September 2011

LETTER REPORT

BIOLOGICAL INVESTIGATION OF DEVELOPMENTAL SETBACK FOR ARCADIA LANDS DEVELOPMENT, FEEDMILL CREEK, KANATA, ONTARIO

Submitted to:
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REPORT

Report Number: 11-1126-0054

Distribution:

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Golder Associates

September 28, 2011 Project No. 11-1126-0054

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BIOLOGICAL INVESTIGATION OF DEVELOPMENTAL SETBACK FOR ARCADIA LANDS DEVELOPMENT, FEEDMILL CREEK, KANATA, ONTARIO

Dear Mr. McIntyre:

Introduction

Golder Associates Ltd. (Golder) was retained by Minto Commercial Properties Inc. to complete a biological investigation and determination of required setbacks along Feedmill Creek, within the Minto Arcadia Lands proposed development as requested. The 14.65 hectare property is located northeast of the intersection of Huntmar Drive and Highway 417. Feedmill Creek is located on the southern boundary of the site running approximately east-west and flows northeast towards the Carp River. A site reconnaissance was conducted on July 6th, 2011 to visually assess the features identified in the desktop review.

The minimum width of the riparian corridor necessary to support stream function of Feedmill creek is dependent on a number of different functions:

- Floodplain limits;
- Valley wall/erosion setbacks;
- Meander belt evolution allowances;
- Aquatic buffers;
- Terrestrial features and functions; and,
- Pathway requirements.

Geotechnical limits of hazard lands were determined by Paterson in August 2011 (Appendix A). These, in conjunction with the aquatic and terrestrial buffers summarized below, were used to determine the suggested overall minimum corridor width of Feedmill Creek within the Minto Arcadia lands. This report provides setback recommendations based upon an assessment of the Paterson report and Golder's biological findings.

Study Area

The Site is located at Part Lot 3, Con 1 City of Ottawa. It is situated on Huntmar Drive. The Site is approximately 14.65 hectares in size. The Site is west of the Carp River. The adjacent land uses include inactive agricultural lands and riparian forests along portions of Feedmill Creek (Figure 1).

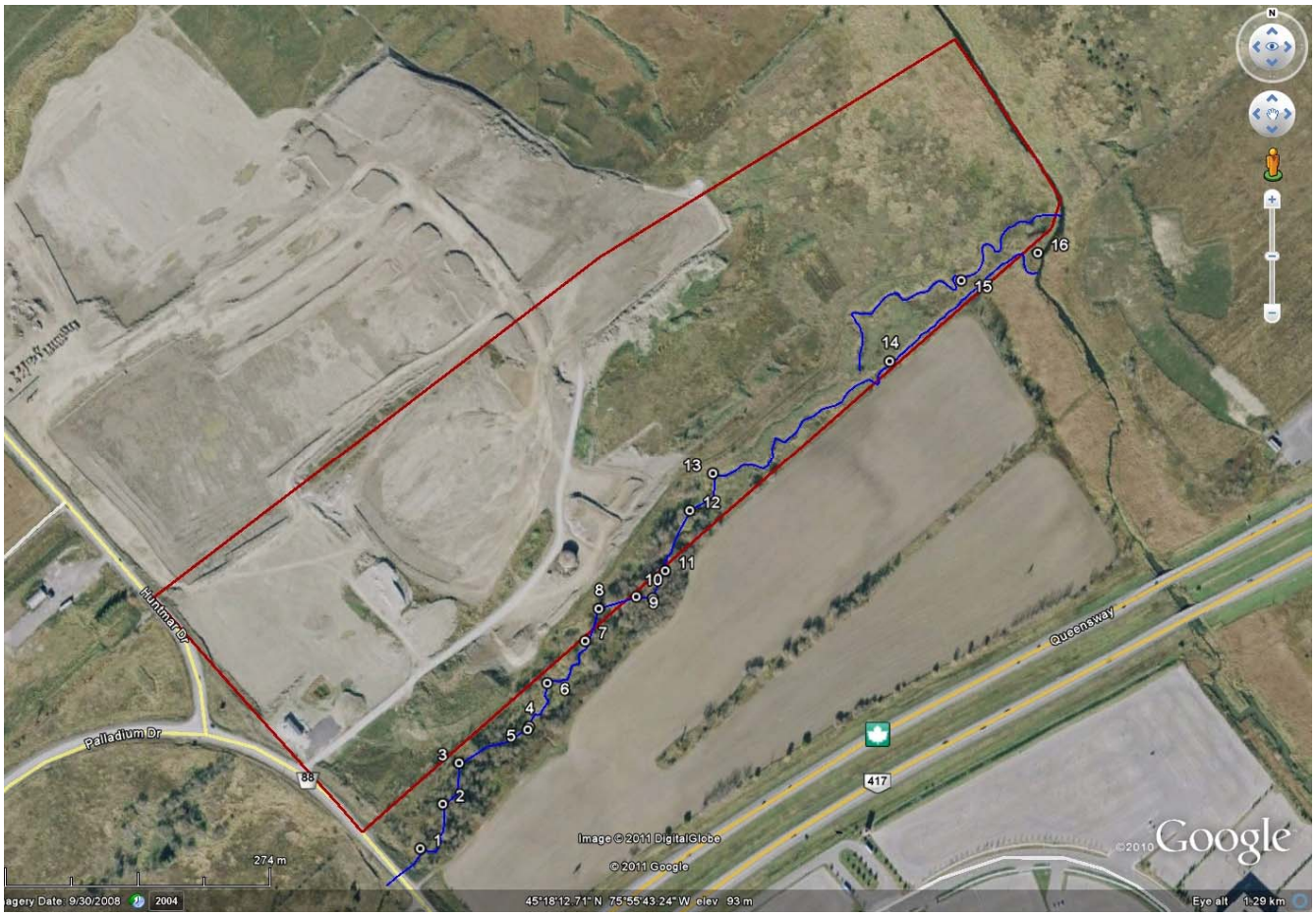

Figure 1: Waypoint Locations

Methods

In order to properly assess environmental constraints associated with Feedmill Creek and determine appropriate setbacks from a biological standpoint, an assessment of the natural heritage features and functions in the area that could be affected by the development proposal was undertaken for potential implications associated with the requirements of the following agencies:

- City of Ottawa;
- Mississippi Valley Conservation Authority; and,
- Province of Ontario.

The following sources were reviewed as part of the background data assessment:

- Natural Heritage Information Centre (NHIC), maintained by the MRN (NHIC 2011);
- Ontario Breeding Bird Atlas (OBBA) (Cadman, *et al*. 2007);
- Land Information Ontario (LIO 2010);
- Atlas of Mammals of Ontario (Dobbyn 1994);
- Ontario Herpetofaunal summary Atlas (Oldham 2000);
- Royal Ontario Museum SAR range mapping (ROM 2010); and,
- City of Ottawa Official Plan (OP) (2003).

A preliminary desktop screening of the potential Species at Risk (SAR) on the Site and was conducted using the data sources from the background assessment.

In addition, a site visit was conducted on July 6, 2011. A visual examination of the regulated features identified during the desktop review was conducted. During the visit, a broad assessment of channel characteristics and features was also conducted.

Finally, a thorough review of existing information on Feedmill Creek as a result of the ongoing Carp River Restoration project was conducted and summarized below.

Regulatory Framework

Provincial Policy Statement

The Provincial Policy Statement (PPS), issued under Section 3 of *The Planning Act*, came into effect on March 1, 2005. Planning authorities are required to make decisions that are consistent with policy statements issued under *The Planning Act*. The PPS includes policies on development and land use patterns, resources, and public health and safety. This report deals with Policy 2.1 directed at the protection and management of natural heritage resources. The eight types of natural heritage features to be considered in accordance with Policy 2.1 (MMAH 2005: Sections 2.1.3, 2.1.4 and 2.1.5) are:

- Significant habitat of endangered species and threatened species;
- Significant wetlands (PSWs);
- Significant coastal wetlands;
- Significant woodlands south and east of the Canadian Shield;
- Significant valleylands south and east of the Canadian Shield;
- Significant wildlife habitat;
- Significant Areas of Natural and Scientific Interest (ANSIs); and,
- Fish habitat.

Development and site alteration shall not be permitted in significant habitat of endangered and threatened species; significant wetlands in Ecoregions 5E, 6E and 7E; and significant coastal wetlands. Development and site alteration shall not be permitted in significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E

and 7E; significant woodlands south and east of the Canadian Shield; significant valleylands south and east of the Canadian Shield; significant wildlife habitat; and significant areas of natural and scientific interest, unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions. Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements. Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.3, 2.1.4 and 2.1.5 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions (MMAH 2005).

Species listed as endangered or threatened by the federal government (SARA 2010), even if not listed provincially, may be considered under the endangered and threatened species section of the PPS (MMAH 2005).

Endangered Species Act

Species at risk designations for species occurring in Ontario are initially determined by the Committee on the Status of Species at Risk in Ontario (COSSARO), and if approved by the provincial Minister of Natural Resources, species are added to the provincial *Endangered Species Act* (ESA) which came into force June 30, 2008 (Ontario 2007). The legislation prohibits the killing or harming of species identified as 'endangered' or 'threatened' in the various schedules to the Act. The ESA provides habitat protection to those species listed as endangered under the former *Endangered Species Act* (listed in Schedule 1 of the current legislation) and recently listed species (under separate regulations), but the ESA will not immediately provide general or species-specific habitat protection to endangered species and threatened species included in Schedules 3 and 4 of the ESA until regulations identifying species-specific habitat come into force, or the 5th anniversary of the date the ESA (30 June 2013), whichever comes first. However, endangered and threatened species listed on Schedules 3 and 4 of the ESA are afforded protection of significant habitat under the PPS.

Mississippi Valley Conservation Authority

The Mississippi Valley Conservation Authority (MVCA) regulates flood potential and natural heritage features in the Mississippi Valley watershed. The MVCA maintains wetland mapping in conjunction with the City of Ottawa and the MNR. It also assigns Natural Heritage and Natural Hazard related boundaries as defined under the PPS. MVCA also conducts Fisheries Act reviews under agreements with Fisheries and Oceans Canada (DFO). Development within regulated areas is governed by Regulation 153/006 *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses* (Ontario Legislative Assembly 2006). Regulation 153/006 was derived under the authority of Ontario Regulation 97/04 (Ontario Legislative Assembly 2004) and is specific to the MVCA.

Under Ontario Regulation 97/04 a regulation may:

a) Restrict and regulate the use of water in or from rivers, streams, inland lakes, ponds, wetlands and natural or artificially constructed depressions in rivers or streams;

b) Prohibit, regulate or require the permission of the authority to straighten, change, divert, or interfere in any way with the existing channel of a river, creek, stream or watercourse, or change or interfere in any way with a wetland; and,

c) Prohibit, regulate or require the permission of the authority for development if, in the opinion of the authority, the control of flooding, erosion, dynamic beaches of pollution or the conservation of land may be affected by the development.

Development is not necessarily restricted within the MVCA regulated area; however, it designates an area which triggers the need for a permit and in most cases an accompanying EIS.

The MVCA regulation limit mapping identified one regulated feature within the Site: Feedmill Creek. Feedmill Creek is regulated since it is a watercourse as explained in Section 3.2 (iii) of the MVCA Policy Document. As defined in the MVCA Policy Document Section 7.1(i), the regulation limit of steeps banks associated with watercourses is based on the erosion allowance, stable slope limit, and 15 metre allowance setback. For floodplain setbacks, the extent of the regulation limit is the 100 year flood level as outlined in the MVCA Policy Document Section 6.1.

Development within the 15 metre allowance setback of Feedmill Creek may be permitted through the MVCA providing the permit application provides clear indication that such development does not extend beyond the erosion access allowance and will not add to or create any erosion hazards at the point of development (Doug Meadows, per.comm, Sept 27, 2011; MNR 2001).

City of Ottawa Official Plan

The City of Ottawa Official Plan, officially adopted on May 2003, includes policies and sections written to protect natural heritage areas and features. The OP promotes, among other objectives, the maintenance of biodiversity and connectivity among features.

The Site and adjacent lands are subject to the following four designations under the City of Ottawa By-Law No. 2003-203 (City of Ottawa 2003);

- On Schedule ‘A’ the Site is designated as “Urban Area”;
- On Schedule ‘B’ the Site is designated as “Mixed Use Centre”. These areas are defined as areas that have been identified as strategic locations in the rapid transit network and lie adjacent to major roads;
- On Schedule ‘K’ the area of the site bordering Carp River is designated floodplain; and,
- On Schedule ‘K’ the area of the Site in proximity of the Carp River is designated as unstable slopes.

The Schedule K designations as specified in Section 4.7.3 of the OP requires a minimum setback of the greater of: the regulatory flood line, geotechnical limit of the hazard lands, 30 metres from the normal high water marks as determined in consultation with the MVCA, or 15 metres from existing top of bank where there is a defined bank. These requirements only apply if no specific Council-approved watershed, subwatershed, or environmental management plan exists.

No designations exist on the OP schedules that are specifically associated with Feedmill creek.

Additional Literature Review

There exist a number of studies and reports associated with the Kanata West development and subsequently Feedmill Creek and Carp River. A thorough review of the following documents was included in the desktop assessment in regards to stated setback requirements for Feedmill Creek:

- Carp River, Poole Creek, and Feedmill Creek Restoration Update and Amendment (Delcan 2010a);
- Carp River, Poole Creek and Feedmill Creek Restoration Class Environmental Assessment (TSH 2006);
- Carp River, Poole Creek and Feedmill Creek Corridor Width Limits Rationale (City of Ottawa 2006);

- Carp River Watershed/Subwatershed Study Volume I – Main Report (Robertson Consultants Inc. 2004); and,
- Implementation Plan Kanata West Development Area (Delcan 2010b).

Existing Conditions

Feedmill creek is part of the Carp River Restoration Plan. As such, a number of studies have been conducted that describe the creek community and associated vegetation within the area. Included below is a summary of the existing information and the observations of the area at the time of the site visit on July 6, 2011 (Attachment D - Photographs 1 to 13).

Vegetation

Literature Review

The 2006 *Carp River, Poole Creek, and Feedmill Creek Restoration Class Environmental Assessment* (EA) (TSH 2006) describes the terrestrial community within the 70m corridor of Feedmill Creek as dominated by open grass field and active agricultural lands. There are no PSW, ANSI or significant riparian valley lands. As well, through the EA, no species at risk were identified. The 800 metre stretch to Carp River is abandoned agricultural lands consisting of grasses, typical field weed species and mature trees along the active agricultural field fence line. The secondary channel to the north supports submerged aquatic vegetation (TSH 2006).

The narrow mature riparian deciduous forest that borders the creek 400 m from Huntmar Drive /Palladium Drive intersection is dominated by creek willow, white ash, and Manitoba maple. Also included are white cedar, yellow birch, sugar maple and red oak. There is a dense canopy from the creek edge to the top of bank on adjacent table lands. The secondary canopy exists as does a shrub layer. The ground cover is well developed and consists of ferns, herbs, grasses and sedges (TSH 2006, Robinson Consultants Inc. 2004).

Current Conditions

A brief classification during the site visit and analysis of the available background data were conducted to identify vegetation communities on the Site. As suggested by the literature reviewed, the site visit on July 6th, 2011 confirms the existence of two distinct vegetation types along Feedmill Creek within the Site boundary.

The eastern most 400 metre of the creek (Figure 1: waypoints 1 through 12) is dominated by fallow fields consisting of golden rod, milk weed, and tall grasses (reed canary grass dominating).

The western 400 metre portion of Feedmill Creek (Figure 1: waypoints 13 through 16) is dominated by dense riparian cover including large willow trees, small sugar maples and other deciduous trees. The understory in this section is dominated by wild grape vine, wild raspberry, ferns species, sedges, and other shrubs. Where Feedmill Creek branches into two channels, the open water portions of the northern channel consist of arrowroot, pickerel weed, and cattails.

The remaining Site area, north of Feedmill Creek, consists of highly disturbed sections that are devoid of vegetation to the northwest as well as open fallow fields to the northeast. There is one building on site at the northwest corner with a manicured lawn and gravel parking lot.

Watercourse

Feedmill Creek runs along the southern boundary of the Site. It enters the site through a culvert under Palladium Drive and flows northeast to discharge into the Carp River at the very eastern boundary of the Site. It has a dynamic meander pattern with varied channel cross sections that supplies significant base flow to the

Carp River (TSH 2006). At the mouth of the Carp River, there are 2 channels. One is the original channel that is no longer connected to Feedmill Creek; the other is the straightened channel of Feedmill Creek.

Literature Review

During the 2006 EA study, Feedmill Creek exhibited bank widths between 1.5 metres and 6 metres with bank full depth of 0.22 metres to 0.69 metres. It experienced a sedimentation rate of 0.06 metres/yr. The creek substrate is predominantly muck with sand and silt. In the lower reaches the bottom substrate is muck over clay. Portions of the creek have gravel based riffles as minor features (TSH 2006).

Current Conditions

The creek bottom consists mainly of clay and fine silts/sand. The clarity of the stream was moderate exhibiting some turbidity. Along the majority of its route through the site it is a single channel. Within approximately 200 metres from Carp River, a second channel develops. The main channel along this stretch is predominantly straight while the secondary channel has maintained a sinuous path. This secondary channel originates from the base of a willow tree within the fallow field.

For 200 metres from Palladium Drive (waypoints 1 through 5), Feedmill Creek runs through a channel approximately 50 metres wide. The channel is scattered with large dead trees. The banks are steep and rocky. The water temperature within this stretch is 19 degrees Celsius and the depth is over 1 metre (Table 1).

Table 1: Creek characteristics observed during site visit on July 6, 2011

Waypoint	Water Temperature (Celcius)	Air Temperature (Celcius)	Time	Approximate Channel Width (metres)	Approximate Channel Depth (metres)
WP 2	19	23	10:15	50	2
WP 5	18	23	11:01	2-3	1.5
WP 7	18	23	11:11	3	1.5
WP 10	18	24	11:22	3-4	0.5
WP 14	18	24	11:41	1.5	0.5

Many beaver dams slow the flow along a 200 metre stretch beginning approximately 200 metres downstream from the Palladium Drive culvert (waypoints 5 through 12). The average channel width within this section is approximately 3-5 metres with the width being determined heavily by the flow as dictated by the beaver dams. The depth varies greatly with the width. The beaver dam closest to the Palladium Drive culvert is approximately two metres tall and reduces the flow to such an extent that the majority of the flow takes a path to the west of the dam. This channel has high velocity and is approximately 0.5 metres in width. The water temperature within this section was 18 degrees Celsius.

The average channel width of Feedmill Creek in the 400 m stretch immediately upstream of the Carp River (waypoints 13 through 16) in the open fallow field area is approximately 1-2 metres. The depth of the creek along this section is approximately 1 metre or less. The water temperature along this section was 18 degrees Celsius.

Wildlife

Literature Review

The EA of 2006 states that Feedmill creek supports a coldwater fish community and a diverse warmwater fishery. The tolerant warmwater fish community includes long nose dace, rock bass and rainbow darter. The cool/cold water fish community consists of *Salma trutra Linaeus* (brown trout), *Cottidus* sp. (sculpin), and *Hypentelium nigricans* (hogsucker) (TSH 2006, Robinson Consultants Inc. 2004). In the Kanata West Implementation Plan, the classification of Feedmill Creek as a cool water fishery was made (Delcan. 2010b). No pike have been observed since 1993 and no snapping turtles were found in 2005 (TSH 2006). The benthic community is of fair condition in the section of Feedmill Creek within the Site boundaries (TSH 2006, Robinson Consultants Inc. 2004). The secondary channel to the north supports frogs and cyprinids (TSH 2006). Based on the Subwatershed Report (Robinson Consultants Inc. 2004), Feedmill Creek is classified as a Type I/Type II watercourse.

The forest community consists of common forest edge birds while in the open fields, common grassland birds breed. During the EA study, skunk, raccoon, fox, coyote and white-tailed deer were observed.

Current Conditions

Although taxa specific surveys were not conducted during the site reconnaissance on July 6, 2011, a few common species were observed incidentally. This included various common birds such as American robin, blue jay and great blue heron. Deer trails exist throughout the Site. There was also clear evidence of beaver presence. No species at risk, rare, or uncommon species were observed. During the site reconnaissance, no fish were observed in the creek through visual inspection.

Species at Risk

In this desktop study, Species at Risk (SAR) are defined as those species listed under the Ontario Endangered Species Act, or the Federal Species at Risk Act. This includes those species listed as Endangered, Threatened, or Special Concern. Depending upon the classification of the listing as well as which Act a given species is protected under, differing levels of protection may be afforded to individual species and their habitats (TRH 2006).

Literature Review

During the 2006 EA studies, species specific surveys were conducted for butternut, stinkpot, Blanding's turtle, and least bittern. No SAR were observed or had been observed in the Feedmill Creek 70 metre corridor up to that point. The biologists also observed the potential for monarch, milksnake and red-shouldered hawk based on the habitat requirements of these species though none were observed.

Current Conditions

A review of available sources was made to determine a list of potential Species at Risk (SAR) that may be found within the Site. This data included recent and historical records, as well as species range maps for Ontario. A total of 32 SAR were identified as having potential to exist in the Site (Appendix A, Table 1).

The site reconnaissance was used to assess the general habitat potential of the Site. A likelihood of occurrence for SAR was made based upon this assessment, after comparing species habitat requirements to actual habitat conditions observed on the Site (Appendix A, Table 1). Two species were ranked with a moderate likelihood of occurrence based on the desktop and site reconnaissance. Sixteen species were ranked with a low likelihood of occurrence.

No SAR were observed during the site visit. No species specific setbacks for Feedmill Creek are recommended.

Table 2: Identified Species at Risk

Taxon	Common name	Scientific Name	SARA	ESA	Habitat Potential On Site
Amphibian	Western chorus frog	*Pseudacris triseriata*	Threatened	Not Listed	Low
Arthropod	Monarch	*Danaus plexippus*	Special Concern	Special Concern	Moderate
Arthropod	Rapids clubtail	*Gomphus quadricolor*	Endangered	Endangered	Low
Bird	Bobolink	*Dolichonyx orizivorus*	Not Listed	Threatened	Low
Bird	Common nighthawk	*Chordeiles minor*	Threatened	Special Concern	Low
Bird	Golden-winged warbler	*Vermivora chrysoptera*	Threatened	Special Concern	Low
Bird	Olive-sided flycatcher	*Contopus cooperi*	Threatened	Special Concern	Low
Bird	Rusty blackbird	*Euphagus carolinus*	Special Concern	Not Listed	Low
Bird	Short-eared owl	*Asio flammeus*	Not Listed	Special Concern	Low
Bird	Red-headed woodpecker	*Melanerpes erythrocephalus*	Threatened	Special Concern	Low
Lichen	Flooded jellyskin	*Leptogium rivulare*	Threatened	Threatened	Low
Reptile	Blanding's turtle	*Emydoidea blandingii*	Threatened	Threatened	Low
Reptile	Eastern ribbonsnake	*Thamnophis sauritius*	Special Concern	Special Concern	Moderate
Reptile	Northern map turtle	*Graptemys geographica*	Special Concern	Special Concern	Low
Reptile	Milksnake	*Lampropeltis triangulum*	Special Concern	Special Concern	Low
Plant	American ginseng	*Panax quinquefolius*	Endangered	Endangered	Low
Plant	Butternut	*Juglans cinerea*	Endangered	Endangered	Low
Plant	Eastern prairie fringed-orchid	*Platanthera leucophaea*	Endangered	Endangered	Low

Corridor Limits

Historic Corridor Limits

Due to the history of the restoration projects in the area, the corridor setbacks for Feedmill Creek have been recommended previously. The 2006 EA and 2004 Watershed study recommended a 70 metre corridor setback based on a 40-80 metre meander belt calculation. The Kanata West Implementation Plan, Appendix B provided rationale for a 100 metre wide corridor based on meander belt allowance and 30 metre setback within the reach of Feedmill Creek within the grassy fields. For the section of the creek exhibiting riparian cover, a 70-80 metre corridor was defined based on the meander belt width plus pathway requirements.

Current Corridor Limit Determination

Since previous corridor limits were completed some years back, up-to-date corridor limits based on existing conditions are needed to finalize the Minto Arcadia Design plans for the blocks 368, 371 and 374. To assist in the determination of corridor limits, pictorial representation of the creek at each waypoint as observed during the site visit on July 6th, 2011 was completed (Appendix B). The measurements in these images are estimates only. An official survey must be completed to confirm these widths in order to properly incorporate the requirements in the final design drawings.

Figure 2 summarizes the Feedmill Creek setback recommendations. Based on the current biological conditions of the creek in both reaches and hazard land determination provided by Paterson, it is recommended that a 30 metre set back from the normal high water mark on either side of the watercourse for the 400 metre riparian fringed section be established (waypoints 1 through 12). This setback will ensure protection and continued functioning of the riparian vegetation as well as conform to the 30 metre setbacks necessary to support the target of a Type I fish community per the Carp River Watershed/Stubwatershed Study (Robinson Consultants Inc. 2004). A setback of 30 metres also conforms to the Schedule K requirements of the City of Ottawa Official Plan. From waypoint 13 to approximately 30 metres west of the secondary channel of Feedmill creek the greatest setback limit is that of the existing floodplain line scaled from flood plain maps and it is suggested that this be the minimum corridor limit. From this point forward, it is recommended that a corridor limit of 30 metres from the secondary channel of Feedmill Creek be maintained. This will ensure the natural dynamic behaviour of the creek is maintained and compiles with the recommendation that this secondary channel be preserved (TSH 2006). This will also allow for the prescribed riparian planting that is to cover 75% of the corridor lands (Robinson Consultants Inc. 2004).

These setbacks are based on the watercourse as it exists currently. However, ongoing beaver activity, in addition to the ultimate permitted development activities along Feedmill Creek may alter the watercourse width, depth and water quality (temperature) and as such the active corridor width may vary in response.

Closure

We trust that this report meets your current needs. If you have any questions, or if we may be of further assistance, please do not hesitate to contact the undersigned.

Yours truly,

GOLDER ASSOCIATES LTD.

Jen Mathia (M.M.M, B.Sc. (Hons))
Project Manager

Kevin Trimble (M.Sc.)
Senior Biologist and Principal

JM/KT/JM/KT/kf/hw
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cc: Natalie Hughes, Fotenn Senior Planner

Attachments: Attachment A: Paterson Geotechnical Report
Attachment B: Species at Risk Screening Summary
Attachment C: Field Drawings of Channel Characteristics at Waypoints
Attachment D: Site Photographs

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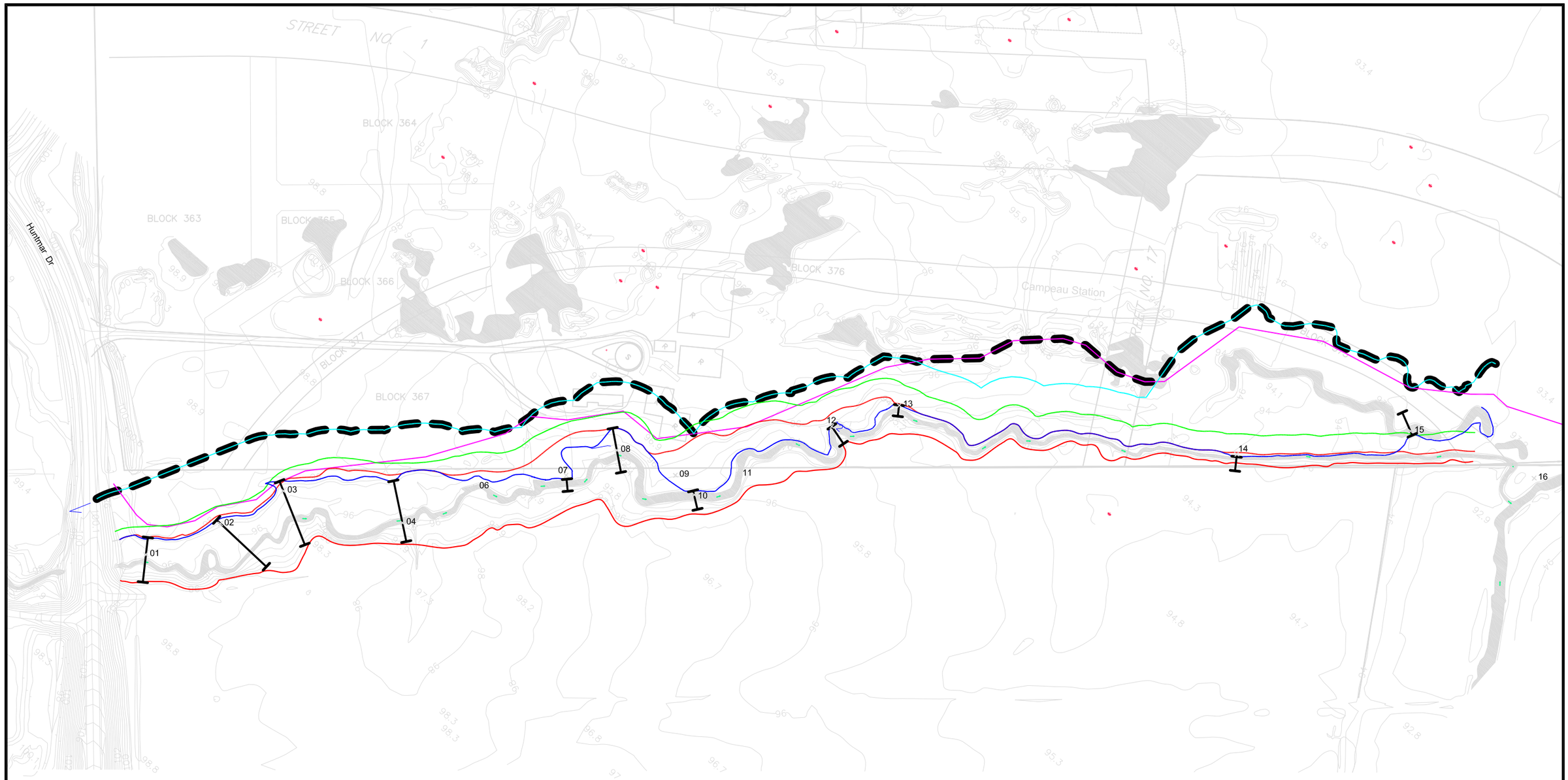

REFERENCE

AUTOCAD PLAN PROVIDED BY PATERSON GROUP, CONSULTING ENGINEERS

NOTE

AUTOCAD PLAN REFERENCED TO UTM NAD 83, ZONE 18

LEGEND

- ESTIMATE LIMIT OF NORMAL HIGH WATER MARK AT WAYPOINTS
- PATERSON LIMIT OF HAZARD LANDS
- PATERSON TOP OF SLOPE
- 30 METRE SETBACK
- GOLDER APPROXIMATE NORMAL HIGH WATER MARK
- FLOOD PLAIN SCALED FROM FLOOD PLAIN MAPS
- RECOMMENDED FINAL SETBACK

Golder Associates
Ottawa, Ontario, Canada

FILE No.	11-1126-0054-02.dwg
PROJECT No.	11-1126-0054
REV.	
SCALE	1:2500
DATE	02 SEP. 2011
DESIGN	J.M.
CAD	P.G.
CHECK	J.M.
REVIEW	K.T.

TITLE

SITE PLAN

FEEDMILL CREEK SETBACKS
ARCADIA LANDS - KANATA WEST

FIGURE 2

PLOT DATE: September 6, 2011
FILENAME: N:\Active\2011\1126 - Environmental and Cultural Sciences\11-1126-0054 Bio Investigation Minto-Arcadia Lands\GIS\DATA\ACAD\11-1126-0054-02.dwg

ATTACHMENT A

Paterson Geotechnical Report

September 2011
Report No. 11-1126-0054

patersongroup Consulting Engineers

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Materials Testing
Building Science

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August 30, 2011
File: PG2472-LET.01

Minto Commercial Properties
200-180 Kent Street
Ottawa, Ontario
K1P 0B6

Attention: **Mr. John McIntyre**

Subject: **Geotechnical Limit of Hazard Lands**
Arcadia Lands - Kanata West
Huntmar Drive - Ottawa

Dear Sir,

Upon your request, Paterson Group (Paterson) has completed our slope stability analysis to determine the limit of hazard lands designation line for the aforementioned site. The present letter summarizes our findings and presents our limit of hazard lands recommendations.

1.0 Background Information

A site visit was conducted on August 12, 2011 by Paterson personnel to assess the existing slope conditions. The subject section of Feedmill Creek is located with a 4 to 45 m wide valley corridor with a 1.5 to 3 m high valley wall. The valley corridor is less defined within the east portion of the site, where the walls are close to 2 m or less. It was noted that the majority of the slope face was densely covered with mature trees, saplings, bushes and grass along the southwest portion. An area of bouldery fill was noted along the north bank at approximately 80 to 100 m northeast of Huntmar Drive. Also, a beaver dam was noted within the watercourse approximately 180 m northeast of Huntmar Drive. The northeast section of the valley corridor is mainly grass covered along top of slope with bushes and trees sparsely populated along the bank face. Tree and plant roots were noted to be protruding from the exposed bank face along the majority of the watercourse. Some sloughing and minor undercutting along the lower portion of the bank face was noted where the watercourse had meandering in close contact with the valley wall.

Five (5) slope profiles were completed for the subject site by Paterson personnel.

Boreholes completed as part of a previous geotechnical investigation indicate the subsurface profile in the area of the subject slope consists of a topsoil/fill material overlying brown silty clay crust followed by a grey silty clay layer. It was noted that the brown silty clay crust reduces in thickness towards Carp River.

2.0 Slope Stability Analysis

A slope stability analysis was completed by Paterson for the subject slope. Five (5) slope sections were studied based on information obtained by Paterson field personnel and topographical mapping from the City of Ottawa.

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 favouring 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. Under seismic loading, a minimum factor of safety of 1.1 is considered to be satisfactory.

The sections were analyzed taking into account a groundwater level at ground surface. Subsoil conditions at the cross-sections were inferred based on the findings at nearby borehole locations and general knowledge of the area's geology.

Static Conditions Analysis

The results for the existing slope conditions at Sections A to E are shown in Figures 2, 4, 6, 8 and 10, respectively, and are attached to the present letter. The results of the slope stability analysis indicate that all sections, except Section E are considered stable from a geotechnical perspective. Therefore, Section E requires a 2.9 m stable slope allowance. The stable slope allowance is included in the limit of hazard lands setback line.

Seismic Loading Analysis

An analysis considering seismic loading was also completed. A horizontal seismic acceleration, K_h, of 0.21G was considered for the analyzed sections. A factor of safety of 1.1 is considered to be satisfactory for stability analysis including seismic loading.

The results of the analysis including seismic loading are shown in Figures 3, 5, 7, 9 and 11 for the slope sections. The overall slope stability factors of safety for the subject sections when considering a seismic loading were found to be greater than 1.1. Based on these results, the slopes are considered to be stable under seismic loading.

Limit of Hazard Lands

Typically, the limit of hazard lands includes a 6 m erosion access allowance. Also, the limit of hazard lands includes a toe erosion allowance, where applicable. It should be noted that based on our analysis results, the majority of the slope is considered stable. The limit of hazard lands designation line for the subject site is indicated on Drawings PG2472-1 to 4 - Site Plan attached to this letter report.

The toe erosion allowance for the valley corridor wall slopes was based on the cohesive nature of the soils, the observed current erosional activities and the width and location of the current watercourse. Signs of erosion were noted along the existing watercourse, especially where the watercourse has meandered in close proximity to the toe of the corridor wall. It is considered that a toe erosion allowance of 6 m is appropriate for the corridor walls confining the existing watercourse. The toe erosion allowance should be applied from the top of stable slope, where the watercourse has meandered to within 10 m of the slope toe. The toe erosion allowance should be taken from the bank full water's edge in areas, where the watercourse is greater than 10 m from the toe of the existing slope. The toe erosion allowance should be applied from the top of stable slope.

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 a 100 to 150 mm of topsoil mixed with a hardy seed or an erosional control blanket be placed across the exposed slope face.

It should also be noted that a meander belt allowance was not considered in our analysis. Meander belt allowances normally only apply to unconfined water systems and terrain-dependent water systems consisting of cohesionless materials, such as sands.

3.0 Statement of Limitations

The recommendations made in this report are in accordance with our present understanding of the project. Should any conditions at the site be encountered which differ from those at the test 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 Minto Commercial Properties or their agents, without review by this firm for the applicability of our recommendations to the altered use of the report.

We trust that this information satisfies your requirements.

Best Regards,

Paterson Group Inc.

Michael Killam, B.Eng.

David J. Gilbert, P.Eng.

Attachments

- ❑ Figure 1 - Key Plan
- ❑ Figures 2 to 11 - Sections for Slope Stability Analysis
- ❑ Drawings PG2472-1 to PG2472-5 - Site Plan
- ❑ Borehole Logs
- ❑ Drawing PG0538-4 - Test Hole Location Plan
- ❑

Report Distribution

- ❑ Minto Commercial Properties (3 copies)
- ❑ Paterson Group (1 copy)

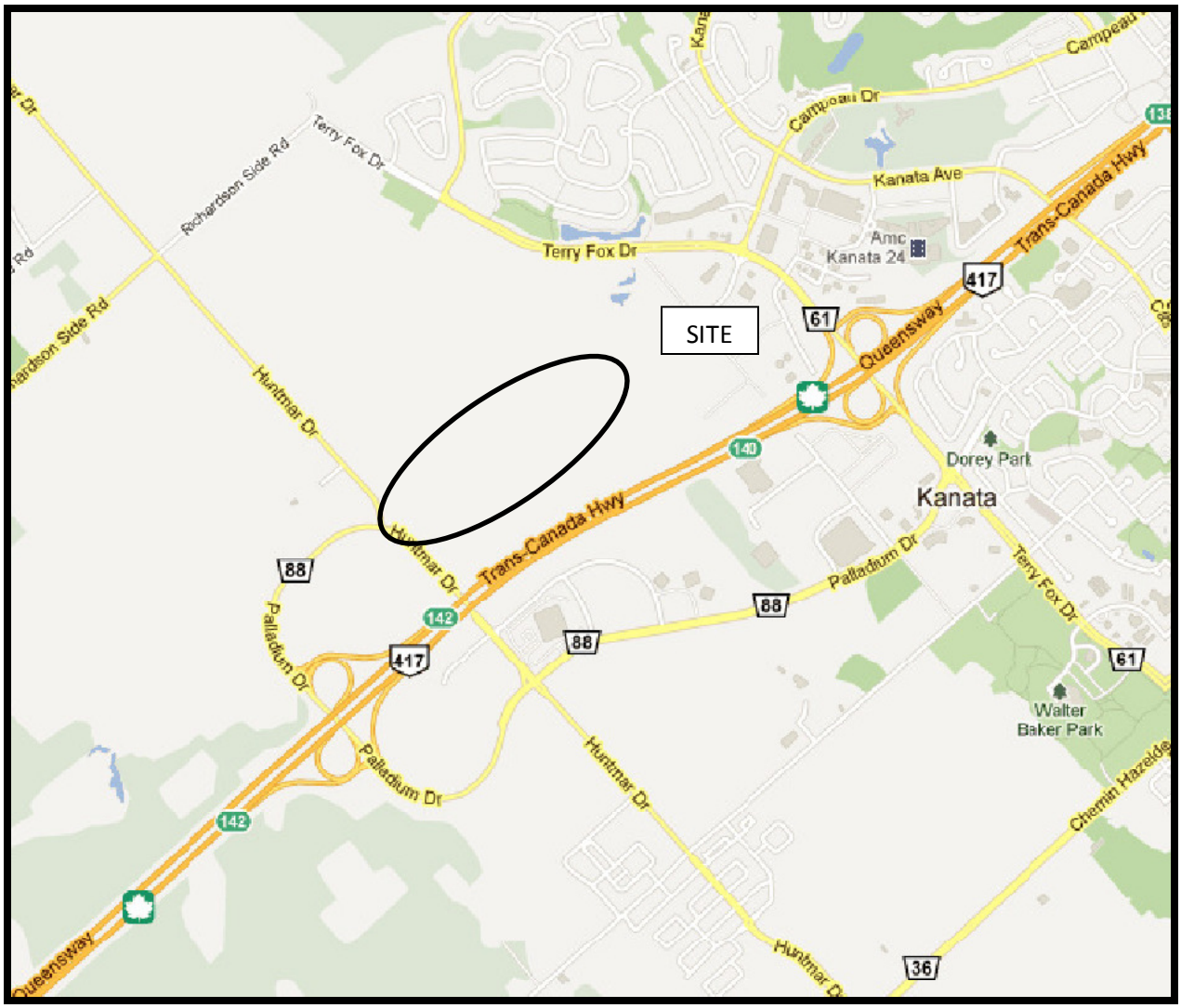


FIGURE 1

KEY PLAN

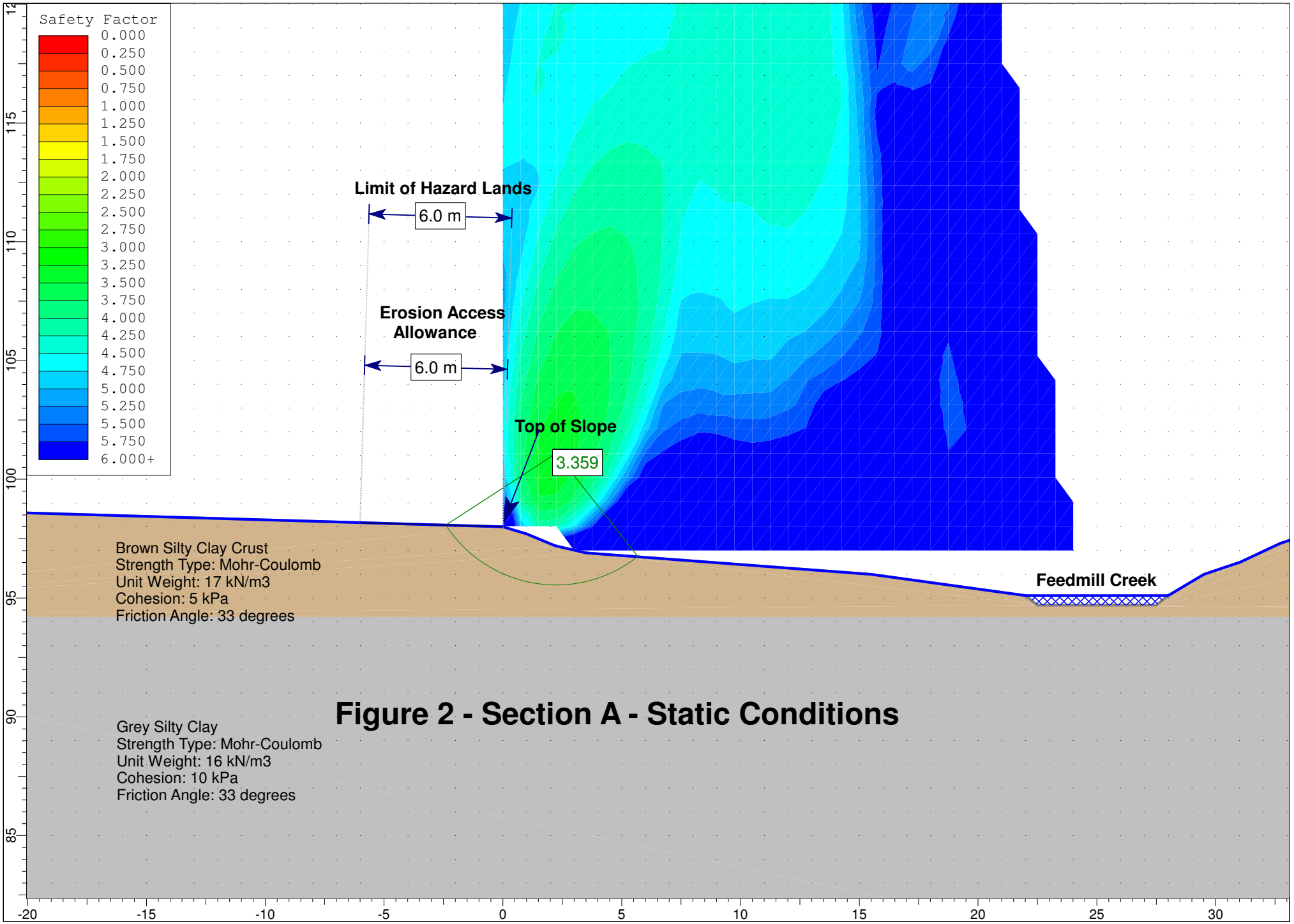


Figure 2 - Section A - Static Conditions

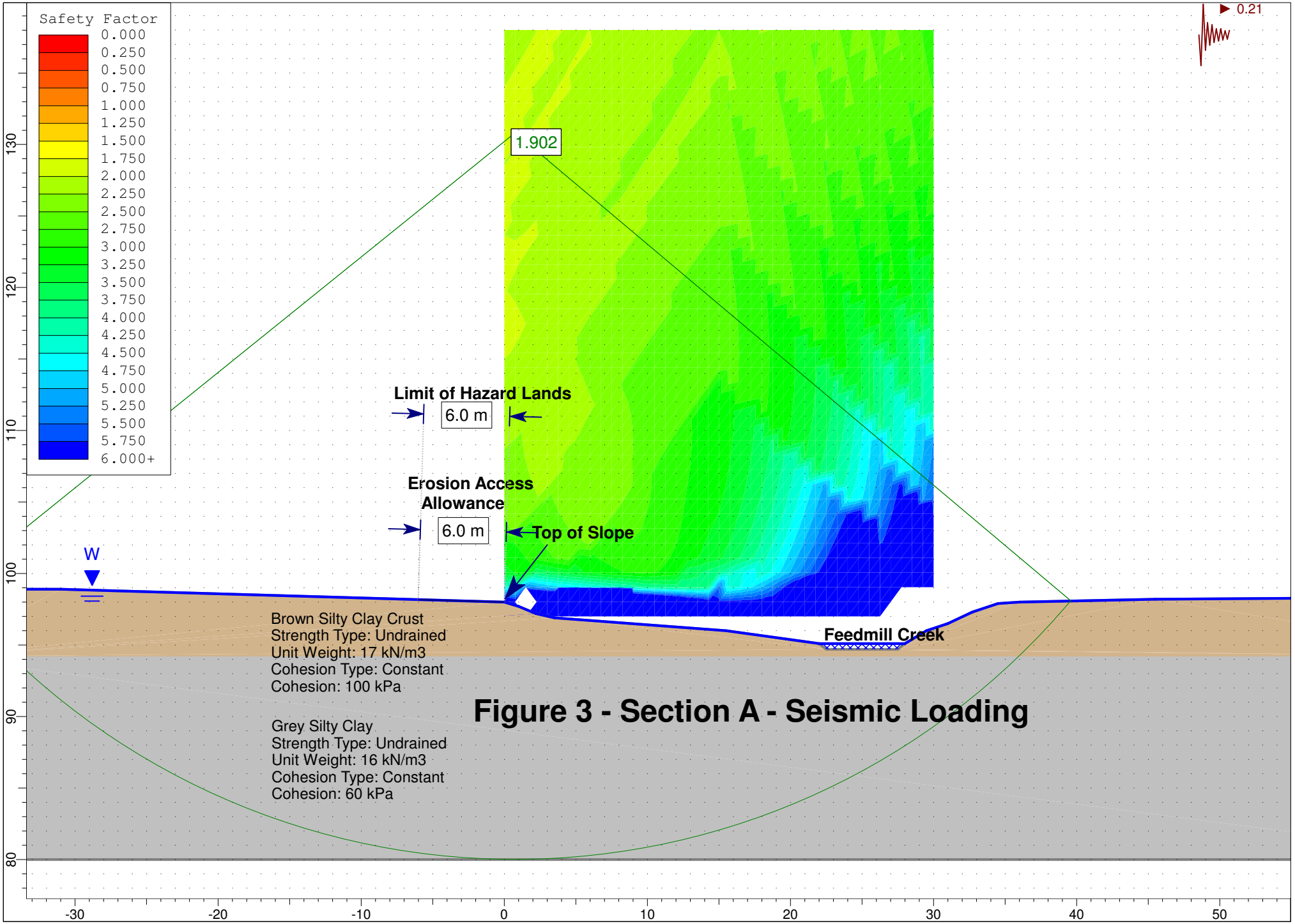


Figure 3 - Section A - Seismic Loading

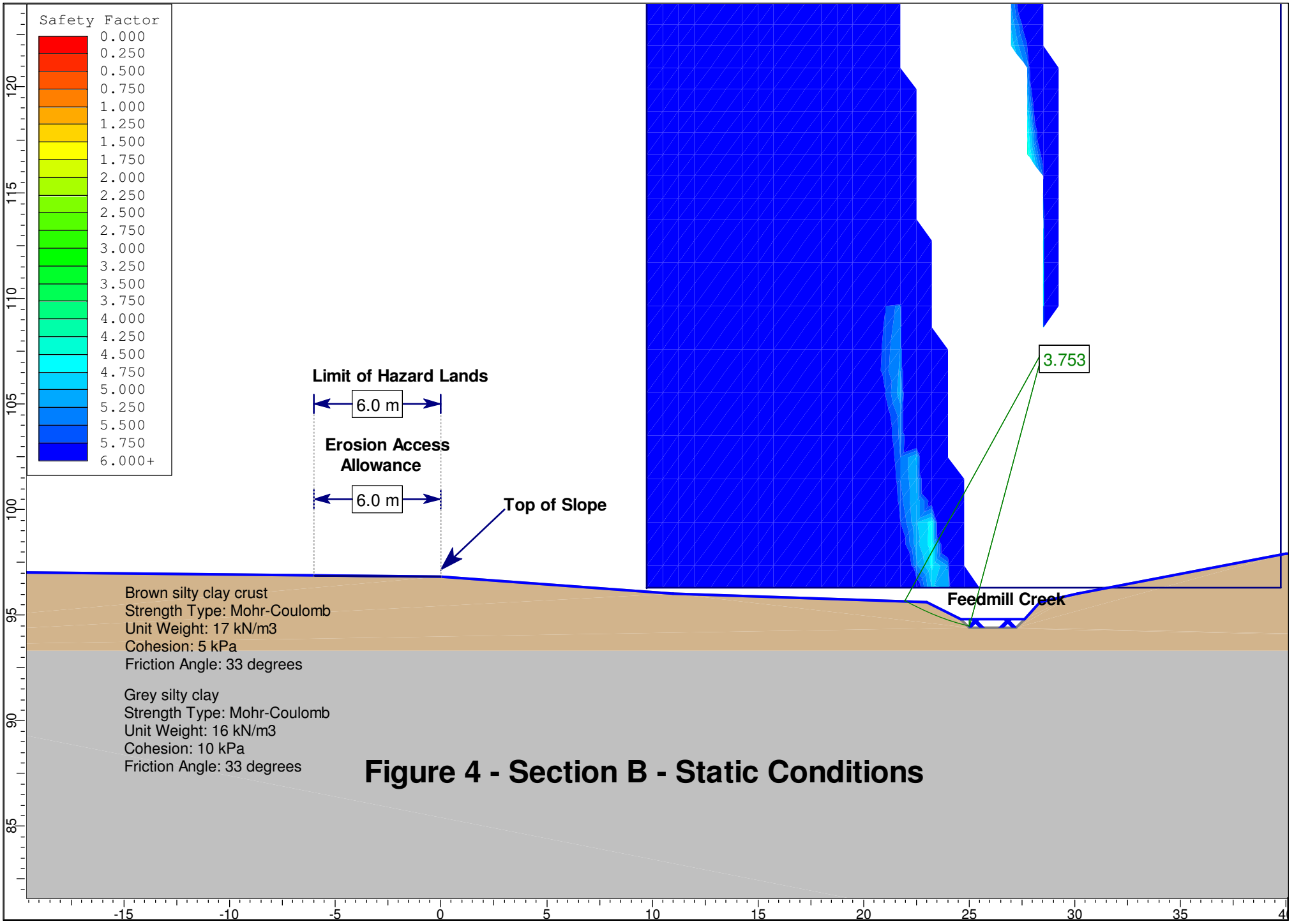


Figure 4 - Section B - Static Conditions

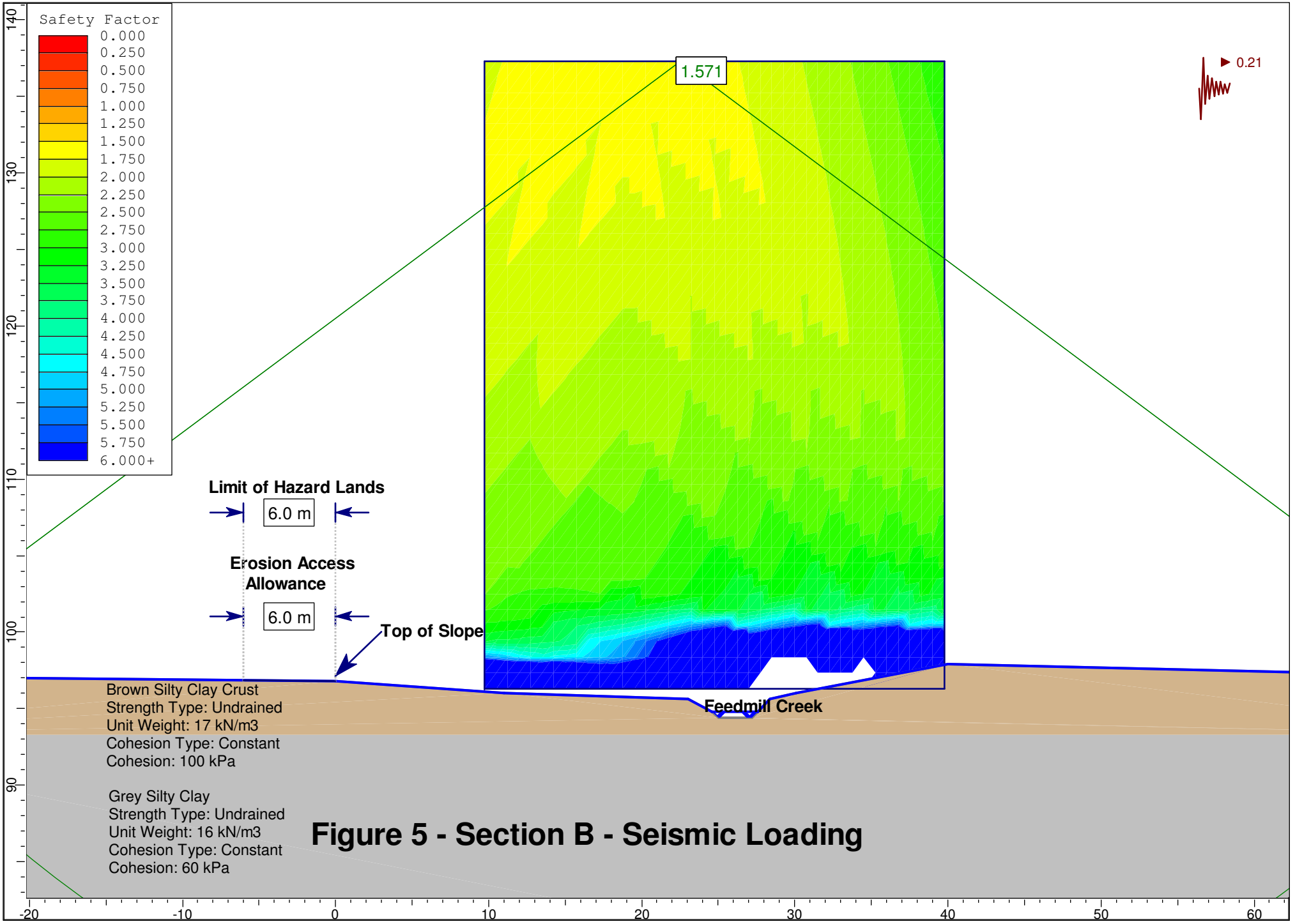


Figure 5 - Section B - Seismic Loading

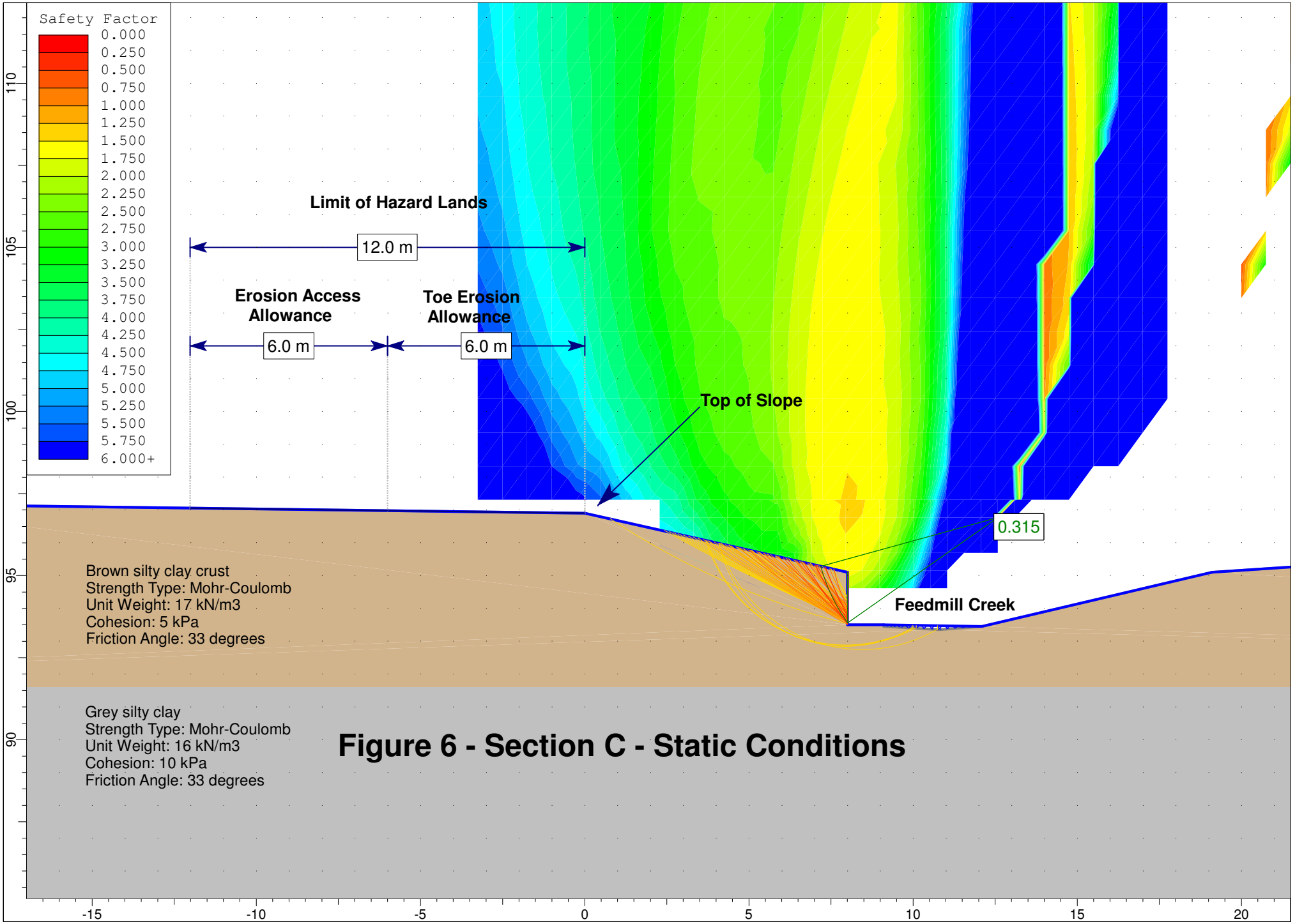


Figure 6 - Section C - Static Conditions

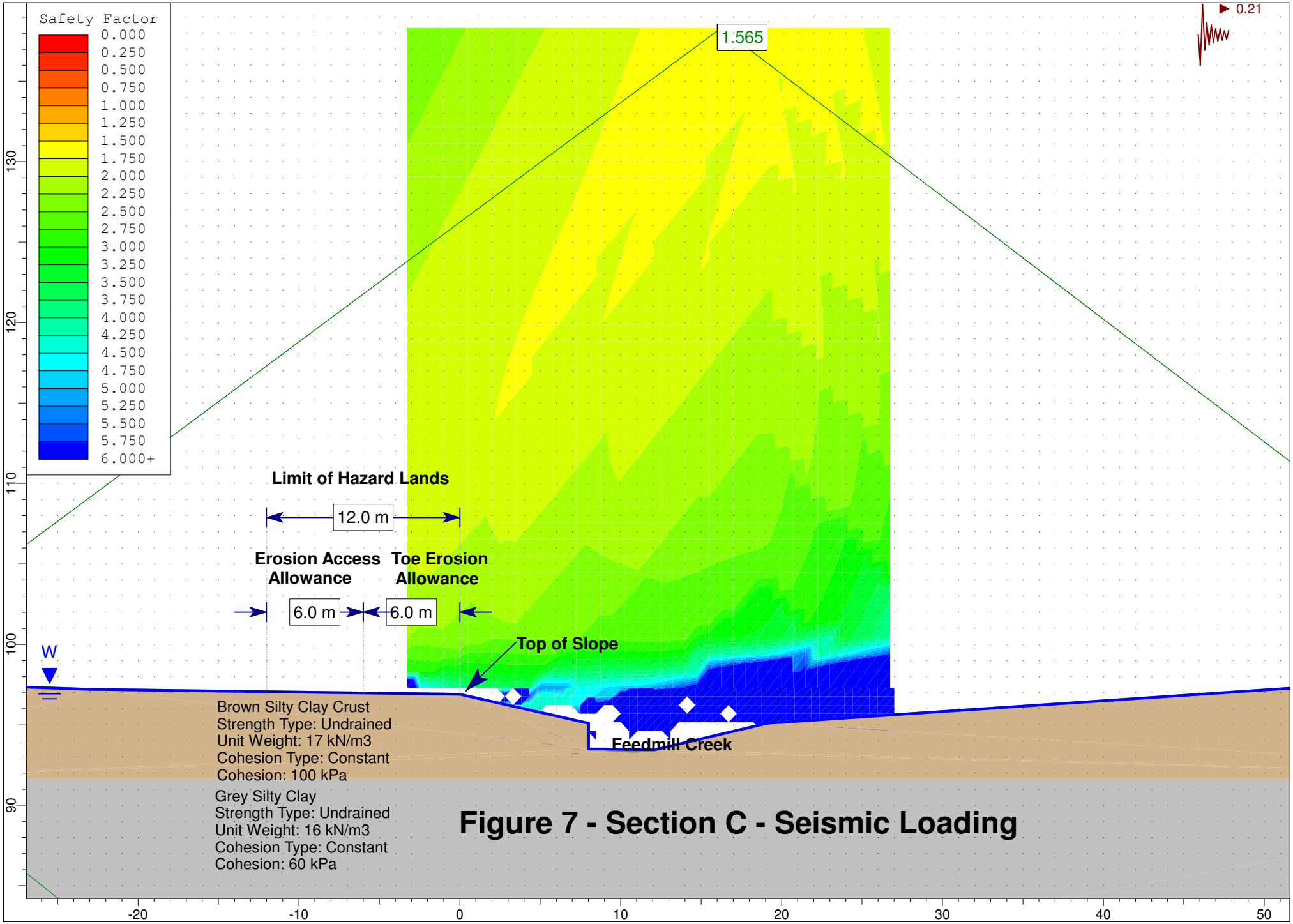


Figure 7 - Section C - Seismic Loading

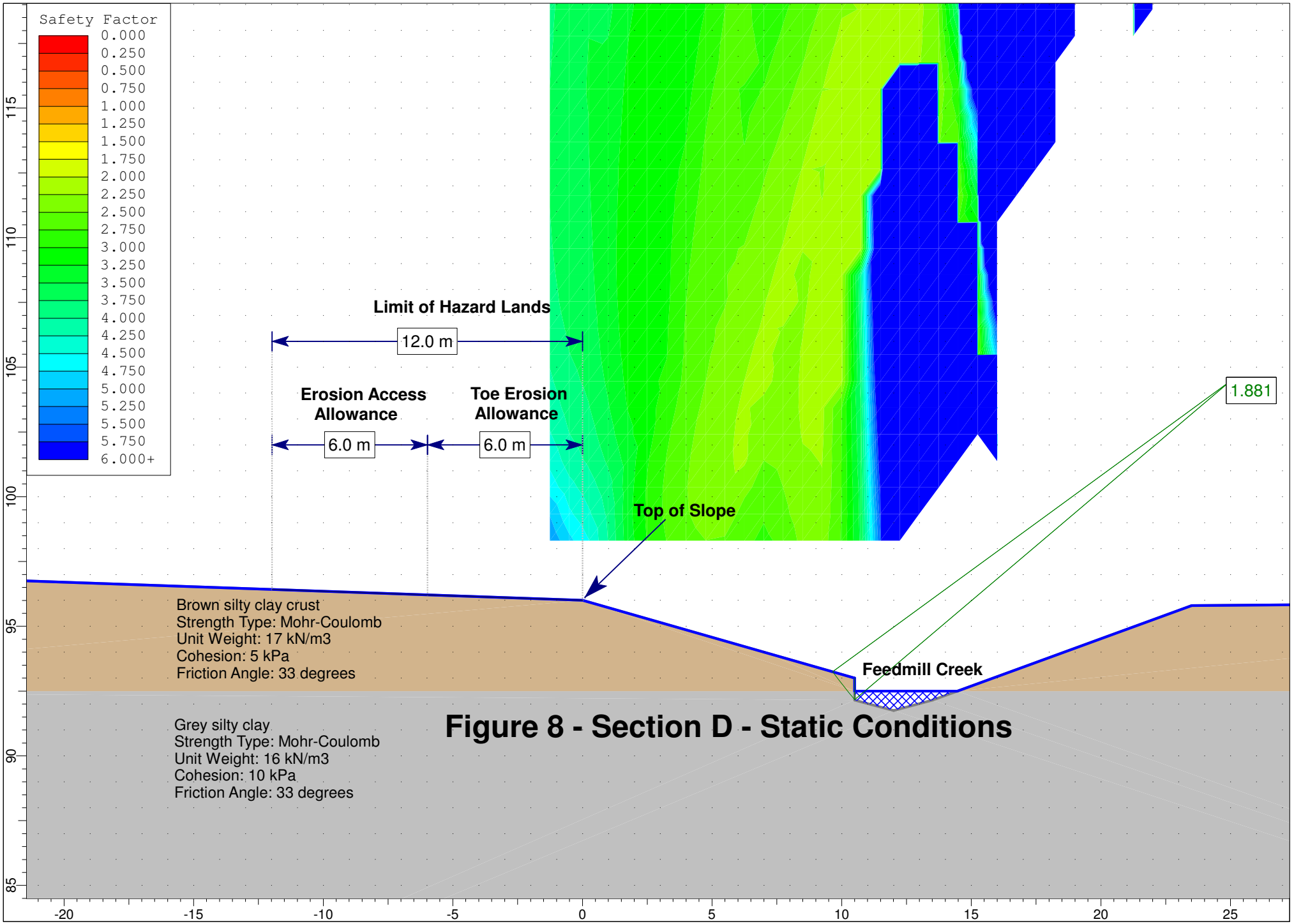


Figure 8 - Section D - Static Conditions

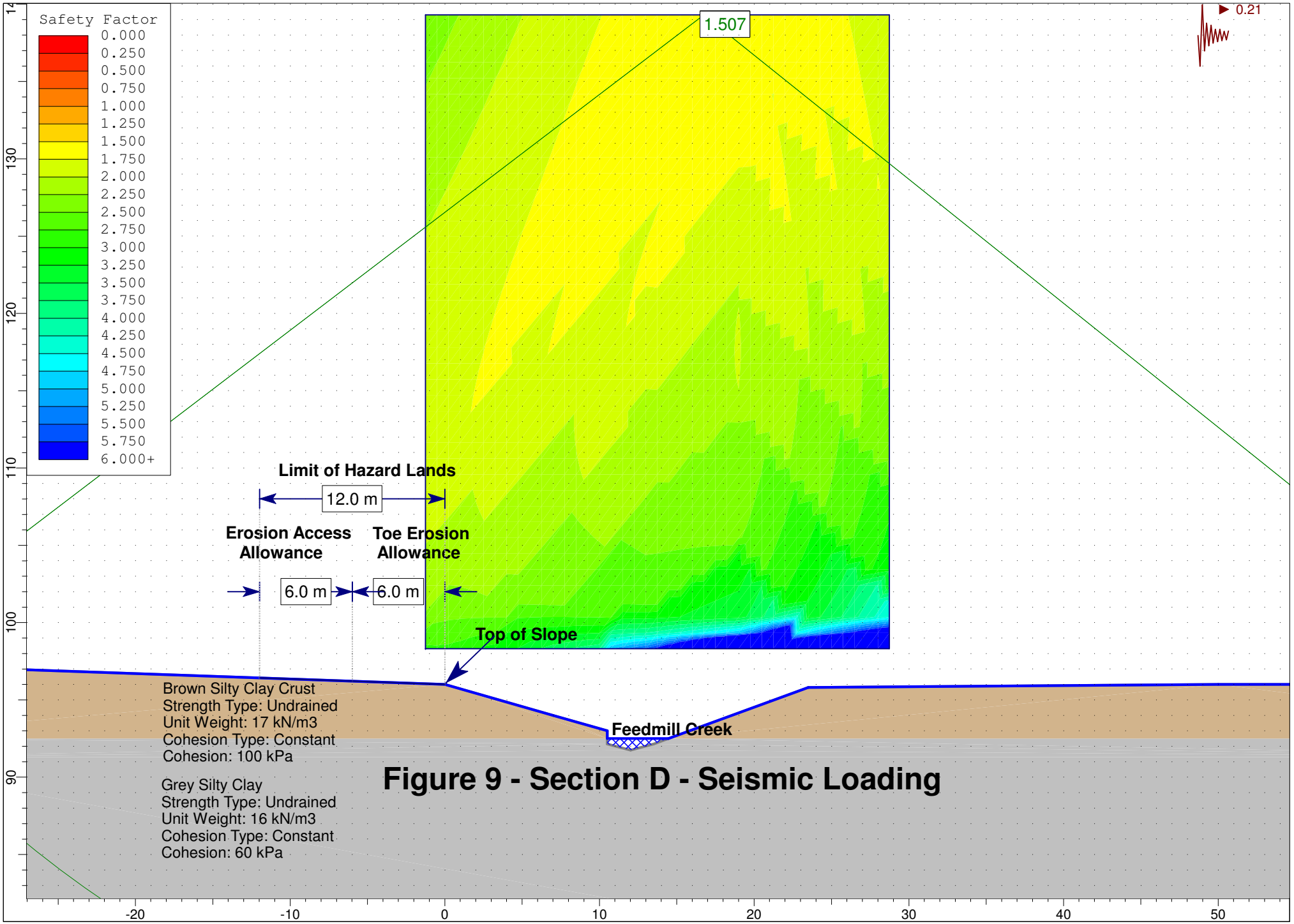


Figure 9 - Section D - Seismic Loading

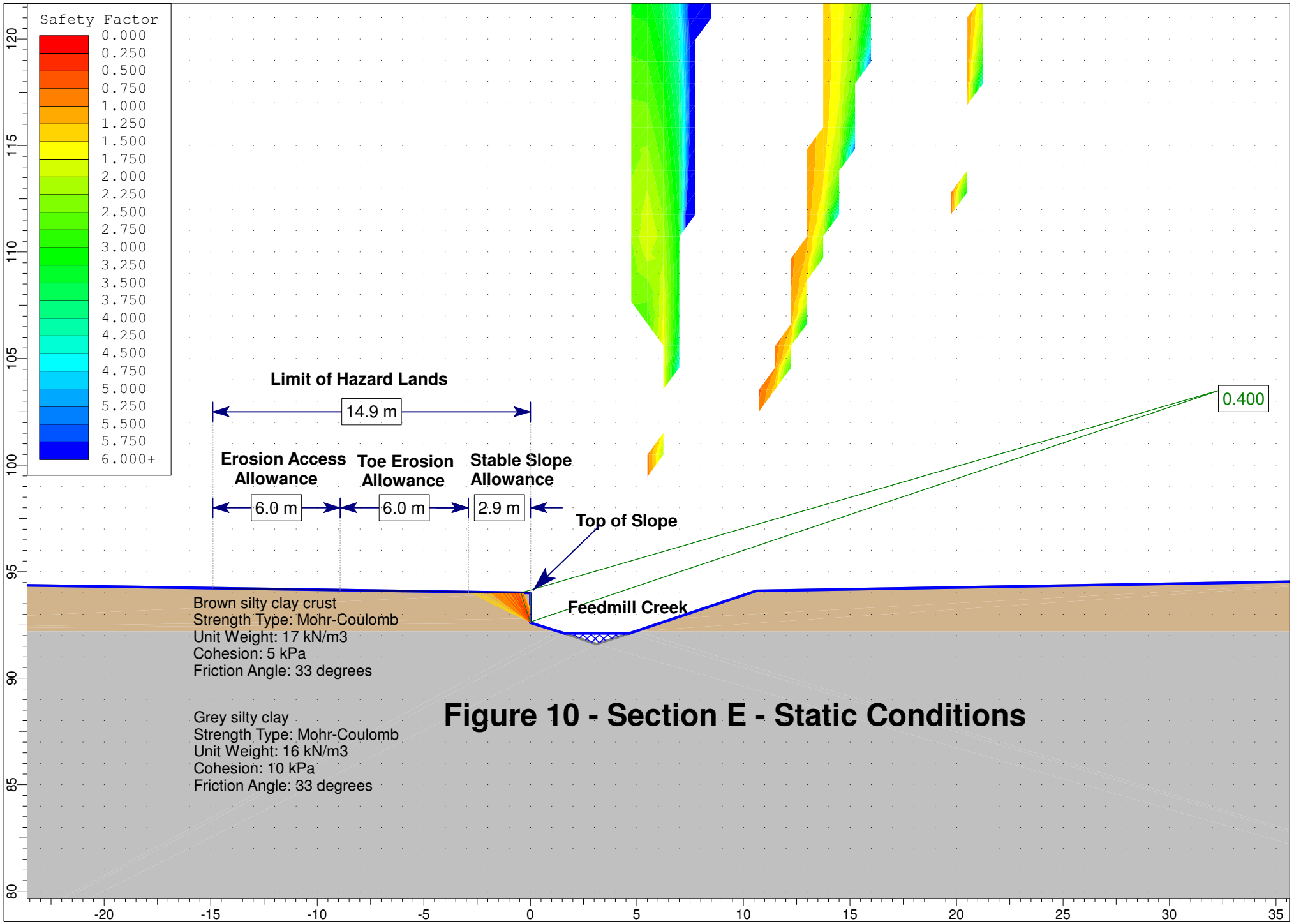


Figure 10 - Section E - Static Conditions

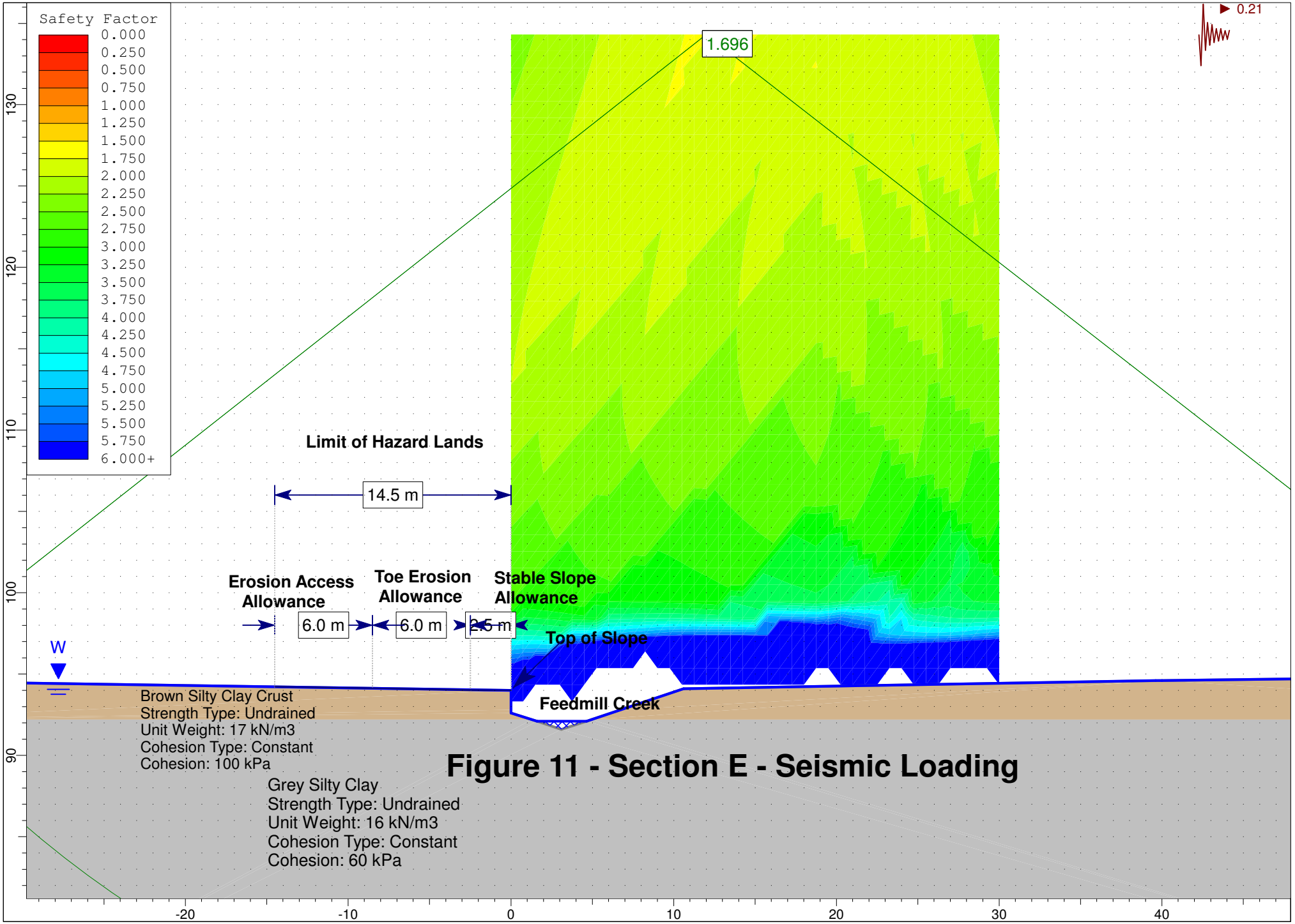
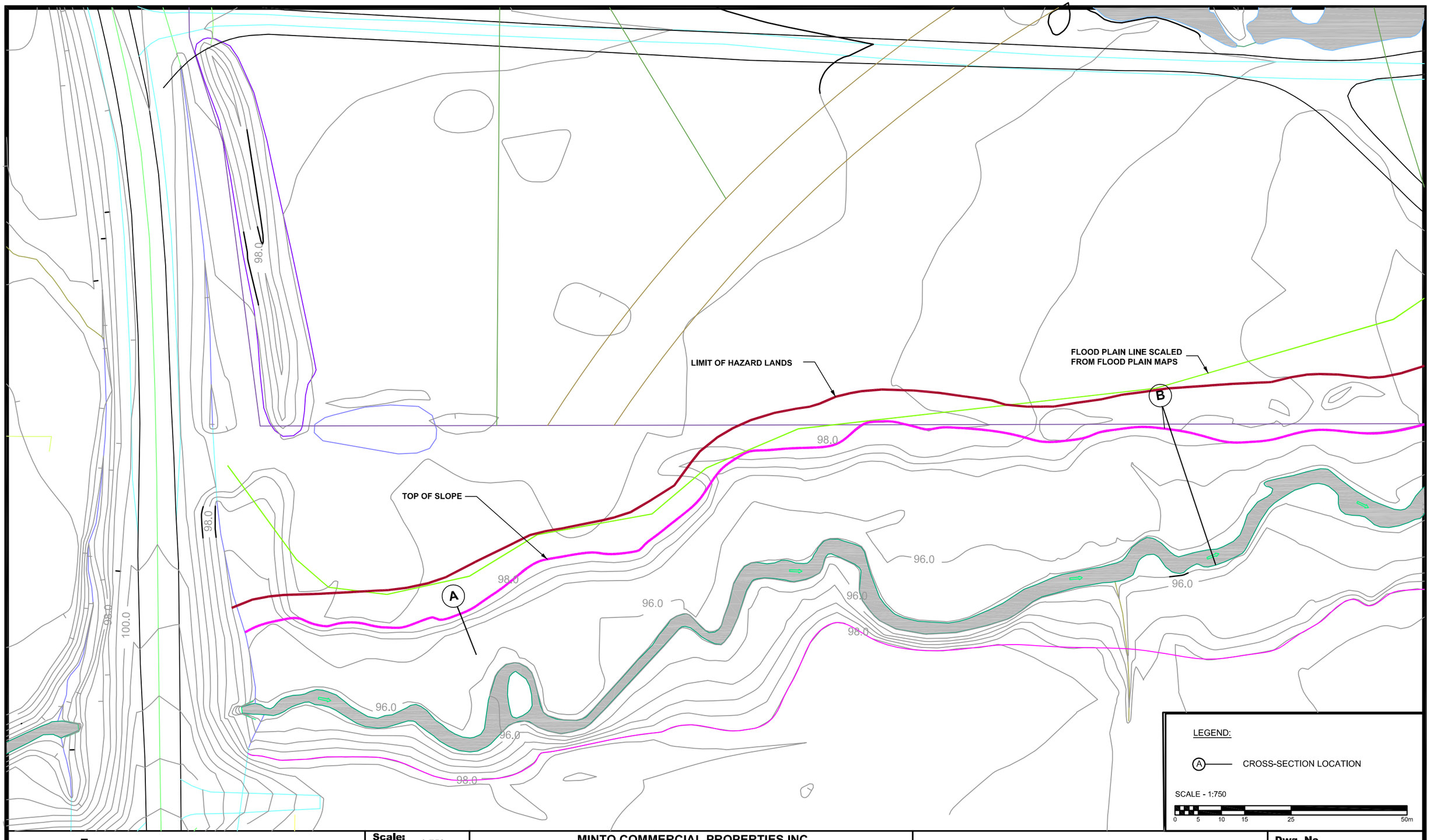


Figure 11 - Section E - Seismic Loading



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consulting engineers
28 Concourse Gate, Unit 1, Ottawa, Ontario K2E 7T7

Scale:	1:750
Des.:	MK
Dwn:	DJA
Chkd:	DG

MINTO COMMERCIAL PROPERTIES INC.

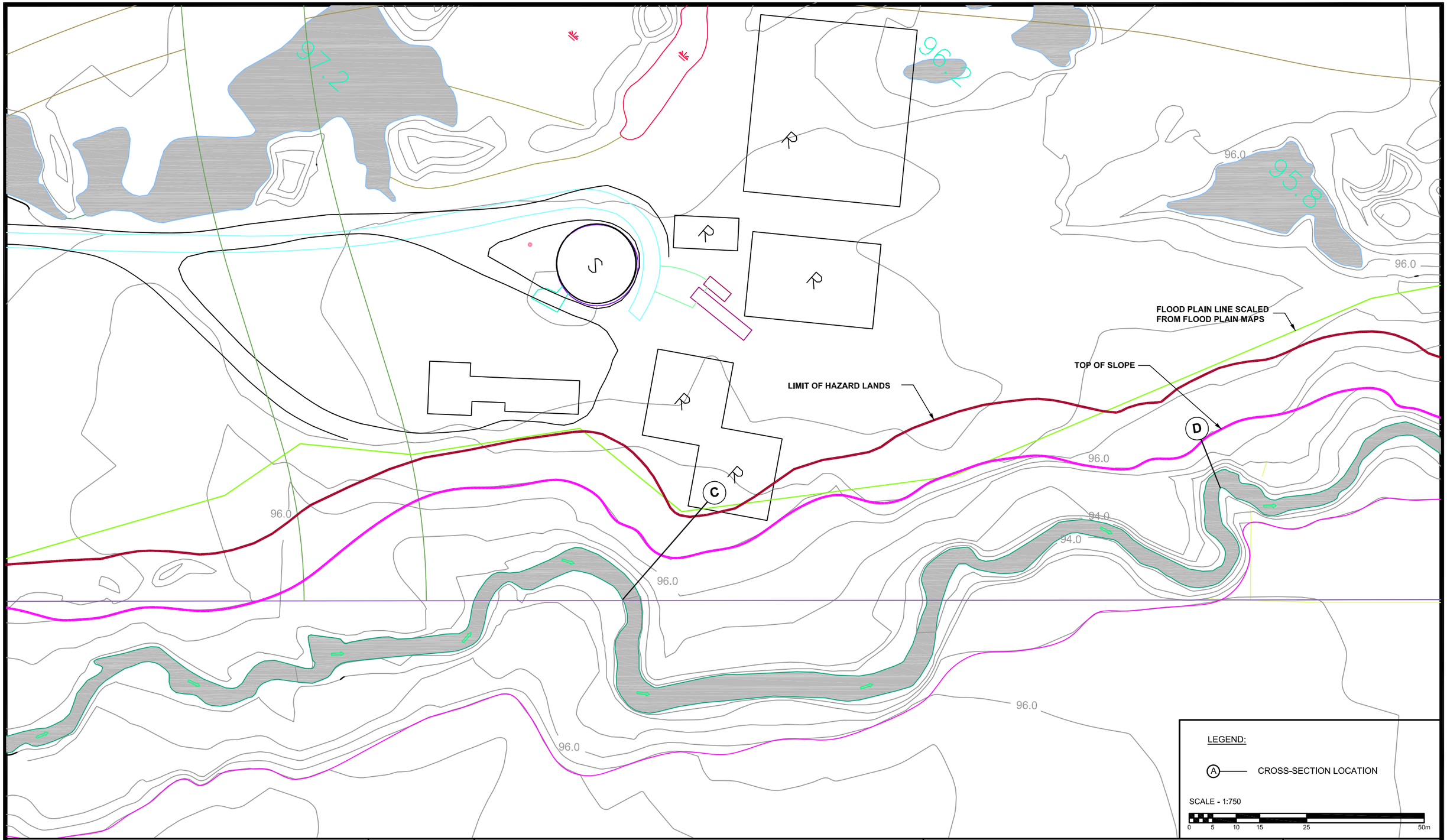
LIMIT OF HAZARD LANDS
ARCADIA LANDS - KANATA WEST

OTTAWA, ONTARIO

SITE PLAN

Dwg. No. **PG2472-1**
Report No.: PG2472-1
Date: 08/2011

11x17



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Scale:	
Des.:	MK
Dwn:	DJA
Chkd:	DG

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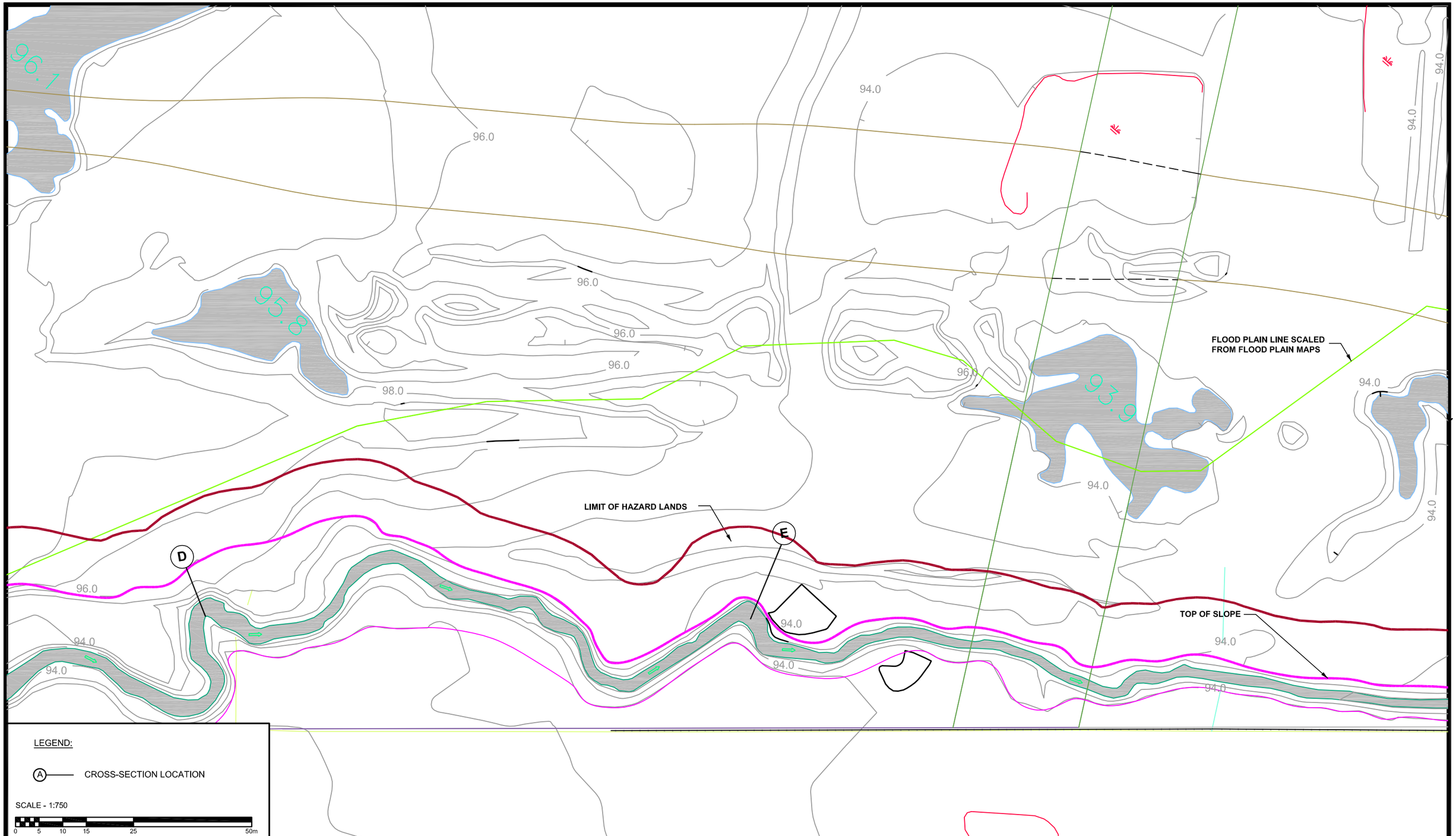
LIMIT OF HAZARD LANDS
ARCADIA LANDS - KANATA WEST

OTTAWA, ONTARIO

SITE PLAN

Dwg. No. PG2472-2
Report No.: PG2472-1
Date: 08/2011

11x17



LEGEND:

A — CROSS-SECTION LOCATION

SCALE - 1:750

0 5 10 15 25 50m

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Scale:	
Des.:	MK
Dwn:	DJA
Chkd:	DG

MINTO COMMERCIAL PROPERTIES INC.

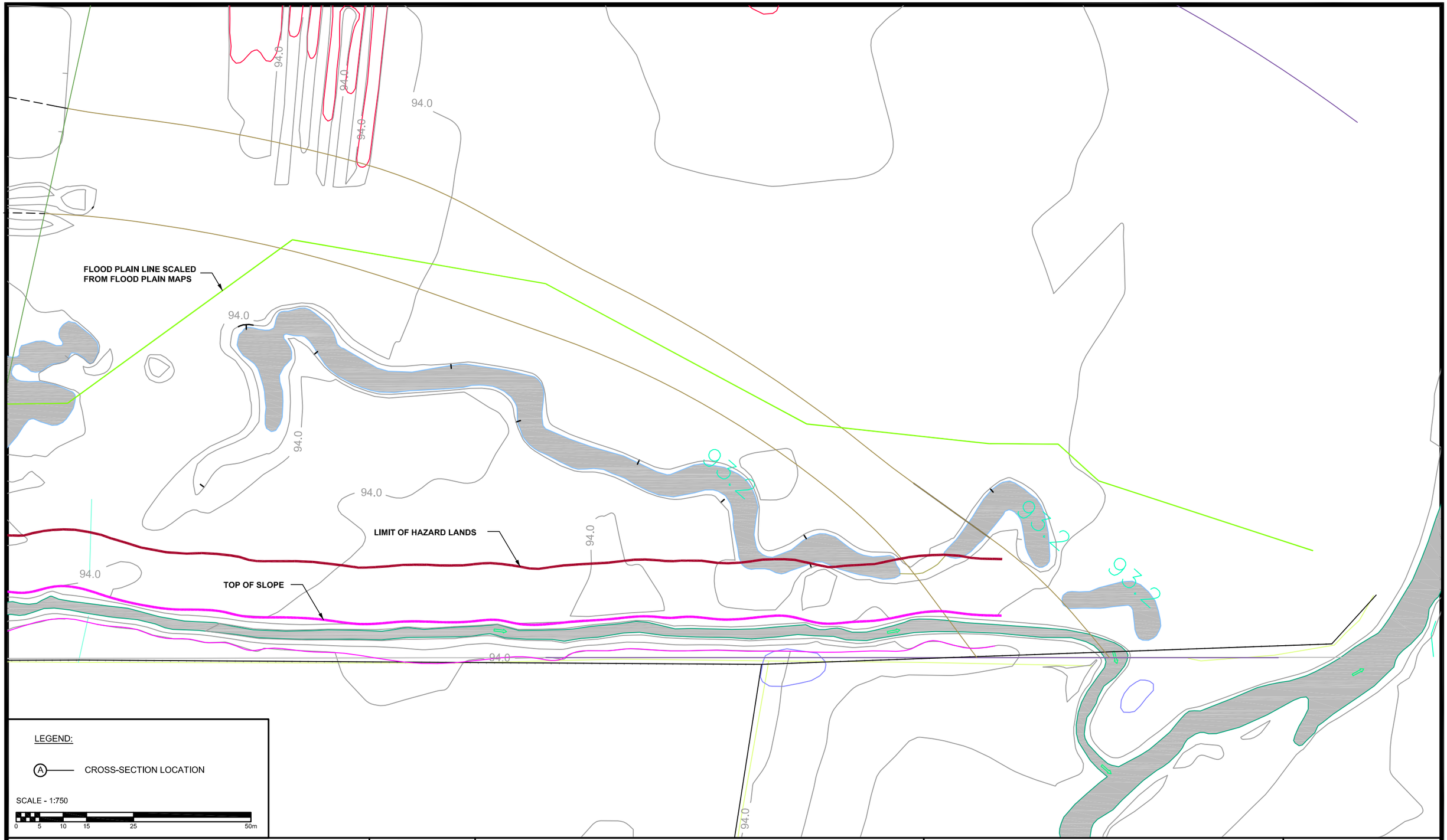
LIMIT OF HAZARD LANDS
ARCADIA LANDS - KANATA WEST

OTTAWA, ONTARIO

SITE PLAN

Dwg. No. PG2472-3
Report No.: PG2472-1
Date: 08/2011

11x17



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Scale:	
Des.:	MK
Dwn:	DJA
Chkd:	DG

MINTO COMMERCIAL PROPERTIES INC.

LIMIT OF HAZARD LANDS
ARCADIA LANDS - KANATA WEST

OTTAWA, ONTARIO

SITE PLAN

Dwg. No. PG2472-4
Report No.: PG2472-1
Date: 08/2011

11x17

BLOCK 362
STREET NO. 1
STREET NO. 20
BLOCK 364
BLOCK 363
BLOCK 365
BLOCK 366
BLOCK 367
BLOCK 376
BLOCK 375
Campeau Station
STREET NO. 17
Huntmar Dr.

PG2472-1
PG2472-2
PG2472-3
PG2472-4

FLOOD PLAIN LINE SCALED
FROM FLOOD PLAIN MAPS

LIMIT OF HAZARD LANDS

TOP OF SLOPE

SCALE - 1:3000

0 50 100 200m

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Scale:	1:3000
Des.:	MK
Dwn:	DJA
Chkd:	DG

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LIMIT OF HAZARD LANDS
ARCADIA LANDS - KANATA WEST

OTTAWA, ONTARIO

KEY PLAN

Dwg. No. **PG2472-5**

Report No. PG2472-1

Date: 08/2011

11x17

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Arcadia Development-Huntmar Road, Kanata
Ottawa, Ontario

DATUM Ground surface elevation provided by Webster and Simmonds Surveying Limited.

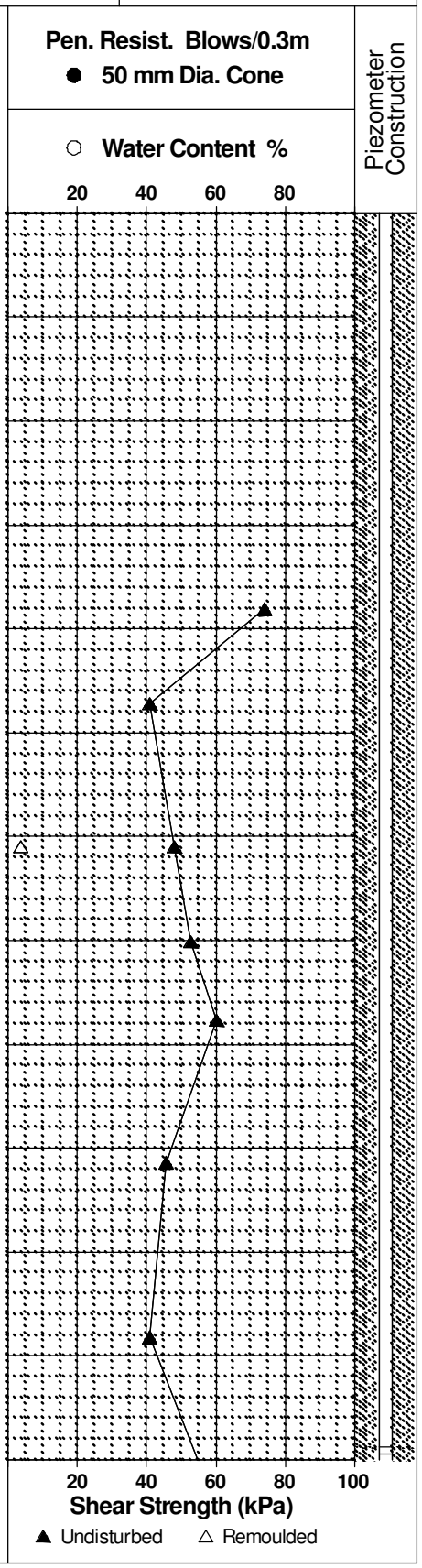
FILE NO. PG0538

REMARKS

HOLE NO. BH10

BORINGS BY CME 75 Power Auger **DATE** 11 Feb 05

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	97.20
FILL: Topsoil, silty clay, sand and gravel		AU	1			1	96.20
		SS	2	25	10	2	95.20
		SS	3	12	7		
2.95						3	94.20
		SS	4	100	4		
Stiff, brown **SILTY CLAY**						4	93.20
- firm and grey by 4.9m depth						5	92.20
		SS	5	0	1	6	91.20
- stiff by 6.4m depth						7	90.20
						8	89.20
		SS	6	100	P	9	88.20
- firm by 9.0m depth						10	87.20
						11	86.20
						12	85.20



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Geotechnical Investigation
Arcadia Development-Huntmar Road, Kanata
Ottawa, Ontario

DATUM Ground surface elevation provided by Webster and Simmonds Surveying Limited.

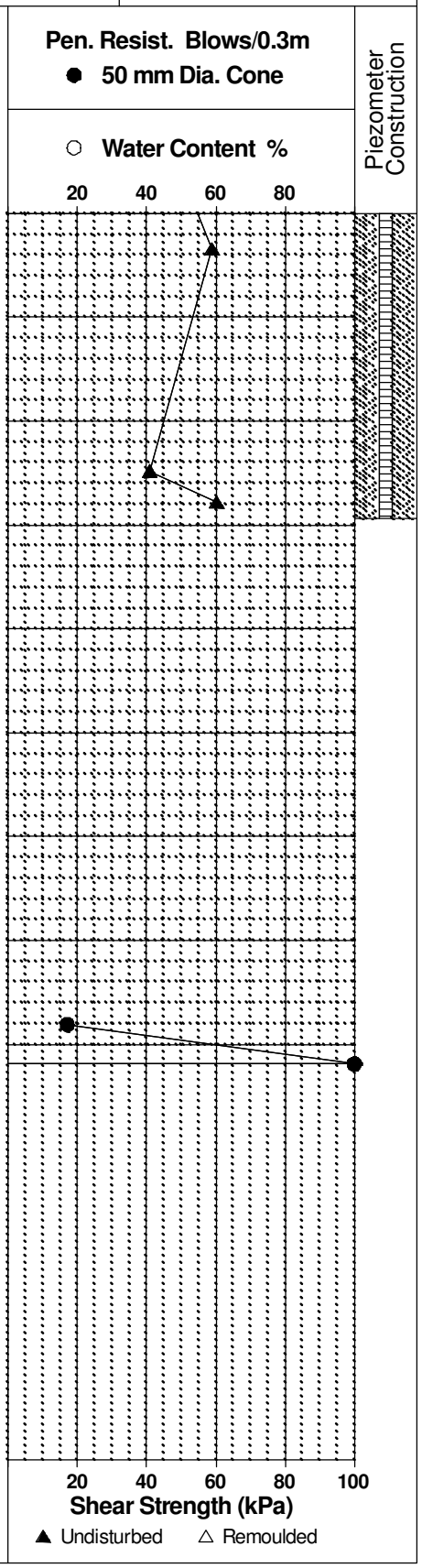
FILE NO. PG0538

REMARKS

HOLE NO. BH10

BORINGS BY CME 75 Power Auger **DATE** 11 Feb 05

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
Firm to stiff, grey **SILTY CLAY**		SS	7	71	1	12	85.20
						13	84.20
						14	83.20
14.94						15	82.20
Dynamic Cone Penetration Test commenced @ 14.94m depth. Cone pushed to 19.9m depth						16	81.20
Inferred **SILTY CLAY**						17	80.20
						18	79.20
						19	78.20
19.90							
Inferred **GLACIAL TILL** 20.19						20	77.20
End of Borehole							
DCPT refusal @ 20.19m depth							
(Piezometer damaged - Feb. 21/05)							



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Arcadia Development-Huntmar Road, Kanata
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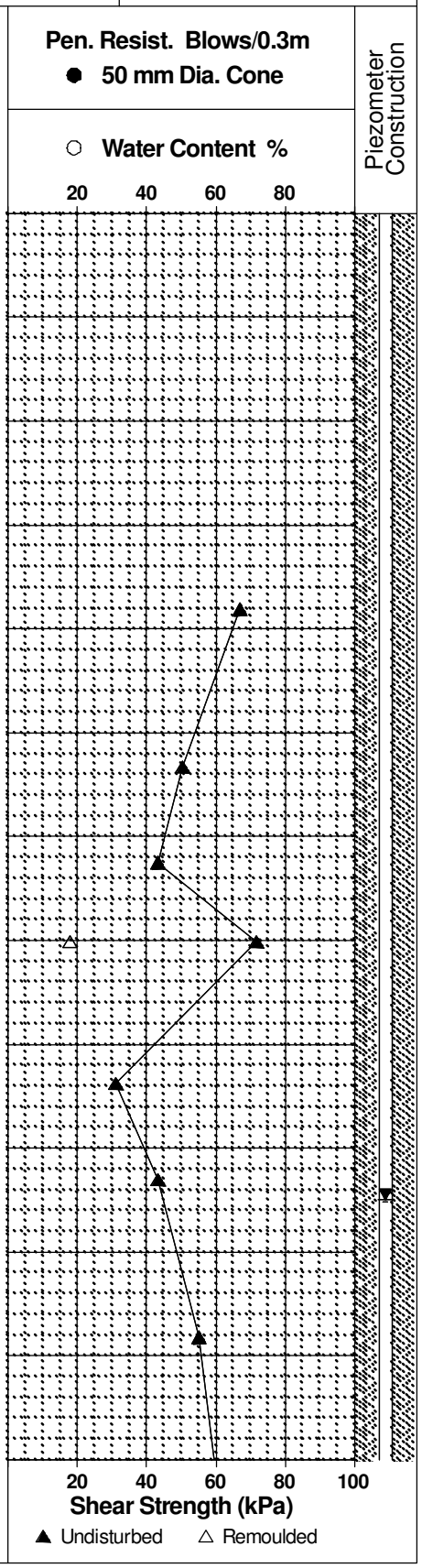
FILE NO. PG0538

REMARKS

HOLE NO. BH11

BORINGS BY CME 75 Power Auger **DATE** 10 Feb 05

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	94.09
FILL: Topsoil, silty clay, sand and gravel		AU	1			1	93.09
1.68		SS	2	62	3	2	92.09
Stiff, brown **SILTY CLAY**, some fine sand seams		SS	3	100	1		
- grey by 2.9 depth		SS	4	17	1	3	91.09
		SS	5	100	P	4	90.09
						5	89.09
						6	88.09
						7	87.09
- firm by 8.0m depth		SS	6	100	3	8	86.09
						9	85.09
- stiff by 10.0m depth						10	84.09
						11	83.09
						12	82.09



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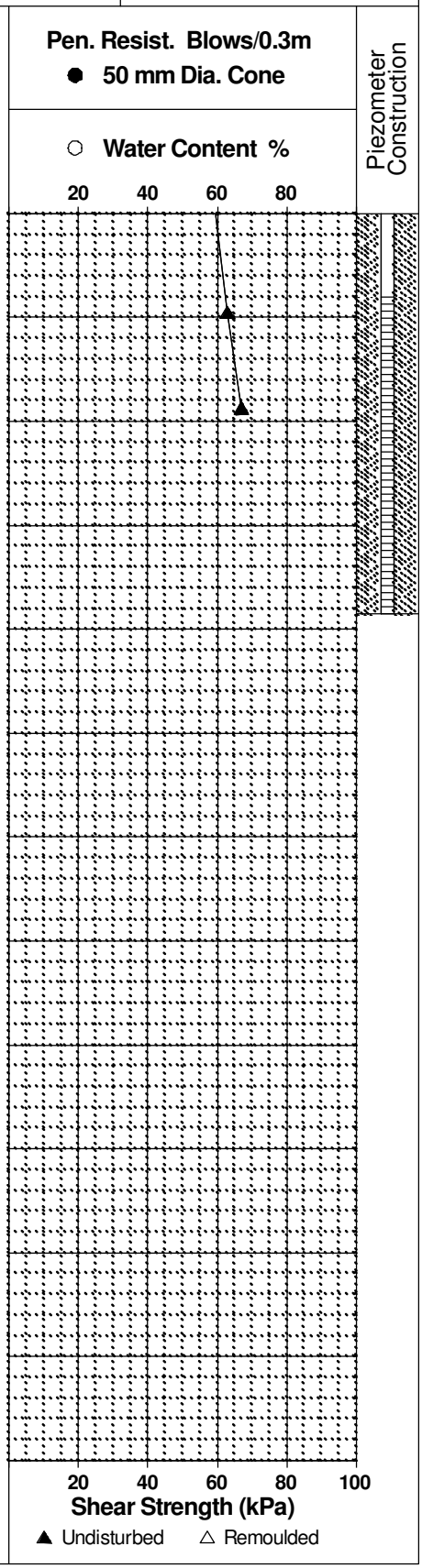
REMARKS

HOLE NO. BH11

BORINGS BY CME 75 Power Auger **DATE** 10 Feb 05

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
Stiff, grey **SILTY CLAY**		SS	7	100	P	12	82.09
						13	81.09
						14	80.09
		SS	8		2	15	79.09
15.85							
Dynamic Cone Penetration Test commenced @ 15.85m depth. Cone pushed to 28.5m depth						16	78.09
						17	77.09
						18	76.09
						19	75.09
Inferred **SILTY CLAY**						20	74.09
						21	73.09
						22	72.09
						23	71.09
						24	70.09



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Arcadia Development-Huntmar Road, Kanata
Ottawa, Ontario

DATUM Ground surface elevation provided by Webster and Simmonds Surveying Limited.

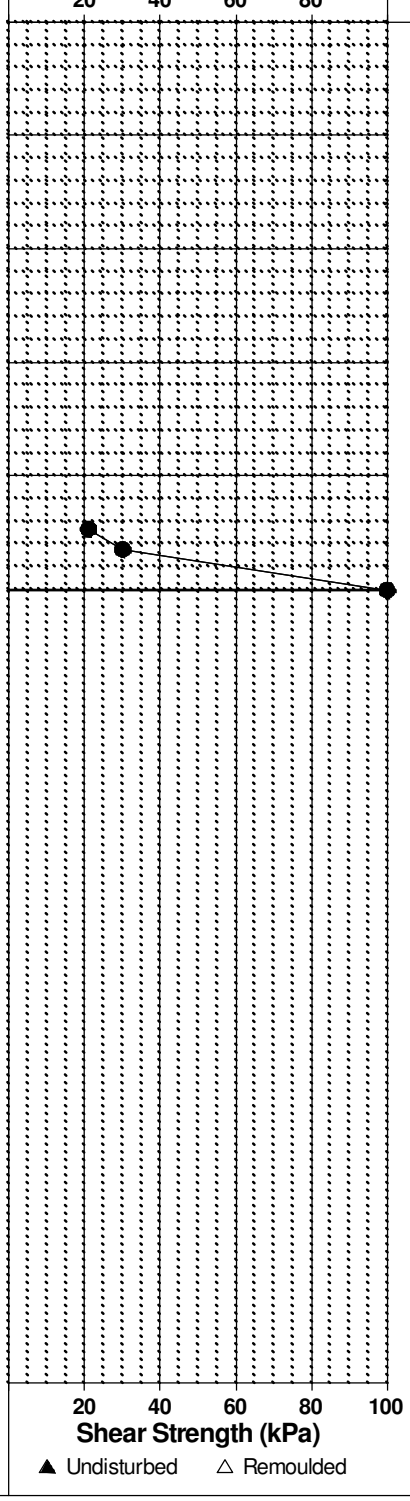
FILE NO. PG0538

REMARKS

HOLE NO. BH11

BORINGS BY CME 75 Power Auger **DATE** 10 Feb 05

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
Inferred **SILTY CLAY**						24	70.09		
						25	69.09		
						26	68.09		
						27	67.09		
						28	66.09		
28.50									
Inferred **GLACIAL TILL**						29	65.09		
29.01									
End of Borehole									
DCPT refusal @ 29.01m depth									
(GWL @ 9.50m-Feb. 21/05)									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Arcadia Development-Huntmar Road, Kanata
Ottawa, Ontario

DATUM Ground surface elevation provided by Webster and Simmonds Surveying Limited.

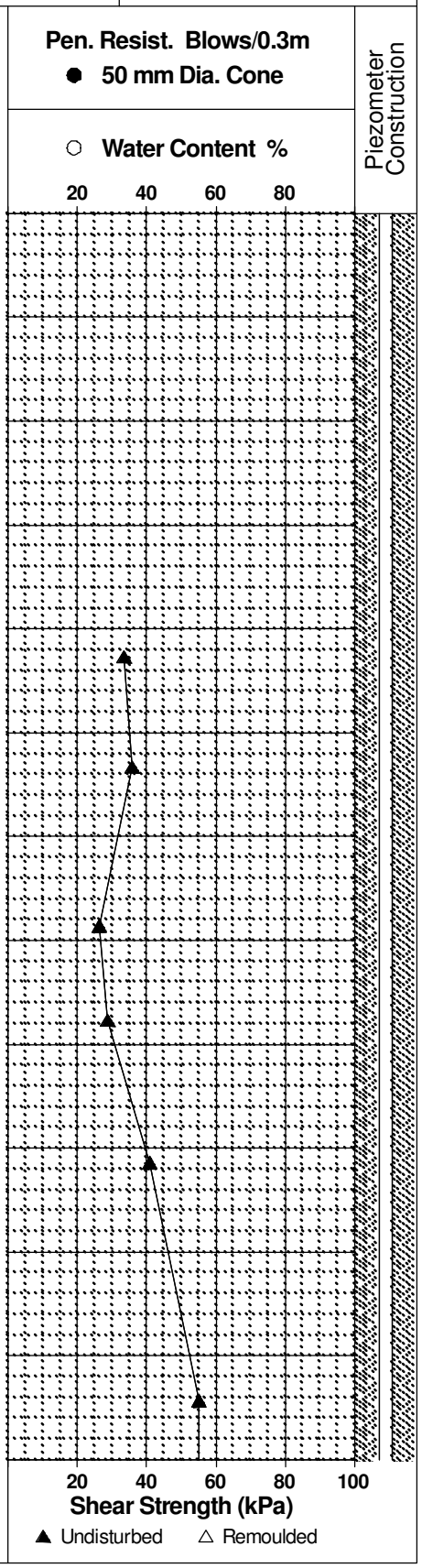
FILE NO. PG0538

REMARKS

HOLE NO. BH12

BORINGS BY CME 75 Power Auger **DATE** 10 Feb 05

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	93.37
FILL: Topsoil, silty clay and sand						1	92.37
1.68							
Loose, brown **SANDY SILT/SILTY** fine **SAND**		SS	1	83	4	2	91.37
2.13							
Loose to very loose, grey fine to coarse **SAND**		SS	2	67	3		
2.44						3	90.37
		SS	3				
						4	89.37
		TW	4	92		5	88.37
Firm, grey **SILTY CLAY**, trace sand						6	87.37
		TW	5	92		7	86.37
						8	85.37
		TW	6	100		9	84.37
						10	83.37
		TW	7	100		11	82.37
- stiff by 11.0m depth						12	81.37



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Consulting Engineers

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Arcadia Development-Huntmar Road, Kanata
Ottawa, Ontario

DATUM Ground surface elevation provided by Webster and Simmonds Surveying Limited.

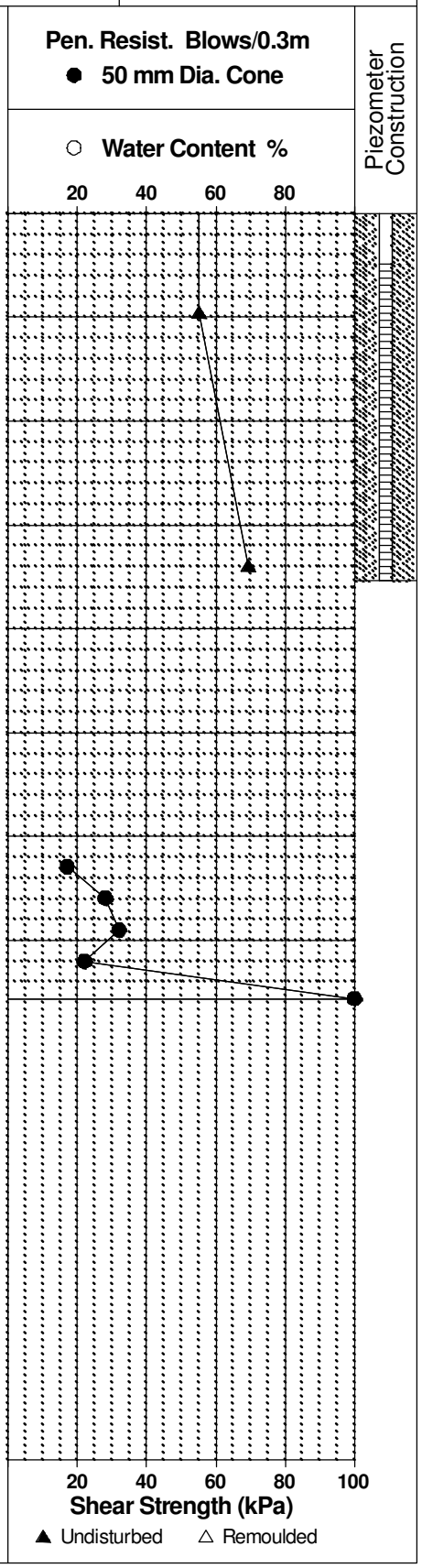
FILE NO. PG0538

REMARKS

HOLE NO. BH12

BORINGS BY CME 75 Power Auger **DATE** 10 Feb 05

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
Stiff, grey **SILTY CLAY**		SS	8	100	P	12	81.37
						13	80.37
						14	79.37
						15	78.37
15.54							
Dynamic Cone Penetration Test commenced @ 15.54m depth. Cone pushed to 18.4m depth						16	77.37
Inferred **SILTY CLAY**						17	76.37
						18	75.37
18.40							
Inferred **GLACIAL TILL**						19	74.37
19.56							
End of Borehole							
DCPT refusal @ 19.56m depth							
(Piezometer blocked with ice @ ground surface - Feb. 21/05)							



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Consulting Engineers

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Arcadia Development-Huntmar Road, Kanata
Ottawa, Ontario

DATUM Ground surface elevation provided by Webster and Simmonds Surveying Limited.

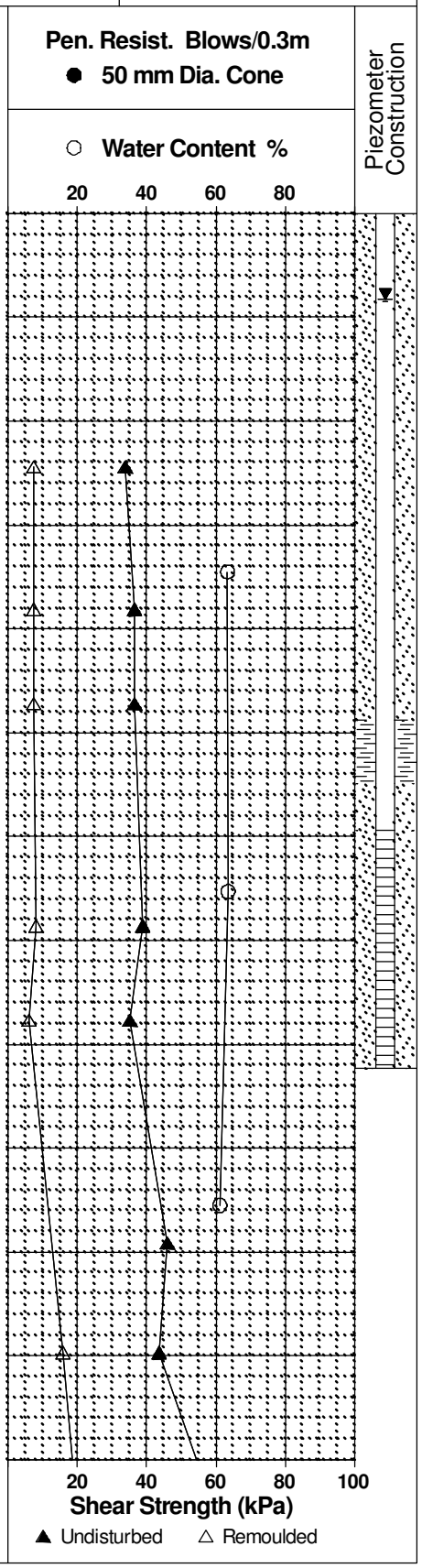
FILE NO. PG0538

REMARKS Wash boring methods used.

HOLE NO. BH21

BORINGS BY CME 75 Power Auger **DATE** 31 May 06

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	94.40
FILL: Brown silty clay							
0.38							
Firm, brown **SILTY CLAY**, some sand seams		SS	1	8	4	1	93.40
		SS	2	100	3	2	92.40
- grey by 2.8m depth		TW	3	98		3	91.40
						4	90.40
						5	89.40
		TW	4	100		6	88.40
						7	87.40
						8	86.40
		TW	5	100		9	85.40
						10	84.40
						11	83.40
						12	82.40



patersongroup

Consulting Engineers

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Arcadia Development-Huntmar Road, Kanata
Ottawa, Ontario

DATUM Ground surface elevation provided by Webster and Simmonds Surveying Limited.

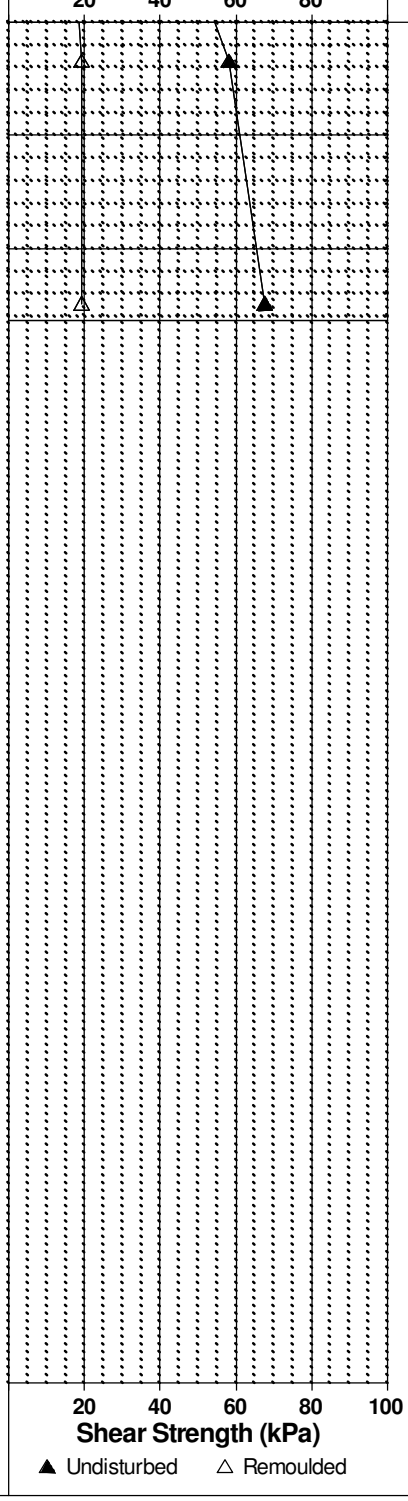
FILE NO. PG0538

REMARKS Wash boring methods used.

HOLE NO. BH21

BORINGS BY CME 75 Power Auger **DATE** 31 May 06

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone / ○ Water Content %	Piezometer Construction
Firm to stiff, grey **SILTY CLAY**		TW	6	100		12	82.40		
						13	81.40		
						14	80.40		
14.63									
End of Borehole									
(GWL @ 0.83m-June 18/06)									



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Consulting Engineers

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Preliminary Geotechnical Investigation
Proposed Development, Huntmar Road
Ottawa (Kanata), Ontario

DATUM

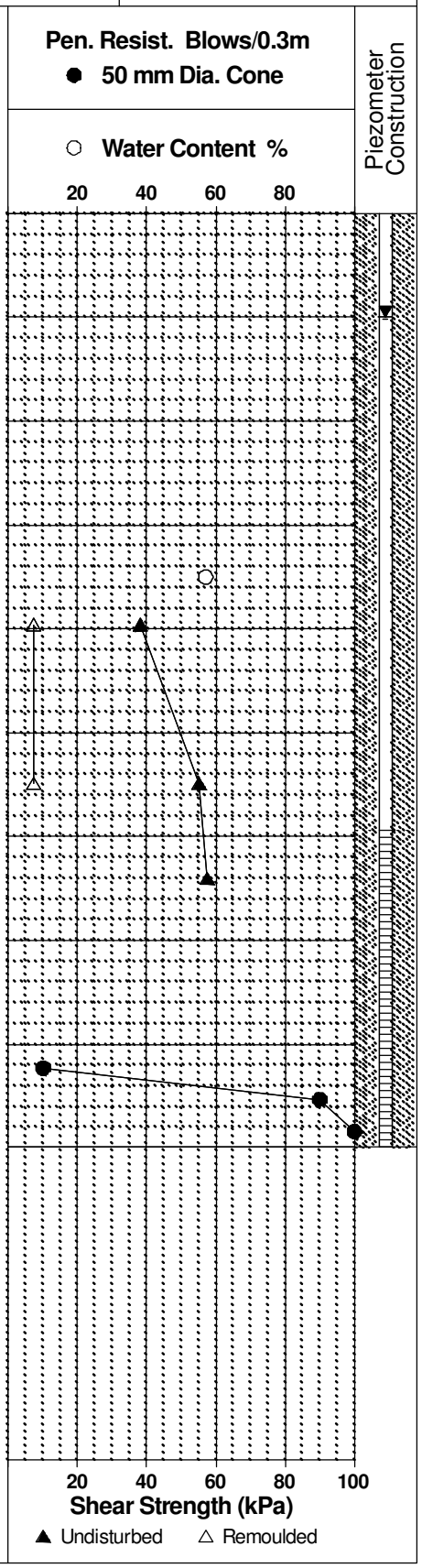
REMARKS

BORINGS BY CME 75 Power Auger **DATE** 7 Jan 04

FILE NO. G9169

HOLE NO. BH 2

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	
TOPSOIL 0.30							
		SS	1	38	13	1	
		SS	2	83	1		
Stiff, brown-grey **SILTY CLAY**		SS	3	100	3	2	
		TW	4			3	
- firm and grey by 4.0m depth						4	
		SS	5	100	1	5	
- stiff by 5.5m depth						6	
6.86							
GLACIAL TILL: Dense, grey silty sand with gravel		TW	6			7	
- grey clayey silt with gravel by 7.6m depth		SS	7	67	39		
8.23						8	
Dynamic Cone Penetration Test commenced @ 8.23m depth							
8.99							
Inferred **GLACIAL TILL**							
End of Borehole							
Cone refusal @ 8.99m depth							
(GWL @ 1.00m-Jan. 15/04)							



CONVENTIONAL CONSTRUCTION (GRADE RAISE AT HOUSE ≤ 1.4m)

PREDEVELOPMENT PRELOADING OR SURCHARGING REQUIRED

OTHER OWNER

OTHER OWNER

HUNTMAR DRIVE

CAMPEAU DRIVE

WHITTINGHAM STREET

WHITTINGHAM STREET

RIVERCHASE DRIVE

STREAMVIEW WAY

SUMMERCREEK TERRACE

BLOCK 97

BUFFER

BLOCK 372

BLOCK 376

STREET NO. 11

FLOOD PLAIN LINE BASED ON EXISTING STE TOPOGRAPHY

FLOOD PLAIN LINE SCALED FROM FLOOD PLAIN MAPS

PART 1
PLAN 4R – 3087

PARK
4.37 a
1.77 ha

PARK
1.71 a
0.69 ha

STORM POND
5.85 a
2.37 ha

COMMERCIAL
15.9 a
6.49 ha

COMMERCIAL
1 storey
18500 sq.ft.

OFFICE
3 STOREY
FP–25500 sq.ft.

OFFICE
3 STOREY
FP–25500 sq.ft.

RETAIL
1 storey
13500 sq.ft.

OFFICE
3 STOREY
FP–25500 sq.ft.

BH 1 98.6 (85.4)
BH 1 95.48 (74.12)
BH 2 98.6 (89.6)
BH 2 94.51 (77.80)
BH 3 92.63 (68.63)
BH 4 92.72 (65.64)
BH 5 99.39 (80.90)
BH 5 93.3 (73.1)
BH 6 97.46 (83.97)
BH 7 94.05 (69.72)
BH 8 93.62 (76.47)
BH 9 92.63 (77.49)
BH 10 97.20 (77.01)
BH 11 94.09 (65.08)
BH 12 93.37 (73.81)
BH 13 95.21
BH 14 92.56 (74.12)
BH 15 92.98 (71.06)
BH 16 93.01 (73.68)
BH 17 92.67 (79.59)
BH 18 93.11 (71.90)
BH 19 93.16
BH 20 93.92
BH 21 94.40
BH 22 95.28 [73.49]
BH 23 94.84
BH 24 92.64 [81.47]
BH 25 92.55 [73.42]
BH 26 93.87
BH 30 92.92 (74.63)
BH 31 95.53 (77.37)
BH 32 94.17
BH 33 93.63 (76.26)
BH 34 93.05 [74.30]
BH 35 93.65 (67.84)
BH 37 94.05 (77.26)
BH 38 94.44
BH 39 94.41 (74.06)
BH 40 93.44 (75.40)
BH 41 93.43 (76.77)
BH 42 93.28 (70.27)
CP 1 94.77
CP 2/BH 27 92.52
CP 3/BH 28 93.31
CP 4/BH 29 92.68 [71.68]
CP 5
CP 6 92.88
CP 7 94.41
CP 8
CP 9 92.63
CP 10 94.05
CP 11 93.44
CP 12 92.79
CP 13 93.98
CP 14 93.96
CP 15 92.84

1A 97.54 96.5
1 97.12 96.6
2 96.67 96.7
3 96.45 96.0
4 96.35 96.2
4A 97.0 93.5
5 96.7 93.0
6 96.6 96.9
7 96.6 96.2
8 96.6 96.2
9 96.6 96.2
10 96.6 93.5
12 96.6 93.6
12A 97.0 92.5

LEGEND:

- BOREHOLE LOCATION, CURRENT INVESTIGATION
- APPROX. BOREHOLE LOCATION, PRELIMINARY GEOTECHNICAL INVESTIGATION (JDPA REPORT NO. G9169–LET.01) GROUND ELEVATIONS WERE INTERPRETED FROM CONTOUR PLAN AND ARE APPROX.
- APPROX. BOREHOLE LOCATION, PRELIMINARY GEOTECHNICAL INVESTIGATION (PATERSON GROUP PG0538–01)
- PIEZOCONE HOLE LOCATION
- 95.48 GROUND SURFACE ELEVATION (m)
- (74.12) PRACTICAL REFUSAL TO AUGERING/DCPT ELEVATION (m)
- [73.42] PRACTICAL REFUSAL TO ADVANCEMENT OF NW CASING BY WASH BORING ELEVATION (m)
- 1A 97.54 96.5 IBI REFERENCED POINT (CONCEPT 27) MINIMUM FINISHED GRADE OVER EXISTNG GRADE

NOTE: BASE PLAN AND GROUND SURFACE ELEVATIONS PROVIDED BY STANTEC GEOMATICS.

REV #	DATE	DESCRIPTION

Client: MINTO LAND DEVELOPMENT CORP.

Project: GEOTECHNICAL INVESTIGATION

Title: TEST HOLE LOCATION PLAN (ARCADIA–CONCEPT 33)
KANATA WEST LANDS–HUNTMAR ROAD
OTTAWA, ONTARIO

Report No. PG0538–11
Date: AUGUST 2011
Dwg. No. PG0538–11
Scale: 1:2000
Des.: DG
Dwn: DJA
Chkd: DG

paterson group
consulting engineers
28 Concourse Gate, Unit 1, Ottawa, Ontario K2E 7T7

PG0538–10_TEST33.DWG

ATTACHMENT B

Species at Risk Screening Summary

Attachment B
Species of Conservation Concern Screening Results

Taxon	Common name	Scientific Name	Global	Provincial	COSEWIC	SARA (Sch 1)	ESA	Source	Habitat Description	Site Habitat	Probability of Occurrence on Site
Amphibian	Western chorus frog (Great Lakes St. Lawrence-Canadian Shield Population)	*Pseudacris triseriata*	G5TNR	S3	Threatened	Threatened	Not Listed	Ontario Herpeto-faunal Summary Atlas	Requires both terrestrial and aquatic habitats in close proximity. Terrestrial habitat consists mostly of humid prairie, moist woods, or meadows. For reproduction and tadpole development, this species requires seasonally dry, temporary ponds that are devoid of predators such as fish. The Western Chorus Frog is primarily a lowland terrestrial species. In marshes or wooded wetland areas, it is found on the ground or in low shrubs and grass. It is a poor climber. Like all other frogs, the Western Chorus Frog requires both terrestrial and aquatic habitats in close proximity. For breeding and tadpole development, it requires seasonally dry temporary ponds devoid of predators, particularly fish. The Western Chorus Frog is very rarely found in permanent ponds. Although it uses aquatic habitat during the breeding season, the Western Chorus Frog is a poor swimmer. The species hibernates in its terrestrial habitat, under rocks, dead trees or leaves, or in loose soil or animal burrows, even though these sites are sometimes flooded. - SARA WEB	Creek, open fields and riparian cover on site, temporary ponds not evident	Low
Arthropod	Monarch	*Danaus plexippus*	G5	S2N, S4B	Special Concern	Special Concern	Special Concern	ROM	Found in Ontario wherever there are milkweed plants for its caterpillars and wildflowers for a nectar source; often found on abandoned farmland and roadsides, but also in city gardens and parks.	Fallow fields full of milk weed	Moderate
Arthropod	Rapids clubtail	*Gomphus quadricolor*	G3G4	S1	Endangered	Endangered	Endangered	ROM	Larvae live in muddy pools in clear, cool streams. Adult males perch on rocks in rapids. Adult females inhabit forests on the riverbanks, moving to the rapids when ready to mate.	Stream perhaps not cool enough	Low
Arthropod	West Virginia white	*Pieris virginiensis*	G3G4	S3	Not Listed	Not Listed	Special Concern	ROM	Lives in moist, deciduous woodlands, and the larvae feed only on the leaves of toothwort (*Dentaria diphylla*; *Dentaria X maxima*), which is a small, spring-blooming plant of the forest floor.	Riparian forest inadequate size and structure	None
Bird	Canada warbler	*Wilsonia Canadensis*	G5	S4B	Threatened	Threatened	Special Concern	ROM	Uses a wide range of deciduous, coniferous and mixed forests, with a well-developed shrub layer and a structurally complex forest floor. It is most abundant in moist, mixed forests. It also occurs in riparian shrub forest on slopes and in ravines, in stands regenerating after natural and anthropogenic disturbances and in old-growth forests with canopy openings and a well-developed shrub layer.	Forest area too small and poorly structured.	None
Bird	Chimney swift	*Chaetura pelagica*	G5	S4B, S4N	Threatened	Threatened	Threatened	ROM	Chimney swifts nest primarily in old chimneys and similar structures in buildings, and in large hollows of trees.	No suitable structures	None
Bird	Common nighthawk	*Chordeiles minor*	G5	S4B	Threatened	Threatened	Special Concern	ROM	These aerial forages require areas with large open habitat. This includes farmland, clearcuts, burns, alvars, and gravel rooftops in cities.	Gravel expanse of disturbed area	Low
Bird	Golden-winged warbler	*Vermivora chrysoptera*	G4	S4B	Threatened	Threatened	Special Concern	ROM	This warbler has a broad range and variety of plant communities it uses for nesting, but its territories have a consistent pattern: patches of herbs, shrubs, and scattered trees, plus a forested edge. The males arrive on the breeding grounds a few days ahead of the females. During the breeding season, this warbler occurs in various semi-open habitats: areas with abundant herbaceous vegetation, large clumps of bushes and relatively few trees. Such habitat may be found in a marsh surrounded by forest or fields left fallow for 10–30 years. Breeds in patchy shrubland and forest edge, such as shrubby fields, marshes, and bogs. Winters in canopy of tropical forests.	Fallow fields with few scattered trees within Site	Low
Bird	Olive-sided flycatcher	*Contopus cooperi*	G4	S4B	Threatened	Threatened	Special Concern	ROM/ CornellLab of Ornithology	The Olive-sided Flycatcher prefers open areas containing tall trees and/or snags for perching and flying out to catch insects. This includes forested wetlands, forest edges, open mature forest, and forest edges near natural and manmade open areas (wetlands, burns, logged areas etc.). These aerial foragers usually nest in tall coniferous trees near an open area.	Few conifers observed within riparian forest	Low

Taxon	Common name	Scientific Name	Global	Provincial	COSEWIC	SARA (Sch 1)	ESA	Source	Habitat Description	Site Habitat	Probability of Occurrence on Site
Bird	Peregrine falcon	*Falco peregrinus anatum*	G4	S3B	Special Concern	Threatened	Threatened	ROM	Nests are usually scrapes made on cliff ledges on steep cliffs, usually near wetlands - including artificial cliffs such as quarries and buildings; prefers to hunt in open habitats such as wetlands, tundra, savannah, sea coasts and mountain meadows, but will also hunt over open forest.	No habitat	None
Bird	Red knot	*Calidris canutus rufa*	G4T2	S1N	Endangered	Not Listed	Endangered	ROM	The majority of Red knots overwinter in Tierra del Fuego, Argentina and undertake an amazing 15,000-kilometre migration to the Canadian Arctic each spring for a short breeding season, before heading south again in the fall. During migration, they stop at several staging sites to rest and re-fuel before continuing their journey. Knots use different habitats and food sources on breeding, wintering and staging grounds. On their wintering and migration stopover sites, they inhabit intertidal areas, salt marshes, and brackish lagoons, wherever they can find mollusks and other invertebrates that form the main part of their diet. On their breeding grounds in the Arctic, they depend on insect larvae and other invertebrates for the bulk of their diet	No habitat	None
Bird	Rusty blackbird	*Euphagus carolinus*	G4	S4B	Special Concern	Special Concern	Not Listed	CornellLab of Ornithology	Nests in and at the edge of forest wetlands such as slow-moving streams, peat bogs, marshes, swamps, beaver ponds and pasture edges. Is usually associated with standing dead timber.	Lots of dead timber within creek and slow moving sections due to beaver dams	Low
Bird	Short-eared owl	*Asio flammeus*	G5	S2N,S4B	Special concern	Not Listed	Special Concern	ROM	Prefers extensive stretches of relatively open habitat; primarily a bird of marshland and deep grass fields. Open areas particularly meadows, marshes, bogs, and tundra.	Deep grass fields within creek areas though no marshes or bogs	Low
Bird	Least bittern	*Ixobrychus exilis*	G5	S4B	Threatened	Threatened	Threatened	ROM	Nests in freshwater marshes, where dense tall aquatic vegetation is interspersed with clumps of woody vegetation and open water; are most regular in marshes exceeding 5 ha.	No wetlands	None
Bird	Red-headed woodpecker	*Melanerpes erythrocephalus*	G5	S4B	Threatened	Threatened	Special Concern	ROM	The red-headed woodpecker nests in open deciduous forest where it requires dead standing snags for nest sites and feeding.	Riparian forest too closed	Low
Fish	American eel	*Anguilla rostrata*	G4	S1?	Special Concern	Not Listed	Endangered	ROM	American eels move freely into muddy, silty bottoms of lakes, lying buried in the daylight hours in summer. They apparently spend the winter buried in mud. Eels are primarily a nocturnal species. Very little is known of their reproductive needs other than the fact that they migrate to the sea to spawn in autumn and the young elvers retreat back to freshwater in the spring.	No lakes with 1km buffer	None
Fish	Lake sturgeon (Great Lakes, upper St.Lawrence Population).	*Acipenser fulvescens*	G3G4TNR	S2	Threatened	Not Listed	Threatened	ROM	This species typically inhabits highly productive shoal areas of large lakes and rivers. They are bottom dwellers and prefer mud or gravel and mud bottoms. Small sturgeons are often found on gravelly shoals near the mouths of rivers. A recent study found that juvenile lake sturgeon are more abundant over silt/sand substrate in areas of low velocity which typically support benthic invertebrate communities; whereas adults prefer areas dominated by boulders with the remaining substrate being composed of silt/sand and cobble. They spawn in depths of 0.5 to 4.5 metres in areas of swift water or rapids. Where suitable spawning rivers are not available, such as in the lower Great Lakes, they are known to spawn in wave action over rocky ledges or around rocky islands.	No lakes with 1km buffer and river without shoal areas and small	None
Fish	River redhorse	*Moxostoma carinatum*	G4	S2	Special Concern	Special Concern	Special Concern	ROM	Inhabits moderate to large rivers where the current is fast, and the bottom is composed of stones, rubble and bedrock with very little siltation.	Slow current and bottom clay/silt	None
Lichen	Flooded jellyskin	*Leptogium rivulare*			Threatened	Threatened	Threatened	ROM	This lobed, leaf-like lichen grows on the lower trunks of trees in hardwood swamps where flooding occurs in the spring.	Creek floodplain within riparian forest	Low

Taxon	Common name	Scientific Name	Global	Provincial	COSEWIC	SARA (Sch 1)	ESA	Source	Habitat Description	Site Habitat	Probability of Occurrence on Site
Mammal	Eastern cougar	*Puma concolor couguar*	G5	SU	Data Deficient	Not Listed	Endangered	ROM	Habitat is essentially the same as that of their primary prey; within this habitat, prefers rocky cliffs, ledges, vegetated ridgetops, or other areas that provide cover for undetected surveillance of prey; stream courses and ridgetops are frequently used as travel corridors and hunting routes; riparian vegetation along streams provides cover for mountain lions traveling in open areas.	No habitat	None
Mammal	Southern flying squirrel	*Glaucomys volans*			Not at Risk	Not Listed (on Sch. 3 currently)	Not Listed	ROM	Inhabit hardwood forests in eastern North America. Dead hollow trees are used as den sites.	Forest too small and poorly structured	None
Reptile	Blanding's turtle	*Emydoidea blandingii*	G4	S3	Threatened	Threatened	Threatened	ROM	Found in shallow water; prefers marshes, bogs, secluded bays, shallow parts of lakes and creeks with soft bottoms and dense aquatic vegetation.	No aquatic vegetation within creek though soft bottomed	Low
Reptile	Eastern ribbonsnake	*Thamnophis sauritius*	G5	S3	Special Concern	Special Concern	Special Concern	ROM	The Eastern Ribbonsnake is semi-aquatic. It is most frequently found along the edges of shallow ponds, streams, marshes, swamps, or bogs bordered by dense vegetation that provides cover. Abundant exposure to sunlight is also required, and adjacent upland areas may be used for nesting. During winter (October to April), Eastern Ribbonsnakes hibernate in rock crevices, animal burrows, and even in ant mounds.	Creek section with dense riparian forest and piles of concrete debris	Moderate
Reptile	Northern map turtle	*Graptemys geographica*	G5	S3	Special Concern	Special Concern	Special Concern	ROM	Inhabits both lakes and rivers, showing a preference for slow moving currents, muddy bottoms, and abundant aquatic vegetation; needs suitable basking sites (such as rocks and logs) and exposure to the sun for at least part of the day; estimates of 15 to 35 turtles per kilometre of shoreline have been made along the Ottawa River.	Not much basking habitat due to tall grasses and narrow channel width in fallow field section. Stream too small to support population	Low
Reptile	Snapping turtle	*Chelydra serpentina*	G5	S3	Special Concern	Special Concern	Special Concern	ROM/ Ontario Herpeto-faunal Summary Atlas	Usually found in large bodies of water, but can be found in smaller ponds. They rarely leave the water except to lay eggs in moist soil.	No large water bodies	None
Reptile	Stinkpot or Eastern Musk Turtle	*Sternotherus odoratus*	G5	S3	Threatened	Threatened	Threatened	ROM	Requires shallow water with little or no current, and soft earth to bury into when they hibernate; nesting habitat is variable, but must be close to the water and exposed to direct sunlight; northernmost locations recorded are in Outaouais, just north of the Ottawa River.	Creek has current and clay bottom	None
Reptile	Milksnake	*Lampropeltis triangulum*	G5	S3	Special Concern	Special Concern	Special Concern	ROM	Inhabits rural areas; most frequently reported in and around buildings, especially old structures; however, it is found in a wide variety of habitats, from prairies, pastures, and hayfields, to rocky hillsides and a wide variety of forest types; occurs along the border between Quebec and Ontario, south of the St. Lawrence River, and east of the St. Francois River.	One building on site though very new	Low
Vascular plant	American ginseng	*Panax quinquefolius*	G3G4	S2	Endangered	Endangered	Endangered	ROM	Found in rich, moist, undisturbed and relatively mature deciduous woods in areas of neutral soil (such as over limestone or marble bedrock; forest canopy is usually dominated by sugar maple, white ash, bitternut hickory, and basswood; colonies are often found near the bottom of gentle south-facing slopes, where the microhabitat is warm and well-drained.	Riparian forest around creek is semi-disturbed with human presence evident from discarded refuse and other old structures (wooden/barbed wire fence and gas cylinders etc).	Low
Vascular plant	Butternut	*Juglans cinerea*	G4	S3?	Endangered	Endangered	Endangered	ROM	Grows best on rich, moist, well-drained loams often found on stream bank sites but may be found on well-drained gravelly sites, especially those of limestone origin; common associates include basswood, black cherry, beech, black walnut, elm, hemlock, hickory, oak, red maple, sugar maple, white ash and yellow birch; may be an indicator /associate of ginseng.		Low
Vascular plant	Eastern prairie fringed-orchid	*Platanthera leucophaea*			Endangered	Endangered	Endangered	ROM	Grows in wet prairies, fens, bogs, and occasionally old fields. Can lay dormant in soil for several years until conditions become favourable.	Old fallow field over majority of site, not suitably wet	Low

Taxon	Common name	Scientific Name	Global	Provincial	COSEWIC	SARA (Sch 1)	ESA	Source	Habitat Description	Site Habitat	Probability of Occurrence on Site
Bird	Whip-poor-will	*Caprimulgus vociferus*	G5	S4B	Threatened	Threatened	Threatened	ROM	dry, open, deciduous woodlands of small to medium trees; oak or beech with lots of clearings and shaded leaf litter; wooded edges, forest clearings with little herbaceous growth; pine plantations; associated with >100ha forests; may require 500-1000ha to maintain population	Riparian forest too overgrown, closed canopy	None
Bird	Bobolink	*Dolichonyx orizivorus*	G5	S4B	Threatened	Not Listed	Threatened	ROM/OBBA	large, open expansive grasslands with dense ground cover; hayfields, meadows of fallow fields; marshes require tracks of grasslands >50ha	Grasslands within and surrounding site not of suitable species or wetness.	Low

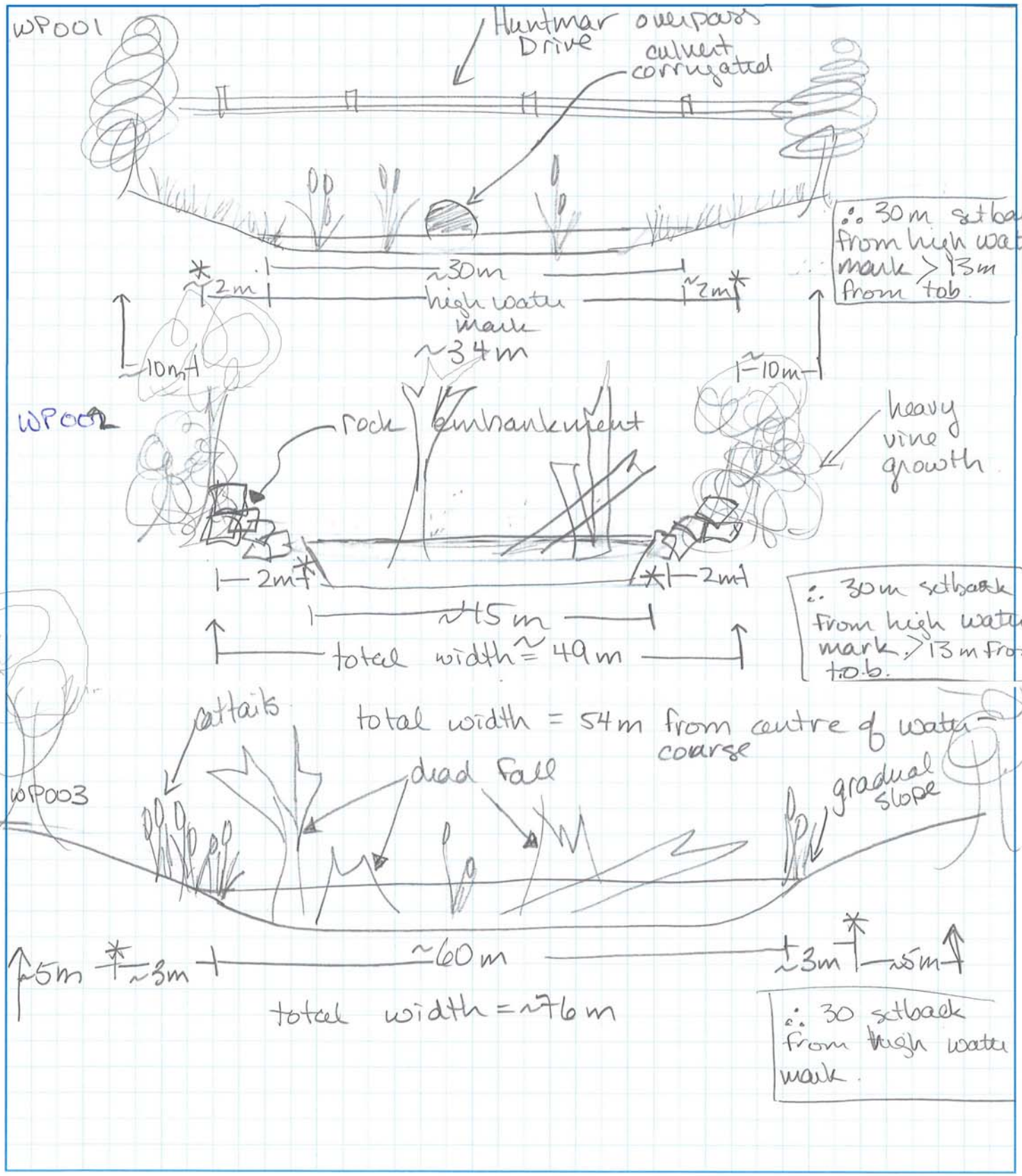
ATTACHMENT C

Field Drawings of Channel Characteristics at Waypoints

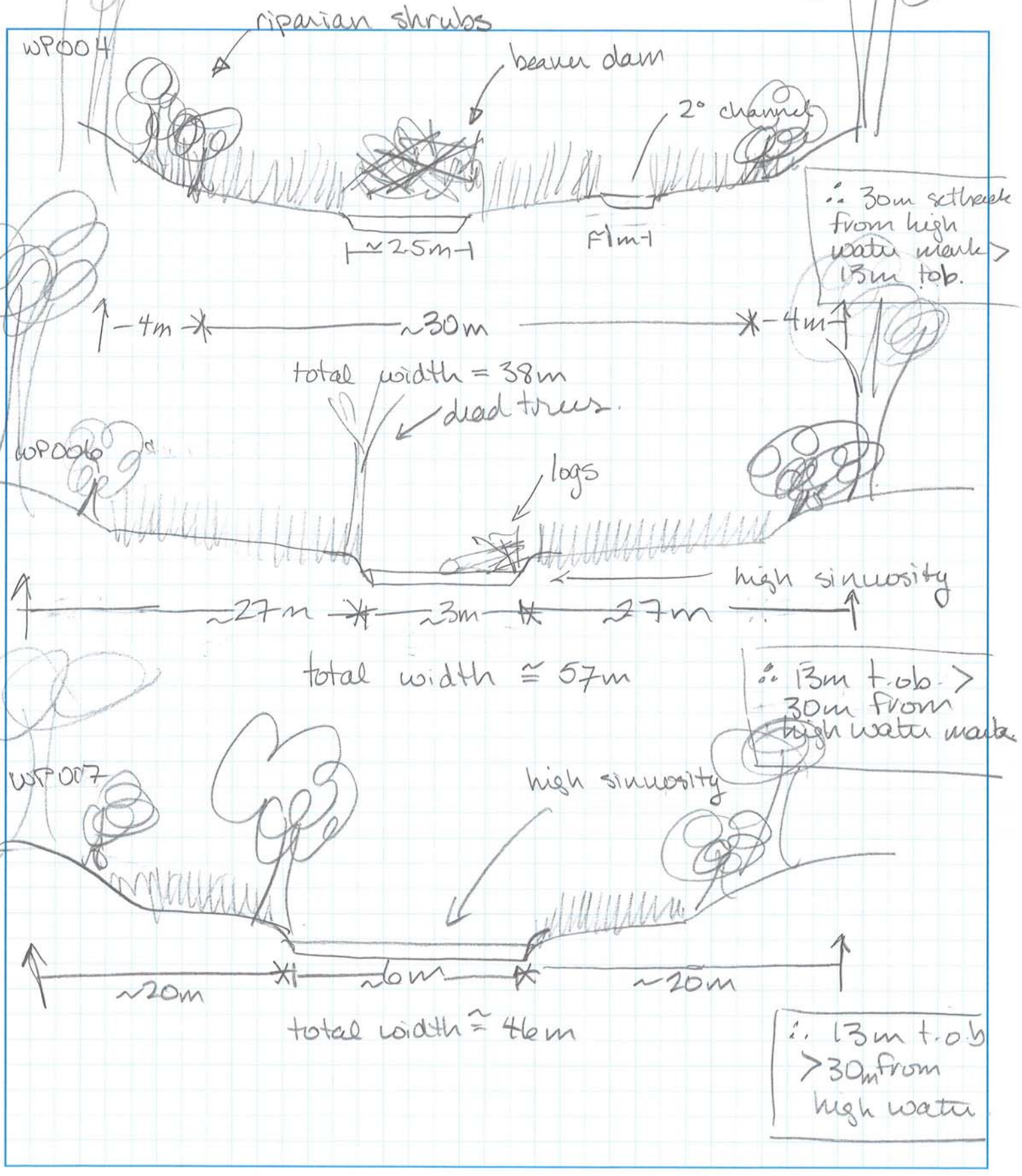
Golder Associés

* indicates estimated high water mark
↑ indicates estimated top of bank

Note: all figures face up stream. All distances are approximate

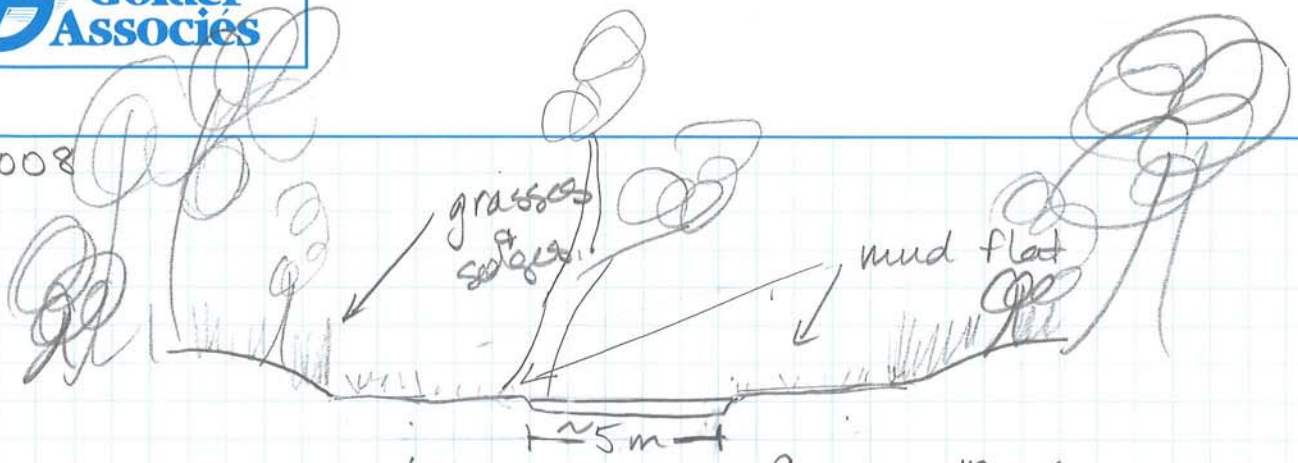


Golder Associés



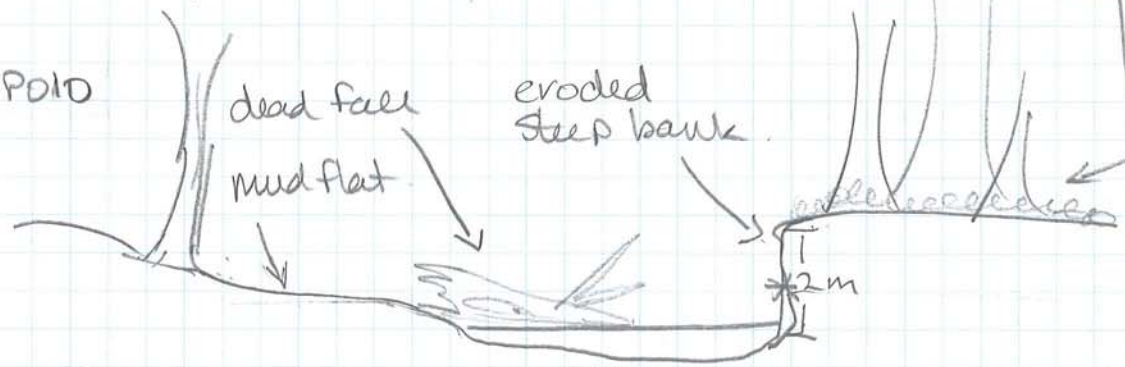
Golder Associés

WP008



∴ 30m from hwm > 13m tob

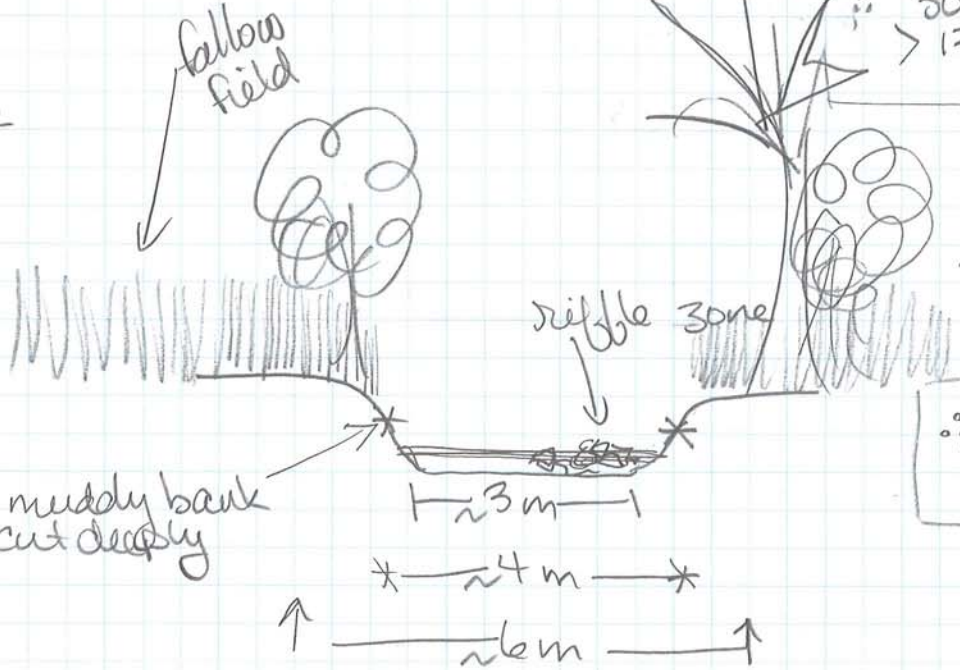
WP010



*cut banks alternate while traveling downstrm. At any particular portion, top of bank = high water mark

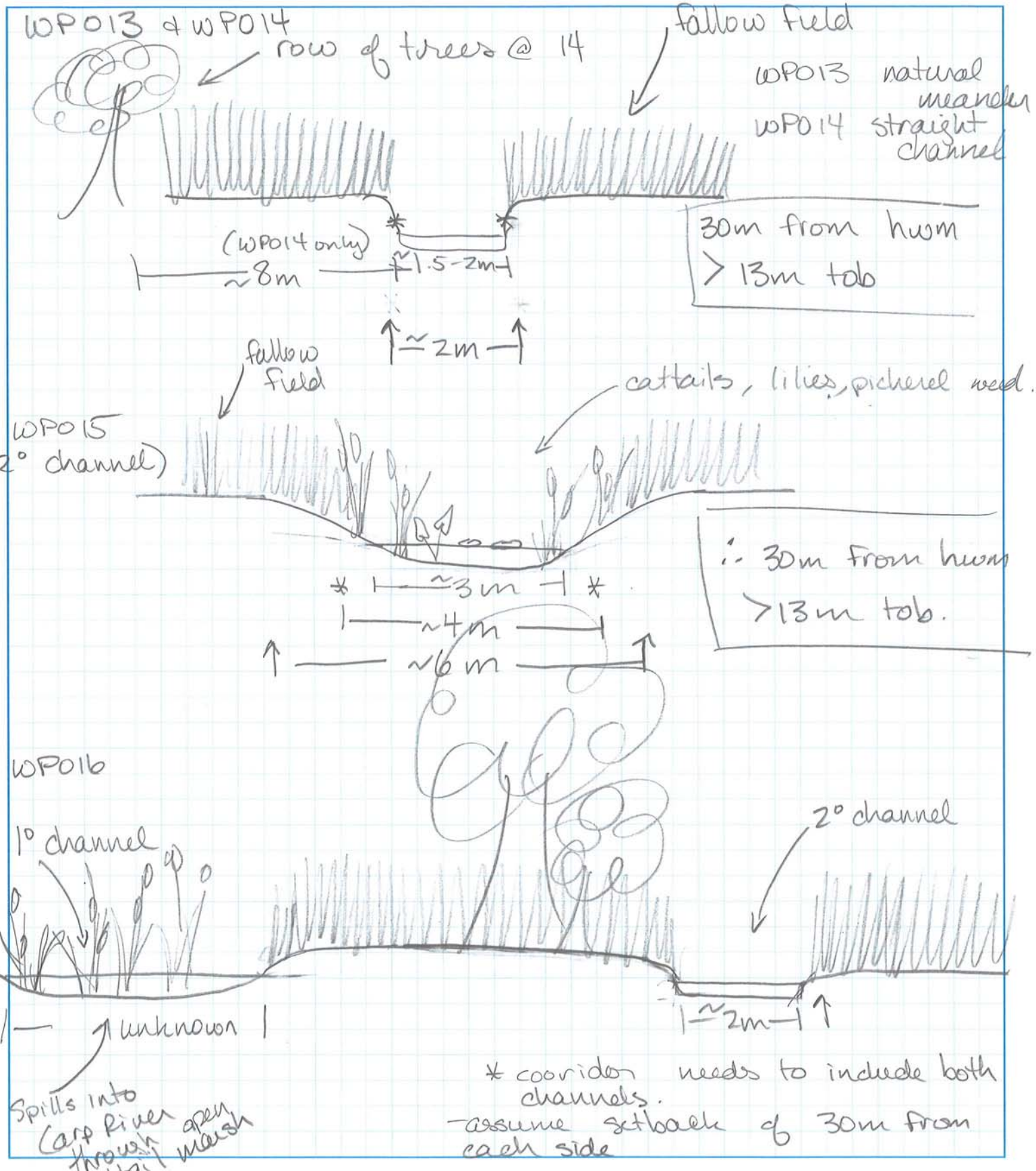
∴ 30m setback from hwm > 13m tob.

WP012



-stream meandering

∴ 30m setback from hwm, > 13m from tob.


WP013 & WP014
row of trees @ 14
fallow field
WP013 natural meander
WP014 straight channel
30m from hwm
> 13m tob
(WP014 only)
~8m
~1.5-2m
~2m
fallow field
cattails, lilies, pickerel weed.
WP015
(2° channel)
∴ 30m from hwm
>13m tob.
~3m
~4m
~6m
WP016
1° channel
2° channel
unknown
~2m
Spills into Carp River open through cattail marsh
* coorider needs to include both channels.
-assume setback of 30m from each side

ATTACHMENT D

Site Photographs

Photograph # 1: Waypoint 1 (facing southeast)

Photograph # 2: Waypoint 2 (facing southeast)

Photograph # 3: Waypoint 3 (facing southeast)

Photograph # 4: Waypoint 4 (facing upstream, southwest)

Photograph # 5: Waypoint 6 (facing upstream, southwest)

Photograph # 6: Waypoint 7 (facing upstream, southwest)

Photograph # 7: Waypoint 8 (facing upstream, southwest)

Photograph # 8: Waypoint 10 (facing downstream, northeast)

Photograph # 9: Waypoint 11 (facing downstream, northeast)

Photograph # 10: Waypoint 12 (facing downstream, northeast)

Photograph # 11: Waypoint 13 (facing upstream, southwest)

Photograph # 12: Waypoint 14 (facing upstream, southwest)

Photograph # 13: Waypoint 15 (second channel, facing northeast)

At Golder Associates we strive to be the most respected global company providing consulting, design, and construction services in earth, environment, and related areas of energy. Employee owned since our formation in 1960, our focus, unique culture and operating environment offer opportunities and the freedom to excel, which attracts the leading specialists in our fields. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees who operate from offices located throughout Africa, Asia, Australasia, Europe, North America, and South America.

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