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February 17, 2023 File: 100737.002

Caivan (Perth GC) Limited
2934 Baseline Road, Suite 302
Ottawa, Ontario
K2H 1B2

Attention: Hugo Lalonde – Director, Land Development

Re: Slope Stability Assessment
Proposed Residential Development
141 Peter Street
Perth, Ontario

This letter presents the results of a slope stability assessment carried out for the proposed residential development located at 141 Peter Street in Perth, Ontario. The purpose of this slope stability assessment is to establish the 'Erosion Hazard Limit' for the site along the Tay River. This limit constitutes a safe setback for any proposed development at the site with respect to slope stability. The Erosion Hazard Limit was determined based on the Natural Hazard Policies set forth in Section 3.1 of the Provincial Policy Statements of the Planning Act of Ontario. Current regulations restrict development within the Erosion Hazard Limit.

BACKBROUND

It is understood that plans are being prepared for a new residential development at the Perth Golf Course located at 141 Peter Street.

GEMTEC Consulting Engineers and Scientists (GEMTEC) carried out a geotechnical investigation for the proposed development, the results of that investigation are provided in the following report:

- Report to Caivan (Perth GC) Limited, titled "Geotechnical Investigation, Proposed Residential Development, 141 Perth Street, Perth, Ontario" dated February 3, 2022 (Project No. 100737.002)

Based on the results of the previous investigation, the site is generally underlain by deposits of weathered silty clay crust and/or glacial till over shallow bedrock. The overburden deposits at the site are underlain by Precambrian bedrock at depths of up to about 3 metres below the existing ground surface, with some localized areas of up to about 8 metres. Several areas of outcropping bedrock were observed within the proposed development during the investigation.

DESCRIPTION OF SITE AND SLOPE

A site reconnaissance was carried out on May 12, 2022 by a member of our engineering staff. At that time, the geometry of the full height of the slope along the Tay River at the site was surveyed at seven locations using hand surveying equipment. The cross sections were positioned in the field by GEMTEC personnel. The locations of the cross sections are provided on Figure 1. Cross sections of the slopes are provided in the attached.

The geometries of the cross sections considered are summarized in Table 3.1:

Table 2.1 – Slope Cross Section Height and Slope Inclination

Cross Section	Slope Height (metres)	Approximate inclination from horizontal (degrees)
A-A	2.7	18
B-B	1.1	18
C-C	1.5	18
D-D	0.9	35
E-E	1.0	18
F-F	1.0	18
G-G	1.0	18

Based on our previous geotechnical investigation, the site is generally underlain by stiff to very stiff weathered silty clay crust and/or compact to dense glacial till over Precambrian bedrock. The slopes along the Tay River have an overall slope height of up to about 2.7 metres, but generally less than about 1.5 metres with inclinations generally about 18 and 35 degrees from the horizontal along the natural slope.

The site is vegetated with small to large trees and grass. No signs of slope instability (e.g., tension cracks) was observed at the site during our site reconnaissance. Signs of minor erosion was observed at the site during our site reconnaissance.

SLOPE STABILITY ASSESSMENT

For unstable slopes, the distance from the unstable slope to the safe setback line is called ‘Erosion Hazard Limit’. In accordance with the Ministry of Natural Resources (MNR) Technical Guide “Understanding Natural Hazards” dated 2001, the Erosion Hazard Limit consists of three

components: (1) Stable Slope Allowance, (2) Toe Erosion Allowance, and (3) Erosion Access Allowance.

The Stable Slope Allowance, as described in the MNR procedures, encompasses the area where a minimum slope inclination of 3 horizontal to 1 vertical is achieved (i.e., a slope angle of about 18 degrees from horizontal). Since the slopes along the Tay River are generally sloped at about 3 horizontal to 1 vertical, with the exception of cross section D-D which has a slope height of about 0.9 metres, the Stable Slope Allowance described in the MNR procedures is not required.

Given that minor erosion was observed along the slope, a Toe Erosion Allowance of 8 metres is required for stiff clay soils/glacial tills. The Toe Erosion Allowance is applied at the crest of the slope.

The MNR procedures also include the application of a 6 metre wide Erosion Access Allowance beyond the Toe Erosion Allowance to allow for access by equipment to repair a possible failed slope.

Based on the above information, the Erosion Hazard Limit for the slopes along the Tay River will be 14 metres, as measured from the crest of the slope.

CLOSURE

We trust that this letter is sufficient for your purposes. If you have any questions or require additional information, please call.

Alex Meacoe, P.Eng.
Senior Geotechnical Engineer

Bill Cavers, P.Eng.
Principal Geotechnical Engineer

PS/WAM/BC

LICENSED PROFESSIONAL ENGINEER
W. A. MEACOE
100162115
Feb 17, 2023
PROVINCE OF ONTARIO

Enclosures
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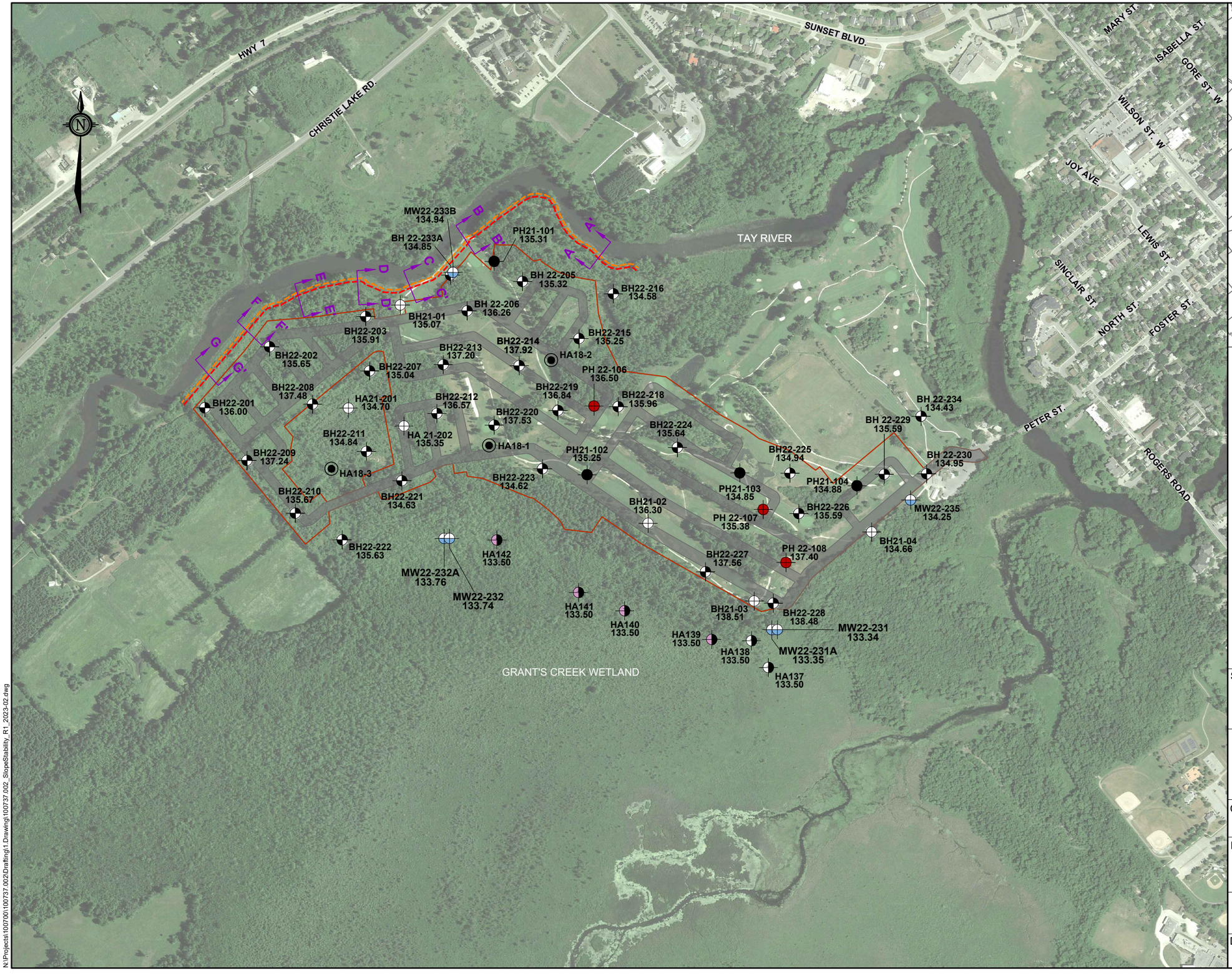
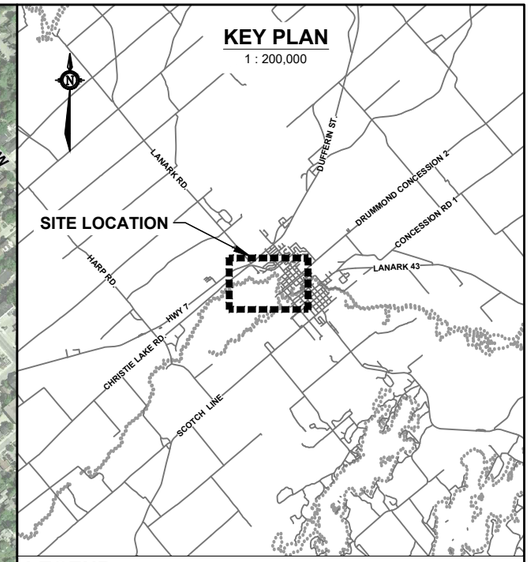
ATTACHMENTS

Figure 1 – Site Plan
Figure 2 to 8 – Slope Cross Sections





LEGEND

- **BH/ PH/ HA #** ← BOREHOLE/ PROBEHOLE/ HAND AUGERHOLE ID
- **XX.XX** ← GROUND SURFACE ELEVATION, IN METRES GEODETIC DATUM
- **BOREHOLE** (current investigation by GEMTEC)
- **BOREHOLE** (previous investigation by GEMTEC)
- **PROBEHOLE** (current investigation by GEMTEC)
- **PROBEHOLE** (previous investigation by GEMTEC)
- **HAND AUGERHOLE** (previous investigation by GEMTEC)
- **HAND AUGER HOLE** (previous investigation by GEMTEC, 2018)
- **HAND AUGER HOLE** (current investigation by GEMTEC)
- **HAND AUGER HOLE** (current investigation by GEMTEC,elevations are based on DEM (not surveyed data))
- **MONITORING WELL** (current investigation by GEMTEC)
- **APPROXIMATE DEVELOPMENT BOUNDARY**
- **EROSION ACCESS ALLOWANCE**
- **TOE EROSION ALLOWANCE**
- **A — A'** **SLOPE CROSS SECTION LOCATION**

Scale 1:7500

0 150 300 450m

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Client	Project
CAIVAN (PERTH GC) LIMITED	100737.002

Location: SLOPE STABILITY ASSESSMENT
PERTH GOLF COURSE
151 PETER STREET
PERTH, ONTARIO

Drwn by	Chkd by	
S.L.	W.A.M.	SITE PLAN

Date	Rev.	
FEBRUARY 2023	1	**FIGURE 1**

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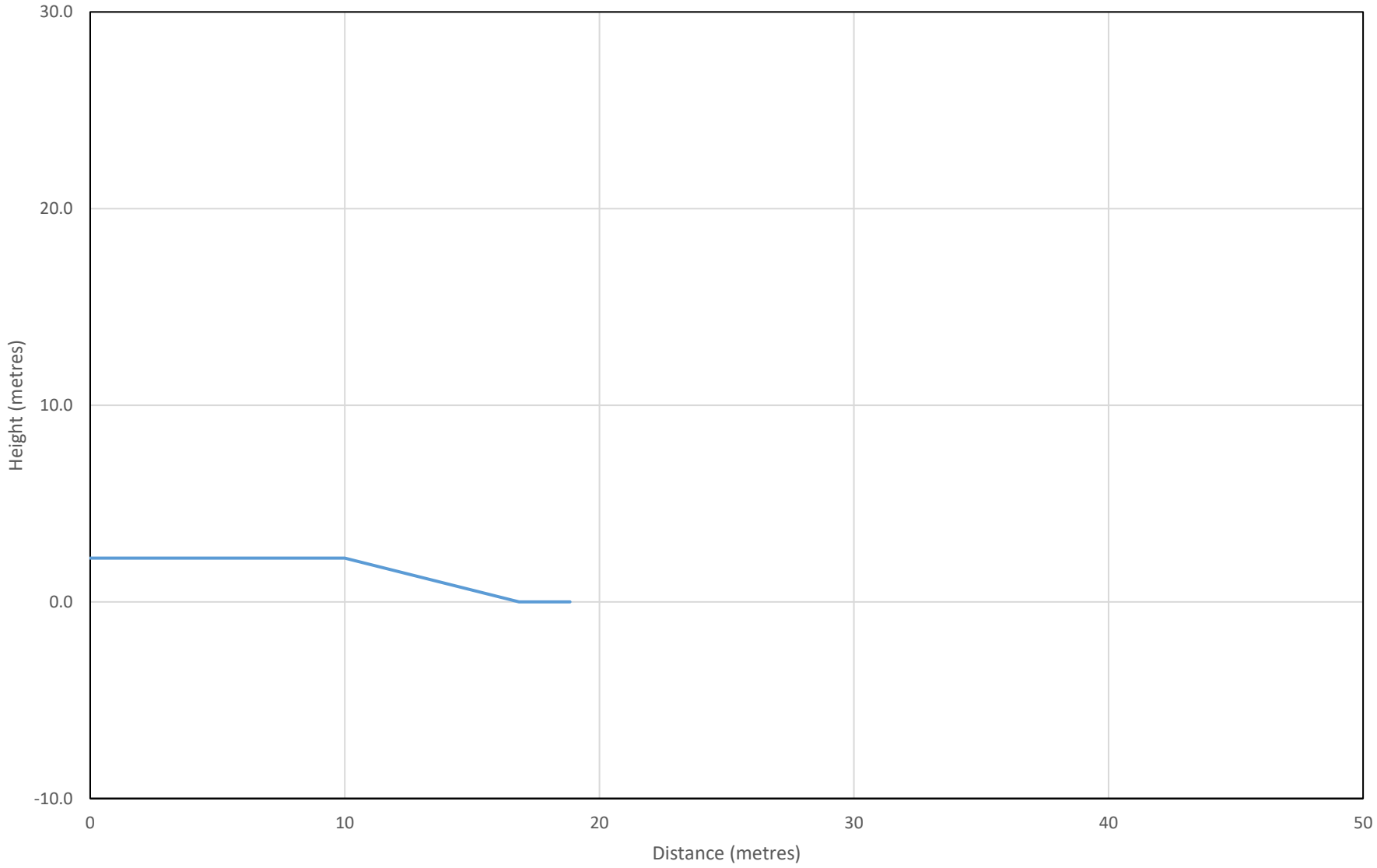

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Slope Cross Section AA

Perth Golf Development

Perth, Ontario

Project No.	100737.002
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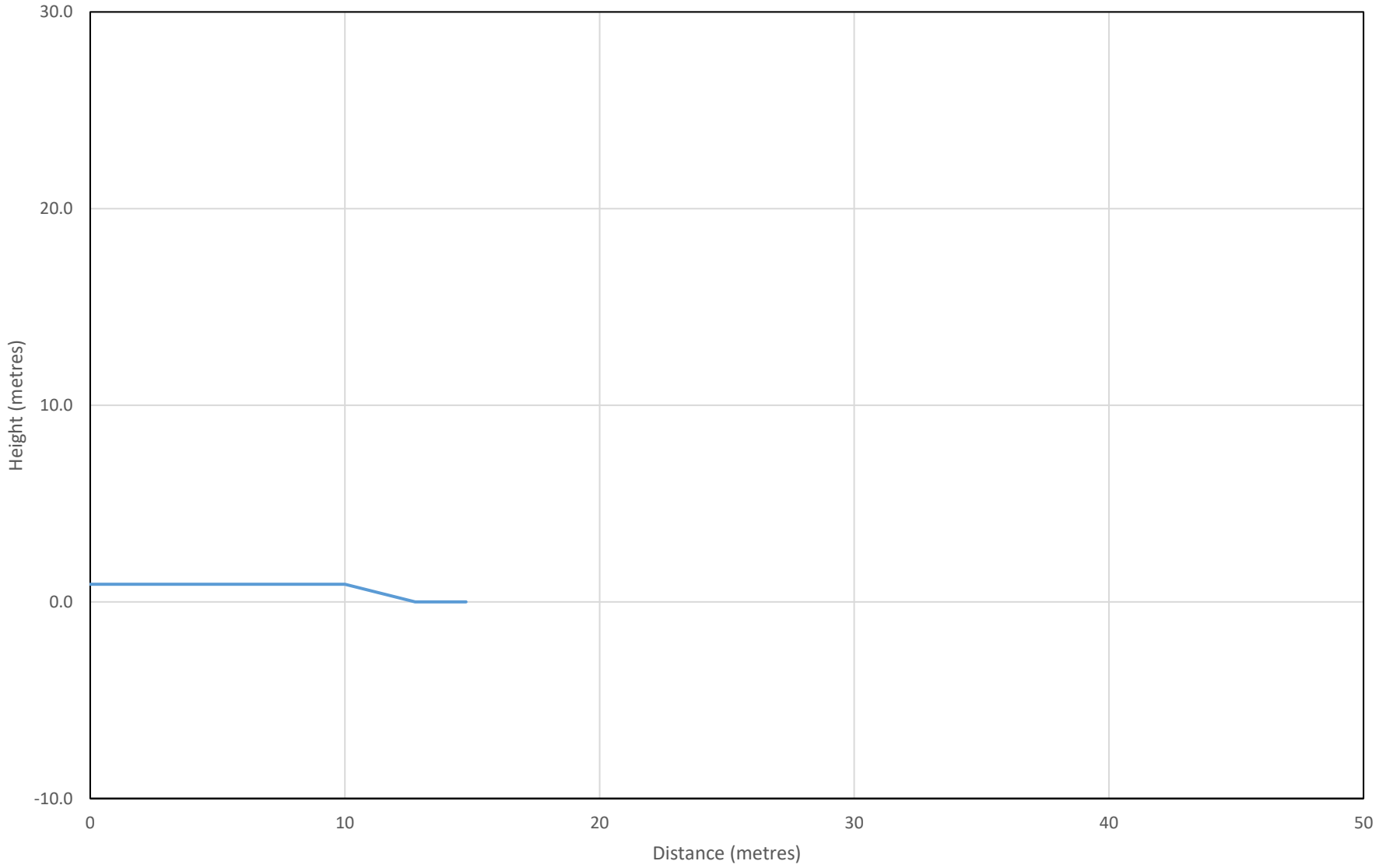
Date:	02/02/2023

Figure 2



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Slope Cross Section BB

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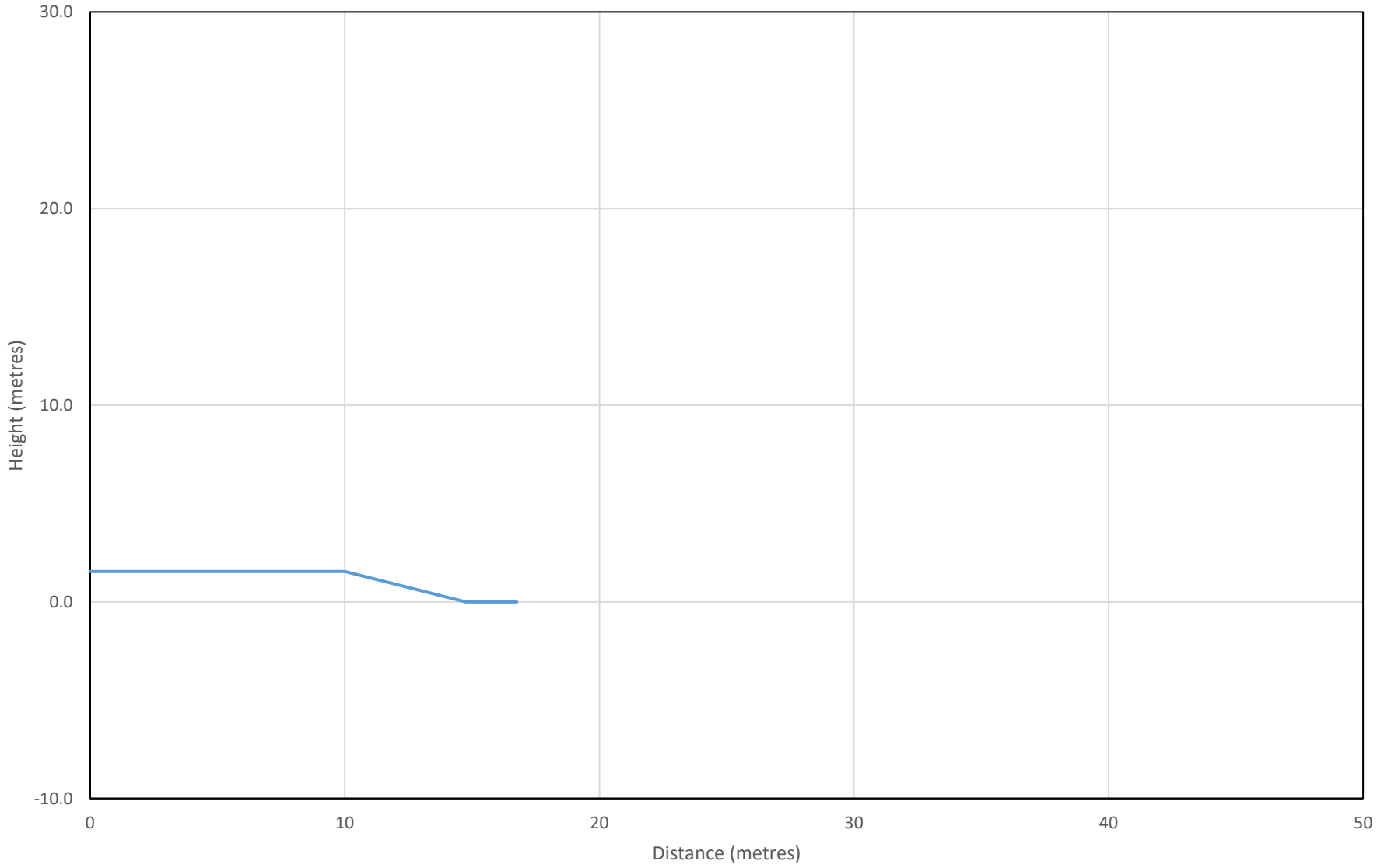
Figure 3



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Slope Cross Section CC

Perth Golf Development

Perth, Ontario

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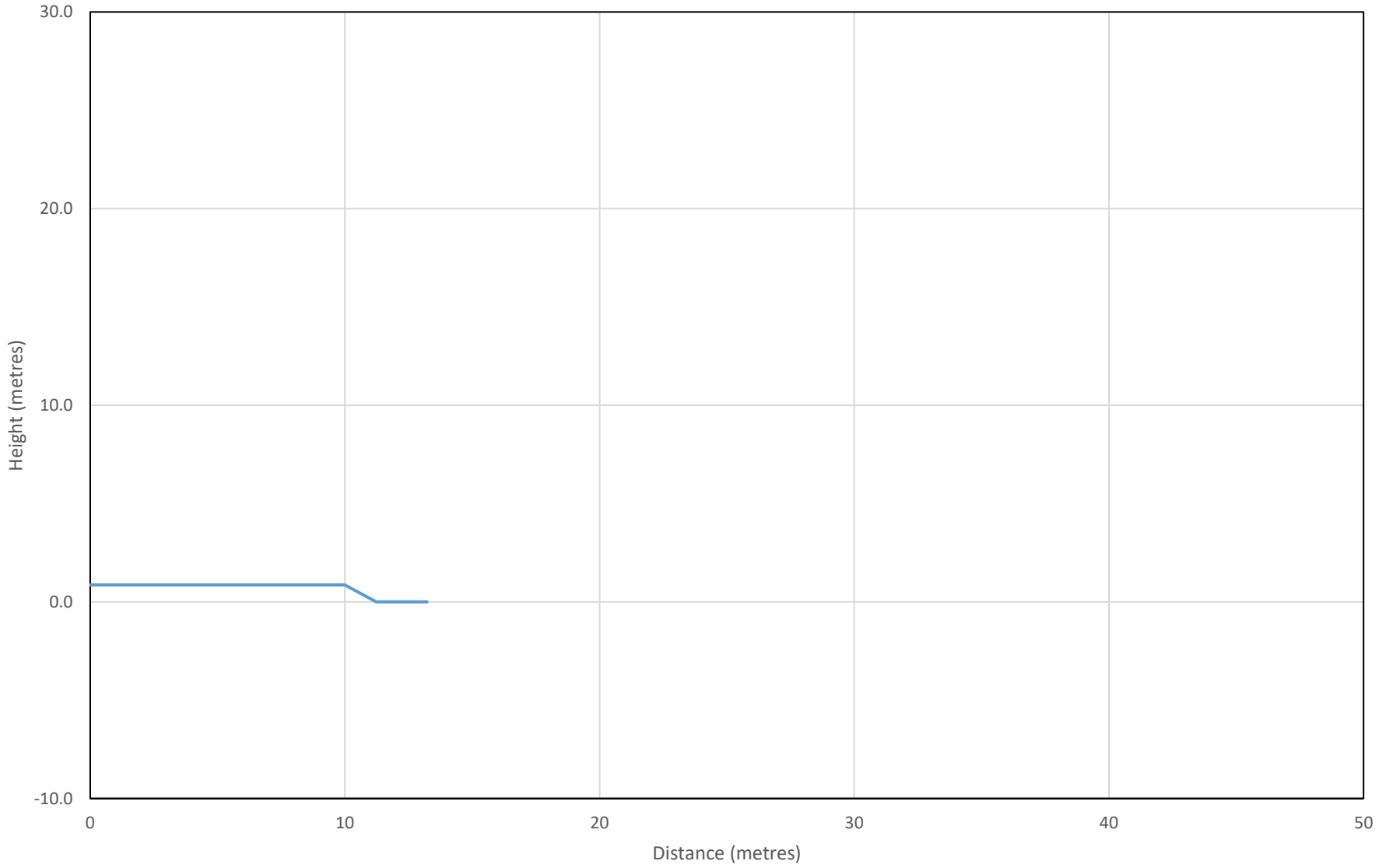
Figure 4



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Slope Cross Section DD

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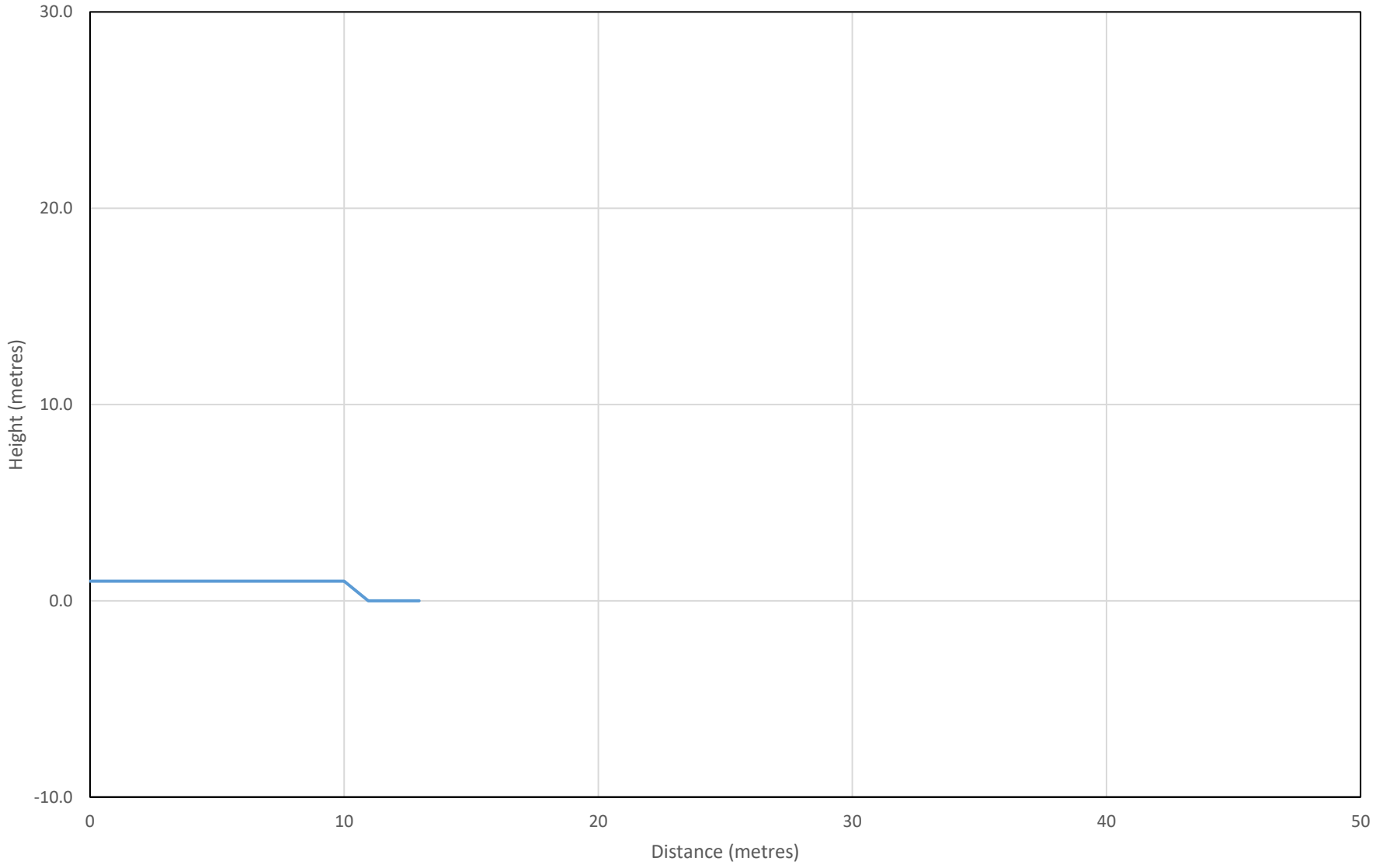
Figure 5



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Slope Cross Section EE

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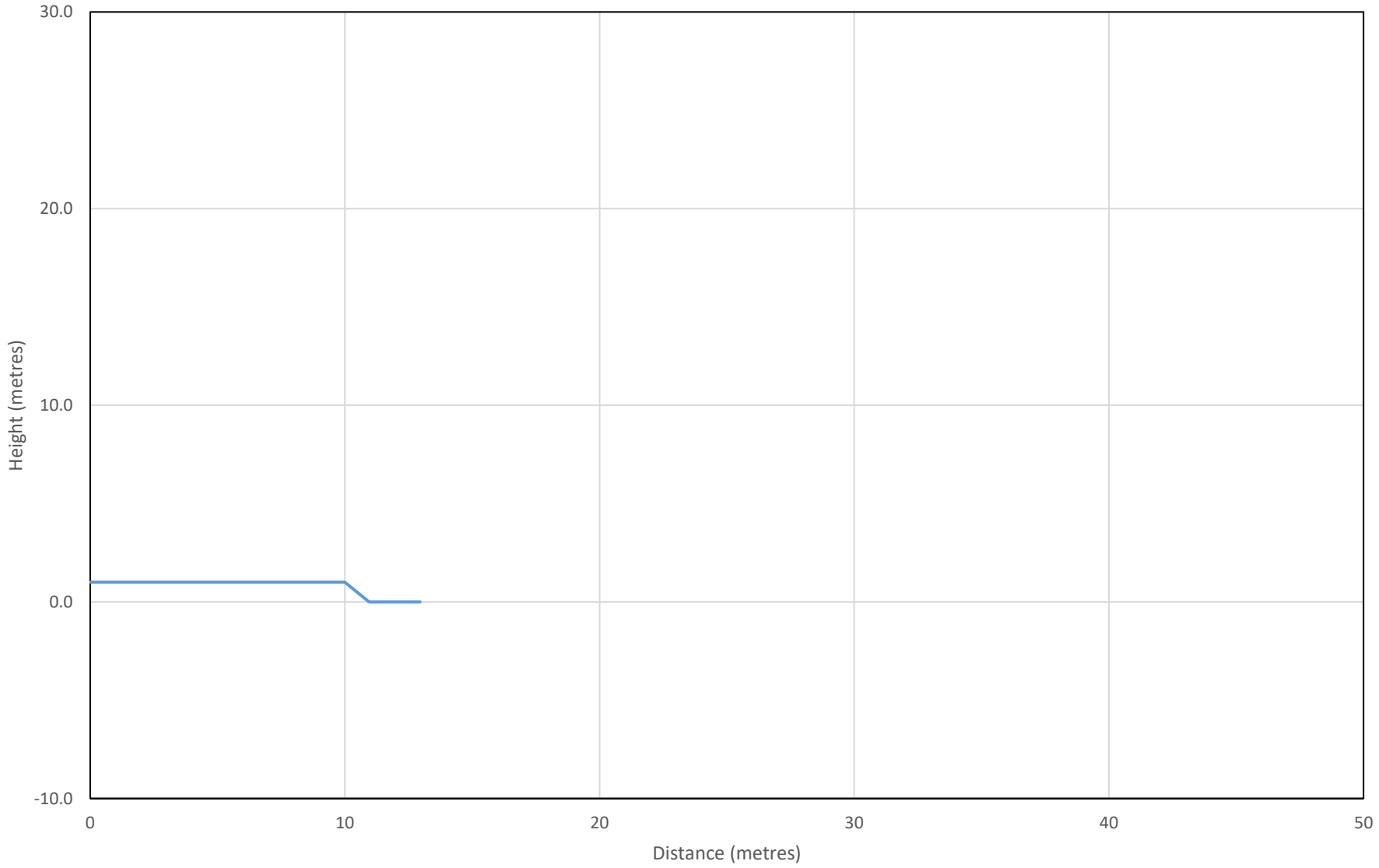
Figure 6



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Slope Cross Section FF

Perth Golf Development

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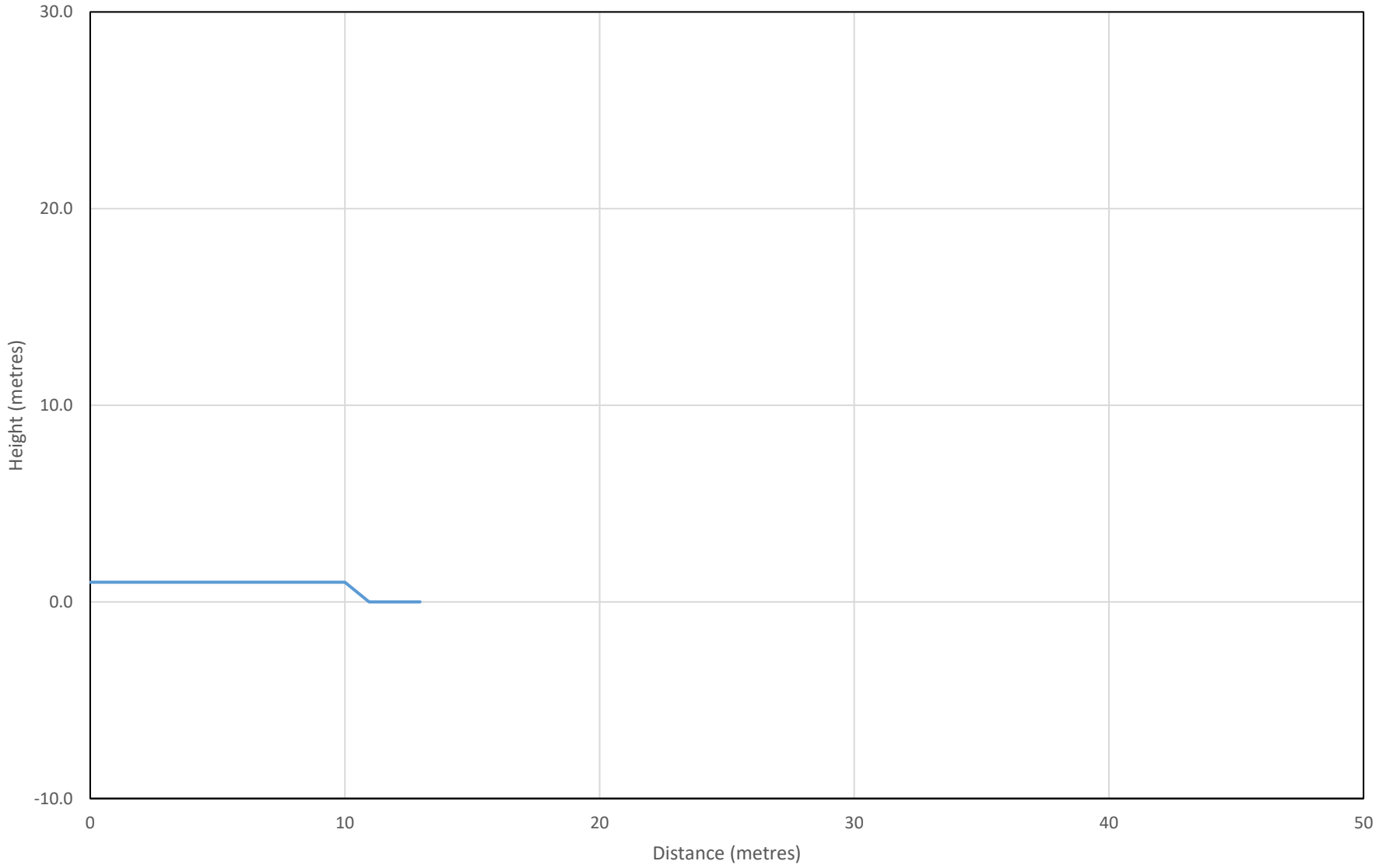
Figure 7



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Slope Cross Section GG

Perth Golf Development

Perth, Ontario

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Figure 8