September 15, 2022 Project No. 20360612

Shining Hill Estates Collection Inc. c/o SCS Consulting Group Ltd.
30 Centurian Drive, Suite 100
Markham, ON L3R 8B8

Attention: Mr. Erich Knechtel, P.Eng.

SHINING HILL (PHASE 3) – UPDATED WATER BALANCE ASSESSMENT – 2ND REVISION
PART OF 162, 306, 370, 434 & 488 ST. JOHN'S SIDEROAD WEST, AURORA, ONTARIO

Dear Mr. Knechtel,

1.0 INTRODUCTION

Golder Associates Ltd. (WSP Golder) has been retained by Shining Hill Estates Collection Inc. c/o SCS Consulting Group Ltd. (SCS) to update the water balance assessment previously prepared for the proposed development located at 162, 306, 370, 434 & 488 St. John's Sideroad West in Aurora, Ontario. The proposed 14.1 ha development area, known as Phase 3, includes residential subdivision and school block areas. The first portion of the site proposed for development is referred to as Phase 3A, and includes Streets A, B and D of the residential subdivision. Figure 2A, Site Plan, from the WSP Golder January 2022 report is attached for reference.

One site-wide and five feature-based water balance assessments were presented in the following hydrogeological report:

- Golder Associates Ltd., January 6, 2022. *Hydrogeological Investigation – Revised, Shining Hill (Phase 3), 162, 306, 370, 434 & 488 St. John's Sideroad West, Aurora, Ontario*. Reference No. 20360612 (1000). (WSP Golder, January 2022).

Subsequently, the site-wide balance assessment was revised in the following letter to incorporate updated design information for the Phase 3A portion of the site:

- Golder Associates Ltd., April 14, 2022. *Shining Hill (Phase 3A) – Updated Water Balance Assessment, Part of 162, 306, 370, 434 & 488 St. John's Sideroad West, Aurora, Ontario*. Reference No. 20360612 (1000). (WSP Golder, April 2022).

The purposes of this letter are: i) to provide additional water level data obtained since the data presented in the WSP Golder January 2022 report, and ii) to provide an update to the site-wide and feature-based water balance assessments which incorporate current detailed design information for the proposed Low Impact Development (LID) features, including the placement of the rear-yard infiltration trenches throughout the Phase 3 development.

The factual data, interpretations and recommendations contained in this letter pertain to a specific project as described in the WSP Golder January 2022 report and are not applicable to any other project or site location. If the project is modified in concept, location, elevation or if the project is not initiated within eighteen months of the date of the letter, WSP Golder should be given an opportunity to confirm that the recommendations are still valid. In addition, this report should be read in conjunction with the attached "Important Information and Limitation of This Report" which are included in Appendix A. The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this letter.

2.0 WATER LEVEL MONITORING

This section provides additional groundwater and surface water level data that have been collected since the data included in the WSP Golder January 2022 report, as well as an updated discussion of all water level data.

2.1 Monitoring Wells

As summarized in the WSP Golder January 2022 report, groundwater levels were manually measured at the monitoring wells by Soil Eng. on September 29, 2020, and by WSP Golder on eleven events between November 2020 and November 2021.

Subsequently, groundwater levels were manually measured on three events by WSP Golder on June 15, June 29 and July 12, 2022, and the data are included in Table B-1, Water Level Depths and Elevations, Appendix B. It should be noted that these observations reflect the groundwater conditions encountered at the time of the field investigation and some seasonal and annual fluctuations should be anticipated.

Based on all of the data collected to date, the depth to groundwater at the monitoring wells ranged from 1.25 m below ground surface (mbgs) (BH104 on June 15, 2022) to 4.77 mbgs (BH202 on September 9, 2021) and from elevations of 258.30 m above sea level (masl) (BH107 on September 29, 2020) to 271.98 masl (BH206-D [deep] on June 15, 2022) on the dates monitored. The groundwater elevation data from January 19, 2021, are presented in plan view on the attached Figure 8, Water Table (January 2021) taken from the WSP Golder January 2022 report.

Automatic data loggers (i.e., pressure transducers) were installed at BH102, BH107, BH206-D (deep) and BH206-S (shallow) on December 1, 2020, set to record every four hours. Hydrographs for data up to November 12, 2021 were presented in the WSP Golder January 2022 report. The data loggers were downloaded again on June 29, 2022. Daily precipitation data were obtained from Environment and Climate Change Canada (ECCC) for the Uxbridge West Meteorological Station (ID 6159123), which was the nearest station to the site with daily precipitation data for the entire period. Hydrographs of all of the logger data with daily precipitation data are provided as Figures B-1 to B-4, Appendix B.

As shown, the data indicate typical seasonal groundwater level fluctuations, with a flat water level trend in the winter months, followed by an increasing trend from late-February/early-March through to seasonally high groundwater levels in mid-April through late-May, a decreasing trend in the warmer and drier summer months through to seasonally low groundwater levels in late-September, followed by increasing trends in the cooler, wetter fall months. The data also indicate that the groundwater elevation in BH102 and BH107 often sharply increases in delayed response to larger rain events. A similar but muted groundwater elevation trend is observed at BH206-D (deep), while the same trends in groundwater elevations were observed at BH206-S (shallow) during this period but without the sharp increases in response to larger rain events.

2.2 Piezometers and Staff Gauges

Water levels were manually measured at the piezometer/staff gauge (P/SG) pairs on the same 14 events as the groundwater level monitoring described above. The locations of the P/SG pairs are shown on Figure 2A, attached. In addition, automatic data loggers were installed at P1/SG1 and P2/SG2 on September 29, 2021, set to record every four hours and downloaded on June 29, 2022. Hydrographs of the logger data are provided as Figure B-5, Appendix B.

At staff gauge SG1, located in the riverine portion of the Southern Wetland, a water depth ranging from 0.23 m to 0.36 m was recorded on the fourteen monitoring events between November 2020 and July 2022. Similarly, the logger data confirm that surface water was recorded at SG1 on September 29, 2021, through June 29, 2022, with obvious water depth increases in response to some rain events during this period. These data indicate the consistent presence of surface water at this location in proximity to the Tannery Creek West Tributary. Below grade water levels were recorded at piezometer P1 on thirteen monitoring events between November 2020 and July 2022, and an above grade water level of -0.01 mbgs was recorded on one monitoring event on June 15, 2022. The logger data for P1 indicate shallow groundwater depths with an increasing trend from early-October through late-November 2021, near surface water levels generally recorded from late-November 2021 through mid-February 2022, above grade water levels from mid-February through mid-May 2022, near surface water levels from mid-May through mid-June 2022, and a decreasing trend from mid- to late-June 2022, as illustrated on the hydrograph presented on Figure B-5. A downward hydraulic gradient was observed at P1/SG1 on November 16, November 24 and December 1, 2020, and September 3, September 9 and September 29, 2021. An upward hydraulic gradient was observed at P1/SG1 on January 19, April 8, June 2, June 9, and November 12, 2021, and June 15, June 29 and July 12, 2022. These data suggest seasonal groundwater discharge to the riverine portion of the Southern Wetland at times of seasonally higher groundwater levels. A change from recharging to discharging conditions in late October 2021 is illustrated on the hydrograph presented on Figure B-5. These observations are generally consistent with the classification of the Tannery Creek West Tributary as a permanent coldwater stream, but suggest that permanently discharging conditions are present upstream in the sub-catchment while groundwater contributions in the area of the site may be more seasonal in nature.

Staff gauge SG2, located in the palustrine portion of the Southern Wetland, was dry on all seven monitoring events in June, September and November 2021, and June and July 2022. The logger data indicate that SG2 was predominantly dry during the period of monitoring (i.e., September 29, 2021, to June 29, 2022) with the exception of early-February to early-April 2022 when surface water was occasionally present. Groundwater levels below the base of the piezometer (June 2021) or below grade (September and November 2021 and June and July 2022) were recorded at piezometer P2 on all seven monitoring events. In general, the logger data for P2 indicate a similar trend to P1, with an increasing trend from early-October through late-November 2021, near surface water levels recorded from late-November 2021 through mid-February 2022, above grade water levels from mid-February through mid-June 2022, and a decreasing trend from mid- to late-June 2022, as illustrated on the hydrograph presented on Figure B-5. These observations are consistent with the location of P2/SG2 in the palustrine portion of the wetland and suggest this portion of the wetland is supported by at least seasonally high groundwater levels.

Staff gauges SG3 and SG4, located in the Northern Wetland (refer to Figure 2A, attached), were dry on all seven monitoring events in June and September 2021 and June 2022. Below-grade heads were recorded at piezometers P3 and P4 on all seven monitoring events, with fluctuating groundwater levels ranging in depth from 1.23 mbgs (P3 on June 2, 2021) to 0.05 mbgs (P4 on September 29, 2021). Automatic data loggers were

installed at P3 and P4 on September 29, 2021, set to record every four hours and downloaded on June 29, 2022. Hydrographs of the logger data are provided as Figure B-6, Appendix B. The logger data for P3 indicate near surface water levels from early-October through early-January, a decreasing and then flat water level trend until mid-February, followed by near surface / above grade water levels from mid-February through to early-May, and a decreasing trend in the warmer and drier summer months, as illustrated on the hydrograph presented on Figure B-6. The logger data for P4 follows a similar trend to P3, but with occasional above grade water levels recorded from early-December through early-January. These observations are consistent with the classification of the Tannery Creek North Tributary as intermittent and suggest that the Northern Wetland is supported in part by groundwater levels that fluctuate at times near/above grade.

3.0 UPDATED SITE-WIDE AND FEATURE WATER BALANCES

The reader is referred to Sections 5.1, 5.2, and 5.3 of the WSP Golder January 2022 report for the methods of the water balance assessments, the assumptions and parameters used, and the results, respectively. Also, information on the assumptions used in the updated average annual site-wide water balance assessment is detailed in the WSP Golder April 2022 letter.

This second update includes the proposed rear-yard infiltration trench design and placement provided by SCS, as shown on the Low Impact Development (LID) Plan (SCS Figure 2.6) and the accompanying Rear-Yard Infiltration Trench Details (SCS Figure 2.9) and invert elevations shown on the Preliminary Grading Plan (SCS Figure 5.1) included as Appendix D. The placement of the LIDs is informed by the Toronto and Region Conservation Authority (TRCA) design guidance to maintain a 1 m separation between the seasonally high groundwater elevations and the invert elevations of the rear-yard infiltration trenches. Based on the groundwater elevation data (see Section 2) and the design invert elevations (see Appendix D), the rear-yard infiltration trenches where this separation is inferred not to be present during certain seasons were assumed to have no infiltration during the corresponding months as detailed below.

The remainder of the Site area is assumed to be the same as presented in the WSP Golder April 2022 letter, and the water balance results for the pre-development condition remain the same as those presented in Section 5.3.1.1 of the WSP Golder January 2022 report.

The following changes were made to the site-wide water balance assessment included in the WSP Golder April 2022 letter as well as the watercourse and wetland catchment water balance assessments included in the WSP Golder January 2022 report. The changes made considered updates to the LID mitigation feature designs, locations and elevations (see Appendix D), consideration of the observed seasonal high groundwater elevations (see Section 2), and a change in the size of the rear-yard infiltration trenches to retain up to a 22.7 mm storm event instead of a 25 mm storm event. The following design details are pertinent to specific rear-yard infiltration trench and bioswale infiltration trench installations and include mention of design changes from previous assumptions:

- The rear half of Lots 53-58 will report to rear-yard infiltration trenches instead of downspout disconnection. Based on the inferred separation between the groundwater elevations at BH202 and BH103, respectively, and the invert elevations of the proposed trenches, these infiltration trenches were considered to contribute to infiltration year-round during unfrozen conditions. The resultant annual runoff reduction factor was considered to be 78%;

- The rear half of Lots 61 and 63-67 will report to rear-yard infiltration trenches instead of downspout disconnection. Based on the inferred separation between groundwater elevations at BH102 and the invert elevations of the proposed trenches, these infiltration trenches were considered to contribute to infiltration year-round during unfrozen conditions. The resultant seasonal runoff reduction factor was considered to be 78%;
- The rear half of Lot 62 will still report to a rear-yard infiltration trench but, based on the inferred separation between groundwater elevations at BH102 and the invert elevations of the proposed trench, this infiltration trench was considered to contribute to infiltration year-round during unfrozen conditions. The resultant seasonal runoff reduction factor was considered to be 78%;
- The rear half of Lots 26-29 and 59-60 will report to rear-yard infiltration trenches instead of catch basin filtration and downspout disconnection, respectively. Based on the inferred separation between groundwater levels at BH104 and BH103, respectively, and the invert elevations of the proposed trenches, these infiltration trenches were considered to contribute to infiltration only during summer and fall (i.e., for six months of the year). The resultant seasonal runoff reduction factor was considered to be 82%;
- The rear half of Lots 5-11 and 14-17 will report to downspout disconnection instead of rear-yard infiltration trenches; and,
- The rear half of 13 townhouse lots will not have LID coverage instead of reporting to rear-yard infiltration trenches.

The updated infiltration factors are provided in Table C-1, Appendix C.

3.1 Post-Development Condition Including Mitigation Results

3.1.1 Results – Site-Wide & Watercourse Catchments

Based on the updated LID scheme, the average annual mitigated post-development water balance was estimated on site-wide and watercourse catchment bases, as summarized below in Table 1, and as detailed in Tables C-2, C-3, C-4, and C-5, Appendix C.

Table 1: Mitigated Post-Development Average Annual Water Balance Results - Site Wide & Watercourse Catchments

Component	Average Annual Volume (m^3/yr)			
	Site-Wide	Tannery Creek West Tributary Catchment	Tannery Creek North Tributary Catchment	Tannery Creek Catchment
Precipitation (P)	119,320	46,310	46,400	26,610
Evapotranspiration (ET)	44,140	19,460	16,355	8,325
Surplus (S)	75,080	26,800	30,005	18,275
Infiltration (I)	17,480	8,275	5,075	4,130
Runoff (R)	57,600	18,525	24,930	14,145

On a site-wide basis, the updated LID mitigation scheme is estimated to increase average annual infiltration by approximately 7,585 m^3 and to similarly reduce average annual runoff compared to the un-mitigated post-development condition. Average annual infiltration is estimated to increase by 4% (i.e., 16,740 m^3 to 17,480 m^3) and average annual runoff is expected to increase by 89% (i.e., 30,485 m^3 to 57,600 m^3) as a result of development compared to pre-development conditions.

Considering the updated LID mitigation scheme, the estimated average annual runoff contributing to the Tannery Creek West Tributary Catchment is approximately 18,525 m^3 and the estimated average annual infiltration within the catchment is approximately 8,275 m^3. As a result of catchment boundary and land use changes from site development, runoff is expected to increase by 39% (i.e., 13,375 m^3 to 18,525 m^3) and infiltration is expected to decrease by 2% (i.e., 8,460 m^3 to 8,275 m^3) on an average annual basis.

Considering the updated LID mitigation scheme, the estimated average annual runoff contributing to the Tannery Creek North Tributary Catchment is approximately 24,930 m^3 and the estimated average annual infiltration within the catchment is approximately 5,075 m^3. As a result of catchment area and land use changes from site development, runoff is expected to increase by 132% (i.e., 10,730 m^3 to 24,930 m^3) and infiltration is expected to decrease by 9% (i.e., 5,555 m^3 to 5,075 m^3) on an average annual basis.

Considering the updated LID mitigation scheme, the estimated average annual runoff contributing to the Tannery Creek Catchment is approximately 14,145 m^3 and the estimated average annual infiltration within the catchment is approximately 4,130 m^3. As a result of catchment boundary and land use changes from site development, runoff is expected to increase by 122% (i.e., 6,380 m^3 to 14,145 m^3) and infiltration is expected to increase by 52% (i.e., 2,725 m^3 to 4,130 m^3) on an average annual basis.

3.1.2 Results – Wetland Catchments

Based on the updated LID scheme, the average annual mitigated post-development water balance for the Southern Wetland (palustrine portion) and the Northern Wetland were estimated, as summarized below in Table 2, and as detailed in Tables C-6 and C-7, Appendix C.

Table 2: Mitigated Post-Development Average Annual Water Balance Results – Wetlands

Component	Average Annual Volume (m^3/yr)	
	Southern Wetland	Northern Wetland
Precipitation (P)	11,375	34,630
Evapotranspiration (ET)	5,425	9,425
Surplus (S)	5,930	25,190
Infiltration (I)	2,220	3,390
Runoff (R)	3,710	21,800

Considering the updated LID mitigation scheme, average annual infiltration contributing to the palustrine section of the Southern Wetland is estimated to increase by 48% (i.e., 1,500 m^3 to 2,220 m^3) and average annual runoff is

expected to remain essentially unchanged (i.e., 3,690 m^3 to 3,710 m^3) as a result of development compared to pre-development conditions.

Considering the updated LID mitigation scheme, average annual infiltration contributing to the Northern Wetland is estimated to increase by 26% (i.e., 2,690 m^3 to 3,390 m^3) and average annual runoff is expected to increase by 269% (i.e., 5,915 m^3 to 21,800 m^3) as a result of development compared to pre-development conditions.

4.0 DISCUSSION

The changes to surplus, infiltration and runoff under the mitigated post-development scenario on site-wide and feature-specific bases, relative to the results provided in the WSP Golder April 2022 letter (site-wide basis) and WSP Golder January 2022 report (feature-specific basis), are summarized in Table 3.

Table 3: Average Annual Water Balance Summary – Results Comparison

Component		Post-Development (Mitigated) m^3/yr		
		WSP Golder 2022 Letter/Report	Updated Water Balance	Change
Site-Wide	Surplus (S)	75,080	75,080	-
	Infiltration (I)	16,915	17,480	+565 (+3%)
	Runoff (R)	58,165	57,600	-565 (-1%)
Tannery Creek West Tributary Catchment	Surplus (S)	27,440	26,800	-640 (-2%)
	Infiltration (I)	7,225	8,275	+1,050 (+15%)
	Runoff (R)	20,215	18,525	-1,690 (-8%)
Tannery Creek North Tributary Catchment	Surplus (S)	30,760	30,005	-755 (-2%)
	Infiltration (I)	5,900	5,075	-825 (-14%)
	Runoff (R)	24,860	24,930	+70 (<1%)
Tannery Creek Catchment	Surplus (S)	19,005	18,275	-730 (-4%)
	Infiltration (I)	4,080	4,130	+50 (+1%)
	Runoff (R)	14,925	14,145	-780 (-5%)
Southern Wetland	Surplus (S)	5,930	5,930	-
	Infiltration (I)	1,765	2,220	455 (+26%)
	Runoff (R)	4,165	3,710	-455 (-11%)
Northern Wetland	Surplus (S)	25,945	25,190	-755 (-3%)
	Infiltration (I)	4,215	3,390	-825 (-20%)
	Runoff (R)	21,730	21,800	+70 (<1%)

In the updated mitigated post-development scenario, average annual infiltration on a site-wide basis is estimated to increase by approximately 4% (i.e., 16,740 m^3 to 17,480 m^3) relative to pre-development conditions. The site-wide mitigated post-development infiltration rate is therefore considered to approximate pre-development conditions (i.e., within +/- 10%), and therefore no impacts to groundwater features (e.g., in the Tannery Creek Sub-Watershed upstream of Yonge Street) including groundwater recharge as it relates to potable groundwater quantity are expected as a result of site development. This is similar to the conclusion of the WSP Golder January 2022 report.

Considering the updated mitigated post-development scenario, the average annual infiltration contributing to the Tannery Creek West Tributary Catchment is estimated to decrease by approximately 2% (i.e., 8,460 m^3 to 8,275 m^3) relative to pre-development conditions. The changes result in the mitigated post-development infiltration rate now approximating pre-development conditions (i.e., within +/- 10%), and therefore no impacts to groundwater features in the Tannery Creek West Tributary Catchment are expected. The changes address a recommendation in the WSP Golder 2022 report to increase mitigated post-development infiltration rates to within 10% of pre-development conditions.

Considering the updated mitigated post-development scenario, the average annual infiltration contributing to the Tannery Creek North Tributary Catchment is estimated to decrease by approximately 9% (i.e., 5,555 m^3 to 5,075 m^3) relative to pre-development conditions. The mitigated post-development infiltration rate is therefore considered to approximate pre-development conditions (i.e., within +/- 10%), and therefore no impacts to groundwater features in the Tannery Creek North Tributary Catchment are expected. This is similar to the conclusion of the WSP Golder January 2022 report.

Considering the updated mitigated post-development scenario, the average annual infiltration contributing to the Tannery Creek Catchment is estimated to increase by approximately 52% (i.e., 2,725 m^3 to 4,130 m^3) relative to pre-development conditions. As noted in the WSP Golder January 2022 report, while more infiltration is expected as a result of development compared to pre-development conditions, the Tannery Creek Catchment (3.08 ha) represents 0.08% of the 3,827.9 ha Tannery Creek Sub-Watershed upstream of Yonge Street. On this basis, no significant impact to groundwater-dependent features in the Tannery Creek Sub-Watershed upstream of Yonge Street is expected. This is similar to the conclusion of the WSP Golder January 2022 report.

Considering the updated mitigated post-development scenario, the average annual infiltration contributing to the palustrine section of the Southern Wetland is estimated to increase by approximately 48% (i.e., 1,500 m^3 to 2,220 m^3) relative to pre-development conditions. The Tannery Creek West Tributary is classified as a coldwater and permanently flowing stream, and field data confirms that the palustrine section of the Southern Wetland at least seasonally has no standing surface water and groundwater heads that fluctuate at times close to or just above grade. A 48% increase in average annual infiltration is expected to result in an increase in groundwater discharge rates and the length of seasonally high groundwater levels in the palustrine section of the Southern Wetland. While the changes increase groundwater contributions to the Southern Wetland, they also assist to approximate the overall groundwater contributions from the site to this catchment area (i.e., within 2% of pre-development conditions as noted above).

Considering the updated mitigated post-development scenario, the average annual infiltration contributing to the Northern Wetland is estimated to increase by approximately 26% (i.e., 2,690 m^3 to 3,390 m^3) relative to pre-development conditions. As noted in the WSP Golder January 2022 report, the Tannery Creek North Tributary is classified as an intermittent coldwater stream, and field data confirms that the North Wetland at least seasonally

has no standing surface water and groundwater levels that fluctuate at times close to grade. The Northern Wetland is located at the downstream end (and the topographically lowest portion) of the Tannery Creek North Tributary Sub-watershed; this part of the sub-watershed receives groundwater input from most of the sub-watershed area and is therefore the least susceptible area to groundwater level changes. Further, the Tannery Creek North Tributary Catchment (5.37 ha) represents 12% of the 45.5 ha Tannery Creek North Tributary Sub-watershed. Therefore, while additional groundwater input to the North Wetland Catchment area may occur, the increase is tempered by overall balanced mitigated post-development infiltration rates within the Tannery Creek North Tributary Sub-watershed which contributes to the groundwater regime in the vicinity of the North Wetland. This is similar to the conclusion of the WSP Golder January 2022 report.

5.0 CLOSURE

We trust that this submission meets your current requirements. If you have any questions regarding the contents of this letter, please contact the undersigned.

Golder Associates Ltd.

David Hinton, P.Eng., PMP
Water Resources Engineer

Joel Gopaul, B.A.Sc.
Geo-Environmental Consultant

Chris Kozuskanich, P.Geo.
Associate, Senior Hydrogeologist

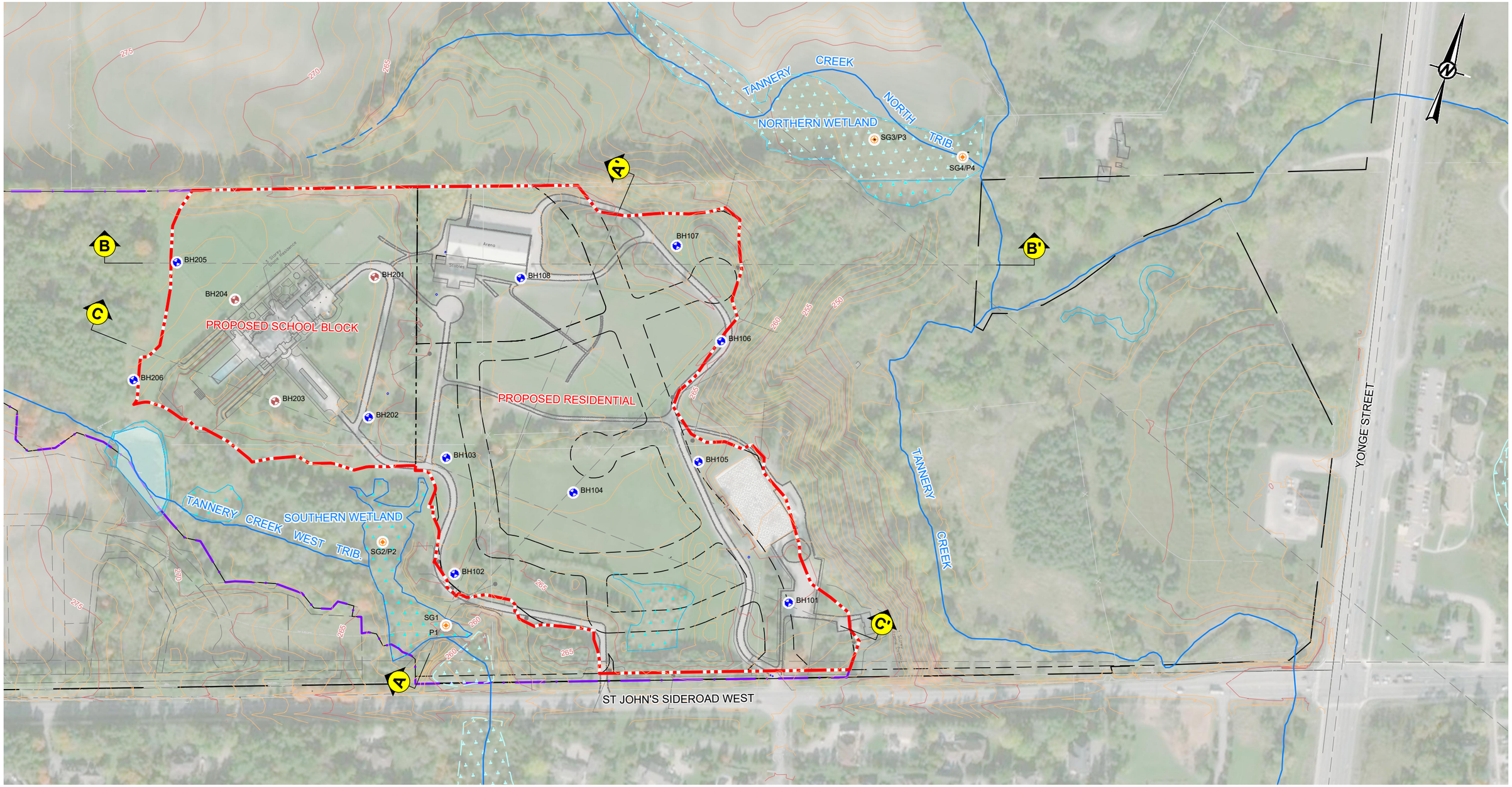
DH/JJG/CK/lb

cc: Mr. Paul Bailey, Shining Hill Estates Collection Inc.

Appendices: Figures
Appendix A – Important Information and Limitations of this Report
Appendix B – Water Level Measurements
Appendix C – Water Balance Results
Appendix D – Supporting Documentation

https://golderassociates.sharepoint.com/sites/133588/project files/6 deliverables/technical memorandums/updated water balance letter/20360612 (1000) 2022'09'15 updated water balance letter - shining hill (phase 3) rev2.docx

FIGURES



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LEGEND

- PHASE 3 (AURORA) SITE BOUNDARY
- SOIL ENG MONITORING WELL
- SOIL ENG BOREHOLE
- GOLDER PIEZOMETER / STAFF GAUGE
- LINE OF SECTION
- UNEVALUATED WETLAND (MNRF)
- MAPPED WETLAND (BEACON)
- SITE CONTOURS (1 masl INTERVAL)

REFERENCES AND NOTES

1. MAPPING BASED ON ESRI GEOGRAPHY NETWORK OBM FEATURES AND CLIENT CAD COMPILATIONS
2. WETLAND AND ECOLOGICAL FEATURES, BEACON, FEBRUARY 2021
3. MAPPED FEATURES AND LOCATIONS ARE APPROXIMATE AND NOT TO SCALE

CLIENT
SHINING HILL ESTATES COLLECTION INC.
C/O SCS CONSULTING GROUP LTD.

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-12-15
DESIGNED	
PREPARED	JPR
REVIEWED	JG
APPROVED	CMK

PROJECT
HYDROGEOLOGICAL INVESTIGATION
SHINING HILL (PHASE 3)
162, 306, 370, 434 & 488 ST. JOHN'S SIDEROAD WEST, AURORA

TITLE
SITE PLAN

PROJECT NO.	CONTROL	REV.	FIGURE
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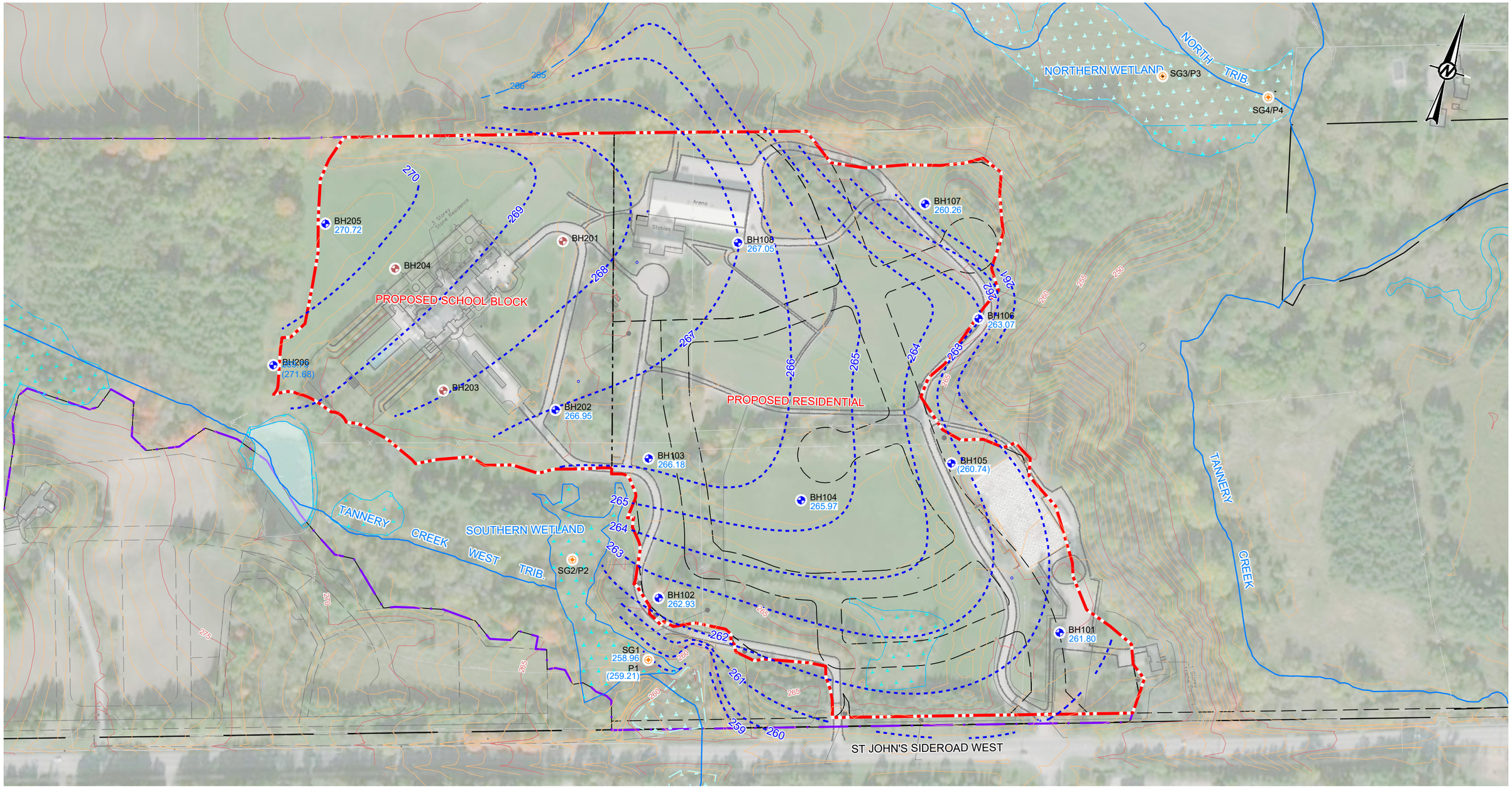

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LEGEND

- PHASE 3 (AURORA) BOUNDARY
- SOIL ENG MONITORING WELL
- SOIL ENG BOREHOLE
- GOLDER PIEZOMETER / STAFF GAUGE
- 262.42 STATIC WATER LEVEL (JANUARY 2021)
- (258.99) LOWER SCREENED POTENTIAL (masl)
- WATER TABLE CONTOUR (masl)
- WETLAND (BEACON)
- SITE CONTOURS (1 masl INTERVAL)

REFERENCES AND NOTES

1. MAPPING BASED ON ESRI GEOGRAPHY NETWORK OBM FEATURES AND CLIENT CAD COMPILATIONS
2. WETLAND AND ECOLOGICAL FEATURES, BEACON, FEBRUARY 2021
3. MAPPED FEATURES AND LOCATIONS ARE APPROXIMATE AND NOT TO SCALE
4. BETWEEN THE WELLS AND TEST WELLS, CONTOURED SURFACES ARE NOT PROVEN.
5. LOWER SCREENED POTENTIALS (LEVELS IN BRACKETS) NOT USED FOR INTERPOLATION.

CLIENT
SHINING HILL ESTATES COLLECTION INC.
C/O SCS CONSULTING GROUP LTD.

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2021-12-15
DESIGNED	
PREPARED	JPR
REVIEWED	JG
APPROVED	CMK

PROJECT
HYDROGEOLOGICAL INVESTIGATION
SHINING HILL (PHASE 3)
162, 306, 370, 434 & 488 ST. JOHN'S SIDEROAD WEST, AURORA

TITLE
WATER TABLE JANUARY 2021

PROJECT NO.	CONTROL	REV.	FIGURE
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APPENDIX A

Important Information and Limitations of this Report

IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Standard of Care: Golder Associates Ltd. (Golder) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

Basis and Use of the Report: This report has been prepared for the specific site, design objective, development and purpose described to Golder by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. Any change of site conditions, purpose, development plans or if the project is not initiated within eighteen months of the date of the report may alter the validity of the report. Golder can not be responsible for use of this report, or portions thereof, unless Golder is requested to review and, if necessary, revise the report.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client can not rely upon the electronic media versions of Golder's report or other work products.

The report is of a summary nature and is not intended to stand alone without reference to the instructions given to Golder by the Client, communications between Golder and the Client, and to any other reports prepared by Golder for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. Golder can not be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and Ground water Conditions: Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on

adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

Sample Disposal: Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

APPENDIX B

Water Level Measurements

Table B-1 - Water Level Depths and Elevations
Shining Hill Development (Phase 3), Aurora, Ontario

Monitoring Well ID	Ground Surface Elevation (masl)	29-Sep-20		16-Nov-20		24-Nov-20		01-Dec-20	
		Depth (mbgs)	Elevation (masl)	Depth (mbgs)	Elevation (masl)	Depth (mbgs)	Elevation (masl)	Depth (mbgs)	Elevation (masl)
BH101	265.00	4.50	260.50	4.13	260.87	4.19	260.81	3.89	261.11
BH102	264.90	2.80	262.10	2.66	262.24	2.67	262.24	2.48	262.42
BH103	268.00	2.50	265.50	2.40	265.61	2.40	265.61	2.26	265.75
BH104	267.30	2.70	264.60	2.24	265.06	2.24	265.06	2.18	265.12
BH105	266.80	7.20	259.60	6.78	260.02	6.72	260.08	6.60	260.20
BH106	265.30	DRY	DRY	6.92	258.38	5.92	259.38	3.69	261.61
BH107	262.50	4.20	258.30	3.56	258.94	3.61	258.89	2.82	259.68
BH108	269.30	3.20	266.10	3.08	266.22	3.10	266.20	2.97	266.34
BH202	271.30	4.60	266.70	4.69	266.61	4.70	266.61	4.64	266.67
BH205	274.10	3.80	270.30	3.97	270.13	4.00	270.10	3.78	270.33
BH206-D	273.30	2.00	271.30	1.83	271.48	1.84	271.47	1.73	271.57
BH206-S	273.30	3.90	269.40	3.92	269.38	3.92	269.38	3.89	269.42
P1	259.35			DRY	DRY	1.11	258.24	0.68	258.67
SG1	258.76			-0.27	259.03	-0.27	259.03	-0.29	259.05
P2	261.20								
SG2	261.22								
P3	250.37								
SG3	250.37								
P4	248.83								
SG4	248.89								

Notes:

1) mbgs = metres below ground surface

2) masl = metres above sea level

3) Monitoring wells 101 to 108, 202, 205 and 206D/S were installed by Soil Engineers Ltd. in September 2020. The elevations provided are understood to be referenced to a geodetic datum.

4) D = deep, S = shallow

5) P = piezometer, SG = staff gauge; P1/SG1 installed by Golder Associates Ltd. on November 16, 2020. P2/SG2 to P4/SG4 installed by Golder Associates Ltd. on June 2, 2021.

6) Elevation data for ground surface at the location of the P1/SG1 to P4/SG4 were surveyed by Golder Associates Ltd. and are referenced to a geodetic datum.

7) Groundwater level data from September 29, 2020, were measured by Soil Engineers Ltd.

8) Stabilized groundwater conditions may not have been present at BH106 on Sept. 29, Nov. 16, Nov. 24, and Dec. 1, 2020.

Input by: AGB/JJG
Checked by: JP

Table B-1 - Water Level Depths and Elevations
Shining Hill Development (Phase 3), Aurora, Ontario

Monitoring Well ID	Ground Surface Elevation (masl)	19-Jan-21		08-Apr-21		02-Jun-21		09-Jun-21	
		Depth (mbgs)	Elevation (masl)	Depth (mbgs)	Elevation (masl)	Depth (mbgs)	Elevation (masl)	Depth (mbgs)	Elevation (masl)
BH101	265.00	3.20	261.80	-	-	4.19	260.81	-	-
BH102	264.90	1.97	262.93	1.82	263.09	2.63	262.27	2.72	262.18
BH103	268.00	1.82	266.18	1.57	266.43	2.02	265.99	-	-
BH104	267.30	1.33	265.97	-	-	1.81	265.50	-	-
BH105	266.80	6.06	260.74	-	-	5.76	261.04	-	-
BH106	265.30	2.24	263.07	-	-	2.77	262.53	-	-
BH107	262.50	2.24	260.26	-	-	2.88	259.62	-	-
BH108	269.30	2.25	267.05	-	-	2.70	266.60	-	-
BH202	271.30	4.35	266.95	-	-	4.21	267.10	-	-
BH205	274.10	3.38	270.72	-	-	2.84	271.26	-	-
BH206-D	273.30	1.62	271.68	-	-	1.63	271.67	-	-
BH206-S	273.30	3.57	269.73	-	-	3.34	269.97	-	-
P1	259.35	0.22	259.13	0.01	259.34	0.09	259.27	0.14	259.21
SG1	258.76	-0.26	259.02	-0.25	259.01	-0.23	258.99	-0.24	259.00
P2	261.20					DRY	DRY	DRY	DRY
SG2	261.22					DRY	DRY	DRY	DRY
P3	250.37					1.23	249.15	0.50	249.87
SG3	250.37					DRY	DRY	DRY	DRY
P4	248.83					0.91	247.93	0.30	248.53
SG4	248.89					DRY	DRY	DRY	DRY

Notes:

1) mbgs = metres below ground surface

2) masl = metres above sea level

3) Monitoring wells 101 to 108, 202, 205 and 206D/S were installed by Soil Engineers Ltd. in September 2020. The elevations provided are understood to be referenced to a geodetic datum.

4) D = deep, S = shallow

5) P = piezometer, SG = staff gauge; P1/SG1 installed by Golder Associates Ltd. on November 16, 2020. P2/SG2 to P4/SG4 installed by Golder Associates Ltd. on June 2, 2021.

6) Elevation data for ground surface at the location of the P1/SG1 to P4/SG4 were surveyed by Golder Associates Ltd. and are referenced to a geodetic datum.

7) Groundwater level data from September 29, 2020, were measured by Soil Engineers Ltd.

8) Stabilized groundwater conditions may not have been present at BH106 on Sept. 29, Nov. 16, Nov. 24, and Dec. 1, 2020.

Input by: AGB/JJG
Checked by: JP

Table B-1 - Water Level Depths and Elevations
Shining Hill Development (Phase 3), Aurora, Ontario

Monitoring Well ID	Ground Surface Elevation (masl)	03-Sep-21		09-Sep-21		29-Sep-21		15-Jun-22	
		Depth (mbgs)	Elevation (masl)	Depth (mbgs)	Elevation (masl)	Depth (mbgs)	Elevation (masl)	Depth (mbgs)	Elevation (masl)
BH101	265.00	-	-	-	-	3.32	261.68	2.46	262.54
BH102	264.90	2.98	261.92	2.92	261.98	2.07	262.83	2.25	262.65
BH103	268.00	2.67	265.34	2.60	265.41	2.14	265.86	1.68	266.33
BH104	267.30	-	-	-	-	1.85	265.45	1.25	266.06
BH105	266.80	-	-	-	-	6.88	259.92	5.77	261.04
BH106	265.30	-	-	-	-	2.67	262.63	2.24	263.07
BH107	262.50	3.80	258.70	3.37	259.14	2.34	260.17	1.96	260.54
BH108	269.30	-	-	-	-	2.24	267.07	2.21	267.09
BH202	271.30	4.76	266.54	4.77	266.53	4.57	266.73	3.94	267.36
BH205	274.10	3.79	270.31	3.84	270.26	3.46	270.64	2.17	271.93
BH206-D	273.30	2.11	271.20	2.06	271.25	1.76	271.54	1.32	271.98
BH206-S	273.30	3.86	269.45	3.86	269.44	3.67	269.63	3.19	270.11
P1	259.35	0.83	258.52	0.85	258.51	0.55	258.80	-0.01	259.36
SG1	258.76	-0.25	259.01	-0.25	259.01	-0.25	259.01	-0.36	259.12
P2	261.20	N/A	N/A	N/A	N/A	0.50	260.70	0.01	261.19
SG2	261.22	N/A	N/A	N/A	N/A	DRY	DRY	DRY	DRY
P3	250.37	1.05	249.32	0.74	249.64	0.14	250.23	0.18	250.20
SG3	250.37	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
P4	248.83	0.74	248.09	0.70	248.14	0.05	248.79	0.08	248.76
SG4	248.89	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY

Notes:

1) mbgs = metres below ground surface

2) masl = metres above sea level

3) Monitoring wells 101 to 108, 202, 205 and 206D/S were installed by Soil Engineers Ltd. in September 2020. The elevations provided are understood to be referenced to a geodetic datum.

4) D = deep, S = shallow

5) P = piezometer, SG = staff gauge; P1/SG1 installed by Golder Associates Ltd. on November 16, 2020. P2/SG2 to P4/SG4 installed by Golder Associates Ltd. on June 2, 2021.

6) Elevation data for ground surface at the location of the P1/SG1 to P4/SG4 were surveyed by Golder Associates Ltd. and are referenced to a geodetic datum.

7) Groundwater level data from September 29, 2020, were measured by Soil Engineers Ltd.

8) Stabilized groundwater conditions may not have been present at BH106 on Sept. 29, Nov. 16, Nov. 24, and Dec. 1, 2020.

Input by: AGB/JJG
Checked by: JP

Table B-1 - Water Level Depths and Elevations
Shining Hill Development (Phase 3), Aurora, Ontario

Monitoring Well ID	Ground Surface Elevation (masl)	29-Jun-22		12-Jul-22	
		Depth (mbgs)	Elevation (masl)	Depth (mbgs)	Elevation (masl)
BH101	265.00	2.79	262.21	3.10	261.90
BH102	264.90	2.66	262.25	2.77	262.13
BH103	268.00	2.02	265.98	2.20	265.81
BH104	267.30	1.89	265.41	2.14	265.16
BH105	266.80	5.96	260.84	6.21	260.60
BH106	265.30	2.93	262.38	3.48	261.82
BH107	262.50	2.91	259.60	3.28	259.23
BH108	269.30	2.65	266.66	2.93	266.37
BH202	271.30	4.09	267.21	4.24	267.07
BH205	274.10	2.55	271.56	2.79	271.31
BH206-D	273.30	1.54	271.76	1.63	271.67
BH206-S	273.30	3.29	270.01	3.36	269.95
P1	259.35	0.11	259.24	0.30	259.05
SG1	258.76	-0.26	259.02	-0.31	259.07
P2	261.20	0.36	260.85	0.69	260.51
SG2	261.22	DRY	DRY	DRY	DRY
P3	250.37	0.65	249.73	-	-
SG3	250.37	DRY	DRY	-	-
P4	248.83	0.37	248.47	-	-
SG4	248.89	DRY	DRY	-	-

Notes:

1) mbgs = metres below ground surface

2) masl = metres above sea level

3) Monitoring wells 101 to 108, 202, 205 and 206D/S were installed by Soil Engineers Ltd. in September 2020. The elevations provided are understood to be referenced to a geodetic datum.

4) D = deep, S = shallow

5) P = piezometer, SG = staff gauge; P1/SG1 installed by Golder Associates Ltd. on November 16, 2020. P2/SG2 to P4/SG4 installed by Golder Associates Ltd. on June 2, 2021.

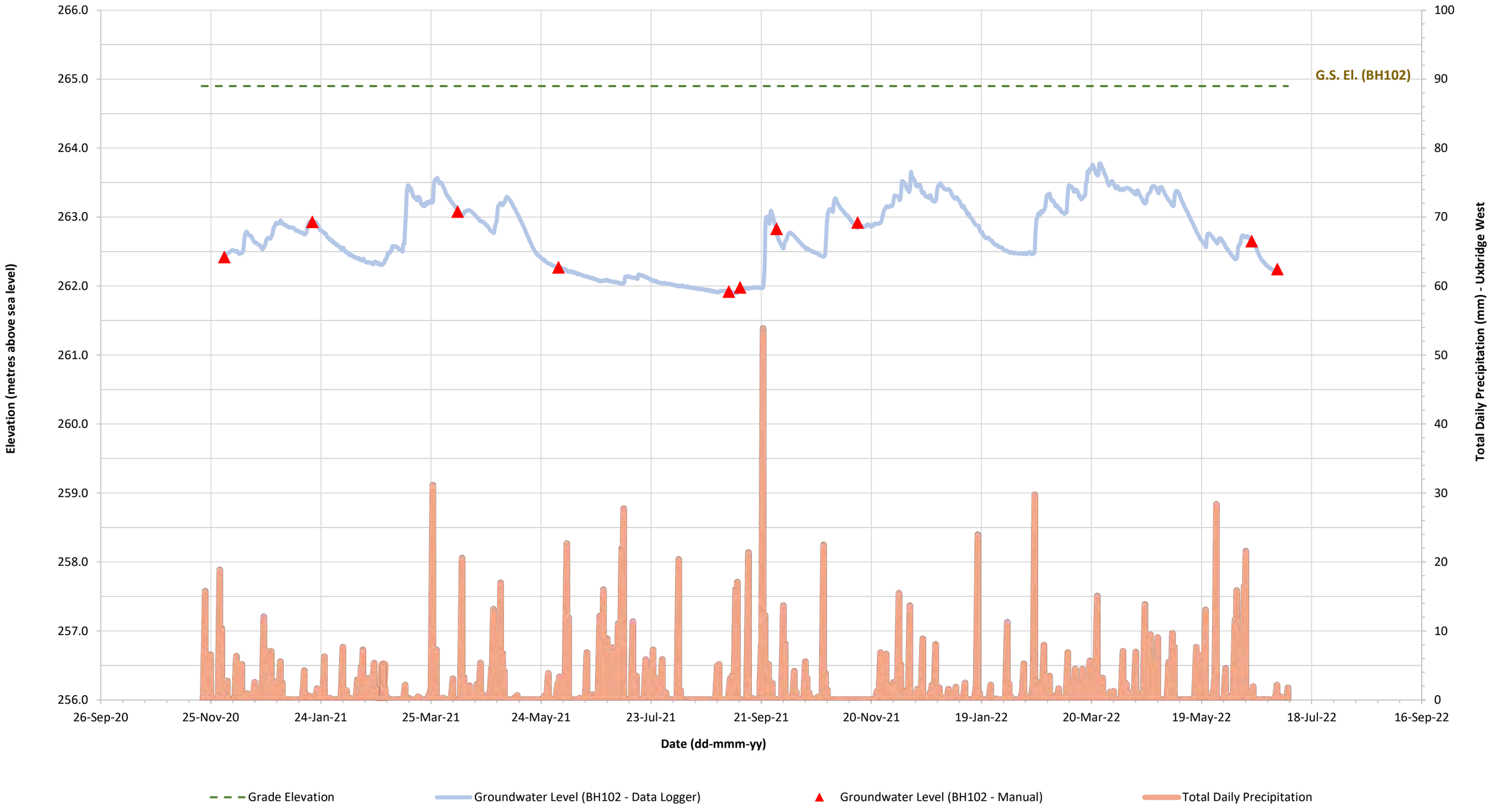
6) Elevation data for ground surface at the location of the P1/SG1 to P4/SG4 were surveyed by Golder Associates Ltd. and are referenced to a geodetic datum.

7) Groundwater level data from September 29, 2020, were measured by Soil Engineers Ltd.

8) Stabilized groundwater conditions may not have been present at BH106 on Sept. 29, Nov. 16, Nov. 24, and Dec. 1, 2020.

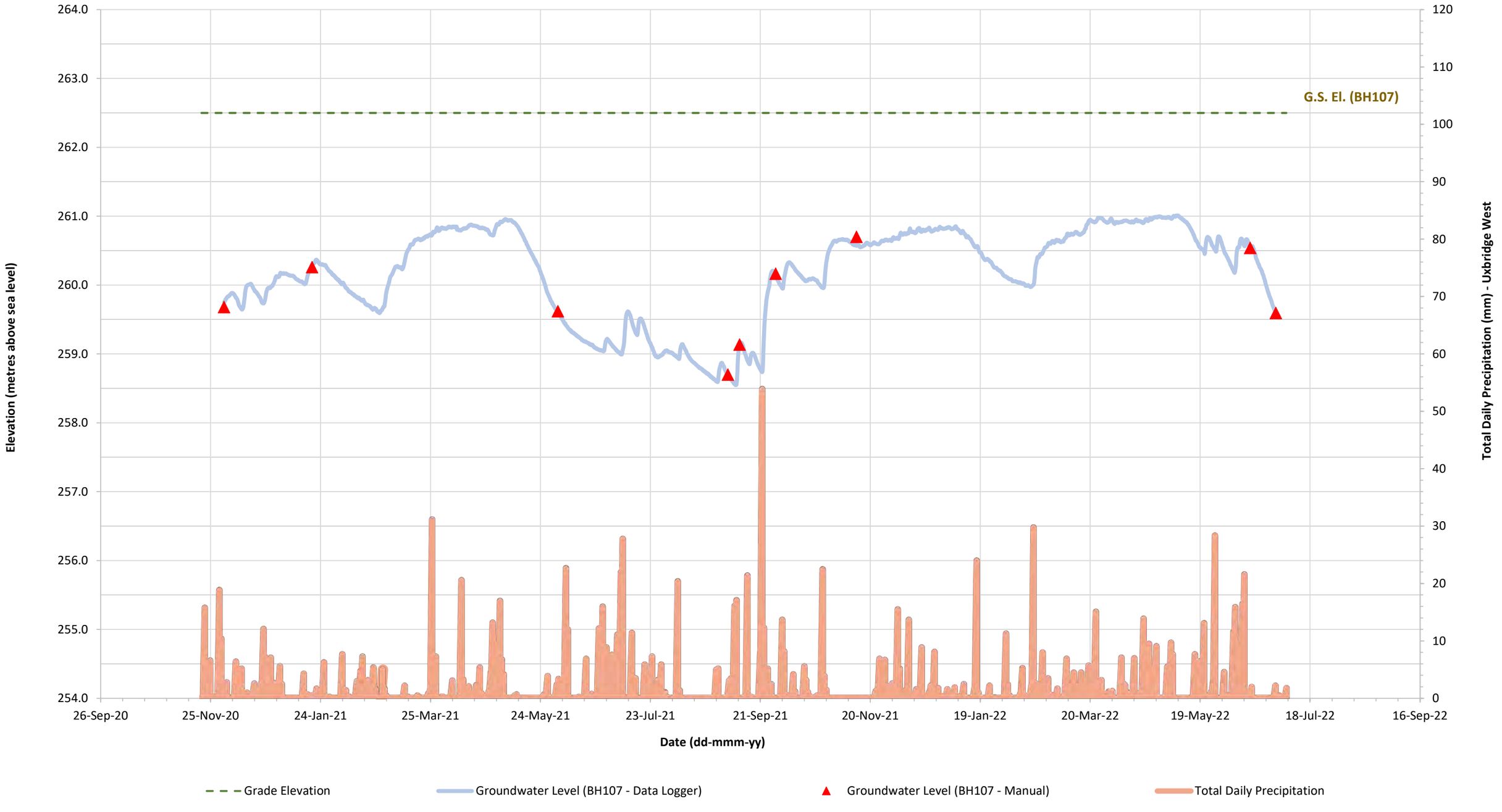
Input by: AGB/JJG
Checked by: JP

Figure B-1: BH102 Hydrograph
Shining Hill (Phase 3), 162 St. John's Sideroad West, Aurora, Ontario



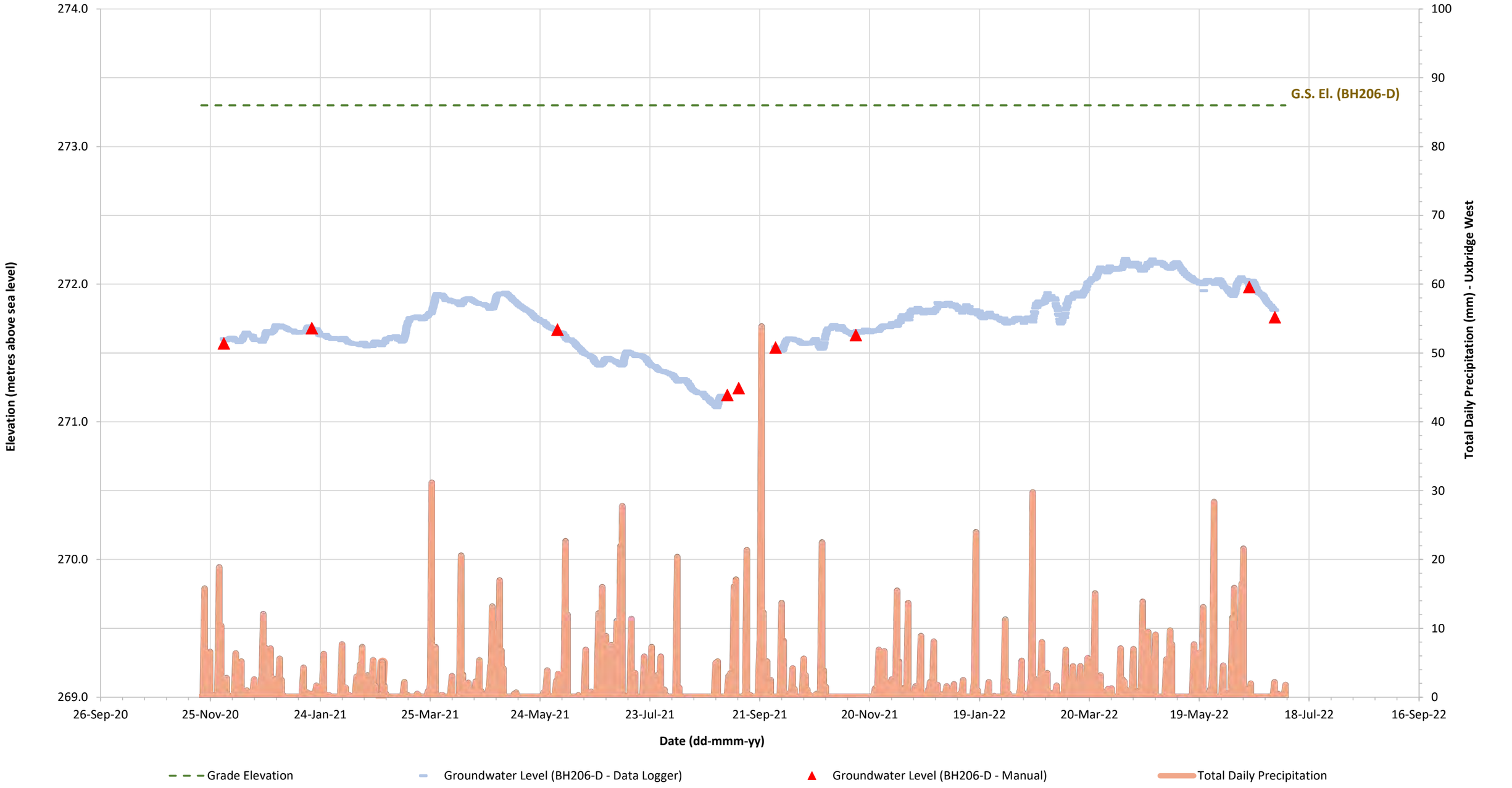
Entered by: AGB/JJG
Checked by: CMK

Figure B-2: BH107 Hydrograph
Shining Hill (Phase 3), 162 St. John's Sideroad West, Aurora, Ontario



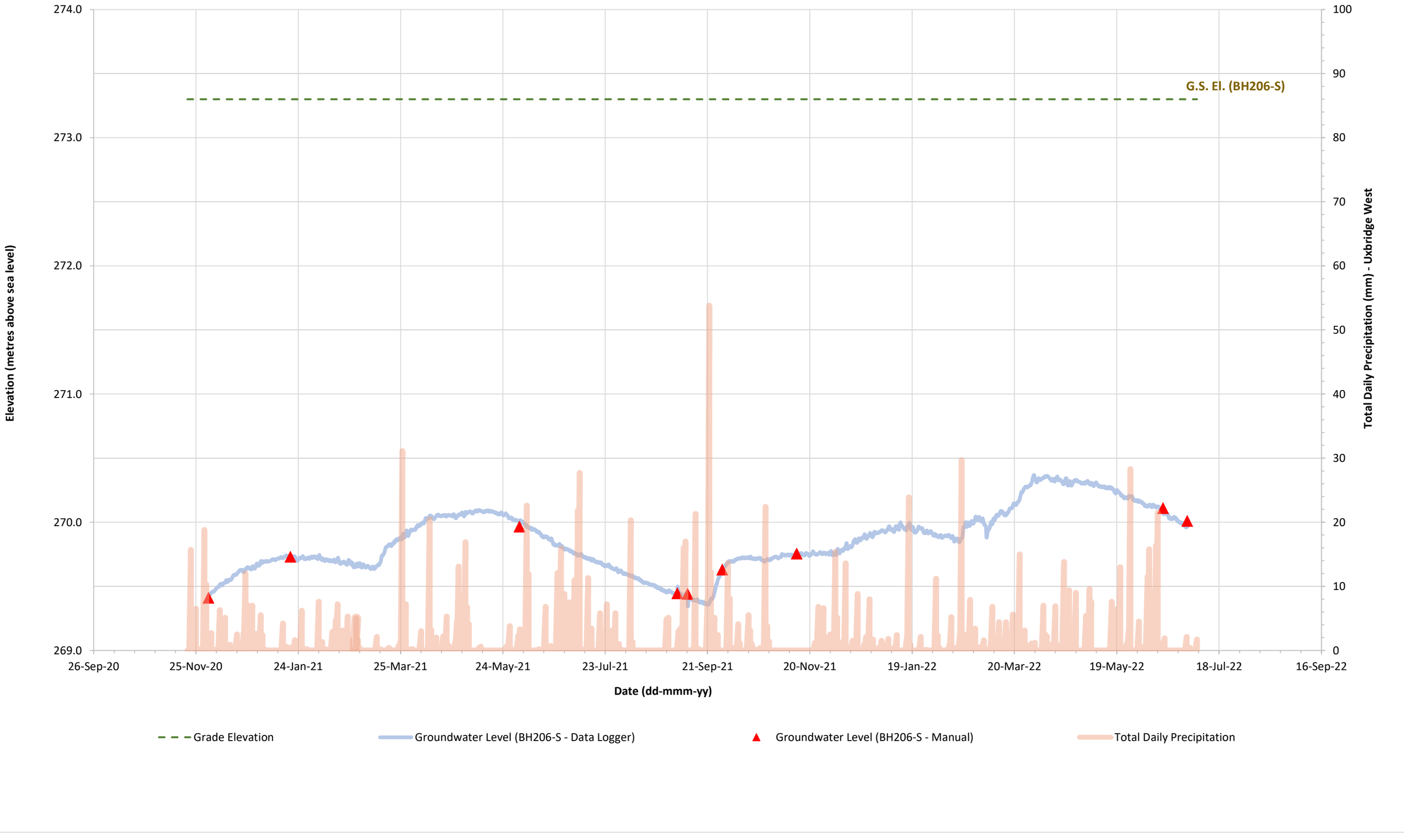
Entered by: AGB/JJG
Checked by: CMK

Figure B-3 BH206-D Hydrograph
Shining Hill (Phase 3), 162 St. John's Sideroad West, Aurora, Ontario



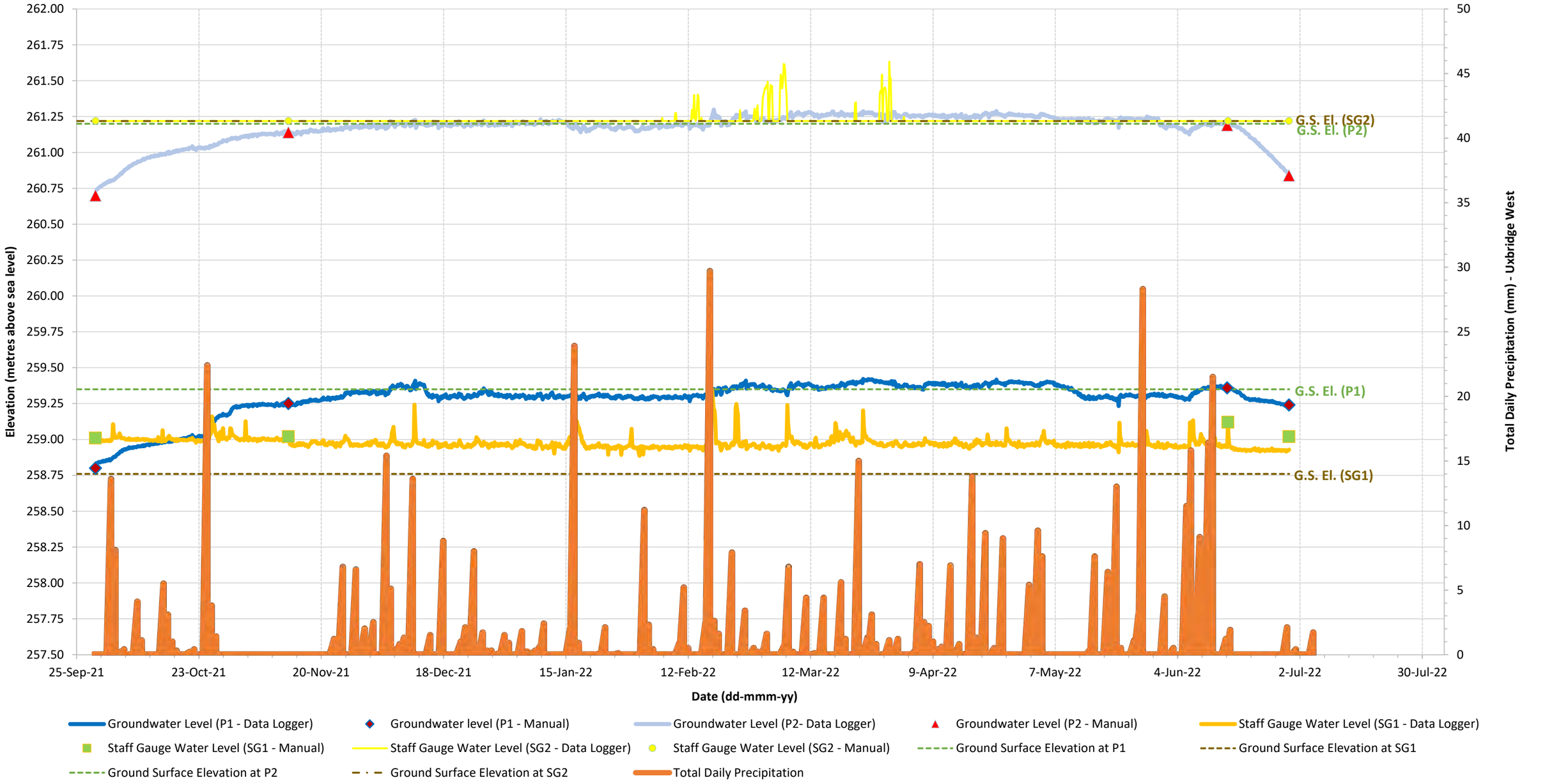
Entered by: AGB/JJG
Checked by: CMK

Figure B-4: BH206-S Hydrograph
Shining Hill (Phase 3), 162 St. John's Sideroad West, Aurora, Ontario



Entered by: AGB/JJG
Checked by: CMK

Figure B-5: Piezometer P1 / Staff Gauge SG1 & Piezometer P2 / Staff Gauge SG2 Hydrograph
Shining Hill (Phase 3), Aurora, Ontario



Entered by: JJG
Checked by: CMK

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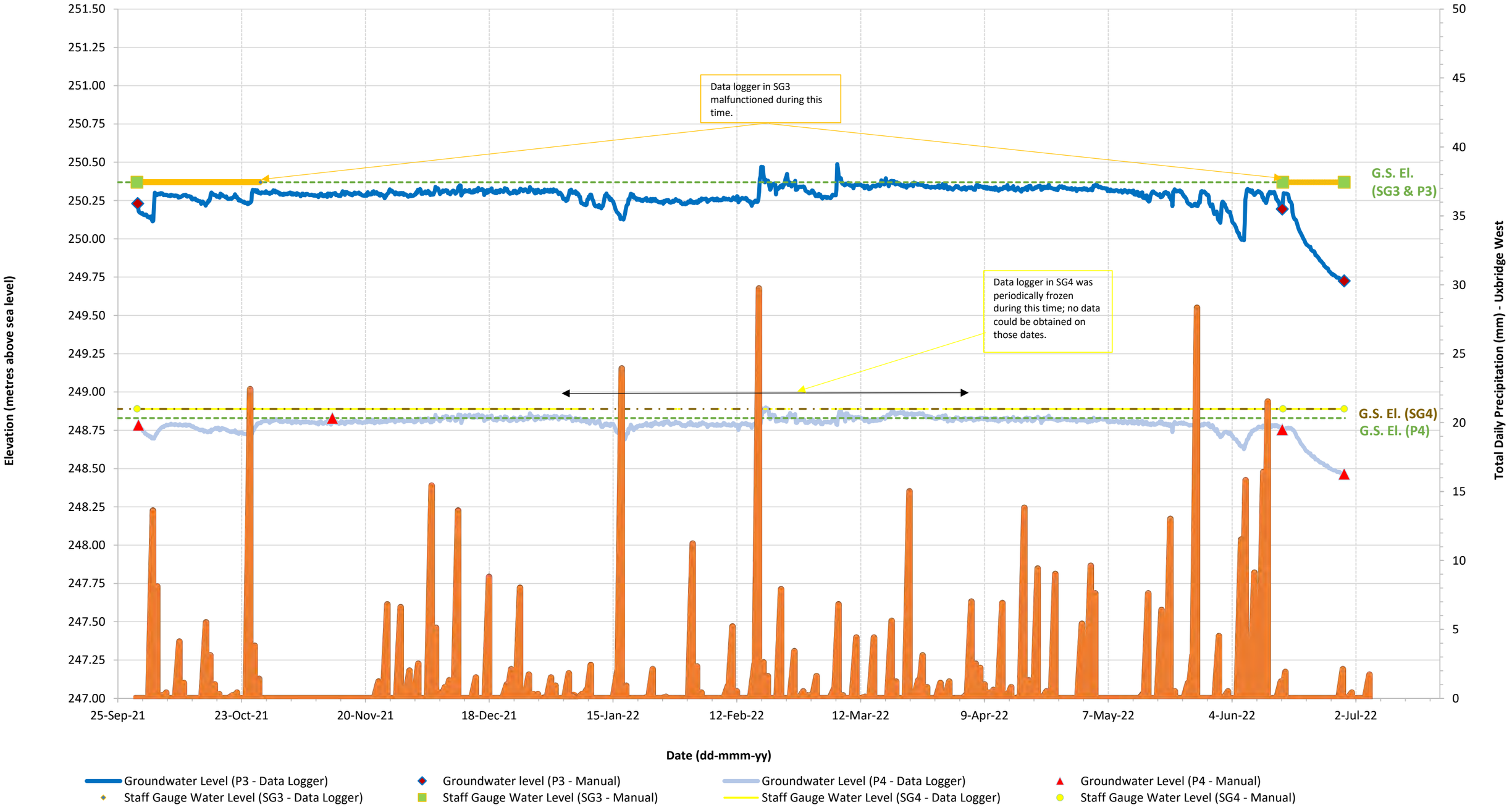
Figure B-6: Piezometer P3 / Staff Gauge SG3 & Piezometer P4 / Staff Gauge SG4 Hydrograph
Shining Hill (Phase 3), Aurora, Ontario



Entered by: JJG
Checked by: CMK

APPENDIX C

Water Balance Results

Table C-1
Annual Infiltration Rates - Site Wide

PRE-DEVELOPMENT SCENARIO

Type	WHC	Type of Land Use	Soil Type	Infiltration Factor (%)			
				Topo	Soils	Cover	Total
Recreational Buildings	90% Precip	Buildings	Impervious	0.0	0.0	0.0	0.00
Grassed - Lawns	125 mm	Urban Lawns	Silt Loam	0.15	0.3	0.1	0.55
Asphalt Roads & Concrete Structures	90% Precip	Paved / Structure	Impervious	0.0	0.0	0.0	0.00
Gravel Pathways	90% Precip	Gravel	Impervious	0.0	0.0	0.0	0.00
Mineral Meadow	250 mm	Pastures and Shrubs	Silt Loam	0.15	0.3	0.1	0.55
Thicket / Forest / Hedgerows / Plantations	400 mm	Mature Forest	Silt Loam	0.15	0.3	0.2	0.65
Mineral Marsh	Precip - PET	Pond	Silt Loam	0.0	0.0	0.0	0.00
Private Property - Residence	90% Precip	Buildings	Impervious	0.0	0.0	0.0	0.00
Private Property - Driveways / Concrete Structures	90% Precip	Paved / Structure	Impervious	0.0	0.0	0.0	0.00
Private Property - Lawns	125 mm	Urban Lawns	Silt Loam	0.10	0.3	0.1	0.50
Private Property - Gravel Pathways	90% Precip	Gravel	Impervious	0.0	0.0	0.0	0.00
Private Property - Mineral Meadow	250 mm	Pastures and Shrubs	Silt Loam	0.15	0.3	0.1	0.55
Private Property - Forest / Hedgerows	400 mm	Mature Forest	Silt Loam	0.2	0.3	0.2	0.65

POST-DEVELOPMENT SCENARIO

Type	WHC	Type of Material	Soil Type	Infiltration Factor (%)			
				Topo	Soils	Cover	Total
Residential Lawns	125 mm	Urban Lawns	Silt Loam	0.15	0.3	0.1	0.55
Neighbourhood Park	125 mm	Urban Lawns	Silt Loam	0.15	0.3	0.1	0.55
Neighbourhood Park - Recreational Amenities / Walkways	90% Precip	Paved	Impervious	0.0	0.0	0.0	0.00
Underground SWM Facility / Trail Head	125 mm	Urban Lawns	Silt Loam	0.0	0.0	0.0	0.00
Single Detached - Roofs	90% Precip	Buildings	Impervious	0.0	0.0	0.0	0.00
Single Detached - Driveways	90% Precip	Paved	Impervious	0.0	0.0	0.0	0.00
Townhouses - Roofs	90% Precip	Buildings	Impervious	0.0	0.0	0.0	0.00
Townhouses - Driveways	90% Precip	Paved	Impervious	0.0	0.0	0.0	0.00
Saint Anne's School - Buildings	90% Precip	Buildings	Impervious	0.0	0.0	0.0	0.00
Saint Anne's School - Paved / Concrete Structures	90% Precip	Paved / Structure	Impervious	0.0	0.0	0.0	0.00
Saint Anne's School - Lawns	125 mm	Urban Lawns	Silt Loam	0.1	0.3	0.1	0.50
Saint Anne's School - Mineral Meadow	250 mm	Pastures and Shrubs	Silt Loam	0.2	0.3	0.1	0.55
Saint Anne's School - Forest / Hedgerows	400 mm	Mature Forest	Silt Loam	0.2	0.3	0.2	0.65
Roads, Sidewalks, Parking & Paths	90% Precip	Paved	Impervious	0.0	0.0	0.0	0.00

Table C-1
Annual Infiltration Rates - Site Wide

POST-DEVELOPMENT MITIGATION SCENARIO

Type	WHC	Type of Material	Soil Type	Infiltration Factor (%)			
				Topo	Soils	Cover	Total
Residential Lawns	125 mm	Urban Lawns	Silt Loam	0.15	0.3	0.1	0.55
Neighbourhood Park - Lawn	125 mm	Urban Lawns	Silt Loam	0.15	0.3	0.1	0.55
Underground SWM Facility / Trail Head	125 mm	Urban Lawns	Silt Loam	0.0	0.0	0.0	0.00
Single Detached - Roofs (to Downspout Disconnection)	90% Precip	Buildings	Impervious	0.0	0.0	0.0	0.25
Single Detached - Roofs (to Catchbasin Filtration Trench)	90% Precip	Buildings	Impervious	0.0	0.0	0.0	0.25
Single Detached - Driveways (to Catchbasin Filtration Trench)	90% Precip	Paved	Impervious	0.0	0.0	0.0	0.00
Roadways (to Catchbasin Filtration Trench)	90% Precip	Paved	Impervious	0.0	0.0	0.0	0.00
Single Detached - Roofs (to Rear Yard Infiltration Trench)	90% Precip	Buildings	Impervious	0.0	0.0	0.0	0.78
Single Detached - Roofs (to Rear Yard Infiltration Trench Near BH102)	90% Precip	Buildings	Impervious	0.0	0.0	0.0	0.78
Single Detached - Roofs (to Rear Yard Infiltration Trench Near BH103)	90% Precip	Buildings	Impervious	0.0	0.0	0.0	0.82
Single Detached - Roofs (to Rear Yard Infiltration Trench Near BH104)	90% Precip	Buildings	Impervious	0.0	0.0	0.0	0.82
Roadways (to Bioswale Filtration Trench)	90% Precip	Paved	Impervious	0.0	0.0	0.0	0.00
Townhouse - Roofs	90% Precip	Buildings	Impervious	0.0	0.0	0.0	0.00
Townhouse - Roofs (to Bioswale Infiltration)	90% Precip	Buildings	Impervious	0.0	0.0	0.0	0.55
Townhouse - Driveways (to Bioswale Infiltration)	90% Precip	Paved	Impervious	0.0	0.0	0.0	0.55
Roadways (to Bioswale Infiltration)	90% Precip	Paved	Impervious	0.0	0.0	0.0	0.55
Saint Anne's School - Buildings	90% Precip	Buildings	Impervious	0.0	0.0	0.0	0.00
Saint Anne's School - Buildings (to Vegetated Filter Strip)	90% Precip	Buildings	Impervious	0.0	0.0	0.0	0.25
Saint Anne's School - Paved / Concrete Structures	90% Precip	Paved / Structure	Impervious	0.0	0.0	0.0	0.00
Saint Anne's School - Paved / Concrete Structures (to Vegetated Filter Strip)	90% Precip	Paved / Structure	Impervious	0.0	0.0	0.0	0.25
Saint Anne's School - Paved / Concrete Structures (to Enhanced Grassed Swale)	90% Precip	Paved / Structure	Impervious	0.0	0.0	0.0	0.10
Saint Anne's School - Lawns	125 mm	Urban Lawns	Silt Loam	0.1	0.3	0.1	0.50
Saint Anne's School - Mineral Meadow	250 mm	Pastures and Shrubs	Silt Loam	0.2	0.3	0.1	0.55
Saint Anne's School - Forest / Hedgerows	400 mm	Mature Forest	Silt Loam	0.2	0.3	0.2	0.65
Roads, Sidewalks, Parking & Paths	90% Precip	Paved	Impervious	0.0	0.0	0.0	0.00

Notes:
WHC - Water Holding Capacity
The infiltration factor is estimated by summing a factor for topography, soils and cover

Table 1: Pre-development Scenario Water Balance Results

Catchment	Area (m^2)	Precipitation (mm/yr) (m^3/yr)	Evapo-transpiration (mm/yr) (m^3/yr)	Surplus (mm/yr) (m^3/yr)	Infiltration (mm/yr) (m^3/yr)	Runoff (mm/yr) (m^3/yr)
Recreational Buildings	4,520	(864) 3,905	(86) 390	(778) 3,515	(0) 0	(778) 3,515
Grassed - Lawns	22,255	(864) 19,230	(570) 12,685	(293) 6,520	(161) 3,585	(132) 2,935
Asphalt Roads & Concrete Structures	8,998	(864) 7,775	(86) 780	(778) 7,000	(0) 0	(778) 7,000
Gravel Pathways	941	(864) 815	(86) 80	(778) 730	(0) 0	(778) 730
Mineral Meadow	39,645	(864) 34,255	(614) 24,340	(247) 9,790	(136) 5,385	(111) 4,405
Thicket / Forest / Hedgerows / Plantations	16,863	(864) 14,570	(629) 10,610	(228) 3,845	(148) 2,500	(80) 1,345
Mineral Marsh	2,078	(864) 1,795	(635) 1,320	(229) 475	(0) 0	(229) 475
Private Property - Residence	1,168	(864) 1,010	(86) 100	(778) 910	(0) 0	(778) 910
Private Property - Driveways / Concrete Structures	5,500	(864) 4,750	(86) 475	(778) 4,280	(0) 0	(778) 4,280
Private Property - Lawns	28,108	(864) 24,285	(570) 16,020	(293) 8,235	(147) 4,120	(147) 4,115
Private Property - Gravel Pathways	131	(864) 110	(86) 10	(778) 100	(0) 0	(778) 100
Private Property - Mineral Meadow	1,338	(864) 1,155	(614) 820	(247) 330	(136) 180	(111) 150
Private Property - Forest / Hedgerows	6,555	(864) 5,665	(629) 4,125	(228) 1,495	(148) 970	(80) 525
Total	**138,100**	**119,320**	**71,755**	**47,225**	**16,740**	**30,485**

Table 2: Proposed Development Scenario Water Balance Results - Without Mitigation

Catchment	Area	Precipitation	Evapo-transpiration	Surplus	Infiltration	Runoff
	(m^2)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)
Residential Lawns	31,560	(864) 27,270	(570) 17,990	(293) 9,245	(161) 5,085	(132) 4,160
Neighbourhood Park	2,415	(864) 2,085	(570) 1,380	(293) 710	(161) 390	(132) 320
Neighbourhood Park - Recreational Amenities / Walkways	13,685	(864) 11,825	(86) 1,180	(778) 10,640	(0) 0	(778) 10,640
Underground SWM Facility / Trail Head	1,700	(864) 1,470	(570) 970	(293) 500	(0) 0	(293) 500
Single Detached - Roofs	24,952	(864) 21,560	(86) 2,155	(778) 19,405	(0) 0	(778) 19,405
Single Detached - Driveways	1,879	(864) 1,625	(86) 160	(778) 1,460	(0) 0	(778) 1,460
Townhouses - Roofs	3,007	(864) 2,600	(86) 260	(778) 2,340	(0) 0	(778) 2,340
Townhouses - Driveways	449	(864) 390	(86) 40	(778) 350	(0) 0	(778) 350
Saint Anne's School - Buildings	2,333	(864) 2,015	(86) 200	(778) 1,815	(0) 0	(778) 1,815
Saint Anne's School - Paved / Concrete Structures	10,288	(864) 8,890	(86) 890	(778) 8,000	(0) 0	(778) 8,000
Saint Anne's School - Lawns	23,729	(864) 20,500	(570) 13,525	(293) 6,950	(147) 3,480	(147) 3,470
Saint Anne's School - Mineral Meadow	1,242	(864) 1,070	(614) 765	(247) 305	(136) 170	(111) 135
Saint Anne's School - Forest / Hedgerows	5,208	(864) 4,500	(629) 3,275	(228) 1,190	(148) 770	(80) 420
Roads, Sidewalks, Parking & Paths	15,653	(864) 13,520	(86) 1,350	(778) 12,170	(0) 0	(778) 12,170
Total	**138,100**	**119,320**	**44,140**	**75,080**	**9,895**	**65,185**

Table 3: Proposed Development Scenario Water Balance Results - With Mitigation

Catchment	Area (m^2)	Precipitation (mm/yr) (m^3/yr)	Evapo-transpiration (mm/yr) (m^3/yr)	Surplus (mm/yr) (m^3/yr)	Infiltration (mm/yr) (m^3/yr)	Runoff (mm/yr) (m^3/yr)
Residential Lawns	31,560	(864) 27,270	(570) 17,990	(293) 9,245	(161) 5,085	(132) 4,160
Neighbourhood Park - Lawn	2,415	(864) 2,085	(570) 1,375	(293) 710	(161) 390	(132) 320
Neighbourhood Park - Recreational Amenities / Walkways	13,685	(864) 11,825	(86) 1,180	(778) 10,640	(0) 0	(778) 10,640
Underground SWM Facility / Trail Head	1,700	(864) 1,470	(570) 970	(293) 500	(0) 0	(293) 500
Single Detached - Roofs (to Downspout Disconnection)	22,111	(864) 19,105	(86) 1,910	(778) 17,190	(194) 4,300	(583) 12,890
Single Detached - Driveways (to Catchbasin Filtration Trench)	1,879	(864) 1,620	(86) 160	(778) 1,460	(0) 0	(778) 1,460
Roadways (to Catchbasin Filtration Trench)	12,547	(864) 10,840	(86) 1,085	(778) 9,760	(0) 0	(778) 9,760
Single Detached - Roofs (to Rear Yard Infiltration Trench)	902	(864) 780	(86) 80	(778) 700	(607) 545	(171) 155
Single Detached - Roofs (to Rear Yard Infiltration Trench Near BH102)	972	(864) 840	(86) 85	(778) 760	(607) 590	(171) 170
Single Detached - Roofs (to Rear Yard Infiltration Trench Near BH103)	256	(864) 220	(86) 20	(778) 200	(328) 85	(450) 115
Single Detached - Roofs (to Rear Yard Infiltration Trench Near BH104)	712	(864) 615	(86) 60	(778) 550	(328) 235	(450) 315
Roadways (to Bioswale Filtration Trench)	1,784	(864) 1,540	(86) 155	(778) 1,385	(0) 0	(778) 1,385
Townhouse - Roofs	1,503	(864) 1,300	(86) 130	(778) 1,170	(0) 0	(778) 1,170
Townhouse - Roofs (to Bioswale Infiltration)	1,503	(864) 1,300	(86) 130	(778) 1,170	(428) 645	(350) 525
Townhouse - Driveways (to Bioswale Infiltration)	449	(864) 390	(86) 40	(778) 350	(428) 190	(350) 160
Roadways (to Bioswale Infiltration)	1,073	(864) 925	(86) 90	(778) 835	(428) 460	(350) 375
Saint Anne's School - Buildings	1,554	(864) 1,340	(86) 135	(778) 1,210	(0) 0	(778) 1,210
Saint Anne's School - Buildings (to Vegetated Filter Strip)	779	(864) 670	(86) 70	(778) 605	(194) 150	(583) 455
Saint Anne's School - Paved / Concrete Structures	6,718	(864) 5,805	(86) 580	(778) 5,225	(0) 0	(778) 5,225
Saint Anne's School - Paved / Concrete Structures (to Vegetated Filter Strip)	935	(864) 810	(86) 80	(778) 725	(194) 180	(583) 545
Saint Anne's School - Paved / Concrete Structures (to Enhanced Grassed Swale)	2,635	(864) 2,275	(86) 230	(778) 2,050	(78) 205	(700) 1,845
Saint Anne's School - Lawns	23,729	(864) 20,500	(570) 13,525	(293) 6,950	(147) 3,480	(147) 3,470
Saint Anne's School - Mineral Meadow	1,242	(864) 1,075	(614) 765	(247) 305	(136) 170	(111) 135
Saint Anne's School - Forest / Hedgerows	5,208	(864) 4,500	(629) 3,275	(228) 1,190	(148) 770	(80) 420
Roads, Sidewalks, Parking & Paths	250	(864) 220	(86) 20	(778) 195	(0) 0	(778) 195
Total	**138,100**	**119,320**	**44,140**	**75,080**	**17,480**	**57,600**

Summary of Results - Tannery Creek West Tributary

Table 1: Pre-development Scenario Water Balance Results

Catchment	Area (m^2)	Precipitation (mm/yr) (m^3/yr)	Evapo-transpiration (mm/yr) (m^3/yr)	Surplus (mm/yr) (m^3/yr)	Infiltration (mm/yr) (m^3/yr)	Runoff (mm/yr) (m^3/yr)
Grassed - Lawns	11,602	(864) 10,020	(570) 6,615	(293) 3,400	(161) 1,870	(132) 1,530
Asphalt Roads	2,309	(864) 1,995	(86) 200	(778) 1,795	(0) 0	(778) 1,795
Mineral Meadow	16,965	(864) 14,660	(614) 10,415	(247) 4,190	(136) 2,305	(111) 1,885
Thicket / Forest / Hedgerows / Plantations	7,762	(864) 6,705	(629) 4,880	(228) 1,770	(148) 1,150	(80) 620
Mineral Marsh	2,078	(864) 1,795	(635) 1,320	(229) 475	(0) 0	(229) 475
Private Property - Residence	1,046	(864) 905	(86) 90	(778) 815	(0) 0	(778) 815
Private Property - Driveways / Concrete Structures	4,372	(864) 3,780	(86) 380	(778) 3,400	(0) 0	(778) 3,400
Private Property - Lawns	17,223	(864) 14,880	(570) 9,815	(293) 5,045	(147) 2,520	(147) 2,525
Private Property - Forest / Hedgerows	4,143	(864) 3,580	(629) 2,605	(228) 945	(148) 615	(80) 330
Total	**63,357**	**58,320**	**36,320**	**21,835**	**8,460**	**13,375**

Entered by: MR
Checked by: MK

Summary of Results - Tannery Creek West Tributary

Table 2: Proposed Development Scenario Water Balance Results - Without Mitigation

Catchment	Area	Precipitation	Evapo-transpiration	Surplus	Infiltration	Runoff
	(m^2)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)
Residential Lawns	12,827	(864) 11,080	(570) 7,310	(293) 3,760	(161) 2,065	(132) 1,695
Single Detached - Roofs	11,361	(864) 9,815	(86) 980	(778) 8,835	(0) 0	(778) 8,835
Single Detached - Driveways	820	(864) 710	(86) 70	(778) 635	(0) 0	(778) 635
Saint Anne's School - Buildings	1,618	(864) 1,400	(86) 140	(778) 1,260	(0) 0	(778) 1,260
Saint Anne's School - Paved / Concrete Structures	5,651	(864) 4,880	(86) 490	(778) 4,395	(0) 0	(778) 4,395
Saint Anne's School - Lawns	14,098	(864) 12,180	(570) 8,035	(293) 4,130	(147) 2,065	(147) 2,065
Saint Anne's School - Forest / Hedgerows	3,333	(864) 2,880	(629) 2,100	(228) 760	(148) 495	(80) 265
Roads, Sidewalks, Parking & Paths	3,893	(864) 3,365	(86) 335	(778) 3,025	(0) 0	(778) 3,025
Total	**53,600**	**46,310**	**19,460**	**26,800**	**4,625**	**22,175**

Summary of Results - Tannery Creek West Tributary

Table 3: Proposed Development Scenario Water Balance Results - With Mitigation

Catchment	Area	Precipitation	Evapo-transpiration	Surplus	Infiltration	Runoff
	(m^2)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)
Residential Lawns	12,827	(864) 11,080	(570) 7,310	(293) 3,760	(161) 2,065	(132) 1,695
Single Detached - Roofs (to Downspout Disconnection)	8,519	(864) 7,360	(86) 735	(778) 6,625	(194) 1,655	(583) 4,970
Roadways (to Bioswale Filtration Trench)	78	(864) 65	(86) 5	(778) 60	(0) 0	(778) 60
Single Detached - Driveways (to Catchbasin Filtration Trench)	820	(864) 710	(86) 70	(778) 635	(0) 0	(778) 635
Roadways (to Catchbasin Filtration Trench)	3,716	(864) 3,210	(86) 320	(778) 2,890	(0) 0	(778) 2,890
Single Detached - Roofs (to Rear Yard Infiltration Trench)	902	(864) 780	(86) 80	(778) 700	(607) 550	(171) 150
Single Detached - Roofs (to Rear Yard Infiltration Trench Near BH102)	972	(864) 840	(86) 80	(778) 755	(607) 590	(171) 165
Single Detached - Roofs (to Rear Yard Infiltration Trench Near BH103)	256	(864) 220	(86) 20	(778) 200	(328) 85	(450) 115
Single Detached - Roofs (to Rear Yard Infiltration Trench Near BH104)	712	(864) 615	(86) 60	(778) 555	(328) 235	(450) 320
Saint Anne's School - Buildings	839	(864) 725	(86) 75	(778) 650	(0) 0	(778) 650
Saint Anne's School - Buildings (to Vegetated Filter Strip)	779	(864) 675	(86) 70	(778) 605	(194) 150	(583) 455
Saint Anne's School - Paved / Concrete Structures	2,081	(864) 1,800	(86) 180	(778) 1,620	(0) 0	(778) 1,620
Saint Anne's School - Paved / Concrete Structures (to Vegetated Filter Strip)	935	(864) 810	(86) 80	(778) 725	(194) 180	(583) 545
Saint Anne's School - Paved / Concrete Structures (to Enhanced Grassed Swale)	2,635	(864) 2,275	(86) 230	(778) 2,050	(78) 205	(700) 1,845
Saint Anne's School - Lawns	14,098	(864) 12,180	(570) 8,035	(293) 4,130	(147) 2,065	(147) 2,065
Saint Anne's School - Forest / Hedgerows	3,333	(864) 2,880	(629) 2,100	(228) 760	(148) 495	(80) 265
Roads, Sidewalks, Parking & Paths	100	(864) 85	(86) 10	(778) 80	(0) 0	(778) 80
Total	**53,600**	**46,310**	**19,460**	**26,800**	**8,275**	**18,525**

Entered by: MR
Checked by: MK

Summary of Results - Tannery Creek North Tributary

Table 1: Pre-development Scenario Water Balance Results

Catchment	Area (m^2)	Precipitation (mm/yr) (m^3/yr)	Evapo-transpiration (mm/yr) (m^3/yr)	Surplus (mm/yr) (m^3/yr)	Infiltration (mm/yr) (m^3/yr)	Runoff (mm/yr) (m^3/yr)
Recreational Buildings	2,358	(864) 2,035	(86) 205	(778) 1,840	(0) 0	(778) 1,840
Grassed - Lawns	2,421	(864) 2,090	(570) 1,380	(293) 710	(161) 390	(132) 320
Asphalt Roads & Concrete Structures	3,474	(864) 3,000	(86) 300	(778) 2,700	(0) 0	(778) 2,700
Gravel Pathways	890	(864) 770	(86) 80	(778) 690	(0) 0	(778) 690
Mineral Meadow	14,297	(864) 12,355	(614) 8,780	(247) 3,530	(136) 1,940	(111) 1,590
Hedgerows	7,345	(864) 6,345	(629) 4,620	(228) 1,675	(148) 1,090	(80) 585
Private Property - Residence	122	(864) 105	(86) 10	(778) 95	(0) 0	(778) 95
Private Property - Driveways / Concrete Structures	1,128	(864) 975	(86) 95	(778) 875	(0) 0	(778) 875
Private Property - Lawns	10,886	(864) 9,405	(570) 6,205	(293) 3,190	(147) 1,595	(147) 1,595
Private Property - Gravel Pathways	131	(864) 115	(86) 10	(778) 100	(0) 0	(778) 100
Private Property - Mineral Meadow	1,338	(864) 1,155	(614) 820	(247) 330	(136) 180	(111) 150
Private Property - Hedgerows	2,412	(864) 2,085	(629) 1,515	(228) 550	(148) 360	(80) 190
Total	**46,800**	**40,435**	**24,020**	**16,285**	**5,555**	**10,730**

Entered by: MR
Checked by: MK

Summary of Results - Tannery Creek North Tributary

Table 2: Proposed Development Scenario Water Balance Results - Without Mitigation

Catchment	Area	Precipitation	Evapo-transpiration	Surplus	Infiltration	Runoff
	(m^2)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)
Residential Lawns	7,020	(864) 6,070	(570) 4,000	(293) 2,060	(161) 1,130	(132) 930
Neighbourhood Park	2,415	(864) 2,085	(570) 1,380	(293) 710	(161) 390	(132) 320
Neighbourhood Park - Recreational Amenities / Walkways	13,685	(864) 11,825	(86) 1,180	(778) 10,640	(0) 0	(778) 10,640
Underground SWM Facility / Trail Head	1,700	(864) 1,470	(570) 970	(293) 500	(0) 0	(293) 500
Single Detached - Roofs	2,073	(864) 1,790	(86) 180	(778) 1,610	(0) 0	(778) 1,610
Single Detached - Driveways	157	(864) 135	(86) 15	(778) 120	(0) 0	(778) 120
Townhouses - Roofs	2,932	(864) 2,535	(86) 255	(778) 2,280	(0) 0	(778) 2,280
Townhouses - Driveways	449	(864) 390	(86) 40	(778) 350	(0) 0	(778) 350
Saint Anne's School - Buildings	715	(864) 615	(86) 60	(778) 555	(0) 0	(778) 555
Saint Anne's School - Paved / Concrete Structures	4,637	(864) 4,005	(86) 400	(778) 3,605	(0) 0	(778) 3,605
Saint Anne's School - Lawns	9,631	(864) 8,320	(570) 5,490	(293) 2,820	(147) 1,410	(147) 1,410
Saint Anne's School - Mineral Meadow	1,242	(864) 1,075	(614) 760	(247) 305	(136) 170	(111) 135
Saint Anne's School - Hedgerows	1,875	(864) 1,620	(629) 1,180	(228) 430	(148) 280	(80) 150
Roads, Sidewalks, Parking & Paths	5,170	(864) 4,465	(86) 445	(778) 4,020	(0) 0	(778) 4,020
Total	**53,700**	**46,400**	**16,355**	**30,005**	**3,380**	**26,625**

Summary of Results - Tannery Creek North Tributary

Table 3: Proposed Development Scenario Water Balance Results - With Mitigation

Catchment	Area	Precipitation	Evapo-transpiration	Surplus	Infiltration	Runoff
	(m^2)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)
Residential Lawns	7,020	(864) 6,065	(570) 4,000	(293) 2,055	(161) 1,130	(132) 925
Neighbourhood Park - Lawn	2,415	(864) 2,085	(570) 1,375	(293) 710	(161) 390	(132) 320
Neighbourhood Park - Recreational Amenities / Walkways	13,685	(864) 11,825	(86) 1,180	(778) 10,640	(0) 0	(778) 10,640
Underground SWM Facility / Trail Head	1,700	(864) 1,470	(570) 970	(293) 500	(0) 0	(293) 500
Single Detached - Roofs (to Downspout Disconnection)	2,073	(864) 1,790	(86) 180	(778) 1,610	(194) 400	(583) 1,210
Single Detached - Driveways (to Catchbasin Filtration Trench)	157	(864) 135	(86) 15	(778) 120	(0) 0	(778) 120
Roadways (to Catchbasin Filtration Trench)	3,381	(864) 2,920	(86) 290	(778) 2,630	(0) 0	(778) 2,630
Roadways (to Bioswale Filtration Trench)	667	(864) 575	(86) 60	(778) 520	(0) 0	(778) 520
Townhouse - Roofs	1,428	(864) 1,235	(86) 125	(778) 1,110	(0) 0	(778) 1,110
Townhouse - Roofs (to Bioswale Infiltration)	1,503	(864) 1,300	(86) 130	(778) 1,170	(428) 645	(350) 525
Townhouse - Driveways (to Bioswale Infiltration)	449	(864) 390	(86) 40	(778) 350	(428) 190	(350) 160
Roadways (to Bioswale Infiltration)	1,073	(864) 930	(86) 95	(778) 835	(428) 460	(350) 375
Saint Anne's School - Buildings	715	(864) 615	(86) 60	(778) 555	(0) 0	(778) 555
Saint Anne's School - Paved / Concrete Structures	4,637	(864) 4,005	(86) 400	(778) 3,605	(0) 0	(778) 3,605
Saint Anne's School - Lawns	9,631	(864) 8,320	(570) 5,490	(293) 2,820	(147) 1,410	(147) 1,410
Saint Anne's School - Mineral Meadow	1,242	(864) 1,075	(614) 765	(247) 305	(136) 170	(111) 135
Saint Anne's School - Hedgerows	1,875	(864) 1,620	(629) 1,180	(228) 430	(148) 280	(80) 150
Roads, Sidewalks, Parking & Paths	50	(864) 45	(86) 0	(778) 40	(0) 0	(778) 40
Total	**53,700**	**46,400**	**16,355**	**30,005**	**5,075**	**24,930**

Summary of Results - Tannery Creek (Including Tannery Creek North Tributary Contribution)

Table 1: Pre-development Scenario Water Balance Results

Catchment	Area (m^2)	Precipitation	Evapo-transpiration	Surplus	Infiltration	Runoff
		(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)
Recreational Buildings	2,162	(864) 1,870	(86) 190	(778) 1,680	(0) 0	(778) 1,680
Grassed - Lawns	8,231	(864) 7,110	(570) 4,690	(293) 2,415	(161) 1,325	(132) 1,090
Asphalt Roads	3,215	(864) 2,780	(86) 280	(778) 2,500	(0) 0	(778) 2,500
Gravel Pathways	51	(864) 40	(86) 5	(778) 40	(0) 0	(778) 40
Mineral Meadow	8,383	(864) 7,245	(614) 5,145	(247) 2,070	(136) 1,140	(111) 930
Hedgerows / Plantations	1,757	(864) 1,520	(629) 1,105	(228) 400	(148) 260	(80) 140
Total - Tannery Creek Sub Catchment	**23,800**	**20,565**	**11,415**	**9,105**	**2,725**	**6,380**
Total - Tannery Creek North Tributary Catchment	**46,800**	**40,435**	**24,020**	**16,285**	**5,555**	**10,730**
Total - Tannery Creek Total Catchment	**70,600**	**61,000**	**35,435**	**25,390**	**8,280**	**17,110**

Entered by: MR
Checked by: MK

Summary of Results - Tannery Creek (Including Tannery Creek North Tributary Contribution)

Table 2: Proposed Development Scenario Water Balance Results - Without Mitigation

Catchment	Area	Precipitation	Evapo-transpiration	Surplus	Infiltration	Runoff
	(m^2)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)
Residential Lawns	11,713	(864) 10,120	(570) 6,675	(293) 3,430	(161) 1,890	(132) 1,540
Single Detached - Roofs	11,519	(864) 9,950	(86) 995	(778) 8,960	(0) 0	(778) 8,960
Single Detached - Driveways	903	(864) 780	(86) 80	(778) 700	(0) 0	(778) 700
Townhouses - Roofs	75	(864) 65	(86) 5	(778) 60	(0) 0	(778) 60
Roads, Sidewalks, Parking & Paths	6,590	(864) 5,695	(86) 570	(778) 5,125	(0) 0	(778) 5,125
Total - Tannery Creek Sub Catchment	**30,800**	**26,610**	**8,325**	**18,275**	**1,890**	**16,385**
Total - Tannery Creek North Tributary Catchment	**53,700**	**46,400**	**16,355**	**30,005**	**3,380**	**26,625**
Total - Tannery Creek Total Catchment	**84,500**	**73,010**	**24,680**	**48,280**	**5,270**	**43,010**

Summary of Results - Tannery Creek (Including Tannery Creek North Tributary Contribution)

Table 3: Proposed Development Scenario Water Balance Results - With Mitigation

Catchment	Area	Precipitation	Evapo-transpiration	Surplus	Infiltration	Runoff
	(m^2)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)
Residential Lawns	11,713	(864) 10,120	(570) 6,675	(293) 3,430	(161) 1,890	(132) 1,540
Single Detached - Roofs (to Downspout Disconnection)	11,519	(864) 9,950	(86) 995	(778) 8,960	(194) 2,240	(583) 6,720
Single Detached - Driveways (to Catchbasin Filtration Trench)	903	(864) 780	(86) 80	(778) 700	(0) 0	(778) 700
Roadways (to Catchbasin Filtration Trench)	5,451	(864) 4,710	(86) 470	(778) 4,240	(0) 0	(778) 4,240
Roadways (to Bioswale Filtration Trench)	1,040	(864) 900	(86) 90	(778) 810	(0) 0	(778) 810
Townhouse - Roofs	75	(864) 65	(86) 5	(778) 55	(0) 0	(778) 55
Roads, Sidewalks, Parking & Paths	100	(864) 85	(86) 10	(778) 80	(0) 0	(778) 80
Total - Tannery Creek Sub Catchment	**30,800**	**26,610**	**8,325**	**18,275**	**4,130**	**14,145**
Total - Tannery Creek North Tributary Catchment	**53,700**	**46,400**	**16,355**	**30,005**	**5,075**	**24,930**
Total - Tannery Creek Total Catchment	**84,500**	**73,010**	**24,680**	**48,280**	**9,205**	**39,075**

Summary of Results - Southern Wetland

Table 1: Pre-development Scenario Water Balance Results

Catchment	Area (m^2)	Precipitation (mm/yr) (m^3/yr)	Evapo-transpiration (mm/yr) (m^3/yr)	Surplus (mm/yr) (m^3/yr)	Infiltration (mm/yr) (m^3/yr)	Runoff (mm/yr) (m^3/yr)
Grassed - Lawns	1,487	(864) 1,285	(570) 845	(293) 435	(161) 240	(132) 195
Asphalt Roads	433	(864) 375	(86) 35	(778) 335	(0) 0	(778) 335
Forest	146	(864) 125	(629) 90	(228) 30	(148) 20	(80) 10
Private Property - Residence	431	(864) 375	(86) 40	(778) 335	(0) 0	(778) 335
Private Property - Driveways / Concrete Structures	2,194	(864) 1,895	(86) 190	(778) 1,705	(0) 0	(778) 1,705
Private Property - Lawns	6,515	(864) 5,630	(570) 3,715	(293) 1,910	(147) 955	(147) 955
Private Property - Forest / Hedgerows	1,925	(864) 1,665	(629) 1,210	(228) 440	(148) 285	(80) 155
Total	**13,130**	**11,350**	**6,125**	**5,190**	**1,500**	**3,690**

Table 2: Proposed Development Scenario Water Balance Results - Without Mitigation

Catchment	Area	Precipitation	Evapo-transpiration	Surplus	Infiltration	Runoff
	(m^2)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)
Residential Lawns	1,920	(864) 1,660	(570) 1,095	(293) 560	(161) 310	(132) 250
Single Detached - Roofs	1,285	(864) 1,110	(86) 110	(778) 1,000	(0) 0	(778) 1,000
Saint Anne's School - Buildings	458	(864) 395	(86) 40	(778) 355	(0) 0	(778) 355
Saint Anne's School - Paved / Concrete Structures	2,669	(864) 2,305	(86) 230	(778) 2,075	(0) 0	(778) 2,075
Saint Anne's School - Lawns	5,888	(864) 5,090	(570) 3,355	(293) 1,725	(147) 860	(147) 865
Saint Anne's School - Forest / Hedgerows	943	(864) 815	(629) 595	(228) 215	(148) 140	(80) 75
Total	**13,163**	**11,375**	**5,425**	**5,930**	**1,310**	**4,620**

Table 3: Proposed Development Scenario Water Balance Results - With Mitigation

Catchment	Area	Precipitation	Evapo-transpiration	Surplus	Infiltration	Runoff
	(m^2)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)
Residential Lawns	1,920	(864) 1,660	(570) 1,095	(293) 560	(161) 310	(132) 250
Single Detached - Roofs (to Rear Yard Infiltration Trench)	902	(864) 780	(86) 80	(778) 700	(607) 545	(171) 155
Single Detached - Roofs (to Rear Yard Infiltration Trench Near BH102)	127	(864) 110	(86) 10	(778) 100	(607) 75	(171) 25
Single Detached - Roofs (to Rear Yard Infiltration Trench Near BH103)	256	(864) 220	(86) 20	(778) 200	(328) 85	(450) 115
Saint Anne's School - Buildings	458	(864) 395	(86) 40	(778) 355	(0) 0	(778) 355
Saint Anne's School - Paved / Concrete Structures	35	(864) 30	(86) 5	(778) 25	(0) 0	(778) 25
Saint Anne's School - Paved / Concrete Structures (to Enhanced Grassed Swale)	2,635	(864) 2,275	(86) 225	(778) 2,050	(78) 205	(700) 1,845
Saint Anne's School - Lawns	5,888	(864) 5,090	(570) 3,355	(293) 1,725	(147) 860	(147) 865
Saint Anne's School - Forest / Hedgerows	943	(864) 815	(629) 595	(228) 215	(148) 140	(80) 75
Total	**13,163**	**11,375**	**5,425**	**5,930**	**2,220**	**3,710**

Summary of Results - Northern Wetland

Table 1: Pre-development Scenario Water Balance Results

Catchment	Area (m^2)	Precipitation (mm/yr) (m^3/yr)	Evapo-transpiration (mm/yr) (m^3/yr)	Surplus (mm/yr) (m^3/yr)	Infiltration (mm/yr) (m^3/yr)	Runoff (mm/yr) (m^3/yr)
Recreational Buildings	1,266	(864) 1,095	(86) 110	(778) 985	(0) 0	(778) 985
Grassed - Lawns	1,639	(864) 1,415	(570) 935	(293) 480	(161) 265	(132) 215
Asphalt Roads & Concrete Structures	2,500	(864) 2,160	(86) 215	(778) 1,945	(0) 0	(778) 1,945
Gravel Pathways	436	(864) 375	(86) 40	(778) 340	(0) 0	(778) 340
Mineral Meadow	14,222	(864) 12,290	(614) 8,730	(247) 3,510	(136) 1,930	(111) 1,580
Hedgerows	937	(864) 810	(629) 590	(228) 215	(148) 140	(80) 75
Private Property - Driveways / Concrete Structures	588	(864) 510	(86) 50	(778) 455	(0) 0	(778) 455
Private Property - Lawns	1,912	(864) 1,650	(570) 1,090	(293) 560	(147) 280	(147) 280
Private Property - Hedgerows	499	(864) 430	(629) 315	(228) 115	(148) 75	(80) 40
Total	**23,501**	**20,735**	**12,075**	**8,605**	**2,690**	**5,915**

Entered by: MR
Checked by: MK

Summary of Results - Northern Wetland

Table 2: Proposed Development Scenario Water Balance Results - Without Mitigation

Catchment	Area	Precipitation	Evapo-transpiration	Surplus	Infiltration	Runoff
	(m^2)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)
Residential Lawns	7,020	(864) 6,065	(570) 4,000	(293) 2,055	(161) 1,130	(132) 925
Neighbourhood Park - Lawn	2,415	(864) 2,090	(570) 1,380	(293) 710	(161) 390	(132) 320
Neighbourhood Park - Recreational Amenities / Walkways	13,685	(864) 11,825	(86) 1,180	(778) 10,640	(0) 0	(778) 10,640
Underground SWM Facility / Trail Head	1,700	(864) 1,470	(570) 970	(293) 500	(0) 0	(293) 500
Single Detached - Roofs	2,073	(864) 1,790	(86) 180	(778) 1,610	(0) 0	(778) 1,610
Single Detached - Driveways	157	(864) 135	(86) 15	(778) 120	(0) 0	(778) 120
Townhouses - Roofs	2,932	(864) 2,535	(86) 250	(778) 2,280	(0) 0	(778) 2,280
Townhouses - Driveways	449	(864) 390	(86) 40	(778) 350	(0) 0	(778) 350
Saint Anne's School - Buildings	279	(864) 240	(86) 25	(778) 215	(0) 0	(778) 215
Saint Anne's School - Paved / Concrete Structures	3,045	(864) 2,630	(86) 265	(778) 2,370	(0) 0	(778) 2,370
Saint Anne's School - Lawns	818	(864) 705	(570) 465	(293) 240	(147) 120	(147) 120
Saint Anne's School - Hedgerows	338	(864) 290	(629) 210	(228) 75	(148) 50	(80) 25
Roads, Sidewalks, Parking & Paths	5,170	(864) 4,465	(86) 445	(778) 4,025	(0) 0	(778) 4,025
Total	**40,080**	**34,630**	**9,425**	**25,190**	**1,690**	**23,500**
			-22%	193%	-37%	297%
					1,000	17,585

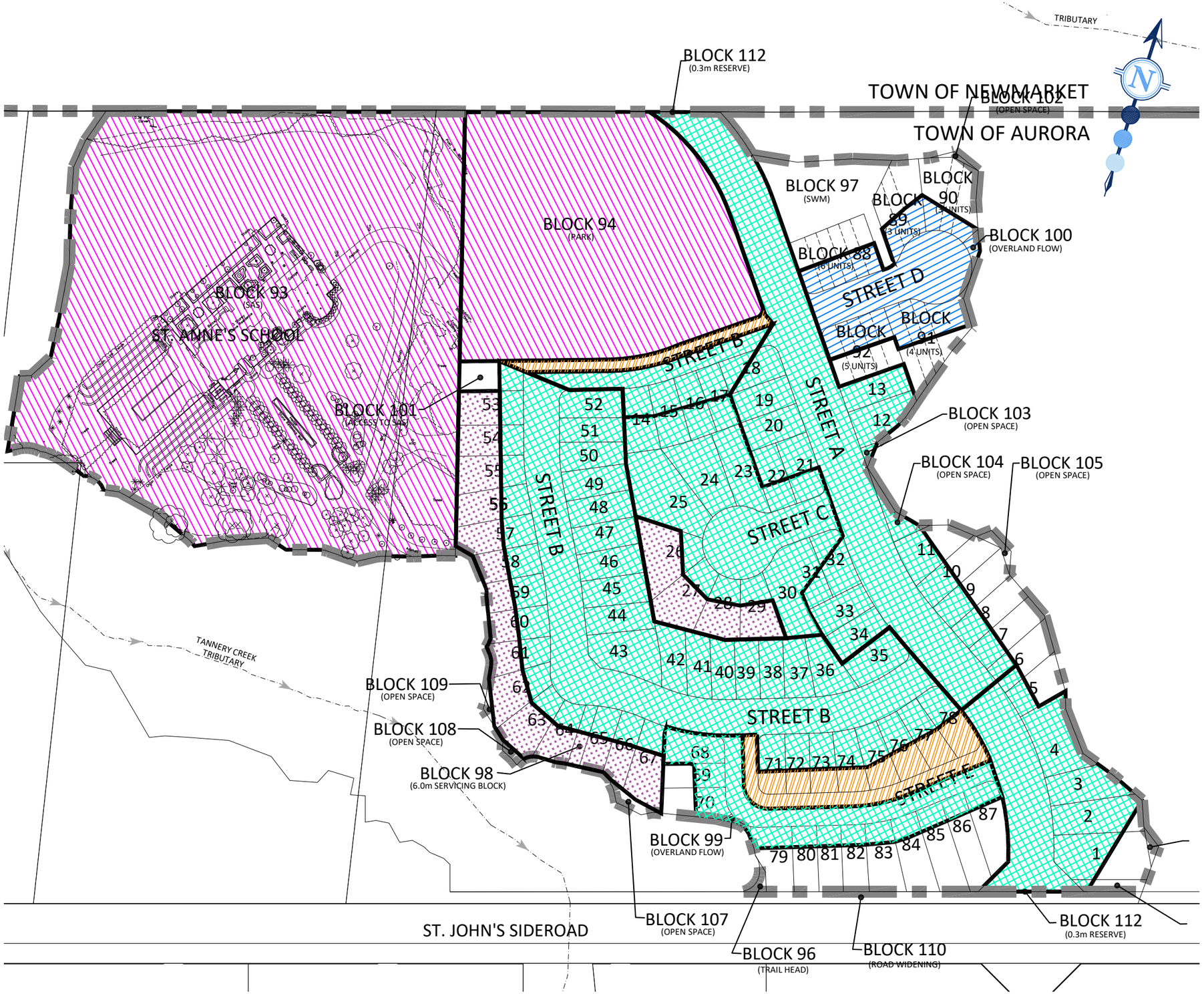
Summary of Results - Northern Wetland

Table 3: Proposed Development Scenario Water Balance Results - With Mitigation

Catchment	Area	Precipitation	Evapo-transpiration	Surplus	Infiltration	Runoff
	(m^2)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)	(mm/yr) (m^3/yr)
Residential Lawns	7,020	(864) 6,065	(570) 4,000	(293) 2,055	(161) 1,130	(132) 925
Neighbourhood Park - Lawn	2,415	(864) 2,085	(570) 1,375	(293) 710	(161) 390	(132) 320
Neighbourhood Park - Recreational Amenities / Walkways	13,685	(864) 11,825	(86) 1,180	(778) 10,640	(0) 0	(778) 10,640
Underground SWM Facility / Trail Head	1,700	(864) 1,470	(570) 970	(293) 500	(0) 0	(293) 500
Single Detached - Roofs (to Downspout Disconnection)	2,073	(864) 1,790	(86) 180	(778) 1,610	(194) 405	(583) 1,205
Single Detached - Driveways (to Catchbasin Filtration Trench)	157	(864) 135	(86) 10	(778) 120	(0) 0	(778) 120
Roadways (to Catchbasin Filtration Trench)	3,381	(864) 2,920	(86) 290	(778) 2,630	(0) 0	(778) 2,630
Roadways (to Bioswale Filtration Trench)	667	(864) 575	(86) 60	(778) 520	(0) 0	(778) 520
Townhouse - Roofs	1,428	(864) 1,235	(86) 125	(778) 1,110	(0) 0	(778) 1,110
Townhouse - Roofs (to Bioswale Infiltration)	1,503	(864) 1,300	(86) 130	(778) 1,170	(428) 645	(350) 525
Townhouse - Driveways (to Bioswale Infiltration)	449	(864) 390	(86) 40	(778) 350	(428) 190	(350) 160
Roadways (to Bioswale Infiltration)	1,073	(864) 930	(86) 95	(778) 835	(428) 460	(350) 375
Saint Anne's School - Buildings	279	(864) 240	(86) 25	(778) 215	(0) 0	(778) 215
Saint Anne's School - Paved / Concrete Structures	3,045	(864) 2,630	(86) 260	(778) 2,370	(0) 0	(778) 2,370
Saint Anne's School - Lawns	818	(864) 705	(570) 465	(293) 240	(147) 120	(147) 120
Saint Anne's School - Hedgerows	338	(864) 290	(629) 215	(228) 75	(148) 50	(80) 25
Roads, Sidewalks, Parking & Paths	50	(864) 45	(86) 5	(778) 40	(0) 0	(778) 40
Total	**40,080**	**34,630**	**9,425**	**25,190**	**3,390**	**21,800**

APPENDIX D

Supporting Documentation



LEGEND:

- MUNICIPAL BOUNDARY
- LIMIT OF DEVELOPMENT
- STORM DRAINAGE BOUNDARY
- REAR YARD INFILTRATION TRENCH (25 mm/imp-ha)
- CATCHBASIN FILTRATION SYSTEM
- ON-SITE INFILTRATION (25 mm/imp-ha)
- BIOSWALE INFILTRATION (25 mm/imp-ha)
- BIOSWALE FILTRATION (25 mm/imp-ha)

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

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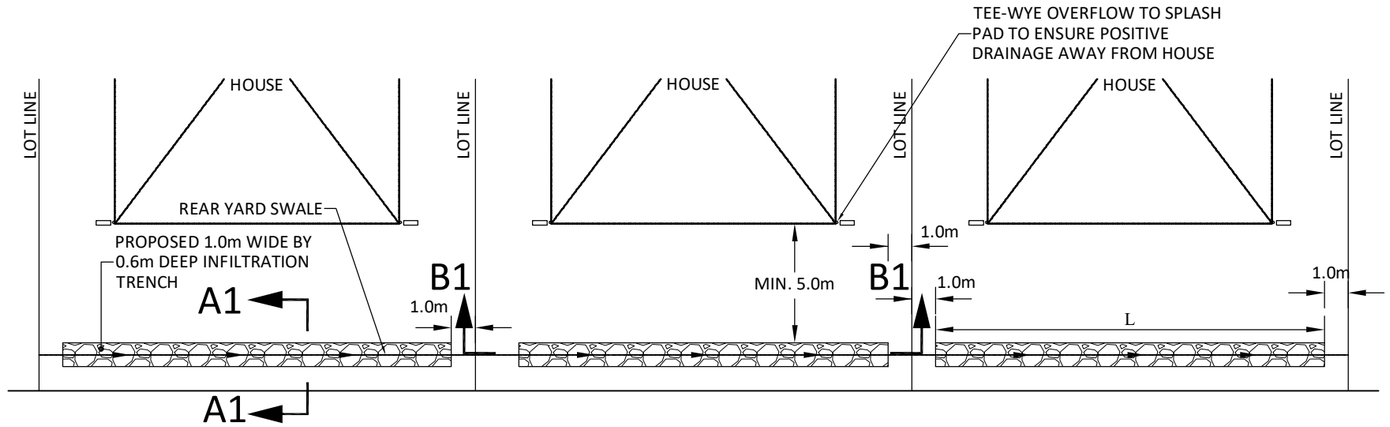
SHINING HILL ESTATES COLLECTION INC.

SHINING HILL ESTATES PHASE 3 - FSSR (AURORA)

LID PLAN

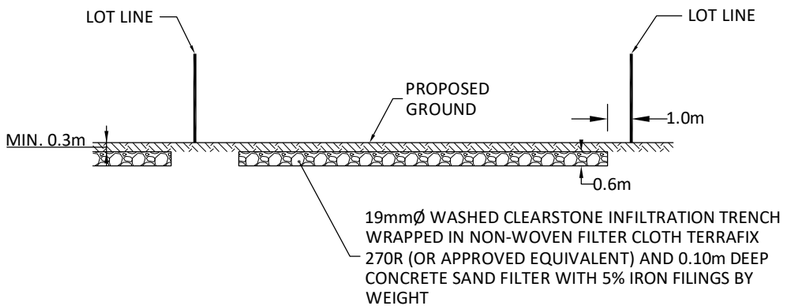
DESIGNED BY:	E.T.C.K.	CHECKED BY:	S.E.K.
SCALE:	1:2000	DATE:	SEPTEMBER 2022
PROJECT No:	2183	FIGURE No:	2.6

File: P:\2183 Shining Hill Estates\Drawings\FSSR-Phase 3\Fig\Report Figures\2183P-FIGS-LIDS-2.6.dwg – Revised by <RCORTEZ> : Thu, Sep 01 2022 – 9:16am



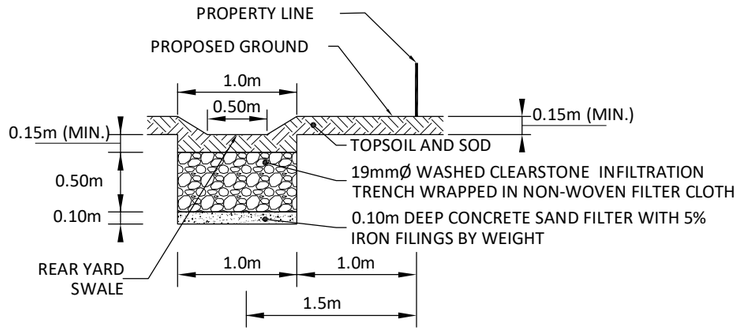
SPLIT DRAINING LOTS PLAN

SCALE 1:250



SECTION B1-B1

SCALE 1:250



SECTION A1-A1 INFILTRATION TRENCH ASSEMBLY

SCALE 1:50

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

SHINING HILL ESTATES COLLECTION INC.

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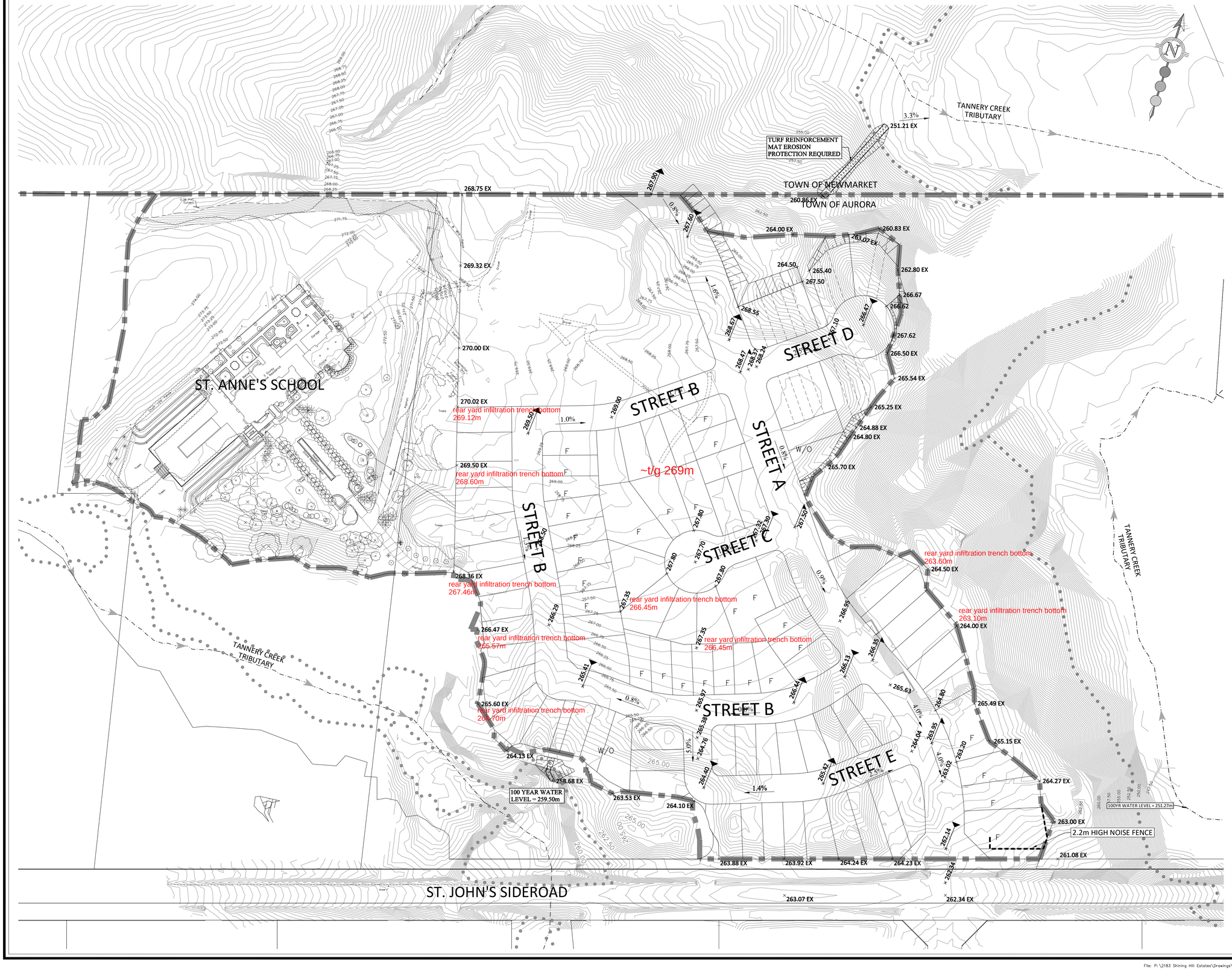
LEGEND:

SHINING HILL ESTATES
PHASE 3 - FSSR (AURORA)

DESIGNED BY:	E.T.C.K.	CHECKED BY:	S.E.K.
SCALE:	AS SHOWN	DATE:	SEPTEMBER 2022

REAR YARD INFILTRATION TRENCH DETAIL

PROJECT No:	FIGURE No:
2183	2.9



LEGEND:

- MUNICIPAL BOUNDARY
- LIMIT OF DEVELOPMENT
- EXISTING CONTOUR AND ELEVATION
- PROPOSED CONTOUR
- ×262.80 EX — EXISTING ELEVATION
- ×255.09 — PROPOSED ELEVATION
- PROPOSED 3:1 MAX SLOPE
- 1.0% — PROPOSED ROAD GRADE
- PROPOSED ROAD HIGH / LOW POINT
- EXISTING REGULATORY FLOODLINE
- F — FRONT DRAINING LOT
- W/O — WALKOUT LOT

NOTE: ALL SINGLE RESIDENTIAL LOTS ARE SPLIT DRAINING UNLESS OTHERWISE NOTED.
*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

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SHINING HILL ESTATES COLLECTION INC.

SHINING HILL ESTATES PHASE 3 - FSSR (AURORA)

PRELIMINARY GRADING PLAN

DESIGNED BY:	E.T.C.K.	CHECKED BY:	S.E.K.
SCALE:	1:1000	DATE:	SEPTEMBER 2022
PROJECT No:	2183	FIGURE No:	5.1

File: P:\2183 Shining Hill Estates\Drawings\FSSR-Phase 3\Fig\Report Figures\2183P-FIGS-GRAD-5.1.dwg – Revised by <RCORTEZ> : Thu, Sep 01 2022 – 10:26am