

1960 Aerial Photo

0 50 m

1:4,000

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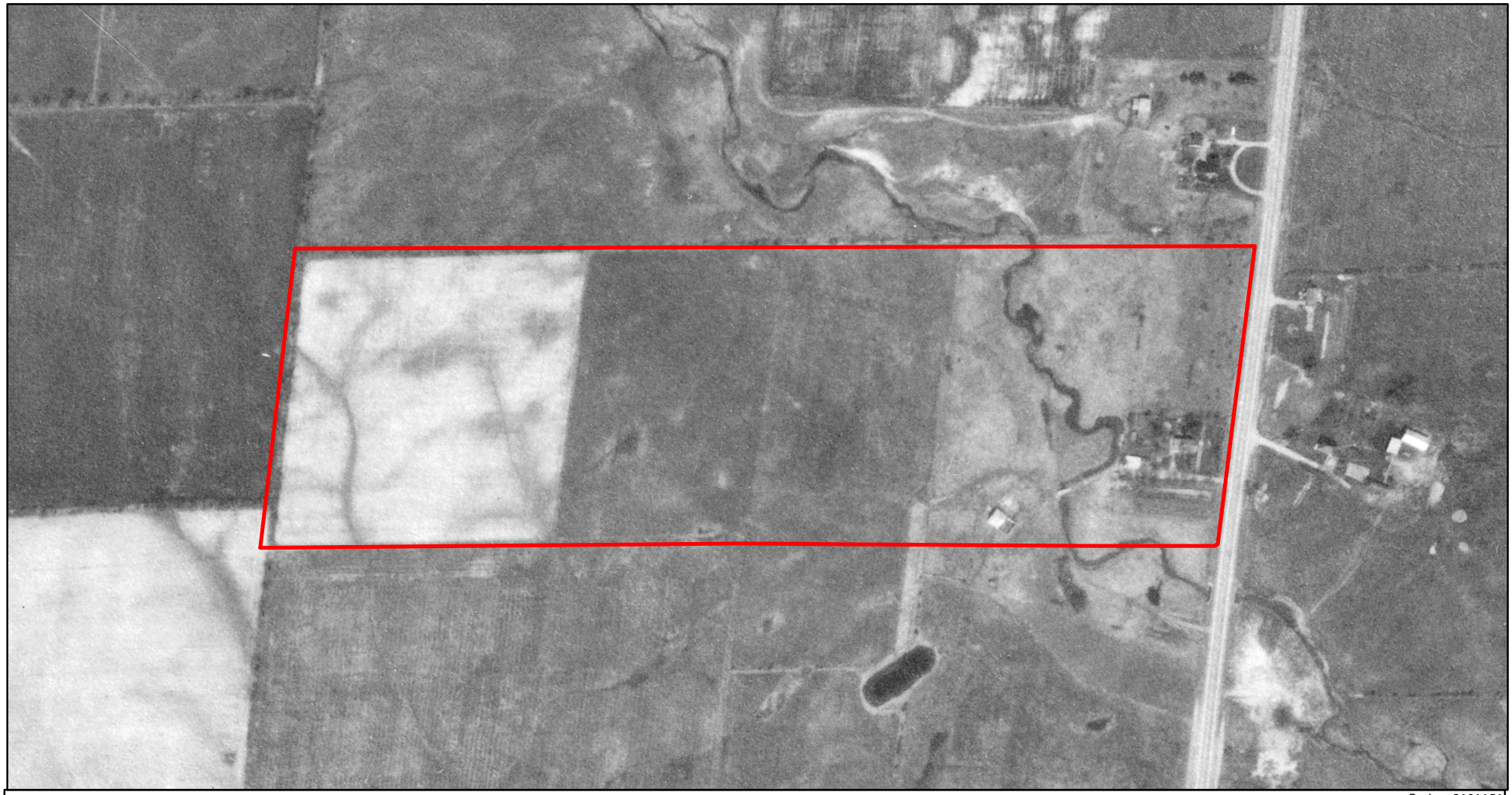

Project 2101151

NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Airphoto Source: National Airphoto Library

Legend

Subject Property

Fluvial Geomorphic Assessment for Salt Creek, Tullamore North
Rice Group

1964 Aerial Photo

0 50 m

1:4,000

GEI Consultants

Project 2101151

NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Airphoto Source: National Airphoto Library

Legend

Subject Property

Fluvial Geomorphic Assessment for Salt Creek, Tullamore North
Rice Group

1970 Aerial Photo

0 50 m

1:4,000

GEI Consultants

Project 2101151

NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Airphoto Source: National Airphoto Library

Legend

Subject Property

Fluvial Geomorphic Assessment for Salt Creek, Tullamore North
Rice Group

1974 Aerial Photo

0 50 m

1:4,000

GEI Consultants

Project 2101151

NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Airphoto Source: National Airphoto Library

Legend

Subject Property

Fluvial Geomorphic Assessment for Salt Creek, Tullamore North
Rice Group

1988 Aerial Photo

0 50 m

1:4,000

GEI Consultants

Project 2101151

NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Airphoto Source: First Base Solutions

Legend

Subject Property

Fluvial Geomorphic Assessment for Salt Creek, Tullamore North
Rice Group

2002 Aerial Photo

0 50 m

1:4,000

GEI Consultants

Project 2101151

NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Airphoto Source: First Base Solutions

Legend

Subject Property

Fluvial Geomorphic Assessment for Salt Creek, Tullamore North
Rice Group

2011 Aerial Photo

0 50 m
1:4,000

GEI Consultants

Project 2101151

NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Airphoto Source: First Base Solutions

Legend

Subject Property

Fluvial Geomorphic Assessment for Salt Creek, Tullamore North
Rice Group

2021 Aerial Photo

0 50 m

1:4,000

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Appendix C

Photographic Record

Photographic Record

Photo 1 – Downstream view of Salt Creek, under the Airport Road crossing.

Photo 2 – General channel conditions, upstream of Airport Road. Photo taken facing upstream.

Photo 3 – Wide and deep pools were occasionally noted within the reach. Photo taken facing upstream.

Photo 4 – An old crossing was noted within the property, which was in poor condition. The structure does not impede flow. Photo taken facing upstream.

APPENDIX C

Fluvial Geomorphic Assessment of Salt Creek

Tullamore North

PHOTOGRAPHIC RECORD

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Photo 5 – General conditions of the channel, showing dense non-woody vegetation cover.

Photo 6 – Occasionally, multiple flow paths were present.

Photo 7 – The channel was found to be wide and shallow in some areas. Photo facing downstream.

Photo 8 – General conditions at the upstream extent of the reach assessed.

APPENDIX C

Fluvial Geomorphic Assessment of Salt Creek

Tullamore North

PHOTOGRAPHIC RECORD

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