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Preliminary Hydrogeological Investigation
Station West Phase 2 Residential Development
1120 Cooke Boulevard
Burlington, Ontario
L7T 4A8

Prepared for:

Adi Development (Masonry) Inc. Group
1100 Burloak Dr., Suite 700
Burlington, Ontario
L7L 6B2

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EXECUTIVE SUMMARY

SCOPE OF SERVICES

Proposed Development	Adi Developments (Masonry) Inc. is intending to develop the site identified as civic address 1120 Cooke Boulevard in Burlington, Ontario as a high-rise tower complex. The proposed development is to comprise of two, 36-storey towers and a 26-storey tower connected by a four-storey podium. The structure will include a maximum of five levels of basement parking. The footprint of the proposed structure is to cover the full site area.
Report Deliverables	The Hydrogeological Investigation is required to assess the current site groundwater conditions, determine potential development/post development effects of the proposed development; estimate the potential dewatering requirement, and provide monitoring and mitigation plans for the development.

SITE DETAILS AND SETTING

Coordinates	592800, 479596	**Site Area (approx.)**	9,900 m^2 (0.99 acres)
Site Description	The site is part of a former sand and gravel pit. It is situated in a developed, residential area and is bounded by Cooke Boulevard to the east, Masonry Court to the south and Waterdown Road to the west. A flood management pond associated with the Station West Phase 1 development bounds the site to the north. The site is undeveloped, relatively flat-lying, and is covered predominantly by bare soils and rough vegetation, with surface stripping operations reported to have already been completed in part across the site area.		
Lithology	Sporadic topsoil cover was encountered at the ground level. Fill material comprising of sand and gravel was encountered extending to a maximum depth of approximately 1.5 m. Underlying the fill is a silty sand deposit which extends to a maximum depth of 3.0 m. Shale bedrock was encountered underlying the clayey silt till layer, extending to a proven depth of approximately 15.0 m below existing ground level.		
Groundwater	Depths to groundwater in all monitoring wells were obtained manually by Landtek staff on January 24, 2022. Based on the groundwater levels recorded, it was determined that depth to groundwater ranged from 3.60 mbgs to 4.81 mbgs. The highest ground water level was determined to be 3.60 mbgs. Depth groundwater varies seasonally, and the water table is typically elevated during spring and periods of active precipitation. As a result, groundwater monitoring is ongoing and high groundwater level will be updated once the seasonal groundwater monitoring is completed at the Site.		

DEWATERING CONSIDERATIONS

Short Term	Based on the groundwater level recorded on January 24, 2022, the short-term dewatering volume less precipitation is estimated to be approximately 25,318 L/day = 25 m^3/day. This value will be updated once the seasonal highest groundwater level is determined.
Long Term	The long-term dewatering volume was estimated to be approximately 25,318 L/day. However, dewatering will not be necessary if the proposed underground basement levels are waterproofed to prevent inflow of groundwater inflow.
Monitoring and Mitigation Plans	Monitoring and mitigation plans are provided. These include dewatering abstraction and settlement monitoring and responses; and limiting adverse dewatering related settlement.

REGISTRATION AND PERMIT

Registration and Permit	Based on the groundwater level monitoring completed in January 2022, the dewatering rate of groundwater for the proposed excavation is estimated to be approximately 25,318 L/day or ~25 m^3/day (radial inflow). An Environmental Activity and Sector Registry (EASR) or permit to take water (PTTW) is not required for this volume of water taking, as the estimated water taking is less than 50,000 L/day.

TABLE OF CONTENTS

SECTION PAGE(S)

1.0 INTRODUCTION 1
1.1 Background 1
1.2 Work Scope and Report Organization 1
2.0 METHODOLOGY 3
2.1 Desktop Study 3
2.2 Site Inspection to Assess Hydrogeologic Features 3
2.3 Field Investigation 3
2.3.1 Drilling and Well Installation 3
2.3.2 Hydraulic Conductivity Tests 4
3.0 FINDINGS 6
3.1 Site Topography, Drainage and Hydrology 6
3.2 Physiography 6
3.3 Climate 6
3.4 Regional Geology 6
3.5 Regional Hydrogeology 7
3.6 Groundwater Resources and MOE Wells 7
3.7 Local Geology and Hydrogeology 8
3.8 Groundwater Monitoring 9
3.9 Hydraulic Gradients and Flow 9
3.10 Estimated Hydraulic Conductivity 9
3.10.1 Hydraulic Conductivity Tests 9
3.11 Groundwater Quality 10
3.12 Site Inspection to Assess Hydrogeologic Features 10
4.0 WATER TAKING EVALUATION & IMPACT ASSESSMENT 11
4.1 Estimating Construction Dewatering Rate 11
4.2 Dewatering Considerations 12
4.2.1 Estimating Total Dewatering Volume 12
4.2.2 Short Term Dewatering Volume 12
4.2.3 Long Term Groundwater Control (Post Construction) 13
4.2.4 Registration and Permit 13
4.2.5 Dewatering Procedure 13
4.2.6 Water Management and Discharge Plan 13
4.3 Assessment of Potential Impacts and Water Management 14
4.3.1 Impact to Existing Groundwater Users 14
4.3.2 Impact to Surface Water and Natural Functions of the Ecosystem 14
4.3.3 Contaminants Impacts 14
4.3.4 Geotechnical Impacts 15
5.0 PROPOSED MONITORING PLAN 16
5.1 Construction Monitoring 16
5.2 Management of Dewatering Abstraction 16
5.2.1 Monitoring, Trigger Levels and Management Responses 16
5.2.2 Contingency Responses 16
5.2.3 Settlement Monitoring 16
6.0 PROPOSED MITIGATION PLAN 18
7.0 SUMMARY AND CONCLUSIONS 19
8.0 RECOMMENDATIONS 20
9.0 CLOSURE 21

10.0 REFERENCES.....22
11.0 LIMITATIONS.....23

Appendices:

Appendix A – Figures
Appendix B – Monitoring Wells Logs
Appendix C – Summary of MECP Well Records
Appendix D – Hydraulic Conductivity Testing Analysis Results
Appendix E – Laboratory Certificate of Analysis
Appendix F – Dewatering Assumptions and Calculations – Basement Parking Levels

1.0 INTRODUCTION

1.1 Background

Landtek Limited (Landtek) was retained by Adi Development (Masonry) Inc. Group (Adi Development) to complete a Hydrogeological Investigation for the proposed Station West Phase 2 Residential development at 1120 Cooke Boulevard in Burlington, Ontario (the 'Site' or 'development property').

The Site is rectangular in shape and covers an area of 0.99 hectares (9,900 m^2). It is part of a former sand and gravel pit; and situated in a developed, residential area and is bounded by Cooke Boulevard to the east, Masonry Court to the south and Waterdown Road to the west. A flood management pond associated with the Station West Phase 1 development bounds the site to the north. The site is undeveloped, relatively flat-lying, and is covered predominantly by bare soils and rough vegetation, with surface stripping operations reported to have already been completed in part across the site area.

It is understood that the proposed tower development will consists of residential towers of 26 and 36 storeys, with an associated four-storey podium. The tower complex will include five levels of basement parking, with at-grade deck pavements and limited landscaping also proposed.

A site location plan showing the Study Area for this investigation is presented on Figure 1 in Appendix A. The proposed basement parking P1 to P5 plans are shown on Figures 2a and 2b in Appendix A.

The purpose of the Hydrogeological Investigation is to evaluate the current conditions of the Site, delineate possible development/post-development effects, and suggest mitigation measures to minimize the effects to the shallow groundwater system post-development. Specifically, the report provides the following:

- A description of the hydrogeologic setting of the property and a summary of the existing soil and groundwater conditions at the Site.
- Identification of hydrogeologic features such as zones of significant groundwater recharge and discharge.
- Assessment of the requirement for groundwater control during construction, if any.

1.2 Work Scope and Report Organization

The scope of work for this investigation includes the following:

- *Review of available background information.* A review of published works was done of available geologic and hydrogeologic information for the site including topographic and geologic maps. Previous Landtek's Geotechnical Investigation completed in and Meteorological data of the area were also reviewed.
- *Site Assessment.* A detailed visual inspection of the site and surrounding area was completed to identify and document local topography, surface water drainage features, and the potential presence of significant hydrogeologic features such as closed

depressions (areas of ground water recharge), seeps, springs, or the presence of phreatophytic vegetation.

- *A subsurface investigation.* Boreholes were drilled at the site and completed as monitoring wells. The subsurface investigation of the property was done to characterize the overburden/bedrock stratigraphy at the Site as well as assess the site-specific groundwater conditions.

- *Hydraulic Conductivity Tests.* In-situ rising head tests were completed in monitoring wells installed at the Site to assess hydraulic conductivity values.

- *Groundwater Monitoring.* Groundwater level monitoring was conducted in all installed monitoring wells in order to assess the depth in groundwater levels across the site.

The report is organized as follows:

Section 1 contains a brief introduction to the project and the scope of work undertaken by Landtek.

Section 2 outlines the methodologies followed during completion of the desktop study and the field investigation.

Section 3 summarizes the findings of the investigation. It includes:
- a description of the physical setting
- the results of the field investigation

Section 4 provides Water Taking Evaluation and Impact Assessment

Section 5 provides Monitoring Plan.

Section 6 provides Mitigation Plan.

Section 7 provides Summary and Conclusions.

Section 8 provides Recommendations.

Section 9 provides Closure.

Section 10 provides References.

Section 11 provides Limitations.

2.0 METHODOLOGY

2.1 Desktop Study

A review of published works, existing site reports and available geologic and hydrogeological information for the site including topographic and geologic maps was completed.

Previous investigations completed at the Site by Landtek were reviewed including the following:

1. Phase Two Environmental Site Assessment, 101 Masonry Court, City of Burlington, Ontario in October 2014.
2. Preliminary Subsurface Soil Investigation, 101 Masonry Court, Burlington, Ontario, in January 2015.
3. Geotechnical Investigation, Station West Phase 2 Residential Development, 1120 Cooke Boulevard, Burlington, Ontario in April 2021.

Climate data for the period of 1981 to 2010 was obtained from Environment Canada publications and from the Hamilton A station (Hamilton Airport) to assess the local climate condition.

The Ministry of Environment, Conservation and Park (MECP) water well database was also accessed, and the individual well records were obtained for wells that are located within 500 m radius of the Site. the Study Area.

2.2 Site Inspection to Assess Hydrogeologic Features

A detailed site inspection was conducted on November 3, 2021, to assess the presence of features which may be of Hydrogeologic significance.

In particular, the site was inspected to assess the following:

- The presence of closed drainage features, depressions, or sandy areas which may allow for ponding and significant or enhanced infiltration of water.

- Assessment of the presence of phreatophytic vegetation which may indicate seasonally high groundwater levels and/or groundwater discharge and seepage.

- Identification of any zones of visible seepage or groundwater discharge.

The visual site inspection included a walking tour of the entire Site.

2.3 Field Investigation

2.3.1 Drilling and Well Installation

Drilling: Landtek's investigation involved the advancement of a total of four (4) boreholes at the Site from January 3 to 7, 2022. The boreholes were drilled to log the stratigraphy. All the boreholes BH1, BH2S, BH2D, and BH3 were completed as monitoring wells, MW1, MW2S, MW2D, and MW3, respectively; with monitoring wells MW2S and MW2D completed as nested wells. Monitoring wells MW1, MW2D, and MW3 were completed to a maximum depth of approximate 15 meter below ground surface (mbgs); and MW2S to an approximate depth of 9 mbgs. The boreholes were advanced by Element Geo Drilling. and were drilled using a Dietrich

50 track-mounted drill rig, with hollow stem augers [150 mm outer diameter (OD) and 100 mm inner diameter (ID)]. Representative soil samples were retained for logging purposes.

The drilling was supervised by an experienced Landtek soil technician, who also prepared borehole logs. The borehole logs are provided in Appendix B of this report.

The monitoring wells were constructed with 50 mm inner diameter, Schedule 40 machine slotted PVC screens equipped with a bottom cap, and machine threaded riser pipe. The screen lengths and slot size are 3.0 m or 1.5 m, and 0.10-inch, respectively.

The annular space between the PVC riser pipes and each borehole wall was backfilled to at least 0.3 m above the top of the screen with silica sand (No. 2). A bentonite seal was placed immediately above the sand pack to a height just below grade. Each monitoring well was finished with a protective steel casing, which was cemented in-place.

The boreholes and monitoring well locations are shown on Figure 3 in Appendix A, and well construction details are provided below in Table 1.

Table 1. Well Construction Details

Well ID	Ground Surface Elevation [masl*]	Well Depth [mbgs]	Well UTMs**		Bentonite Seal Depth [masl]		Well Screen Depth [masl]	
			Easting	Northing	Top	Bottom	Top	Bottom
MW1	102.27	17.0	592804	4795884	102.27	88.57	88.27	85.27
MW2S	103.09	6.0	592841	4795889	103.09	98.89	98.59	97.09
MW2D	103.09	19.0	592838	4795887	103.09	87.39	87.09	84.09
MW3	104.14	18.0	592837	4795859	104.14	89.44	89.14	86.14

mm = millimetre
mbgs = metre below ground surface
UTMs**: +/- 4.0 m Accuracy.
masl* = R. AVIS SURVEYING INC., dated June 28, 2021.

Well Development: All monitoring wells were developed to remove any sediment that may have been introduced during drilling/installation and to improve the hydraulic properties of the formation against which the wells were screened. This work was completed by Landtek staff on January 20, 2022. Development employed an electric well pump and/or Waterra Tubing with Foot Valve. Each well was pumped until a visible decrease in turbidity was observed.

Groundwater Sampling: On January 24, 2022, ground water samples were collected from on-site monitoring wells MW1 and MW4 and submitted to ALS laboratories in Mississauga, Ontario for the City of Burlington Storm Water Discharge Parameters Limits analysis and e-coli.

2.3.2 Hydraulic Conductivity Tests

Hydraulic Conductivity Testing: Monitoring wells MW1 and MW3 were tested to provide estimates of the hydraulic conductivity values for the zones against which the screens for the wells were set. Rising head tests were conducted by Landtek on January 25, 2022. The tests involved the extraction of volume of groundwater to displace the water level. A datalogger programed at 3 seconds intervals was used to record the water level response during the tests.

Data Analysis: The rising head test data were analyzed using AqteSolve Professional Version 4.5 software package developed by Glenn M. Duffield of HydroSOLVE Inc. applying the Hvorslev analysis solutions, depending on hydrogeology.

3.0 FINDINGS

3.1 Site Topography, Drainage and Hydrology

The site is undeveloped, relatively flat-lying, and is covered predominantly by bare soils and rough vegetation, with surface stripping operations reported to have already been completed in part across the site area.

Based on the topography of the area, it is expected that the direction of groundwater flow at the site is southwest towards Lake Ontario.

3.2 Physiography

The Site is located in the Iroquois Plains physiographic region, as defined by Chapman and Putnam (1984). The Iroquois Plains extends 305 km along the western part of Lake Ontario, with varying conditions from the Niagara River to the Trent River. In more detail, Chapman and Putnam (1984) subdivided the Iroquois Plains into smaller areas to account for the varying conditions along this region. The Site and its surrounding area are described as being situated in a former gravel bar (extending between Hamilton and Toronto), with the nearby shoreline consisting of distinct bluff cuts into the red shale of the Queenston Formation.

3.3 Climate

The climate in the study area is largely influenced by Lake Ontario. The general climate data presented below in Table 2 was obtained from Environment Canada publications and from the Environment Canada online database. Average climate data was taken from Hamilton A station Airport (Hamilton Airport) for the period of 1981 to 2010.

Table 2. 1981 to 2010 Climate Norms for Hamilton A Station (as averages)

	Daily Average Temperature (°C)	Average Rainfall (mm)	Average Snowfall (cm)	Average Precipitation (mm)
January	-5.5	29.7	40.8	64.0
February	-4.6	28.2	35.1	57.8
March	-0.1	42.6	26.5	68.4
April	6.7	71.3	8.4	79.1
May	12.8	78.7	0.5	79.4
June	18.3	84.9	0.0	84.9
July	20.9	100.7	0.0	100.7
August	20.0	79.2	0.0	79.2
September	15.8	81.9	0.0	81.9
October	9.3	76.5	0.7	77.4
November	3.7	74.4	11.0	84.3
December	-2.3	43.8	33.5	73.0
Year	7.9	791.7	156.5	929.8

3.4 Regional Geology

The surficial geology of the Site and the surrounding area is mapped as sand and is shown on Figure 2. Ministry of Natural Resources mapping (accessed via Ontario Geological Survey (OGS) OGS Earth published by the Ontario Ministry of Natural Development, Mines and Forestry), indicates the regional surficial geology on the Site is comprised of coarse-textured glacio-lacustrine deposits of sand, gravel, minor silt and clay.

According to bedrock mapping provided by the OGS Earth website, bedrock in the area of the Site and the Study Area is identified as the Queenston Formation consisting of shale, limestone, dolostone, and siltstone.

3.5 Regional Hydrogeology

The Halton Till unit, underlying the Site and its vicinity, is generally regarded as an aquitard. The range of indicated hydraulic conductivity values for the Halton Till is from 7 x 10-10 m/s (Gartner Lee, 1983) to 4.8 x 10-5 m/s (Ostry, 1979). Ostry (1979) also calculated hydraulic conductivities for Peel Plain sediments as ranging from 4.0 x 10-5 m/s to 5.0 x 10-6 m/s in east and middle areas of the Town of Oakville. As such, the shallow overburden materials (Halton Till and Peel Plain sediments) are considered aquitards.

The underlying Queenston Formation shale bedrock, particularly the upper, weathered portion, is regarded as a poor aquifer, however the upper 3 to 6 m of weathered bedrock typically provides sufficient water supplies to meet domestic requirements (Ostry, 1979). The bedrock porosity is low as a result of the compaction and consolidation of these fine-grained rocks since their deposition. Groundwater does, however, flow within joints, fractures, cleavage planes and faults within the shale bedrock (which generally become tighter and fewer with increasing depth). Well yields from the Queenston Formation shale bedrock in Halton Region are generally low. Very few wells yield 276,480 L/day (3.2 L/s) or more, and a yield of approximately 13,824 L/day (0.16 L/s) is generally expected (Gore & Storrie et al., 1995).

A regional summary of hydraulic conductivity values derived from consulting work conducted throughout Halton Region, by Holysh, April 1997 are presented. The indicated hydraulic conductivity values for the Halton Till range from 7 x 10-10 (Gartner Lee, 1983) to 4.8 x 10-5 m/s (Ostry, 1979). The range of indicated values for the Queenston Formation is from 1 x 10-8 m/s (Gartner Lee, 1983) to 3.2 x 10-5 m/s (Ostry, 1979).

3.6 Groundwater Resources and MOE Wells

The site is located in the Halton Region Source Protection Area and is not classified as a Highly Vulnerable Aquifer area. The source water protection details for the site were referenced from the Ministry of the Environment, Conservation and Park (MECP) website on Source Water Protection for the Province of Ontario (MECP, June 16, 2021). Observed evidence of karstification was not observed due to the character of bedrock, lack of outcrop and/or relative thickness of overburden.

Well records were downloaded from the MECP water well database for a radius of approximately 500 m from the proposed development. A total of 54 well records were identified within the search radius.

The well records were reviewed to assess the general nature and use of the groundwater resource in the area and to characterize local hydrogeologic conditions; and determine the type of well. A summary of the data obtained from this review is presented below.

Well Construction

- Wells terminated in bedrock 1
- Wells terminated in overburden 42
- Unknown 11
- **Total.....54**

Well Uses

- Domestic 0
- Commercial 1
- Observation Wells 19
- Test Holes/Monitoring Wells 17
- Abandoned.....5
- Unknown 12
- **Total.....54**

Well Depth

- Less than 15 m 42
- 15 to 30 m 0
- Greater than 30 m 1
- No Data 11
- **Total.....54**

The locations of all the MOE wells are shown on Figure 4 in Appendix A, and a summary of the Well Records is provided in Appendix C.

Based on the well records, it was determined that there is only one water well, a commercial water well, located approximately 270 m northeast of the site.

3.7 Local Geology and Hydrogeology

Based on the results of the Geotechnical and Hydrogeological Investigations carried out at the Site, a brief description of the general surficial geology of the Site, in order of depth is summarized in the following sections. Boreholes BH1, BH2S, BH2D and BH3 were completed at depths ranging from approximately 9.0 to 15.0 mbgs (Appendix B).

The borehole information is generally consistent with the geological data. The ground lithologies encountered by the boreholes are discussed further in the following sections.

Fill Materials

Fill materials were encountered in all boreholes extending to depths of between approximately 0.9 m in MW3 to 1.5 m in MW1 and MW2S/MW2D. The fill materials generally comprised of sand and gravel with silt.

Silty Sand

Silty Sand was encountered underlying the Fill deposit and extends to a depth of approximately 3.0 m below existing ground level. This layer contains trace silt and is damp to wet.

Clayey Silt Till

Clayey Silt Till was encountered underlying the Silty Sand deposits in all monitoring wells and extending to a depth of approximately 9.2 m below existing ground level. The till contains some sand, trace gravel, red shale fragments, moist, and is brown.

Bedrock

Red shale of the Queenston Formation was encountered underlying the till deposits at depths of approximately 9.2 m below existing ground level in all monitoring wells.

Groundwater

During drilling, wet to saturated soil conditions were observed in all boreholes at depths between approximately 3.0 m and 6.0 m to 8.0 m below existing ground level. These conditions are interpreted as the level at which groundwater was encountered (i.e. groundwater strike) and indicate that perched waters may be encountered at shallow depths within the silt and sand deposits overlying the more impermeable silty clay till.

3.8 Groundwater Monitoring

Depths to groundwater in all monitoring wells were obtained manually by Landtek staff on January 24, 2022. Monitoring is ongoing to determine the seasonal high groundwater level. The readings are presented below in Table 3.

Table 3. Monitoring Well Details

Monitoring Well ID	Ground Surface Elevation (masl)*	Date	Stick-up (m)	Water Strike Depth (mbgs)	Water Level (mbgs)	Water Level Elevation (masl)	Screened Material
MW1	102.27	24-Jan-22	0.99	8.00	4.81	97.46	Bedrock
MW2S	103.09	24-Jan-22	1.01	3.00	3.60	99.49	Till
MW2D	103.09	24-Jan-22	1.17	3.00	4.79	98.30	Bedrock
MW3	104.14	24-Jan-22	1.01	6.50	3.96	100.18	Bedrock

Notes:
masl* = R. AVIS SURVEYING INC., dated June 28, 2021.
m = meters
mbtoc = meters below top of casing

3.9 Hydraulic Gradients and Flow

Groundwater typically follows the general path of the surface water courses and flows to low lying and major surface water features from areas of higher elevations to areas of relative lower elevations.

3.10 Estimated Hydraulic Conductivity

3.10.1 Hydraulic Conductivity Tests

The estimated hydraulic conductivity values for the Site and adjacent area are provided on the following page in Table 4, and normalized head vs. time curves for each hydraulic conductivity test is provided in Appendix D.

Table 4. Estimated Hydraulic Conductivity

Monitoring Well ID	Hydraulic Conductivity (m/s)	Well Screened Material
MW1	2.564×10^{-8}	Bedrock
MW3	5.291×10^{-8}	Bedrock

Note:
[1] A regional summary of hydraulic conductivity values derived from consulting work conducted throughout Halton Region, by Holysh, April 1997. The indicated hydraulic conductivity values for the Queenston Formation range from 1×10^{-8} m/s (Gartner Lee, 1983) to $3.2\ 10^{-5}$ m/s (Ostry, 1979). The Geometric Mean of hydraulic conductivity vales for Halton Till is 1×10^{-9} m/s.

[2] Based on the hydraulic conductivity values in Table 4 above, the average of the hydraulic conductivity values was determined to be 3.93×10^{-8} m/s. As a result, the value of 3.93×10^{-8} m/was adopted in estimating the potential dewatering requirement at the Site.

3.11 Groundwater Quality

Copies of the laboratory Certificates of Analysis are provided in Appendix E.

Sewer Discharge Analysis

The laboratory results for the analyzed groundwater samples collected from monitoring wells MW1. MW2S, MW2D and MW3 were compared to the City of Burlington Municipal Storm Sewer Discharge Limits Guidelines. The parameters that exceeded the Limits Guidelines are highlighted on the Table 5 presented below.

Table 5. Laboratory Testing Results Summary: Sample Date: January 24, 2022

Parameter	Guidance/ Standard (mg/L)	MW1	MW2D	MW3
		Lab Result (mg/L)	Lab Result (mg/L)	Lab Result (mg/L)
Biological Oxygen Deficiency (BOD)	15	758	68.0	9.00
Chloroform	0.002	0.0040	<0.0008	0.0042
Phenols	0.008	0.035	0.007	0.005
Total Chromium	0.08	0.195	<0.020	<0.020
Total Manganese	0.05	2.31	2.17	0.304
Total Nickel	0.08	0.100	<0.015	<0.015
Total Phosphorous	0.4	2.47	0.08	<0.3
Total Suspended Solids	15	3260	<10	40
Total Zinc	0.04	0.265	<0.020	<0.020

[*] Exceedance
[1] The laboratory results for the analyzed groundwater samples collected from monitoring wells were compared to the City of Burlington Municipal Storm Sewer Discharge Limits Guidelines. However, a Record of Site Condition (RSC) has been completed for the Site and it has been determined clean.

3.12 Site Inspection to Assess Hydrogeologic Features

During the inspection no potential hydrogeological concerns of significance were identified on the Site.

4.0 WATER TAKING EVALUATION & IMPACT ASSESSMENT

It is understood that the proposed tower development will include five levels of underground parking. It is assumed that footprint of the proposed underground level is to cover the full site area. The proposed basement parking P1 to P5 plans are shown on Figures 2a and 2b in Appendix A.

4.1 Estimating Construction Dewatering Rate

It is assumed that the excavation will a supported open excavation. The excavation area estimated from the proposed basement parking P1 to P5 plans is approximated to be: ~ 100 m x 95 m = ~9,500 m2.

There will be five levels of underground parking. As a result, the maximum depth of the underground parking is estimated to be 16.1 mbgs (Level 1 = 4.1 m, Level 2 = 3.0 m, Level 3 = 3.0 m, Level 4 = 3.0 m, and Level 5 = 3.0 m). An elevator shaft extension is assumed to be 1.5 m. Therefore, a total excavation depth of 17.6 mbgs is required for the construction. A dewatering depth of approximately 0.5 m below the excavation bottom (18.1 mbgs) is assumed in order to keep the bottom of the excavation dry during construction.

Underground Parking Levels Excavation

The potential groundwater flow rate to the underground parking excavation was estimated using the dewatering equation for a fully penetrated well of unconfined aquifer fed by circular source (Powers, et. al., 2007):

$$Q = \pi K (H^2 - h_w^2)/(\ln R_o/r_e)$$

Where: Q = pumping rate [m^3/s]
K = hydraulic conductivity [m/s]
H = saturated thickness of the aquifer before dewatering [m]
h_w = saturated thickness of the aquifer after dewatering [m]
R_o. = radius of cone of depression [m]
r_e = equivalent radius [m]

The radius of cone of depression R can be estimated using:

$$R_o = Ch*Sqrt(K)$$

Where: C = is a factor equal to 3000 for radial flow to a pumping well

h = H- h_w =required drawdown [m]
K = hydraulic conductivity [m/s]

Dewatering of a rectangular area can be accomplished by using an equivalent radius (r_e) to assess drawdown where r_e is given by the following equation:

$r_e = (a + b)/\pi$ (applies when a/b<1.5 and $R_o >> r_e$)
r_e = Sqrt (length*width/π) (applies when a/b>1.5 and $R_o << r_e$)

Static Water Levels

Depths to groundwater in all monitoring wells were obtained manually by Landtek staff on January 24, 2022. The readings are presented in Table 3.

Based on the groundwater levels recorded, it was determined that depth to groundwater ranged from 3.60 mbgs to 4.81 mbgs. The highest ground water level was determined to be 3.60 mbgs. Depth groundwater varies seasonally, and the water table is typically elevated during spring and periods of active precipitation. As a result, groundwater monitoring is ongoing and high groundwater level will be updated once the seasonal groundwater monitoring is completed at the Site.

Radial Flow into Excavation

The total amount of groundwater required to be pumped for dewatering the excavation associated with the underground levels construction, assuming there is no rainfall and applying a factor of safety of 1.3 to account for expected seasonal high groundwater level in Spring will be 25,318 L/day (0.29 L/s). These calculations and associated assumptions are provided in Table 1, Appendix F.

It should be noted that the estimated volume above is based on the information correlated from boreholes data, and that variations between borehole locations may exist, such that the actual conditions beneath the Site cannot be fully practically accounted for.

4.2 Dewatering Considerations

4.2.1 Estimating Total Dewatering Volume

The dewatering rate for the proposed excavation must also consider management of direct precipitation input. As a result, dewatering volume is estimated from the following two contributions:

- Radial flow into an excavation under a water table condition (Section 4.1).
- Direct precipitation

Direct Precipitation

Note: Radial flow into an excavation under a water table condition estimate does not take into account storm water management from rainfall events. Additional volume generated from a 100 year-storm event for the City of Burlington of 100 mm (from Extreme Rainfall Intensity-Duration-Frequency [IDF] Curve for the City of Burlington) rainfall event is estimated as follows:

Direct Precipitation into the proposed excavation = A (m^2) *rainfall (m) = (100 m x 95 m) *0.100 m = 950 m^3/day = 950,000 L/day

Due to the large volume from precipitations especially a 100 year-storm event, it is advised that dewatering should not be completed during period of active precipitation.

4.2.2 Short Term Dewatering Volume

- Dewatering rate outside periods of active precipitation: ~ 25,318 L/day (~25 m3/day)

- Dewatering during Spring/active precipitation period: ~25,318 L/day (radial flow into excavation) + 950,000 L/day (direct precipitation) = 975,318 L/day or ~975 m^3/day.

Normal condition is considered to be weather conditions that should be expected during the operation of the construction dewatering. Normal operation does not include extreme weather events.

The short-term dewatering volume less precipitation is estimated to be approximately 25,318 L/day = 25 m^3/day.

4.2.3 Long Term Groundwater Control (Post Construction)

Based on the "*seasonally high groundwater level*" established by this assessment, it is recommended that either:

1. All subsurface structures and areas are appropriately waterproofed below the established "*seasonally high groundwater level*" plus the required buffer zone (nominally 1.0 m to 1.5 m above) to prevent inflow of groundwater into the basement areas; or,

2. A long-term dewatering system is installed to reduce the water level to below the lowest (I.e., basement) floor slab subgrade level of the proposed structure. The long-term dewatering volume was estimated to be approximately 25,318 L/day.

A long-term dewatering system will not be required if the proposed basement levels are to be waterproofed.

4.2.4 Registration and Permit

The maximum dewatering rate of groundwater, under normal condition, for the proposed excavation is estimated to be approximately 25,318 L/day or ~25 m^3/day (radial inflow). An Environmental Activity and Sector Registry (EASR) or permit to take water (PTTW) is not required for this volume of water taking, as the estimated water taking is less than 50,000 L/day.

4.2.5 Dewatering Procedure

Based on the results of the hydraulic conductivity tests, seepage through the overburden/bedrock beneath the Site should be feasible to be handled by a sump and/or well point dewatering system. The type of dewatering system to be used should be discussed with a dewatering contractor and be evaluated based on anticipated low and high volumes estimates.

The following general construction practices can be implemented to minimize the volume of water to be extracted:

- It is recommended that any excavations should be staged or constructed in such a manner to be able to manage dewatering volume conveniently.
- Reduce the length of time during which the open cut remains open.

4.2.6 Water Management and Discharge Plan

Water extracted during construction dewatering is required to be discharged into a storm sewer near the Site. As per the Sewers ByLaw, in order to issue a discharge approval, information relating to the quality and quantity of the discharge must be provided to City of Burlington. It is

strongly recommended that the applicant provide this information eight to twelve weeks prior to the proposed start of discharge.

The rate and total volume of the discharge during dewatering should be recorded. This would require that the discharge line be equipped with a flow meter capable of monitoring the discharge rate and a volume totalizer to record the total volume of water discharge. The discharge rate and total daily flow will need to be recorded with the records maintained on site. This can be accommodated by installing a flow meter on the discharge line.

If needed, a weir tank and filter bag can be utilized during dewatering to reduce total suspended solids (TSS) and turbidity prior to discharging of the water into a sewer system.

A T-Coupling and valves should be installed downstream of the flow meter, which, if necessary, can be operated to divert flow for mitigation purposes.

4.3 Assessment of Potential Impacts and Water Management

4.3.1 Impact to Existing Groundwater Users

A search of the Ontario Ministry of the Environment Water Well Records for an area extending about 500 m outward from the edge of the excavation was completed, identifying one water well in the database. This well is located approximately 270 m northeast of the Site. As a result, it is anticipated that there will impact to this well during dewatering at the Site.

4.3.2 Impact to Surface Water and Natural Functions of the Ecosystem

A minor tributary of Grindstone Creek runs along the site boundary on Cooke Boulevard (Ontario Ministry of Natural Resources and Forestry – Topographic Map), Lake Ontario is located approximately 1.2 km south-southwest of the site. The groundwater dewatering activities will result in localized depression of the groundwater table, and it is anticipated that there will be impact within the radius of influence of approximately 9.0 m calculated in Table 1, Appendix F.

4.3.3 Contaminants Impacts

This occurs when pre-existing ground or groundwater contamination is mobilised and transported where transmission pathways are created.

A Record of Site Condition (RSC) has been completed for the Site and it has been determined clean. As a result, there is no potential for mobilization of contaminants or creation of transmission pathways during the planned groundwater dewatering activities.

However, the laboratory results for the analyzed groundwater samples collected from monitoring wells MW1. MW2S, MW2D and MW3 were compared to the City of Burlington Municipal Storm Sewer Discharge Limits Guidelines. Parameters exceeded the Limits Guidelines, and these are presented in Table 4 of this report. These exceedances are usually treated or factored into the quality of groundwater before discharge to the City’s Sewers.

4.3.4 Geotechnical Impacts

Geotechnical impacts occur where the geotechnical properties or state of the ground are changed by groundwater control activities. The most common type of impact in this category is ground settlement, with the corresponding risk of distortion and damage to structures, services and other sensitive infrastructure.

Ground settlement can be caused by two principal mechanisms:

- Increases in effective stress as a result of lowering of groundwater levels, resulting in compression and consolidation of the ground. Such settlements are an unavoidable consequence of lowering of groundwater levels
- Removal of fine particles from the ground (loss of fines) which can occur when poorly controlled sump pumping draws out soil particles with the pumped water. With good design and implementation, loss of fines (and the associated settlement risk) can be avoided.

The Site is located at the northeast corner area of the intersection of Waterdown Road and Masonry Court in a partly developed area of Burlington. The Site is bound by Waterdown Road to the west, Masonry Court to the south, an undeveloped land across Cooke Boulevard to the east, and undeveloped land to the north. It is anticipated that there will be impact within the radius of influence of approximately 9 m calculated in Table 1, Appendix F.

Based on the above, potential geotechnical impacts may be anticipated during dewatering. Surrounding buildings and roads should be monitored by surface instrumentation (i.e., pre-conditions survey markers etc.) to determine impact, if any.

Dewatering could be handled by pumping from a sump/well point dewatering system. The well sump/point system used for lowering the water table within the excavation must be properly screened and installed to ensure that pumping will not remove sediment from the low permeability overburden aquifer. Removal of significant fines may result in the formation of voids and the loss of ground.

The proposed monitoring and mitigation plans are presented in Sections 5 and 6, respectively.

5.0 PROPOSED MONITORING PLAN

5.1 Construction Monitoring

Once construction dewatering is initiated it will be difficult to stop pumping or significantly reduce the rate of pumping without disrupting construction activities. It will however be possible to monitor the drawdown response at the construction site and to adjust the pumping rate to optimize drawdown and the associated pumping rate.

5.2 Management of Dewatering Abstraction

5.2.1 Monitoring, Trigger Levels and Management Responses

Abstraction management is critical to ensure target water levels within the construction zone are met, but that over-pumping does not occur.

Target groundwater levels in- and outside excavations will be set individually for each dewatering monitoring well based on location, aquifer and construction requirements, in-line with stated dewatering aims above.

Trigger levels for wells will typically be set 0.5 m above the dewatering target and 1.0 m below the dewatering target to give a 1.5 m target operational zone. These targets may be reviewed and adjusted to decrease size of the operational target zone and increase the factor of safety.

If monitoring indicates that dewatering zone groundwater levels exceed the upper trigger levels (i.e., required drawdown is not being achieved or maintained) management actions are available (in order of preference):

- Adjust automatic pump start and stop water levels.
- Increase pumping rates within the constraints of the system; and/or
- Install additional abstraction capacity (well points, spears or sump pumps).

If monitoring indicates that excavation zone groundwater levels are below the lower trigger levels (i.e., excessive drawdown) management actions available are (in order of preference):

- Adjust automatic pump start and stop water levels; and/or
- Decrease pumping rates; and/or
- Reduce the number of pumps operating.

5.2.2 Contingency Responses

If management responses prove to be insufficient to achieve and maintain the target levels, excavations may be slowed or suspended to enable contingencies to be implemented. Available contingency measures that will be assessed include (in order of preference):

- Construction of additional dewatering wells, spears or sumps.
- Construction of additional drains or groundwater control structures.

Excavation would resume when the required drawdown is able to be reliably obtained.

5.2.3 Settlement Monitoring

Implementation of a settlement monitoring plan is recommended to be completed within an approximate radius of 9 m of the Site. Prior to commencing dewatering, condition surveys of

adjacent properties that could potentially be affected by dewatering considering anticipated effects and specific dewatering design should be completed.

A typical settlement monitoring system would comprise a series settlement marker sited at various distances beyond and at the site, within the zone of influence of groundwater drawdown. Monitoring points should be surveyed to an accuracy of +/-2 mm. Note that the reference benchmark must be located beyond the extent of the anticipated influence of groundwater drawdown. For very high-risk projects, incorporation of piezometer standpipes will allow confirmation of the field groundwater drawdown and will enable calibration of field settlement observation with theoretical assessments.

Alert and Action settlement thresholds should be set, selected though theoretical assessment of anticipated settlements and review of sensitivity of adjacent structures and infrastructure. It is prudent to implement staged groundwater drawdown, providing hold points to allow adequate time to enable observation of the delayed settlement response of the ground.

6.0 PROPOSED MITIGATION PLAN

The groundwater dewatering activities will result in localized depression of the groundwater table, and it is anticipated that there will be no impact beyond the radius of influence of 9.0 m.

Mitigation would involve the reduction or elimination of the impacts induced by construction dewatering. As noted above, the potential exists for dewatering to cause ground settlement, with the corresponding risk of distortion and damage to structures, services and other sensitive infrastructure.

Methods to limit adverse dewatering settlement are:

- Settlement associated with loss of fines can be mitigated through appropriate design of the dewatering system to control flow velocity and provide screens and/or filters matched to the grading of the in-situ soils. Entrainment of fines must be monitored during construction; actions could include analysis of TSS in discharge water and/or monitoring of accumulation of sediment in sedimentation tanks.

- Drawdown-induced ground settlement is mitigated though pre-construction estimation of groundwater drawdown and settlement coefficients to identify risk prior to drawing the groundwater down, and water level monitoring in monitoring boreholes to check that a larger drawdown than anticipated at distance from the excavation is not occurring.

- Differential settlement is most problematic; this can be reduced by managing the rate of drawdown and understanding where clear changes in soil type occur. Should potentially damaging settlement be indicated, these can be mitigated by installing groundwater cut-offs to stem or restrict groundwater flow and limit drawdown beyond the site.

- Provide sufficient temporary support to excavations to maintain stability, where seeps might otherwise induce progressive collapse of the sides of the excavation.

- During dewatering implement staged drawdowns (where appropriate), and monitor field settlement and water level changes beyond the immediate site, comparing against theoretical settlements and water levels to allow warning of potential dewatering settlement issues.

7.0 SUMMARY AND CONCLUSIONS

The following summarizes the results of the investigation:

- The borehole information is generally consistent with the geological data of the area, and the predominant lithology is Fill which overlies Silty Sand which in turn overlies Clayey Silt Till overlying bedrock which extends to the maximum drilling depth of approximately 19.0 mbgs.

- Significant hydrogeologic features were not identified at the site and there were no areas of significant seepage or groundwater recharge areas on the site.

- Based on the topography of the area, it is expected that the direction of groundwater flow at the site is southwest towards Lake Ontario.

- Based on the groundwater levels recorded, it was determined that depth to groundwater ranged from 3.60 mbgs to 4.81 mbgs. The highest ground water level was determined to be 3.60 mbgs. Depth groundwater varies seasonally, and the water table is typically elevated during spring and periods of active precipitation. As a result, groundwater monitoring is ongoing and high groundwater level will be updated once the seasonal groundwater monitoring is completed at the Site.

- The short-term dewatering volume outside period of precipitation is estimated to be approximately 25,318 L/day = 25 m^3/day.

- It should be noted that the estimated volume above is based on the information correlated from boreholes data, and that variations between borehole locations may exist, such that the actual conditions beneath the Site cannot be fully practically accounted for.

- Based on the "*seasonally high groundwater level*" established by this assessment, it is recommended that either: All subsurface structures and areas are appropriately waterproofed below the established "*seasonally high groundwater level*" plus the required buffer zone (nominally 1.0 m to 1.5 m above) to prevent inflow of groundwater into the basement areas; or, A long-term dewatering system is installed to reduce the water level to below the lowest (I.e., basement) floor slab subgrade level of the proposed structure. The long-term dewatering volume was estimated to be approximately 25,318 L/day. A long-term dewatering system will not be required if the proposed basement levels are to be waterproofed.

- The maximum dewatering rate of groundwater for the proposed excavation is estimated to be approximately 25,318 L/day or ~25 m^3/day (radial inflow). An Environmental Activity and Sector Registry (EASR) or permit to take water (PTTW) is not required for this volume of water taking, as the estimated water taking is less than 50,000 L/day.

- As per the Sewers ByLaw, in order to issue a discharge approval, information relating to the quality and quantity of the discharge must be provided to City of Burlington. It is strongly recommended that the applicant provide this information eight to twelve weeks prior to the proposed start of discharge.

8.0 RECOMMENDATIONS

The following general construction practices are recommended to minimize the volume of water to be extracted:

- Reduce, where practicable, the length of time during which the open cut remains open.
- Install valves on the individual well point to allow for the flow adjustment.
- Appropriately waterproof all subsurface structures and areas below the established "*seasonally high groundwater level*" plus the required buffer zone (nominally 1.0 m to 1.5 m above) to prevent inflow of groundwater into the basement areas; or install a long-term dewatering system to reduce the water level to below the lowest (I.e., basement) floor slab subgrade level of the proposed structure.

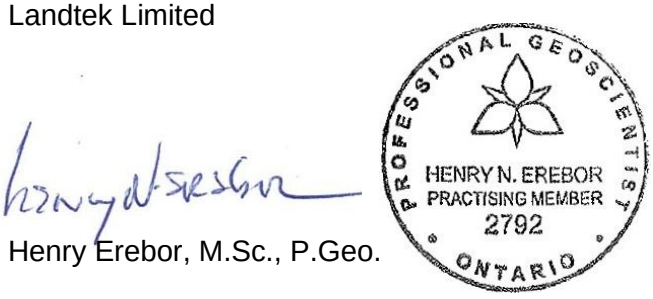
As per the Sewers ByLaw, in order to issue a discharge approval, information relating to the quality and quantity of the discharge must be provided to City of Burlington. It is strongly recommended that the applicant provide this information eight to twelve weeks prior to the proposed start of discharge.

9.0 CLOSURE

We trust this report is satisfactory for your purposes. If you have any questions regarding our submission, please do not hesitate to contact this office.

Yours truly,

Landtek Limited



Henry Erebor, M.Sc., P.Geo.

10.0 REFERENCES

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Ontario Geological Survey, OGS Earth. Bedrock Geology of Ontario.

11.0 LIMITATIONS

The conclusions and recommendations given in this report are based on information determined at the borehole locations. Subsurface and ground water conditions between and beyond the boreholes may be different from those encountered at the borehole locations, and conditions may become apparent during construction that could not be detected or anticipated at the time of the geotechnical investigation. It is recommended practice that Landtek be retained during construction to confirm that the subsurface conditions throughout the site are consistent with the conditions encountered in the boreholes.

The comments made in this report on potential construction problems and possible remedial methods are intended only for the guidance of the designer. The number of boreholes may not be sufficient to determine all the factors that may influence construction methods and costs. For example, the thickness and quality of surficial topsoil or fill layers may vary markedly and unpredictably. Contractors bidding on the project, or undertaking construction on the site should make their own interpretation of the factual borehole information, and establish their own conclusions as to how the subsurface conditions may affect their work.

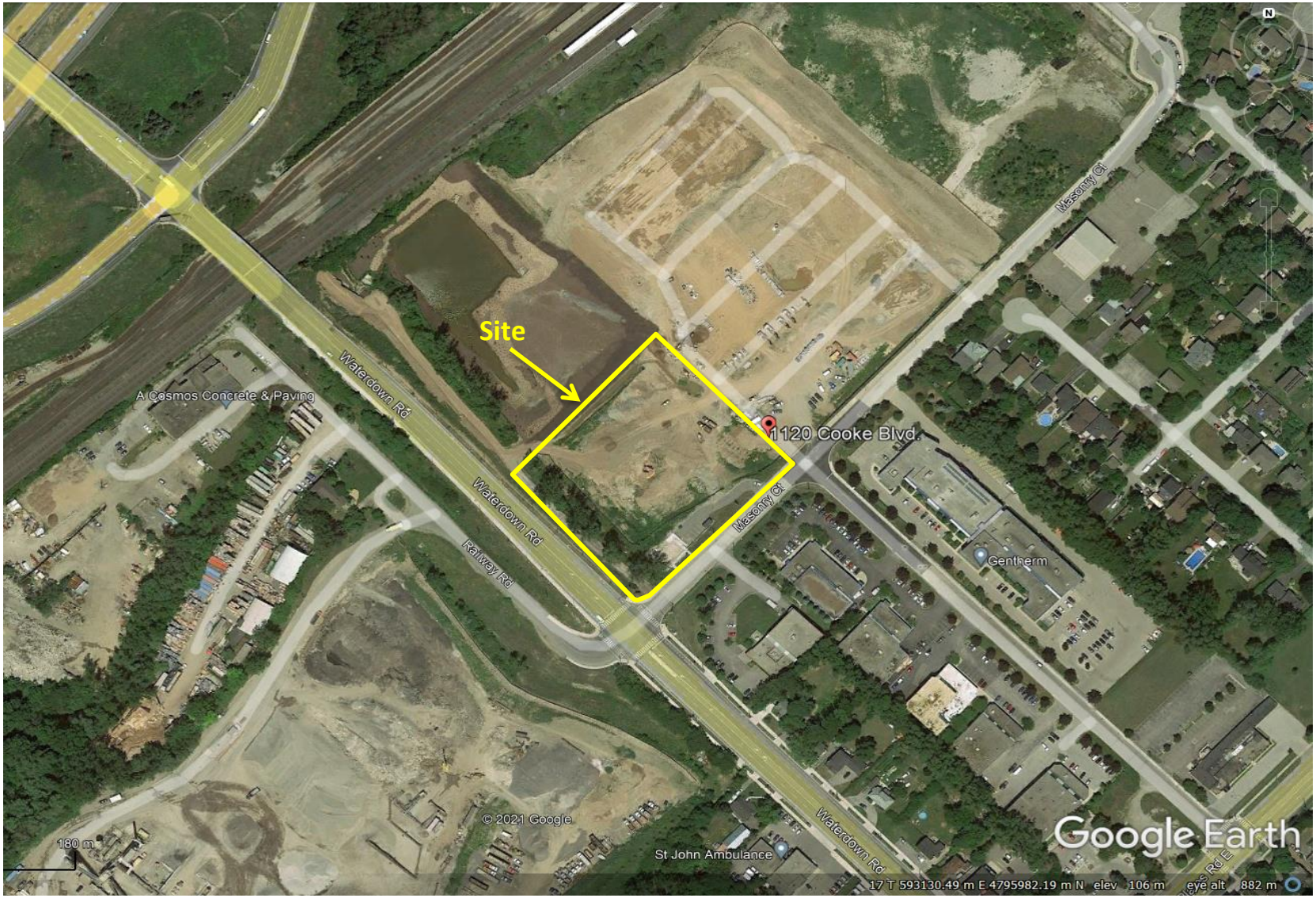
The survey elevations in the report were obtained by Landtek or others, and are strictly for use by Landtek in the preparation of the geotechnical report. The elevations should not be used by any other parties for any other purpose.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Landtek accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

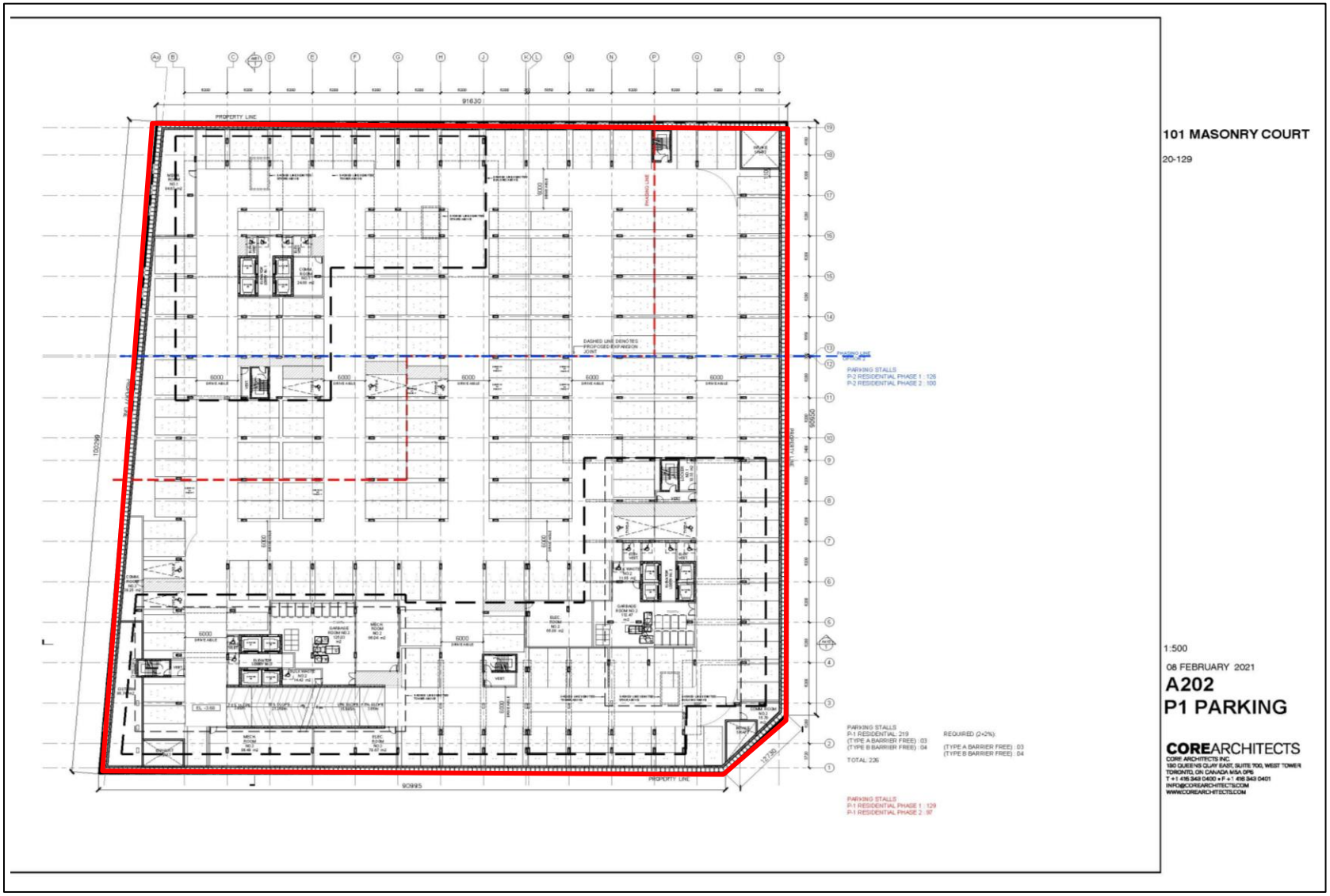
This report does not reflect environmental issues or concerns related to the property unless otherwise stated in the report. The design recommendations given in the report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, it is recommended that Landtek be retained during the final design stage to verify that the design is consistent with the report recommendations, and that the assumptions made in the report are still valid.

APPENDIX A

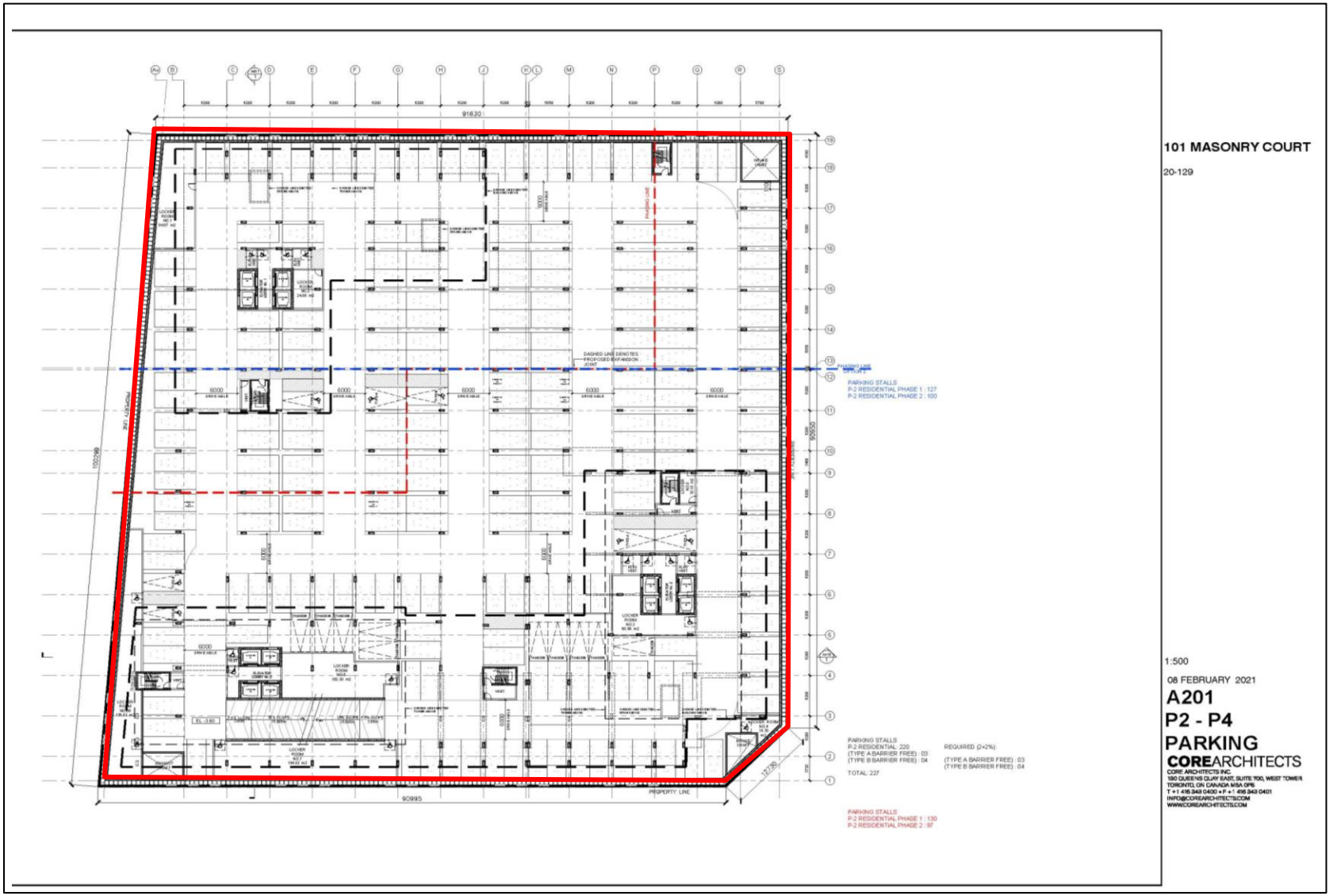
FIGURES



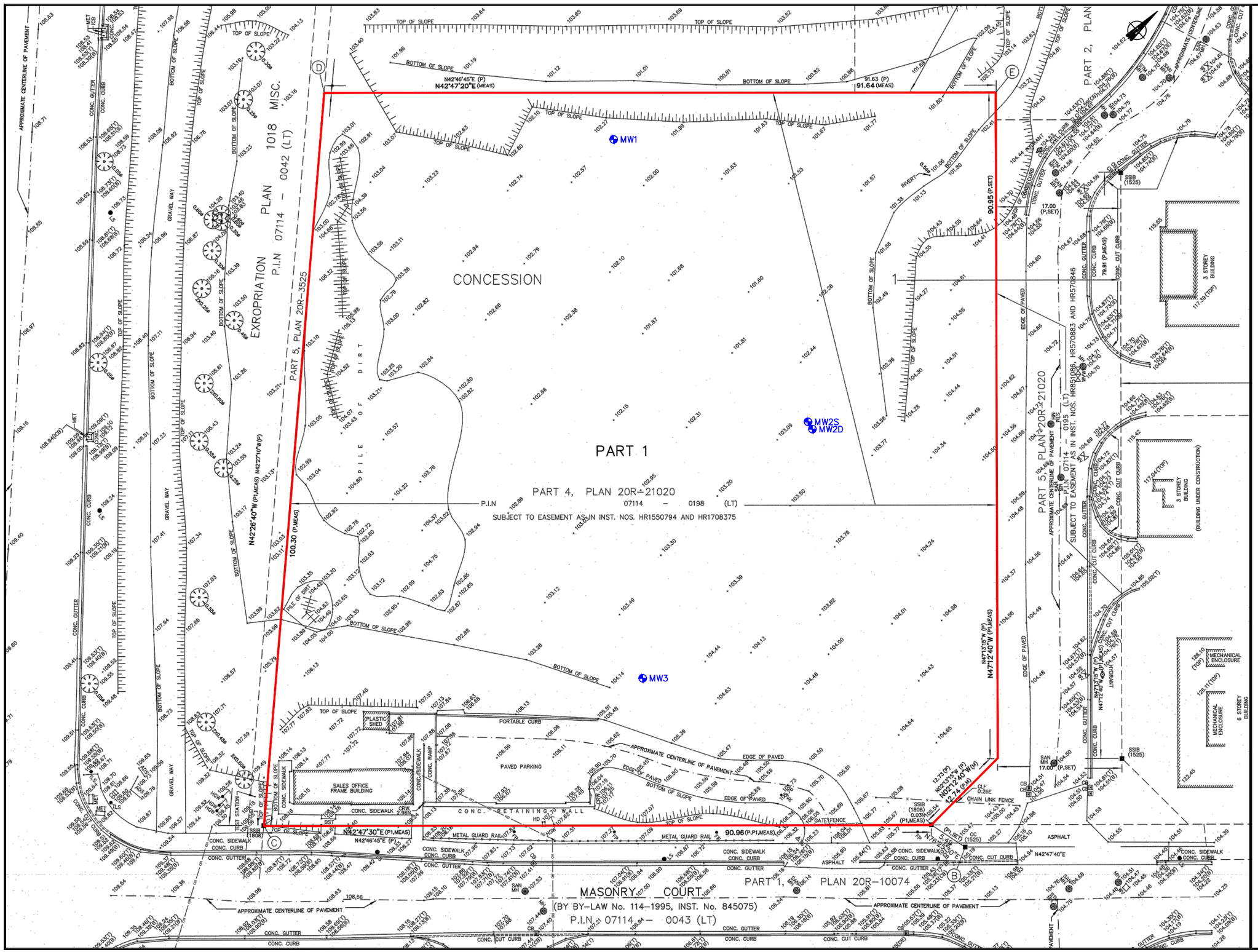
	LANDTEK LIMITED ***CONSULTING ENGINEERS*** **205 NEBO ROAD, HAMILTON, ONTARIO, L8W 2E1**
Scale: See Map	Date: Deccember 2021
Project:	Hydrogeological Investigation 1120 Cooke Boulevard Burlington, Ontario
Title:	Figure 1: Site Location
Project No.	21463



LANDTEK LIMITED	
CONSULTING ENGINEERS	
205 NEBO ROAD, HAMILTON, ONTARIO, L8W 2E1	
Scale: On Plan	Date: December 2021
Project:	Hydrogeological Investigation
	1120 Cooke Boulevard
	Burlington, Ontario
Title:	Figure 2a: P1 Parking Plan
Project No.	21463



LANDTEK LIMITED *CONSULTING ENGINEERS* **205 NEBO ROAD, HAMILTON, ONTARIO, L8W 2E1**	
Scale: On Plan	Date: December 2021
Project:	Hydrogeological Investigation 1120 Cooke Boulevard Burlington, Ontario
Title:	Figure 2b: P2-4 Parking Plan
Project No.	21463



Location plan an extract from Google Earth®

Monitoring Well Location

Base plan an extract of the Topographical Survey Plan of Part of Lot 6, Concession 1, as completed by R. Avis Surveying Inc., reference No. 3211-8T dated June 27th, 2021.

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engineering@landtek.ca
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project location

revisions

#	date	revision/comment
1	2022-02-11	issued for report

client
Adi Developments (Masonry) Inc.

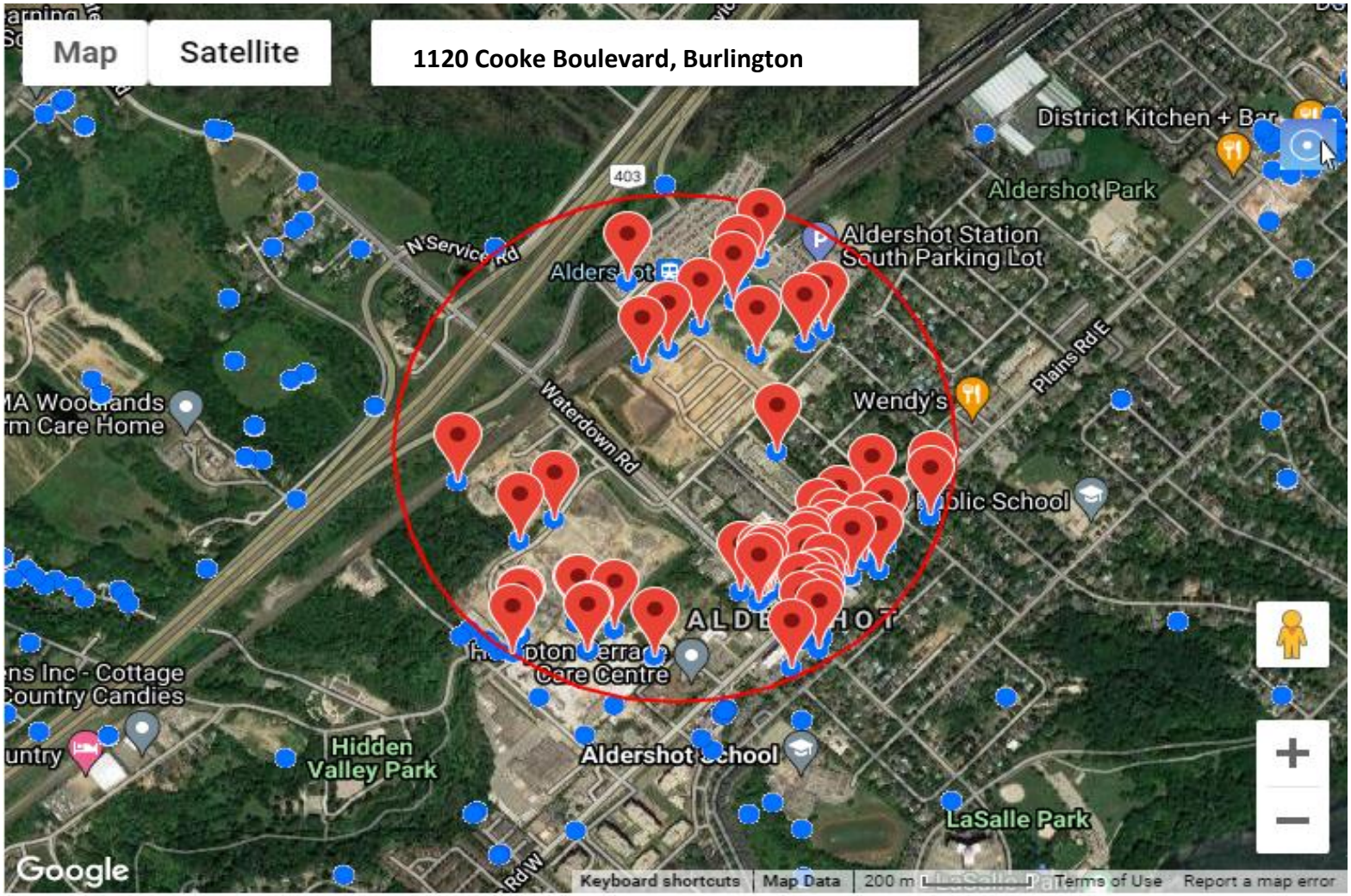
municipality
The Corporation of the City of Burlington

project
Hydrogeological Assessment
StationWest Phase 2, 1120 Cooke Boulevard

sheet
Monitoring Well Location Plan

date: February 11, 2022
drawn: MD
checked: JD
project #: 21463
scale: 1:500

Figure 3
21463-01



Latitude:43.30370, Longitude:-79.85773 (UTM Zone:17, Easting:592645, Northing:4795174)

MOE Wells Locations

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	Scale: See Map	Date: December 2021
Project:	Hydrogeological Investigation 1120 Cooke Boulevard Burlington, Ontario	
Title:	Figure 4: MOE Wells Locations	
Project No.	21463	

APPENDIX B

MONITORING WELLS LOGS

LANDTEK LIMITED

BH 1

Project No.:	21463	Drill Date:	January 7, 2022
Project:	Hydrogeological Investigation	Drill Method:	[ ] solid stem [x] hollow stem [x] Coring
Location:	StationWest Phase 2, 1120 Cooke Blvd., Burlington	Datum:	Geodetic

Material Description	Symbol	Elev. Depth	Samples No.	Samples Type	Scale (m)	SPT "N" Value	Soil Moisture (%)	GWL	Monitor Details	Test Data
Ground Surface		102.27								
FILL: sand and gravel, trace silt, brown, damp		0.0	1	SS						
		1.5								
SILTY SAND: clayey, trace gravel, trace sand seams, loose, damp to wet			2	SS						
		3.0	3	SS						
CLAYEY SILT TILL: trace to some sand, trace gravel, red shale fragments, brown becoming grey, firm to stiff, moist			4	SS						
			5	SS						
			6	SS						
			7	SS						bentonite backfill
… wet below approximately 8.0 m depth			8	SS						
		9.2								
BEDROCK shale, highly weathered to weathered, weak, red										
highly weathered, weak, red										
weathered, weak, red and grey										
weathered, red and grey, moderately strong										
		17.0								
END OF BOREHOLE										

Scale (m): 0.0, -0.5, -1.0, -1.5, -2.0, -2.5, -3.0, -3.5, -4.0, -4.5, -5.0, -5.5, -6.0, -6.5, -7.0, -7.5, -8.0, -8.5, -9.0, -9.5, -10.0, -10.5, -11.0, -11.5, -12.0, -12.5, -13.0, -13.5, -14.0, -14.5, -15.0, -15.5, -16.0, -16.5, -17.0, -17.5, -18.0, -18.5, -19.0, -19.5, -20.0

SPT "N" Value: 0, 25, 50, 75, 100

Soil Moisture (%): 0, 25, 50

Monitor Details: sand backfill to 13.7 m; 14.0 m; 3.0 m of slotted 50 mm dia. PVC pipe; 17.0 m

Notes:
1. Wet soils encountered between approximately 2.5 m and 3.0 m, and at 8.0 m.
2. Borehole open on completion.

PP = pocket penetrometer TCV = total combustible vapour BRD = bulk relative density
PL = plastic limit LL = liquid limit PI = plasticity index FV = field vane LV = lab vane VS = vane sensitivity

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LANDTEK LIMITED

BH 2S

Project No.:	21463	Drill Date:	January 7, 2022
Project:	Hydrogeological Investigation	Drill Method:	[ ] solid stem [x] hollow stem [x] Coring
Location:	StationWest Phase 2, 1120 Cooke Blvd., Burlington	Datum:	Geodetic

Material Description	Elev. Depth	Samples No.	Samples Type	Test Data
Ground Surface	103.09			
FILL: sand and gravel, trace silt, brown, moist	0.0			
SAND fine to medium, well graded, moist, brown	0.9	1	SS	
		2	SS	
SILTY SAND AND GRAVEL coarse, very moist, oxidixed, rootlets		3	SS	
SILT clay seams, fine sand, very moist to wet, redish brown	3.0	4	SS	
		5	SS	
		6	SS	
TILL clayey silt with gravel, red shale pieces very moist, redish brown	6			
END OF BOREHOLE				

Scale (m): 0.0, -0.5, -1.0, -1.5, -2.0, -2.5, -3.0, -3.5, -4.0, -4.5, -5.0, -5.5, -6.0, -6.5, -7.0, -7.5, -8.0, -8.5, -9.0, -9.5, -10.0, -10.5, -11.0, -11.5, -12.0, -12.5, -13.0, -13.5, -14.0, -14.5, -15.0, -15.5, -16.0, -16.5, -17.0, -17.5, -18.0, -18.5, -19.0, -19.5, -20.0

SPT "N" Value: 0, 25, 50, 75, 100

Soil Moisture (%): 0, 25, 50

GWL

Monitor Details: bentonite backfill; sand backfill to 4.2 m; 4.5 m; 1.5 m of slotted 50 mm dia. PVC pipe; 6.0 m

Notes:
1. Wet soils encountered between approximately 3.0 m
2. Borehole open on completion.

PP = pocket penetrometer TCV = total combustible vapour BRD = bulk relative density
PL = plastic limit LL = liquid limit PI = plasticity index FV = field vane LV = lab vane VS = vane sensitivity

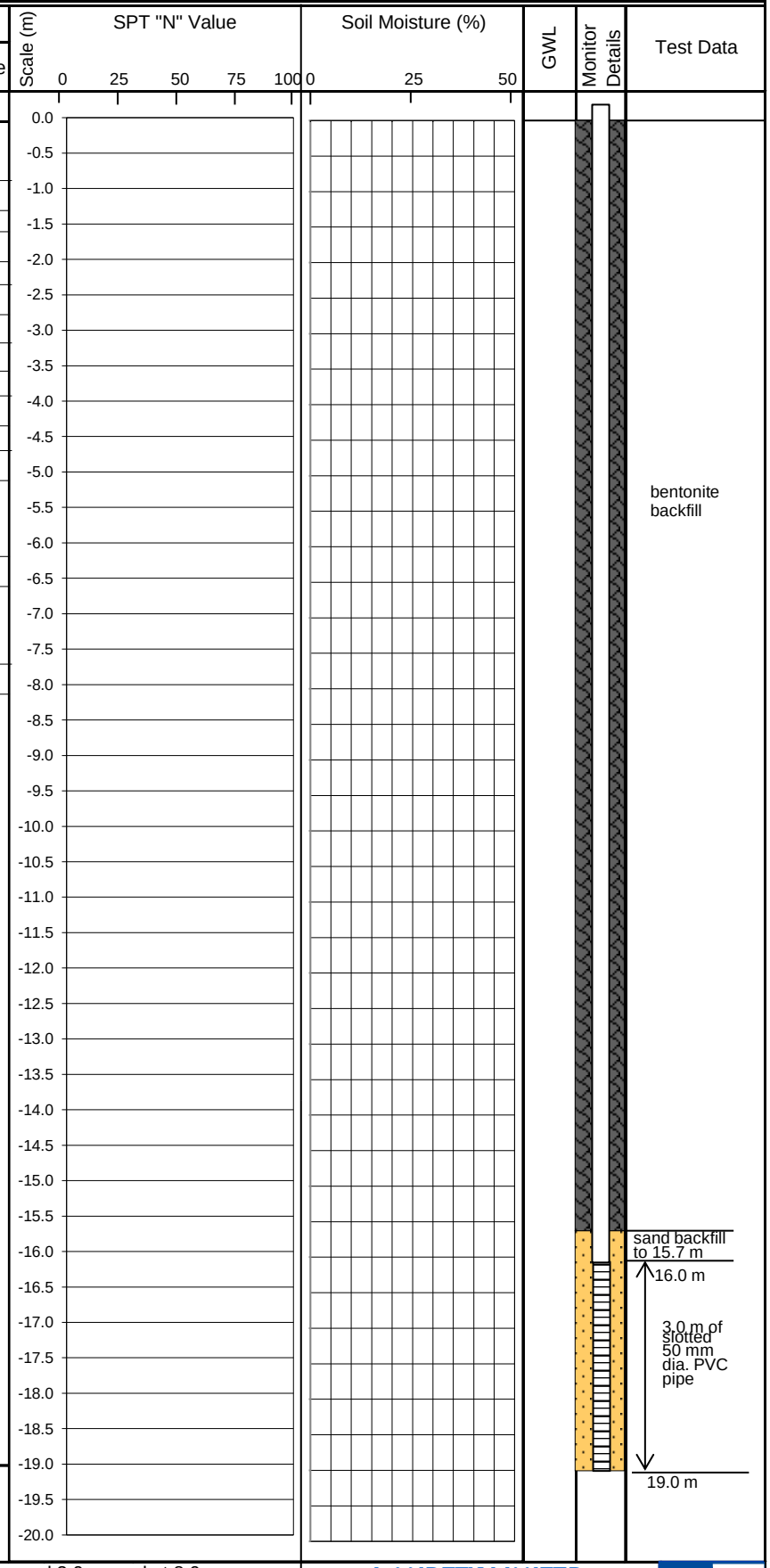
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LANDTEK LIMITED

BH 2D

Project No.:	21463	Drill Date:	January 7, 2022
Project:	Hydrogeological Investigation	Drill Method:	[ ] solid stem [x] hollow stem [x] Coring
Location:	StationWest Phase 2, 1120 Cooke Blvd., Burlington	Datum:	Geodetic

Material Description	Elev. Depth	Samples No.	Type	Test Data
Ground Surface	103.09			
FILL: sand and gravel, trace silt, brown, moist	0.0 / 0.9			
SAND fine to medium, well graded, moist, brown		1	SS	
		2	SS	
	2.1			
SILTY SAND AND GRAVEL coarse, very moist, oxidixed, rootlets		3	SS	
	3.0			
SILT clay seams, fine sand, very moist to wet, redish brown		4	SS	
		5	SS	
		6	SS	
	5.5			
CLAYEY SILT TILL clayey silt with gravel, red shale pieces very moist, redish brown		7	SS	
		8	SS	
	9.2			
BEDROCK shale, completely to highly weathered, very weak, red				
highly weathered, weak, red				
weathered, red and grey, moderately strong				
slightly weathered, red and grey, strong				
END OF BOREHOLE	19.0			



Notes:
1. Wet soils encountered between approximately 2.5 m and 3.0 m, and at 8.0 m.
2. Borehole open on completion.

PP = pocket penetrometer TCV = total combustible vapour BRD = bulk relative density
PL = plastic limit LL = liquid limit PI = plasticity index FV = field vane LV = lab vane VS = vane sensitivity

LANDTEK LIMITED
205 Nebo Road, Unit 4B
Hamilton, Ontario, Canada, L8W 2E1
Ph: (905) 383-3733
www.landtek.ca

LANDTEK LIMITED

BH 3

Project No.:	21463	Drill Date:	January 7, 2022
Project:	Hydrogeological Investigation	Drill Method:	[ ] solid stem [x] hollow stem [x] Coring
Location:	StationWest Phase 2, 1120 Cooke Blvd., Burlington	Datum:	Geodetic

Material Description	Elev. Depth	Samples No.	Type	Test Data
Ground Surface	104.14			
FILL: sand and gravel, trace silt, brown, damp	0.0	1	SS	
	1.5	2	SS	
SILTY SAND: clayey, trace gravel, trace sand seams, loose, damp to wet		3	SS	
	3.0	4	SS	
CLAYEY SILT TILL: trace to some sand, trace gravel, red shale fragments, brown becoming grey, stiff, moist		5	SS	bentonite backfill
		6	SS	
… wet below approximately 6.5 m depth		7	SS	
… sand and gravel seams below approximately 7.0 m depth		8	SS	
	9.2			
BEDROCK shale, completely to highly weathered, very weak, red				
highly weathered, weak, red				
weathered, red and grey, moderately strong				
slightly weathered, red and grey, strong				
	18.0			
END OF BOREHOLE				

Scale (m) 0.0 to -20.0 (-0.5 m increments)

SPT "N" Value: 0 25 50 75 100

Soil Moisture (%): 0 25 50

GWL

Monitor Details: sand backfill to 14.7 m; 15.0 m; 3.0 m of slotted 50 mm dia. PVC pipe; 18.0 m

Notes:
1. Wet soils encountered at approximately 6.5 m.
2. Borehole open on completion.

PP = pocket penetrometer TCV = total combustible vapour BRD = bulk relative density
PL = plastic limit LL = liquid limit PI = plasticity index FV = field vane LV = lab vane VS = vane sensitivity

LANDTEK LIMITED
205 Nebo Road, Unit 4B
Hamilton, Ontario, Canada, L8W 2E1
Ph: (905) 383-3733
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APPENDIX C

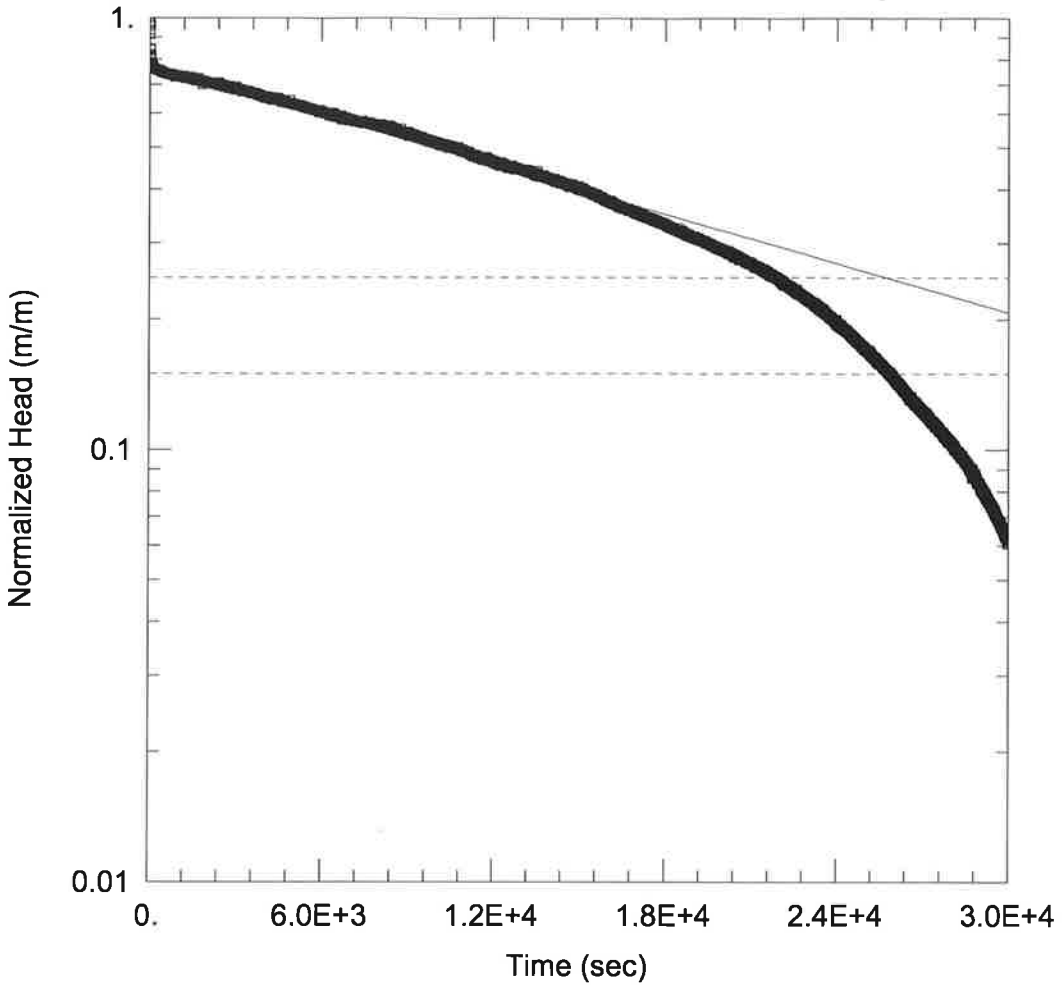
SUMMARY OF MECP WELL RECORDS

Summary of MECP Well Records

Well #	WELL_ID	DIAMETER (inches)	DATE_COMPLETED	DATE_RECEIVED	EAST83	NORTH83	WATER_FOUND_DEPTH (FT)	Static Water Level (ft)	KIND	FINAL_STATUS	USE_1ST	USE_2ND	DEPTH_TO (ft)	DEPTH_TO (m)	Well Construction	STREET	CITY/TOWNSHIP
1	2800273	6	15-Mar-49	24-Jul-50	592928.5	4796182	40	22	Salty	Water Suppy	Commercial	NA	225	68.60	Bedrock	NA	Burlington
2	2809957	2	18-May-04	15-Jun-04	593196.0	4795761	NA	NA	NA	NA	NA	NA	35	10.67	Overburden	71 Plains Road	Burlington
3	2810154	2	22-Nov-04	07-Feb-05	593153.0	4795606	NA	NA	NA	Observation Well	NA	NA	14.8	4.51	Overburden	Plains Road East (Road Holes)	Burlington
4	2810377	2	12-Sep-05	05-Oct-05	593109.0	4795549	NA	NA	NA	Observation Well	NA	NA	29.9	9.12	Overburden	14 Plains Road	Burlington
5	2810512	2	02-Feb-06	05-Apr-06	593049.0	4795411	NA	NA	NA	Observation Well	NA	NA	29.9	9.12	Overburden	14 Plains Road West	Burlington
6	7118602	2	10-Jan-08	29-Jan-09	593070.0	4795470	NA	NA	NA	Observation Well	NA	NA	39.7	12.10	Overburden	14 Plains Road	Burlington
7	7141517	2	05-Oct-09	07-Mar-10	592939.0	4796217	NA	NA	NA	Test Hole	Monitoring	NA	26.9	8.20	Overburden	1199 Waterdown Road	Burlington
8	7160240	NA	12-Jan-11	11-Mar-11	593090.0	4795516	NA	NA	NA	Obsevation Well	Monitoring	NA	30	9.15	Overburden	14 Plains Road East	Burlington
9	7167017	NA	30-May-11	09-Aug-11	593105.0	4795518	NA	NA	NA	Abandoned	Monitoring	NA	35	10.67	Overburden	14 Plains Road East	Burlington
10	7176158	2	20-Oct-11	01-Feb-12	593161.0	4795606	22	NA	Untested	Observation Well	Monitoring	NA	30	9.15	Overburden	34 Plains Road East	Burlington
11	7211367	2	08-Oct-13	19-Nov-13	593105.0	4795474	NA	NA	NA	Test Hole	Test Hole	NA	22	6.71	Overburden	14 Plains Road East	Burlington
12	7214775	2	16-Dec-13	14-Jan-14	593122.0	4795644	NA	NA	NA	Obsevation Well	Monitoring	NA	26	7.93	Overburden	35 Plains Road East	Burlington
13	7219297	2	31-Jan-14	23-Apr-14	592407.0	4795794	NA	NA	NA	NA	Monitoring	NA	15	4.57	Overburden	2021 Emery Avenue	Burlington
14	7220632	NA	29-Apr-14	20-May-14	593103.0	4795489	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Burlington
15	7227608	NA	30-Jun-14	18-Sep-14	593065.0	4796097	NA	NA	NA	Abandoned	NA	NA	NA	NA	NA	Waterdown Go Station	Burlington
16	7229430	2	23-Aug-14	14-Oct-14	592950.0	4795571	NA	13	NA	Abandoned	NA	NA	14	4.27	Overburden	1028 Waterdown Road	Burlington
17	7232291	2	18-Jul-14	21-Nov-14	593122.0	4795644	20	NA	NA	Abandoned	NA	NA	26	7.93	Overburden	35 Plains Road East	Burlington
18	7232366	2	17-Jun-14	21-Nov-14	593101.0	4796124	NA	NA	NA	Observation Well	Monitoring	NA	40	12.20	Bedrock	101 Masonary Ct	Burlington
19	7236354	2	05-Dec-14	27-Jan-15	592989.0	4795569	NA	NA	NA	Monitoring & TH	Monitoring & TH	NA	17	5.18	Overburden	1022 Waterdown Road	Burlington
20	7236355	2	05-Dec-14	27-Jan-15	592994.0	4795562	NA	NA	NA	Monitoring & TH	Monitoring & TH	NA	17	5.18	Overburden	1022 Waterdown Road	Burlington
21	7236356	2	05-Dec-14	27-Jan-15	592985.0	4795548	NA	NA	NA	Monitoring & TH	Monitoring & TH	NA	18	5.49	Overburden	1022 Waterdown Road	Burlington
22	7236357	2	04-Dec-14	27-Jan-15	593008.0	4795574	NA	NA	NA	Monitoring & TH	Monitoring & TH	NA	30	9.15	Overburden	1022 Waterdown Road	Burlington
23	7236358	2	04-Dec-14	27-Jan-15	593002.0	4795569	NA	NA	NA	Monitoring & TH	Monitoring & TH	NA	17.7	5.40	Overburden	1022 Waterdown Road	Burlington
24	7248588	2	18-Aug-15	21-Sep-15	593098.0	4795664	NA	NA	NA	Observation Well	Monitoring	NA	30.2	9.21	Overburden	35 Plains Road East	Burlington
25	7248589	2	18-Aug-15	21-Sep-15	593118.0	4795620	NA	NA	NA	Observation Well	Monitoring	NA	30.2	9.21	Overburden	35 Plains Road East	Burlington
26	7267367	2	10-Jun-16	20-Jul-16	593101.0	4795452	26	NA	Untested	Observation Well	Monitoring	NA	34.8	10.61	Overburden	of 982 Lasalle Pk Rd. 1 m W of Edge of Lasalle Pl	Burlington
27	7271535	NA	08-Oct-15	15-Sep-16	593014.0	4795865	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Burlington
28	7294096	4	09-Aug-17	05-Sep-17	592754.0	4796045	4	4	Untested	Observation Well	Monitoring	NA	7	2.13	Overburden	1199 Waterdown Road	Burlington
29	7294097	3	09-Aug-17	05-Sep-17	592864.0	4796127	4	4	Untested	Observation Well	Monitoring	NA	7	2.13	Overburden	1199 Waterdown Road	Burlington
30	7294098	2	08-Aug-17	05-Sep-17	593065.0	4796097	13	13	Untested	Observation Well	Monitoring	NA	10	3.05	Overburden	1199 Waterdown Road	Burlington
31	7296543	2	22-Sep-17	05-Oct-17	593075.0	593075	NA	NA	NA	Monitoring & TH	TH	NA	18	5.49	Overburden	15 Plains Road East	Burlington
32	7296544	2	22-Sep-17	05-Oct-17	593081.0	4795606	NA	NA	NA	Monitoring & TH	TH	NA	20	6.10	Overburden	15 Plains Road East	Burlington
33	7296545	2	22-Sep-17	05-Oct-17	593074.0	4795568	NA	NA	NA	Monitoring & TH	TH	NA	23	7.01	Overburden	15 Plains Road East	Burlington
34	7299235	2	26-Oct-17	16-Nov-17	593065.0	4795510	NA	NA	NA	Observation Well	Monitoring	NA	35	10.67	Overburden	15 Plains Road East	Burlington
35	7299351	2	23-Sep-17	17-Nov-17	592977.0	4796273	30	30	NA	Obsevation Well	Monitoring	NA	40	12.20	Overburden	1190 Waterdown Road	Burlington
36	7301691	NA	27-Oct-17	18-Dec-17	593308.0	4795736	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Burlington
37	7305852	NA	17-Oct-17	14-Feb-17	592805.0	4796076	NA	NA	NA	Abandoned	Monitoring	NA	NA	NA	NA	101 Masonary Ct	Burlington
38	7314783	12	23-Mar-18	18-Jul-18	593135.0	4795692	NA	NA	NA	NA	Monitoring	NA	30	9.15	Overburden	53 Plains rpad East	Burlington
39	7333791	2	19-Mar-19	15-Apr-19	592533.0	592533	NA	NA	NA	Monitoring & TH	Monitoring & TH	NA	15	4.57	Overburden	1077 Howard Road	Burlington
40	7333792	2	19-Mar-19	15-Apr-19	592527.0	4795671	NA	NA	NA	Monitoring & TH	Monitoring & TH	NA	15	4.57	Overburden	1077 Howard Road	Burlington
41	7333793	2	20-Mar-19	15-Apr-19	592591.0	4795717	NA	NA	NA	Monitoring & TH	Monitoring & TH	NA	17.4	5.30	Overburden	1077 Howard Road	Burlington
42	7333846	2	18-Mar-19	15-Apr-19	592636.0	4795500	NA	NA	NA	Monitoring & TH	Monitoring & TH	NA	16	4.88	Overburden	1077 Howard Road	Burlington
43	7333850	2	18-Mar-19	15-Apr-19	592517.0	4795434	NA	NA	NA	Monitoring & TH	Monitoring & TH	NA	15	4.57	Overburden	1077 Howard Road	Burlington
44	7333852	2	20-Mar-19	15-Apr-19	592529.0	4795471	NA	NA	NA	Monitoring & TH	Monitoring & TH	NA	30	9.15	Overburden	1077 Howard Road	Burlington
45	7333853	2	20-Mar-19	15-Apr-19	592641.0	4795500	NA	NA	NA	Monitoring & TH	Monitoring & TH	NA	15	4.57	Overburden	1077 Howard Road	Burlington
46	7355583	NA	05-Mar-20	13-Mar-20	598664.0	4779251	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Burlington
47	7360760	NA	10-Feb-20	22-Jun-20	592658.0	4795442	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Burlington
48	7361071	NA	NA	26-Jun-20	593224.0	4795674	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Burlington
49	7361072	NA	NA	26-Jun-20	593187.0	4795640	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Burlington
50	7363235	NA	NA	27-Jul-20	593213.0	4795619	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Burlington
51	7372986	2	13-May-20	13-Nov-20	592787.0	4795431	33	NA	Untested	Observation Well	Monitoring	NA	38	11.59	Overburden	1020 Emery Avenue	Burlington
52	7372995	2	08-May-20	13-Nov-20	592663.0	4795444	10	NA	Untested	Observation Well	Monitoring	NA	30	9.15	Overburden	1020 Emery Avenue	Burlington
53	7372996	2	13-May-20	13-Nov-20	592711.0	4795488	NA	NA	NA	Observation Well	Monitoring	NA	30	9.15	Overburden	1020 Emery Avenue	Burlington
54	7374324	NA	14-Jul-20	08-Dec-20	593312.0	4795767	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Burlington

APPENDIX D

HYDRAULIC CONDUCTIVITY TESTING ANALYSIS RESULTS



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...\MW1.aqt
Date: 01/31/22 Time: 10:21:52

PROJECT INFORMATION

Company: Landtek Limited
Client: Adi Development Inc. Group
Project: 21463
Location: 1120 Cooke Blvd. Burlington
Test Well: MW1
Test Date: January 25, 2022

AQUIFER DATA

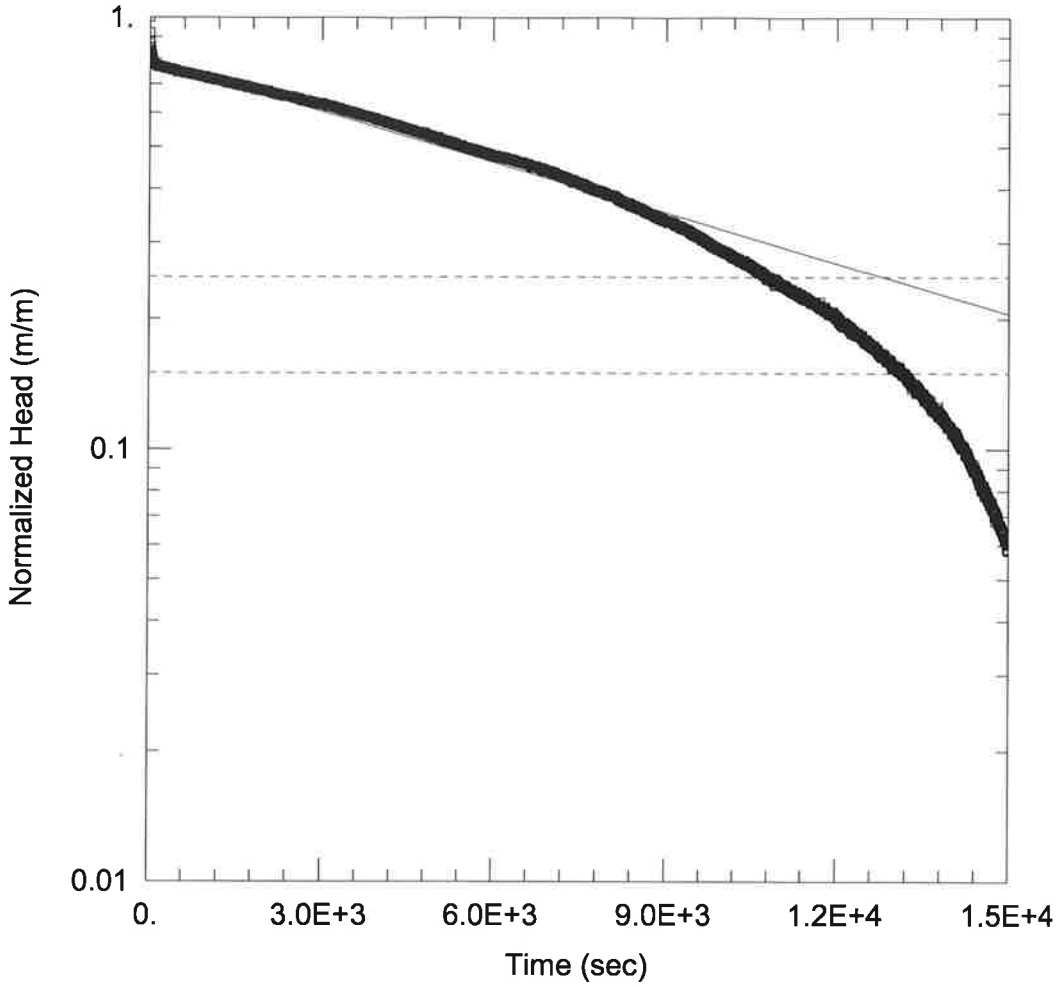
Saturated Thickness: 5.8 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW1)

Initial Displacement: 0.4181 m Static Water Column Height: 3.09 m
Total Well Penetration Depth: 5.8 m Screen Length: 3. m
Casing Radius: 0.0254 m Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev
K = 2.564E-8 m/sec y0 = 0.3211 m



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...\MW3.aqt
Date: 01/31/22 Time: 10:22:06

PROJECT INFORMATION

Company: Landtek Limited
Client: Adi Development Inc. Group
Project: 21463
Location: 1120 Cooke Blvd. Burlington
Test Well: MW3
Test Date: January 25, 2022

AQUIFER DATA

Saturated Thickness: 5.8 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW1)

Initial Displacement: 0.3571 m
Total Well Penetration Depth: 5.8 m
Casing Radius: 0.0254 m
Static Water Column Height: 5.8 m
Screen Length: 3. m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 5.291E-8 m/sec y0 = 0.2828 m

APPENDIX E

LABORATORY CERTIFICATE OF ANALYSIS

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: LANDTEK LTD.
205 NEBO ROAD, UNIT 3
HAMILTON, ON L8W2E1
(905) 383-3733
ATTENTION TO: Henry Erebor
PROJECT: 21463
AGAT WORK ORDER: 22H856665
MICROBIOLOGY ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer
TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor
WATER ANALYSIS REVIEWED BY: Jason Coughtrey, Inorganics Supervisor
DATE REPORTED: Feb 04, 2022
PAGES (INCLUDING COVER): 19
VERSION*: 2

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

VERSION 2:Version 2 supersedes work order 22H856665 Version 1, issued January 28, 2022. Partial (excluding NP/NPE)
VERSION 1:January 28, 2022 - Partial (excluding BOD, NP/NPE)

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Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 22H856665

PROJECT: 21463

CLIENT NAME: LANDTEK LTD.

ATTENTION TO: Henry Erebor

SAMPLING SITE:

SAMPLED BY:

E. Coli (Using MI Agar)

DATE RECEIVED: 2022-01-24 **DATE REPORTED: 2022-01-27**

				SAMPLE DESCRIPTION:	MW1	MW2D	MW3
				SAMPLE TYPE:	Water	Water	Water
				DATE SAMPLED:	2022-01-24	2022-01-24	2022-01-24
Parameter	Unit	G / S	RDL		3454092	3454095	3454096
Escherichia coli	CFU/100mL	200			0	0	0

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to ON Burlington Storm 086-2002
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3454092 Escherichia coli RDL = 100 CFU/100mL.
RDL > 1 indicates dilutions of the sample.

Sampling time was not stated on the Chain of Custody.

The sample was diluted prior to filtration due to the presence of sediments.

3454095-3454096 Escherichia coli RDL = 2 CFU/100mL.
RDL > 1 indicates dilutions of the sample.

Sampling time was not stated on the Chain of Custody.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



Results relate only to the items tested. Results apply to samples as received.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 22H856665

PROJECT: 21463

CLIENT NAME: LANDTEK LTD.

ATTENTION TO: Henry Erebor

SAMPLING SITE:

SAMPLED BY:

Burlington Storm - Organics

DATE RECEIVED: 2022-01-24

DATE REPORTED: 2022-01-28

		SAMPLE DESCRIPTION:		MW1		MW2D		MW3
		SAMPLE TYPE:		Water		Water		Water
		DATE SAMPLED:		2022-01-24		2022-01-24		2022-01-24
Parameter	Unit	G / S	RDL	3454092	RDL	3454095	RDL	3454096
Methylene Chloride	mg/L	0.0052	0.0006	<0.0006	0.0012	<0.0012	0.0006	<0.0006
trans-1,3-Dichloropropylene	mg/L	0.0056	0.0006	<0.0006	0.0012	<0.0012	0.0006	<0.0006
cis- 1,2-Dichloroethylene	mg/L	0.0056	0.0004	<0.0004	0.0008	<0.0008	0.0004	<0.0004
Chloroform	mg/L	0.002	0.0004	**0.0040**	0.0008	<0.0008	0.0004	**0.0042**
Benzene	mg/L	0.002	0.0004	0.0020	0.0008	<0.0008	0.0004	<0.0004
Trichloroethylene	mg/L	0.0076	0.0004	<0.0004	0.0008	<0.0008	0.0004	<0.0004
Toluene	mg/L	0.002	0.0004	<0.0004	0.0008	<0.0008	0.0004	<0.0004
Tetrachloroethylene	mg/L	0.0044	0.0002	<0.0002	0.0004	<0.0004	0.0002	<0.0002
Ethylbenzene	mg/L	0.002	0.0004	<0.0004	0.0008	<0.0008	0.0004	<0.0004
1,1,2,2-Tetrachloroethane	mg/L	0.017	0.0004	<0.0004	0.0008	<0.0008	0.0004	<0.0004
1,2-Dichlorobenzene	mg/L	0.0056	0.0004	<0.0004	0.0008	<0.0008	0.0004	<0.0004
1,4-Dichlorobenzene	mg/L	0.0068	0.0004	<0.0004	0.0008	<0.0008	0.0004	<0.0004
m & p-Xylene	mg/L		0.0004	<0.0004	0.0008	<0.0008	0.0004	<0.0004
o-Xylene	mg/L		0.0002	<0.0002	0.0004	<0.0004	0.0002	<0.0002
Xylenes (Total)	mg/L	0.0044	0.0002	<0.0002	0.0002	<0.0002	0.0002	<0.0002
PCBs	mg/L	0.0004	0.0002	<0.0002	0.0002	<0.0002	0.0002	<0.0002
Pentachlorophenol	mg/L	0.002	0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005
Di-n-butyl phthalate	mg/L	0.015	0.0005	0.0012	0.0005	0.0011	0.0005	0.00079
3,3'-Dichlorobenzidine	mg/L	0.0008	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Bis(2-Ethylhexyl)phthalate	mg/L	0.0088	0.0005	0.0021	0.0005	0.00062	0.0005	0.00068
Acenaphthene	mg/L		0.0002	<0.0002	0.0002	<0.0002	0.0002	<0.0002
Acenaphthylene	mg/L		0.0002	<0.0002	0.0002	<0.0002	0.0002	<0.0002
Anthracene	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Benzo(a)anthracene	mg/L		0.0002	<0.0002	0.0002	<0.0002	0.0002	<0.0002
Benzo(a)pyrene	mg/L		0.00001	<0.00001	0.00001	<0.00001	0.00001	<0.00001
Benzo(b)fluoranthene	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Benzo(ghi)perylene	mg/L		0.0002	<0.0002	0.0002	<0.0002	0.0002	<0.0002
Benzo(k)fluoranthene	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Chrysene	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Dibenzo(a,h)anthracene	mg/L		0.0002	<0.0002	0.0002	<0.0002	0.0002	<0.0002

Certified By:

Results relate only to the items tested. Results apply to samples as received.

AGAT Laboratories
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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 22H856665

PROJECT: 21463

CLIENT NAME: LANDTEK LTD.

ATTENTION TO: Henry Erebor

SAMPLING SITE:

SAMPLED BY:

Burlington Storm - Organics

DATE RECEIVED: 2022-01-24

DATE REPORTED: 2022-01-28

		SAMPLE DESCRIPTION:		MW1		MW2D		MW3
		SAMPLE TYPE:		Water		Water		Water
		DATE SAMPLED:		2022-01-24		2022-01-24		2022-01-24
Parameter	**Unit**	**G / S**	**RDL**	**3454092**	**RDL**	**3454095**	**RDL**	**3454096**
Fluoranthene	mg/L		0.0002	<0.0002	0.0002	<0.0002	0.0002	<0.0002
Fluorene	mg/L		0.0002	<0.0002	0.0002	<0.0002	0.0002	<0.0002
Indeno(1,2,3-cd)pyrene	mg/L		0.0002	<0.0002	0.0002	<0.0002	0.0002	<0.0002
Naphthalene	mg/L		0.0003	<0.0003	0.0003	<0.0003	0.0003	<0.0003
Phenanthrene	mg/L		0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Pyrene	mg/L		0.0002	<0.0002	0.0002	<0.0002	0.0002	<0.0002
Total PAHs	mg/L	0.002	0.0003	<0.0003	0.0003	<0.0003	0.0003	<0.0003
Surrogate	**Unit**	**Acceptable Limits**						
Toluene-d8	% Recovery	50-140		84	**4**	82	**2**	65
4-Bromofluorobenzene	% Recovery	50-140		109	**4**	109	**2**	96
Decachlorobiphenyl	%	50-140		97	**1**	96	**1**	78
2,4,6-Tribromophenol	%	50-140		78	**1**	78	**1**	78
2-Fluorophenol	%	50-140		85	**1**	85	**1**	85
Chrysene-d12	%	50-140		99	**1**	99	**1**	99
phenol-d6 surrogate	%	50-140		90	**1**	101	**1**	90

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to ON Burlington Storm 086-2002
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3454092 Dilution factor=2
The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used.

3454095 Dilution factor=4
The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used.

3454096 Dilution factor=2
The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 22H856665

PROJECT: 21463

CLIENT NAME: LANDTEK LTD.

ATTENTION TO: Henry Erebor

SAMPLING SITE:

SAMPLED BY:

BOD5

DATE RECEIVED: 2022-01-24

DATE REPORTED: 2022-02-01

				SAMPLE DESCRIPTION:	MW1	MW2D	MW3
				SAMPLE TYPE:	Water	Water	Water
				DATE SAMPLED:	2022-01-24	2022-01-24	2022-01-24
Parameter	Unit	G / S	RDL		3454092	3454095	3454096
Biochemical Oxygen Demand, Total	mg/L	15	2.00		**758**	**68.0**	9.00

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to ON Burlington Storm 086-2002
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

Analysis performed at AGAT Halifax (unless marked by *)

Certified By:

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AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 22H856665

PROJECT: 21463

CLIENT NAME: LANDTEK LTD.

ATTENTION TO: Henry Erebor

SAMPLING SITE:

SAMPLED BY:

Burlington Storm Sewer Use By-law - Inorganics

DATE RECEIVED: 2022-01-24

DATE REPORTED: 2022-01-28

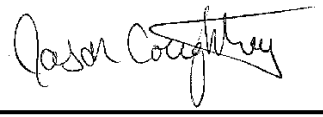
		SAMPLE DESCRIPTION:		MW1		MW2D		MW3
		SAMPLE TYPE:		Water		Water		Water
		DATE SAMPLED:		2022-01-24		2022-01-24		2022-01-24
Parameter	Unit	G / S	RDL	3454092	RDL	3454095	RDL	3454096
pH	pH Units	6.5 - 8.5	NA	8.10	NA	7.39	NA	7.33
Total Suspended Solids	mg/L	15	10	**3260**	10	<10	10	**40**
Total Cyanide	mg/L	0.02	0.002	<0.002	0.002	<0.002	0.002	<0.002
Phenols	mg/L	0.008	0.002	**0.035**	0.002	0.007	0.002	0.005
Total Phosphorus	mg/L	0.4	**1.2**	**2.47**	0.06	0.08	0.3	<0.3
Total Arsenic	mg/L	0.02	**0.075**	<0.075	0.015	<0.015	0.015	<0.015
Total Cadmium	mg/L	0.008	0.0005	<0.0005	0.0001	<0.0001	0.0001	<0.0001
Total Chromium	mg/L	0.08	**0.100**	**0.195**	0.020	<0.020	0.020	<0.020
Chromium VI	mg/L	0.04	0.002	<0.002	0.002	<0.002	0.002	<0.002
Total Copper	mg/L	0.04	**0.075**	<0.075	0.015	<0.015	0.015	<0.015
Total Lead	mg/L	0.12	0.100	<0.100	0.020	<0.020	0.020	<0.020
Total Manganese	mg/L	0.05	**0.100**	**2.31**	0.020	**2.17**	0.020	**0.304**
Total Mercury	mg/L	0.0004	0.0002	<0.0002	0.0002	<0.0002	0.0002	<0.0002
Total Nickel	mg/L	0.08	0.075	**0.100**	0.015	<0.015	0.015	<0.015
Total Selenium	mg/L	0.02	0.010	<0.010	0.002	<0.002	0.002	<0.002
Total Silver	mg/L	0.12	0.100	<0.100	0.020	<0.020	0.020	<0.020
Total Zinc	mg/L	0.04	**0.100**	**0.265**	0.020	<0.020	0.020	<0.020

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to ON Burlington Storm 086-2002
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3454092-3454096 Dilution required, RDL has been increased accordingly.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



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Exceedance Summary

AGAT WORK ORDER: 22H856665

PROJECT: 21463

CLIENT NAME: LANDTEK LTD.

ATTENTION TO: Henry Erebor

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
3454092	MW1	ON Burlington SM	BOD5	Biochemical Oxygen Demand, Total	mg/L	15	758
3454092	MW1	ON Burlington SM	Burlington Storm - Organics	Chloroform	mg/L	0.002	0.0040
3454092	MW1	ON Burlington SM	Burlington Storm Sewer Use By-law - Inorganics	Phenols	mg/L	0.008	0.035
3454092	MW1	ON Burlington SM	Burlington Storm Sewer Use By-law - Inorganics	Total Chromium	mg/L	0.08	0.195
3454092	MW1	ON Burlington SM	Burlington Storm Sewer Use By-law - Inorganics	Total Manganese	mg/L	0.05	2.31
3454092	MW1	ON Burlington SM	Burlington Storm Sewer Use By-law - Inorganics	Total Nickel	mg/L	0.08	0.100
3454092	MW1	ON Burlington SM	Burlington Storm Sewer Use By-law - Inorganics	Total Phosphorus	mg/L	0.4	2.47
3454092	MW1	ON Burlington SM	Burlington Storm Sewer Use By-law - Inorganics	Total Suspended Solids	mg/L	15	3260
3454092	MW1	ON Burlington SM	Burlington Storm Sewer Use By-law - Inorganics	Total Zinc	mg/L	0.04	0.265
3454095	MW2D	ON Burlington SM	BOD5	Biochemical Oxygen Demand, Total	mg/L	15	68.0
3454095	MW2D	ON Burlington SM	Burlington Storm Sewer Use By-law - Inorganics	Total Manganese	mg/L	0.05	2.17
3454096	MW3	ON Burlington SM	Burlington Storm - Organics	Chloroform	mg/L	0.002	0.0042
3454096	MW3	ON Burlington SM	Burlington Storm Sewer Use By-law - Inorganics	Total Manganese	mg/L	0.05	0.304
3454096	MW3	ON Burlington SM	Burlington Storm Sewer Use By-law - Inorganics	Total Suspended Solids	mg/L	15	40

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Quality Assurance

CLIENT NAME: LANDTEK LTD.

AGAT WORK ORDER: 22H856665

PROJECT: 21463

ATTENTION TO: Henry Erebor

SAMPLING SITE:

SAMPLED BY:

Microbiology Analysis

RPT Date:			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
E. Coli (Using MI Agar)															
Escherichia coli	3453620		0	0	NA										

Comments: NA - % RPD Not Applicable.

Certified By:



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Quality Assurance

CLIENT NAME: LANDTEK LTD.

AGAT WORK ORDER: 22H856665

PROJECT: 21463

ATTENTION TO: Henry Erebor

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Burlington Storm - Organics															
Methylene Chloride	3450575		<0.0003	<0.0003	NA	< 0.0003	94%	50%	140%	99%	60%	130%	109%	50%	140%
trans-1,3-Dichloropropylene	3450575		<0.0003	<0.0003	NA	< 0.0003	106%	50%	140%	93%	60%	130%	81%	50%	140%
cis- 1,2-Dichloroethylene	3450575		<0.0002	<0.0002	NA	< 0.0002	92%	60%	130%	94%	60%	130%	102%	60%	130%
Chloroform	3450575		<0.0002	<0.0002	NA	< 0.0002	85%	50%	140%	86%	60%	130%	100%	50%	140%
Benzene	3450575		0.0004	0.0004	NA	< 0.0002	88%	50%	140%	88%	60%	130%	80%	50%	140%
Trichloroethylene	3450575		<0.0002	<0.0002	NA	< 0.0002	87%	50%	140%	87%	60%	130%	96%	50%	140%
Toluene	3450575		<0.0002	<0.0002	NA	< 0.0002	103%	50%	140%	97%	60%	130%	78%	50%	140%
Tetrachloroethylene	3450575		<0.0001	<0.0001	NA	< 0.0001	75%	50%	140%	98%	60%	130%	83%	50%	140%
Ethylbenzene	3450575		<0.0002	<0.0002	NA	< 0.0002	82%	50%	140%	111%	60%	130%	96%	50%	140%
1,1,2,2-Tetrachloroethane	3450575		<0.0002	<0.0002	NA	< 0.0002	106%	50%	140%	110%	60%	130%	104%	50%	140%
1,2-Dichlorobenzene	3450575		<0.0002	<0.0002	NA	< 0.0002	92%	50%	140%	88%	60%	130%	92%	50%	140%
1,4-Dichlorobenzene	3450575		<0.0002	<0.0002	NA	< 0.0002	107%	50%	140%	117%	60%	130%	112%	50%	140%
m & p-Xylene	3450575		<0.0002	<0.0002	NA	< 0.0002	105%	50%	140%	107%	60%	130%	93%	50%	140%
o-Xylene	3450575		<0.0001	<0.0001	NA	< 0.0001	81%	50%	140%	106%	60%	130%	91%	50%	140%
PCBs	3440099		< 0.0002	< 0.0002	NA	< 0.0002	107%	50%	140%	91%	50%	140%	90%	50%	140%
Pentachlorophenol	3456599		< 0.0005	< 0.0005	NA	< 0.0005	95%	50%	140%	73%	50%	140%	93%	50%	140%
Di-n-butyl phthalate	3456599		< 0.0005	< 0.0005	NA	< 0.0005	78%	50%	140%	75%	50%	140%	105%	50%	140%
3,3'-Dichlorobenzidine	3456599		< 0.0005	< 0.0005	NA	< 0.0001	96%	30%	130%	96%	30%	130%	86%	30%	130%
Bis(2-Ethylhexyl)phthalate	3456599		< 0.0005	< 0.0005	NA	< 0.0005	105%	50%	140%	90%	50%	140%	98%	50%	140%
Acenaphthene	3456599		< 0.00010	< 0.00010	NA	< 0.0002	89%	50%	140%	98%	50%	140%	98%	50%	140%
Acenaphthylene	3456599		< 0.00011	< 0.00011	NA	< 0.0002	105%	50%	140%	105%	50%	140%	105%	50%	140%
Anthracene	3456599		< 0.00007	< 0.00007	NA	< 0.0001	93%	50%	140%	88%	50%	140%	86%	50%	140%
Benzo(a)anthracene	3456599		< 0.00008	< 0.00008	NA	< 0.0002	95%	50%	140%	94%	50%	140%	94%	50%	140%
Benzo(a)pyrene	3456599		< 0.001	< 0.001	NA	< 0.00001	95%	50%	140%	99%	50%	140%	95%	50%	140%
Benzo(b)fluoranthene	3456599		< 0.00003	< 0.00003	NA	< 0.0001	98%	50%	140%	98%	50%	140%	75%	50%	140%
Benzo(ghi)perylene	3456599		< 0.00006	< 0.00006	NA	< 0.0002	78%	50%	140%	86%	50%	140%	78%	50%	140%
Benzo(k)fluoranthene	3456599		< 0.00006	< 0.00006	NA	< 0.0001	86%	50%	140%	86%	50%	140%	96%	50%	140%
Chrysene	3456599		< 0.00005	< 0.00005	NA	< 0.0001	97%	50%	140%	105%	50%	140%	98%	50%	140%
Dibenzo(a,h)anthracene	3456599		< 0.00009	< 0.00009	NA	< 0.0002	77%	50%	140%	97%	50%	140%	98%	50%	140%
Fluoranthene	3456599		< 0.00012	< 0.00012	NA	< 0.0002	70%	50%	140%	85%	50%	140%	95%	50%	140%
Fluorene	3456599		< 0.0002	< 0.0002	NA	< 0.0002	86%	50%	140%	86%	50%	140%	86%	50%	140%
Indeno(1,2,3-cd)pyrene	3456599		< 0.00003	< 0.00003	NA	< 0.0002	98%	50%	140%	82%	50%	140%	105%	50%	140%
Naphthalene	3456599		< 0.0003	< 0.0003	NA	< 0.0003	94%	50%	140%	95%	50%	140%	95%	50%	140%
Phenanthrene	3456599		< 0.00011	< 0.00011	NA	< 0.0001	96%	50%	140%	95%	50%	140%	99%	50%	140%
Pyrene	3456599		< 0.00012	< 0.00012	NA	< 0.0002	80%	50%	140%	96%	50%	140%	95%	50%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

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Quality Assurance

CLIENT NAME: LANDTEK LTD.

AGAT WORK ORDER: 22H856665

PROJECT: 21463

ATTENTION TO: Henry Erebor

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Certified By:

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Quality Assurance

CLIENT NAME: LANDTEK LTD.

AGAT WORK ORDER: 22H856665

PROJECT: 21463

ATTENTION TO: Henry Erebor

SAMPLING SITE:

SAMPLED BY:

Ultra Trace Analysis

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Nonylphenol and Nonylphenol Ethoxylates (Ontario, mg/L)															
Total Nonylphenol	1	3456337	< 0.001	< 0.001	NA	< 0.001	NA	60%	140%	113%	60%	140%	NA	60%	140%
NP1EO	1	3456337	< 0.001	< 0.001	NA	< 0.001	NA	60%	140%	49%	60%	140%	NA	60%	140%
NP2EO	1	3456337	< 0.0003	< 0.0003	NA	< 0.0003	NA	60%	140%	89%	60%	140%	NA	60%	140%

Comments: Blank spike: More than 90% of the elements met acceptance limits and overall data quality is acceptable for use. For a multi-element scan up to 10% of analytes may exceed the quoted limits by up to 10% absolute.

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Quality Assurance

CLIENT NAME: LANDTEK LTD.

AGAT WORK ORDER: 22H856665

PROJECT: 21463

ATTENTION TO: Henry Erebor

SAMPLING SITE:

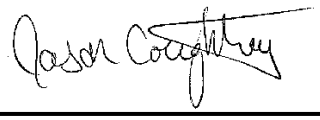
SAMPLED BY:

Water Analysis

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Burlington Storm Sewer Use By-law - Inorganics															
pH	3454899		7.44	7.44	0.0%	NA	101%	90%	110%						
Total Suspended Solids	3458652		<10	<10	NA	< 10	102%	80%	120%						
Total Cyanide	3436194		0.004	0.004	NA	< 0.002	92%	70%	130%	94%	80%	120%	107%	70%	130%
Phenols	3450411		<0.002	0.007	NA	< 0.002	105%	90%	110%	103%	90%	110%	106%	80%	120%
Total Phosphorus	3454095	3454095	0.08	<0.06	NA	< 0.02	104%	70%	130%	103%	80%	120%	110%	70%	130%
Total Arsenic	3457151		0.460	0.450	2.2%	< 0.015	97%	70%	130%	103%	80%	120%	104%	70%	130%
Total Cadmium	3457151		<0.0001	<0.0001	NA	< 0.0001	100%	70%	130%	103%	80%	120%	104%	70%	130%
Total Chromium	3457151		<0.020	<0.020	NA	< 0.020	103%	70%	130%	101%	80%	120%	104%	70%	130%
Chromium VI	3450552		<0.002	<0.002	NA	< 0.002	101%	70%	130%	104%	80%	120%	105%	70%	130%
Total Copper	3457151		<0.015	<0.015	NA	< 0.015	100%	70%	130%	102%	80%	120%	103%	70%	130%
Total Lead	3457151		<0.020	<0.020	NA	< 0.020	105%	70%	130%	101%	80%	120%	101%	70%	130%
Total Manganese	3457151		0.026	0.025	NA	< 0.020	102%	70%	130%	103%	80%	120%	105%	70%	130%
Total Mercury	3454725		<0.0002	<0.0002	NA	< 0.0002	100%	70%	130%	93%	80%	120%	89%	70%	130%
Total Nickel	3457151		<0.015	<0.015	NA	< 0.015	102%	70%	130%	100%	80%	120%	103%	70%	130%
Total Selenium	3457151		<0.010	<0.010	NA	< 0.002	104%	70%	130%	114%	80%	120%	111%	70%	130%
Total Silver	3457151		<0.020	<0.020	NA	< 0.020	98%	70%	130%	100%	80%	120%	103%	70%	130%
Total Zinc	3457151		0.033	0.032	NA	< 0.020	104%	70%	130%	103%	80%	120%	106%	70%	130%
BOD5															
Biochemical Oxygen Demand, Total	3456185		824	815	1.1%	< 2	84%	70%	130%						

Comments: NA signifies Not Applicable.
Duplicate NA: results are under 5X the RDL and will not be calculated.

Certified By:



AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation. RPDs calculated using raw data. The RPD may not be reflective of duplicate values shown, due to rounding of final results.

Results relate only to the items tested. Results apply to samples as received.

AGAT Laboratories

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http://www.agatlabs.com

QC Exceedance

CLIENT NAME: LANDTEK LTD.

AGAT WORK ORDER: 22H856665

PROJECT: 21463

ATTENTION TO: Henry Erebor

RPT Date:		REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Sample Id	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
			Lower	Upper		Lower	Upper		Lower	Upper
Nonylphenol and Nonylphenol Ethoxylates (Ontario, mg/L)										
NP1EO	3456337	NA	60%	140%	49%	60%	140%	NA	60%	140%

Comments: Blank spike: More than 90% of the elements met acceptance limits and overall data quality is acceptable for use. For a multi-element scan up to 10% of analytes may exceed the quoted limits by up to 10% absolute.

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Method Summary

CLIENT NAME: LANDTEK LTD.

AGAT WORK ORDER: 22H856665

PROJECT: 21463

ATTENTION TO: Henry Erebor

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Microbiology Analysis			
Escherichia coli	MIC-93-7010	EPA 1604	Membrane Filtration

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Method Summary

CLIENT NAME: LANDTEK LTD.

AGAT WORK ORDER: 22H856665

PROJECT: 21463

ATTENTION TO: Henry Erebor

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Methylene Chloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
trans-1,3-Dichloropropylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
cis- 1,2-Dichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Chloroform	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Benzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Toluene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Xylenes (Total)	VOL-91-5001	modified from EPA 5030B & EPA 8260D	CALCULATION
Toluene-d8	VOL-91- 5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91- 5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
PCBs	ORG-91-5112	modified from EPA SW-846 3510C & 8082A	GC/ECD
Decachlorobiphenyl	ORG-91-5112	modified from EPA SW846 3510C & 8082A	GC/ECD
Pentachlorophenol	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Di-n-butyl phthalate	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
3,3'-Dichlorobenzidine	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Bis(2-Ethylhexyl)phthalate	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Acenaphthene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Acenaphthylene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Anthracene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Benzo(a)anthracene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS

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Method Summary

CLIENT NAME: LANDTEK LTD.

AGAT WORK ORDER: 22H856665

PROJECT: 21463

ATTENTION TO: Henry Erebor

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Benzo(a)pyrene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Benzo(b)fluoranthene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Benzo(ghi)perylene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Benzo(k)fluoranthene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Chrysene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Dibenzo(a,h)anthracene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Fluoranthene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Fluorene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Naphthalene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Phenanthrene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Pyrene	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Total PAHs	ORG-91-5114	modified from EPA 3510C and EPA 8270E	CALCULATION
2,4,6-Tribromophenol	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
2-Fluorophenol	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Chrysene-d12	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
phenol-d6 surrogate	ORG-91-5114	modified from EPA 3510C and EPA 8270E	GC/MS
Ultra Trace Analysis			
Total Nonylphenol	TOX-151-19003F	ASTM D7065-6	LCMSMS
NP1EO	TOX-151-19003F	ASTM D7065-6	LCMSMS
NP2EO	TOX-151-19003F	ASTM D7065-6	LCMSMS
Total Nonylphenol Ethoxylates	TOX-19003F	ASTM D7065-6	LCMSMS

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Method Summary

CLIENT NAME: LANDTEK LTD.

AGAT WORK ORDER: 22H856665

PROJECT: 21463

ATTENTION TO: Henry Erebor

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Biochemical Oxygen Demand, Total	INOR-121-6023	SM 5210 B	INCUBATOR
pH	INOR-93-6000	modified from SM 4500-H+ B	PC TITRATE
Total Suspended Solids	INOR-93-6028	modified from EPA 1684,ON MOECC E3139,SM 2540C,D	BALANCE
Total Cyanide	INOR-93-6051	modified from MOECC E3015; SM 4500-CN- A, B, & C	TECHNICON AUTO ANALYZER
Phenols	INOR-93-6072	modified from SM 5530 D	LACHAT FIA
Total Phosphorus	INOR-93-6022	modified from SM 4500-P B and SM 4500-P E	SPECTROPHOTOMETER
Total Arsenic	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cadmium	MET -93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Chromium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Chromium VI	INOR-93-6073	modified from SM 3500-CR B	LACHAT FIA
Total Copper	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Lead	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Manganese	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Mercury	MET-93-6100	modified from EPA 245.2 and SM 3112 B	CVAAS
Total Nickel	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Selenium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Silver	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Zinc	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS

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Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 22H856665

Cooler Quantity: 3 LG COOLERS

Arrival Temperatures: 4.3 | 4.2 | 4.1
3.8 | 2.9 | 3.5

Custody Seal Intact: ☐ Yes ☐ No ☐ N/A

Notes: ICE PKS

Report Information:

Company: LANDTEK LIMITED
Contact: HENRY EREBOR
Address: 209 NEBO RD.
HAMILTON, ON
Phone: 289-880-3992 Fax:
Reports to be sent to:
1. Email: henry@landtek.ca
2. Email:

Regulatory Requirements:

(Please check all applicable boxes)

☐ Regulation 153/04
Table ___ (Indicate One)
☐ Ind/Com
☐ Res/Park
☐ Agriculture
Soil Texture (Check One)
☐ Coarse
☐ Fine

☐ Excess Soils R406
Table ___ (Indicate One)

☐ Regulation 558

☐ CCME

☑ Sewer Use ☐ Sanitary ☑ Storm
___ (Region)

☐ Prov. Water Quality Objectives (PWQO)

☑ Other BURLINGTON (Indicate One)

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
*TAT is exclusive of weekends and statutory holidays

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: 21463
Site Location: 1140 COOKE BLVD. BURLINGTON
Sampled By: JIN
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Invoice Information:

Bill To Same: Yes ☑ No ☐

Company:
Contact:
Address:
Email:

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC (Y/N)	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs, Analyze F4G if required ☐ Yes ☐ No	O. Reg 153: PAHs	O. Reg 153: PCBs	O. Reg 153: VOC	O. Reg 558: Landfill Disposal Characterization TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	O. Reg 406: Excess Soils SPLP Rainwater Leach SPLP: ☐ Metals ☐ VOCs ☐ SVOCs	O. Reg 406: Excess Soils Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Salt - EC/SAR	BURLINGTON STORM	Potentially Hazardous or High Concentration (Y/N)
MW1	24-Jan-22	AM/PM		Water													X	
~~MW2S~~	~~✓~~	~~AM/PM~~		~~✓~~	NOT ENOUGH Water												~~X~~	
MW 2D	✓	AM/PM		✓													X	
MW 3	✓	AM/PM		✓													X	
		AM/PM																
		AM/PM																
		AM/PM																
		AM/PM																
		AM/PM																
		AM/PM																
		AM/PM																

Samples Relinquished By (Print Name and Sign): JINSUKO	Date: 2022.1.24	Time: PM	Samples Received By (Print Name and Sign): DTARC	Date: 1/24/22	Time: 4:20PM
Samples Relinquished By (Print Name and Sign): DTARC	Date: Jan25/22	Time: 3pm	Samples Received By (Print Name and Sign):	Date: 01/25/22	Time: 3:05PM
Samples Relinquished By (Print Name and Sign):	Date: 01/25/22	Time: 4 PM	Samples Received By (Print Name and Sign):	Date:	Time:

Page 1 of 1

N°: T 12677

Document ID: DW-78-[illegible]-021

Pink Copy - Client | Yellow Copy - AGAT | White Copy- AGAT

AGAT Laboratories

Sample Temperature Log

Client: LANDTEC LTD.

Work Order #: _____

Arrival Temperatures - Branch/Driver

Cooler #1:	4.3	4.2	4.1
Cooler #2:	3.9	4.0	4.1
Cooler #3:	3.8	3.0	2.7
Cooler #4:			
Cooler #5:			
Cooler #6:			
Cooler #7:			
Cooler #8			
Cooler #9:			
Cooler #10:			

IR Gun ID: Stan John

Taken By: 01/25/22 3:05PM

Date (mm/dd/yy): _____ Time: _____ AM / PM

Arrival Temperatures - Laboratory

Cooler #1:	3.8	2.9	3.5
Cooler #2:	3.5	3.7	3.9
Cooler #3:	3.3	2.5	2.3
Cooler #4:			
Cooler #5:			
Cooler #6:			
Cooler #7:			
Cooler #8			
Cooler #9:			
Cooler #10:			

IR Gun ID: _____

Taken By: Stan John

Date (mm/dd/yy): 01/25/22 Time: 4PM AM / PM

2nd

Document ID: SR-78-9511.001
Date Issued: February 24, 2015

Page: _____

APPENDIX F

DEWATERING ASSUMPTIONS AND CALCULATIONS – BASEMENT PARKING LEVELS

Table 1 – Basement Parking Levels Excavation Dewatering Calculations

$$Q = \pi K (H^2 - h_w^2)/\ln (R_o/r_e)$$

Equation 1: The potential groundwater flow rate to the excavation for the proposed development was estimated using the dewatering equation for a fully penetrated well of unconfined aquifer fed by circular source (Powers, et al., 2007).

Where: Q = pumping rate (m^3/s)
K = hydraulic conductivity (m/s)
H = saturated thickness of the aquifer before dewatering (m)
h_w = saturated thickness of the aquifer after dewatering (m)
R = radius of cone of depression (m)
r_e = radius of well or effective radius (m)
C = 3000

R = C*(H – h)*√(K) Radius of Influence - Sichardt's equation

r_e = √(L * B)/π (applies when a/b>1.5 and R0 << rs)

r_e = (L + B)/π (applies when a/b<1.5 and R0 >>rs)

Area of Parking Levels: 9,500 m^2 (~ 100 m x 95 m)

Basement	H (m)	h_w (m)	R (m)	r_e (m)	Q m3/s	Q L/day	Q (1.3 FS) L/day	Q L/s
	16.4	1.9	8.6 (~9.0)	55	2.254 x 10-3	19,475	25,318	0.29

Assumptions for hydrogeological setting:

1. An unconfined composite aquifer is assumed to exist locally with a seasonal high groundwater table of 0.30 mbgs and extending to an estimated depth of approximately 20.0 mbgl.
2. An ideal aquifer is assumed for the preliminary calculations of pumping rates and drawdown, as described by Powers, et al., 2007).
3. The maximum excavation dewatering depth of construction activities is assumed to be 18.1 mbgl (0.5 m below bade of Excavation).
4. It is assumed that as a requirement of the proposed construction activities the excavation will be pumped dry.
5. The hydraulic conductivity values for the composite aquifer beneath the site was determined to be 3.98 x 10^{-8} m/s