February 4, 2025

Elora Sands Development Inc.
c/o Cachet Developments
2555 Meadowpine Boulevard, Unit 3
Mississauga, Ontario
L5N 6C3

Attn: **Brendan Walton, P.Eng.**
Engineering Manager, Land Development

Re: **Nichol Drain and Queen Street Creek**
Preliminary Fluvial Geomorphological Assessment
Elora Sands and Keating Lands
Official Plan Amendment (OPA) for Settlement Area Boundary Expansion
Township of Centre Wellington, Ontario
GEO Morphix Project No. 25002

GEO Morphix was retained to complete a fluvial geomorphological assessment for the Elora Sands and Keating Lands, herein referred to as the "subject lands", which comprise approximately 79.6 ha and are bound by Irvine Street to the east and Gerrie Road to the west in Elora, Ontario. The Nichol Drain bisects the northeastern portion of the subject lands for a length of approximately 800 m. The drain originates east of Gerrie Road and ultimately crosses Sideroad 15 draining northwest to Irvine Street and the main branch of Irvine Creek. The southwestern portion of the subject lands drains to a wetland along Irvine Street, which ultimately outlets to the Queen Street Creek tributary of Irvine Creek. The subject lands and local watercourses are shown in **Figure 1**.

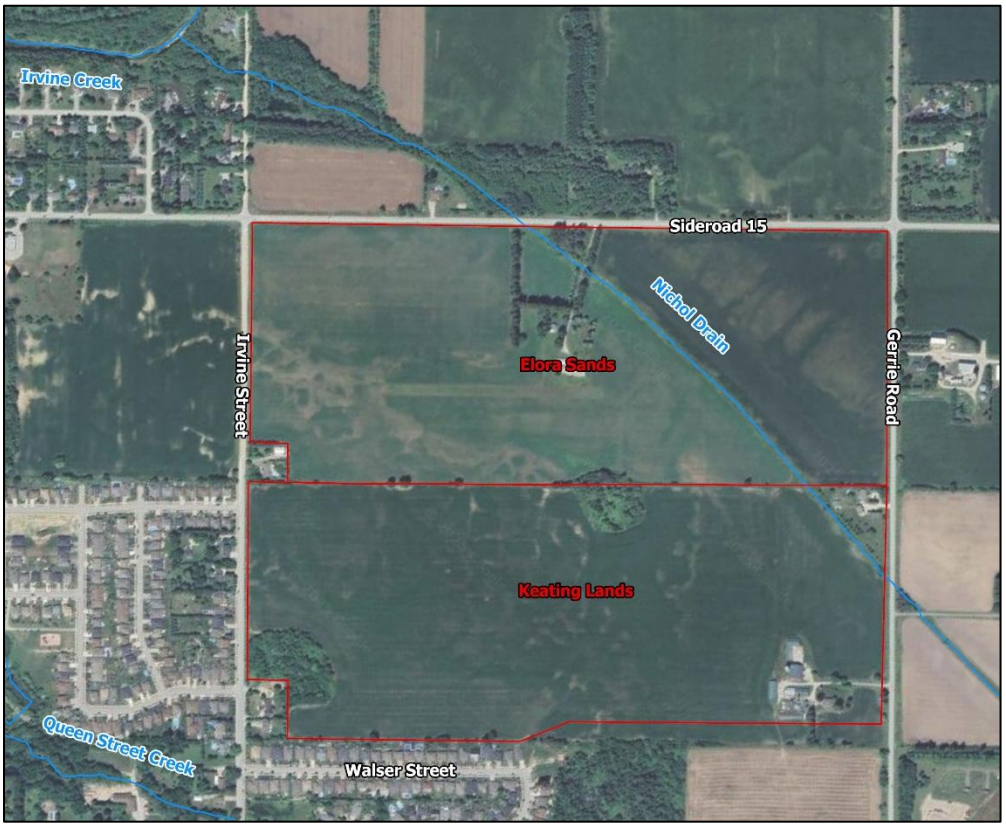


Figure 1. Subject lands situated south of Sideroad 15 between Irvine Street and Gerrie Road; Nichol Drain bisects the subject lands, and Queen Street Creek is situated to the southwest

The subject lands are currently outside of the existing settlement area boundary outlined in the Township of Centre Wellington Official Plan (OP), but it is our understanding that an Official Plan Amendment (OPA) application will be made to bring the lands into the settlement area. To support the OPA and future development submissions, GEO Morphix was retained to assess existing geomorphic conditions and support development of appropriate stormwater management strategies to mitigate negative impacts (i.e., erosion) to downstream watercourses from the subject lands.

GEO Morphix has prepared the following technical letter, which includes a summary of existing information and data collected for the subject lands from previously completed studies. We also provide a summary of existing information on proposed stormwater management plans for the subject lands in the context of downstream erosion mitigation.

Field-confirmation of existing conditions as well as detailed work to address erosion hazard delineation and erosion mitigation plans are ongoing. A standard geomorphology checklist has been included in **Appendix A** to summarize the various scope components that are underway. This checklist is consistent with geomorphic submission guidelines developed in other jurisdictions across southern Ontario.

Background Review and Desktop Assessment

Queen Street Creek and the Nichol Drain are both tributaries to Irvine Creek, a tributary to the Grand River that flows through Elora. The Nichol Drain subwatershed originates in the northwestern portion of nearby Fergus and spans approximately 750 ha. The subwatershed drains to Irvine Creek, roughly 150 m west of Irvine Street in Elora. The subwatershed is largely dominated by agricultural land use. The Queen Street Creek tributary flows through urban, residential lots southwest of the subject lands, with an outlet to Irvine Creek west of Geddes Street. In the pre-development condition, approximately 62% of the subject lands (50.3 ha) drain to the Nichol Drain, and approximately 28% of the lands (22.7 ha) drain to the Queen Street Tributary (MTE, 2025).

A Subwatershed Study (SWS) for the Nichol Drain was completed in 2008 by Aquafor Beech Limited, which included existing conditions information for the Nichol Drain and surrounding lands. The SWS notes that the Nichol Drain had been improved as a municipal drain since the early 1920s and was historically straightened and maintained as a ditch feature. Although, in 2008 when the SWS was published, it was evident that the drain had not been recently maintained and was showing signs of adjustment, including more naturalized channel morphology. Historical aerial photographs from the National Air Photo Library and more recent aerial imagery from Google Earth Pro are being reviewed to understand historical changes in channel morphology and surrounding land use. The historical assessment is ongoing and will include data back to 1930.

The subject lands are situated within the Guelph Drumlin Field physiographic region, which is characterized by drumlinized till plains and glacial meltwater channels. The SWS provides an overview of surficial geology, noting that the area is dominated by glacio-fluvial outwash sand with localized concentrations of outwash gravel to the north and south. This is consistent with the most recent surficial geology mapping published by the Ontario Geological Survey (OGS) for the subject lands. A map with surficial geology of the subject lands is included in **Appendix B**, for reference.

A fluvial geomorphological assessment was completed as part of the SWS and included reach delineation and an evaluation of channel stability and sensitivity for the Nichol Drain. Reaches are homogenous segments of channel used in geomorphological investigations and are studied semi-independently as each is expected to function in a manner that is at least slightly different from adjoining reaches. This method allows for a meaningful characterization of a watercourse as the aggregate of reaches, or an understanding of a particular reach in relation to a proposed activity. Geomorphic reaches were first delineated by desktop assessment and then field verified in the SWS. Six (6) main reaches were delineated for the Nichol Drain; and various sub-reaches were defined to document variability within the main reaches. A reach delineation map is provided in **Appendix C**, which reflects the SWS reach delineation for the Nichol Drain in the context of the subject lands. Preliminary reach delineation for Queen Street Creek is also provided, but will be refined through subsequent field study, where access is permitted.

Nichol Drain Sub-reach 2a and a portion of sub-reach 2b are located within the Elora Sands subject lands. These reaches drain to Reach 1 and Reach 0 downstream of Sideroad 15. SWS field observations indicate that Reach 2 was a straightened ditch with limited bed morphology. Channel substrate contained gravel and sand but was largely vegetation controlled due to the presence of grasses. Most reaches of the Nichol Drain were considered stable with processes of aggradation occurring. Reach 0 and Reach 1 – downstream of Sideroad 15 and the subject lands – were the exception and were documented as moderately stable with evidence of minor degradation and widening. This is likely due to steeper channel gradients along these reaches. Areas of erosion concern were not specifically documented in the SWS, but it was suggested that Reaches 0 and 1 may be sensitive to future changes in hydrology. Given that the SWS was finalized in 2008, GEO Morphix is working to refine the reach delineation and feature characterization based on more recent desktop information and field observations.

Existing conditions field observations are not currently available for Queen Street Creek. Based on a review of desktop information, including recent aerial photographs and topographic data, Queen Street Creek is a small, low-order stream that flows through an existing residential area southwest of the subject lands. The creek flows through forested riparian areas before crossing Geddes Street and discharging to the main Irvine Creek. GEO Morphix is working to characterize the feature based on more recent desktop information and field observations, where access is permitted.

The Nichol Drain SWS also included a high-level assessment of lateral channel migration potential for the Nichol Drain in support of future constraint delineation. Given the limited sinuosity and historic modifications that have occurred along the drain, the SWS reviewed surrogate reaches with similar geology and drainage area. Meander belt widths of 32 m and 45 m were mapped from surrogate reaches in the nearby Irvine Creek subwatershed to provide context for the migration potential of the Nichol Drain. In cases where watercourse reaches have been historically straightened and natural meanders are no longer present, empirical modelling approaches can be used to delineate the meander belt width. GEO Morphix is working to refine the erosion hazard or meander belt width delineation for the subject lands based on approaches for modified systems. The refined erosion hazard delineation will be based on site-specific data collected for the Nichol Drain and will be in keeping with the Provincial Policy for defining riverine erosion hazards (MNR, 2001).

Stormwater Management and Erosion Mitigation

Proposed development for the subject lands will include a mix of residential land use, parkland, and three (3) stormwater management (SWM) facilities. Refer to **Appendix D** for the Concept Plan prepared by Malone Given Parsons Ltd. (MGP, 2024) for the subject lands. An excerpt from the Preliminary SWM Strategy Report prepared by MTE Consultants (MTE, 2025) is also provided in **Appendix E** to show the location of proposed SWM facilities.

The existing drainage area to Nichol Drain from the subject lands is 55.3 ha, but this will increase to 67.1 ha in the post-development condition. Future drainage will be directed to SWM Facility 1 and SWM Facility 2 situated adjacent to Sideroad 15. Both facilities will convey flows to the Nichol Drain via a storm sewer that will discharge downstream of Sideroad 15 (MTE, 2025). The subject lands draining to Nichol Drain comprise approximately 10% of the total drainage area of the Nichol Drain subwatershed which was documented as 767 ha in the Nichol Drain SWS (Aquafor Beech, 2008).

The existing drainage area to Queen Street Creek from the subject lands is 22.7 ha, but this will be reduced to approximately 10 ha in the post-development condition. Future drainage will be directed to SWM Facility 3a which will ultimately outlet to Queen Street Creek. The reduced drainage area in this case may provide an opportunity to reduce peak flows and mitigate impacts with regards to erosion for the receiving Queen Street Creek tributary (MTE, 2025). Further analysis is ongoing to understand the drainage area contribution to Queen Street Creek from the subject lands relative to the larger, overall drainage area for the Queen Street Creek tributary.

An increase in erosion is one of the potential consequences of urbanization and uncontrolled runoff. As such, stormwater management (SWM) plans are developed to address erosion potential in downstream receiving watercourses. Erosion is a natural process in river systems and so the objective of SWM is not to eliminate erosion, but to maintain a level of stream erosion that is consistent with pre-development conditions.

The Ministry of the Environment, Conservation and Parks (MECP) provides general guidance on appropriate erosion control for SWM planning in the Stormwater Management Planning and Design Manual (MOE, 2003). A general approach for erosion mitigation is detention of the 25 mm runoff event for a minimum of 48 hours. We understand that this approach has been adopted or proposed in other developments within the Nichol Drain subwatershed, including the North West Fergus Secondary Plan Area (RJB, 2013) and the Clayton Subdivision (MTE, 2023) immediately west of the subject lands.

As documented in the Nichol Drain SWS, reaches within the subject lands were stable with limited evidence of active channel erosion. However, reaches downstream of the subject lands are situated in a forested valley with steeper channel gradients and may be more sensitive to future land use changes in the upstream subwatershed. These downstream reaches will receive future SWM flows from the subject lands. Given that the lands comprise roughly 10% of the overall subwatershed drainage area for the Nichol Drain, the standard 48-hour detention of the 25 mm event has been suggested as a preliminary approach to erosion control (MTE, 2025). A reduction in post-development drainage area is also expected for the Queen Street Creek tributary, which may provide an opportunity to reduce peak flows and mitigate downstream erosion (MTE, 2025).

Ultimately, SWM erosion control requirements for the Nichol Drain should be confirmed through a more detailed geomorphological assessment. GEO Morphix is actively working to support refinement of the erosion mitigation plan based on the proposed development for the subject lands. This work includes a detailed desktop- and field-data review of existing erosion and channel stability within the subject lands as well as sensitive, receiving reaches downstream along the Nichol Drain and Queen Street Creek. This work is ongoing and will be consistent with the MECP SWM Guidelines (MOE, 2003) as well as other jurisdictional resources on SWM erosion criteria, including the Toronto and Region Conservation Authority's Stormwater Management Criteria document (TRCA, 2012).

Summary and Recommendations

This preliminary geomorphological assessment and summary has been prepared in support of an Official Plan Amendment (OPA) application for the subject lands. We have provided a high-level summary of existing geomorphological conditions available for the Nichol Drain and Queen Street Creek, as well as an outline of various data gaps related to watercourse management in the context of future land use change.

The Nichol Drain was previously characterized under the 2008 Nichol Drain Subwatershed Study by Aquafor Beech Limited. The feature was generally characterized as a stable, vegetation-controlled drainage ditch; however, watercourse reaches of the Nichol Drain downstream of the subject lands were identified as potentially sensitive to changes in upstream land use. Queen Street Creek is a small tributary to Irvine Creek but has not been adequately studied from a geomorphological perspective.

GEO Morphix is completing a more detailed geomorphological assessment to address data gaps associated with the Nichol Drain and Queen Street Creek. This includes, but is not limited to the following:

- Updates to existing conditions desktop characterization for the Nichol Drain and Queen Street Creek, including refined reach delineation and a review of more recent topographic and geological data for the subwatershed and subject lands
- Updated field data collection for the Nichol Drain and Queen Street Creek within the subject lands as well as downstream, receiving reaches (where access is permitted) to document present-day channel conditions, assess channel stability, and record evidence of active channel erosion
- Delineation of appropriate meander belt widths or erosion hazards for the Nichol Drain to support natural hazard constraint delineation in accordance with the Provincial Policy Statement (PPS, 2024)
- Completion of a detailed erosion threshold and erosion mitigation assessment to support appropriate SWM planning for the subject lands

Ongoing geomorphology work is intended to support further advancement of the subject lands and requirements for future planning and development submissions. The geomorphology scope of work will be consistent with other standard geomorphology submission guidelines, as summarized in **Appendix A**.

We trust this letter meets your current requirements. Should you have any questions please contact the undersigned.

Respectfully submitted,

Paul Villard Ph.D., P. Geo., CAN-CISEC, EP, CERP
Director, Principal Geomorphologist

Kat Woodrow, M.Sc.
Manager of Watershed Studies

References

Aquafor Beech Limited, October 2008. Nichol Drain Subwatershed Study Phase 1 Existing Conditions Final Report. Prepared for: Township of Centre Wellington.

Malone Given Parsons Ltd. (MGP), January 2024. Concept Plan. Prepared for Elora Sands Development Inc.

Ministry of Natural Resources (MNR), 2002. Technical Guide – River & Stream Systems: Erosion Hazard Limit.

Ministry of the Environment (MOE), 2003. Stormwater Management Planning and Design Manual.

MTE Consultants Inc. (MTE), February 2025. Elora Sands/Keating Lands Preliminary SWM Strategy Report. Prepared for: Elora Sands Development Inc.

MTE Consultants Inc. (MTE), February 2025. Elora Sands/Keating Lands Functional Servicing Report. Prepared for: Elora Sands Development Inc.

MTE Consultants Inc. (MTE), July 2023. Clayton Subdivision Preliminary Stormwater Management Report. Prepared for: Cachet Developments (Elora) Inc.

Ontario Geologic Survey (OGS), 2012. Surficial Geology of Southern Ontario.

R.J. Burnside and Associates Limited (RJB), September 2013. Environmental Implementation Report North West Fergus Secondary Plan Area Township of Centre Wellington.

Toronto and Region Conservation Authority (TRCA), August 2012. Stormwater Management Criteria.

Appendix A

Geomorphology Submission Checklist

Geomorphological input is typically required in support of various types of projects and at different stages in planning (e.g., master plans, secondary plans and tertiary plans) and design phases (e.g., conceptual and detailed design).

A fluvial geomorphology scope of work is designed to:

- Review any previously completed studies to ensure consistency and identify/address any data gaps
- Characterize the watershed and existing drainage network
- Characterize existing watercourse conditions
- Characterize headwater drainage features (HDFs)
- Develop recommendations for appropriate watercourse and HDF management
- Delineate constraints to development such as erosion hazards or setback limits for infrastructure crossings (e.g., meander belt widths / 100-year erosion limits)
- Support the design of stormwater management / dewatering strategies that mitigate the potential for erosion

A summary of these elements is provided below. Note that a given project may involve one or more scope types described below.

Fluvial Geomorphological Characterization

A fluvial geomorphological characterization study must contain sufficient information to understand existing drainage feature/watercourse conditions prior to development (e.g., areas of erosion concern or sensitivity, anthropogenic modification, locations of watercourses/drainage features that are high constraint). The following tasks should be included in the project scope:

1. Describe the proposed development and location
2. Review available background reports and mapping (e.g., watershed/subwatershed studies, geology, topography, conceptual development plans) to inform watershed and drainage network characterization
3. Describe historical changes in land use, channel planform and instream characteristics, if feasible, within and upstream of the development that may affect current and future channel form
4. Delineate watercourse reaches based on desktop review of channel and drainage area characteristics
5. Conduct rapid geomorphic field assessments to confirm the desktop reach delineation and characterize existing conditions.
6. At minimum, provide technical input to HDFAs specifically related to sediment supply/ transport and feature form / function
7. If applicable, develop HDF and watercourse management recommendations to inform development opportunities and constraints
8. Prepare a report that documents the above activities, including dates of field work, extent of drainage features/watercourses assessed, any limitations to the assessment (e.g., site access), and all key findings that are relevant to the development

Erosion Hazard Assessments

Erosion hazard assessments are typically completed for watercourses that are to be retained to inform, in part, the limit of development and/or the siting of infrastructure such as storm water/dewatering outfalls and road crossings. The following tasks should be included in the project scope:

9. Complete items 1 to 5 above
10. Review historical and recent aerial photographs and remote sensing data, as appropriate, to inform the meander belt width / 100-year erosion limit for all features to be retained on the landscape
11. Erosion hazard delineation completed in accordance with the Provincial Policy Statement (PPS, 2020) on defining natural hazards and considering valley setting (i.e., unconfined, partially confined, confined), historical channel form, and field-based reach observations

12. The assessment should also include consideration of any additional setbacks (e.g., erosion access allowance)
13. Map the extent of the erosion hazard to inform, in part, the limit of development
14. Prepare a report that documents the above activities, including the date of field work, extent of drainage features/watercourses assessed, approach to delineation of the erosion hazard, any limitations to the assessment (e.g., site access, poor aerial photograph resolution, dense woody riparian vegetation in aerial imagery), and the extent of all erosion hazards

Erosion Threshold and Mitigation in Support of Stormwater Management / Dewatering

An erosion threshold and mitigation assessment is typically required when stormwater or dewatering discharge is proposed to outlet to a watercourse. Erosion mitigation criteria may have been defined in previous planning stages. The approach taken should be consistent with requirements established for the watershed and address any local, site-specific concerns. The following tasks should be included in the project scope:

15. Complete items 1 to 5 above.
16. Consideration of the location of HDFs may also be required, subject to the proposed outlet location
17. Complete a detailed geomorphic field assessment to support erosion threshold determination, which will include a longitudinal profile survey of the channel centre line and cross sections, and a detailed review of channel substrate grain size distribution and bank material composition and structure (the site will be downstream, where possible, of future outlets and be associated with the reach most sensitive to erosion)
18. Erosion threshold calculations should consider both channel substrates and bank composition
19. Provide technical support for assessing erosion mitigation strategies as part of the proposed stormwater management plan (e.g., modelling of post- to pre- development hydrology scenarios) following accepted erosion mitigation practices outlined in stormwater management guidelines
20. If an erosion exceedance analysis is required, the study should document the type and source of the hydrological modelling used (e.g. synthetic storms or continuous modelling) and development of an erosion mitigation scenario based on post- to pre-development comparisons of erosion threshold exceedance duration, exceedance frequency, cumulative exceedance volume, and cumulative excess work
21. Prepare a report that documents the above activities, including the date of field work, extent of drainage features/watercourses assessed, approaches used to determine the erosion threshold and complete the erosion exceedance analysis and any limitations to the assessment (e.g., site access)

Infrastructure Crossing Assessments (Underground Services and Watercourse Crossings)

Crossing assessments are typically completed when road crossings and underground infrastructure are proposed to ensure that potential lateral and vertical riverine erosion hazards are adequately mitigated. Fluvial geomorphologic recommendations should be considered with those of other disciplines (e.g., hydrology and hydraulics, wildlife passage). The following tasks should be included in the project scope:

22. Complete items 1 to 5 above.
23. Consideration of the location of HDFs may also be required, subject to the proposed crossing location
24. If required based on the project scope and design stage, complete a detailed geomorphic field assessment that includes a longitudinal profile survey of the channel centre line and cross sections, and a detailed review of channel substrate grain size distribution and bank material composition and structure
25. Provide technical input and recommendations for any watercourse crossings including location, structure type, span, and skew, as well as any setbacks to address the erosion hazard
26. When possible, structures should be sited along relatively straight sections of channel, cross perpendicular to the channel, and be of sufficient span to accommodate the potential erosion hazard
27. A vertical scour assessment may be required where underground services are proposed to ensure adequate depth of cover over the long-term
28. If instream works are required to mitigate erosion, natural channel design principles should be used at the discretion of the Practitioner
29. Prepare a report that documents the above activities, including the date of field work, extent of drainage features/watercourses assessed, and any constraints or opportunities associated with the

assessment/design (e.g., presence of valley walls or excessive erosion, evidence of channel degradation)

Natural Channel Design

Natural channel design may be completed at the reach scale or as part of local, site-specific restoration works. In many cases, conceptual and detailed channel designs are initiated after the completion of a larger overall study such as a master plan or subwatershed study and follows watercourse management recommendations (e.g., net constraint rankings).

30. Complete Items 1 to 5 above
31. Consideration of the location of HDFs may also be required, subject to the proposed extent of watercourse/drainage feature realignment
32. Complete a detailed geomorphic field assessment along a suitable reference reach to inform the design, including a longitudinal profile survey of the channel centre line and cross sections, and a detailed review of channel substrate grain size distribution and bank material composition and structure
33. Provide rationale/describe reasons for channel realignment/restoration
34. Complete bankfull channel sizing calculations to ensure there is an appropriate connection between the channel and its floodplain to dissipate energy during higher flow events (if site constraints permit); bankfull channel sizing should be based on data collected along the surveyed reference reach and a review of hydraulic/hydrologic modelling
35. Determine appropriate channel planform, gradient and morphology based on proposed development plan and any specific site constraints and ecological targets
36. Confirm that the potential erosion hazard of the designed channel is accommodated with the realigned corridor, if applicable
37. Complete substrate sizing using velocities/shear stresses/discharges to ensure the design remains stable over a range of flow events (to be refined as detailed design proceeds)
38. Prepare design drawings in planview and profile following principles of natural channel design
39. Provide general recommendations regarding mechanical stabilization and suitable plantings
40. Phasing, erosion and sediment control plans may be prepared at the detailed design stage by practitioner or the project engineer; however, a general understanding of how the project is to be implemented is required at the initial project stage to ensure it is feasible
41. All natural channel designs should be accompanied by a technical brief that details previously completed studies and data reviewed, existing conditions, opportunities and constraints for the design, and rationale for the design approach. In addition, general recommendations for implementation and post-construction monitoring are to be provided

Stormwater / Dewatering Outlet Siting and Treatment Design

42. Complete Items 1 to 5 above along the reach receiving stormwater / dewatering discharge
43. Consideration of the location of HDFs may also be required, subject to the proposed outlet location
44. Provide technical input and recommendations for the siting of outlet locations, including consideration of the erosion hazard associated with the receiving watercourse and outlet treatment concepts to mitigate erosion
45. Outlet treatments are to consider bioengineered measures to ensure positive drainage and promote detention and infiltration
46. All stone should be hydraulically sized using velocities/shear stresses/discharges to ensure the outlet treatment remains stable over a range of flow events (to be refined as detailed design proceeds)
47. General recommendations regarding mechanical stabilization and suitable plantings should also be provided
48. All outfall treatment designs should be accompanied by a technical brief that details previously completed studies and data reviewed, existing conditions, opportunities and constraints for the design, rationale for the design approach, and general recommendations for implementation and post-construction monitoring

Additional Information:

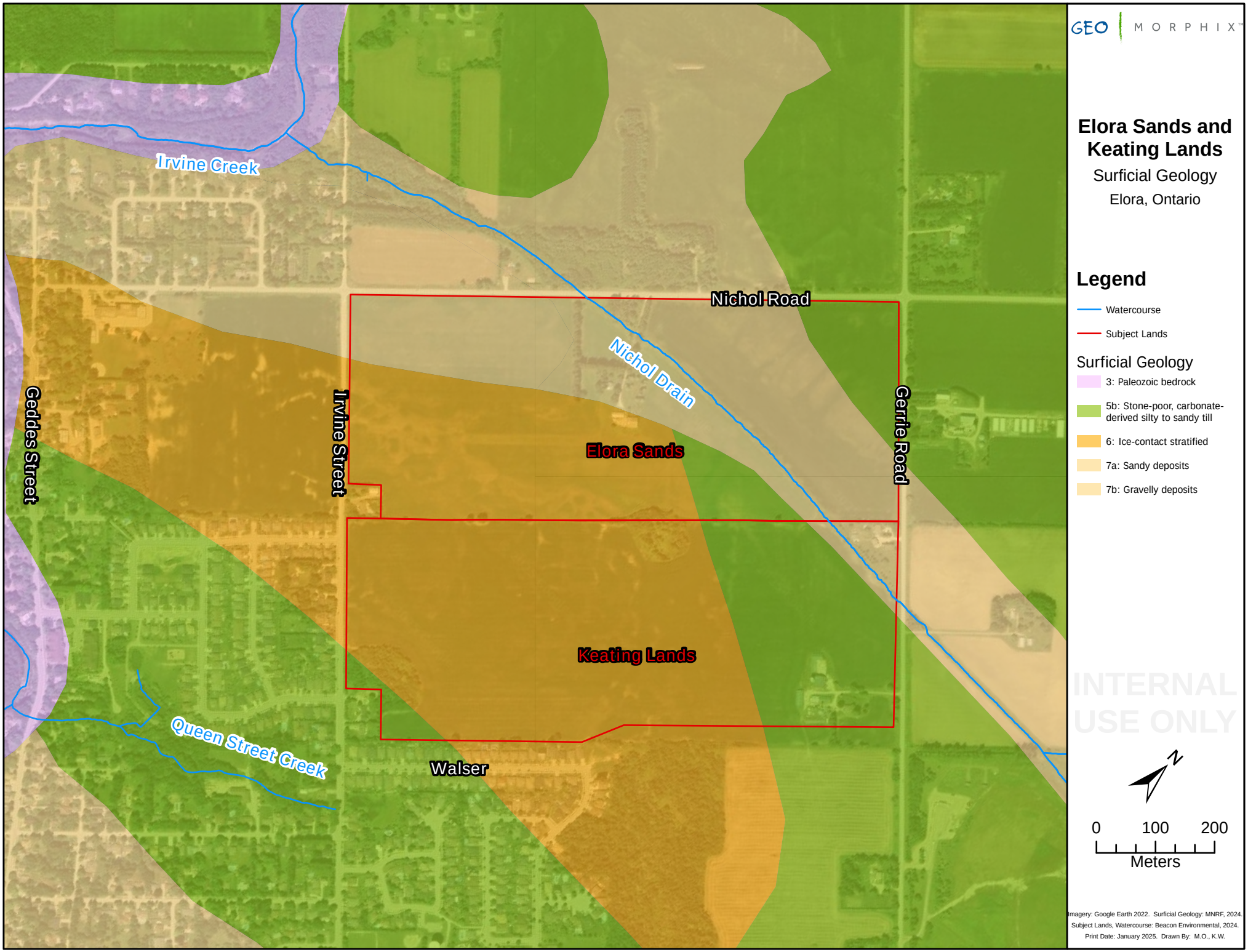
In many cases a fluvial geomorphology study is completed in conjunction with stormwater management reports and delineation of limit of development linework.

For projects that involve in-water works, consultation with provincial and federal regulatory agencies may be required, including Ministry of Environment, Conservation and Parks, Ministry of Northern Development, Mines, Natural Resources and Forestry, Fisheries and Oceans Canada, and Transport Canada.

At a minimum, the following resources are recommended when conducting a fluvial geomorphology study:

- Erosion and Sediment Control Guide for Urban Construction (Toronto and Region Conservation Authority, 2019)
- Technical Guidelines for Watercourse Crossings – Version 1.0 (Credit Valley Conservation, 2019)
- Ontario Stream Assessment Protocol – Version 10 (L. Stanfield, 2017)
- Credit Valley Conservation Fluvial Geomorphic Guidelines (Credit Valley Conservation, 2015)
- Crossing Guidelines for Valley and Stream Corridors (Toronto and Region Conservation Authority, 2015)
- Evaluation, Classification and Management of Headwater Drainage Features Guidelines (Credit Valley Conservation and Toronto and Region Conservation, 2014)
- Evaluating the Effectiveness of 'Natural' Channel Design Projects: A Protocol for Monitoring New Sites (TRCA et al., 2009)
- Belt Width Delineation Procedures (Toronto and Region Conservation Authority, 2004)
- Stormwater Management Criteria (Toronto and Region Conservation Authority, 2012)
- Stormwater Management Planning and Design Manual (Ministry of the Environment, 2003)
- Technical Guide – River & Stream Systems: Erosion Hazard Limit (Ministry of Natural Resources, 2002)

Appendix B



GEO MORPHIX™

Elora Sands and Keating Lands

Surficial Geology

Elora, Ontario

Legend

- Watercourse
- Subject Lands

Surficial Geology

- 3: Paleozoic bedrock
- 5b: Stone-poor, carbonate-derived silty to sandy till
- 6: Ice-contact stratified
- 7a: Sandy deposits
- 7b: Gravelly deposits

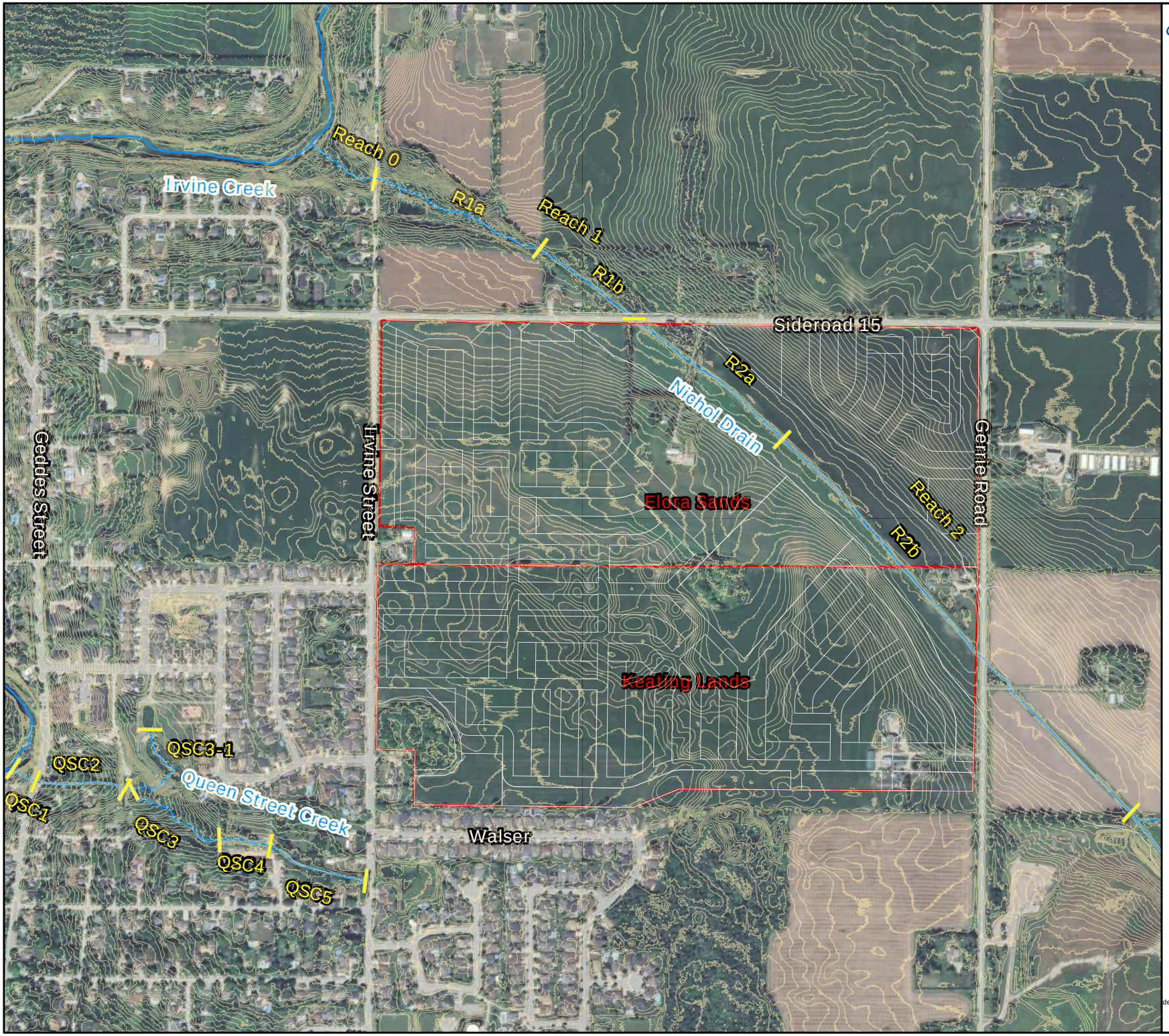
N

0 100 200

Meters

Imagery: Google Earth 2022. Surficial Geology: MNRF, 2024.
Subject Lands, Watercourse: Beacon Environmental, 2024.
Print Date: January 2025. Drawn By: M.O., K.W.

Appendix C



GEO MORPHIX™

Elora Sands and Keating Lands

Nichol Drain and Queen Street Creek Reach Delineation

Elora, Ontario

Legend

- Reach Break and ID
- Watercourse
- Concept Plan
- Subject Land
- 0.5 m Contour

N

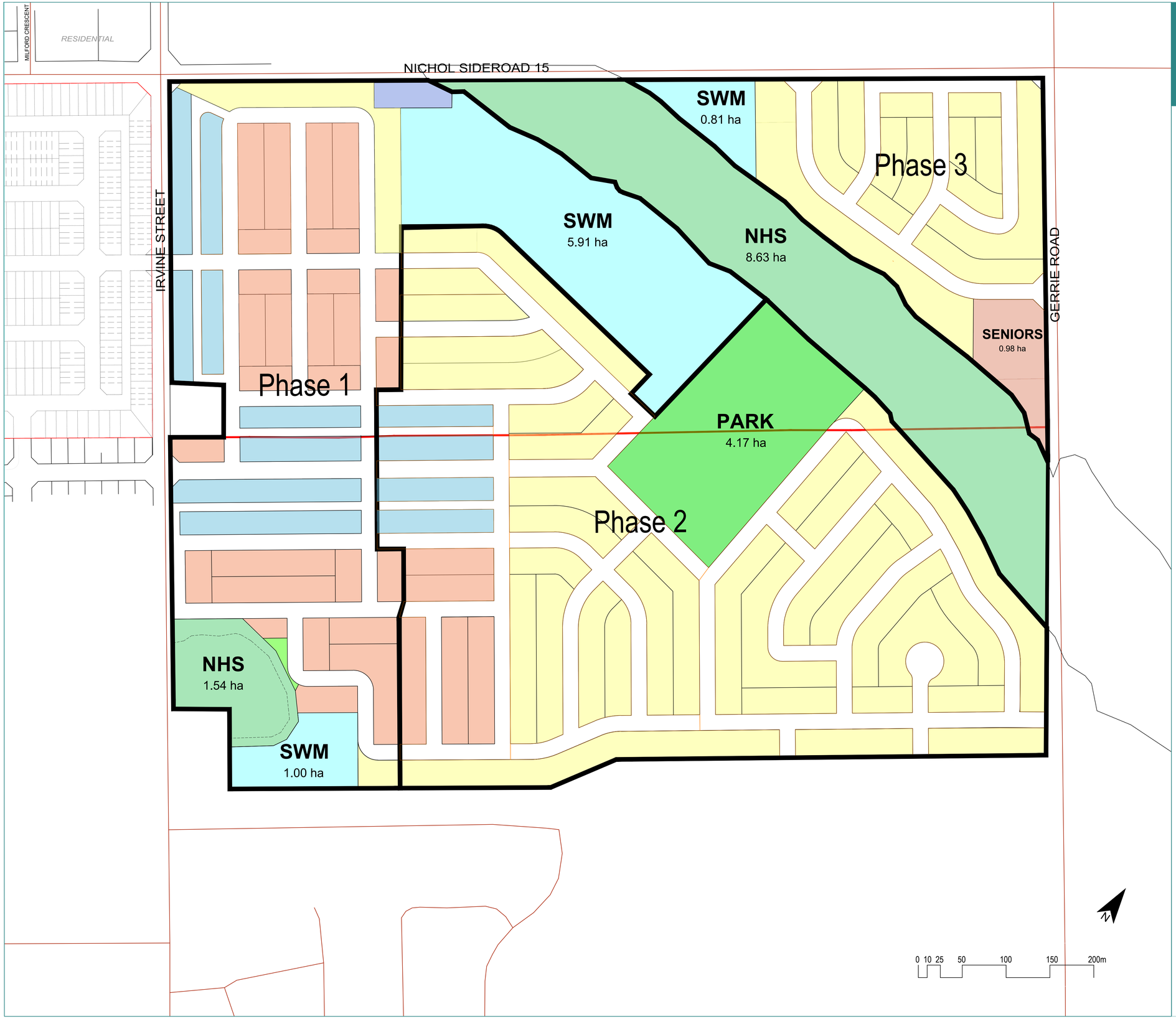
0 100 200

Meters

Imagery: Google Earth 2022. Watercourse: MNRF, 2024. Reach Break and ID: Aquafor Beech Limited, 2008. Woodland buffer, wetland, wetland buffer, floodline, development fabric, study area: Beacon Environmental, 2024. 0.5 m Contour MTE, 2024. PN25002.

Print Date: January 2025. Drawn By: M.O., K.W.

Appendix D



CONCEPT PLAN

PHASE 1 LAND USE			AREA ha	AREA ac.	FRONTAGE m	FRONTAGE ft.	APPROX. UNITS
	Low Density Residential @	11 m	1.30	3.21	306	1,004	**28**
	Low/Medium Density Residential @	6 m	6.39	15.79	1,863	6,112	**311**
	Lane Access Residential @	6 m	3.31	8.18	1,105	3,626	**184**
	Vista		0.05	0.12			
	SWM		1.58	3.90			
	NHS		1.54	3.81			
	Roads / Lanes		6.01	8.70			
	TOTAL		**20.18**	**49.86**	**3,274**	**10,742**	**523**

PHASE 2 LAND USE			AREA ha	AREA ac.	FRONTAGE m	FRONTAGE ft.	APPROX. UNITS
	Low Density Residential @	11 m	17.61	43.51	4,751	15,587	**432**
	Low/Medium Density Residential @	6 m	1.92	4.74	553	1,813	**92**
	Lane Access Residential @	6 m	1.40	3.46	455	1,491	**76**
	Park		4.17	10.30			
	Vista		0.00	0.00			
	SWM		3.20	7.91			
	Roads / Lanes		9.08	22.44			
	TOTAL		**37.38**	**92.37**	**5,758**	**18,892**	**600**

PHASE 3 LAND USE			AREA ha	AREA ac.	FRONTAGE m	FRONTAGE ft.	APPROX. UNITS
	Low Density Residential @	11 m	5.37	13.27	1,354	4,441	**123**
	Seniors Residence		0.98	2.42			
	Park		0.00	0.00			
	SWM		0.81	2.00			
	Roads / Lanes		2.07	5.11			
	TOTAL		**9.23**	**22.81**	**1,354**	**4,441**	**123**

TOTAL	**66.79**	**165.04**	**10,386**	**34,074**	**1,245**

Frontage lengths have been discounted by
10% to compensate for inefficiencies in lotting.

FOR DISCUSSION ONLY

NOTE: Development limits are preliminary
and subject to ruther technical study.

Prepared For:
ELORA SANDS DEVELOPMENTS INC.

MGP File No.: 22-3192
Date: January 4, 2024

MGP Malone Given Parsons.
140 Renfrew Drive, Suite 201 | Markham, ON | L3R 6B3
905 513 0170 | mgp.ca

Appendix E

CAD: P:\P\49878\100\49878-100-F16 POST D.DWG

Plot Date: January 31, 2025 - 3:37 PM

WOOLWICH STREET EAST

SIDEROAD 15

GERRIE ROAD

IRVINE STREET

SALEM PUBLIC SCHOOL

CLAYTON SUBDIVISION

ELORA SANDS

KEATING LANDS

AINLEY FARM SUBDIVISION

NICHOL DRAIN

ENVIRONMENTAL EASEMENT

OPEN SPACE

802 #####ha

639 4.52ha

636 3.32ha

637 8.36ha

630 33.04ha

801 ####ha

627 7.31ha

9622 6.00ha

8622 1.96ha

9628 5.35ha

8625 4.11ha

9625 8.07ha

8624 4.28ha

9624 8.39ha

9622.1 0.85ha

610 78.05ha

9623 4.42ha

8623 2.05ha

8709 3.51ha

8621 4.46ha

9621 15.35ha

708 3.50ha

9709 7.20ha

712 14.67ha

620 4.39ha

711 5.75ha

710 17.91ha

SWMF 1

SWMF 2

SWMF 3a

BLOCK 174 Walkway

BLOCK 177 Overland Flow

BLOCK 176 Servicing Corridor

BLOCK 179 0.3m Reserve

BLOCK 173 PARK 0.61 ha

BLOCK 178 0.3m Reserve

BLOCK 175 Walkway

STREET A

STREET B

STREET C

STREET D

STREET 1

STREET 2

STREET 3

STREET 4

STREET 5

STREET 6

STREET 7

STREET 8

STREET 9

STREET 10

STREET 11

STREET 12

STREET 13

LEGEND

- SITE BOUNDARY
- EXISTING CONTOURS (ORCA)
- EXISTING CONTOURS
- POST-DEVELOPMENT CATCHMENT
- APPROXIMATE FLOODPLAIN LIMIT (FROM NDSS)
- OVERLAND FLOW ROUTE
- 1000 / 1.10 — CATCHMENT No. / AREA (Ha)

MTE
Engineers, Scientists, Surveyors

PROJECT
ELORA SANDS / KEATING LANDS

TITLE
POST DEVELOPMENT DRAINAGE AREA PLAN

Drawn	Scale	Figure
TJD	1:2000	9.1
Checked: TRN	Project No.: 49878-100	
Date (yyyy-mm-dd): 2024-12-16	Rev No.: 0	