From:	Ashley Haigh
To:	Sagan, Barsha
Cc:	Victor Kleinsasser; Daniel Burns; Kyla Dietrich
Subject:	RE: Please provide TAC comment response for the File 6193.00 – Crystal Spring Colony Wastewater Treatment Lagoon
Date:	October 22, 2024 10:50:17 AM
Attachments:	image001.png RPT 2024-07-25 Crystal Springs 200YR FPL 0_Final NW 0105-068-00.pdf

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ATTENTION: ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Good morning Barsha,

There were two outstanding TAC comments that BMCE had yet to respond to regarding the Crystal Spring Lagoon (see your two emails below in this chain). I have summarized both comments and the client's responses below:

1. Environmental Compliance and Enforcement would like to see a contingency plan (apart from the excessive 15% in volume) regarding the weeping tile management during periods when the weeping tile water volume is greater than expected or when the lagoon is near capacity and heavy rains come.

In addition to the excessive 15% volume carried for the hydraulic loading, the collection system in the community will be constructed in such a way that weeping tile water will not negatively impact the lagoon during wet or near-capacity conditions. We have advised that the residential weeping tile sump assemblies be fitted with a directional control valve which will direct weeping tile water to the sewer in cold/dry conditions, and to the surface for release at-grade during thaw/wet conditions.

2. The MTI Committee recommends that the Province:

- **Increase the standard for the Flood Protection Level to one based on a 1-in-200 year flood event.**

We will assess the flood hazard of any particular development or land use proposal based upon the 200 year flood level, and will provide flood protection recommendations to the 200 year flood protection level. While they are correct that the RM of Fisher-Armstrong would be the authority for this, the fact that their development plan has not been updated does not mean that the 100-year flood protection level is the correct requirement. I would recommend that they reach out to the RM of Fisher-Armstrong to confirm what flood protection level they would be requiring.

Based on this request, additional analyses were commissioned to provide the 200-year flood level. As demonstrated in the attached report from Trek Geotechnical (dated July 25, 2024), the results of the 200-year hydraulic analysis yield a 200-year water level at the proposed lagoon site of 248.06m. Per the submitted design, the proposed lagoon berms are set at an elevation of 248.50m, which exceeds the stipulated 200-year flood level. At this elevation, 0.7m of freeboard is provided above the 100-year flood level, and 0.44m of freeboard is provided above the 200-year level.

I do not believe there are any other outstanding responses necessary for the lagoon EAP review. If I am missing anything or you have further questions, please feel free to let me know.

Regards,

Ashley Haigh, P.Eng.
Civil Engineer

BURNS MAENDEL
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Burns Maendel Consulting Engineers Ltd.

Crystal Springs Colony - New Colony Development
200-Year Flood Level Assessment

Prepared for:

Ashley Haigh, P.Eng.
Burns Maendel Consulting Engineers Ltd.
Civil Engineer
903 Rosser Avenue
Brandon, MB
R7A 0L3

Project Number:
0105 068 00

Date:
July 26, 2024

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1712 St. James Street | Winnipeg, Manitoba R3H 0L3 | Tel 1.204.975.9433 | Fax 1.204.975.9435

July 26, 2024

Our File No. 0105 068 00

Ashley Haigh, P.Eng.
Burns Maendel Consulting Engineers Ltd.
Civil Engineer
903 Rosser Avenue
Brandon, MB
R7A 0L3

RE: Crystal Springs Colony - New Colony Development
200-year Flood Level Assessment

TREK Geotechnical Inc. is pleased to submit our report to support the previously submitted Hydrologic and Hydraulic Assessment. This report provides additional information regarding the 200-year Flood Level for the Proposed Lagoon site as part of the Crystal Springs Colony New Colony Development. This additional information is provided to comply with Provincial Standards.

Please contact the undersigned if you have any questions. Thank you for the opportunity to serve you on this assignment.

Sincerely,

TREK Geotechnical Inc.
Per:

[redacted]

Natasha Woelcke, P. Eng.
Water Resources Engineer
Tel: 204.792.2913

Encl.

Revision History

Revision No.	Author	Issue Date	Description
0	NW	July 26, 2024	Report

Authorization Signatures

Prepared By:

[redacted]

[redacted]
Natasha Woelcke, P.Eng.
Water Resources Engineer

ENGINEERS GEOSCIENTISTS MANITOBA
Certificate of Authorization
TREK GEOTECHNICAL INC.
[redacted] Date:_____

Reviewed By:

[redacted]
John Doering, Ph.D., P.Eng., FCSCE, FEC, FCAE, FCSSE
Senior Water Resources Engineer

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List of Appendices

1.0 Introduction

TREK Geotechnical Inc. (TREK) completed a Hydrologic and Hydraulic Assessment of the Crystal Springs Colony new colony development site in 2022 for Burns Maendel Consulting Engineers (BMCE) to provide a drainage assessment of a portion of Willow Creek, South Malonton Drain, and an unnamed drain to support the new proposed development.

During the regulatory authorization phase for the wastewater treatment lagoon, BMCE received comments from the Province of Manitoba requiring an assessment of the 200-year flood level at the site. BMCE requested that TREK undertake the required analysis and reporting to provide the 200-year flood level.

All engineering analysis undertaken in preparation of this report follows the methodology provided in the report titled "Crystal Springs Colony – New Colony Development Hydrologic and Hydraulic Assessment" by TREK dated November 21, 2022. The contents of this report should be reviewed and considered in conjunction with the aforementioned report.

2.0 Updated Hydrology

The hydrology was derived using methodology as presented in the 2022 Hydrologic and Hydraulic Assessment. As recommended by the Province of Manitoba, instantaneous peak flows are used in the assessment of flood protection levels. Instantaneous peak regional discharge coefficients were provided to TREK by Manitoba Transportation and Infrastructure - Hydrologic Forecasting and Water Management in July 2024. The following tables provide updated hydrologic estimates for Willow Creek, South Malonton Drain and Unnamed Drain for a 200-year return period.

Table 1: Willow Creek - Flood Hydrology

Discharge Event	Regional Discharge Coefficient*	Instantaneous Peak Discharge Willow Creek at Rd 107N Drainage Area = 131.3 km^2 (m^3/s)	Instantaneous Peak Discharge Willow Creek at Rd 15E Drainage Area = 175.3 km^2 (m^3/s)
200-year (0.5%)	0.822	34.3	42.8

* Updated discharge coefficients for WSC Gauge 05SB002 provided by MTI on July 4, 2024 (regional exponent n = 0.765).

Table 2: South Malonton Drain at the Confluence with Willow Creek - Flood Hydrology

Discharge Event	Regional Discharge Coefficient* Willow Creek near Gimli Gauge 05SB002 Drainage Area = 236 km^2	Instantaneous Peak Discharge South Malonton Drain at the Confluence with Willow Creek (Rd 15E) Drainage Area = 41.8 km^2 (m^3/s)
200-year (0.5%)	0.822	14.3

* Updated discharge coefficients for WSC Gauge 05SB002 provided by MTI on July 4, 2024 (regional exponent n = 0.765).

Table 3: South Malonton Drain Just Downstream of Sta 22+10 - Flood Hydrology

Discharge Event	Regional Discharge Coefficient* Willow Creek near Gimli Gauge 05SB002 Drainage Area = 236 km^2	Rational Discharge Coefficient** Rational Method*** Drainage Area = 13 km^2	Mean Daily Discharge Estimate for South Malonton Drain at Sta 22+10 Drainage Area = 24.5 km^2 Transitional Method (m^3/s)
200-year (0.5%)	0.822	0.53	9.9

* Updated discharge coefficients for WSC Gauge 05SB002 provided by MTI on July 4, 2024 (regional exponent n = 0.765).

** Flat, silty soil and a combination of woodland, pasture, and crop.

*** Source – Province of Manitoba Department of Natural Resources Water Resource Branch "Runoff from Small Watersheds.

Table 4: Unnamed Drain at the Confluence with South Malonton Drain - Flood Hydrology

Discharge Event	Rational Discharge Coefficient*	Mean Daily Discharge Estimate for Unnamed Drain at the Confluence with South Malonton Drain Drainage Area = 1.7 km^2 Rational Method (m^3/s)
200-year (0.5%)	0.50	0.83

* Flat, silty soil and a combination of mostly woodland and pasture.

3.0 Hydraulic Assessment

Steady-state hydraulic backwater models of the Willow Creek study reach, South Malonton Drain and Unnamed Drain were developed to assess the hydraulic conditions of the creek, drains and culvert crossings. The models were updated to run the 200-year flows and estimate the corresponding water levels.

3.1 Flood Protection Level Recommendation

Upon review of the Crystal Springs Colony Wastewater Treatment Lagoon, the Province of Manitoba provided the following feedback with respect to TREK's 2022 Hydrologic and Hydraulic Report:

> *The information in the report quotes the 100-year flood protection level, however, the province has been using the 200-year flood protection level as the standard since 2013. We would recommend that this be increased to a **200-year level** to comply with provincial standards.*

The hydraulic HEC RAS model that was developed by TREK in 2022 of the study area was updated to assess the 200-year levels at the proposed lagoon site. Steady state analysis was undertaken with updated 200-year flows for Willow Creek, South Malonton Drain and Unnamed Drain.

Steady state simulations do not account for storage in the system and assume an infinite volume of water. The model simulations showed that the South Malonton Drain has the potential to overflow the north bank of the drain on Road 106 N and west bank of the drain on Road 15 E in the vicinity of the proposed development during events greater than the 50-year event and as a result inundate these adjacent areas. The drain capacity is restricted by the undersized culvert crossings on Rd 106 N and Rd

15 E. Upgrading of the culvert structures would help to locally lower the flood levels within the study reach, however, the lower bank sections near the Unnamed Drain and southeast corner of property would still flood during larger flood events due to low prairie elevations.

In the determination of the 200-year flood levels, TREK assumed that the drainage upgrades as described in Section 3.3 of their 2022 Hydrologic and Hydraulic Report are implemented. A summary of the proposed drainage improvements include:

- New 2 x 1.8m diameter CSP access crossing from Rd 106N at STA 23+79
- Removal of the existing undersized access crossing at STA 22+10
- Replacement of the access crossing along Rd 15E at STA 6+86 with 2 x 2.0m diameter CSP

The RM of Gimli Zoning By-Law 11-0013 states that no permanent building shall be constructed or placed in the vicinity of a lake, river, watercourse or body of water on land that has been identified by the province as a flood hazard or would be inundated by the hundred year flood or by a recorded flood exceeding the hundred year flood.

The results of the 200-year hydraulic analysis yield a 200-year water level at the proposed lagoon site of **248.06 m**. The proposed lagoon berms designed by others are set at an elevation of 248.5 m which is higher than the 200-year flood level as stipulated by the Province of Manitoba. It is typically prudent to provide 2 feet (0.61 m) of freeboard above the estimated flood level. The designed top of berm provides 0.7 m of freeboard above the 100-year flood level specified in the Gimli Zoning By-Law and 0.44 m of freeboard above the 200-year level.

Figure 1 shows the Project Area and Figure 2 shows updated Water Surface Profiles including the 200-year flood level at the proposed lagoon site.

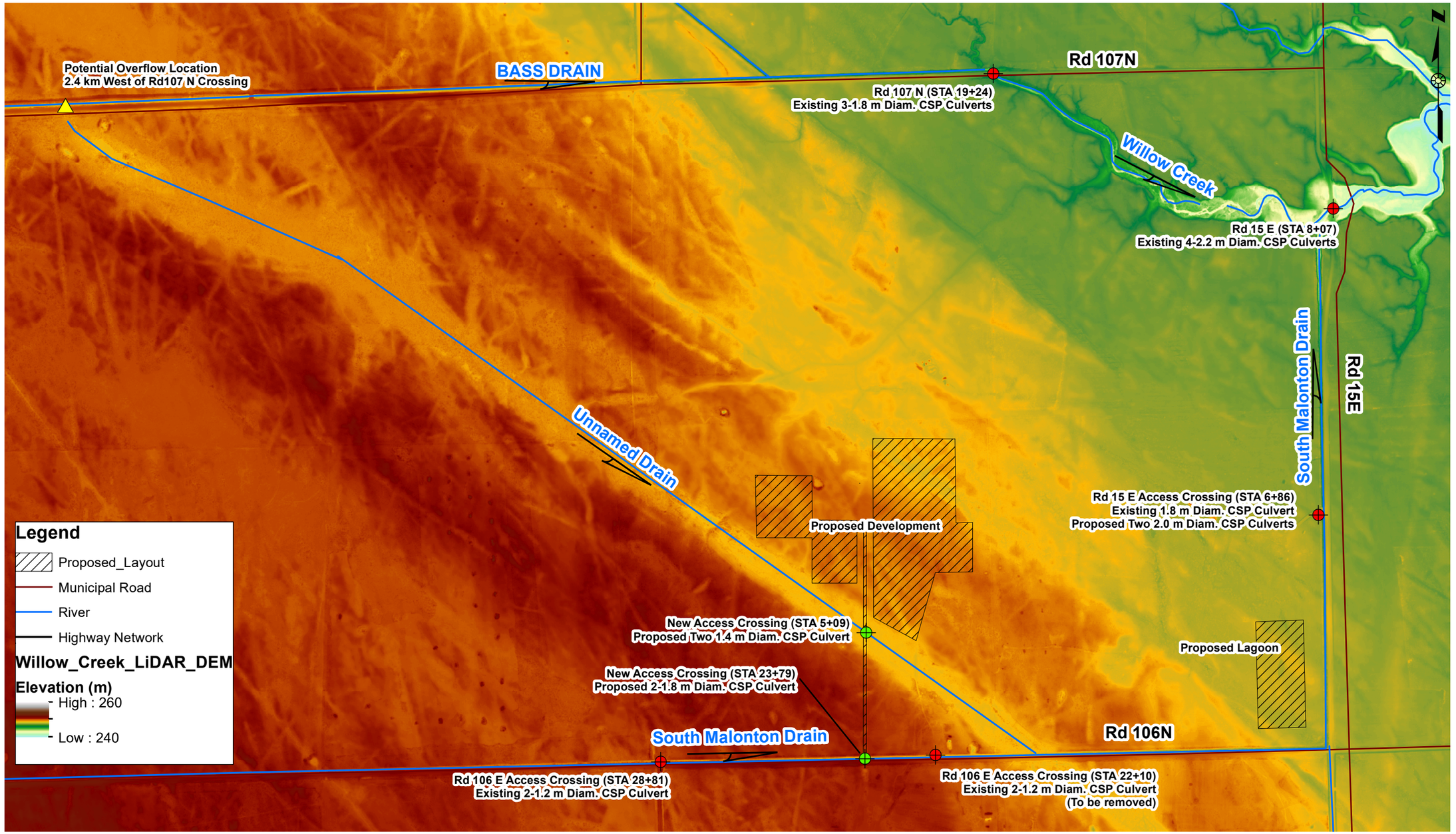
4.0 Closure

The technical information provided in this report is in accordance with current engineering principles and practices (Standard of Practice). The findings of this report were based on information (field investigation & survey) provided by BMCL. Hydrotechnical analysis is based on environmental characteristics assumed to extend uniformly throughout the contributing area and watershed-scale, temporally-discrete hydrologic events.

All information provided in this report is subject to our standard terms and conditions for engineering services, a copy of which is provided to each of our clients with the original scope of work, or a mutually executed standard engineering services agreement. If these conditions are not attached, and you are not already in possession of such terms and conditions, contact our office and you will be promptly provided with a copy.

This report has been prepared by TREK Geotechnical Inc. (the Consultant) for the exclusive use of the BMCL (the Client) and their agents for the work product presented in the report. Any findings or recommendations provided in this report are not to be relied upon by any third parties, except as agreed to in writing by the Client and Consultant prior to use.

Figures



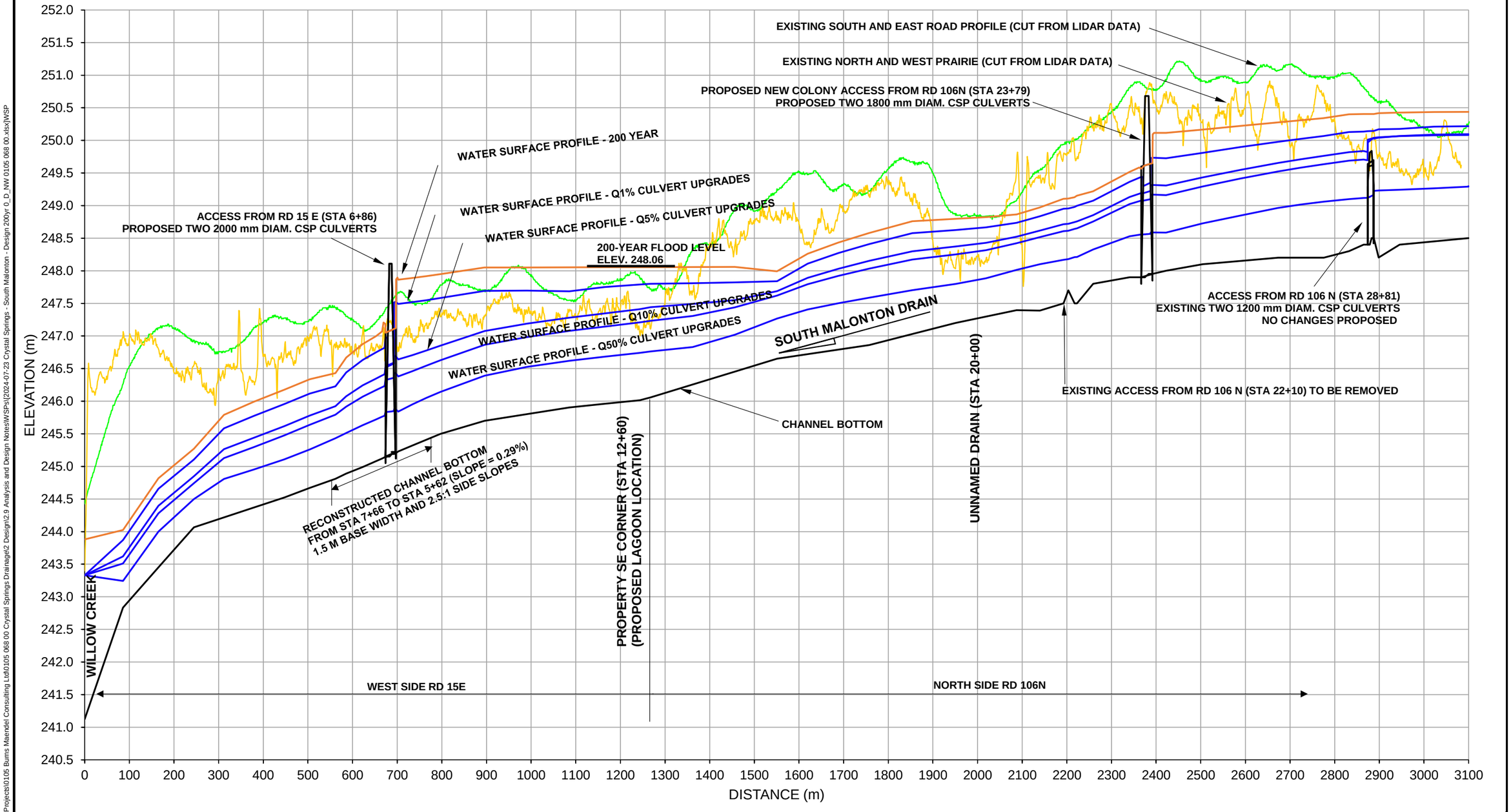
Document Path: Z:\Projects\0105 Burns Maendel Consulting Ltd\0105 068 00 Crystal Springs Drainage\3 Survey and Dwg\3.3 GIS\Proposed_Development_TEMPLATE_Figure 2.mxd

NOTES:

1. REFERENCE: CANVEC © NATURAL RESOURCES CANADA, 2012
2. REFERENCE: LIDAR PROVIDED BY MTI FOR THE RM OF BROKENHEAD

0 0.125 0.25 0.5 0.75 1 Kilometers

Figure 01
STUDY AREA
LAYOUT PLAN



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NOTES:

1. HEC-RAS MODEL DEVELOPED FROM 2022 SURVEY DATA PROVIDED BY BURNS MAENDEL CONSULTING LTD.
2. WATER SURFACE PROFILES REFLECT HYDRAULIC CONDITIONS WITH 1% TAILWATER LEVEL ON WILLOW CREEK - EL 243.41. WSP FOR 200 YEAR FLOOD WITH 0.5% TAILWATER LEVEL ON WILLOW CREEK - EL. 243.88.
3. WATER SURFACE PROFILES REFLECT HYDRAULIC CONDITIONS WITH THE PROPOSED DOUBLE 1800 mm DIAM. CSP CULVERTS AT THE PROPOSED ACCESS ROAD FROM RD 106 N AND DOUBLE 2000 mm DIAM. CSP CULVERTS AT THE EXISTING FARMYARD CROSSING AT RD 15 E, WITH THE EXISTING FIELD CROSSING AT STA 22+10 REMOVED, AND WITH PROPOSED REGRADED CHANNEL FROM STA 7+97 TO STA 5+62.

Figure 02

SOUTH MALONTON DRAIN ALONG RD 106 N AND RD 15E

CULVERT UPGRADES - WATER SURFACE PROFILES