Environmental Impact Study for proposed development at 2175 Prince of Wales Drive, Nepean, Ontario

2023-10-17

Final Report

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Project Number: Myers 1534

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1.0 INTRODUCTION

This Environmental Impact Study (EIS) was prepared by Kilgour & Associates Ltd. (KAL; Appendix A) on behalf of Myers Automotive in support of a proposed Zoning Bylaw Amendment (ZBLA) at 2175 Prince of Wales in Nepean, Ontario ("the Site"; Figure 1).

In the City of Ottawa, an EIS is required when development, site alternation, or bylaw amendment is proposed within 120 m of a Natural Environment area as mapped on Schedule "C11-A" of the City of Ottawa Official Plan. The purposes of an EIS are to:

- Identify natural heritage features on or adjacent to the Site;
- Assess potential impacts of the proposed development to existing features; and,
- Recommend mitigation measures to minimize or eliminate identified impacts.

As the development project addressed by this EIS is in support of a ZBLA, the aim of the study is to evaluate whether the permitted site uses within the proposed zoning bylaw can be completed in a manner unlikely to have significant impacts to natural heritage system elements.

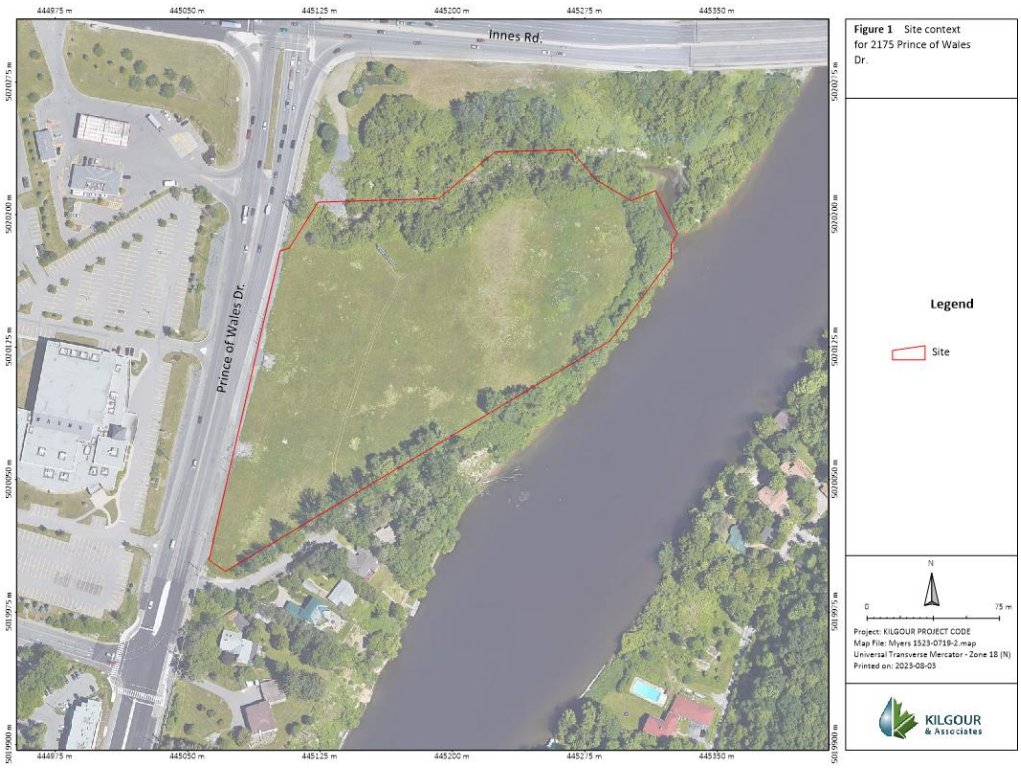

Figure 1 Site context for 2175 Prince of Wales Dr.

2.0 ENVIRONMENTAL POLICY CONTEXT

Natural heritage policies and legislation relevant to this EIS are outlined below.

2.1 City of Ottawa Official Plan

The City of Ottawa Official Plan (2021) provides direction for future growth in the City and is a policy framework to guide physical development to 2031. The Official Plan was developed in accordance with the PPS (and relevant provincial legislation). The City of City of Ottawa reviews development applications within its boundaries the in accordance with the Official Plan.

2.2 *Conservation Authorities Act*, 1990

Conservation Authorities were created to address erosion, flooding, and drought concerns regionally by managing at the watershed level. Conservation Authorities were given the ability to regulate under Section 28 of the *Conservation Authorities Act* (Government of Ontario, 1990b). The Act provides mechanisms to regulate works and site alterations that have potential to affect erosion, flooding, land conservation, and alterations to waterbodies within their jurisdiction. It is the obligation of all Conservation Authorities to implement Ontario Regulations 42/06 and 146/06 to 182/06 *Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses* under Section 28 of the Conservation Authorities Act for relevant works.

2.3 Ontario Regulation 174/06

Section 2(1)(b) states no person shall undertake development or permit another person to undertake development in or on areas within the jurisdiction of the Authority, that include river or stream valleys, the limits of which are determined in accordance with the following:

- Where the river or stream valley is apparent and has stable slopes, the valley extends from the stable top of bank, plus 15 meters, to a similar point on the opposite site; and,

- Where the river or stream valley is apparent and has unstable slopes, the valley extends from the predicted long term stable slope projected from the existing stable slope or, If the toe of the slope is unstable, from the predicted location of the toe of the slope as a result of stream erosion over a projected 100-year period, plus 15 meters, to a similar point on the opposite side.

2.4 The Provincial Policy Statement, 2020

The Provincial Policy Statement (PPS) was issued under Section 3 of the *Planning Act* (Government of Ontario, 1990a). The current PPS came into effect May 1, 2020 (Government of Ontario, 2020). Natural features are afforded protections under Section 2.1 of the PPS. Protections may include maintenance, restoration, and improved function of diversity, connectivity, ecological function, and biodiversity of natural heritage systems. These protections restrict development and site alteration in significant natural areas (e.g., woodlands, wetlands, wildlife habitat) unless it can be demonstrated that there will be no negative effects on the features and ecological functions of those natural areas. Technical guidance for implementing the natural heritage

policies of the PPS is found within the second edition of the *Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005* (NHRM: Ministry of Natural Resources (MNR), 2010). This manual recommends the approach and technical criteria for protecting natural heritage features and areas in Ontario.

2.5 *Species at Risk Act*, 2002

The federal *Species at Risk Act* (SARA; Government of Canada, 2002) is administered by Environment and Climate Change Canada (ECCC) and provides direction to protect and ensure the survival of wildlife species in Canada. The purpose of the SARA is to prevent populations of wildlife from becoming Extirpated, Endangered, or Threatened, provide recovery Endangered or Threatened species, and to manage other species to prevent them from becoming Endangered or Threatened.

All species listed on Schedule 1 of SARA are afforded protection on federal lands. Aquatic species and species of migratory birds protected by the *Migratory Birds Convention Act* (MBCA; 1994) and listed as Endangered, Threatened, or Extirpated under Schedule 1 of SARA are protected wherever they occur in Canada, regardless of land ownership.

2.6 *Endangered Species Act*, 2007

The provincial *Endangered Species Act* (ESA; Government of Ontario, 2007) is administered by the Ministry of Environment, Conservation, and Parks (MECP) and provides protection for species at risk (SAR) and their habitat. The ESA states that it is illegal to harm the habitat of species listed as Extirpated, Endangered, and Threatened. It is also illegal to kill, harm, harass, possess, transport, buy or sell Extirpated, Endangered, and Threatened species, whether it is living or dead. Species listed as Endangered, Threatened, or Extirpated and their habitats (e.g., areas essential for breeding, rearing, feeding, hibernation, and migration) are automatically afforded legal protection under the ESA.

2.7 *Fisheries Act*, 1985

The federal *Fisheries Act* (Government of Canada, 1985) is administered by Fisheries and Oceans Canada (DFO) and provides protections to fish, fish habitat, and fisheries. Specifically, the *Fisheries Act* in its current version provides:

- Protection for all fish and fish habitat
- Prohibition against the "harmful alteration, disruption or destruction of fish habitat"
- Prohibition against causing "the death of fish by means other than fishing"

Projects with a scope that does not fall within DFO’s defined standards and codes of practice require submission of a request for review to DFO.

2.8 *Migratory Birds Convention Act*, 1994

Nesting migratory birds are protected under the MBCA (Government of Canada, 1994). No work is permitted that would result in the destruction of active nests (nests with eggs or young birds) or the wounding or killing of bird species protected under the MBCA and/or associated regulations (e.g., SARA). The "incidental take" of migratory birds and the disturbance, destruction, or taking of the nest of a migratory bird is prohibited. "Incidental take" is the killing or harming of migratory birds due to actions that are not primarily focused on taking migratory birds (e.g., economic development) and no permits exist for the incidental take of migratory birds or their nest/eggs as a result of activities that are not focused on taking migratory birds. These prohibitions apply throughout the year. The Government of Canada has compiled nesting calendars that apply across Canada that can be used to greatly reduce the risk of harming/destroying active nests by ensuring works that may impact nests are performing outside of the nesting period.

Effective July 30, 2022, a list of 18 species of migratory birds identified on Schedule 1 of the MBCA are provided year-round nest protection until they can be deemed abandoned. The Schedule includes this list for birds that re-se their own nest from one year to the next. If the nest of a Schedule 1 species has not been occupied by a migratory bird for the entirety of the waiting time indicated in the MBCA, it is considered to be abandoned, and to no longer have high conservation value for migratory birds.

2.9 *Fish and Wildlife Conservation Act*, 1997

The provincial *Fish and Wildlife Conservation Act* (FWCA; Government of Ontario, 1997) governs the hunting and trapping of a variety of wildlife including mammals, birds, reptiles, amphibians, and fish in Ontario, thereby facilitating the protection of wildlife and their habitat. The FWCA outlines the prohibition of hunting or trapping specially protected species and the requirement for provincially issued licenses for the hunting or trapping of "furbearing" or "game" animals. Examples of specifically protected animals include, for example, Southern Flying Squirrel (*Glaucomys 6olans*), Northern Harrier (*Circus cyaneus*), American Kestrel (*Falco sparverius*), Blue Jay (*Cyanocitta cristata*), Midland Painted Turtle (*Chrysemus picta marginata*), Northern Watersnake (*Nerodia sipedon*) and Gray Treefrog (*Hyla versicolor*). In particular, raptors that are not protected under the MBCA (including Peregrine Falcon) are protected under the FWCA.

3.0 PROPERTY IDENTIFICATION

The Site is located at 2175 Prince of Wales Drive, Nepean, Ontario (Latitude: 45.332608, Longitude: -75.699436; Figure 1). The subject property has a total area of 3.23 ha and is zoned as Development Reserve and is currently a fallow field. The site is dominated by meadow communities with scattered young trees, with mature trees around the perimeter of the property. There is a valley along the northern border, the Rideau River to the east, Prince of Wales Dr. to the east, and Hunt Club to the north.

4.0 METHODOLOGY

4.1 Desktop and Background Data Review

4.1.1 Background Review

Background information was obtained from online databases and geographic information system mapping applications to review relevant information. Aerial imagery was used to identify existing features and confirm information found in the background review. Background information was obtained from available resources, which include:

- Species at Risk in Ontario (SARO; Ministry of Environment, Conservation, and Parks (MECP, 2022);
- Species at Risk Public Registry (Government of Canada, 2022);
- Natural Heritage Information Centre (NHIC; Ministry of Natural Resources, and Forestry (MNRF, 2022a);
- Land Information Ontario (MNRF, 2022b);
- Aquatic Species at Risk Map (DFO, 2022);
- Ontario Reptile and Amphibian Atlas (Ontario Nature, 2019);
- Ontario Breeding Birds Atlas (Birds Canada et al., 2009);
- Ontario Butterfly Atlas (Toronto Entomologists' Association, 2022);
- eBird (Cornell Lab of Ornithology, 2022a);
- iNaturalist (California Academy of Sciences and National Geographic Society, 2022);
- Bumble Bee Watch (Wildlife Preservation Canada et al., 2022);
- Recovery Strategy for the Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*), and Tri-colored Bat (*Perimyotis subflavus*) in Ontario (Humphrey and Fotherby, 2019);
- Recovery Strategy for the Eastern Small-footed Myotis (*Myotis leibii*) in Ontario (Humphrey, 2017); and,
- Fish ON-Line (MNRF, 2022c).

4.1.2 Agency Consultation

The review of existing information included a preliminary SAR screening for species listed under the federal SARA and provincial ESA. The screening identified SAR having some potential to occur on or near the Site.

The screening was completed following the *Draft Client's Guide to Preliminary Screening for Species at Risk* (MECP, 2019a). The results of the screening process inform the initial list of species to be considered in the assessment of the potential for development to impact(s) to SAR or SAR habitat (Appendix B). If it is determined through the EIS process that there is an anticipated impact of the development on SAR, an Information Gathering Form (IGF) will be submitted to MECP for further review.

A pre-consultation meeting was held with the City of Ottawa on May 16, 2023. The City of Ottawa has required that the EIS address the following items:

- Potential significant valleylands, significant woodlands, and species at risk habitat (including Category 2 Habitat for Blanding's Turtle on Site); and,
- Applicable watercourse, meanderbelt, and hazard land setbacks.

4.1.3 Ecological Land Classification

Desktop review of available aerial imagery and preliminary field visits informed how the Site may be divided into vegetation communities based on variation in land cover, topography, and vegetation structure. Vegetation communities on the Site were identified and mapped in the field using standard Ecological Land Classification (ELC) methods for Ontario (Lee et al., 1998). This method provides a consistent approach to identify, describe, and map vegetation communities or physiographic features on the landscape based on dominant plant species and soil composition. It results in a standardized description of each vegetation community to capture the natural diversity and variability of communities within a site, and to provide insight into available habitat and the type of species that may be present. More specifically, the classifications from ELC provide a basis for determining whether potential habitat for a given SAR or other ecological value may be present.

During the survey on July 25, 2023, the dominant plant species were recorded within each proposed ecosite in the field to further divide ecosites into vegetation types (the finest resolution in ELC), where possible. Representative photos of each ELC unit on the Site were taken and are included with the community descriptions in this report.

5.0 EXISITING CONDITIONS

5.1 Landform, Soils, and Geology

The majority of the Site is relatively flat, with a gently slope towards the Rideau River to the east. The eastern and northern boundaries of the Site generally follow the southern top of valley to a drainage channel to the north, and the Rideau River to the east, respectively. Soil types throughout the site can be generally characterized by a thin layer of topsoil overlying a sandy silt later followed by a 1 to 3 m thick very stiff brown silty clay deposit (Paterson Group, 2017).

5.2 Surface water

The northern boundary of the Site generally follows, and includes portions of, an unnamed drainage channel that conveys stormwater from Prince of Wales Dr. to the Rideau River (Figure 2). The eastern boundary of the Site is directly adjacent to the Rideau River. While formal fish community surveys were not completed of the unnamed channel to the north as part of this study, it is directly connected to the Rideau River to the east provide fish habitat, and these features could provide suitable spawning habitat for fish in the spring and fall.

5.3 Vegetation Cover (Ecological Land Classification)

The majority of the Site is characterized by a single ELC unit, Mineral Cultural Meadow (CUM1; Figure 2) and is a highly disturbed open community primarily composed of herb, graminoid, and forb species. Deciduous and coniferous saplings, as well as small shrubs are scattered throughout the Site.

Along the northern and eastern boundary, along the banks of the drainage channel and Rideau River there is a mixed forest with Balsam Poplar (*Populus balsamifera*), Black Locust (*Robinia pseudoacacia*), and Weeping Willow (*Salix babylonica*). While these communities differ from the rest of the Site, they are too small to qualify as a separate ELC code and as such are described in further detail in Section 5.3.2 below.

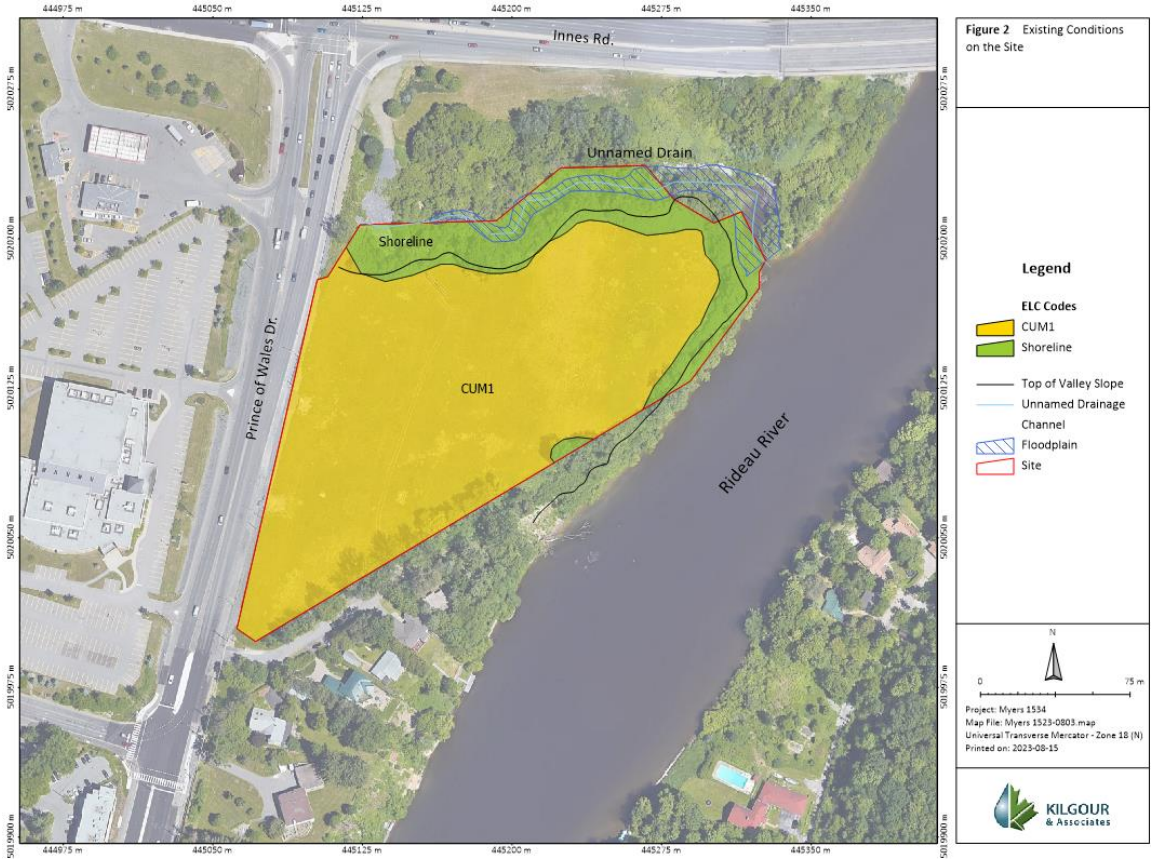

Figure 2 Existing Conditions on the Site

5.3.1 Cultural Meadow (CUM1)

The majority of the Site is representative of a meadow (ELC code CUM1). The area is relatively flat to gently sloping to the north and east toward the Rideau River. The area is grass dominated but left to grow fallow (Figure 3). Dominant groundcover includes grasses such as Little Bluesteam (*Schizachyrium scoparium*) and Kentucky Blue Grass (*Poa pratensis*). Scattered throughout the meadow was young trees such as Black Locust (*Robinia pseudoacacia*) and Scots Pine (*Pinus sylvestris*) with some shrub species such as Alder Buckthorn (*Rhamnus frangula*), Staghorn Sumac (*Rhus typhina*), and Red Rasberry (*Rubus ideaus*). Subdominant groundcover includes Common Tansy (*Tanacetum vulgare*), Milkweed (*Asclepias syriaca*), Common Evening Primrose (*Oenothera biennis*), Common Mullerin (*Verbascum thapsus*), Garlic Mustard (*Alliaria petiolata*), Greater Burdock (*Arctium lappa*), and Greater Celandine (*Chelidonium majus*).

Figure 3 Photograph of the Cultural Meadow (CUM1) on Site taken on July 25, 2023.

5.3.2 Shoreline

The shoreline vegetation is dominated by Black Locust, Balsam Poplar, and Weeping Willow. Subdominant tree species include White Spruce (*Picea glauca*), Silver Maple (*Acer saccharinum*). Shrub species present in these areas were Gray Alder(*Alnus incana*) and Staghorn Sumac (Figure 4).

Figure 4 Photograph of the shoreline tree line on the southern side of the property taken on July 25, 2023.

5.4 Species at Risk

The initial review of species listed under SARA and ESA was completed to identify species having some potential to occur in the broader vicinity of the Site, including Extirpated, Endangered, Threatened, and Special Concern species (Appendix C). Species listed as Extirpated, Endangered, and Threatened are afforded species and habitat protection under the ESA. Federal protections under SARA are also in force for listed species of fish and migratory birds. For species of other groups, SARA normally only applies on federal lands or on projects having some level of participation with or oversight by the federal government. However, SARA-based protections can be imposed by ministerial order on a case-by-case basis in situations where provincial-level protections are deemed inadequate to otherwise protect a species. Such protections are not expected to apply to the Site.

The SAR assessment for this EIS (Appendix C) evaluated whether the Site would or could provide suitable habitat for SAR and whether they have potential to interact with future development of the Site. An assessment of the potential for SAR and their potential habitat was completed based on the results of the field surveys, ELC (i.e., habitat availability), and a desktop review that considered known species ranges, historic observation records, and preferred habitat requirements of these species. Of the 49 SAR initially flagged for review, Blanding's Turtle are the only species with "moderate" or "high" potential to occur on Site. However, based on the potential for the actual occurrence of individuals and/or their possible use of the Site given existing site conditions it was deemed that it would not have any likelihood for negative interactions with site development generally (Appendix C).

5.4.1 Blanding's Turtle

The occurrence of Blanding's Turtle in the Rideau River designate the Site as Category 2 and Category 3 Habitat for the species (MECP, 2021). Blanding's Turtle Habitat is defined based on three habitat categories (MNRF, 2014b). Category 1 Habitat includes nesting and overwintering areas. Category 2 includes suitable aquatic/ wetland areas and a 30m buffer around them. These areas are protected under the ESA as places in which Blanding's Turtles will spend most of their active time (i.e., general summer habitat). Category 3 Habitat extends 220 m beyond the Category 2 areas to identify potential travel corridors.

The Category 2 designation is intended to protect features upon which Blanding's Turtles depends for life process including feeding, mating, thermoregulation, movement, and protection from predators (MECP, 2021). As the habitat adjacent to the Site along the Rideau River and drainage channel is not characteristic of a "suitable" wetland habitat (steep bank and minimal vegetation), it is unlikely to provide regular "living space" and is not included in determination of Category 2 and 3 habitat areas. Category 2 and 3 habitat areas are considered to extend 30m and 250 back from the Rideau River respectively.

5.5 Significant Natural Heritage Features

The Site does not contain Significant Woodlands, Earth/ Life Science Areas of Natural and Significant and Scientific Interest, Significant Wildlife Habitat, or potentially significant wildlife corridors or greenspace linkages.

The forested area on Site does not include >0.8 ha of forest cover dating to before 1963, i.e., forest cover within the valley is too small and too young to qualify as Significant Woodland per City of Ottawa (2022) guidelines. The valley and it's forested area lead only to a major intersection and industrial area, and thus do not function as a wildlife corridor or greenspace linkage.

Guidelines and criteria for the identification of Significant Wildlife habitats in ecoregion 6E are provided by MNRF (2015a). Significant Wildlife Habitats are identified based on the presence of certain types (identified through ELC codes) and the presence and/ or groupings of certain species. Due to the small size of the Site, urban character and proximity to urban areas, limited natural heritage features, it does not meet the criteria for Significant Wildlife Habitat.

Using the City of Ottawa and The Natural Heritage Reference Manuals evaluation criteria for Significant Valleylands (MNR, 2010), slopes must be greater than 15% and lengths over 5m. The valley adjacent to the northern border of the Site meets the criteria for Significant Valleyland and although it is not mapped as such,will be considered Significant throughout this EIS and development cannot occur within this area. A slopestability analysis was conducted to address geotechnical hazard limits as it relates to development proximityto the top of stable slope.

6.0 DESCRIPTION OF THE PROJECT

The proposed ZBLA will change the zoning from Development Reserve (DR) to General Industrial (IG). Proposed future development of the site as an automotive sales center would be within the list of site-specific permitted uses of an IG zone for the Site. The total size of the Site is 3.23 ha. Following existing directives within the City's OP and the Zoning Bylaws, the Site will minimally have a 30 m setback from the Rideau River and the drainage channel, as well as further setbacks in areas where the Slope Stability Analysis has identified that requirement. With the required standard setbacks, there will be approximately 2.12 ha of developable land for which the proponent could build on (Figure 5)

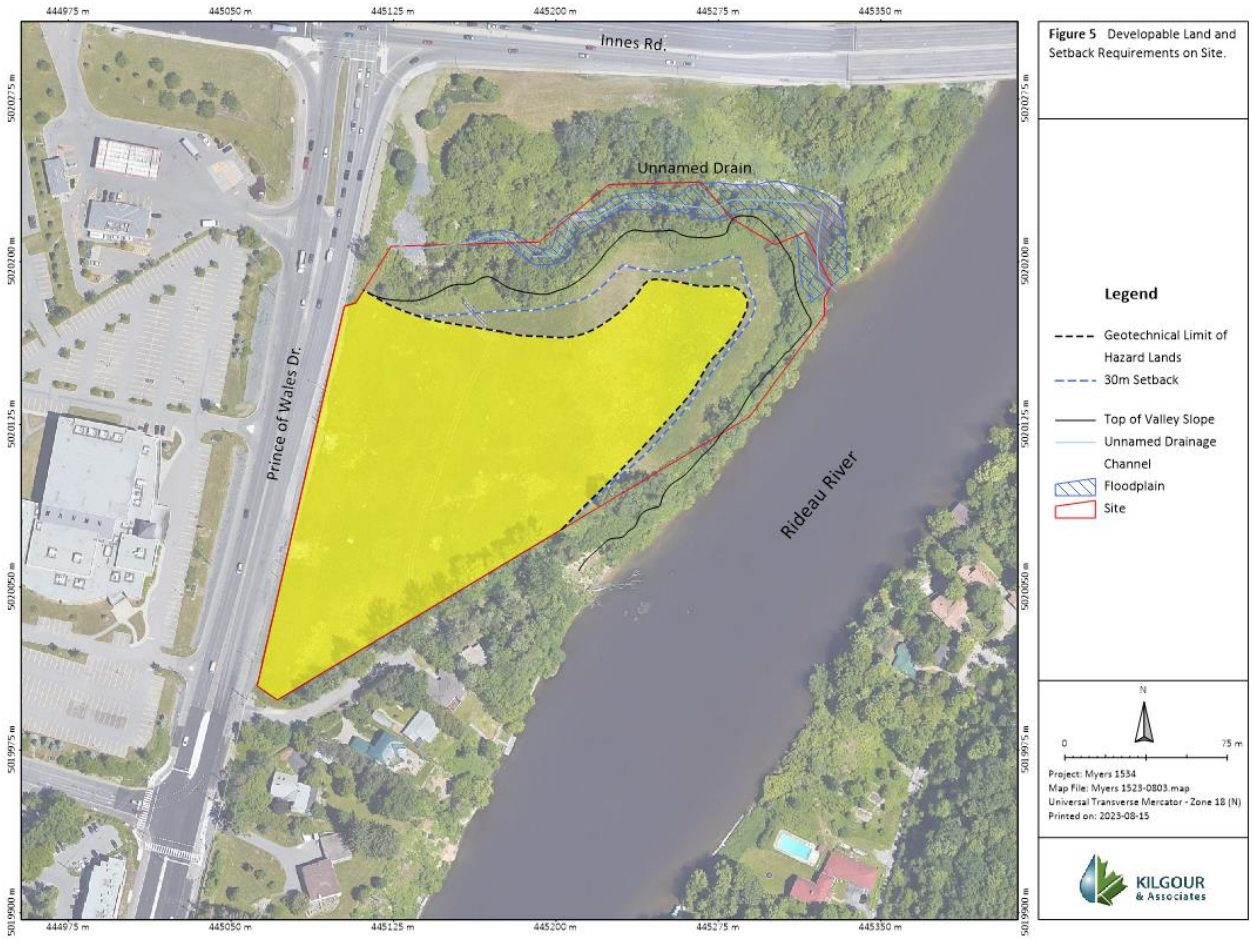

Figure 5 Developable Land and Setback Requirements on Site

7.0 IMPACT ASSESSMENT AND MITIGATION

7.1 Surface Water

No impact to the unnamed drainage channel to the north or the Rideau River to the east is anticipated. A Slope Stability Analysis was conducted for the Site which provided setback requirements for the future proposed development to provide a limit of hazard lands as it relates to the slopes on site (Figure 6; Appendix D). As per Section 4.9.3.2 of the Official Plan, there are four applicable setbacks relevant to this Site and the greatest of these must be respected. As there is no Environmental Management Plan for this Site and meanderbelts are not typically relevant for the rivers the size of the Rideau, the three setbacks are as follows: (1) 1:100-year floodplain, (2) the geotechnical hazard limit, and (3) 30 meters from the high-water mark of the Rideau River and drainage channel. Of these setback requirements, the geotechnical hazard limit, studied in the Slope Stability Analysis is the greatest setback requirement, and must be respected in the Site Plans.

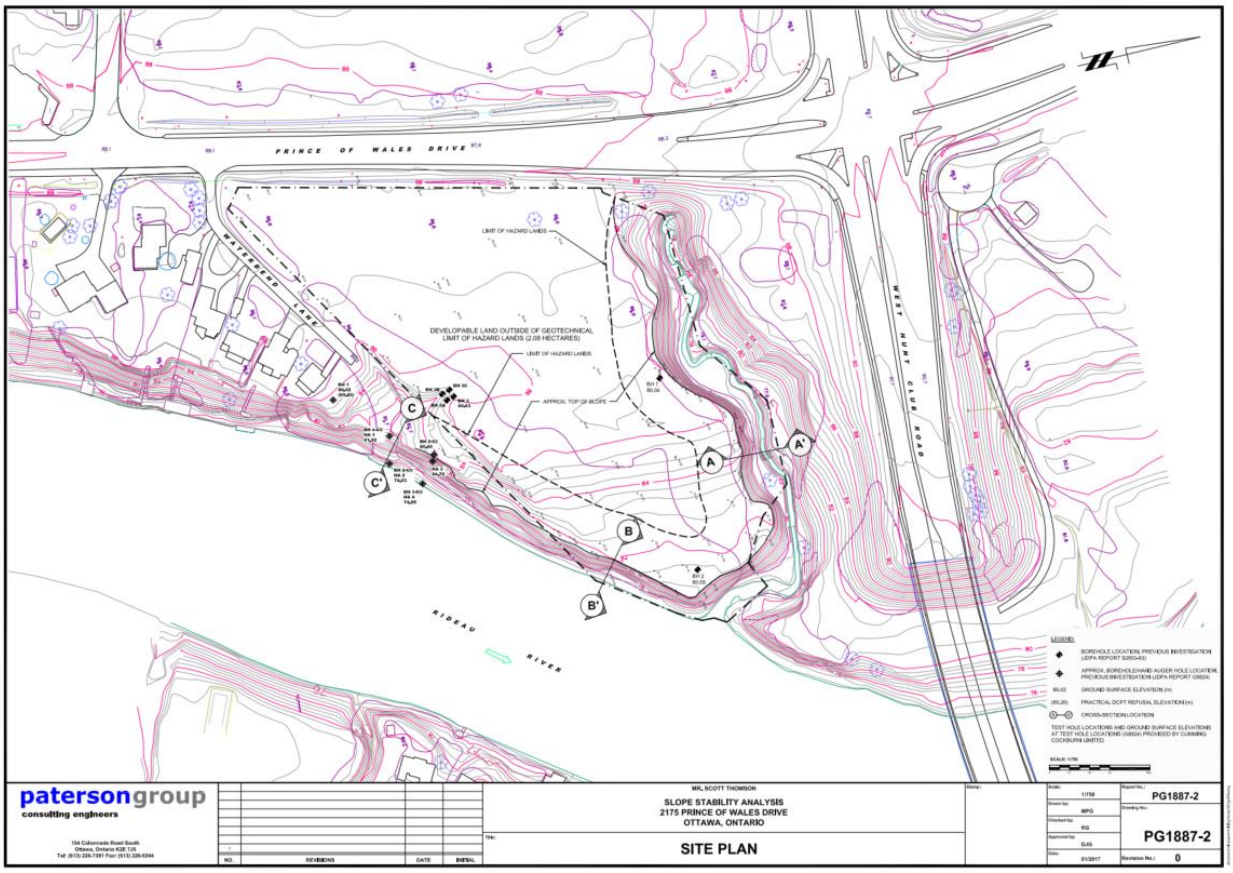

Figure 6 Slope Stability Analysis Setbacks (Paterson Group, 2017)

Within the City of Ottawa's urban boundary, stormwater is captured by the city; therefore, there is minimal risk to impacting water quality of function of the drainage channel, and ultimately the Rideau River. Grading considerations and location of snow piles must be made such that any snow piles and melt water be captured by the City of Ottawa Stormwater system, so meltwater from snow piles do not cause erosion issues along the slopes on the north and eastern boundary and/or potentially release deleterious substances into drainage channel and Rideau River north and east of the Site, respectively.

The potential for sediment to be released into surface water features during site preparation and construction should be mitigated using standard erosion and sediment control measures. To minimize impact to the Rideau River adjacent to the Site, and the broader catchment during construction, an erosion and sediment control (ESC) plan will be required and must be developed to the satisfaction of RVCA. The ESC plan should include a multi faceted approach to provide ESC including but not limited to:

- Silt fence paired with sturdy construction fence along the project perimeter (around the development envelope). This fencing can also act as a wildlife exclusion measure for smaller and less mobile animals that may occupy or traverse across the Site, such as amphibians, turtles, and snakes;
- Regularly inspecting and maintaining the ESC measures during all phases of the project;
- Retention of existing vegetation and stabilization of exposed soils with native vegetation where possible;
- Keeping the ESC measures in place until all disturbed ground has been permanently stabilized;
- Using biodegradable ESC materials where possible and removing all exposed non-biodegradable ESC materials once the Site is stabilized;
- Limiting the duration of soil exposure and phasing project works;
- Limiting the size of disturbed areas by minimizing nonessential clearing and grading;
- Minimizing the total slope length and the gradient of disturbed areas;
- Refueling of machinery should occur >30 m from surface water features and all machinery will remain on the project-side of silt and construction fence;
- Maintaining overland sheet flow and avoiding concentrated flows;
- Storing/stockpiling materials >15 m away from the wetland and other surface water features (if possible);
- Developing a response plan to be implemented immediately in the event of a spill of a deleterious substance;
    - Keeping an emergency spill kit on the Site;

  - the event of a spill, stopping work and containing deleterious substances to prevent dispersal; and,

- Reporting any spills of sewage, oil, fuel, or other deleterious material whether near or directly into a surface water feature.

7.2 Vegetation

No rare or unique vegetation communities or at-risk vegetation species were observed on the Site. No tree clearing is anticipated to accommodate future development. The following general protection measures are recommended during construction to limit impacts to trees:

- Tree removal on the Site within the development envelope and for associated access should be minimized as much as possible;
  - If tree removal does occur on Site; any removals should be off set with the planting of new trees at either the front or the rear of the yard
- Woody vegetation removal should occur before April 15 or after August 15 for the protection of breeding birds and bats, unless a survey conducted by a qualified biologist within five days of the vegetation removal identifies no breeding activity. Note that it is very difficult to effectively complete bird nesting surveys in the upper canopies of forest habitats during the leaf-on period;
- To minimize impacts to retained trees during development:
  - Sturdy protective fencing (could be silt fence) is recommended around the perimeter of the work areas to ensure the adjacent vegetation to be retained is not impacted by the construction and to isolate the work area from sensitive wildlife. The protective fencing is to be installed at the outer limits of the critical root zone (CRZ; i.e., 10x the diameter at breast height);
  - Do not place any material or equipment within the CRZ of trees;
  - Do not attach any signs, notices, or posters to any trees;
  - Do not raise or lower the existing grade within the CRZ of trees without approval;
  - Tunnel or bore when digging within the CRZ of a tree;
  - Do not damage the root system, trunk, or branches of any remaining trees; and
  - Ensure that exhaust fumes from all equipment are not directed toward any tree's canopy.
- Ensure equipment is clean prior to vegetation removal to avoid introducing invasive species to the Site, and clean equipment prior to leaving Site to avoid spreading invasives (e.g., Common Reed - *Phragmites australis*) elsewhere.

- KAL recommends that, to the extent possible, native plants be incorporated into Site landscaping for the benefit of local wildlife and pollinators. It is recommended that plantings encompass a variety of native flowering species with different blooming periods to provide varied food sources for native pollinators. Further, limit the use of herbicides within and surrounding the planted habitat.

7.3 Species at Risk

7.3.1 Blanding's Turtle

The Site includes areas defined as Category 2 and Category 3 habitats for Blanding's Turtle based on proximity to the Rideau River (MECP, 2019b). While the unnamed drainage channel is not considered a suitable habitat area per se, transient turtle presence within the water course is possible and is considered in the following review of potential impacts to the species.

All the proposed development areas on the Site (i.e. beyond the required setbacks to the Rideau River and the valley of the unnamed drain), are beyond 30 m from the water courses. As such, future development would be fully outside areas of Category 2 habitat that would to be functionally supportive of turtle life processes (e.g. feeding, mating, thermoregulation, etc.; MECP 2019b). Future development would occur within 250 m of the Rideau River (i.e. Category 3 habitat). The Category 3 designation is only intended, however, to protect movement corridors (MECP 2019b). The proposed development zone though directly abuts existing areas of development on the south (residential), west (Prince of Wales Dr.), and north sides (Hunt Club Road). Additionally, there are no existing wetlands adjacent to the Site on the south, west, or north sides of the Site. Therefore, future Site development withing the nominal Category 3 habitat areas of the Site would have no impact on travel corridor functionality and would thus be in compliance with the ESA.

Blanding's Turtles and/or other at-risk reptiles that may be present in the Rideau River have the potential to be harmed during site preparation and construction if they are able to access the Site. To prevent potential impacts to Blanding's Turtles in the future, the proponent must implement the following measures during the construction phase:

- All areas subject to active works during the turtle nesting season (May 15-July 15) require the installation of temporary exclusion fencing around the perimeter prior to May 15. Properly installed and maintained standard silt fence can function as exclusion fence.

- Prior to vegetation clearing, pre-construction sweeps of vegetated areas should be undertaken to ensure turtles are not present; and,

- If possible, vegetation clearing should be undertaken outside of the active season of Blanding's turtle (generally taken to be April 1st to October 30th).

Additionally, to prevent potential impacts to transient Blanding's Turtles, fencing along the eastern and northern edges of the property must be designed and installed as a permanent turtle exclusion to limit access by turtles potentially roaming more than 30m from the Rideau River. The permanent fence can serve as an additional safety measure for customers and staff working near the slope adjacent to the Rideau River and drainage channel.

7.4 Wildlife Mitigation

The following mitigation measures shall be implemented during future construction to generally protect wildlife and potential SWH areas:

- At present, the development is not anticipated to directly impact wildlife species; however, impacts may occur at the time of future development. As the timing for development is currently undetermined, additional field surveys for SAR are recommended in the spring/summer prior to development if the proponent wishes to proceed with development within the sensitive timing windows. Postponing wildlife surveys until the suitable seasons preceding development will ensure the data collected is up-to-date and accurately reflects current site conditions and wildlife use as well as will ensure that the surveys target the development footprint. Requirements for field surveys will be determined in consultation with MECP and may include:
    - Breeding bird surveys following the Ontario Breeding Bird Atlas protocol (Birds Canada et al., 2001; Birds Canada et al., 2021). Two rounds of surveys are to take place between sunrise and five hours after sunrise between May 24 and July 10.
    - Anuran (frog and toad) surveys following the Marsh Monitoring Program (Birds Canada et al., 2008). Three rounds of surveys are to take place at night (beginning one half hour after sunset and ending before midnight), no less than 15 days apart, during the spring and early summer.
- Areas shall not be altered or cleared during sensitive times of year for wildlife (breeding season; early spring to early summer) unless mitigation measures are implemented and/or the habitat has been inspected by a qualified Biologist.
- To limit the potential for interactions with turtle nests it is recommended that initial site clearing take place between October and May. A mitigation measure for turtle nesting areas is to ensure the project footprint is fenced off (i.e., silt fence) during the turtle nesting period (late May to early July) (MNRF, 2015c). This should be done to ensure turtles are not nesting in areas that may be disturbed or destroyed due to construction activities if clearing occurs within the turtle nesting period.
    - Clearing of trees and/or vegetation should not take place April 1 to September 30 inclusive unless a qualified Biologist has determined that no birds are nesting or suitable bat roosting trees are present. The bird nest sweep would be valid for five days.
        - The MBCA protects the nests and young of migratory breeding birds in Canada. The timing of nesting for birds in the area spans April 1 to August 31 (Government of Canada, 2018).
        - The breeding and roosting period for bats is recognized as April 1 to September 30 (MNRF, 2015b).

- Ensure that a wildlife management plan for the construction process and delivers environmental compliance and biodiversity training to all site workers to implement the plan. The plan should include (but not be limited to) requirements to:

    - Utilize silt fence paired with sturdy construction fence around soil stockpiles to serve as a wildlife exclusion measure to prevent smaller animals from accessing/utilizing temporary habitats on the Site (e.g., prevent turtles from nesting in stockpiles on the Site);

    - Any turtles or snakes observed in the vicinity of the work areas or that may otherwise be in danger should be encouraged to relocate outside of the development envelope. Animals should be moved only far enough to ensure their immediate safety and not off of the property. Any handling of SAR during construction for safe relocation purposes should be done by individuals who are properly trained to do so. The area should be monitored to prevent re-entry;

    - Check the entire work site for wildlife prior to beginning work each day;

    - Do not harm, feed, or unnecessarily harass wildlife;

    - Manage waste to prevent attracting wildlife to the work site. Effective mitigation measures include litter prevention and keeping all trash secured in wildlife-proof containers and promptly removing it from the work site, especially during warm weather;

    - Enforce a speed limit of 20 km/h during the active season (April 1 to September 30) to reduce wildlife mortality;

    - Manage stockpiles and equipment at the work site to prevent wildlife from being attracted to artificial habitat. Cover and contain any piles of soil, fill, brush, rocks, and other loose materials and cap ends of pipes where necessary to keep wildlife out. Ensure that trailers, bins, boxes, and vacant buildings are secured at the end of each workday to prevent access by wildlife; and,

    - Initial earthworks should not take place early September to early May while snakes are hibernating (MNRF 2016; MNRF 2018).

8.0 CONCLUSION

It is our professional opinion that no significant negative impacts are likely to species-at-risk or their habitats, or to significant natural heritage features present in the broader project vicinity under the proposed project if all mitigation recommendations provided within this report are followed.

9.0 CLOSURE

This report was prepared for exclusive use by Myers Automotive and may be distributed only by Myers Automotive. Questions relating to the data and interpretation can be addressed to the undersigned.

Respectfully submitted,

KILGOUR & ASSOCIATES LTD.

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Appendix A Qualifications of Report Authors

Nicholas Moore, BSc

Nick is a Field Ecologist with a background in Aquatic Biology. He graduated from Sir Sandford Fleming in 2018 with two Technical Diplomas for Environmental Technician and Environmental Technologist, as well as completing his Bachelor of Science with Honors in Biology and Environmental and Resource Studies at Trent University. He has worked with Kilgour & Associates Ltd. for two years. With KAL, he has been involved in dozens of land-development projects where he has written many Environmental Impact Studies and has used his academic training to characterize the flora and fauna of natural environments. Nick is a certified wetland evaluator under Ontario's Wetland Evaluation System (OWES) process.

Anthony Francis, PhD

Dr. Francis is a Senior Ecologist with 24 years' consulting experience to both government agencies and private industry. He has worked on a diversity of projects relating to species at risk, invasive species, terrestrial and aquatic habitat, environmental effects monitoring and mitigation, and fate/effects of contaminants. Within each of these subject areas, Dr. Francis has completed projects addressing specific site concerns and broader policy initiatives. He has extensive experience in preparing Environmental Impact Statements, Integrated Environmental Reviews and Tree Conservation Reports in support of land development and property severances. He has carried out literature reviews for government agencies, performed complex geospatial analyses of plant and animal distributions, and completed numerous field programs in support of environmental impact statements and assessments.

Appendix B Results from Initial SAR Screening

Species Name (*Scientific name*)	Information Source	Prov. Status	Fed. Status
Birds			
American White Pelican (*Pelecanus erythrorhynchos*)	Cornell Lab of Ornithology (2023)	THR	-
Bald Eagle (*Haliaeetus leucocephalus*)	Cornell Lab of Ornithology (2023), California Academy of Sciences and National Geographic Society (2023)	SC	-
Bank Swallow (*Riparia riparia*)	Birds Canada et al. (2009), Cornell Lab of Ornithology (2023)	THR	THR
Barn Swallow (*Hirundo rustica*)	Birds Canada et al. (2009), Cornell Lab of Ornithology (2023)	SC	THR
Black Tern (*Chlidonias niger*)	Cornell Lab of Ornithology (2023)	SC	-
Bobolink (*Dolichonyx oryzivorus*)	Birds Canada et al. (2009), MNRF (2023a), Cornell Lab of Ornithology (2023), MNRF (2023b)	THR	THR
Canada Warbler (*Cardellina canadensis*)	Cornell Lab of Ornithology (2023)	SC	THR
Cerulean Warbler (*Setophaga cerulea*)	Cornell Lab of Ornithology (2023)	THR	END
Chimney Swift (*Chaetura pelagica*)	Birds Canada et al. (2009), Cornell Lab of Ornithology (2023)	THR	THR
Common Nighthawk (*Chordeiles minor*)	Birds Canada et al. (2009), Cornell Lab of Ornithology (2023)	SC	THR
Eastern Meadowlark (*Sturnella magna*)	Birds Canada et al. (2009), MNRF (2023a), Cornell Lab of Ornithology (2023), MNRF (2023b)	THR	THR
Eastern Whip-poor-will (*Antrostomus vociferus*)	Cornell Lab of Ornithology (2023)	THR	THR
Eastern Wood-Pewee (*Contopus virens*)	Birds Canada et al. (2009), MNRF (2023a), Cornell Lab of Ornithology (2023)	SC	SC
Evening Grosbeak (*Coccothraustes vespertinus*)	Cornell Lab of Ornithology (2023)	SC	SC
Golden Eagle (*Aquila chrysaetos*)	Cornell Lab of Ornithology (2023)	END	-
Golden-winged Warbler (*Vermivora chrysoptera*)	Cornell Lab of Ornithology (2023)	SC	THR
Grasshopper Sparrow (*Ammodramus savannarum*)	Birds Canada et al. (2009), MNRF (2023a), Cornell Lab of Ornithology (2023)	SC	SC
Horned Grebe (*Podiceps auritus*)	Cornell Lab of Ornithology (2023), California Academy of Sciences and National Geographic Society (2023)	SC	SC
Hudsonian Godwit (*Limosa haemastica*)	Cornell Lab of Ornithology (2023), California Academy of Sciences and National Geographic Society (2023)	THR	-
Least Bittern (*Ixobrychus exilis*)	MNRF (2023a), Cornell Lab of Ornithology (2023)	THR	THR
Lesser Yellowlegs (*Tringa flavipes*)	Cornell Lab of Ornithology (2023), California Academy of Sciences and National Geographic Society (2023)	SC	-
Loggerhead Shrike (*Lanius ludovicianus*)	MNRF (2023a), Cornell Lab of Ornithology (2023), MNRF (2023b)	END	END
Olive-sided Flycatcher (*Contopus cooperi*)	Cornell Lab of Ornithology (2023)	SC	THR
Peregrine Falcon (*Falco peregrinus*)	Birds Canada et al. (2009), MNRF (2023a), Cornell Lab of Ornithology (2023), California Academy of Sciences and National Geographic Society (2023), MNRF (2023b)	SC	SC
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	Cornell Lab of Ornithology (2023)	END	END

Rusty Blackbird (*Euphagus carolinus*)	Cornell Lab of Ornithology (2023), California Academy of Sciences and National Geographic Society (2023)	SC	SC
Short-eared Owl (*Asio flammeus*)	Birds Canada et al. (2009), MNRF (2023a), Cornell Lab of Ornithology (2023), California Academy of Sciences and National Geographic Society (2023)	THR	SC
Wood Thrush (*Hylocichla mustelina*)	Birds Canada et al. (2009), MNRF (2023a), Cornell Lab of Ornithology (2023), California Academy of Sciences and National Geographic Society (2023)	SC	THR
Mammals			
Eastern Small-footed Myotis (*Myotis leibii*)	Humphrey (2017) & Humphrey and Fotherby (2019), California Academy of Sciences and National Geographic Society (2023)	END	-
Little Brown Myotis (*Myotis lucifugus*)	Humphrey (2017) & Humphrey and Fotherby (2019), California Academy of Sciences and National Geographic Society (2023)	END	END
Northern Myotis (*Myotis septentrionalis)*	Humphrey (2017) & Humphrey and Fotherby (2019), California Academy of Sciences and National Geographic Society (2023)	END	END
Tri-colored Bat (*Perimyotis subflavus*)	Humphrey (2017) & Humphrey and Fotherby (2019), California Academy of Sciences and National Geographic Society (2023)	END	END
Amphibians			
Western Chorus Frog (*Pseudacris triseriata*)	California Academy of Sciences and National Geographic Society (2023)	-	THR
Reptiles			
Blanding's Turtle (*Emydoidea blandingii*)	Ontario Nature (2019), MNRF (2023a), California Academy of Sciences and National Geographic Society (2023), MNRF (2023b)	THR	END
Eastern Milksnake (*Lampropeltis triangulum*)	Ontario Nature (2019)	-	SC
Eastern Musk Turtle (*Sternotherus odoratus*)	Ontario Nature (2019), MNRF (2023b)	SC	SC
Midland Painted Turtle (*Chrysemys picta marginata*)	Ontario Nature (2019), MNRF (2023a), California Academy of Sciences and National Geographic Society (2023)	-	SC
Northern Map Turtle (*Graptemys geographica*)	Ontario Nature (2019), California Academy of Sciences and National Geographic Society (2023)	SC	SC
Snapping Turtle (*Chelydra serpentina*)	Ontario Nature (2019), MNRF (2023a), California Academy of Sciences and National Geographic Society (2023), MNRF (2023b)	SC	SC
Arthropods			
American Bumble Bee (*Bombus pensylvanicus*)	MNRF (2023a)	SC	-
Gypsy Cuckoo Bumble Bee (*Bombus bohemicus*)	MNRF (2023a), MNRF (2023b)	END	END
Monarch (*Danaus plexippus*)	California Academy of Sciences and National Geographic Society (2023), Wildlife Preservation Canada et al. (2023)	SC	SC
Nine-spotted Lady Beetle (*Coccinella novemnotata*)	MNRF (2023b)	END	-
Yellow-banded Bumble Bee (*Bombus terricola*)	MNRF (2023a), MNRF (2023b)	SC	SC
Fish			
River Redhorse (*Moxostoma carinatum*)	MNRF (2023a)	SC	SC

Vascular Plants			
Black Ash (*Fraxinus nigra*)	California Academy of Sciences and National Geographic Society (2023)	END	-
Butternut (*Juglans cinerea*)	MNRF (2023a), California Academy of Sciences and National Geographic Society (2023), MNRF (2023b)	END	END
Lichens			
Black-foam Lichen (*Anzia colpodes*)	California Academy of Sciences and National Geographic Society (2023), MNRF (2023b)	-	THR
Pale-bellied Frost Lichen (*Physconia subpallida*)	California Academy of Sciences and National Geographic Society (2023)	END	END

Appendix C SAR Potential to Interact With Development Assessment

Species Name (*Taxonomic Name*)	Status under *Endangered Species Act* (ESA)	Status under Schedule 1 of the *Species at Risk Act* (SARA)	Closest Species Occurrence Record to the Site	General Habitat Requirements	Site Suitability	Potential for Protected Elements[1]		Potential for Negative Interactions with Protected Elements[2]
						Habitat	Individuals	
Birds								
American White Pelican (Pelecanus erythrorhynchos)	**Threatened**	**-**		Nests in groups on remote islands that are barren or sparsely treed located in lakes, reservoirs, or on large rivers.	The Site does not appear to contain suitable habitat.	Negligible	Negligible	Negligible
Bald Eagle (*Haliaeetus leucocephalus*)	**Special Concern**	**Not at Risk**		Nest in mature forests near open water. In large trees such as pine and poplar.	The mature trees have some potential for Bald Eagles to nest or perch on.	Moderate	Low	Low. There are no snags along the Rideau River. Additionally, the Site is adjacent to both Prince of Wales and West Hunt Club Road, and the West Hunt Club Rd bridge that crosses the Rideau River would deter Bald Eagles from inhabiting the Site.
Bank Swallow (*Riparia riparia*)	**Threatened**	**Threatened**		Colonial nester; burrows in eroding silt or sand banks, sand pit walls, and human-made sand piles. Often found on banks of rivers and lakes.	The steep slopes on the northern boundary of the Site have some potential for nesting of bank swallow	Moderate	Low	Low. There was no exposed soil cliff faces observed during the Site visit. All slopes were vegetated. As such there is a low potential it interact with protected elements.
Barn Swallow (*Hirundo rustica*)	**Special Concern**	**Threatened**		Nests on barns and other structures. Forages in open areas for flying insects. Lives in close association with humans and prefers to nest on structures such as open barns, under bridges, and in culverts.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Black Tern (*Chlidonias niger*)	**Special Concern**	**Not at Risk**		Build floating nests in loose colonies in shallow marshes with abundant emergent vegetation, especially in cattails.	The Site does not appear to contain suitable habitat	Low	Low	Low
Bobolink (*Dolichonyx oryzivorus*)	**Threatened**	**Threatened**		Breeds in hayfields, pastures, agricultural fields, and abandoned fields with tall grass that are ≥5 ha, and preferably >30 ha.	The meadow community on Site and shrubs on the northern boundary provide some potential habitat for Bobolink.	Moderate	Low	Low. There is some suitable habitat on Site. However, it barely meets the minimum size requirement of 2 ha for suitable nesting habitat size. However, the Site is surrounded by developed land and as such would deter nesting or

Species Name (*Taxonomic Name*)	Status under *Endangered Species Act* (ESA)	Status under Schedule 1 of the *Species at Risk Act* (SARA)	Closest Species Occurrence Record to the Site	General Habitat Requirements	Site Suitability	Potential for Protected Elements[1]		Potential for Negative Interactions with Protected Elements[2]
						Habitat	Individuals	
								transient individual sightings.
Canada Warbler (*Cardellina canadensis*)	**Special Concern**	**Threatened**		Prefers moist forests with dense shrub layers. Nests located on or near the ground on mossy logs or roots, along stream banks or on hummocks. Area-sensitive species that usually require a minimum of 30 ha of continuous forest for breeding habitat (OMNR, 2000).	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Cerulean Warbler (*Setophaga cerulea)*	**Threatened**	**Endangered**		Prefers mature deciduous forests. Area-sensitive species that require large forests (>100 ha) (OMNR, 2000).	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Chimney Swift (*Chaetura pelagica*)	**Threatened**	**Threatened**		Nests in traditional-style open brick chimneys (and rarely in hollow trees). Tends to stay close to water.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Common Nighthawk (*Chordeiles minor*)	**Special Concern**	**Threatened**		Nests in a wide variety of open sites, including beaches, fields, and gravel rooftops with little to no ground vegetation. They also nest in cultivated fields, orchards, urban parks, mine tailings and along gravel roads/railways but tend to occupy more natural sites.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Eastern Meadowlark (*Sturnella magna*)	**Threatened**	**Threatened**		Breeds in hayfields, pastures, agricultural fields, and abandoned fields with tall grass that are ≥5 ha, and preferably >30 ha.	The meadow community on Site and shrubs on the northern boundary provide some potential habitat for the Eastern Meadowlark.	Moderate	Low	Low. There is some suitable habitat on Site. However, it does not meet the minimum size requirement of 2.6 ha for suitable nesting habitat size. As well, the Site is surrounded by developed land and as such would deter nesting or transient individual sightings.
Eastern Whip-poor-will (*Antrostomus vociferus*)	**Threatened**	**Threatened**		Suitable breeding habitats generally include open and half treed areas and often exhibit a scattered distribution of treed and open	The Site does not appear to contain suitable habitat.	Negligible	Low	Low

Species Name (*Taxonomic Name*)	Status under *Endangered Species Act* (ESA)	Status under Schedule 1 of the *Species at Risk Act* (SARA)	Closest Species Occurrence Record to the Site	General Habitat Requirements	Site Suitability	Potential for Protected Elements[1]		Potential for Negative Interactions with Protected Elements[2]
						Habitat	Individuals	
				space. Lays eggs directly on the forest floor. Roosts are typically located in forest habitat on a low branch or directly on the ground. Home range size varies from 20 to 500 ha (mean 136 ha) (ECCC, 2018a).				
Eastern Wood-Pewee (*Contopus virens*)	**Special Concern**	**Special Concern**		Woodland species often found in the mid-canopy layer near clearings and edges of intermediate age and mature deciduous and mixed forests with little understory.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Evening Grosbeak (*Coccothraustes vespertinus*)	**Special Concern**	**Special Concern**		Nests in trees or large shrubs. Prefers mature coniferous forests (fir and/or spruce dominated), but will also use deciduous forests, parklands, and orchards. Its abundance is strongly linked to the cycle of Spruce Budworm.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Golden Eagle (*Aquila chrysaetos*)	**Endangered**	**Not at Risk**		Nests in remote, undisturbed areas, usually building their nests on ledges on a steep cliff/riverbank or large trees if needed. Most hunting is done near open areas such as large bogs or tundra. Migration only; no reported nests in Ottawa.	The mature trees have some potential for Golden Eagles to nest or perch on.	Moderate	Low	Low. There are no snags along the Rideau River. Additionally, the Site is adjacent to both Prince of Wales and West Hunt Club Road, and the West Hunt Club Rd bridge that crosses the Rideau River would deter them from inhabiting the Site.
Golden-winged Warbler (*Vermivora chrysoptera*)	**Special Concern**	**Threatened**		Ground-nests in areas of young shrubs surrounded by mature forest. Often found in areas that have recently been disturbed such as field edges, hydro or utility right-of-ways, or logged areas. Requires >10 ha of habitat (OMNR, 2000).	The meadow community and mature trees on the periphery of the property may provide suitable habitat.	Moderate	Low	While there is potentially suitable habitat on Site, the size of the site does not meet the minimum size requirement of 10ha. Additionally the Site is surrounded by developed areas and as such would deter them.
Grasshopper Sparrow (*Ammodramus savannarum*)	**Special Concern**	**Special Concern**		Lives in open grassland areas with well-drained sandy soil. Will also nest in hayfields and pastures, as well as	The Site does not appear to contain suitable habitat.	Negligible	Low	Low

Species Name (*Taxonomic Name*)	Status under *Endangered Species Act* (ESA)	Status under Schedule 1 of the *Species at Risk Act* (SARA)	Closest Species Occurrence Record to the Site	General Habitat Requirements	Site Suitability	Potential for Protected Elements[1]		Potential for Negative Interactions with Protected Elements[2]
						Habitat	Individuals	
				alvars, prairies, and occasionally grain crops such as barley. It prefers areas that are sparsely vegetated, and its nests are well hidden in the field, woven from grasses in a small cup-like shape.				
Horned Grebe (*Podiceps auritus*)	**Special Concern**	**Special Concern**		Nest in small ponds, marshes, and shallow bays that contain areas of open water and emergent vegetation. Migrant only; no reported nests in Ottawa.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Hudsonian Godwit (*Limosa haemastica*)	**Threatened**	**No Status**		They use a wide variety of habitats during migration, such as freshwater marshes, saline lakes, flooded fields, shallow ponds, coastal wetlands, and mudflats. Migrant only; breeds in far north.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Least Bittern (*Ixobrychus exilis*)	**Threatened**	**Threatened**		Found in a variety of wetland habitats, but strongly prefers cattail marshes with a mix of open pools and channels. They prefer larger marshes >5 ha in size and are intolerant of loss of habitat and human disturbance (OMNR, 2000).	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Lesser Yellowlegs (*Tringa flavipes*)	**Threatened**	**No Status**		Breeds in boreal wetlands. Nests on dry ground or forest openings near peatlands, marshes, and ponds in the boreal forest and taiga (Government of Canada, 2021). Migrant only; nests in far north.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Loggerhead Shrike (*Lanius ludovicianus*)	**Endangered**	**Endangered**		Prefers grazed pastures or other grasslands with scattered low trees and shrubs, especially hawthorns. Lives in fields or alvars (areas of exposed bedrock) with short grass, which makes it easier to spot prey.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Louisiana Waterthrush (*Seiurus motacilla*)	**Threatened**	**Threatened**		Found in large tracts of mature deciduous or mixed forests in steep, forested ravines with running	The Site does not appear to contain suitable habitat.	Negligible	Low	Low

Species Name (*Taxonomic Name*)	Status under *Endangered Species Act* (ESA)	Status under Schedule 1 of the *Species at Risk Act* (SARA)	Closest Species Occurrence Record to the Site	General Habitat Requirements	Site Suitability	Potential for Protected Elements[1]		Potential for Negative Interactions with Protected Elements[2]
						Habitat	Individuals	
				streams. Clear headwater streams and associated wetlands are preferred sites, but it will also inhabit wooded swamps (Environment Canada, 2011).				
Olive-sided Flycatcher (*Contopus cooperi*)	**Special Concern**	**Threatened**		Found along coniferous or mixed forest edges and openings. Will use forests that have been logged or burned if there are ample tall snags and trees to use for foraging perches.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Peregrine Falcon (*Falco peregrinus*)	**Special Concern**	**Special Concern**		Nests on tall, steep cliff ledges close to large bodies of water. Urban peregrines raise their young on ledges of tall buildings, even in busy downtown areas.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Red Knot (*Calidris canutus rufa*)	**Endangered**	**Endangered**		Prefer open beaches, mudflats, and coastal lagoons where they feast on molluscs, crustaceans, and other invertebrates. Migrant only; nests in far north.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	**Endangered**	**Endangered**		Lives in open woodland and woodland edges and is often found in parks, golf courses, and cemeteries. These areas typically have many dead trees, which the birds use for nesting and perching.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Red-necked Phalarope (*Phalaropus lobatus*)	**Special Concern**	**Special Concern**		Lives in coastal and inland marshes where it feeds in shallow ponds and nests on the grassy edges. Always near water during migration. Migrant only; nests in far north.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Rusty Blackbird (*Euphagus carolinus*)	**Special Concern**	**Special Concern**		Prefers wet wooded or shrubby areas. Nests at edges of boreal wetlands and coniferous forests. These areas include bogs, marshes, and beaver ponds.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Short-eared Owl (*Asio flammeus*)	**Threatened**	**Special Concern**		Prefer a mosaic of grasslands and wetlands. Lives in open areas such as grasslands,	The Site does not appear to contain suitable habitat.	Negligible	Low	Low

Species Name (*Taxonomic Name*)	Status under *Endangered Species Act* (ESA)	Status under Schedule 1 of the *Species at Risk Act* (SARA)	Closest Species Occurrence Record to the Site	General Habitat Requirements	Site Suitability	Potential for Protected Elements[1]		Potential for Negative Interactions with Protected Elements[2]
						Habitat	Individuals	
				marshes, and tundra where it nests on the ground and hunts for small mammals (Environment Canada, 2016c).				
Wood Thrush (*Hylocichla mustelina*)	**Special Concern**	**Threatened**		Lives in mature deciduous and mixed forests. They seek moist stands of trees with well-developed undergrowth and tall trees for singing and perching. Prefers nesting in large forest mosaics, but will also use fragmented forests. Usually build nests in Sugar Maple or American Beech.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Yellow Rail (*Coturnicops noveboracensis*)	**Special Concern**	**Special Concern**		Lives deep in the reeds, sedges, and marshes of shallow wetlands, where they nest on the ground. The marshy areas used by Yellow Rails have an overlying dry mat of dead vegetation that is used to make roofs for nests.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Mammals								
Eastern Small-footed Myotis (*Myotis leibii*)	**Endangered**	**Not Listed**	Humphrey (2017) – in region	In the spring and summer, Eastern Small-footed Myotis will roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees. Overwinters in caves and abandoned mines.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Little Brown Myotis (*Myotis lucifugus*)	**Endangered**	**Endangered**	Humphrey and Fotherby (2019) – in region	During the day they roost in trees and buildings. They often select attics, abandoned buildings, and barns for summer colonies where they can raise their young. They can squeeze through very tiny spaces (as small as six millimetres across) allowing them access to many different roosting areas.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Northern Myotis / Northern Long-eared Bat (*Myotis septentrionalis*)	**Endangered**	**Endangered**	Humphrey and Fotherby (2019) – in region	Associated with deciduous and mixed forests, choosing to roost under loose bark and in the cavities of trees. They forage along and within	The Site does not appear to contain suitable habitat.	Negligible	Low	Low

Species Name (*Taxonomic Name*)	Status under *Endangered Species Act* (ESA)	Status under Schedule 1 of the *Species at Risk Act* (SARA)	Closest Species Occurrence Record to the Site	General Habitat Requirements	Site Suitability	Potential for Protected Elements[1]		Potential for Negative Interactions with Protected Elements[2]
						Habitat	Individuals	
				forests as well as in hayfields and pastures adjacent to mixed forests.				
Tri-colored Bat / Eastern Pipistrelle (*Perimyotis subflavus*)	**Endangered**	**Endangered**	Humphrey and Fotherby (2019) – in region	Roosts mainly in trees during summer; overwinters in caves and mines along with other species, but often uses deeper parts of the hibernaculum. Foraging occurs in forested riparian areas, over water, and within gaps in forest canopies.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Amphibians								
Western Chorus Frog (*Pseudacris triseriata*)	**Not Listed**	Great Lakes/ St. Lawrence population: **Threatened**		Inhabits forest openings around woodland ponds but can also be found in or near damp meadows, marshes, bottomland swamps, and temporary ponds in open country, or even urban areas.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Reptiles								
Blanding's Turtle (*Emydoidea blandingii*)	**Threatened**	**Endangered**		Quiet lakes, streams, and wetlands with abundant emergent vegetation. Also frequently occurs in adjacent upland forests.	The Site does not appear to contain suitable habitat.	**Low**	Low	Moderate. The Rideau River System is known Blanding's Turtle Habitat and as such is considered within the EIS. However, there is no wetland habitat on Site, and low possibilities of transient observations of Blanding's Turtles on Site.
Eastern Milksnake (*Lampropeltis triangulum*)	**Not Listed**	**Special Concern**		Found in a variety of open and edge habitats, including meadows, rocky outcrops, and forest edges. They can also inhabit forests. Further, they are often associated with human-made structures such as barns (Environment Canada, 2015b).	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Eastern Musk Turtle / Stinkpot (*Sternotherus odoratus*)	**Special Concern**	**Special Concern**		Found in lakes, ponds, marshes, and rivers that are generally slow-moving, have abundant emergent vegetation, and muddy bottoms that they burrow into for winter hibernation.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low

Species Name (*Taxonomic Name*)	Status under *Endangered Species Act* (ESA)	Status under Schedule 1 of the *Species at Risk Act* (SARA)	Closest Species Occurrence Record to the Site	General Habitat Requirements	Site Suitability	Potential for Protected Elements[1]		Potential for Negative Interactions with Protected Elements[2]
						Habitat	Individuals	
Midland Painted Turtle (*Chrysemys picta marginata*)	**Not Listed**	**Special Concern**		Inhabits waterbodies, such as ponds, marshes, lakes, and slow-moving creeks that have a soft bottom and provide abundant basking sites and aquatic vegetation. Often bask on shorelines or on logs and rocks that protrude from the water.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Northern Map Turtle (*Graptemys geographica*)	**Special Concern**	**Special Concern**		Lives in rivers and lakeshores where it basks on emergent rocks and fallen trees throughout the spring and summer. In winter, they hibernate on the bottom of deep, slow-moving sections of river.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Snapping Turtle (*Chelydra serpentina*)	**Special Concern**	**Special Concern**		Spend most of their lives in the water. Prefer shallow waters so they can hide under the soft mud and leaf litter with only their noses exposed to the surface to breathe.	The Site does not appear to contain suitable habitat.	Negligible	Low	Low
Arthropods								
American Bumble Bee (*Bombus pensylvanicus*)	**Special Concern**	**No Status**	COSEWIC (2018) – in region	Habitat generalist. Requires a variety of habitat throughout it's life stages. Often found in or adjacent to open fields and meadows, grasslands, farmlands, and other undisturbed open habitats (Government of Canada, 2019).	The meadow community could provide some suitable habitat.	Moderate	Low	Low. The meadow community could provide some suitable habitat. However, there were no flowering plants observed on Site, and as such their presence is low.
Gypsy Cuckoo Bumble Bee (*Bombus bohemicus*)	**Endangered**	**Endangered**		Live in diverse habitats including open meadows, mixed farmlands, urban areas, boreal forest, and montane meadows. Host nests occur in abandoned underground rodent burrows and rotten logs.	Currently only known to occur in Pinery Provincial Park (MECP, 2019b).	None	None	None
Monarch (*Danaus plexippus*)	**Special Concern**	**Special Concern**		Milkweeds are the sole food plant for Monarch caterpillars. These plants predominantly grow in open and periodically disturbed habitats such as roadsides, fields, wetlands, prairies, and open forests.	The meadow community could provide some suitable habitat.	Moderate	Low	Low. The meadow community could provide some suitable habitat. However, there were no Milkweed observed on Site, and as such their presence is low.

Species Name (*Taxonomic Name*)	Status under *Endangered Species Act* (ESA)	Status under Schedule 1 of the *Species at Risk Act* (SARA)	Closest Species Occurrence Record to the Site	General Habitat Requirements	Site Suitability	Potential for Protected Elements[1]		Potential for Negative Interactions with Protected Elements[2]
						Habitat	Individuals	
Nine-spotted Lady Beetle (*Coccinella novemnotata*)	**Endangered**	**No Status**		Occurs within agricultural areas, suburban gardens, parks, coniferous forests, deciduous forests, prairie grasslands, meadows, riparian areas, and isolated natural areas.	There have been no records of this species in Ontario since the mid-1990s (MECP, 2019c).	None	None	None
Yellow-banded Bumble Bee (*Bombus terricola*)	**Special Concern**	**Special Concern**	ECCC (2022) – in region	This species is a forage and habitat generalist, able to use a variety of nectaring plants and environmental conditions. Can be found in mixed woodlands, particularly for nesting and overwintering, as well as a variety of open habitat such as native grasslands, farmlands, and urban areas.	The meadow community could provide some suitable habitat.	Moderate	Low	Low. The meadow community could provide some suitable habitat. However, there were no flowering plants observed on Site, and as such their presence is low.
Fish								
River Redhorse (*Moxostoma carinatum*)	**Special Concern**	**Special Concern**		Prefers fast-flowing, clear rivers over rocky substrate.	The Site does not appear to contain suitable habitat.	Low	Low	Low
Vascular Plants								
Black Ash (*Fraxinus nigra*)	**Endangered**	**No Status**		Predominantly a wetland species found in swamps, floodplains, and fens.	The Site has some potential to contain suitable habitat.	**Moderate**	**Low**	None. There were no individuals observed on the Site during the field visit.
Butternut (*Juglans cinerea*)	**Endangered**	**Endangered**		Commonly found in riparian habitats but is also found on rich, moist, well-drained loams and well-drained gravels, especially those of limestone origin.	The Site has some potential to contain suitable habitat.	**Moderate**	**Low**	None. There were no individuals observed on the Site during the field visit.
Lichens								
Black-foam Lichen (*Anzia colpodes*)	**No Status**	**Threatened**		Grows on the trunks of mature deciduous trees growing on level or sloped land where high humidity is supplied by nearby wetlands, lakes, or streams. The most common host is Red Maple but it also occurs on White Ash, Sugar Maple, Red Oak, and very	Assumed to no longer occur in Ontario (COSEWIC, 2015).	None	None	None

Species Name (*Taxonomic Name*)	Status under *Endangered Species Act* (ESA)	Status under Schedule 1 of the *Species at Risk Act* (SARA)	Closest Species Occurrence Record to the Site	General Habitat Requirements	Site Suitability	Potential for Protected Elements[1]		Potential for Negative Interactions with Protected Elements[2]
						Habitat	Individuals	
				occasionally on other species.				
Pale-bellied Frost Lichen (*Physconia subpallida*)	**Endangered**	**Endangered**		Typically grows on the bark of hardwood trees such as White Ash, Black Walnut, and American Elm. Can also be found growing on fence posts and boulders.	There are no recent records of the species in the Ottawa area (MECP, 2019f).	None	None	None

Appendix D Slope Stability Analysis

patersongroup Consulting Engineers

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February 28, 2017
File: PG1887-LET.01 Revision 3

Geotechnical Engineering
Environmental Engineering
Archaeological Services
Hydrogeology
Geological Engineering
Materials Testing
Building Science

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Mr. Scott Thomson
3 Lemon Point Lane
Prescott, Ontario
K0E 1T0

Subject: **Slope Stability Analysis**
2175 Prince of Wales Drive
Ottawa, Ontario

Dear Sir,

Further to your request, Paterson Group (Paterson) has conducted a slope stability analysis and determined the limit of hazard lands for the aforementioned site. The limit of hazard lands for the subject site extends along the west side of the Rideau River and along the south side of a ravine containing a tributary watercourse to the Rideau River. The present letter summarizes our findings from a geotechnical perspective.

The subject site is presently undeveloped and has an approximate area of 3.23 hectares. The majority of the subject site is grassed covered and slopes gradually downward to the west towards the Rideau River. The subject site is bordered by a ravine to the north, the Rideau River to the east, Waterbend Lane followed by residential housing to the south and Prince of Wales Drive to the west. A topographic survey was completed by Paterson to provide spot grade elevations across the subject site and three (3) slope cross sections were completed for our slope stability analysis. One slope cross section was completed for the area that has undergone a slope remedial repair after slope toe erosion activities have caused slip failures.

A previous geotechnical investigation was completed by John D. Paterson and Associates (JDPA) for the subject site with the findings presented under cover Report S2853-83 dated December 30, 1983.

1.0 Existing Slope Conditions and Soils Information

The south valley corridor wall of the drainage ravine along the north property boundary was noted to be vegetated with small brush and signs of erosion occurring at several localized outbends in the watercourse/creek channel. A 2 to 3 m wide watercourse was noted to meander throughout the valley corridor. The water depth was noted to vary between approximately 0.2 to 0.3 m.

Along the east property boundary, the west valley corridor wall of the Rideau River is undergoing active erosion within several areas, the slope was noted to have been undercut at the toe. It is expected that historical erosional activities have resulted in currently observed steep back scarp slope. Currently, the majority of the bank was vegetated with small brush and full grown trees (mainly deciduous). A previous slope slip failure due to toe erosion activities had occurred at the south property boundary of the subject site (Section C in Drawing PG1887-2 - Site Plan). A slope remedial program was initiated in Summer 2003 and consisted of modifying the existing slope and reinstating with blast rock fill.

The subsurface soil profile used for the slope stability analysis was based on existing test hole information and available geological mapping in the immediate area of the subject site. Generally, the soil profile at the test hole locations placed within the subject site, consists of a thin layer of topsoil overlying a sandy silt layer followed by a 1 to 3 m thick very stiff brown silty clay deposit. The silty clay layer was underlain by a sandy silt to silty sand deposit extending beyond a 12 m depth. Based on nearby borehole locations, glacial till was encountered at 18 to 20 m followed by bedrock at 25 to 30 m below ground surface. Based on available geological mapping, the bedrock surface in this area is encountered at depths varying between 15 to 25 m and consists of dolomite of the Oxford formation.

2.0 Slope Stability Analysis

The slope stability analysis was completed using the topographical survey, as well as, a current slope condition review by Paterson field personnel. Two (2) slope cross-sections (Section A and Section B) were studied as the worst case scenarios. Due to the proximity of the former slope failure located at the south property boundary, a third cross-section (Section C) was analysed during a recent site visit and using topographic mapping from before and after the remedial program. The cross section locations are presented on Drawing PG1887-2 - Site Plan attached to the present letter.

The analysis of the stability of the slope was carried out using SLIDE, a computer program which permits a two-dimensional slope stability analysis using several methods including the Bishop's method, which is a widely used and accepted analysis method. The program calculates a factor of safety, which represents the ratio of the forces resisting failure to those favoring failure. Theoretically, a factor of safety of 1.0 represents a condition where the slope is stable. However, due to intrinsic limitations of the calculation methods and the variability of the subsoil and groundwater conditions, a factor of safety greater than one is usually required to ascertain the risks of failure are acceptable. A minimum factor of safety of 1.5 is generally recommended for conditions where the failure of the slope would endanger permanent structures.

Subsoil conditions at the cross-sections were inferred based on the findings at nearby borehole locations and general knowledge of the area's geology.

The results for the existing slope conditions under static loading at Sections A, B and C are shown in Figures 1, 2 and 3, respectively, attached to the present letter. The overall slope stability factors of safety for the subject sections were found to be less than 1.5, except at Section C. The stable slope allowance from top of slope required for a slope with a minimum factor of safety of 1.5 is identified for each profile in the attached figures.

Seismic Loading Analysis

An analysis considering seismic loading was also completed. A horizontal seismic acceleration, K_h, of 0.16G was considered for the analyzed sections. A factor of safety of 1.1 is considered to be satisfactory for stability analyses including seismic loading.

The results of the analyses including seismic loading are shown in Figures 2, 4 and 6 for the slope sections. Where the minimum factor of safety is less than 1.1, the stable slope allowance from top of slope required for the slope section is identified in the attached figures.

3.0 Limit of Hazard Lands

The limit of hazard lands includes a stable slope allowance taken from top of slope. The limit of hazard lands also includes a toe erosion and a 6 m erosion access allowance. The various allowances and the overall limit of hazard lands for the subject site are indicated on Drawing PG1887-2 - Site plan attached to the present letter.

The toe erosion allowance for the slopes was based on the nature of the soils, the observed current erosional activities and the width and location of the current watercourse. Signs of erosion were noted in areas where the existing watercourse has meandered in close proximity to the toe of the corridor wall of the north neighbouring tributary watercourse. It is considered that a toe erosion allowance of 5 m is appropriate for the tributary watercourse.

Some erosional activities were noted along the toe of the subject valley corridor wall for the Rideau River. It is considered that a toe erosion allowance of 8 m is appropriate for the subject slope along the Rideau River.

Based on the location of the limit of hazard lands line within the subject site, a total of 5.14 acres of developable land is available from a geotechnical perspective within the subject site.

4.0 Recommendations

The existing vegetation on the slope face should not be removed as it contributes to the stability of the slope and reduces erosion. If the existing vegetation needs to be removed, it is recommended that 100 to 150 mm of topsoil mixed with a hardy seed or an erosional control blanket be placed across the exposed slope face.

5.0 Statement of Limitations

The information gathered for this report is based on a soils investigation, which is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test hole locations, we request that we be notified immediately in order to permit reassessment of our recommendations.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Mr. Scott Thomson or their agent(s) is not authorized without review by this firm for the applicability of our recommendations to the altered use of the report.

We trust that this letter satisfies your requirements.

Sincerely,

Paterson Group Inc.

Richard Groniger, C. Tech.

David J. Gilbert, P.Eng.

Attachments:

- ❏ Figures 1 to 6 - Slope Stability Analysis
- ❏ Soil and Profile Test Data sheets (JDPA)
- ❏ Drawing PG1887-2 - Site Plan

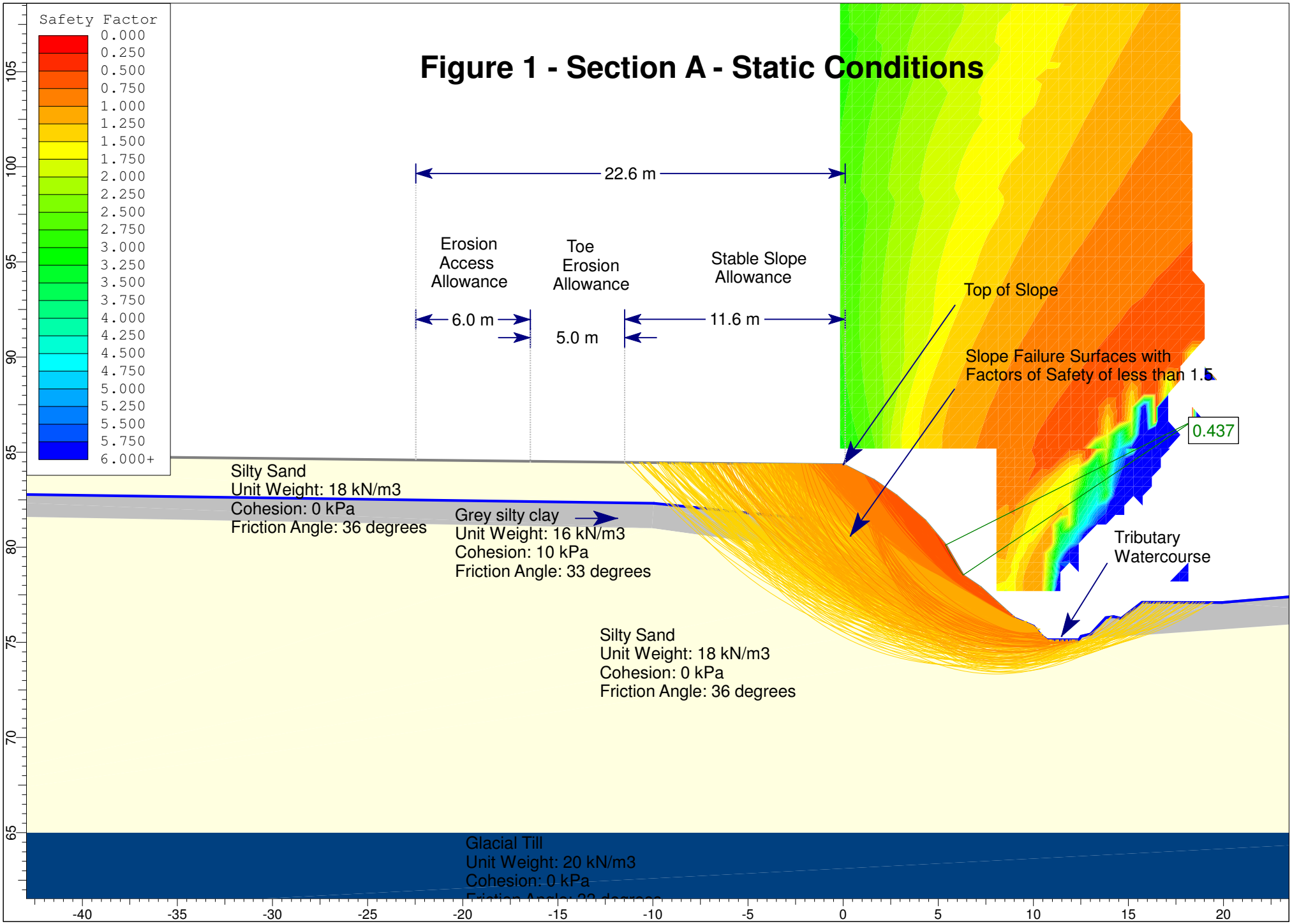
Figure 1 - Section A - Static Conditions
Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
22.6 m
Erosion Access Allowance
6.0 m
Toe Erosion Allowance
5.0 m
Stable Slope Allowance
11.6 m
Top of Slope
Slope Failure Surfaces with Factors of Safety of less than 1.5
0.437
Silty Sand
Unit Weight: 18 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Grey silty clay
Unit Weight: 16 kN/m3
Cohesion: 10 kPa
Friction Angle: 33 degrees
Tributary Watercourse
Silty Sand
Unit Weight: 18 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Glacial Till
Unit Weight: 20 kN/m3
Cohesion: 0 kPa
105
100
95
90
85
80
75
70
65
-40
-35
-30
-25
-20
-15
-10
-5
0
5
10
15
20

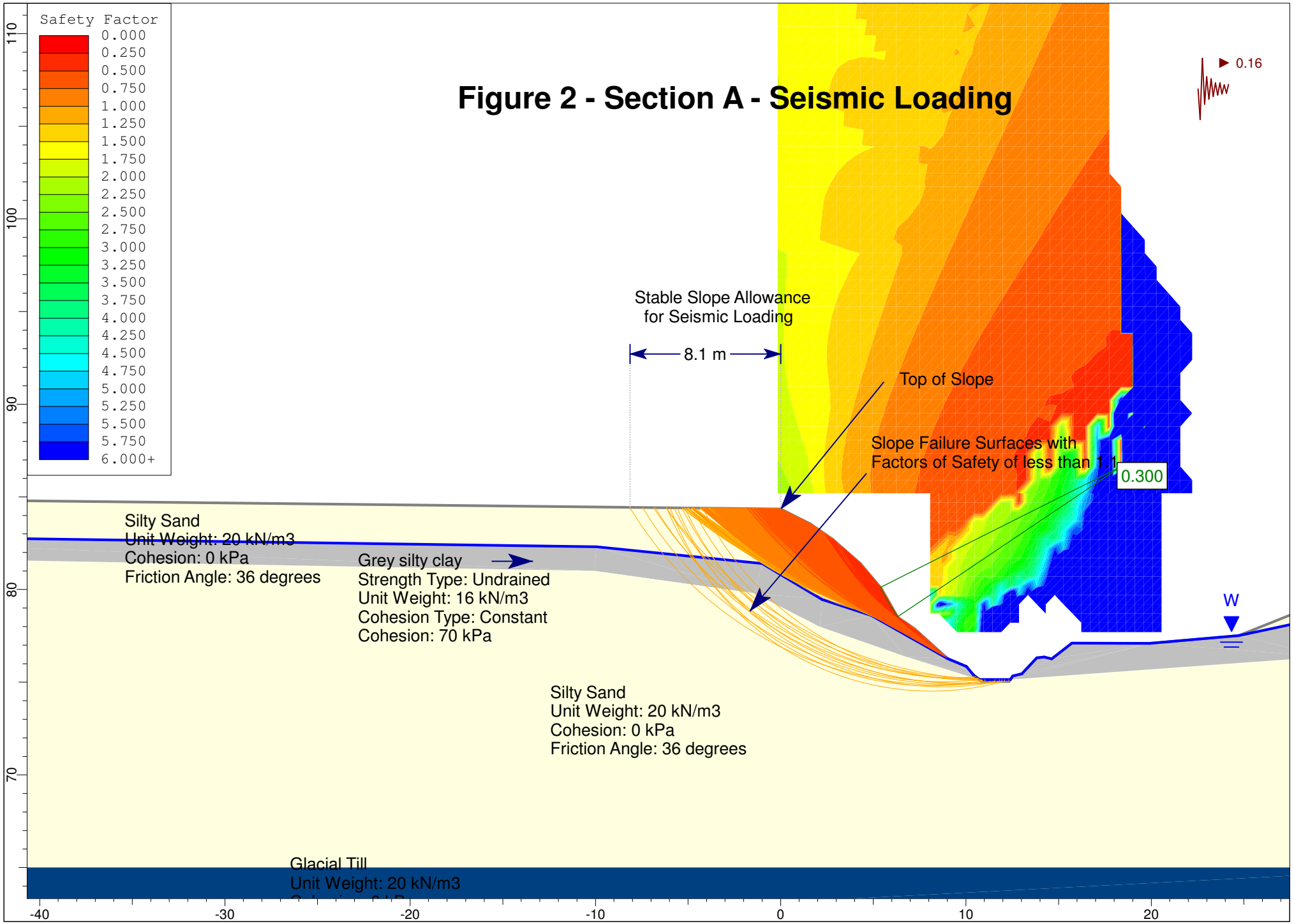
Figure 2 - Section A - Seismic Loading
Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
0.16
Stable Slope Allowance
for Seismic Loading
8.1 m
Top of Slope
Slope Failure Surfaces with
Factors of Safety of less than 1.1
0.300
W
Silty Sand
Unit Weight: 20 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Grey silty clay
Strength Type: Undrained
Unit Weight: 16 kN/m3
Cohesion Type: Constant
Cohesion: 70 kPa
Silty Sand
Unit Weight: 20 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Glacial Till
Unit Weight: 20 kN/m3
110
100
90
80
70
-40
-30
-20
-10
0
10
20

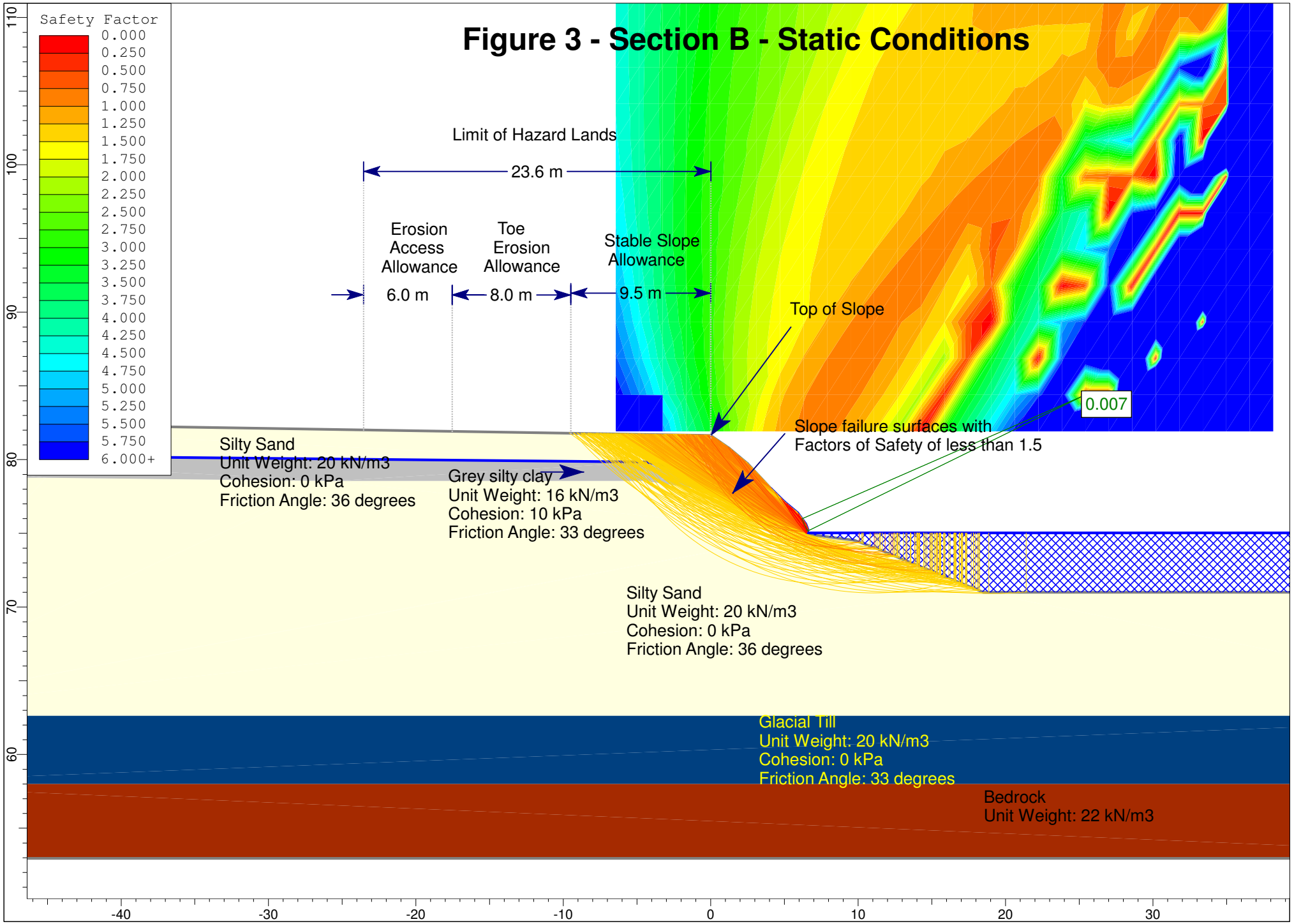
Figure 3 - Section B - Static Conditions
Safety Factor
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0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Limit of Hazard Lands
23.6 m
Erosion Access Allowance
6.0 m
Toe Erosion Allowance
8.0 m
Stable Slope Allowance
9.5 m
Top of Slope
0.007
Slope failure surfaces with Factors of Safety of less than 1.5
Silty Sand
Unit Weight: 20 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Grey silty clay
Unit Weight: 16 kN/m3
Cohesion: 10 kPa
Friction Angle: 33 degrees
Silty Sand
Unit Weight: 20 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Glacial Till
Unit Weight: 20 kN/m3
Cohesion: 0 kPa
Friction Angle: 33 degrees
Bedrock
Unit Weight: 22 kN/m3
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100
90
80
70
60
-40
-30
-20
-10
0
10
20
30

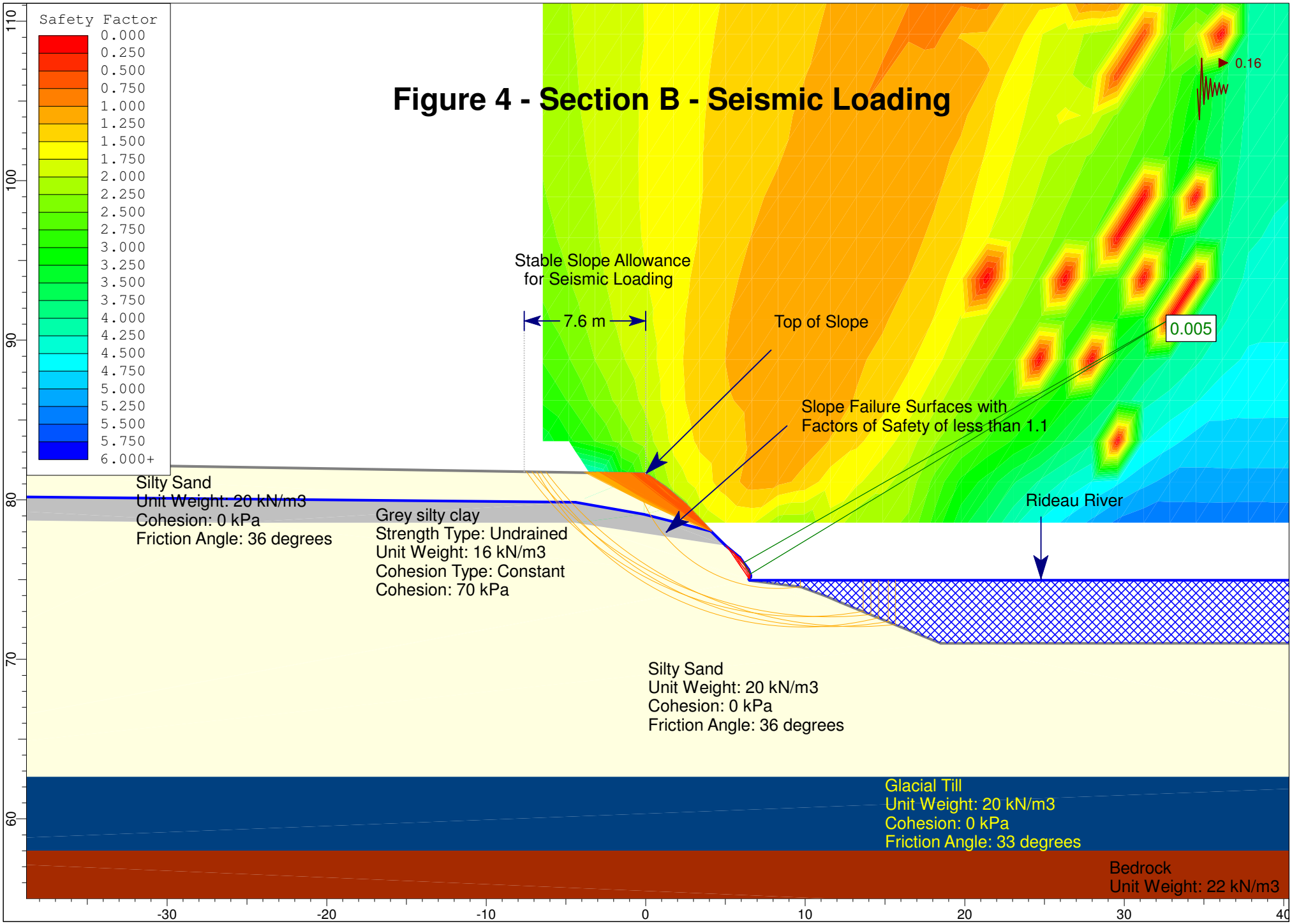


Figure 4 - Section B - Seismic Loading
Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
0.16
Stable Slope Allowance
for Seismic Loading
7.6 m
Top of Slope
0.005
Slope Failure Surfaces with
Factors of Safety of less than 1.1
Silty Sand
Unit Weight: 20 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Grey silty clay
Strength Type: Undrained
Unit Weight: 16 kN/m3
Cohesion Type: Constant
Cohesion: 70 kPa
Rideau River
Silty Sand
Unit Weight: 20 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Glacial Till
Unit Weight: 20 kN/m3
Cohesion: 0 kPa
Friction Angle: 33 degrees
Bedrock
Unit Weight: 22 kN/m3
110
100
90
80
70
60
-30
-20
-10
0
10
20
30
40

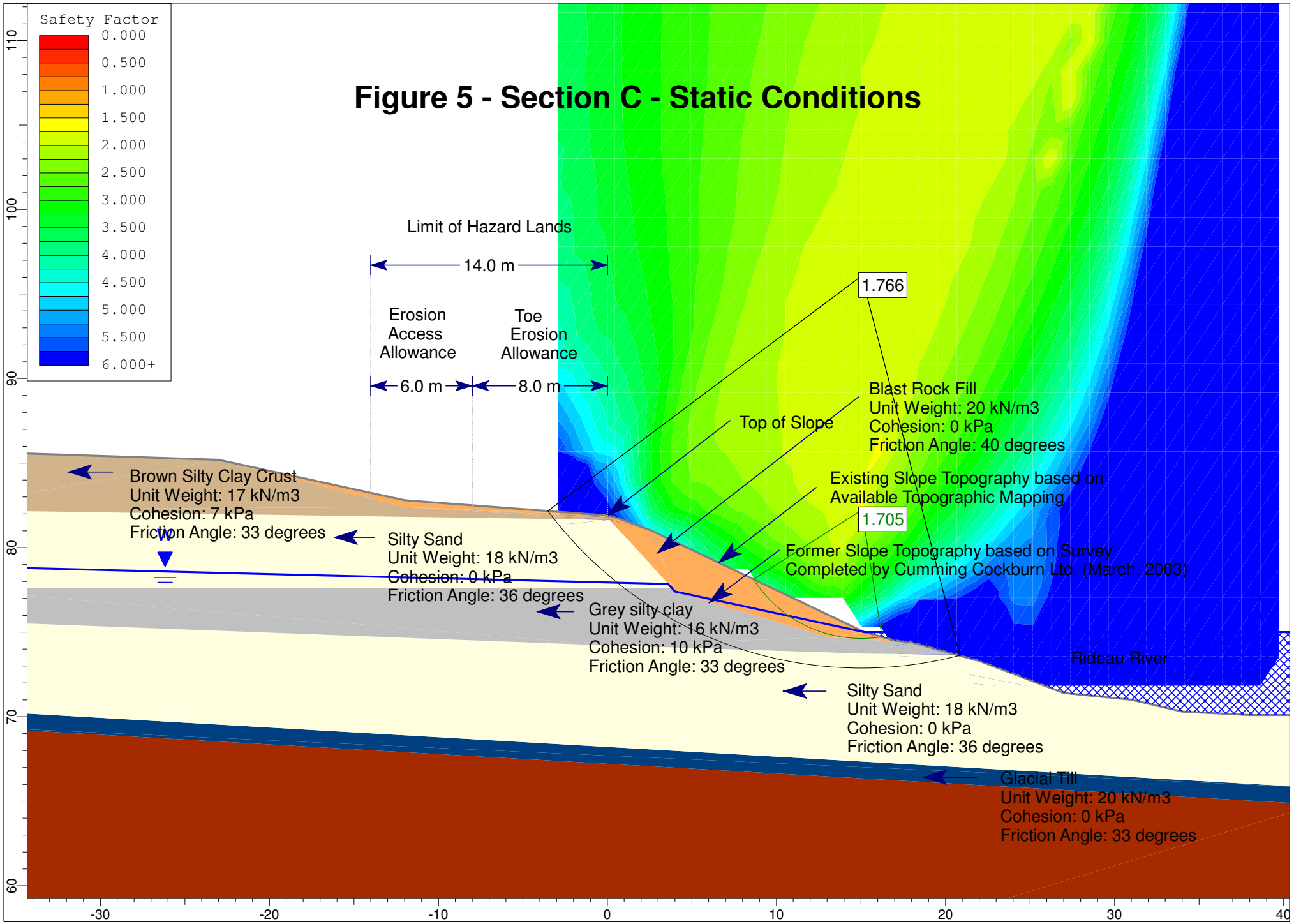
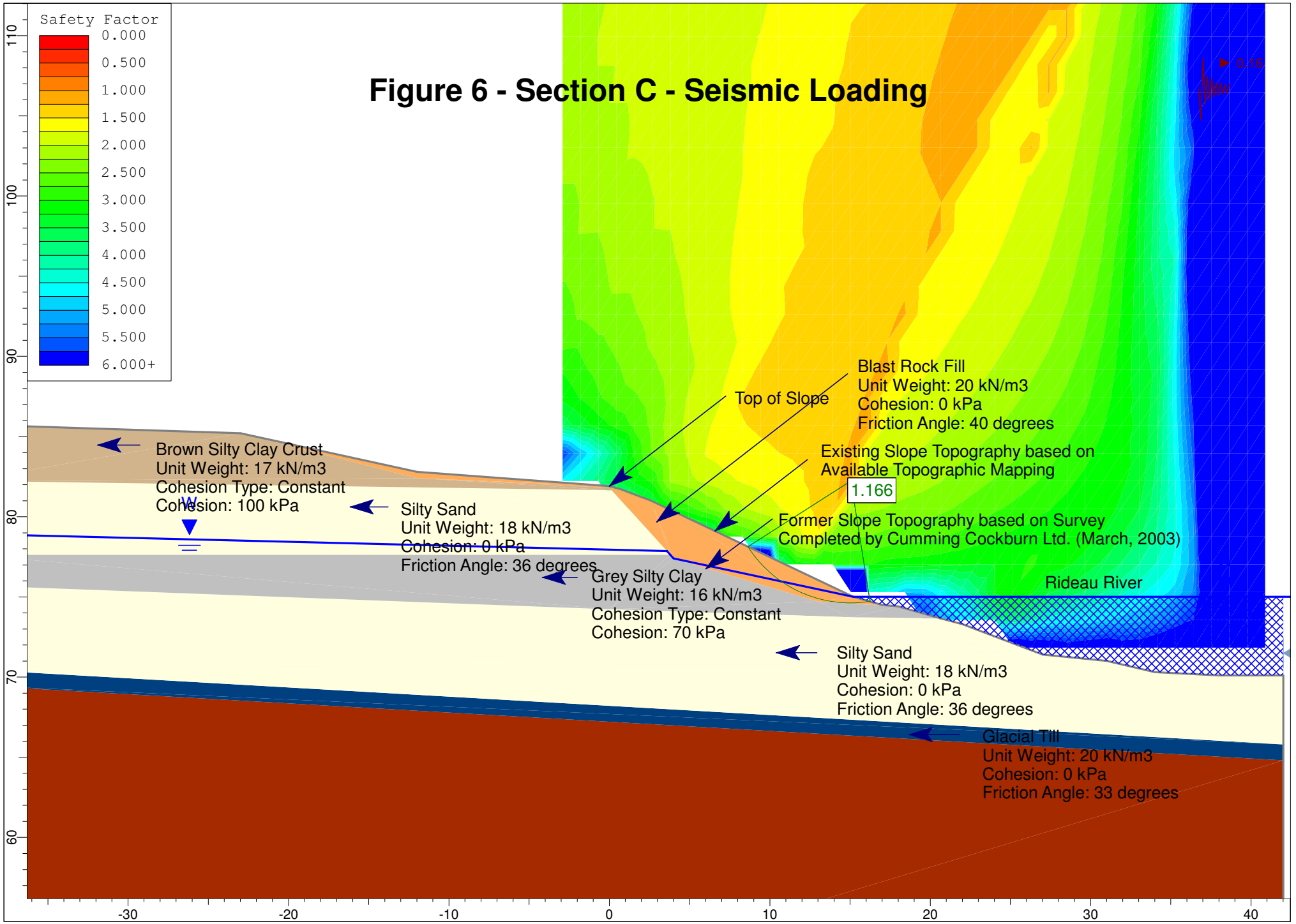


Figure 5 - Section C - Static Conditions
Safety Factor
0.000
0.500
1.000
1.500
2.000
2.500
3.000
3.500
4.000
4.500
5.000
5.500
6.000+
Limit of Hazard Lands
14.0 m
Erosion Access Allowance
6.0 m
Toe Erosion Allowance
8.0 m
1.766
1.705
Top of Slope
Blast Rock Fill
Unit Weight: 20 kN/m3
Cohesion: 0 kPa
Friction Angle: 40 degrees
Existing Slope Topography based on Available Topographic Mapping
Former Slope Topography based on Survey Completed by Cumming Cockburn Ltd. (March, 2003)
Brown Silty Clay Crust
Unit Weight: 17 kN/m3
Cohesion: 7 kPa
Friction Angle: 33 degrees
Silty Sand
Unit Weight: 18 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Grey silty clay
Unit Weight: 16 kN/m3
Cohesion: 10 kPa
Friction Angle: 33 degrees
Rideau River
Silty Sand
Unit Weight: 18 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Glacial Till
Unit Weight: 20 kN/m3
Cohesion: 0 kPa
Friction Angle: 33 degrees
110
100
90
80
70
60
-30
-20
-10
0
10
20
30
40


Safety Factor
0.000
0.500
1.000
1.500
2.000
2.500
3.000
3.500
4.000
4.500
5.000
5.500
6.000+
Figure 6 - Section C - Seismic Loading
Blast Rock Fill
Unit Weight: 20 kN/m3
Cohesion: 0 kPa
Friction Angle: 40 degrees
Top of Slope
Existing Slope Topography based on
Available Topographic Mapping
1.166
Former Slope Topography based on Survey
Completed by Cumming Cockburn Ltd. (March, 2003)
Brown Silty Clay Crust
Unit Weight: 17 kN/m3
Cohesion Type: Constant
Cohesion: 100 kPa
Silty Sand
Unit Weight: 18 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Grey Silty Clay
Unit Weight: 16 kN/m3
Cohesion Type: Constant
Cohesion: 70 kPa
Rideau River
Silty Sand
Unit Weight: 18 kN/m3
Cohesion: 0 kPa
Friction Angle: 36 degrees
Glacial Till
Unit Weight: 20 kN/m3
Cohesion: 0 kPa
Friction Angle: 33 degrees
110
100
90
80
70
60
-30
-20
-10
0
10
20
30
40

SOIL PROFILE AND TEST DATA

Proposed Residential Subdivision
South 1/2 Lot 26, Concession "A", R.F.
Nepean, Ontario

JOHN D. PATERSON & ASSOCIATES LTD.
Consulting Engineers & Geologists
Soil Investigations
Inspection & Testing Services
Damage Claims

Offices & Laboratory
1479 Laperriere Ave.
Ottawa, Canada K1Z 7S8
Telephone (613) 728-3505

SHEET NO. 1 OF 3
HOLE NO. BH 1
GROUND SURFACE 86.04 BOTTOM HOLE 73.84
BEDROCK _____ GROUNDWATER DRY

DESCRIPTION	LEGEND	SAMPLE TYPE	SAMPLE NUMBER	ELEV. / DEPTH
Ground Surface				86.04
250 mm TOPSOIL over a compact grey interbedded FINE SAND and SANDY SILT 0.8		G	1	0.00
		SS	2	0.80
Very stiff to stiff fissured olive grey SILTY CLAY with pinkish grey banding containing fine sand seams		TW	3	1.60
		TW	4	
		TW	5	2.40
3.6		TW	6	3.20
				82.04
Compact brown SILTY FINE SAND containing clayey silt seams approximately 5 mm thick		SS	7	4.00
		SS	8	
5.5		SS	9	4.80
Very dense grey SANDY SILT containing silty fine sand seams 6.7		SS	10	5.60
		SS	11	6.40
		SS	12	
		SS	13	7.20
				78.04
		SS	14	8.00
		SS	15	8.80
Dense pale grey FINE SAND with some hairlike black banding. Becoming coarser with depth.		SS	16	
		SS	17	9.60
		SS	18	10.40
		SS	19	11.20
				74.04
12.2		SS	20	12.00
Borehole terminated in sand				12.80

Θ WATER CONTENT %
10 20 30 40 50 60 70 80

UNIT WEIGHT kN/m³
■
5 10 15 20

SHEAR STRENGTH (kPa)
▲ UNDISTURBED
△ REMOULDED
20 40 60 80 100 120 140
(psf) 1000 2000 3000

STANDARD (N) PENETRATION TEST
PENETRATION RESISTANCE
20 40 60 80
BLOWS/0.3m.

WATER LEVEL

SOIL PROFILE AND TEST DATA

Proposed Residential Subdivision
South 1/2 Lot 26, Concession "A", R.F.
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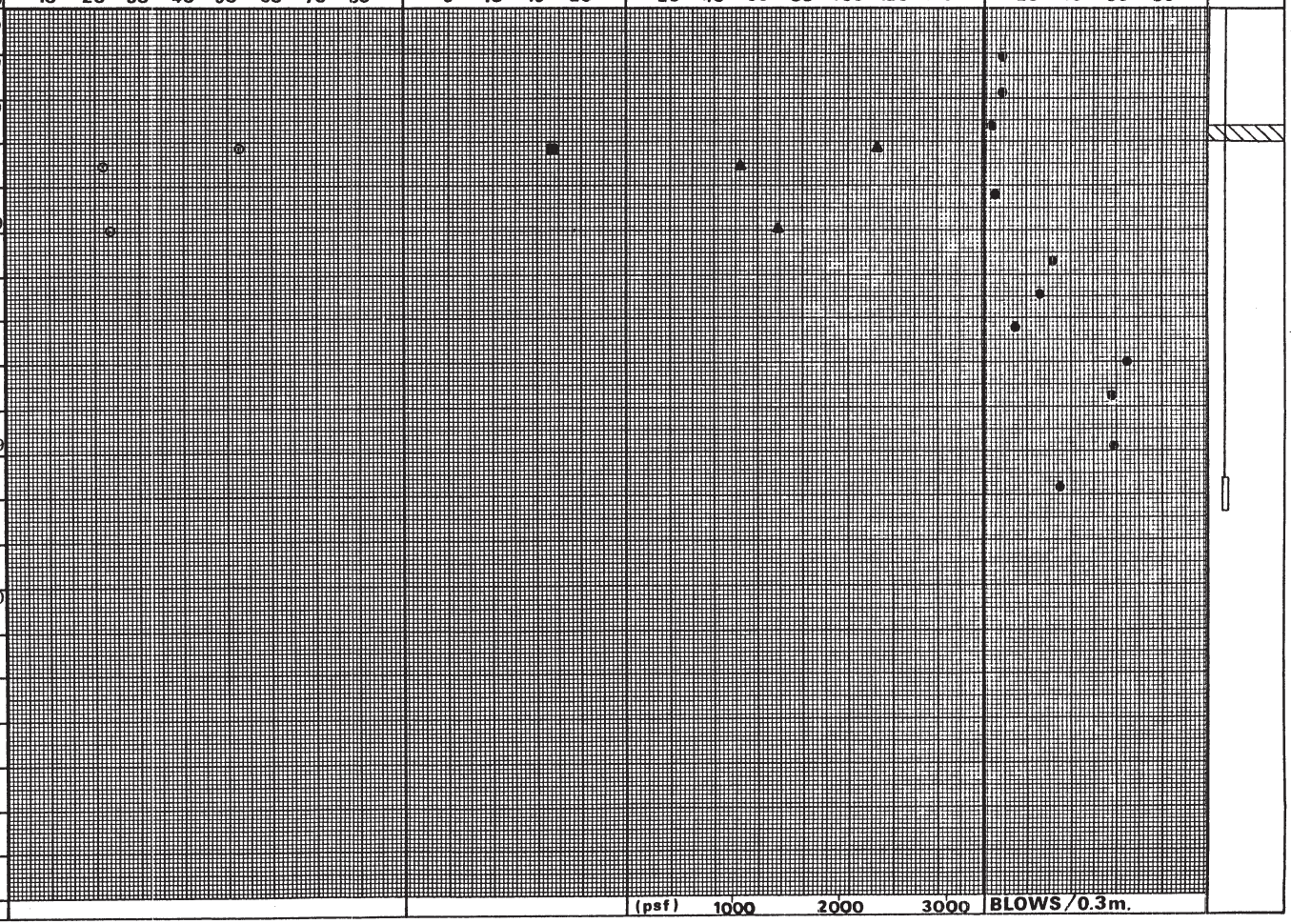
SHEET NO. 2 OF 3
HOLE NO. BH 2
GROUND SURFACE 80.59 BOTTOM HOLE 71.59
BEDROCK _____ GROUNDWATER DRY

DESCRIPTION	LEGEND	SAMPLE TYPE	SAMPLE NUMBER	ELEV. / DEPTH
Ground Surface				80.59
300 mm TOPSOIL over a loose brown SANDY SILT interbedded with layers of clayey silt and fine sand.		G	21	0.00
		SS	22	0.80
		SS	23	1.60
		SS	24	
2.2				
Stiff fissured olive grey SILTY CLAY		SS	25	2.40
2.9				
		SS	26	3.20
				76.59
Compact grey FINE SANDY SILT with a trace of clay		TW	27	4.00
		SS	28	
		SS	29	4.80
6.1		SS	30	5.60
		SS	31	6.40
		SS	32	7.20
Dense light brown to grey SILTY FINE SAND				72.59
		SS	33	8.00
		SS	34	
9.0				8.80
Borehole terminated in silty fine sand				9.60
				10.40



SOIL PROFILE AND TEST DATA

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Nepean, Ontario

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SHEET NO. 3 OF 3
HOLE NO. BH 3
GROUND SURFACE 85.53 BOTTOM HOLE 73.33
BEDROCK _____ GROUNDWATER DRY

DESCRIPTION	LEGEND	SAMPLE TYPE	SAMPLE NUMBER	ELEV. / DEPTH
Ground Surface				85.53
250 mm TOPSOIL over a loose brown SANDY SILT interbedded with clayey silt & sand		G	35	0.00
0.8		SS	36	0.80
Stiff olive grey fissured SILTY CLAY containing brown fine sand seams at 50 mm ± intervals		SS	37	1.60
		TW	38	2.40
		TW	39	
3.3		SS	40	3.20
		SS	41	81.53 4.00
Compact brown SILTY FINE SAND containing clayey silt seams		SS	42	4.80
		SS	43	5.60
		SS	44	
		SS	45	6.40
		TW	46	7.20
7.9		TW	47	77.53 8.00
Firm to stiff grey fissured SILTY CLAY with occasional fine sand lenses and containing fine sand seams		TW	48	8.80
		TW	49	
9.8		TW	50	9.60
STRATIFIED SILT: grey compact layers of silty sand, sandy silt and stiff silty clay		TW	51	10.40
		TW	52	11.20
		TW	53	73.53 12.00
12.2				
Borehole terminated in silt				

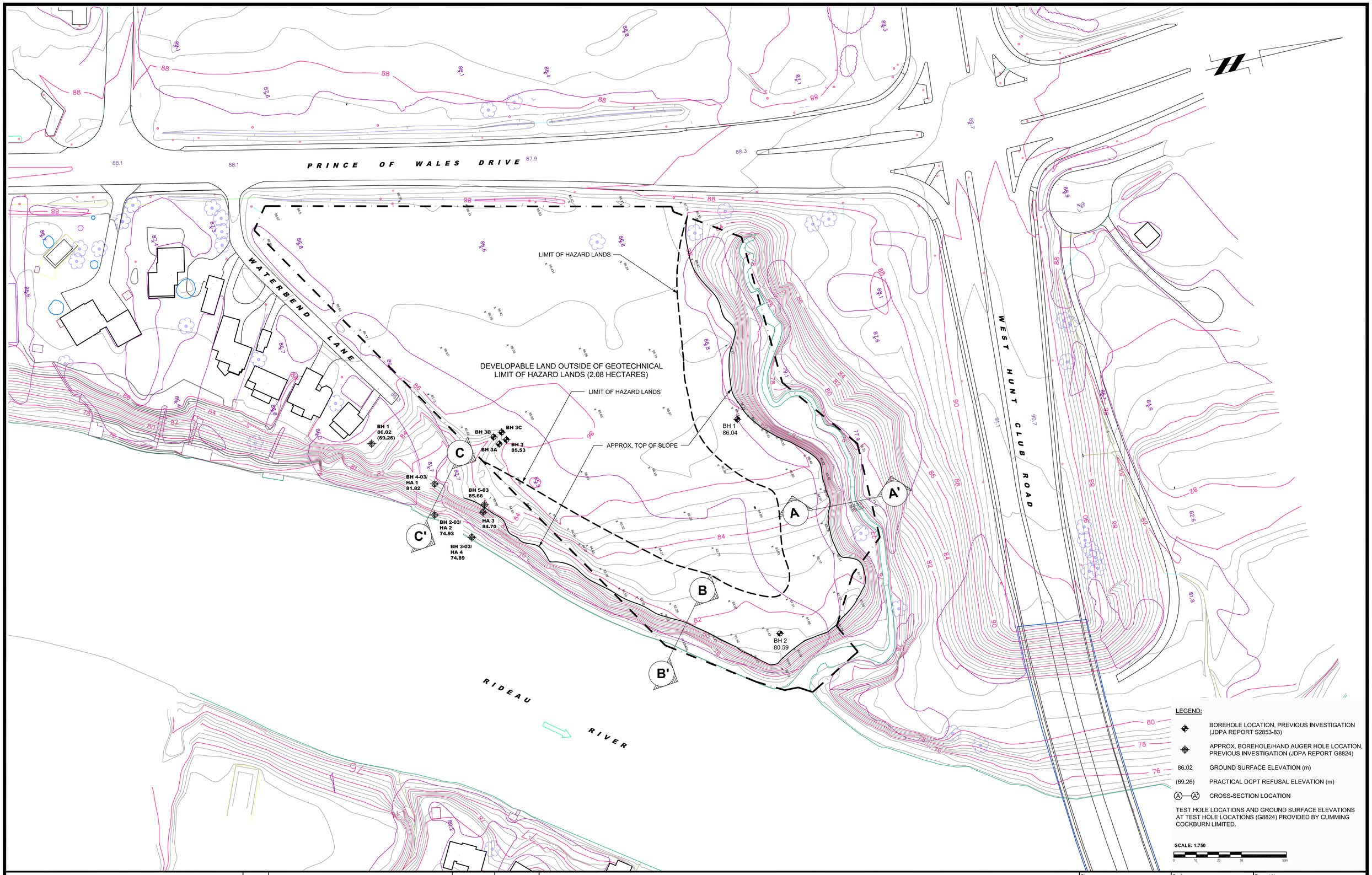
WATER CONTENT (%) — 10 20 30 40 50 60 70 80

UNIT WEIGHT (kN/m^3) ■ — 5 10 15 20

SHEAR STRENGTH (kPa) ▲ UNDISTURBED △ REMOULDED — 20 40 60 80 100 120 140 (psf) 1000 2000 3000

STANDARD (N) PENETRATION TEST o—o PENETRATION RESISTANCE — 20 40 60 80 BLOWS/0.3m.

WATER LEVEL



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consulting engineers

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Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
0			

MR. SCOTT THOMSON

SLOPE STABILITY ANALYSIS
2175 PRINCE OF WALES DRIVE
OTTAWA, ONTARIO

Title:

SITE PLAN

Stamp:

Scale:	1:750
Drawn by:	MPG
Checked by:	RG
Approved by:	DJG
Date:	01/2017
Report No.:	PG1887-2
Drawing No.:	PG1887-2
Revision No.:	0