LRL
ENGINEERING | INGÉNIERIE

May 13, 2026

Our File Ref.: 240374

Blackstone Granite
1914 Merivale Road Unit 7,
Nepean, Ontario K2G 1E8

Attention: Mostafa Ghafari

Subject: Hydrogeological Assessment & Terrain Analysis –
Proposed Warehouse Development
561 Somme Street, Ottawa, Ontario

Dear Mr. Ghafari,

LRL Engineering (LRL) was retained by Blackstone Granite to complete a Hydrogeological Assessment & Terrain Analysis for the property located at 561 Somme Street in Ottawa, Ontario in support of the proposed site development. It is anticipated that one (1) approximately 2,800 m², two-storey retail granite showroom and warehouse facility will be developed on the subject property, in addition to corresponding asphalt parking and circulation area and related components. The proposed development will be serviced by a private water supply well and sewage disposal system.

The assessment was carried out to determine if the proposed development can be adequately and safely supplied with potable water according to the Ontario Drinking Water Standards (ODWS) and *Procedure D-5-5 Technical Guideline for Private Wells: Water Supply Assessment (August 1996)*; and that the proposed development can be serviced with a private septic system. The assessment was also intended to confirm that the construction of the supply well, and proposed construction activities, will be such as to minimize impairment to the regional aquifer and that it meets the current Ontario Regulation 903 requirements.

The assessment was conducted according to Ontario Ministry of the Environment, Conservation and Parks (MECP) "*Hydrogeological Technical Information Requirements for Land Development Applications*" (April 1995), which include the following guidelines and procedures:

- Guideline D-5 Planning for Sewage and Water Services (August 1996);
- Procedure D-5-4 Technical Guideline for Individual On-site Sewage Systems: Water Quality Impact Risk Assessment (August 1996); and
- Procedure D-5-5 Technical Guideline for Private Wells: Water Supply Assessment (August 1996).

The City of Ottawa Hydrogeological and Terrain Analysis Guidelines, March 2021, was also referenced to support the completion of this study.

The assessment involved a desktop review of available information on the geology and hydrogeology of the site and adjacent lands, supply aquifer demand evaluations and water quality sampling and analysis. Multiple studies have been completed historically for the industrial subdivision which the Site is part of, which are referenced in this report. It should be noted that from this point forward, references to TW1 and TW2 pertain only to the newly installed on-site wells completed as part of the current investigation, unless clearly indicated otherwise.

Based on our review of available information, and results of our field investigations, it is determined that the proposed warehouse development can be supplied with a sufficient quantity of water, which is considered treatable with advanced treatment options, as well as that the site conditions are suitable for an on-site sewage disposal system. Although advanced treatment of the sewage is required to ensure safe levels of nitrates are maintained in the received groundwater at the property limits.

1 SCOPE OF INVESTIGATION

LRL was retained by Blackstone Granite to complete a Hydrogeological Assessment & Terrain Analysis for the property located at 561 Somme Street, Ottawa, Ontario (herein referred to as the 'Site'). This assessment was requested in support of the proposed development of the Site, and associated application submission to the City of Ottawa. It is understood that one (1) approximately 2,800 m², two-story retail granite showroom and warehouse facility will be developed on the subject property, in addition to corresponding asphalt parking and circulation area and related components. Further details pertaining to the anticipated development are included in Section 4.

LRLs scope for this investigation was in general accordance with current applicable provincial guidelines, in addition to the City of Ottawa Hydrogeological and Terrain Analysis Guideline, dated March 2021. Prior to the initiation of the scope of this investigation, a virtual pre-consultation meeting was held with the Hydrogeologist of the City of Ottawa on August 16, 2024. The meeting was requested by LRL to review the project with the technical review from the City of Ottawa, discuss the possible concerns related to the natural features of the area, and how this can be addressed through the pumping test of the supply well.

On October 31, 2025, LRL submitted a work plan, *Hydrogeological Assessment & Terrain Analysis Additional Efforts – Work Plan Proposal (City of Ottawa File No. PC2024-0203),* to the City of Ottawa, which outlined modified proposed efforts to be completed as part of the Hydrogeological Assessment & Terrain Analysis in support of the proposed development on the Site.

LRLs scope for this Hydrogeological Assessment & Terrain Analysis was generally as follows:

- Conduct a search of available well information for neighbouring properties through the MECP water well records database;
- Perform a desk top review of available geological maps and local well records to obtain information pertaining to the quantity supply aquifer of the subject Site;
- Review available previously prepared Hydrogeological Investigation and Terrain Evaluation report, March 1994, completed for the proposed rural industrial subdivision; and Hydrogeological Investigation Terrain Analysis and Impact Assessment report, September 2011, completed to support the Hawthorne Industrial Park – Phase 2;
- Provide guidance with respect to the best suited supply well location with respect to

known proposed, and existing features, as well as geological and hydrology Site characteristics;

- As part of the installation of the test well on the Site, complete a grouting inspection to verify the installation corresponds to applicable requirements and regulations (Ontario Regulation 903);
- Return to the Site in advance of future hydrogeological assessment work to install a water level data logger in the newly constructed test well to allow for analysis of natural aquifer fluctuations and influence;
- Conduct one (1) – eight (8) hour pumping test on the newly constructed test well on the Site by using a submersible pump, powered by a portable generator.
    - Manual water levels were collected from the supply well during the pumping test to analyse the hydrogeological characteristics of the aquifer on-Site;
    - Collect and submit water samples from the supply well periodically during the pumping test, four (4)-hours and eight (8)-hours of pumping, for laboratory analysis under the subdivision package, volatile organic compounds, trace metals, free cyanide, PCB, polycyclic aromatic hydrocarbons, and petroleum hydrocarbons; and
    - Following the pumping test, record water levels for up to 24 hours or until 95% recovery has occurred.
- Compare the laboratory analysis results, from the supply well, to the applicable Ontario Drinking Water Standard (ODWS) and MECP D-5-5 Maximum Concentration Considered Reasonably Treatable (MCCRT);
- Compile relevant sub-surface details related to the underlying subsurface conditions through review of the findings of a geotechnical investigation field study prepared by others in support of this proposed development; and
- Prepare a summary regarding the quality and the quantity of the supply aquifer and comparison to D-5-5 compliance requirements set forth by the City of Ottawa Technical Reviewer. Summarize the findings to confirm that the property size and soil conditions are suitable to attenuate the impacts of the septic system effluent.

2 PREVIOUS HYDROGEOLOGICAL ASSESSMENT, 2008

In support of the proposed industrial park subdivision which the Site is located within, a Hydrogeological Assessment report was prepared by Golder Associates, for R.W. Tomlinson Limited, dated December 2008. A copy of this report was provided to LRL by the City of Ottawa in support of this assessment to provide details on the overall previously encountered groundwater quality and confirm the best suited supply aquifer for the proposed warehouse development on the Site.

The scope of the assessment by Golder Associates included the construction of three (3) test wells across the property, and inclusion of two (2) existing test wells, to perform aquifer pumping tests, and monitor the influence between shallower groundwater intercepted test wells, and deeper bedrock intercepted test wells. Test pits were also advanced to assess the overburden conditions, and to prepare an impact assessment with respect to potential down-gradient receptors of proposed septic systems. The report references two (2) historical studies, prepared in 1994 and in 2008 in support of the proposed subdivision development.

The previous 1994 assessment included the advancement of three (3) test wells, as follows:

- The TW1, was constructed through a layer of fill material, being approximately 3.0 m in thickness, followed by glacial till to a total depth of approximately 5.0 m, where bedrock was encountered. The TW1 extended in the lower March formation, or upper Nepean formation to a total depth of 41.2 m below grade. The casing was 9.4 m in length, and the well was reported to yield between 68 and 91 L/minute. The water quality was not evaluated from TW1 as a result of concerns raised due to the likelihood of the well being affected by material placed in its vicinity, and the well was decommissioned;
- Test well TW-2 encountered approximately 8.0 m of overburden, consisting of sand with stones and till, at which depth bedrock was encountered. The bedrock was sandstone. The well was constructed with 11.9 m of casing, and continued to a total depth of 30.5 m below grade. The well was reported to have an estimated yield of 91 L/minute; and
- Test well TW3 encountered sandstone bedrock at surface, and the well extended a total depth of 30.5 m. A length of 6.7 m was used to construct the well, and the installation was recorded to have a yield of 23 L/minute.

In 2008, an additional three (3) test wells were installed in the subject subdivision footprint, and included:

- Test Well TW4 which encountered sandy clay overburden to a depth of 3.96 m below grade, at which depth bedrock was encountered. The well continued to 29.86 m into bedrock, which was described as sandstone. A length of 13.1 m of casing was used to construct the installation, and the well was reported to yield 36.4 L/minute;
- Test Well TW5 encountered fill material to a depth of 1.2 metres, followed by sand with stone to 4.0 m below grade, at which depth sandstone bedrock was encountered. The well extended into bedrock to an overall depth of 29.8 m below grade. The well was equipped with 12.8 m of casing, and the well was reported to be able to produce a yield of 45.5 L/minute; and
- Test Well TW6 encountered a layer of clay from ground surface to approximately 9.1 m below grade, at which depth bedrock was encountered. Bedrock was described as shale, with limestone at a depth of 42.6 m. The well extended a total depth of 83.2 m below grade, with 17.6 m of casing used the upper portion of the installation. The well was estimated to yield 13.6 L/minute.

A pumping test was completed on each of the six (6) test wells to establish the hydraulic characteristics of the corresponding aquifers, and to facilitate the collection of water samples to establish the quality of the proposed supply aquifer, with respect to applicable provincial regulations.

Overall, the report prepared by others concluded two (2) water bearing units were encountered, with the initial one being within the overburden and shallow bedrock, and the second being the deeper bedrock aquifer. The overburden and shallow bedrock aquifer were not considered appropriate for water supply purposes. Rather, it was recommended that the deeper bedrock aquifer, which was found to be hydraulically isolated from the shallow water bearing unit, is better suited for a supply source.

The report recommended that:

- *"All water supply wells on this property must be constructed in accordance with Regulation 903 under the Ontario Water Resources Act. In addition to the legislated requirements, the following well construction methodology should be employed when constructing wells on the proposed industrial subdivision:*
    - *All wells should be constructed with two (2) lengths of casing (approximately 12 metres) or with casing extending a minimum of one metre into competent bedrock, whichever is greater;*
    - *The casing should be sealed in accordance with Regulation 903. If Portland cement is used to seal the casing, the grout should be allowed to cure for a minimum of 72 hours before drilling continues. If high early strength cement is used, the curing time can be reduced to 24 hours.*

Based on the groundwater quality data collected from the test wells advanced, it was reported that the water quality was considered acceptable for the proposed development. Iron, manganese and total dissolved solids were found to exceed the applicable Ontario Drinking Water Standards, aesthetic objectives, although it was indicated that treatment is available.

The water quality in TW3 was noted to be vary different from the remaining wells tested, with most of the inorganic parameters analysed being elevated. The quality encountered in TW3 was attributed to possible impacts from infiltrations into the installation, as the well was missing a cover at the time of the assessment. As the conditions of TW3 were questionable, TW5 was installed to replace it. The report describes the quality from TW5 as meeting the provincial water quality guidelines for health-related parameters, as well as aesthetic parameters, with the exception of iron and manganese, although considered to be within the ranged deemed treatable. TW4 was reported to have comparable results with exceedances to iron, manganese and total dissolved solids.

TW6 was reported to have distinctly different water quality, with exceedances health related parameters limited to fluoride and exceedances to the aesthetic objectives were encountered for iron, sodium and total dissolved solids.

It was noted that in 1974 -1975, a property located approximately 1.3 km west of the subdivision developed experienced a release of arsenic. The analysis of arsenic was included in the assessment, along with organic parameters to address potential presence of petroleum-based parameters. Historically, polycyclic aromatic hydrocarbons (PAH) were detected in overburden groundwater collected in the area, which exceeded the applicable limits at the time for drinking water. PAH were included in the analysis. These additional parameters were not detected in the proposed supply aquifer.

3 SITE AND AREA DESCRIPTION

The majority of the Site is undeveloped and covered with a granular fill. The eastern portion of the Site, and southern extent of the Site, is covered with overgrown vegetation (shrubs and grasses). There are presently no permit structures or buildings, other than a previously constructed test well (TW1) constructed in support of this assessment in November 2024 although is to be decommissioned as discussed below; and the more recently constructed proposed supply well (TW2) completed in March 2026. Previously constructed groundwater monitoring well structures are also present across the Site, and it is assumed that they will be decommissioned in accordance with Ontario Regulation 153/04 prior to Site development.

The Site is set in a rural industrial park with the neighbouring property to the west being developed with a landscape stonework supplier warehouse and retailer (Techo-Bloc); north is an auto salvage and storage yard facility (Cash for Cars) and automotive auctioneer (Copart – Ottawa); south is operated as a mineral extraction facility (Quarry); and east is undeveloped – vacant land. The Site is legally described as Part Block 2 Plan 4M1388, Gloucester, Parts 1 & 2 4R35791, City of Ottawa, Ontario.

The Site is located approximately 930 m southeast of the Rideau Road and Hawthorne Road intersection, within the Hawthorne Industrial Park as presented in **Figure 1**. The Site is a rectangular shape, with a total area of approximately 16,190 m² or 1.62 hectare as shown in **Figure 2**. Historically, as of at least the mid 1970's according to available aerial imagery retrieved through the City of Ottawa interactive mapping system (geoOttawa), the Site was vacant and undeveloped. The Site remains in these conditions' present day, although in the early 2000's (2002), fill material was introduced to the Site. Neighbouring lands, to the east remain vacant and covered with overgrown vegetation. The remaining neighbouring properties are developed with industrial or commercial use operations as mentioned above.

The Site is zoned as Rural Heavy Industrial Zone (RH), according to the City of Ottawa interactive mapping system (geoOttawa) which permits the development of warehouse, as proposed. The following provisions, although not limited to, must be noted for development, as set out by the City of Ottawa Rural Heavy Industrial Zone By-Law:

- Minimum Lot Width of 50 m;
- Minimum Lot Area of 8,000 m²;
- Minimum Front Yard Setback of 15 m;
- Minimum Rear Yard Setback of 15 m;
- Minimum Corner Side Yard Setback of 15 m;
- Maximum Lot Coverage of 50%; and
- Maximum Principal Building Height of 15 m.

Municipal water supply and sanitary services are not available for the Site. Select neighbouring lands are equipped with private water supply wells, and sewage disposal systems. The potable groundwater is found in the sandstone bedrock layer, at depths between 29.8 m and 48.4 m below ground surface (bgs). Further discussion pertaining to the neighbouring supply wells are provided in Section 3.9.

3.1 Topography

The topography of the Site and vicinity are generally flat, with a steep slope along the southern extent of the property, which descends towards an unnamed stream. The topography of the majority of the Site ranges between 90.2 to 91.6 m above mean sea level (amsl) according to the Topographic Survey plan prepared to support the proposed development of the Site, completed by Farley, Smith & Denis Surveying Ltd. 2024. The top of the slope along the southern extent of the Site ranges between 91.1 and 91.5 m amsl, with the base of the slope being 83.8 and 85.6 m amsl.

The Topographic Survey plan, field work completed on April 26th, 2024, and included in **Attachment A**.

3.2 Existing Development Features

The Site is generally undeveloped, although a granular fill base has been applied across the majority of the surface in the early 2000's. Additionally, a test well / supply well has been completed in support of this assessment and is located at the approximate northeastern portion of the property. Further discussion relating to the test well is provided in later sections of this report. Groundwater monitoring wells, apparent by the protective casing extending above grade, are present across the property. The wells were installed by others and discussed further in the Phase I Environmental Site Assessment prepared by Paterson Group, September 2024.

3.3 Aerial Imagery

Aerial imagery was access through the City of Ottawa on-line interactive mapping portal, geoOttawa. The available historical imagery for the Site dates back to the mid 1970's (1976). A summary of the aerial imagery, with respect to the Site, and the neighbouring lands, is as follows:

Aerial Image (Year)	Description of Observations
1976	The Site and neighbouring lands appear to be forested. Somme Street is not developed.
2008	Generally, no significant changes to the observations made in 1976, however agricultural lands are noted to the far east of the Site, and the mineral aggregate extraction operations (Quarry) to the southwest and to the far northwest of the Site appear underway.
2011	Generally, no significant changes to the observations made in 2008, however the adjacent properties to the west, and north following Somme Street, appear cleared and Somme Street is developed.
2017	The Site appears to be cleared in the 2017 aerial imagery, in addition to the adjacent property to the east. No additional significant changes to the neighbouring lands are observed.
2021	The Site appears to be used for the storage of unknown materials. They appear to be placed in linear clusters across the west and central area of the Site. No additional significant changes to the neighbouring lands are observed.
2022	The adjacent property appears to be developed in 2022, comparable to the features observed at the time this assessment was prepared. The Site remains undeveloped.

3.4 Neighbouring Properties and Land Uses

According to the City of Ottawa's Zoning information, available through the City of Ottawa's on-line interactive mapping portal, geoOttawa, the neighbouring lands are zoned as Rural Heavy Industrial Zone (RH).

The neighbouring land uses generally include the following:

- North: Industrial - An auto salvage and storage yard facility (Cash for Cars) and automotive auctioneer (Copart – Ottawa);
- South: Mineral Aggregate Extraction Operation - Quarry;
- East: Undeveloped – vacant; and
- West Industrial - Landscape stonework supplier warehouse and retailer (Techo-Bloc)

3.5 Hydrology

The topography of the Site and vicinity are generally flat, with a steep slope along the southern extent of the Site, which descends towards an unnamed stream. The topography of the majority of the Site ranges between 90.2 to 91.6 m above mean sea level (amsl) according to the Topographic Survey plan prepared to support the proposed development of the Site, completed by Farley, Smith & Denis Surveying Ltd. 2024. The top of the slope along the southern extent of the Site ranges between 91.1 and 91.5 m amsl, with the base of the slope being 83.8 and 85.6 m amsl. A municipal ditch is presented along the northern extent of the Site.

Using the available features of the interactive mapping tool, *The Atlas of Canada – Toporama*, it appears that the local groundwater flow direction is east to southeast towards the North Castor River, approximately 2.3 km to the southeast of the Site. The unnamed stream along the southern extent of the Site flows in an easterly direction.

According to a Draft Wetland Delineation Report for 561 Somme Street, Ottawa[1] dated July 23, 2024, and prepared by others, a wetland has been identified along the southern portion of the Site, although, it was understood by the author that the City of Ottawa and the South Nation Conservation Authority wetland mappings are out of date for the subject Site, and it was requested by Blackstone Granite to conduct an investigation required to update the information accordingly, in support of the proposed Site development, and respective constraints. A Site visit was completed by the qualified party on July 9, 2024, to assess the Site conditions, and to delineate the wetland extents through observations to Site features. The report details that the wetland boundary is approximately 15 m from the top of the slope. The report further recommends that future development on the Site, anticipated to occur on the existing gravel pad, which maintains a 15 m setback from the identified wetland limits, is considered sufficient to protect the natural feature. The report provides mitigation measures to be executed to reduce the possibility of impairment to the wetland during Site preparation and construction, which are summarized as follows:

- Design and implement erosion and sediment (ESC) controls to contain/isolate the construction zone, manage site drainage/runoff and prevent erosion of exposed soils and fill and migration of sediment;
- Regularly inspecting and maintaining ESC measures during all phases of the project;
- Developing a response plan to be implemented immediately in the event of the spill of a deleterious substance;

[1] Wetland Delineation for 561 Somme Street, Ottawa, prepared by Kilgour & Associates Ltd., July 23, 2024.

- Keeping an emergency spill kit on the Site;
- Stopping work and containing deleterious substances to prevent dispersal;
- Reporting any spills of sewage, oil, fuel, or other deleterious material whether near or directly into a surface water feature; and
- Fuel storage and refueling of machinery should occur > 30 m from surface water features both during and after site construction.

3.6 Natural Heritage Features

Based on available databases and records reviewed, the following with respect to Natural Heritage Features, are revealed for the Site:

- The Site is not part of a provincial park or conservation area;
- The Site is not within any Areas of Natural and Scientific Interest (ANSI) identified by the Ministry of Natural Resources (MNR) as having provincial significance;
- The Site does not include any area designated as environmental significant in municipal official plans;
- The Site does not include any area designated as an escarpment natural area by Niagara Escarpment Plan;
- The Site does not include any area which is a habitat of endangered species;
- The Site does not include any Oak Ridges Moraine Conservation area; and,
- The Site does not include any area designated as a wilderness area.

In conjunction with Section 3.5, which discusses the presence of a Wetland along the southern portion of the Site, according to the MNR Land Information Ontario Topographic Mapping Tool, a provincially significant wetland is present at the southeastern extent of the Site, and continues onto the property to the east, and southeast, in addition to across an area of the land to the north, following Somme Street. The approximate extents of the mapped wetland, as presented by the MNR, is included in **Figure 3**.

3.7 Environmental Conditions and Sources of Potential Contamination

3.7.1 Previously Prepared Reports

3.7.1.1 Phase One Environmental Site Assessment (Paterson Group, September 2024)

Paterson Group was retained by Blackstone Granite to complete a Phase I Environmental Site Assessment (ESA) of the subject Site, 561 Somme Street, Ottawa, Ontario. The Phase I ESA was completed to review the past and present uses of the Site and study area, and to identify potential environmental concerns associated with the findings.

The findings of the Phase I ESA indicated that the Site has never been developed with a permanent structure. It was reported that in the late 2010s, the Site was used as material storage, although the type of material was not confirmed. The neighbouring lands, within 250 m radius of the Site, were found to historically be vacant or used for agricultural purposes until more development of commercial operations. The report concludes that based on the findings, no historical Potentially Contaminating Activities were identified on the surrounding properties.

A previously prepared Phase I ESA was referenced in the report. It was indicated that at the time of the previous Phase I ESA study, 2008, the present-day fill was deposited on the Site. A Phase II ESA was previously completed on the Site, in 2020, which addressed the quality of the

fill material across the Site. It was reported that the soil and groundwater across the Site, at the time of the previous Phase II ESA, meet the appliable Site Condition Standard.

No concerns were identified with the current use of the surrounding properties. Paterson concluded that based on the results of the Phase I ESA, a Phase II Environmental Site Assessment was not required for the Site.

3.7.2 Potential Sources of Contamination

It is understood that the Phase I ESA completed by others, with reference to additional previous environmental investigations, did not identify potential environmental concern, or contaminating activities in the vicinity of the Site or on the Site. As part of this Hydrogeological Assessment, it was found that select operations (past and present) have been identified in the area of the Site, which according to LRL are considered a potential environmental concern and may have an impact on the proposed supply aquifer groundwater quality.

Although based on the anticipated east, to southeast, groundwater flow direction, select activities have been excluded from the potential contamination rationale. A summary of these findings is included below. These are limited to aerial imagery reviewed, and findings of the available assessments completed by others. LRL was not mandated to conduct an investigation to further address these identified concerns or further confirm the finding of work completed by others. Identification of the potential sources of contamination will be used during the hydrogeological assessment to confirm that contaminates of concern which may impair the proposed supply aquifer are addressed.

It should be noted that during borehole advancement, as part of a geotechnical investigation completed by others, discussed below in Section 3.8.3, buried asphalt was encountered. Although the risks associated with asphalt placed over surfaces as part of general infrastructure is considered negligible, but when buried, the risk is considered elevated for leaching into underlying soils or groundwater. Groundwater was generally not encountered in the overburden above the bedrock across the Site, based on the findings of the geotechnical investigation, therefore the potential risk for impairment to drinking water supply sources, is considered low but should be overlooked.

The review revealed the following potential sources of contamination, and the corresponding PCA as set out by Ontario Regulation 153/04.

O. Reg 153/04 Schedule D PCA	Location of PCA	Description and Source Information	Contribution to an APEC
PCA 58: Waste Disposal and Waste Management, including thermal treatment, landfilling and transfer of waste, other than use of biosoils as soil conditioners	On-Site	According to geoOttawa, the Site, and the neighbouring lands are identified as being within a formal landfill property with an identification number of GI-03. The Phase I ESA identified is as being reported as an error, based on the 2008 previous phase I ESA completed. LRL has reached out to the City of Ottawa for confirmation. On January 29, 2025, the City provided a response to LRL that read "*The landfill you have inquired about is a private un-named site located on*	The PCA is located on the Site and is therefore considered a high risk for potential environmental concern for metals, PHC, VOC, PAH parameters.

O. Reg 153/04 Schedule D PCA	Location of PCA	Description and Source Information	Contribution to an APEC
		Hawthorne Road in Lot 25, Concession 6, Gloucester Township. City records indicate that the site received what appeared to be mostly construction waste, and was located on private property with no records of municipal involvement."	
PCA 58: Waste Disposal and Waste Management, including thermal treatment, landfilling and transfer of waste, other than use of biosoils as soil conditioners	770 m southwest of the Site.	The 1991 Ontario Ministry of the Environment's waste disposal inventory reveals a closed disposal site at a location identified as Lot 25-26, Concession 6, Gloucester Township. This is in the vicinity of the Site. Listed as being closed in 1981, and classified as A3, an inactive facility.	The PCA is located trans-gradient of the Site and is therefore considered a low risk for potential environmental concern for metals parameters.
PCA 30: Importation of Fill Materials of Unknown Quality	On-Site	Identified through aerial imagery and confirmed by the interview with the Site owner. According to the Phase I ESA prepared by others, 2024, a Phase II ESA was completed in 2020 which addressed the quality of the fill material deposited on the Site. The report indicates that the quality meets the appliable Site condition standard applied. It is unclear to LRL what parameters were analyzed for and what the concentrations returned are, therefore the fill material remains a potential contaminating activity with respect to the conditions of the proposed supply aquifer.	The PCA is located on the Site and is therefore considered a high risk for potential environmental concern for metals, PHC, VOC, PAH parameters.
PCA 49: Salvage Yard, including automobile wrecking	300 Somme Street, north of the Site following Somme Street. Located up- to trans-gradient of the Site with respect to a southeasterly to east groundwater flow direction.	The use of the property as an automotive salvage and storage yard facility (Cash for Cars) and automotive auctioneer (Copart – Ottawa) presents a moderate to high risk for potential environmental concerns related to the Site.	The facility is located generally up- to trans-gradient of the Site, and does present a potential risk for environmental concern related to metals, PHC, VOC, PCB and PAH parameters.
PCA 58: Waste Disposal and Waste Management, including thermal treatment, landfilling and transfer of waste, other than use of biosoils as soil	5123 Hawthorne Road, approximately 680 m west of the Site. Located up- gradient of the Site with respect to a southeasterly to east groundwater flow direction.	Retrieved through Access Environment on-line Environmental Compliance Approvals and Permissions Database, Convertus Canada Ltd., Ottawa Composting Facility is identified as an operating 10.12 hectare waste	The facility is located generally up-gradient of the Site, and does present a potential risk for environmental concern related to metals, and overall organics and inorganic

O. Reg 153/04 Schedule D PCA	Location of PCA	Description and Source Information	Contribution to an APEC
conditioners		disposal site, issued approval in August 2022.	parameters.
PCA 40: Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications	5208 Ramsayville Road, approximately 130 m east of the Site. Located down- gradient of the Site with respect to a southeasterly to east groundwater flow direction.	Agricultural land use since at least the mid 1970's based on readily available aerial imagery.	The risk to the Site associated with this land use is conserved low, due to the inferred down-gradient location.
PCA Other: Spill	Approximately 1.3 km west of the Site.	The previously prepared Hydrogeological Assessment report for the proposed industrial subdivision, Golder Associates 2008, indicated that was noted that in 1974 -1975, a property located approximately 1.3 km west of the subdivision developed experienced a release of arsenic.	The risk to the Site associated with this land use is conserved low as at the time of the 2008 assessment, arsenic was not detected. Arsenic however is included in the overall metal scan for the water quality assurance, and its presence or detection on the Site will be confirmed as part of this investigation.
PCA Other: Historically Detected PAH impacted Shallow Groundwater	Hathorne Road Industrial Subdivision.	The previously prepared Hydrogeological Assessment report for the proposed industrial subdivision, Golder Associates 2008, indicated that polycyclic aromatic hydrocarbon impacts were historically detected in the overburden groundwater at the overall industrial subdivision site.	The risk to the Site associated with this land use is conserved low as at the time of the 2008 assessment, PAH was not detected. However, PAH was included in the potential contaminates of concern to be addressed as part of this assessment as a precautionary approach.

To confirm that the identified potential contaminating activities have not impaired the quality of the proposed supply aquifer, the corresponding contaminates of concern have been incorporated into the sampling set at the time of the hydrogeological assessment, and groundwater sample collection.

3.8 Geology & Hydrogeology

3.8.1 Geological Mapping

Surficial soil deposit mapping[2] indicates that the surficial geology of the Site, and immediate area, is found to be on the transitional area of two (2) distinct surficial conditions anticipated to include:

- Nearshore Sediments: fine to medium-grained sand, calcareous and commonly fossiliferous; nearshore sand generally occurs as a sheet or as bars or splits associated with glaciofluvial materials; or
- Paleozoic Bedrock: Limestone, dolomite, sandstone, and locally shale; relatively flat-lying; mainly occurring as bare, tabular outcrops; includes areas thinly veneered by unconsolidated Quatemary sediments up to 1 m thick.

According to available bedrock mapping[3], the bedrock on the Site is documented to be on the divide of the March Formation: Interbedded sandstone and sandy dolomite, and the Carlsbad Formation: grey shale, sandy shale, some dolomitic layers. Slightly east of the Site is documented to be the Nepean Formation: Sandstone. According to the Brunton, F.R. and Dodge, J.E.P. Karst map of Southern Ontario, including Manitoulin Island; Ontario Geological Survey, Groundwater Resource Study 5, 2008, the Site and neighbouring lands are identified as "Unknown or no observed evidence of karstification due to the character of bedrock, lack of outcrop and/or relative thickness of overburden."

3.8.2 Environmental Permissions – Permit to Take Water

The mineral aggregate extraction facility located immediately south of the Site was found, through the Access Environment database, to have three (3) issued Permit to Take Water (PTTW) applications. They are summarized as follows:

- Number 7480-655R6G, Issued to Lafarge Canada Inc., for the quarry sump located at Lot 28, Concession 6, Geographic Township of Gloucester, Ottawa, dated March 30, 2005. The permit was issued for dewatering of the quarry pond, at a maximum rate of 2,273 L/minute, for a 24-hour period, for a total daily maximum volume of 3,182,200 L/day;
- Number 1238-8XVPGL, Issued to Petersen's Turf Farms Ltd., located at Lot 28, Concession 6, Geographic Township of Gloucester, Ottawa, dated September 11, 2012. The permit was issued for agricultural use at a sod farm, collecting surface and ground water from a quarry pond, at a maximum rate of 2,730 L/minute, for a 24-hour period, for a total daily maximum volume of 3,200,000 L/day; and
- Number 5201-9UWQHE, Issued to Lafarge Canada Inc., located at Lot 28, Concession 6, Geographic Township of Gloucester, Ottawa, dated April 1, 2015. The permit was issued for dewatering, aggregate washing and other construction purposes, using quarry pond water. A breakdown of each use and maximum volumes are as follows:
    - Dewatering, with a maximum rate of 2,730 L/minute, for a 24-hour period, for a total daily maximum volume of 3,182,200 L/day;
    - Industrial Aggregate Wash, with a maximum rate of 2,730 L/minute, for a 24-hour period, for a total daily maximum volume of 3,182,200 L/day; and

[2] St-Onge, D.A., Surficial Geology, Lower Ottawa Valley, Ontario, Map 2140A, Geological Survey of Canada, 2009.
[3] Harrison, J.E., Generalized Bedrock Geology, Ottawa – Hull, Ontario and Quebec, Map 1508A, Geological Survey of Canada, 1976.

- Construction, with a maximum rate of 2,273 L/minute, for a18-hour period, for a total daily maximum volume of 500,500 L/day.

The watering taking in the area of the Site is for large quantities and exists as of 2005. According to the Hydrogeological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision, prepared by Golder Associates, December 2008, the water bearing zone for the proposed subdivision developments is encountered at depths grater than 25 m below grade within the sandstone stratum of the March/Nepean Formation. The report references a study completed historically on the nearby quarry, which revealed that maximum predicted extent of the drawdown cone, established using the mean hydraulic conductivity value, on the proposed subdivision is approximately 1 to 3 m. With reference to the location of the primary water bearing zones of the test wells constructed to the support the proposed subdivision development, the minimal predicted drawdown cone is anticipated to have negligible impacts to the proposed supply aquifer.

The report prepared by Golder Associates, 2008, further supports the unlikely impacts of the quarry operations through measuring the influence in static water levels in available groundwater monitoring wells. It was reported that water levels collected in 1993 were comparable to those collected in 2008, which was considered suitable to demonstrate that the radial influence of the water level drawdown associated with the quarry operations on neighbouring properties, over 15 years, did not result in measurable changes in the groundwater levels of the bedrock beneath the proposed subdivision.

The report prepared by Golder Associates, 2008, concludes that "*the continued development of the quarries on nearby properties is not expected to result in negative effects to water supply wells in the proposed industrial subdivision*".

3.8.3 Geotechnical Investigation (Paterson Group, October 2024):

Paterson Group[4] completed a geotechnical investigation across the Site in support of the proposed development. The intent of the investigation was to confirm the subsoil and ground water conditions on the subject property through the advancement of boreholes, and to provide recommendations with respect to design in relation to the geotechnical characteristics of the Site. The geotechnical investigation involved the advancement of four (4) boreholes on the Site on September 9th, 2024, to a maximum depth of 6.8 m below grade. Samples were collected using a split-spoon sampler, sealed into a plastic bag, and transported to the laboratory for additional analysis. Standpipes were installed in two (2) of the boreholes, and one (1) location was completed into a groundwater monitoring well, to allow for the collection, and monitoring of groundwater.

The subsurface conditions were described as Fill material, consisting of very loose to dense, brown silty sand to silty clay with gravel, cobbles and organics. Traces of concrete was observed. The fill material extended to a depth of 3.7 to 6.8 m below grade. A thin layer of organic deposits (silt) was encountered in BH1-24 and BH2-24 between 4.5 and 5.3 m below grade. Practical refusal was encountered at depths of 4.9 to 6.7 m below grade, which is anticipated to be the bedrock interface. The conditions in each respective borehole, in addition to previously advanced boreholes included in the report, are further described as follows:

[4] Geotechnical Investigation Report, Proposed Commercial Building, 561 Somme Street, Ottawa, Ontario, Paterson Group, prepared for Blackstone Granite, dated October 1, 2024.

Borehole Identification (Year of Advancement)	Subsurface Material Description (as described by others)
BH24-1 (2024)	0.0 – 4.11 m below grade, Fill : Brown silty sand with gravel, traces of clay and cobbles from 2.21 – 4.41 m. 4.11 – 4.50 m below grade, Organic Silt 4.50 – 4.88 m below grade, Silty Sand: with gravel 4.88 m below grade, refusal
BH24-2 (2024)	0.0 – 4.88 m below grade, Fill : Brown silty sand with gravel, traces of clay and topsoil from 1.07 – 2.59 m, and traces of clay and concrete between 2.59 and 4.88 m. 4.88 – 5.26 m below grade, Organic Silt 5.26 – 5.64 m below grade, Glacial Till: with gravel and shale fragment. 5.64 m below grade, refusal
BH24-3 (2024)	0.0 – 6.78 m below grade, Fill : Silty sand and gravel, traces of clay, and traces of asphalt between 2.21 and 3.35 m below grade, shale fragments between 3.35 and 4.50 m below grade. 6.78 m below grade, refusal
BH24-4 (2024)	0.0 – 0.18 m below grade, Topsoil. 0.18 – 2.31 m below grade, Fill : Silty sand with gravel, traces of organics and cobbles.
BH 3 (2019)	0.0 – 0.6 m below grade, Fill : Sandy silt with traces organics and plastic. 0.6 – 1.68 m below grade, silty sand, some gravel and pieces of asphalt. 1.68 – 3.66 m below grade, Shaley Fill. 3.66 – 4.72 m below grade, Silt: occasional sand and gravel.
B2-2 (2008)	0.0 – 1.42 m below grade, Fill : Sand, some gravel, organics.

No bedrock collection or detailed investigation was conducted has part of the geotechnical study. The report indicates that bedrock is the March Formation, consisting of interbedded sandstone and dolomite.

Groundwater levels were recorded on September 16, 2024, from the piezometers installed, and the groundwater monitoring well. The water levels were reported as being 4.68 m below grade in a select location, and the remining two (2) locations encountered dry conditions, or the installation was blocked. This would indicate that water is likely perched over the confining bedrock interface, and that an aquifer is likely not situated in the overburden layer.

3.8.4 Hydrogeologically Sensitive Areas

The Site is considered Hydrogeologically Sensitive by using the associated trigger parameters, summarized as follows:

Shallow Soil Conditions or Bedrock Outcrops

In regard to shallow soils or bedrock outcrops, a review of geological mapping and additional supporting documents, including MECP water well records, have revealed a deposit of native overburden greater than 2.0 m in thickness in the vicinity of the Site,

although surficial mapping indicates the possibility of Paleozoic bedrock at surface. Through the borehole advancement by others in support of a geotechnical investigation on the Site (further discussion included above in Section 3.8.3), the overburden on the Site was primarily comprised of Fill, previously established to have been deposited on the Site in the early 2000's.

The geotechnical investigation revealed that native organic deposits, silty sand with gravel or till, ranged between 0.7 and 1.1 m in depth, before bedrock was encountered. One (1) borehole advanced only encountered fill material over bedrock. It is likely that the Site, prior to the introduction of fill material, was considered a shallow soil property, with the possibility of bedrock outcrops based. Therefore, the Site can be considered hydrogeologically sensitive based on the shallow overburden conditions prior to the introduction of fill.

Potential Karst Topography

According to the Ontario Geological Survey, Karst study for Southern Ontario, issued in 2008, the subject area is identified to be within a region identified as:

- Unknown or no observed evidence of karstification due to the character of bedrock, lack of outcrop and/or relative thickness of overburden.

High Permeable Soils

Subsurface conditions across the Site encountered during the geotechnical investigation on the Site completed by others (further discussion included above in Section 3.8.3), generally included a layer of brown silty sand and gravel to depths of between 4.1 and 6.7 m below grade, across the Site. Underlying the fill material was a layer of organic deposits, silty sand with gravel or till, ranged between 0.7 and 1.1 m in depth, before bedrock was encountered. One (1) borehole advanced to 6.7 m below grade encountered fill material throughout, until it was terminated upon bedrock refusal.

Surficial soil deposit mapping indicates that the surficial geology, where bedrock is not encountered at surface, includes fine to medium-grained sand, calcareous and commonly fossiliferous; nearshore sand generally occurs as a sheet or as bars or splits associated with glaciofluvial materials.

Therefore, the underlying soils on the Site are not considered to be high-permeable.

Within 30 m of Surface Water

An unnamed stream is identified along the southern extent of the Site, in addition to a provincially significant wetland along the southeastern portion of the property. Since a property within 30 m of a water feature is considered hydrogeologically sensitive, therefore, based on the presence of the stream, the Site will be considered hydrogeologically sensitive.

3.9 Ontario Water Well Records

A search was conducted of the well records from the MECP Water Well Information System (WWIS) department. The search by UTM coordinates covered a 500 m radius from the Site. The search returned 14 water well records, however, several of which did not have any details available related to the construction or subsurface conditions encountered. Of the 14 water well records retrieved, seven (7) included details with respect to the well construction, and subsurface materials encountered.

Three (3) of the well records were for test / monitoring wells. Notably, for two (2) records, additional individual wells were assigned to them. More specifically, nine (9) records were

included under Well Record No. 7115790, and three (3) records were included for Well Record No. 7402444. Monitoring Well 7149254, is identified as being approximately 280 m west of the Site is advanced through 4.26 m of overburden described as soil stones (assumed sand), where bedrock was encountered. The well extended to 29.8 m below grade into the Sandstone Bedrock. The remaining monitoring wells, 7115790 and 7402444, although they include several monitoring wells in the area of the Site, the well which was considered most representative of the Site area were identified as being 350 m west, and 475 m northwest of the Site, respectively. These monitoring wells were terminated in the overburden at depths of 7.6 ad 6.1 m below grade, respectively, and the overburden encountered included Fill, Sand and Till materials.

The remaining five (5) well records retrieved were supply wells records, for commercial, domestic, industrial and public uses. The well records revealed that they were each advanced into the bedrock, to depths of between 29.9 and 48.4 m below grade. The subsurface material encountered in the remaining locations are comparable, and are summarized as follows:

- Well 7115711: Fill to 1.21 m below grade, over Sand to 3.96 m below grade, where bedrock was encountered;
- Well 7371671: Till to 4.57 m below grade, where bedrock was encountered;
- Well 7371691: Till to 1.82 m below grade, where bedrock was encountered;
- Well 7206093: Fill to 2.43 m below grade, followed by clay to 7.31 m below grade, where bedrock was encountered; and
- Well 7371679: Till to 3.96 m below grade, where bedrock was encountered.

A copy of those WWRs which included relevant details related to the hydrogeological and subsurface features are included in **Attachment B** and their approximately locations are presented in **Figure 4**.

On November 18, 2024, an earlier test well (TW1) was installed on the northeastern portion of the Site (Well Tag#A364264). The well was advanced to a depth of 24.4 m below grade. Fill material was encountered from grade to a depth of 5.2 m, where bedrock was encountered. The bedrock was described as limestone, which extended to 24.4 m, where the well was terminated. The well was advanced using air percussion, with steel casing extending 8.2 m in length. Water was indicated to have been found at 21.9 m below grade, and at the one (1) hour pump test a static water level of 7.10 m below the top of casing was measured. **This test well was not constructed in accordance with the subdivision agreement for the Hawthorne Industrial Parks requirements and will be decommissioned prior to the development of the Site to ensure that the well is not used in the future.** The well was used during the on-Site pumping test on April 20, 2026, to identify potential influence between the various water zones on the Site. This is discussed in greater detail below.

Rather, on March 20th, 2026, a new test well (TW2) was installed at the west-central portion of the Site, as shown in **Figure 2**. The new test well extended to a total depth of 39.6 m below grade. Fill material, described as a mix of sand and clay, was encountered from surface to approximately 3.0 m below grade, followed by gravel with stones to a depth of 7.6 m below grade. The gravel extended to limestone bedrock, including fractured limestone to 8.5 m below grade, becoming better quality for the remainder of the length of the installation. The well was constructed with a 12.5 m length of steel casing, sticking up above grade for an additional 0.6 m. The remaining length of well, from 12.5 to 39.6 m is open hole construction. The well construction meets the minimum requirements as set out in the subdivision agreement for the Hawthorne Industrial Park, which specifies:

- All wells should be constructed with two (2) lengths of casing (approximately 12 metres) or with casing extending a minimum of one metre into competent bedrock, whichever is greater.

It is also worth noting that a grouting inspection was completed on March 20th, 2026, upon completion of the initial stages of the well installation, to ensure the steel casing was accurately sealed with cement. Once the casing was sealed, the well and grout was allowed to set of a period of 72 hours in accordance with the subdivision agreement. The installation of the well continued on March 24th, 2026, when the remainder of the well was advanced into the bedrock.

Inferred subsurface profiles cross sections are presented in **Figure 5A** through **Figure 5B** and include select wells in the vicinity of the cross-section segments as shown in **Figure 4**. The general overburden conditions encountered in the wells, where details were available, within 500 m of the Site are as follows:

MECP Well Number	Distance and Direction from Site	Depth (m)	Overburden Details			Bedrock Details	Groundwater Encountered (m)	Static Water Level (m)	Type of water
			Sand/Till (m)	Clay (m)	Gravel (m)	Bedrock (m)			
Tag # A364254	**On-Site**	**39.6**	**0 – 3.0 (Fill)**	**--**	**3.0 – 7.6**	**7.6 – 39.6 (Limestone)**	**26.5 / 34.1**	**8.5**	**Fresh**
Tag # A364264	On-Site	24.3	0 – 5.18 (Fill)	--	--	5.18 – 24.3 (Limestone)	21.9	7.10	Fresh
7115711	90 m West	29.9	0 – 1.21 (Fill) 1.21 – 3.96 (Sand)	--	--	3.96 – 29.8 (Sandstone)	27.12	6.85	Untested
7371671	90 m West	37.2	0 – 4.57 (Till)	--	--	4.57 – 24.3 (Limestone) 24.3 - 37.2 (Sandstone)	25.3 / 35.3	7.07	Untested
7371691	200 m West	48.4	0 – 1.82 (Till)	--	--	1.82 – 13.7 (Limestone) 13.7 - 48.5 (Sandstone)	18.3 / 29.3 / 46.9	8.38	Untested
7149254	280 m West	29.8	0 – 4.26 (Sand)	--	--	4.26 – 29.8 (Sandstone)	9.14 / 18.28	4.41	Untested
7115790	*350 m West*	*7.6*	*0 – 4.7 (Fill)* *4.7 – 6.0 (Sand)* *6.0 – 7.6 (Till)*	--	--	--	--	*0.7 – 13.2*	*Untested*
7206093	445 m West	16.7	0 – 2.43 (Fill)	2.43 – 7.31	--	7.31- 47.2 (Limestone)	41.15	7.62	Fresh
7404166	440 m Northwest	--	--	--	--	--	--	--	--
7404165	480 m Northwest	--	--	--	--	--	--	--	--

MECP Well Number	Distance and Direction from Site	Depth (m)	Overburden Details			Bedrock Details	Groundwater Encountered (m)	Static Water Level (m)	Type of water
			Sand/Till (m)	Clay (m)	Gravel (m)	Bedrock (m)			
7404162	120 m North	--	--	--	--	--	--	--	--
7404419	120 m North	Well Decommissioning Record							
7404167	390 m Northwest	--	--	--	--	--	--	--	--
7404161	475 m Northwest	--	--	--	--	--	--	--	--
7402444	*475 m Northwest*	*6.1*	*0 -4.57 (Fill)* *4.57 – 6.1 (Till)*	--	--	--	--	--	--
7371679	500 m Northwest	42.6	0 – 3.96 (Till)	--	--	3.96 – 42.6 (Sandstone)	31.4 / 40.8	7.77	Untested

Notes:

Italics	Test Hole/ Monitoring Well Record
BOLD	Test Well (TW2) Used for this Hydrogeological Assessment (Constructed March 2026)
--	Not Data/Not Tested
Italics	Various monitoring wells are assigned to the water well record (nine (9) records for No. 7115790, and three (3) for No. 7402444)

3.9.1 Water Well Record Summary

Based on the details of the well records obtained in the area (within 500 m of the Site) it is anticipated that the aquifer can yield a sufficient amount to supply the proposed development on the Site in the long term. For example, one (1) hour pumping test results from select neighbouring wells within 500 m of the Site, provide results indicative that the deeper bedrock – limestone or sandstone aquifer is able to achieve a rate of 75.5 L/min over 60 minutes utilizing approximately 4% of the available drawdown. The duration of the 60-minute pumping test, with a 4% available drawdown, accounted for a volume of 4,530 L being removed.

A summary of the quantity of water of select neighboring wells within a 500 m radius of the Site is as follows:

MECP Well Number	Distance and Direction from Site	Depth (m)	Pump Test Details					
			Pump Rate (L/min)	Duration (min)	Drawdown (m)	Specific Capacity (L/Sec/m)	Recovery (%)	Recommended Pump Rate (L/min)
7115711	90 m West	29.9	54.6	60	3.17	0.058	72	45.5
7371671	90 m West	37.2	75.7	60	2.13	0.028	100	75.7
7371691	200 m West	48.4	75.5	60	1.61	0.033	100	75.7
7371679	500 m Northwest	42.6	75.5	60	1.59	0.021	100	75.5

4 PROPOSED DEVELOPMENT

It is understood that one (1) approximately 2,800 m², two-story retail granite showroom and warehouse facility will be developed on the subject property. An asphalted parking and circulation area will be located at the northern extent of the Site, and along the south of the building, with an asphalt route traversing the general perimeter of the building to access the rear parking and loading bay. An area of approximately 6,355 m² is anticipated for the asphalt area on the property. The remainder of the Site will be soft landscaping, accounting for approximately 14,895 m² of landscape area. The proposed development will be serviced by a private water supply well and sewage disposal system. The location and dimensions of the proposed features are presented in **Figure 6**.

The warehouse will be slab-on grade construction. The entirety of the building will be two (2) – stories in height, with a portion of the northern extent consisting of two (2) defined floors, while the warehouse portion will be open to the roof structure. The warehouse is anticipated to 2,090 m², with the remainder of the building including a reception area, showroom, two (2) individual washrooms, two (2) design centres and a mechanical and electrical space on the ground floor, with eight (8) offices on the second floor along with a kitchen and two (2) washrooms. One (1) loading bay will be constructed for the warehouse and being accessible at the rear of the development.

The septic system to facilitate the development will be designed by a competent individual and submitted for approval with the Ottawa Septic System Office (OSSO). A formal submission will accompany the overall development application delivered to the City of Ottawa. It should be noted that based on the overburden material encountered across the Site, the septic designer may consider a fully raised unit. This will be verified by the designer, although as discussed in later sections of this report, a fully raised unit will be inferred for discussion purposes, and is considered more conservative with respect to space required, and replacement area.

In support of this hydrogeological assessment, a test well has been constructed on the Site in the location presented in **Figure 2**. The new test well extended to a total depth of 39.6 m below grade. Fill material, described as a mix of sand and clay, was encountered from surface to approximately 3.0 m below grade, followed by gravel with stones to a depth of 7.6 m below grade. The gravel extended to limestone bedrock, including fractured limestone to 8.5 m below grade, becoming better quality for the remainder of the length of the installation. The well was constructed with a 12.5 m length of steel casing, sticking up above grade for an additional 0.6 m. The remaining length of well, from 12.5 to 39.6 m is open hole construction. Water being

found at 26.5 and 34.1m below grade, and at the one (1) hour pump test a static water level of 8.5 m below the top of casing was measured. The new test well construction meets the minimum requirements as set out in the subdivision agreement for the Hawthorne Industrial Park, which specifies:

- All wells should be constructed with two (2) lengths of casing (approximately 12 metres) or with casing extending a minimum of one metre into competent bedrock, whichever is greater.

In November 2024, a test well was advanced at the northern portion of the Site. Based on the subdivision agreement for Hawthorne Industrial Parks, the well installed on the Site in November 2024 was found to not meet the construction requirements and would not be permitted to supply the proposed development on the Site. The well will be decommissioned prior to the development of the proposed warehouse on the Site.

5 WATER QUALITY AND QUANTITY ASSESSMENT

The proposed supply water well to facilitate the anticipated warehouse development on the Site was constructed on between March 20th and March 24th, 2026, by Olympic Well Co. Ltd. (Metcalfe, Ontario). The well was advanced at the approximate west-central portion of the Site, along the south of the proposed warehouse structure, being a minimum of 3.0 m from all property lines, and beyond 30 m from potential sources of contamination, such as septic disposal systems (exiting off-Site systems and proposed on-Site systems). More specifically, the newly constructed test well was located approximately 32 m northeast (up-gradient) from the adjacent property to the west sewage disposal system; and 30 up-gradient of the proposed on-Site sewage disposal system. The new test well is located approximately 78 m southwest from the previously installed test well at the northeastern portion of the Site, which will be decommissioned prior to the development of the Site.

The new test well extended to a total depth of 39.6 m below grade. Fill material, described as a mix of sand and clay, was encountered from surface to approximately 3.0 m below grade, followed by gravel with stones to a depth of 7.6 m below grade. The gravel extended to limestone bedrock, including fractured limestone to 8.5 m below grade, becoming better quality for the remainder of the length of the installation. The well was constructed with a 12.5 m length of steel casing, sticking up above grade for an additional 0.6 m. The remaining length of well, from 12.5 to 39.6 m is open hole construction. The well construction conforms with the minimum requirement of two (2) casing lengths, or approximately 12.0 m length of casing to be used. Water being found at 26.5 and 34.1m below grade, and at the one (1) hour pump test a static water level of 8.5 m below the top of casing was measured. The new test well construction meets the minimum requirements as set out in the subdivision agreement for the Hawthorne Industrial Park.

A copy of the well record (Well Tag#A364254) is included in **Attachment C**. The well is referred to as TW2, as noted in the supporting groundwater quality certificates of analysis, and pumping test field notes. The location of the TW2, with respect to setback and proposed structures is shown in **Figure 6**.

5.1 Quantity

The proposed development of the Site is anticipated to include an approximate 2,800 m² warehouse with showroom, and office space. The required aquifer yield has been derived from the City of Ottawa Design Guidelines – Water Distribution, 2010, as amended, including the August 18, 2021, Technical Bulletin specified alterations, and the MECP's Design Guidelines for Drinking-Water Systems, 2008.

The anticipated average daily flow demands have been evaluated based on the septic design. The daily flow demand is estimated based on the total daily design sanitary sewage flow, calculated as per Table 8.2.1.3.B of the Ontario Building Code, 2012. The calculation is shown in the following table.

Occupancy Type	Column 2 (L/unit)	Column 1 (unit)	Number of units	Daily Design Flow
Warehouse*	950 L	Water Closet	4	3 800
	150 L	Loading Bay	1	150
Total Daily Demand				**3,950 L**

Notes

* Volumes listed apply to warehouses, as indicated in Table 8.2.1.3.B of the Ontario Building Code, 2012

Based on the septic design, the anticipated daily flow demand is 3,950 L/day. The average daily flow demand was estimated based on the anticipated daily flow demand of 3,950 L/day over an eight (8)-hour period as 8.2 L/min.

For general consideration, and although not the anticipated volume to be meet at the Site during operations, the maximum daily flow is often estimated based on a multiplier of 1.5 the average daily flow. This is intended to confirm the aquifer can meet this arbitrary value in the event of a possible isolated increase in demand. The maximum daily flow is estimated as 5 925 L/day or 12.3 L/min (1.5 times the average daily flow, over an eight (8) -hour period) and the peak hourly flow is estimated as 14.8 L/min (1.8 times the maximum daily flow).

5.1.1 Eight (8) Hour Pumping Test

To establish the hydraulic properties of the proposed supply aquifer, an eight (8)-hr pump test was conducted on the newly constructed supply well, TW2, on April 20, 2026, by LRL.

Prior to the commencement of the pumping test on April 20, 2026, from between April 13 through April 16, 2026, the well installer inserted a submersible pump into the well, and pumped it at a steady flow rate periodically to support the development of the installation post-construction. LRL visited the Site on April 16, 2026, to confirm the general conditions of the water from the well through in-field measurements including colour, turbidity and conductivity. As these measurements were for internal use and planning purposes only, the values measured will not be included in the is report, although it should be noted that they were considered acceptable and suggestive that the supply well has been developed sufficiently. A data logger was installed in well in general accordance with the City of Ottawa Hydrogeological and Terrain Analysis Guideline, March 2021 which indicates that "*Loggers are to be installed, and monitoring is to be started a minimum of one week prior to starting the pumping tests and must be monitored for at least one week following the test to determine background water levels*." The datalogger was installed four (4) days in advance of the anticipated pumping test, which is slightly less than the one (1) week specified, however, as discussed below, the well performed adequately throughout the drawdown and recovery stages of the pumping test, therefore background conditions are not required for further support of the findings. Additionally, the datalogger was removed once the well reached suitable recovery levels as future monitoring

was not considered necessary in support of this assessment. Printouts depicting the barometric pressure compensation of the water levels in the well are included in **Attachment D**.

The test well was pumped at a constant flow rate (±5%) of approximately 57.6 L/min over eight (8)-hr period using a temporary submersible pump lowered into the well, and set at a depth of 36.5 m below the top of casing. The pumping test rate was greater than the calculated peak hourly flow of 14.8 L/minute. The pumping rate was steady throughout the entirety of the pumping test with no fluctuations encountered or deviations observed.

Drawdown was measured manually during the pumping and recovery periods using an electronic water level tape in conjunction with the use of a datalogger to ensure the accuracy and functionality of the datalogger. The datalogger probe was also inserted into TW2 at a depth of approximately 18 m below the top of casing, which equates to approximately 10.0 m below static water level, for the duration of the test which recorded data at a set interval of 30 seconds. Printouts depicting the barometric pressure compensation of the water levels in the well are included in **Attachment D**. Following the pump's cessation, the supply well water level recovery was measured. Data collected in the field for the pumping test which includes the flow rate, water levels and measurement intervals, are presented in **Attachment E**.

At the time of the pumping test, the initial static water level, with the submersible pump installed, was measured as 8.05 m below top of casing (btc) on April 20, 2026, and test well depth was indicated by the well installer as approximately 39.6 m btc. The submersible pump was set at approximately 36.5 m btc at the time of the test. The total drawdown after eight (8)-hr of pumping was 6.29 m. This represents only approximately 22% of the available drawdown in the well, assuming the set pump depth (intake) of 36.5 m is the maximum drawdown which can be reached. The specific capacity of the well after eight (8)-hr of pumping was calculated to be 0.152 L/sec/m with a long-term availability of 251.6 m^3 per day (251,600 L/day). This surpasses the calculated maximum daily flow is estimated as 5,925 L/day and 12.3 L/min (1.5 times the average daily flow, over an eight (8)-hour period). The long-term availability calculation is presented in **Table 1**.

The recovery was commenced at the end of the eight (8)-hr pumping duration. The submersible pump remained in the well throughout this time so not to alter the recovery test process and measurements, although LRL did collect a static water level prior to the well being installed. After one (1) hour of recovery, the well returned to 87.4% of the initial water level. LRL returned after approximately 19 hours (1106 minutes) of recovery to verify the water level. The well was recorded to have reached 98.6% recovery. The well recovery complies with the D-5-5 guideline requirement of 95% within 24 hours.

5.1.1 Aquifer Characteristics

Following the completion of the constant rate pumping test, the data was analysed using the Aquifer Test software package, by Waterloo Hydrogeologic. The data underwent Theis and Agarwal-skin Recovery analysis, the results of which are shown in the table below. Graphical analyses are provided for reference purposes in **Attachment F**.

Based on the information gathered from the pump tests, the wells' transmissivity and coefficient of storage were calculated using the average of the Theis semi-logarithmic approximation for the drawdown. The interpretation curves for the eight (8) hour pump test are given in **Attachment F.** The specific yield of the well was calculated using the information obtained from the pump test, the transmissivity and coefficient of storage. The yield takes into account a minimum safety factor of 0.67. The characteristics of the well are summarized in the table below. The aquifer tested can supply above the minimum water yield of 18.75 L/min required for a residential dwelling. The yield was calculated using the safety factor, therefore the theoretical yields can be higher.

Parameter	**Test Well TW2 (#A364254)**
	8-Hour Pump Test (Draw Down)
Transmissivity (m^2/day)	6.28
Coefficient of Storage	4.79×10^{-2}
Pumping Rate (L/min)	57.6
Available Drawdown (m)*	28.56
Maximum Drawdown (m)**	6.30
% Drawdown	16.7%
Specific Yield (m^3/day/m)	10.5
Safe Yield (L/min)	42.0
Long Term Availability (m^3/day)	60.5

* Available Drawdown has been calculated based off of the pump set depth of 36.6 m during the pumping test.

**The maximum drawdown is that encountered during the pumping test and is in relation to the pump inlet at the time of the test (36.6 m).

Based on the observed drawdown/recovery relationship, it is concluded that the long-term yield of the test well is in excess of maximum daily demand flow of 5,925 L (5.92 m³/day) with a projected value of 251.6 m³/day and is found to be able to meet a maximum pumping rate of 8.2 L/minute, more than double the peak hourly demand of 12.3 L/minute, as well as the Maximum Hour Demand of 14.8 L/minute.

The results of the pumping test on TW2, and the overall pumping test completed on TW2 is considered technically representative of the water quantity to be supplied to the proposed warehouse development on the Site.

The previously installed test well, at the northeastern portion of the Site (TW1) was monitored through the pumping test to identify a potential influence between groundwater zones. The TW1 was constructed at a shallower depth of approximately 24.3 m with water found at 21.9 m. A summary of the water levels collected, and elapsed time from the commencement of the pumping test are summarized as follows:

Time / Elapsed Time from Commencement of Test **April 20, 2026**	**Water Level (m btc)**
7:30 AM / 0 minutes	6.33
9:06 AM / 70 minutes	6.70
10:58 AM / 182 minutes	7.00
13:05 PM / 309 minutes	7.20
14:05 PM / 369 minutes	7.28
15:03 PM / 427 minutes	7.31
15:45 PM / 469 minutes	7.34
Recovery **Time / Elapsed Time from End of Test**	
April 20, 2026 17:15 PM / 67 minutes	7.04
April 21, 2026 10:50 AM / 1122 minutes	6.43

5.1.2 Groundwater Supply Interference

The radius of influence (R_a) for the Site, specifically TW2, has been approximated using the transmissivities and storage coefficients calculated with Aquifer Test software package. The interpretation curves for the eight (8) hour pump test are included in **Attachment F**. Utilizing an equation developed by Bear (1979) R_a were calculated with the following using an associated peak demand time of 120 minutes[5]:

$$R_a = 1.5\left(\frac{Tt}{S}\right)^{1/2}$$

R_a Radius of influence of a pumping well;

T Transmissivity of the confined aquifer;

t Time; and

S Storage Coefficient

[5] Bear, J. 1979. Hydraulics of Groundwater. New York: McGraw-Hill.

The radius of influence for TW2 has been calculated to be 376 m. This radius is considered worst case as it assumes that the well on the Site will be pumped at the minimum peak demand rate of 57.6 L/min for 480 min. As presented in the included in the summary table above, the observation well (TW1) on the Site encountered drawdown during pumping. The draw down equated to a total of 1.01 m over the eight (8) hour pumping period. The eight (8) hour pumping test is a conservative test to demonstrate that the aquifer could withstand a maximum likely demand for a proposed development. It is unlikely such a demand would be encountered, or would it be a common occurrence. Based on the low drawdown measured in TW2, influence between the two (2) wells, and likely neighbouring property wells, in the vicinity of the Site are considered negligible.

Using the calculated radius of influence of 376 m (approximately 0.3 km), it is found that three (3) supply wells are within the likely radius of influence. This is based on the inferred plotted locations presented by the MECP Water Wells Data Base. To further evaluate the cumulative drawdown, affect in the existing off-site wells within the inferred radius of influence, a conservative estimate of the likely available water column of this impacted wells was calculated, assuming the maximum cumulative drawdown (1.01 m as demonstrated in TW1 over eight (8) hours), in addition to a 20% variance resulting from potential alternative sources, seasonal conditions and well use (1.21 m cumulative drawdown). This is considered a highly conservative estimate, as peak demand is anticipated to occur over 480 minutes.

The calculated available water column potentially impacted water well is summarized below in the subsequent table. The wells presented are those considered to be located closes to the test well and would likely demonstrate the greatest interference. As demonstrated, with the use of a conservative approach (maximum cumulative drawdown) and a 20% alterative source influence, each of the potentially impacted drilled wells, closes to the proposed development on the Site demonstrate that they can maintain a minimum water column of 21.84 m or 1,540 L in a 0.15 m diameter well without assumption for recharge influence. This is a conservative estimate and is found to demonstrate that the existing supply wells will be able to continue to provide adequate water supply post- development.

MECP Well Number	**Well Depth (m)**	**Static Water Level (m)**	**Estimated Available Water Column (m)**	**Water Column, With Maximum Assumed Calculated Cumulative Drawdown Interference (m)**	**Water Column, With Maximum Calculated Cumulative Drawdown Interference (m) Including An Additional 20% Additional Interference Assumption**
7115711	29.9	6.85	23.05	22.04	21.84
7371671	37.2	7.07	30.13	29.12	28.92
7371691	48.4	8.38	40.02	39.01	38.83

5.2 Quality

5.2.1 Field Measurements

Throughout the pumping tests the following field parameters were measured and recorded:

- Turbidity, chlorine and colour using a Lamotte TC-3000 Trimeter; and
- Conductivity, total dissolved solids (TDS) and pH using a portable meter (Hanna Instruments).

A summary of the field measurements collected throughout the duration of the pumping test are included in **Attachment E**.

The machine detection limits of the Lamotte TC-3000 Trimeter are as follows:

- Turbidity of 0.01 NTC, with an accuracy of +/- 0.05 (or 2%, whichever is greater);
- Colour of 0.1 CU, with an accuracy of +/- 0.5 (or 2%, whichever is greater); and
- Chlorine of 0.01 ppm, with an accuracy of +/-0.02 (or 2%, whichever is greater).

For the purposes of this report, values read as less than the corresponding limits will be reported as <0.01, or <0.1.

The following calibration, or zeroing techniques performed as part of this assessment, during the filed investigations is summarized as follows:

Parameter	Equipment Used	Calibration and Zeroing Techniques
Turbidity	Lamotte TC-3000 Trimeter	Prior to use, the equipment was calibrated using the 'two-point' method, following manufacturer instructions. Standard calibration solutions of 0.0 NTU and a 1.0 NTU were used to calibrate the machine. The solutions were pre-made by a supplier.
Colour	Lamotte TC-3000 Trimeter	Prior to the use of the equipment, and periodically during the pumping test, colour measurements were first zeroed by following the manufacturer's instructions and using Deionized Water (prepared and supplied by Hanna Instruments – HI7040-2).
Chlorine	Lamotte TC-3000 Trimeter	Prior to each chlorine reading, a blank sample, including Deionized Water (prepared and supplied by Hanna Instruments – HI7040-2) was screened to zero the machine.
Conductivity	HI98129 Hanna Instruments	Prior to each event, where the meter is used (typically daily), the instrument was calibrated using the Hanna Instrument prepared 1413 µs/cm conductivity solution (HI7031).
pH	HI98129 Hanna Instruments	Prior to each event, where the meter is used (typically daily), the instrument was calibrated using the 'two-point' method, following manufactures specifications. As the pH readings are anticipated to be within the neutral to slightly acid range based on our knowledge of the area and past experience, solutions of 7.01 pH Units (Hanna Instruments HI7007) and 4.01 pH Units (Hanna Instruments HI7004) were used.

5.2.2 Groundwater Sampling

Groundwater samples were collected for laboratory analysis during the pumping tests to assess the quality of the proposed supply aquifer. The water samples were collected after four (4) and eight (8)-hours of pumping. The water samples were collected directly into laboratory prepared bottles. The water samples were submitted to the laboratory for analysis of a "subdivision" package. The eight (8)-hour sample was also submitted to the laboratory for analysis of trace metals and volatile organic compounds (VOCs), as per the City of Ottawa requirements.

To address the contaminates of concern, as discussed above in Section 3.7.2, the following additional parameters were included in the sample analysis of the eight (8) – hour sample: Petroleum Hydrocarbons (PHC) F1 through F4, Polycyclic Aromatic Hydrocarbons (PAH), Polychlorinated Biphenyls (PCB), and Free Cyanide. The trace metals analysis, included in the typical sample package for such a mandate includes arsenic as a component of the scan.

The groundwater analytical results are discussed in Section 5.2.3. The laboratory Certificate of Analysis from Paracel Laboratories Ltd. (Ottawa, Ontario) is included in **Attachment G**.

5.2.2.1 Chlorine Residual

Procedure D-5-5 specifies, "*The chlorine residual must be zero before any bacteriological sample can be taken*." At the start of the eight (8)-hour pumping test, the chlorine residual was measured at 0.01 mg/L and fluctuated throughout the duration of the test with values of 0.00 and 0.01 mg/L at both the four (4) - and eight (8) - hours pumping durations.

According to the equipment manual for the Lamotte TC-3000e, chlorine measurement accuracy is 0.02 ppm (mg/L) or 2%, which ever is greater. Therefore, based on the accuracy of the equipment, the chlorine residual measurements collected of 0.01 mg/L in the eight (8) hour samples collected, is most likely considered to be zero (0.00 mg/L) based simply on the machine accuracy range, the samples are likely free of chlorine residual.

5.2.3 Supply Aquifer Quality – Proposed Supply Well (April 20th, 2026)

The groundwater chemistry of the proposed supply aquifer for the development was obtained by collecting water samples from the newly constructed proposed supply well, TW2, located at the west-central portion of the Site. The well was installed within the limestone formation at a depth of approximately 39.6 m.

To represent the long-term water quality of the well, samples were collected during different stages of the pump test and well development (after four (4) and eight (8)-hours of pumping). The water samples were collected using laboratory prepared bottles and were submitted to an accredited laboratory (Parcel Laboratories Ltd. of Ottawa, Ontario) for analysis of a standard "subdivision" package, trace metals, VOCs, PHCs, PCBs, PAH and Free Cyanide. The laboratory certificates of analysis are included in **Attachment G**.

Table 2A through **Table 2D** summarizes the water analysis and includes the relative ODWS (O. Reg. 169/03) for the parameters tested. The majority of the parameters analysed meet the ODWS parameters tested except for the following:

- Alkalinity was reported to have values of 623 and 618 mg/L at 4- and 8-hour samples, respectively. These values are above the ODWS OG limit of 500 mg/L. Elevated alkalinity can result in undesirable taste and may result in scaling which could lead to buildup in piping and other mechanical components which may use the water supply (i.e. heat exchange systems). **Alkalinity can be affectively reduced through the use of a reverse osmosis treatment system**. Additionally, corrosion resistant plumbing fixtures can be used to prolong the longevity of these components;

- Dissolved Organic Compound (DOC) was reported to have values of 7.6 and 8.0 mg/L at four (4) - and eight (8) - hours samples, respectively, above the ODWS of 5 mg/L, although below the maximum concentration considered reasonably treatable provided in MECP D-5-5 of 10 mg/L. Elevated DOC can result in biofilm formation, as well as unpleasant odours, tase and colouration of the water supply. Furthermore, elevated DOC can impede on the effectiveness of UV and chlorination treatment, and can result in a harmful by-product, though a chemical reaction with chlorine. **Effective treatment options for elevated DOC include granular activated carbon filtration, or aeration**. The concentrations are within acceptable levels considered reasonable treatable;
- Colour was reported to have values of 5 TCU at the four (4) - and eight (8) -hours samples, respectively, meeting the ODWS of 5 TCU, and below the maximum concentration considered reasonably treatable (MCCRT) provided in MECP D-5-5 of 7 TCU. Although the concentration is within the ODWS limits, consideration to include treatment of colour is recommended as a conservative approach to support the use of the remaining treatment systems required. **Colour can be reduced through the use of granular activated carbon filtration or reverse osmosis, much like that of DOC and alkalinity**;
- Hardness was found to be 893 and 887 mg/L at 4- and 8-hours, respectively, above the ODWS OG limit range of between 80 and 100 mg/L. High levels of hardness can lead to scale deposits and excessive utilization of regular soaps. **Hardness can be reduced through the use of a water softener**;
    - The Langelier Saturation Index (LSI) is used to determine the calcium carbonate stability of water and the pH at which water is saturated with calcium carbonate (pHs). The LSI calculation is used to establish the level of saturation. The Ryznar Stability Index (RI) is used to determine the aggressiveness of water which can indicate the scale and corrosion potential. The calculations for RI and LSI are shown in **Table 3**. Using a water temperature of 10°C (typical of an interior distribution system circulating through a building), the LSI was calculated for the 8-hour sample of 0.824 which indicates the water is scale forming but non-corrosive. The RI was calculated to be 5.75 at the 8-hour sample which indicates light scaling.
- TDS values were found to be 1050 and 1040 mg/L in the four (4)- and eight (8)-hour samples, respectively, above the AO of 500 mg/L. Where TDS levels exceed the ODWS AO, it is required that a professional comment regarding treatment include "***written rationale that corrosion, encrustation or taste problems will not occur***", according to the MECP D-5-5 Guideline. As indicated in the ODWS for TDS parameter "*The term total dissolved solids refer to inorganic substances dissolved in water. The principal constituents of TDS are chloride, sulphates, calcium, magnesium and bicarbonates. The effects of TDS on drinking water quality depend on the levels of the individual components. Excessive hardness, taste, mineral deposition or corrosion are common properties of highly mineralized water. The palatability of drinking water with a TDS level less than 500 mg/L is generally considered to be good*."
    - ***Corrosion Rationale***: In support of the required rationale with respect to TDS levels in excess of 500 mg/L, the RI and LSI were calculated for the water sample to determine the corrosivity or scale formation potential of the water. The LSI is used to determine the calcium carbonate stability of water and the

pH at which water is saturated with calcium carbonate (pHs). The RI is used to determine the aggressiveness of water which can indicate the scale and corrosion potential. Using a water temperature of 10°C (typical of an interior distribution system circulating through a building), the LSI was calculated for the 8-hour sample of 0.824 which indicates the water is scale forming but non-corrosive. The RI was calculated to be 5.75 at the eight (8)-hour sample which indicates light scaling.

- ***Encrustation Rationale:*** Much like the corrosion rationale, the use of the RI and the LSI calculation is suitable for estimating the likelihood of a water supply being scale forming or the encrustation potential. The proposed water distribution supply is found to be scale forming but non-corrosive and light scaling.

  Taste Problems: The proposed water supply will be limited to use general water distribution purposes related to cleaning and hygiene. According to the Government of Canada, Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Total Dissolved Solids (TDS), the palatability of a drinking water supply (with respect to TDS) has been rated by participants, and the findings are as follows:

  - **Excellent,** less than 300 mg/L;
  - **Good,** between 300 and 600 mg/L;
  - **Fair,** between 600 and 900 mg/L;
  - **Poor,** between 900 and 1200 mg/L; and
  - **Unacceptable,** greater than 1200 mg/L.

  The raw water results of the test well are in within the levels considered low. Therefore, the proposed water distribution supply has a palatability rating of 'poor'.

A reverse osmosis system can be effective in removing up to 99% TDS in cases.

- Organic Nitrogen is calculated based on values of Total Kjeldahl Nitrogen (TKN) and Ammonia (NH3). More specifically, the difference between TKN and NH3. Organic Nitrogen was calculated to be 0.25 mg/L in the four (4) – hour sampling, and 0.24 mg/L in the eight (8) – hour sample. Elevated organic nitrogen can result in biofilm formation, as well as unpleasant odours, tase and colouration of the water supply. **Organic nitrogen can be treated through the use of a reverse osmosis system or anion exchange unit**;
- Turbidity was measured to have a level of 19.4 NTU in the four (4)-hour sample, and 16.4 NTU in the eight (8)-hour sample. Both of which are above the ODWS OG of 1 NTU if the treatment system is required to provide filtration, and the maximum concentration considered reasonably treatable provided in MECP D-5-5 of 5 NTU. It is important to note that in-field measurements collected, supported through observations, revealed much lower turbidity values at the time of sampling. No apparent colour or tinge to the samples were encountered, which is shown in the supporting photos collected during the pumping test, as presented below. In-field measurements collected were recorded as 0.91 NTU at the four (4) hour sample collection time, and 0.56 NTU at the eight (8) hour sample collection time;



In-field observations of water during eight (8) hour pumping test. In-field turbidity measurement of 1.19 NTU after one (1) hour of pumping



In-field observations of water during eight (8) hour pumping test. In-field turbidity measurement of 0.59 NTU after six (6) hour of pumping

It is suspected that from the time the sample was collected, to the time the samples were analysed at the laboratory, reactions of select parameters or minerals present in the aquifer may have attributed to the elevated turbidity concentrations encountered. As demonstrated above, the water directly upon collection, which would be best representative of the actual conditions to be encountered, are well below the respective provincial levels. The differences may reflect settling/reaction during sample holding time and should be further evaluated.

If the water is to be disinfected using an ultra-violet filter, it is recommended that the water be pre-treated with a 5 um filter;

- Iron was reported in both the four (4)-hour and the eight (8)-hour sample with values of 1.9 and 1.7 mg/L, above the ODWS AO of 0.3 mg/L, and below the MCCRT of 5 mg/L. Elevated iron can be the result of naturally occurring mineral deposits in a water supply and may lead to an unpleasant taste, as well as discolouration. High concentrations of iron can result in blockages to distribution systems. **Iron can be reduced through aeration, followed by filtration in cases where concentrations exceed 10 mg/L**. In cases of lesser iron concentrations, sediment filters, carbon filters or water softeners are effective to reduce levels; and
- Manganese concentrations exceeded the ODWS AO of 0.05 mg/L, with values of 0.608 and 0.621 mg/L in both the four (4)-hour and eight (8)-hour samples collected. Elevated concentrations of manganese can result in discolouration of fixtures or counter tops, and laundry staining. Additionally, the Canadian Drinking Water Quality Guidelines indicate that levels above 0.12 mg/L can result in neurological development and behaviour effects, as well as deficits in memory, attention and motor skills. **Reverse osmosis can be used to reduce concentrations of manganese.**

VOC, PHC, PCB, PAH parameters were not detected in the samples submitted for analysis.

6 WATER SUPPLY ASSESSMENT

Based on the Site geology and hydrogeology the recommended potential supply aquifer for the Site, is the limestone aquifer. The proposed supply well installed on the Site currently intercepts this aquifer, and it is our understanding that the proposed development of the Site will utilize this newly constructed well. The selection of this aquifer is supported through previous

hydrogeological assessments completed for the Hawthorne Industrial Park development, which recommends the deeper limestone and sandstone aquifer as the better suited one based on quality and quantity encountered during the assessments.

6.1.1 Demand

The proposed development of the Site is anticipated to include an approximate 2,800 m² warehouse with showroom, and office space. The required aquifer yield has been derived from the City of Ottawa Design Guidelines – Water Distribution, 2010, as amended, including the August 18, 2021, Technical Bulletin specified alterations, and the MECP's Design Guidelines for Drinking-Water Systems, 2008. The anticipated average daily flow demands have been evaluated based on the septic design. The daily flow demand is estimated based on the total daily design sanitary sewage flow, calculated as per Table 8.2.1.3.B of the Ontario Building Code, 2012.

Based on the septic design, the anticipated daily flow demand is 3,950 L/day. The average daily flow demand was estimated based on the anticipated daily flow demand of 3,950 L/day over an eight (8)-hour period as 8.2 L/min. For general consideration, and although not the anticipated volume to be meet at the Site during operations, the maximum daily flow is often estimated based on a multiplier of 1.5 the average daily flow. This is intended to confirm the aquifer can meet this arbitrary value in the event of a possible isolated increase in demand. The maximum daily flow is estimated as 5,925 L/day or 12.3 L/min (1.5 times the average daily flow, over an 8-hour period) and the peak hourly flow is estimated as 14.8 L/min (1.8 times the maximum daily flow).

The findings of the pumping test of the newly constructed test well revealed that the aquifer, at a pumping rate of 36 L/minute, did not demonstrate stressed conditions, which supports that it is suitable for the anticipated development. The well achieved more than 95% recovery in less than 24 hours, meeting the minimum aquifer supply requirements as set out in the MECP D-5 guideline.

7 TERRAIN ANALYSIS

The terrain analysis was conducted to demonstrate that the Site is appropriate for the construction of an on-Site subsurface sewage disposal system on the Site. The proposed location of the sewage disposal system is presented in **Figure 6**, although this will be finalized by the Site Plan Layout Engineer once the OSSO has approved the size and configuration of the proposed system

Based on the presence of an unnamed stream along the immediate southern extent of the Site, the Site is considered Hydrogeologically Sensitive. Additionally, it was deciphered through the review and consideration of intrusive investigations completed by others that the native organic deposits, silty sand with gravel or till, ranged between 0.7 and 1.1 m in depth, before bedrock was encountered. One (1) borehole advanced only encountered fill material over bedrock. It is likely that the Site, prior to the introduction of fill material, was considered a shallow soil property, with the possibility of bedrock outcrops based. Therefore, the Site can be considered hydrogeologically sensitive based on the shallow overburden conditions prior to the introduction of fill.

No bedrock outcrops were encountered at the time of LRLs Site visits associated with the field work component of this assessment.

Paterson Group completed a geotechnical investigation across the Site in support of the proposed development. The subsurface conditions encountered were described as Fill material,

consisting of very loose to dense, brown silty sand to silty clay with gravel, cobbles and organics. Traces of concrete was observed. The fill material extended to a depth of 3.7 to 6.8 m below grade. A thin layer of organic deposits (silt) was encountered in BH1-24 and BH2-24 between 4.5 and 5.3 m below grade. Practical refusal was encountered at depths of 4.9 to 6.7 m below grade, which is anticipated to be the bedrock interface.

The subsurface conditions indicated for the Site may be generally suitable for a Class IV septic sewage disposal system, however it was noted in the findings of the geotechnical investigation that the presence of unsuitable fill material, including asphalt pieces, concrete rubble and plastic may be present. Therefore, for discussion purposes herein, a fully raised leaching bed will be assumed, although the Site-specific soil and groundwater conditions at the actual location of the proposed septic system leaching bed should be confirmed at the time of formal design. The leaching bed should be constructed to conform to the specifications set out in the Ontario Building Code (OBC).

As part of this assessment, an analysis was carried out to ensure that sufficient space exists at the proposed lot for the construction of a septic system in accordance with the OBC. As a conservative approach to determining the expected largest septic system envelope required to service an industrial warehouse establishment at the Site, a septic system envelope size was calculated assuming a fully raised bed with mantle, a percolation rate of 12 min/cm for the imported sand required and a daily sewage flow of 3,950 L.

The total length of pipe required for the septic bed, assuming imported fill, was calculated as approximately 237 m:

$L = QT/200$

where L = length of pipe (m)

Q = daily sewage flow for the proposed development (L/day)

T = percolation rate of the imported sand fill material (min/cm)

Assuming a conventional system is used, the anticipated pipe runs will be 15 runs being 15 m in length. Due to the total length of the piping, a pumping chamber will be required. All details related to the proposed installation, sizing of the equipment, and features are to be included in proposed septic design. Therefore, based on our assumptions included herein an area of approximately 465 m² is required for the septic bed. A mantle of 15 m in length would be required along the down gradient portion of the bed. Based on the total coverage of the septic bed (raised portion and mantle plus a replacement area) would be approximately 700 m².

The proposed septic will be placed at the southern extent of the Site, where an area of more than 1,600 m² is available for the installation of the unit. The Site has a surface 11,920 m², of which, approximately 4,000 m² is considered suitable for placement of the sewage disposal system, which encompasses the southern portion of the property. Sufficient area of replacement area and mantle exists on the Site in accordance with the OBC to service the proposed development with a design sewage flow of up to 3,950 L/day. A proposed development layout plan is presented in **Figure 6** which provides visual support to this.

Respective setbacks from natural features must be considered when installing the sewage disposal system.

8 PRIVATE SEWAGE DISPOSAL SYSTEM IMPACT STUDY

As per Section 5.2, Groundwater Impact Assessment in Non-Designated Areas, of the MECP's Procedure D-5-4 outlines the three (3) step assessment process for evaluating the potential risk for "every proposed development involving on-site sewage systems". The steps are intended to be followed in succession, where the conditions established in the previous step determine whether it is necessary to move on to the next step.

Step one of the assessment processes is ***Lot Size Consideration***. If it can be demonstrated that the area of the Site is not hydrogeologically sensitive, developments on a property with an area of one (1) hectare or greater may not require a comprehensive hydrogeological assessment. It is expected that attenuative processes inside a one (1) hectare (10,000 m²) parcel of land will be adequate to decrease the nitrate-nitrogen to a satisfactory focus in groundwater underneath contiguous properties. The Site has a surface area of approximately 16,190 m² or 1.62 hectare, which meets the ***Lot Size Consideration***. However, due to the presence of the stream along the southern limit of the Site, the Site is considered to be hydrogeologically sensitive, therefore this consideration cannot be supported.

Step Two is ***System Isolation Considerations***, which evaluates the risk to groundwater from septic effluent, where geological setting and characteristics present suitable isolation conditions. Such conditions are most often supported by a lower hydraulic or physical boundary of the receiving groundwater. Such boundaries can include a thick layer of underlying soils with low permeability (i.e. clays). Based on the information collected by others with respect to the subsurface conditions, the materials across the Site are not considered suitable to promote ***System Isolation Consideration***. The ***System Isolation Consideration*** approach is not considered suitable for the Site, therefore Step Three of the assessment will be applied for the Site.

Step three is the ***Contaminate Attenuation Consideration*** for sites that do not meet the above two points. The Contaminant Attenuation Consideration (Predictive Assessment) was used to determine the potential risk to groundwater resources on- and off-Site resulting from the proposed on-Site septic systems. More specifically, to confirm that the concentration of nitrates at the boundary of the Site are in accordance with the MECP's Procedure D-5-4: Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment. The potential risk to off-Site receptors from the proposed upgraded sewage disposal system has been considered using the inferred nitrate contamination loading for commercial / industrial property use. Section 5.6.3 of the D-5-4 Guideline pertains to Predictive Assessment - Industrial/Commercial Development. The procedure (MECP's Procedure D-5-4 (1996)) followed for this study specifies a maximum allowable concentration of nitrate in the groundwater of 10 mg/L at the property boundary.

To support the corresponding estimation of anticipated nitrate concentration at the property boundary, nitrate dilution calculations for commercial / industrial properties were considered. The following details were included in the calculation used:

- Infiltration factors for the Site;
    - A total area of 16,190 m² (1.62 hectare);
    - Flat topography;
    - An assumption of sand;
    - Background nitrate concentration was not detected in submitted water

samples thus for this calculation the background concentration is set to 0 mg/L;

- Impervious area of 9,155 m^2, which includes 2,800 m² for the warehouse, and 6,355 m² for the asphalt parking and circulation area;
- Moisture surplus values from the Ottawa weather station (Environment Canada, 2011) Post Development;
    i. The cultivated land (lawn and grassed area) is considered Shallow Rooted Crops;
    ii. The septic bed will be sand, and the current fill material across the Site includes silty sand with gravel; and
- Impervious areas (proposed development footprint) were calculated to be of 9,155 m² for the proposed warehouse and paved parking and circulation area. This equates to hard surface area, post development, of 56.5% of the subject property; and
- The use of an advanced tertiary treatment system, with a capability to treat nitrate concentrations of the effluent to at least 15 mg/L (67% nitrogen reduction).

The moisture surplus printout is included in **Appendix H**.

Based on the total proposed sewage volume for the entire Site of 3,950 L/day, the existing lot size, soil conditions, impermeable surface coverage post development, a nitrate concentration of the sewage of 40 g/L, the calculated levels of nitrates at the property limits is estimated as 15.45 mg/L as presented in the attached **Table 4A**. This is above the procedure's guideline limit of 10 mg/L at the property line. Based on the ***Contaminant Attenuation Method***, without tertiary treatment the current lot size and soil conditions are not suitable to attenuate the nitrate impacts generated by the septic systems of the development in accordance with D-5-4 guideline.

The above calculations are based on the current D-5-4 guideline which requires the use of 40 mg/L as the contaminant source as per Section 5.6.2 (a). Therefore, the use of an advanced tertiary treatment system such as Norweco tertiary system is necessary to reduce the levels of nitrates prior to discharge to the disposal field. This particular system is approved by the OBC and the Building Materials Evaluation Commission of the Ontario Ministry of Municipal Affairs and Housing. Furthermore, Section 5.7 of the D-5-4 guideline states that the Ministry recognises "*that as research continues, information and technologies may become available which warrant minor or substantial revisions to this guideline*".

The Norweco HK 4730L-3M is certified (BNQ Certified) for a minimum 50% total nitrogen reduction. Therefore, a nitrate effluent concentration of 20 mg/L was used for the proposed upgraded system for the Site, although they are known and advertised to treat to at least 15 mg/L (67% nitrogen reduction). A copy of the specifications for the Norweco tertiary system is included in **Attachment I**. The calculated nitrate level at the property line is estimated based on the daily sewage volume for the proposed building, treated with a Noweco tertiary system. The detailed calculations for the proposed development are presented in the attached **Table 4B**, which accounts for the available permeable infiltration area following the re-development of the site. It is assumed that the level of nitrates in the effluent from the proposed Norweco tertiary

systems are 20 mg/L. Based on these assumptions the nitrates at the property limits is estimated as 7.73 mg/L. This is above the procedure's guideline of 10.0 mg/L.

Based on these considerations, the current lot size and soil conditions are suitable to attenuate the nitrate impacts generated by the septic systems on the development in accordance with current D-5-4 guidelines, provided an appropriate tertiary treatment is used for the proposed system.

A formal septic design is not available at this time. It is understood that upon approval by the City for certain aspects of the development, the client would then request a formal septic design for the development, to be approved by the Ottawa Septic System Office (OSSO).

9 SUMMARY AND CONCLUSIONS

Based on the results of this investigation the following summary and conclusions are provided.

- The Site set within the Hawthorn Industrial Park Subdivision, located approximately 930 m southeast of the Rideau Road and Hawthorne Road intersection. The Site is legally described as Part Block 2 Plan 4M1388, Gloucester, Parts 1 & 2 4R35791, City of Ottawa, Ontario. The Site is zoned as Rural Heavy Industrial Zone (RH).
- The majority of the Site is undeveloped and covered with a granular fill. The eastern portion of the Site, and southern extent of the Site, is covered with overgrown vegetation (shrubs and grasses). The neighbouring property to the west being developed with a landscape stonework supplier warehouse and retailer (Techo-Bloc); north is an auto salvage and storage yard facility (Cash for Cars) and automotive auctioneer (Copart – Ottawa); south is operated as a mineral extraction facility (Quarry); and east is undeveloped – vacant land.
- The Site is a rectangular shape, with a total area of approximately 16,190 m² or 1.62 hectare. The topography of the Site and vicinity are generally flat, with a steep slope along the southern extent of the property, which descends towards an unnamed stream. The topography of the majority of the Site ranges between 90.2 to 91.6 m amsl.
- The Site is generally undeveloped, although a granular fill base has been applied across the majority of the surface in the early 2000's. There is presently no permit structures or buildings, other than the test well (proposed supply well) constructed in support of this assessment in November 2024.
- Historically, as of at least the mid 1970's according to available aerial imagery retrieved through the City of Ottawa interactive mapping system (geoOttawa), the Site was vacant and undeveloped. The Site remains in these conditions' present day, although in the early 2000's (2002), fill material was introduced to the Site.
- The Hydrogeological Assessment & Terrain Analysis was requested in support of the proposed development of the Site, and associated application submission to the City of Ottawa. It is understood that one (1) approximately 2,800 m² two-storey granite showroom and warehouse will be developed on the subject property, in addition to corresponding asphalt parking and circulation area and related components. The proposed development will be serviced by a private water supply well and sewage disposal system.
- Using the available features of the interactive mapping tool, *The Atlas of Canada – Toporama*, it appears that the local groundwater flow direction is east to southeast towards the North Castor River, approximately 2.3 km to the southeast of the Site. The

unnamed stream along the southern extent of the Site flows in an easterly direction.

- A wetland has been identified along the southern portion of the Site. According to a Draft Wetland Delineation Report for 561 Somme Street, Ottawa dated July 23, 2024, it was recommended that future development on the Site, anticipated to occur on the existing gravel pad, which maintains a 15 m setback from the identified wetland limits, is considered sufficient to protect the natural feature.
- Surficial soil deposit mapping indicates that the surficial geology of the Site, and immediate area, is found to be on the transitional area of two (2) distinct surficial conditions anticipated to include:
    - Nearshore Sediments: fine to medium-grained sand, calcareous and commonly fossiliferous; nearshore sand generally occurs as a sheet or as bars or splits associated with glaciofluvial materials; or
    - Paleozoic Bedrock: Limestone, dolomite, sandstone, and locally shale; relatively flat-lying; mainly occurring as bare, tabular outcrops; includes areas thinly veneered by unconsolidated Quatemary sediments up to 1 m thick.
- According to available bedrock mapping, the bedrock on the Site is documented to be on the divide of the March Formation: Interbedded sandstone and sandy dolomite, and the Carlsbad Formation: grey shale, sandy shale, some dolomitic layers. Slightly east of the Site is documented to be the Nepean Formation: Sandstone.
- According to available mapping, the Site and neighbouring lands are identified as “Unknown or no observed evidence of karstification due to the character of bedrock, lack of outcrop and/or relative thickness of overburden.” Borehole advancement by others in support of a geotechnical investigation on the Site revealed that the overburden on the Site was primarily comprised of Fill, previously established to have been deposited on the Site in the early 2000’s. The geotechnical investigation revealed that native organic deposits, silty sand with gravel or till, ranged between 0.7 and 1.1 m in depth, before bedrock was encountered. One borehole advanced only encountered fill material over bedrock. It is likely that the Site, prior to the introduction of fill material, was considered a shallow soil property, with the possibility of bedrock outcrops based. Therefore, the Site can be considered hydrogeologically sensitive based on the shallow overburden conditions prior to the introduction of fill.
- A search was conducted of the well records from the MECP Water Well Information System (WWIS) department. The search by UTM coordinates covered a 500 m radius from the Site. The search returned 14 water well records, however, several of which did not have any details available related to the construction or subsurface conditions encountered. Of the 14 water well records retrieved, seven (7) included details with respect to the well construction, and subsurface materials encountered. Three (3) of the well records were for test / monitoring wells. Notably, for two (2) records, additional individual wells were assigned to them. More specifically, nine (9) records were included under Well Record No. 7115790, and three (3) records were included for Well Record No. 7402444. The remaining five (5) well records received form were for supply wells, for commercial, domestic, industrial and public uses. The well records revealed that they were each advanced into the bedrock, to depths of between 29.9 and 48.4 m below grade.
- Based on the details of the well records obtained in the area (within 500 m of the Site) it is anticipated that the aquifer can yield a sufficient amount to supply the proposed development on the Site in the long term. For example, one (1) hour pumping test results

from select neighbouring wells within 500 m of the Site, provide results indicative that the deeper bedrock – limestone or sandstone aquifer is able to achieve a rate of 75.5 L/min over 60 minutes utilizing approximately 4% of the available drawdown. The duration of the 60-minute pumping test, with a 4% available drawdown, accounted for a volume of 4,530 L being removed.

- March 20th, 2026, a new test well (TW2) was installed at the west-central portion of the Site. The new test well extended to a total depth of 39.6 m below grade. Fill material, described as a mix of sand and clay, was encountered from surface to approximately 3.0 m below grade, followed by gravel with stones to a depth of 7.6 m below grade. The gravel extended to limestone bedrock, including fractured limestone to 8.5 m below grade, becoming better quality for the remainder of the length of the installation. The well was constructed with a 12.5 m length of steel casing, sticking up above grade for an additional 0.6 m. The remaining length of well, from 12.5 to 39.6 m is open hole construction.
    - The well construction meets the minimum requirements as set out in the subdivision agreement for the Hawthorne Industrial Park, which specifies: All wells should be constructed with two (2) lengths of casing (approximately 12 metres) or with casing extending a minimum of one metre into competent bedrock, whichever is greater.
    - It is also worth noting that a grouting inspection was completed on March 20th, 2026, upon completion of the initial stages of the well installation, to ensure the steel casing was accurately sealed with cement. Once the casing was sealed, the well and grout was allowed to set of a period of 72 hours in accordance with the subdivision agreement. The installation of the well continued on March 24th, 2026, when the remainder of the well was advanced into the bedrock.
- Water being found at depth of 26.5 and 34.1 m below grade, and at the one (1) hour pump test a static water level of 8.5 m below the top of casing was measured, as indicated on the corresponding water well record.
- It is understood that the Phase I ESA completed by others, with reference to additional previous environmental investigations, did not identify potential environmental concern, or contaminating activities in the vicinity of the Site or on the Site. As part of this Hydrogeological Assessment, it was found that select operations (past and present) have been identified in the area of the Site, which according to LRL are considered a potential environmental concern and may have an impact on the proposed supply aquifer groundwater quality. To address the contaminates of concern, the following additional parameters were included in the sample analysis as part of this assessment: Petroleum Hydrocarbons (PHC) F1 through F4, Polycyclic Aromatic Hydrocarbons (PAH), Polychlorinated Biphenyls (PCB), and Free Cyanide. The trace metals analysis, included in the typical sample package for such a mandate includes arsenic as a component of the scan, which was identified as a potential contaminate of concern.
- To establish the hydraulic properties of the proposed supply aquifer, an eight (8)-hr pump test was conducted on the newly constructed supply well, TW2, on April 20, 2026, by LRL. The well was pumped at a constant flow rate (±5%) of approximately 57.6 L/min over eight (8)-hr period using a temporary submersible pump lowered into the well. The pumping test rate was greater than the calculated peak hourly flow of 14.8 L/minute.
- At the time of the pumping test, the initial static water level, with the submersible pump installed, was measured as 8.04 m below top of casing (btc) on April 20, 2026, and test

well depth was measured as approximately 39.6 m btc. The submersible pump was set at approximately 36.6m btc at the time of the test. The total drawdown after eight (8)-hr of pumping was 6.30 m. This represents only approximately 19.9% of the available drawdown in the well, assuming the set pump depth of 36.6 m is the maximum drawdown which can be reached. The specific capacity of the well after eight (8)-hr of pumping was calculated to be 0.152 L/sec/m with a long-term availability of 251.9 m³ per day (251,900 L/day). This surpasses the calculated maximum daily flow is estimated as 5,925 L/day and 12.3 L/min (1.5 times the average daily flow, over an 8-hour period).

- The recovery was commenced at the end of the eight (8)-hr pumping duration. The submersible pump remained in the well throughout this time so not to alter the recovery test process and measurements, although LRL did collect a static water level prior to the well being installed. After one (1) hour of recovery, the well returned to 87.4% of the initial water level. LRL returned after approximately 19 hours (1106 minutes) of recovery to verify the water level. The well was recorded to have reached 98.6% recovery. The well recovery complies with the D-5-5 guideline requirement of 95% within 24 hours.
- Based on the observed drawdown/recovery relationship, it is concluded that the long-term yield of the test well is in excess of maximum daily demand flow of 5,925 L with a projected value of 59.2 m³/day and is found to be able to meet a maximum pumping rate of 175.0 L/minute, more than double the peak hourly demand of 12.3 L/minute, as well as the Maximum Hour Demand of 14.8 L/minute.
- Groundwater samples were collected for laboratory analysis during the pumping tests to assess the quality of the proposed supply aquifer. The water samples were collected after four (4) and eight (8)-hours of pumping. The majority of the parameters analysed meet the ODWS parameters tested except for the following:
    - Alkalinity was reported to have values of 623 and 618 mg/L at 4- and 8-hour samples, respectively. These values are above the ODWS OG limit of 500 mg/L;
    - Dissolved Organic Compound (DOC) was reported to have values of 7.6 and 8.0 mg/L at 4- and 8-hours samples, respectively, above the ODWS of 5 mg/L, and the maximum concentration considered reasonably treatable provided in MECP D-5-5 of 10 mg/L;
    - Colour was reported to have values of 5 TCU at the 4- and 8-hours samples, respectively, and below the maximum concentration considered reasonably treatable (MCCRT) provided in MECP D-5-5 of 7 TCU;
    - Hardness was found to be 861 and 828 mg/L at 4- and 8-hours, respectively, above the ODWS OG limit range of between 80 and 100 mg/L;
    - TDS values were found to be 1050 and 1040 mg/L in the 4- and 8-hour samples, respectively, above the AO of 500 mg/L;
    - Organic Nitrogen is calculated based on values of Total Kjeldahl Nitrogen (TKN) and Ammonia (NH3). More specifically, the difference between TKN and NH3. Organic Nitrogen was calculated to be 0.25 mg/L in the four (4) – hour sampling, and 0.24 mg/L in the eight (8) – hour sample;
    - Turbidity was measured to have a level of 19.4 NTU in the four (4)-hour sample, and 16.4 NTU in the eight (8)-hour sample. Both of which are above the ODWS OG of 1 NTU if the treatment system is required to provide filtration, and the maximum concentration considered reasonably treatable provided in MECP D-5-5 of 5 NTU. It is important to note that in-field measurements collected, supported

through observations, revealed much lower turbidity values at the time of sampling. No apparent colour or tinge to the samples were encountered, which is shown in the supporting photos collected during the pumping test, as presented below. In-field measurements collected were recorded as 0.91 NTU at the four (4) hour sample collection time, and 0.56 NTU at the eight (8) hour sample collection time;

- Iron was reported in both the four (4)-hour and the eight (8)-hour sample with values of 1.9 and 1.7 mg/L, above the ODWS AO of 0.3 mg/L, and below the MCCRT of 5 mg/L; and
- Manganese concentrations exceeded the ODWS AO of 0.05 mg/L, with values of 0.608 and 0.621 mg/L in both the four (4)-hour and eight (8)-hour samples collected.

- It is our profession opinion that through the use of conventional treatment systems, the supply water can be treated to more suitable conditions. Such treatment system which can be considered included:
  - Activated Carbon filter can be used to reduce level of dissolved organic compound (DOC); iron and colour although considered within the acceptable limits.
  - A Water Softener to reduce levels of manganese and hardness; and
  - Reverse Osmosis System to reduce concentrations of TDS, alkalinity, manganese and organic nitrogen.
- Corrosion resistant plumbing fixtures can be used to prolong the longevity of these components.
- It is understood that the Phase I ESA completed by others, with reference to additional previous environmental investigations, did not identify potential environmental concern, or contaminating activities in the vicinity of the Site or on the Site. As part of this Hydrogeological Assessment, it was found that select operations (past and present) have been identified in the area of the Site, which according to LRL are considered a potential environmental concern and may have an impact on the proposed supply aquifer groundwater quality. To address the contaminates of concern, the following additional parameters were included in the sample analysis as part of this assessment: Petroleum Hydrocarbons (PHC) F1 through F4, Polycyclic Aromatic Hydrocarbons (PAH), Polychlorinated Biphenyls (PCB), and Free Cyanide. The trace metals analysis, included in the typical sample package for such a mandate includes arsenic as a component of the scan, which was identified as a potential contaminate of concern.
- To establish the hydraulic properties of the proposed supply aquifer, an eight (8)-hr pump test was conducted on the newly constructed supply well, TW1, on November 28, 2024 by LRL. The well was pumped at a constant flow rate (±5%) of approximately 36 L/min over eight (8)-hr period using a temporary submersible pump lowered into the well. The pumping test rate was greater than the calculated peak hourly flow of 14.8 L/minute. It should be noted that during the initial 25 minutes of the test, the rate was increased at between 40 and 44 L/minute, which was found to draw the water in the well too quickly and was considered excessive to demonstrate adequate demand availability for the proposed development. The rate was reduced to 36 L/minute for the remaining seven (7) hours of pumping.
- At the time of the pumping test, the initial static water level, with the submersible pump

installed, was measured as 7.10 m below top of casing (btc) on November 28, 2024, and test well depth was measured as approximately 24.4 m btc. The submersible pump was set at approximately 23.7 m btc at the time of the test. The total drawdown after eight (8)-hr of pumping was 9.95 m. This represents only approximately 60% of the available drawdown in the well, assuming the set pump depth of 23.7 m is the maximum drawdown which can be reached. The specific capacity of the well after eight (8)-hr of pumping was calculated to be 0.060 L/sec/m with a long-term availability of 59.2 m³ per day (59,200 L/day). This surpasses the calculated maximum daily flow is estimated as 5 925 L/day and 12.3 L/min (1.5 times the average daily flow, over an 8-hour period).

- The recovery was commenced at the end of the eight (8)-hr pumping duration. The submersible pump remained in the well throughout this time so not to alter the recovery test process and measurements, although LRL did collect a static water level prior to the well being installed. After one (1) hour of recovery, the well returned to 93.2% of the initial water level. LRL returned after approximately 21 hours (1245 minutes) of recovery to verify the water level. The well was recorded to have reached 99.6% recovery. The well recovery complies with the D-5-5 guideline requirement of 95% within 24 hours.
- Based on the observed drawdown/recovery relationship, it is concluded that the long-term yield of the test well is in excess of maximum daily demand flow of 3,950 L (3.95 m³/day) with a projected value of 59.2 m³/day and is found to be able to meet a maximum pumping rate of 8.2 L/minute, more than double the peak hourly demand of 12.3 L/minute, as well as the Maximum Hour Demand of 14.8 L/minute.
- As a conservative approach to determining the expected largest septic system envelope required to service an industrial warehouse establishment at the Site, a septic system envelope size was calculated assuming a fully raised bed with mantle, a percolation rate of 12 min/cm for the imported sand required and a daily sewage flow of 3 950 L. The total length of pipe required for the septic bed, assuming imported fill, was calculated as approximately 237 m. Assuming a conventional system is used, the anticipated pipe runs will be 15 runs being 15 m in length. Based on the total coverage of the septic bed (raised portion and mantle plus a replacement area) would be approximately 700 m².

  The proposed septic will be placed at the southern extent of the Site, where an area of more than 1,600 m² is available for the installation of the unit. The Site has a surface 11 920 m², of which, approximately 4,000 m² is considered suitable for placement of the sewage disposal system, which encompasses the southern portion of the property. Sufficient area of replacement area and mantle exists on the Site in accordance with the OBC to service the proposed development with a design sewage flow of up to 3 950 L/day.
- The ***Contaminant Attenuation Consideration*** (Predictive Assessment) demonstrates that through the use of the advanced tertiary septic treatment system, with an effluent nitrate concentration of 20 mg/L, the risk for impairment to the groundwater is considered low. The annual septic flow for the Site of 1 442 m³ will be meet with a calculated maximum allowable septic flow of 2 291 m³, with nitrate reduction technologies.
- Based on the ***Contaminant Attenuation Consideration***, the current Site conditions are suitable to attenuate the nitrate impacts generated by the septic systems on the development in accordance with current D-5-4 guidelines, provided an appropriate tertiary treatment is used and maintained. **The system must be able to treat the effluent to a nitrate level of 20 mg/L or less.** The potential impacts related to the use of the sewage disposal system on the Site, with respect to natural features, is low risk. Furthermore, supply wells in the area retain their water supply from deeper bedrock

aquifer which based on previous studies by others, is isolated from the proposed receiving groundwater, at the bedrock interface, of the on-Site septic system and will have little to negligible impacts to the neighbouring water supply.

10 RECOMMENDATIONS

Based on the results of this investigation the following recommendations are provided:

1. It is recommended that the recently constructed test well – TW2 at the Site be utilized as a water supply for the proposed development features of the Site. The well is found to generally have acceptable groundwater supply for the proposed Site activities and with treatment applied. Furthermore, the well will be able to meet the daily supply demands, as determined through the eight (8)-hour pumping test initiated.
2. The previously installed test well at the northeastern portion of the Site (TW1), is to be decommissioned in accordance with Ontario Regulation 903.
3. The casing of the well must maintain or be extended to 400 mm above final grade after construction.
4. Any new wells to be constructed on the Site should be of similar construction to that used as part of this assessment, and:
    a. All wells should be constructed with two (2) lengths of casing (approximately 12 metres) or with casing extending a minimum of one metre into competent bedrock, whichever is greater; and
    b. The casing should be sealed in accordance with Regulation 903. If Portland cement is used to seal the casing, the grout should be allowed to cure for a minimum of 72 hours before drilling continues. If high early strength cement is used, the curing time can be reduced to 24 hours.
5. No potential contamination sources to the proposed supply well shall be introduced within 30 m of the structure (TW2).
6. Additional consideration with respect to maintaining the condition of the supply well, and the corresponding supply aquifer include the following:
    a. Snow should not be piled in the area of the well so as not to potentially damage the supply well; and
    b. The Site, post- development, should be graded such that surface run-off and drainage be diverted away from the supply well.
7. The water quality of the proposed supply well is found to be in general accordance with the ODWS. The following exceptions were encountered:
    a. Alkalinity was reported to have values of 623 and 618 mg/L at 4- and 8-hour samples, respectively. These values are above the ODWS OG limit of 500 mg/L. Elevated alkalinity can result in undesirable taste and may result in scaling which could lead to buildup in piping and other mechanical components which may use the water supply (i.e. heat exchange systems). **Alkalinity can be affectively reduced through the use of a reverse osmosis treatment system**. Additionally, **corrosion resistant plumbing fixtures** can be used to prolong the longevity of these components;
    b. Dissolved Organic Compound (DOC) was reported to have values of 7.6 and 8.0

mg/L at four (4) - and eight (8) - hours samples, respectively, above the ODWS of 5 mg/L, although below the maximum concentration considered reasonably treatable provided in MECP D-5-5 of 10 mg/L. Elevated DOC can result in biofilm formation, as well as unpleasant odours, tase and colouration of the water supply. Furthermore, elevated DOC can impede on the effectiveness of UV and chlorination treatment, and can result in a harmful by-product, though a chemical reaction with chlorine. **Effective treatment options for elevated DOC include granular activated carbon filtration, or aeration**;

c. Colour was reported to have values of 5 TCU at the four (4) - and eight (8) -hours samples, respectively, meeting the ODWS of 5 TCU, and below the maximum concentration considered reasonably treatable (MCCRT) provided in MECP D-5-5 of 7 TCU. Although the concentration is within the ODWS limits, consideration to include treatment of colour is recommended as a conservative approach to support the use of the remaining treatment systems required. **Colour can be reduced through the use of granular activated carbon filtration or reverse osmosis**;

d. Hardness was found to be 893 and 887 mg/L at 4- and 8-hours, respectively, above the ODWS OG limit range of between 80 and 100 mg/L. High levels of hardness can lead to scale deposits and excessive utilization of regular soaps. **Hardness can be reduced through the use of a water softener**;

e. TDS values were found to be 1050 and 1040 mg/L in the 4- and 8-hour samples, respectively, above the AO of 500 mg/L. Elevated TDS can result in corrosion to plumbing fixtures and piping; encrustation; or taste problems. **A reverse osmosis system can be effective in removing up to 99% TDS in cases;**

f. Organic Nitrogen is calculated based on values of Total Kjeldahl Nitrogen (TKN) and Ammonia (NH3). More specifically, the difference between TKN and NH3. Organic Nitrogen was calculated to be 0.25 mg/L in the four (4) – hour sampling, and 0.24 mg/L in the eight (8) – hour sample. Elevated organic nitrogen can result in biofilm formation, as well as unpleasant odours, taste and colouration of the water supply. **Organic nitrogen can be treated through the use of a reverse osmosis system or anion exchange unit**;

g. Turbidity was measured to have a level of 19.4 NTU in the four (4)-hour sample, and 16.4 NTU in the eight (8)-hour sample. Both of which are above the ODWS OG of 1 NTU if the treatment system is required to provide filtration, and the maximum concentration considered reasonably treatable provided in MECP D-5-5 of 5 NTU. It is important to note that in-field measurements collected, supported through observations, revealed much lower turbidity values at the time of sampling. No apparent colour or tinge to the samples were encountered, which is shown in the supporting photos collected during the pumping test, as presented below. In-field measurements collected were recorded as 0.91 NTU at the four (4) hour sample collection time, and 0.56 NTU at the eight (8) hour sample collection time. **If the water is to be disinfected using an ultra-violet filter, it is recommended that the water be pre-treated with a 5 um filter**;

h. Iron was reported in both the 4-hour and the 8-hour sample with values of 1.9 and 1.7 mg/L, above the ODWS AO of 0.3 mg/L, and marginally above the MCCRT of 5 mg/L. Elevated iron can be the result of naturally occurring mineral deposits in a water supply and may lead to an unpleasant taste, as well as discolouration. High concentrations of iron can result in blockages to distribution

systems. Iron can be reduced through aeration, followed by filtration in cases where concentrations exceed 10 mg/L. **In cases of lesser iron concentrations, sediment filters, carbon filters or water softeners are effective to reduce levels**; and

i. Manganese concentrations exceeded the ODWS AO of 0.05 mg/L, with values of 0.608 and 0.621mg/L in both the 4-hour and 8-hour samples collected. Elevated concentrations of manganese can result in discolouration of fixtures or counter tops, and laundry staining. Additionally, the Canadian Drinking Water Quality Guidelines indicate that levels above 0.12 mg/L can result in neurological development and behaviour effects, as well as deficits in memory, attention and motor skills. **Reverse osmosis can be used to reduce concentrations of manganese**.

8. Although select parameters were encountered in excess of the maximum concentration considered reasonably treatable provided in MECP D-5-5 , it is our profession opinion that through the use of more advanced systems, the supply water can be treated to more suitable conditions. Such treatment system which can be considered included:
    - Activated Carbon filter can be used to reduce level of dissolved organic compound (DOC); iron and colour although considered within the acceptable limits.
    - A Water Softener to reduce levels of manganese and hardness; and
    - Reverse Osmosis System to reduce concentrations of TDS, alkalinity, manganese and organic nitrogen.
9. The water treatment system should be maintained on a regular basis in accordance with the manufacturer's recommendations to ensure that it is properly functioning and providing a safe drinking water.
10. Chlorination is not recommended as a treatment option of the proposed development based on the levels of organic carbon, and other parameters detected.
11. The owner should maintain their well as outlined in the Ontario Ministry of Agricultural and Rural Affairs Best Management Series – Water Wells.
12. The subsurface conditions indicated for the Site are considered suitable for a Class IV septic sewage disposal system with a partially to fully raised leaching bed depending on the specific soil and groundwater conditions at the actual leaching bed locations. Sewage system designs shall be based on specific investigations to evaluate the suitability of local conditions on each lot. The system should be designed using the percolation time of the native and imported sand and according to the Ontario Building Code (OBC). The leaching beds should be constructed to conform to the specifications set out in the OBC. The septic systems shall be constructed above the groundwater table over the native soil once all organic soils have been stripped from is footprint.
13. The system must be able to treat the effluent to a nitrate level of 20 mg/L or less.
14. Prior to installation of the septic disposal system, an updated application must be filed and approved by the Ontario Septic System Office (OSSO).
15. Due to the sensitive features encountered on the Site, namely proximity of the wetland, the septic system should be placed at least 30 m from any drilled supply wells on the Site, 30 m from any shallow/dug wells, and at least 3 m from the property boundary limits.

16. It is recommended that the water table be surveyed prior to installation of the sewage disposal systems.
17. A formal septic system design must be completed by a licenced designer or equivalent. The design must be approved by the OSSO before installation. The system is to be located in the down-gradient of the proposed supply well, as presented in Figure 6. The septic system must be designed so that it contains filtration components to treat nitrate concentrations to at least 20 mg/L.
18. The Rideau Valley Conservation Authority, 2022 document entitled 'SepticSmart' outlines the best management procedures for a private sewage disposal system. This document should be consulted. Select best management practices, as included in this document, included:
    a. Have the system inspected for sludge and scum buildup on a regular basis (3-5 years) and have the tank clean out when a third of the depth of your tank is full of sludge (solids);
    b. Use an effluent filter, and have it inspected and cleaned annually;
    c. Strategically grade the area around the distribution system (during installation, and maintain afterwards) to divert surface water away; and
    d. Conserve water to reduce the amount of wastewater that must be treated, use toilets with low flush features, include lint filter on washing machine's discharge pipe.
19. The occupant of the proposed development is advised to have their water regularly analysed for bacteria and septic indicator parameters, such as chloride, ammonia, nitrates, nitrites, Total Kjeldahl Nitrogen, E. Coli and Total Coliforms.
20. The water is considered to be scale forming but non-corrosive. Although it is considered non-corrosive, it is recommended that corrosion resistant plumbing be introduced as it is possible that alterations to the levels encountered post treatment may increase the corrosivity of the water supply.

11 LIMITATIONS

The findings contained in this report are based on data and information collected during the Hydrogeological Assessment & Terrain Analysis of the subject property conducted by LRL Engineering. The conclusions and recommendations are based solely on-Site conditions encountered at the time of our fieldwork between November 24, 2024, and January 8, 2025, supplemented by historical information and data obtained as described in this report. The information presented in this report represents the groundwater conditions at the locations sampled. Due to natural variations in geological conditions, no inference is made to the soil or groundwater conditions between sampling points. No assurance is made regarding changes in conditions subsequent to the time of this investigation. If additional information is discovered or obtained, LRL Engineering should be requested to re-evaluate the conclusions presented in this report and to provide amendments as required.

In evaluating the subject property, LRL Engineering has relied in good faith on information provided by individuals as noted in this report. We assume that the information provided is factual and accurate. We accept no responsibility for any deficiencies, misstatements or inaccuracies contained in this report as a result of omissions, misinterpretation or fraudulent acts of the persons contacted.

Yours truly,

LRL Engineering

LICENSED PROFESSIONAL ENGINEER
May 13, 2026
K. MOHAMMADI
100172155
PROVINCE OF ONTARIO

Jessica Arthurs
Environmental Engineering Manager

Kourosh Mohammadi, Ph. D., P. Eng.
Senior Hydrogeological Engineer

W:\FILES 2024\240374\04 Environmental\04 Hydrogeology\05 Reports\2026 Revision01\2026.05.13.LRL240374Report.TW2.HydrogeologicalAssessment.561SommeStreet.docx

FIGURES

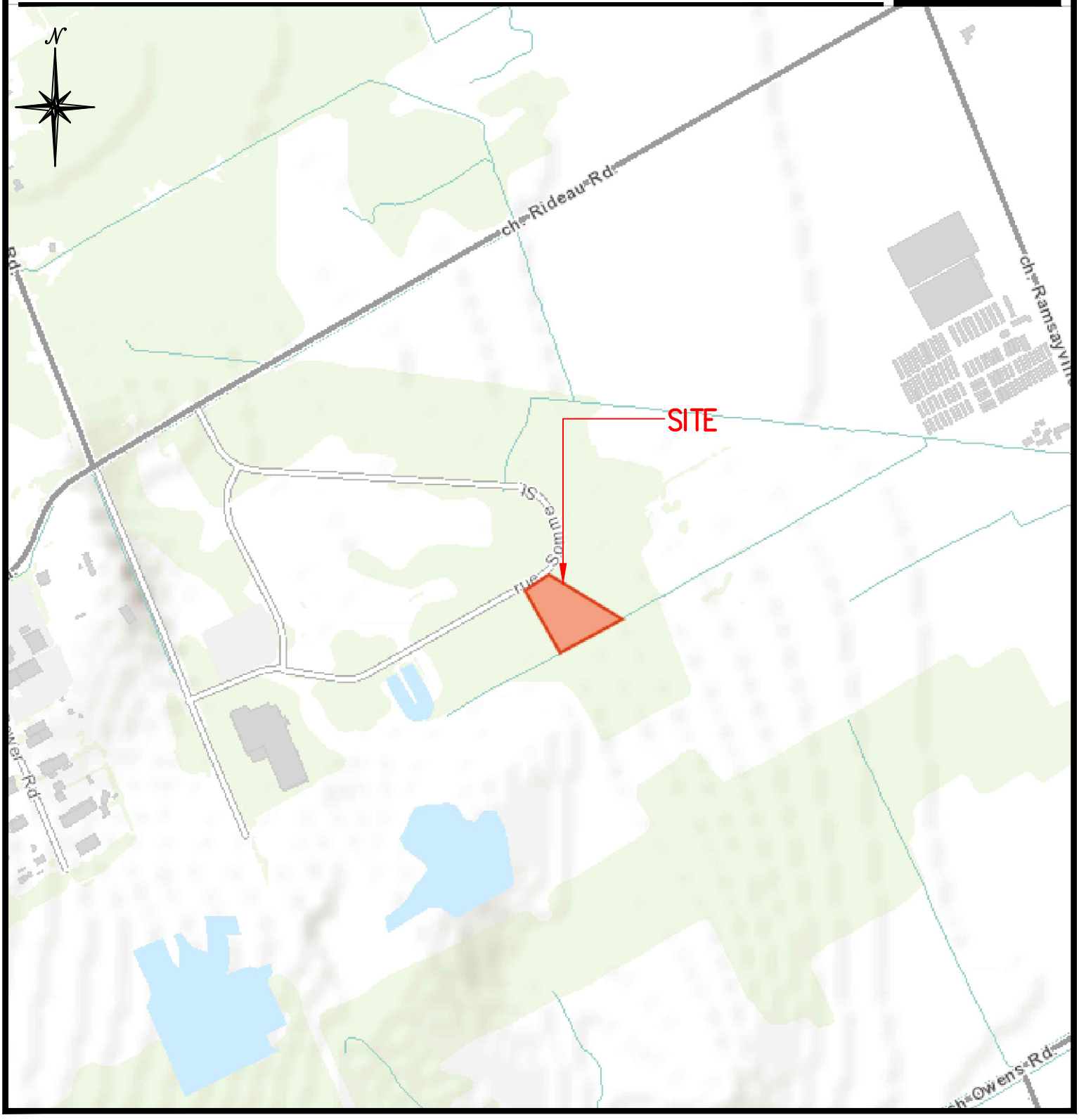
LRL
ENGINEERING I INGÉNIERIE
5430 Canotek Road I Ottawa, ON, K1J 9G2
www.lrl.ca I (613) 842-3434

PROJECT
HYDROGEOLOGICAL ASSESSMENT & TERRAIN ANALYSIS
PROPOSED WAREHOUSE DEVELOPMENT
561 SOMME STREET
OTTAWA, ONTARIO

DRAWING TITLE
SITE LOCATION
(NOT TO SCALE)
SOURCE: GEOOTTAWA

CLIENT	DATE	PROJECT
BLACKSTONE GRANITE	MAY 2026	240374

FIGURE1





LEGEND

- Property Line – Subject Site (561 Somme Street)
- Neighbouring Property Boundaries
- XX Test Well (TW1) – To Be Decommissioned
- XX Test Well (TW2) – Proposed Supply Well
- Identified Stream
- Division Between Various Surficial Materials

20m 10 0 20 40m

SCALE: 1:1000

No.	REVISIONS	BY	DATE
01	FINAL	J.A.	04/05/2026

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
BLACKSTONE GRANITE

DESIGNED BY:	DRAWN BY:	APPROVED BY:
J.A	J.A.	K.M.

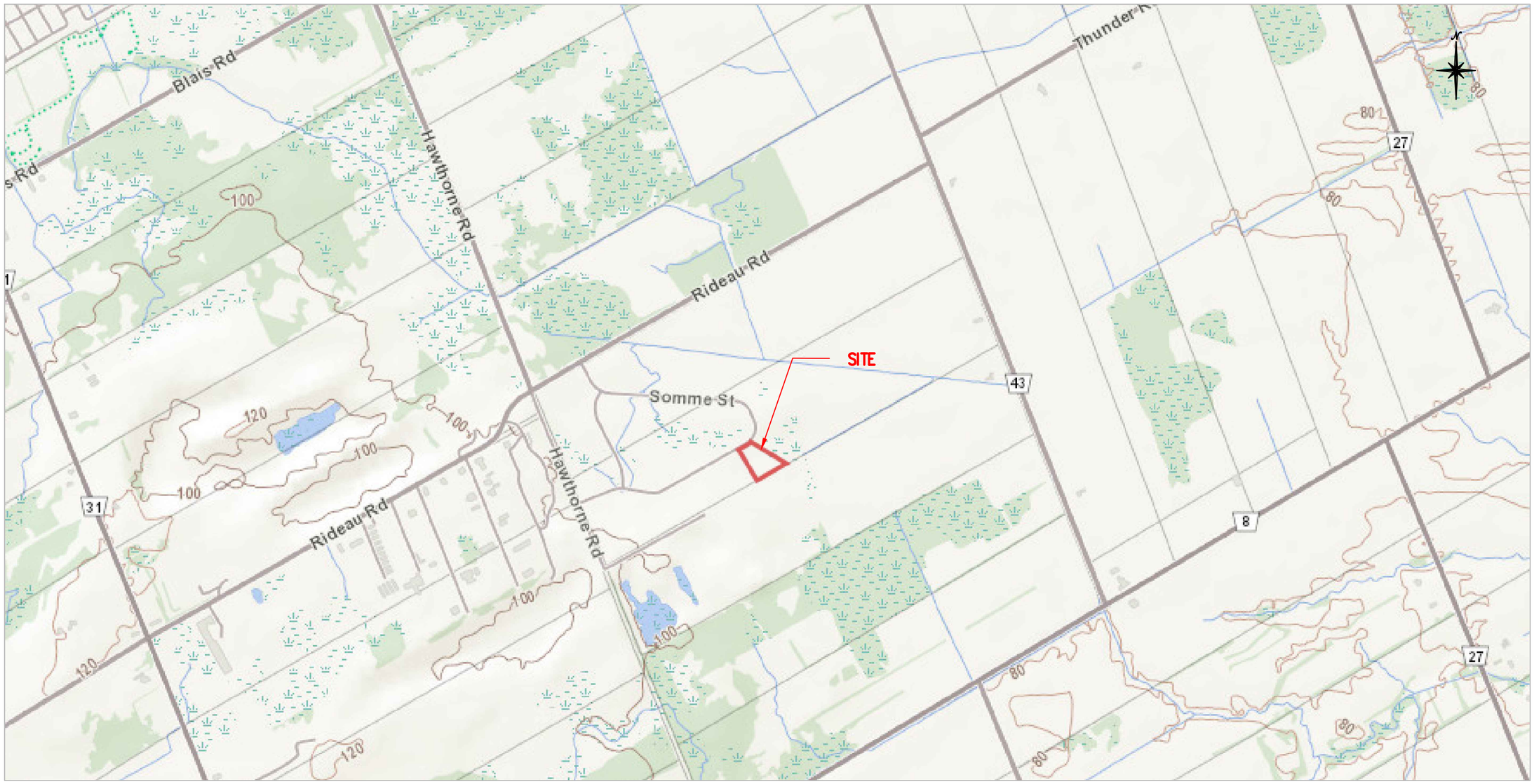
PROJECT
HYDROGEOLOGICAL ASSESSMENT &
TERRAIN ANALYSIS
PROPOSED WAREHOUSE DEVELOPMENT
561 SOMME STREET
OTTAWA, ONTARIO

DRAWING TITLE
SITE PLAN

PROJECT NO.
240374

DATE
MAY 2026

FIGURE2



LEGEND

- 208 — Spot Height
- 200 — Index Contour
- Contour
- Wooded Area
- Wetland

No.	REVISIONS	BY	DATE
01	FINAL	J.A.	04/05/2026

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
BLACKSTONE GRANITE

DESIGNED BY:	DRAWN BY:	APPROVED BY:
J.A	J.A.	K.M.

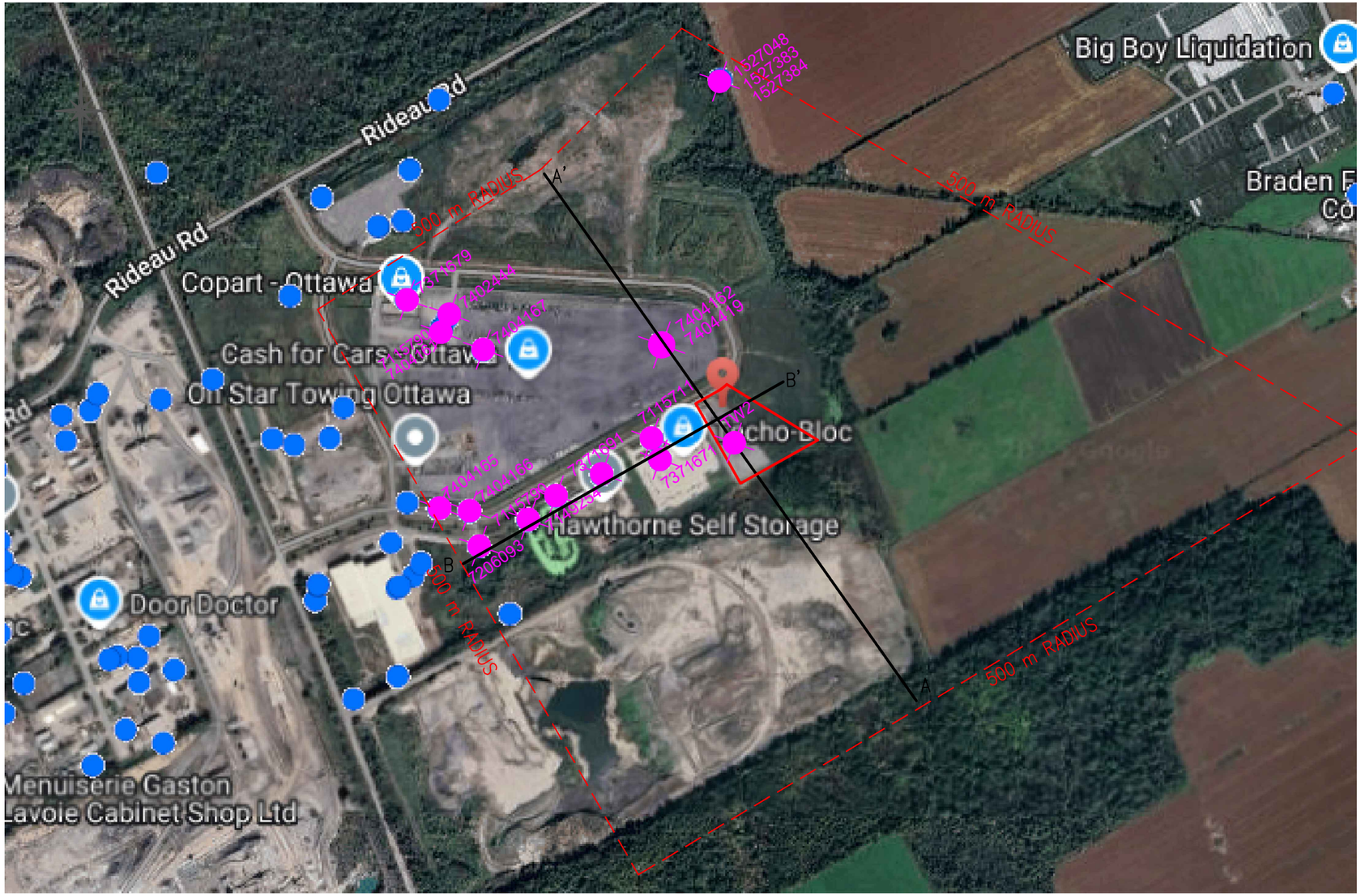
PROJECT
HYDROGEOLOGICAL ASSESSMENT & TERRAIN ANALYSIS
PROPOSED WAREHOUSE DEVELOPMENT
561 SOMME STREET
OTTAWA, ONTARIO

DRAWING TITLE
MNR - MAKE A MAP
NATURAL HERITAGE AREAS
(WETLAND)
(NOT TO SCALE)

PROJECT NO.
240374

DATE
MAY 2026

FIGURE3



Legend

Property Line – Subject Site (561 Somme Street)

xxxx Wells within 500 m of the Site

xxxx Wells beyond 500 m of the Site

No.	REVISIONS	BY	DATE
01	FINAL	J.A.	04/05/2026

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
BLACKSTONE GRANITE

DESIGNED BY:	DRAWN BY:	APPROVED BY:
J.A	J.A.	K.M.

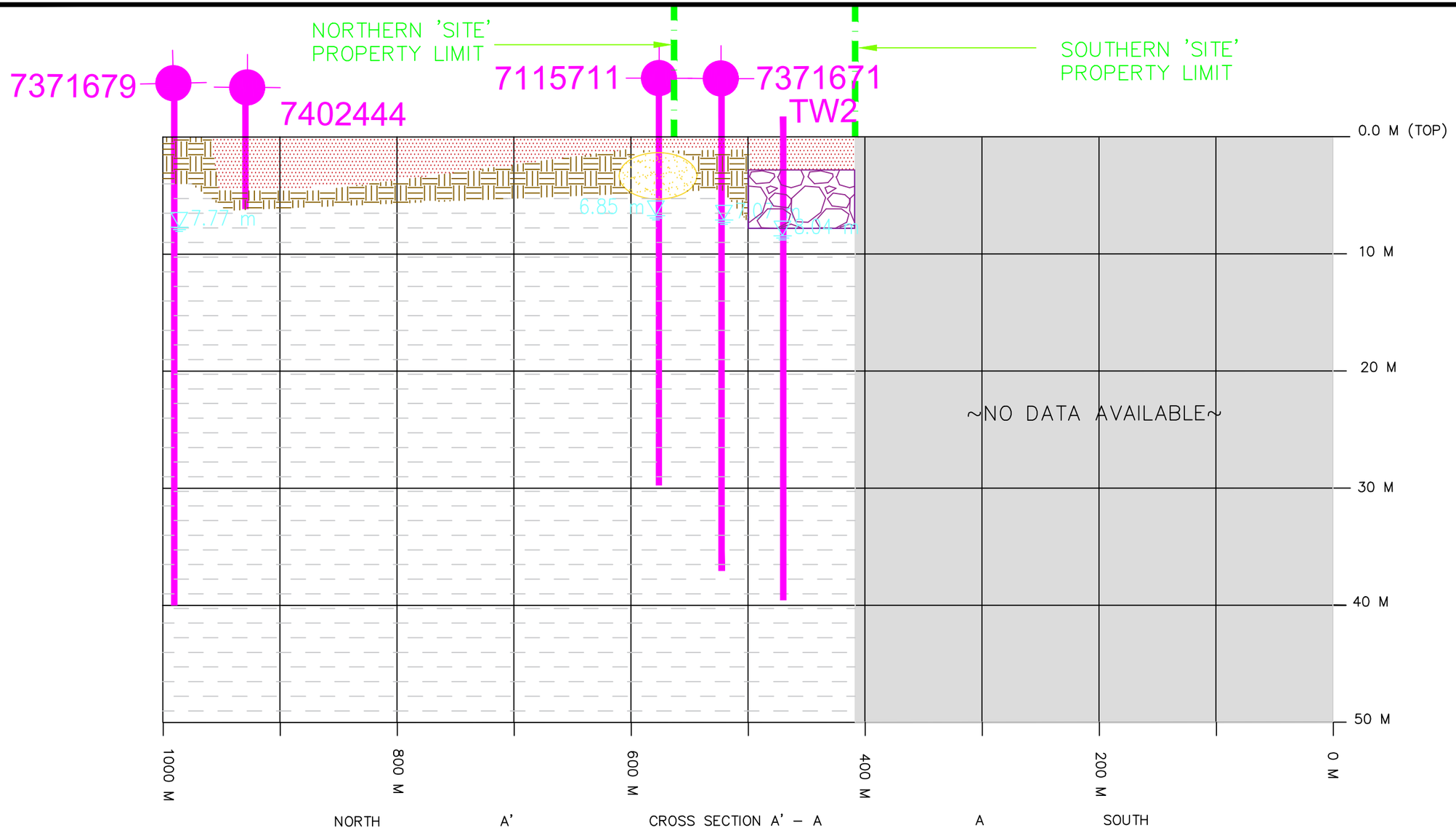
PROJECT
HYDROGEOLOGICAL ASSESSMENT & TERRAIN ANALYSIS
PROPOSED WAREHOUSE DEVELOPMENT
561 SOMME STREET
OTTAWA, ONTARIO

DRAWING TITLE
WELLS WITHIN 500 m OF THE SITE (SOURCE & BASE LAYER: MECP WELL RECORD DATABASE)

PROJECT NO.
240374

DATE
MAY 2026

FIGURE4



LEGEND

- Clay
- Bedrock
- Fill
- Sand (Sand, Gravel. Boulders)
- Till
- Gravel
- ▽XXX m Static Water Level, as indicated in water well log

No.	REVISIONS	BY	DATE
01	FINAL	J.A.	04/05/2026

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
BLACKSTONE GRANITE

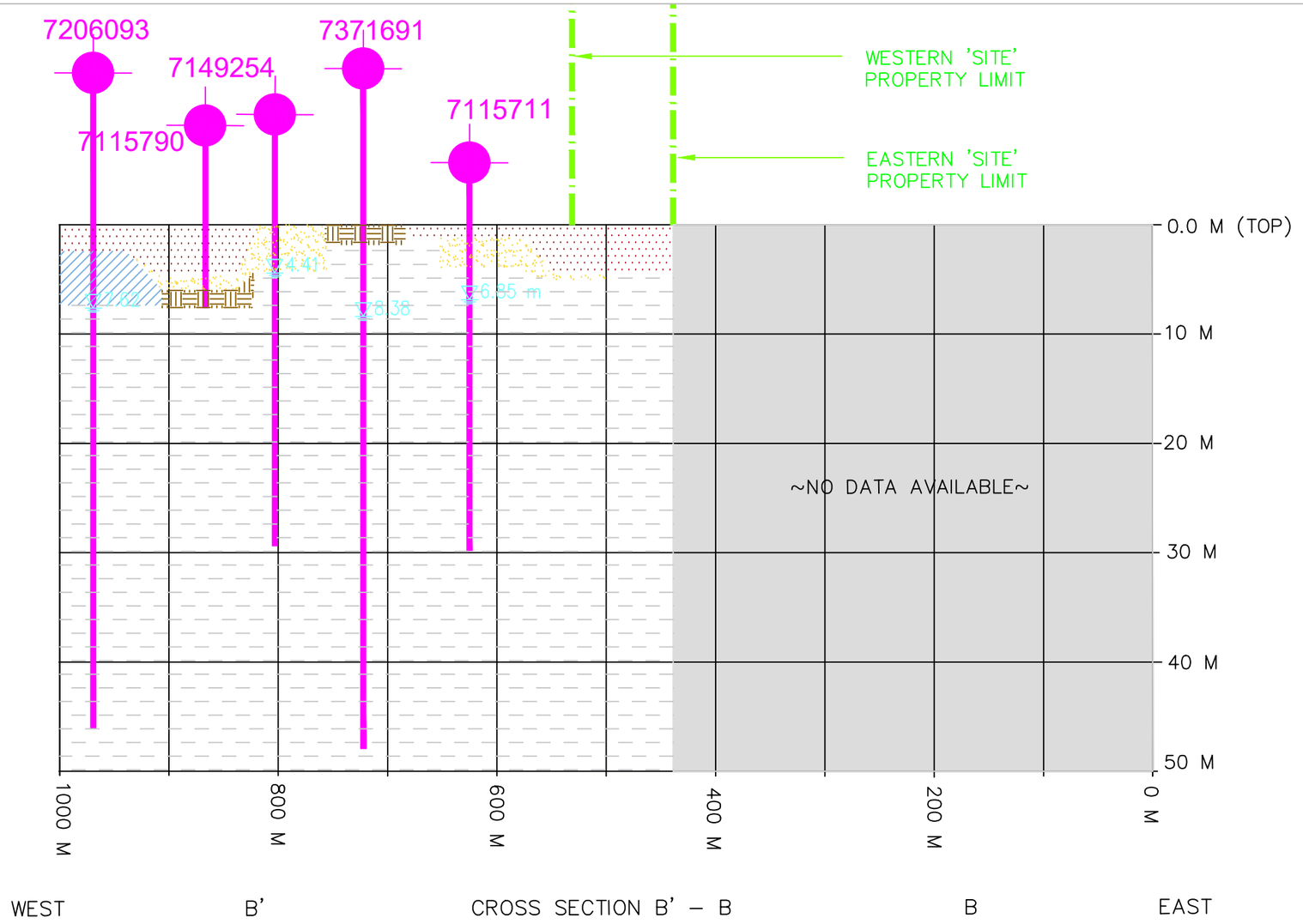
DESIGNED BY:	DRAWN BY:	APPROVED BY:
J.A	J.A.	K.M.

PROJECT
HYDROGEOLOGICAL ASSESSMENT & TERRAIN ANALYSIS
PROPOSED WAREHOUSE DEVELOPMENT
561 SOMME STREET
OTTAWA, ONTARIO

DRAWING TITLE
APPROXIMATE SUBSURFACE CROSS SECTION
A - A'

PROJECT NO. 240374
DATE MAY 2026

FIGURE5A



LEGEND

- Bedrock
- Sand (Sand, Gravel. Boulders)
- XXX m — Static Water Level, as indicated in water well log
- Clay
- Fill
- Till

15m 0 30 60m

SCALE: 1:1250

No.	REVISIONS	BY	DATE
01	FINAL	J.A.	04/05/2026

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
BLACKSTONE GRANITE

DESIGNED BY:	DRAWN BY:	APPROVED BY:
J.A	J.A.	K.M.

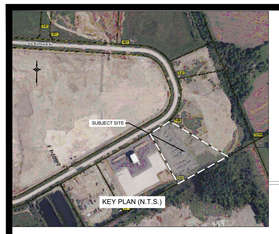
PROJECT
HYDROGEOLOGICAL ASSESSMENT & TERRAIN ANALYSIS
PROPOSED WAREHOUSE DEVELOPMENT
561 SOMME STREET
OTTAWA, ONTARIO

DRAWING TITLE
APPROXIMATE SUBSURFACE CROSS SECTION
(B - B')

PROJECT NO.
240374

DATE
MAY 2026

FIGURE 5B



PROP. 20.0m- 600mm Ø FROST TREATED HDPE CULVERT, AS PER OPSD 803.030 RIP-RAP TO BE PLACED AT CULVERT INLET/OUTLET AS PER OPSD 801.101.

PROP. INV. =89.13

PROP. INV. = 88.93

PROP. 150mmØ ROOF-DRAIN STM OUTLET PIPE INV. =89.20 BOTTOM OF DITCH =88.90 C/W RODENT GRATE AND BACKFLOW PREVENTOR.

PROP. 300mmØ STM OUTLET PIPE INV. =89.20 BOTTOM OF DITCH =88.85 C/W RODENT GRATE AND BACKFLOW PREVENTOR. RIP-RAP TO BE PLACED AT STM-SEWER INLET/OUTLET AS PER OPSD 801.101.

PROP. ±20m-150mmØ PVC DR-18 WTR SERVICE PIPE TO SERVICE DRY HYDRANT ON-SITE. PIPE TO BE BURIED 2.4m BELOW GRADE.

EXISTING TEST WELL (TO BE DECOMMISSIONED)

FIRE PROTECTION WATER SUPPLY VOLUME REQ'D = 180,000L AS PER NFPA CALCULATIONS PROVIDED BY JAIN SUSTAINABILITY CONSULTANTS DATED AUG 12, 2025. TENT. PROP. REINFORCED CONCRETE TANKS @ 60,000L CAPACITY EACH.
C/W ANCHORING TO COUNTER BUOYANCY FORCES. LEAD TANK TO BE FITTED WITH CHUTE AND DRAIN PIPE AS PER CITY OF OTTAWA DETAILS W51 AND W52.

PROPOSED REINFORCED CONCRETE UNDERGROUND FIRE PROTECTION TANKS (DESIGN BY OTHERS) ALL STORAGE TANKS TO BE DESIGNED WITH ADDITIONAL REINFORCING TO SUPPORT CHBDC VEHICULAR LOADING.

PROP. 6.1m- 50mmØ PEX WTR SERVICE PIPE TO BE BURIED 2.4m BELOW GRADE. WTR CONNECTION TO THE BUILDING AS PER MECHANICAL DESIGN.

PIPE CROSSING CR-02 WTR OBV=88.80 STM INV=90.24 VERTICAL SEPARATION=±1.44m (TO BE COORDINATED FURTHER WITH MECHANICAL ENGINEER)

PROP.ROOF DRAIN OUTLET. PROP INV. AT STUB= ±90.55. EXACT LOCATION AND INV TO BE COORDINATED W/ MECHANICAL ENGINEER.

PIPE CROSSING CR-01 STM INV=89.47 MIN CLEARANCE =0.72m

PROP. ±156m-150mmØ PVC DR-18 WTR SERVICE PIPE TO SERVICE DRY HYDRANT ON-SITE. PIPE TO BE BURIED 2.4m BELOW GRADE.

PROPOSED SUPPLY WELL (TW2)

DIRECTION OF INFERRED GROUNDWATER FLOW DIRECTION

PROPOSED GRANITE SHOWROOM AND WAREHOUSE DEVELOPMENT (G.F.A. = ±2787m²) F.F.E. = 91.70

30 m Setback

SEPTIC SANITARY SERVICE OUTLET LOCATION AND INVERT TO BE COORDINATED BETWEEN MECHANICAL ENGINEER AND SEPTIC DESIGNER

TOP OF TRENCH DRAIN = 90.45 PROP. TRENCH DRAIN TO OUTLET ON THE GRASS-SURFACE VIA INTERNAL PUMP. REFER TO MECH DRAWINGS FOR INTERNAL PUMP AND PLUMBING DETAILS.

PROP. ±10.0m - 150mm PVC SDR-28 SANITARY SERVICE @ MIN. 1.0% SLOPE. SANITARY SERVICE DIAMETER & PLACEMENT TO BE CONFIRMED BY THE SEPTIC DESIGNER.

PROPOSED SEPTIC TREATMENT SYSTEM (DESIGN BY OTHERS)

PROPOSED LEACHING BED (DESIGN BY OTHERS)

PROP. GRASS SWALE @2.7%

~NEIGHBOURING SEPTIC~

30.3m
20.8m
25.4m
4.7m
5.8m

LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED LIMITS OF RE-GRADING
- PROPOSED DOOR ENTRANCE/EXIT
- PROPOSED GRASS AREA (100mm TOP SOIL & SOD)
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED RIP RAP
- ×50.00 PROPOSED ELEVATION
- ×50.00HP PROPOSED HIGH POINT ELEVATION
- ×50.00S PROPOSED BOTTOM OF SWALE ELEVATION
- ×50.00BC PROPOSED BOTTOM OF CURB / ASPHALT ELEVATION
- ×50.00TC PROPOSED TOP OF CURB ELEVATION
- ×50.00BW PROPOSED EXPOSED BOTTOM OF RETAINING WALL
- ×50.00TW PROPOSED TOP OF RETAINING WALL
- ×50.00EX MATCH INTO EXISTING ELEVATION
- ×70.19 EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- STM / STM PROPOSED STORM SEWER
- SAN / SAN PROPOSED SANITARY SEWER
- WTR / WTR PROPOSED WATERMAIN
- PROPOSED DRY FIRE HYDRANT
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED MANHOLE
- PROPOSED CURB STOP
- PROPOSED ROOF SCUPPER
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- CA-XX (CONTROLLED) XX — WATERSHED NAME, RUNOFF COEFFICIENT, AREA IN HECTARES

USE AND INTERPRETATION OF DRAWINGS

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION ARE PART OF THE CONTRACT DOCUMENTS AND DESCRIBE USE AND INTENT OF THE DRAWING. THE CONTRACT DOCUMENTS INCLUDE NOT ONLY THE DRAWINGS, BUT ALSO THE OWNER-CONTRACTOR AGREEMENTS, CONDITIONS OF THE CONTRACT, THE SPECIFICATIONS, ADDENDA, AND MODIFICATIONS ISSUED AFTER EXECUTION OF THE CONTRACT. THESE CONTRACT DOCUMENTS ARE COMPLEMENTARY, AND WHAT IS REQUIRED BY ANY ONE SHALL BE BINDING AS IF REQUIRED BY ALL. WORK NOT COMPLETELY DELINEATED HEREON SHALL BE CONSTRUCTED OF THE SAME MATERIALS AND DETAILED SIMILARLY AS WORK SHOWN MORE COMPLETELY ELSEWHERE IN THE CONTRACT DOCUMENTS.

BY USE OF THE DRAWINGS FOR CONSTRUCTION OF THE PROJECT, THE OWNER CONFIRMS THAT HE HAS REVIEWED AND APPROVED THE DRAWINGS. THE CONTRACTOR CONFIRMS THAT HE HAS VISITED THE SITE, FAMILIARIZED HIMSELF WITH THE LOCAL CONDITIONS, VERIFIED FIELD DIMENSIONS AND CORRELATED HIS OBSERVATIONS WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

AS INSTRUMENTS OF SERVICE, ALL DRAWINGS, SPECIFICATIONS, CADD FILES OR OTHER ELECTRONIC MEDIA AND COPIED THERE OF FURNISHED BY THE ENGINEER ARE HIS PROPERTY. THEY ARE TO BE USED ONLY FOR THIS PROJECT AND ARE NOT TO BE USED ON ANY OTHER PROJECT, INCLUDING REPEATS OF THE PROJECT. CHANGES TO THE DRAWINGS MAY ONLY BE MADE BY THE ENGINEER.

UNLESS THE REVISION TITLE IS "ISSUED FOR CONSTRUCTION", THESE DRAWINGS SHALL BE CONSIDERED PRELIMINARY AND SHALL NOT BE USED AS A CONSTRUCTION DOCUMENT.

THESE DRAWINGS ILLUSTRATES THE WORK TO BE DONE. THE ENGINEER IS NOT RESPONSIBLE FOR THE MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES USED TO DO THE WORK, OR THE SAFETY ASPECTS OF CONSTRUCTION, AND NOTHING ON THESE DRAWINGS EXPRESSED OR IMPLIED CHANGES THIS CONDITION. CONTRACTOR SHALL DETERMINE ALL CONDITIONS AT THE SITE AND SHALL BE RESPONSIBLE FOR KNOWING HOW THEY AFFECT THE WORK. SUBMITTAL OF A BID TO PERFORM THIS WORK IS ACKNOWLEDGEMENT OF THE RESPONSIBILITIES, AND THAT THEY HAVE BEEN FULLY CONSIDERED IN PLANNING OF THE WORK, AND THE BID PRICE. NO CLAIMS FOR EXTRA CHANGES DUE TO THESE CONDITIONS WILL BE FORTHCOMING.

UNAUTHORIZED CHANGES:

IN THE EVENT THE CLIENT, THE CLIENT'S CONTRACTORS OR SUBCONTRACTORS, OR ANYONE FOR WHOM THE CLIENT IS LEGALLY LIABLE MAKES OR PERMITS TO BE MADE ANY CHANGES TO ANY REPORTS, PLANS, SPECIFICATIONS OR OTHER CONSTRUCTION DOCUMENTS PREPARED BY LRL ASSOCIATES LTD. (LRL) WITHOUT OBTAINING LRL'S PRIOR WRITTEN CONSENT, THE CLIENT SHALL ASSUME FULL RESPONSIBILITY FOR THE RESULTS OF SUCH CHANGES, THEREFORE THE CLIENT AGREES TO WAIVE ANY CLAIM AGAINST LRL AND TO RELEASE LRL FROM ANY LIABILITY ARISING DIRECTLY OR INDIRECTLY FROM SUCH UNAUTHORIZED CHANGES.

IN ADDITION, THE CLIENT AGREES, TO THE FULLEST EXTENT PERMITTED BY LAW, TO INDEMNIFY AND HOLD HARMLESS LRL FROM ANY DAMAGES, LIABILITIES OR COST, INCLUDING REASONABLE ATTORNEY'S FEES AND COST OF DEFENSE, ARISING FROM SUCH CHANGES.

IN ADDITION, THE CLIENT AGREES TO INCLUDE IN ANY CONTRACTS FOR CONSTRUCTION APPROPRIATE LANGUAGE THAT PROHIBITS THE CONTRACTOR OR ANY SUBCONTRACTORS OF ANY TIER FROM MAKING ANY CHANGES OR MODIFICATIONS TO LRL'S CONSTRUCTION DOCUMENTS WITHOUT THE PRIOR WRITTEN APPROVAL OF LRL AND THAT FURTHER REQUIRES THE CONTRACTOR TO INDEMNIFY BOTH LRL AND THE CLIENT FROM ANY LIABILITY OR COST ARISING FROM SUCH CHANGES MADE WITHOUT SUCH PROPER AUTHORIZATION.

GENERAL NOTES:

EXISTING SERVICES AND UTILITIES SHOWN ON THESE DRAWINGS ARE TAKEN FROM THE BEST AVAILABLE RECORDS, BUT MAY NOT BE COMPLETE OR TO DATE. CONTRACTOR SHALL VERIFY IN FIELD FOR LOCATION AND ELEVATION OF PIPES AND CHECK WITH THE UTILITY COMPANIES BEFORE DIGGING OR PERFORMING WORK.

CONTRACTOR IS ADVISED TO COLLECT INFORMATION ON SOIL CONDITIONS BEFORE START OF CONSTRUCTION.

THE ENGINEER WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THESE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THEY CONVEY, OR FOR PROBLEMS WHICH ARISE FROM OTHERS' FAILURE TO OBTAIN AND/OR FOLLOW THE ENGINEER'S GUIDANCE WITH RESPECT TO ANY ERRORS, OMISSIONS, INCONSISTENCIES AMBIGUITIES OR CONFLICTS WHICH ARE ALLEGED.

CONTRACTOR TO VERIFY ALL DIMENSIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE WORK COMMENCES. DO NOT SCALE DRAWINGS.

5m 2 0 5 10m
SCALE: 1:300

NOT FOR CONSTRUCTION TENDER OR PERMIT

No.	REVISIONS	BY	DATE
02	RE- ISSUED FOR APPROVAL	S.V.	10 OCT 2025
01	ISSUED FOR APPROVAL	S.V.	17 APRIL 2025

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING I INGÉNIERIE
5430 Canotek Road I Ottawa, ON, K1J 9G2
www.lrl.ca I (613) 842-3434

CLIENT
BLACKSTONE GRANITE

DESIGNED BY:	DRAWN BY:	APPROVED BY:
S.V.	S.V.	M.B.

PROJECT
PROPOSED GRANITE SHOWROOM & WAREHOUSE DEVELOPMENT
561 SOMME STREET
OTTAWA, ON K0A 1V0

DRAWING TITLE
PROPOSED DEVELOPMENT PLAN, AND SUPPLY WELL LOCATION (TW2)

PROJECT NO.
240374 FIGURE 6

TABLES

Table 1
Specific Capacity and Longterm Availability - Proposed Supply Well
Hydrogeological Assessment & Terrain Analysis
Proposed Warehouse Development - 561 Somme Street, Ottawa, Ontario
LRL File: 240374

Well	Cs - Static mTOC	EOH mTOC	Cp - Pump* mTOC	Cp - Cs	Drawdown (m)	Pumping Rate L/min	*Sc* - Specific Capacity L/sec/m	Qsc -Maximum Pumping Rate L/min	Long Term Availability m^3/day	Qsc GPM (US)	Qsc GPM (IMP)
TW2	8.04	14.34	36.6	28.6	6.30	57.6	0.152	175.0	251.9	46.2	38.5

Notes:

$$Qsc = 0.67\frac{(C_p - C_s)S_c}{SF}$$

Qsc	Pumping rate
$C_p - C_s$	Difference between pump level and static water level (m);
S_c	Specific capacity (L/min/m); and
0.67	Is a factor that compensates for the variation of the static water level due to seasonal variations as well as to drawdown from nearby wells
Minimum Daily Demand	3.95 m^3
*	Depth of pump at the time of the pumping test - measured in field
	Greater than Minimum Demand
	Less than Minimum Demand
TOC	Top of Casing

Table 2A
Summary of Analysis of Water Sample Collected - Proposed Supply Well
Hydrogeological Assessment and Terrain Analysis
Proposed Warehouse Development - 561 Somme Street, Ottawa, Ontario
LRL File: 240374

Parameter	Units	MRL	Ontario Drinking Water Standards		MECP D-5-5[5]	Sample	
			Standard	Type		TW2 4-HR	TW2 8-HR
Sample Date (d/m/y)						**20-Apr-26**	**20-Apr-26**
Microbiological Parameters							
E. Coli	CFU/100 mL	1	0	MAC		<1	<1
Fecal Coliforms	CFU/100 mL	1	0 [1]	MAC		<1	<1
Heterotrophic Plate Count	CFU/ml	10	--			<10	<10
Total Coliforms	CFU/100 mL	1	0/5[1]	MAC		<1	<1
General Inorganics							
Alkalinity, total	mg/L	5	30 - 500	OG		**623**	**618**
Ammonia as N	mg/L	0.01	--			0.25	0.26
Dissolved Organic Carbon	mg/L	0.5	5	AO	10	**7.6**	**8.0**
Colour	TCU	2	5	AO	7	5	5
Conductivity	uS/cm	5	--			1690	1690
Cyanide, free	mg/L	0.001	0.2			--	<0.002
Hardness	mg/L	1	80 - 100	OG		**861**	**828**
pH	pH Units	0.05	6.5 - 8.5	OG		7.3	7.4
Phenolics	mg/L	0.001	--			<0.001	<0.001
Total Dissolved Solids	mg/L	10	500	AO		**1050**	**1040**
Sulphide	mg/L	0.02	0.05	AO		<0.02	<0.02
Tannin & Lignin	mg/L	0.1	--			0.3	0.3
Total Kjeldahl Nitrogen	mg/L	0.1	--			0.5	0.5
Organic Nitrogen	mg/L		0.15	OG		**0.25**	**0.24**
Turbidity	NTU	0.1	1/5[2]	OG/AO	5	**19.4**	**16.4**
Anions							
Chloride	mg/L	1	250	AO	250	89	89
Fluoride	mg/L	0.1	1.5[3]/2.4	MAC		0.2	0.2
Nitrate as N	mg/L	0.1	10	MAC		<0.1	<0.1
Nitrite as N	mg/L	0.05	1	MAC		<0.05	<0.05
Sulphate	mg/L	1	500	AO	500	221	221

NOTES

MRL Minimum Reportable Limit
MAC Maximum Acceptable Concentration
AO Aesthetic Objective
OG Operational Guideline

ODWS Ontario Drinking Water Standards (2006)
NA Not Analysed
UNDERLINE Parameter level above ODWS
Italics Notify Medical Officer of Health
BOLD Parameter level above D-5-5 maximum treatability limits

[1] As per Table 1 of MECP's technical guideline "*D-5-5 Private Wells: Water Supply Assessment*"

[2] 1.0 NTU MAC if treatment system required to provide filtration for disinfection. 5.0 NTU AO for all points of consumption

[3] Where supplies of naturally occuring flouride at levels above 1.5 mg/L but below 2.4 mg/L the Ministry of Health recommends notification of local board of health of levels to avoid excesses exposure from other sources.

[4] Limit at which Local Medical Officer of Health should be notified of Levels.

[5] MECP D-5-5 guideline, maximum concentration considered reasonably treatable

Table 2B
Summary of Analysis of Water Sample Collected - Proposed Supply Well
Hydrogeological Assessment and Terrain Analysis
Proposed Warehouse Development - 561 Somme Street, Ottawa, Ontario
LRL File: 240374

Parameter	Units	MRL	Ontario Drinking Water Standards		MECP D-5-5[2]	Sample	
			Standard	Type		TW2 4-HR	TW2 8-HR
Sample Date (d/m/y)						**20-Apr-26**	**20-Apr-26**
Metals							
Aluminum	mg/L	0.001	0.1	AO		--	0.010
Antimony	mg/L	0.0005	0.006	MAC		--	<0.0005
Arsenic	mg/L	0.001	0.01	MAC		--	<0.001
Barium	mg/L	0.001	1	MAC		--	0.188
Boron	mg/L	0.01	5	MAC		--	0.20
Cadmium	mg/L	0.0001	0.005	MAC		--	<0.0001
Calcium	mg/L	0.1				208	200
Chromium	mg/L	0.001	0.05	MAC		--	<0.001
Copper	mg/L	0.0005	1			--	<0.0005
Iron	mg/L	0.1	0.3	AO	5	1.9	1.7
Lead	mg/L	0.0001	0.01	MAC		--	<0.0001
Magnesium	mg/L	0.2				82.7	79.8
Manganese	mg/L	0.005	0.05	AO	1	0.608	0.621
Potassium	mg/L	0.1				12.6	12.4
Selenium	mg/L	0.001	0.05	MAC		--	<0.001
Sodium	mg/L	0.2	20[1]/200	MAC		96.9	96.3
Uranium	mg/L	0.0001	0.02	MAC		--	0.0005
Zinc	mg/L	0.005	5	AO		--	<0.005

NOTES

MRL Minimum Reportable Limit
MAC Maximum Acceptable Concentration
AO Aesthetic Objective
OG Operational Guideline

ODWS Ontario Drinking Water Standards (2006)
NA Not Analysed
UNDERLINE Parameter level above ODWS
Italics Notify Medical Officer of Health
BOLD Parameter level above D-5-5 maximum treatability limits

[1] Limit at which Local Medical Officer of Health should be notified of Levels.
[2] MECP D-5-5 guideline, maximum concentration considered reasonably treatable

Table 2C
Summary of Analysis of Water Sample Collected (VOC) - Proposed Supply Well
Hydrogeological Assessment and Terrain Analysis
Proposed Warehouse Development - 561 Somme Street, Ottawa, Ontario
LRL File: 240374

			Sample	
Parameter	Units	MRL	TW2 4-HR	TW2 8-HR
Sample Date (d/m/y)			**20-Apr-26**	**20-Apr-26**
Volatile Organic Compounds (VOCs)				
Acetone	mg/L	0.0050	--	<0.0050
Benzene	mg/L	0.0005	--	<0.0005
Bromodichloromethane	mg/L	0.0005	--	<0.0005
Bromoform	mg/L	0.0005	--	<0.0005
Bromomethane	mg/L	0.0005	--	<0.0005
Carbon Tetrachloride	mg/L	0.0002	--	<0.0002
Chlorobenzene	mg/L	0.0005	--	<0.0005
Chloroethane	mg/L	0.0010	--	<0.0010
Chloroform	mg/L	0.0005	--	<0.0005
Dibromochloromethane	mg/L	0.0005	--	<0.0005
Dichlorodifluoromethane	mg/L	0.0010	--	<0.0010
Ethylene dibromide (dibromoethane, 1,2-)	mg/L	0.0002	--	<0.0002
1,2-Dichlorobenzene	mg/L	0.0005	--	<0.0005
1,3-Dichlorobenzene	mg/L	0.0005	--	<0.0005
1,4-Dichlorobenzene	mg/L	0.0005	--	<0.0005
1,1-Dichloroethane	mg/L	0.0005	--	<0.0005
1,2-Dichloroethane	mg/L	0.0005	--	<0.0005
1,1-Dichloroethylene	mg/L	0.0005	--	<0.0005
cis-1,2-Dichloroethylene	mg/L	0.0005	--	<0.0005
trans-1,2-Dichloroethylene	mg/L	0.0005	--	<0.0005
1,2-Dichloroethylene, total	mg/L	0.0005	--	<0.0005
1,2-Dichloropropane	mg/L	0.0005	--	<0.0005
cis-1,3-Dichloropropylene	mg/L	0.0005	--	<0.0005
trans-1,3-Dichloropropylene	mg/L	0.0005	--	<0.0005
1,3-Dichloropropene, total	mg/L	0.0005	--	<0.0005
Ethylbenzene	mg/L	0.0005	--	<0.0005
Hexane	mg/L	0.0010	--	<0.0010
Methyl Ethyl Ketone (2-Butanone)	mg/L	0.0050	--	<0.0050
Methyl Isobutyl Ketone	mg/L	0.0050	--	<0.0050
Methyl tert-butyl ether	mg/L	0.0020	--	<0.0020
Methylene Chloride	mg/L	0.0050	--	<0.0050
Styrene	mg/L	0.0005	--	<0.0005
1,1,1,2-Tetrachloroethane	mg/L	0.0005	--	<0.0005
1,1,2,2-Tetrachloroethane	mg/L	0.0005	--	<0.0005
Tetrachloroethylene	mg/L	0.0005	--	<0.0005
Toluene	mg/L	0.0005	--	<0.0005
1,1,1-Trichloroethane	mg/L	0.0005	--	<0.0005
1,1,2-Trichloroethane	mg/L	0.0005	--	<0.0005
Trichloroethylene	mg/L	0.0005	--	<0.0005
Trichlorofluoromethane	mg/L	0.0010	--	<0.0010
Vinyl Chloride	mg/L	0.0002	--	<0.0002
m/p-Xylene	mg/L	0.0005	--	<0.0005
o-Xylene	mg/L	0.0005	--	<0.0005
Xylenes, total	mg/L	0.0005	--	<0.0005

Table 2D
Summary of Analysis of Water Sample Collected (PHC, PCB, PAH) - Proposed Supply Well
Hydrogeological Assessment and Terrain Analysis
Proposed Warehouse Development -561 Somme Street , Ottawa, Ontario
LRL File: 240374

			Sample	
Parameter	**Units**	**MRL**	**TW2 4-HR**	**TW2 8-HR**
Sample Date (d/m/y)			**28-Nov-24**	**28-Nov-24**
Semi-Volatiles				
Acenaphthene	mg/L	0.0050	--	<0.05
Acenaphthylene	mg/L	0.0005	--	<0.05
Anthracene	mg/L	0.0005	--	<0.01
Benzo[a]anthracene	mg/L	0.0005	--	<0.01
Benzo[a]pyrene	mg/L	0.0005	--	<0.01
Benzo[b]fluoranthene	mg/L	0.0002	--	<0.05
Benzo[g,h,i]perylene	mg/L	0.0005	--	<0.05
Benzo[k]fluoranthene	mg/L	0.0010	--	<0.05
1,1-Biphenyl	mg/L	0.0005	--	<0.05
Chrysene	mg/L	0.0005	--	<0.05
Dibenzo[a,h]anthracene	mg/L	0.0010	--	<0.05
Fluoranthene	mg/L	0.0002	--	<0.01
Fluorene	mg/L	0.0005	--	<0.05
Indeno [1,2,3-cd] pyrene	mg/L	0.0005	--	<0.05
1-Methylnaphthalene	mg/L	0.0005	--	<0.05
2-Methylnaphthalene	mg/L	0.0005	--	<0.05
Methylnaphthalene (1&2)	mg/L	0.0005	--	<0.10
Naphthalene	mg/L	0.0005	--	<0.05
Phenanthrene	mg/L	0.0005	--	<0.05
Pyrene	mg/L	0.0005	--	<0.01
Hydrocarbons	mg/L	0.0005		
F1 PHCs (C6-C10)	mg/L	0.0005	--	<0.0250
F2 PHCs (C10-C16)	mg/L	0.0005	--	<0.1
F3 PHCs (C16-C34)	mg/L	0.0005	--	<0.1
F4 PHCs (C34-C50)	mg/L	0.0005	--	<0.1
PCBs	mg/L	0.0005		
PCBs, total	mg/L	0.0010	--	<0.05

Table 3
Langelier and Ryznar Calculations
Hydrogeological Assessment & Terrain Analysis
Proposed Warehouse Development - 561 Somme Street , Ottawa, Ontario
LRL File: 240374

Analyzed Parameters

TDS (mg/L)	1040
Hardness(mg/L)	828
alkalinity(mg/L)	618
pH (pH units)	7.4
Temperature °C	10

Langelier

LSI = pH - pHs

pHs = (9.3 +A+B) - (C+D) Where

A= (Log10(TDS)-1)/10	=	0.2017033
B= (-13.12*Log10(T°C+273)+34.55	=	2.382562
C= Log10(Hardness)-0.4	=	2.5180303
D= Log10(Alkalinity)	=	2.7909885

Ryznar

RI=2pHs-pH

pHs=	6.575246
LSI=	0.824754
RI=	5.750493

Table 4A
Nitrate Attenuation Calculations - Conventional Treatment System
Hydrogeological Assessment & Terrain Analysis
Proposed Warehouse Development - 561 Somme Street, Ottawa, Ontario
LRL File: 240374

1. Potential Infiltration

Weather Station Ottawa

No.	Section Area (m^2)	Infiltration Factor (IF)[1]							Moisture Surplus (MS)				Potential Infiltration (PI) (IF*MS) (mm)	
		Topography	Value	Soil	Value	Cover	Value	Total	Ground Cover	Soil Type	Moisture Retention[2] (mm)	Moisture Surplus[3] (mm)	Section	Weighted
1	16,190	Flat	0.3	Sand	0.4	Cultivated Land	0.1	0.8	Shallow Rooted Crops	1 Fine Sand	50	407	325.6	325.6
Total	16,190												**Total**	325.6

2. Area Available for Infiltration

Number of Lots		n	1	
Approximate footprint of proposed garage		H	2800	m^2
Approximate area of paved driveways		d	6355	m^2
Approximate Length of Road		L	0	m
Approximate Width of Road		w	0	m
Total Area of Property			16190	m^2
Impervious Area			9155.0	m^2
	Roads	l x w	0 m^2	
	Driveway	n x d	6355 m^2	
	Warehouse	n x H	2800 m^2	
Area available Infiltration		A	7,035	m^2

3. Nitrate Diluation Calculations

Nitrate Concentration of Infiltration	C_i	0	mg/L
Site Infiltration	$Q_i = A*PI$	2291	m^3
Daily Sewage Volume per Lot [4]	Q_d	3.95	m^3
Maximum Yearly Sewage Volume (water)	$Q_e=365*n*Q_d$	1442	m^3
Nitrate Concentration in Sewage[5]	C_e	40	mg/L
Maximum Allowable Nitrate Concentration at Boundary	C_m	10.0	mg/L
Increase in Nitrate Concentration at Boundaries	$C = (Q_eC_e+Q_iC_i)/(Q_e+Q_i)$	15.45	mg/L

NOTES

1 Table 2: Infiltration Factors, *Hydrogical Technical Information Requirements for Land Development Applications*, Ministry of the Energy and Environment, April 1995.

2 Thornthwaite and Mather's (1957) Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance.

3 Moisture surplus for data for Ottawa ON (Environment Canada Meteorological Service of Canada, 2010).

4 Volume is based on the Ontairo Building Code, Table 8.2.1.3.B with the assumption of a wareshouse being constructed on the Site, with two (2) loading bays and two (2) water closets.

5 As per *Technical Guideline for Individual On-Site Sewage Systems: Water Quality and Impact Risk Assessment*, Ministry of the Energy and Environment, August 1996.

Table 4B
Nitrate Attenuation Calculations - Advanced Treatment System
Hydrogeological Assessment & Terrain Analysis
Proposed Warehouse Development - 561 Somme Street, Ottawa, Ontario
LRL File: 240374

1. Potential Infiltration

Weather Station Ottawa

No.	Section Area (m^2)	Infiltration Factor (IF)[1]							Moisture Surplus (MS)				Potential Infiltration (PI) (IF*MS) (mm)	
		Topography	Value	Soil	Value	Cover	Value	Total	Ground Cover	Soil Type	Moisture Retention[2] (mm)	Moisture Surplus[3] (mm)	Section	Weighted
1	16,190	Flat	0.3	Sand	0.4	Cultivated Land	0.1	0.8	Shallow Rooted Crops	1 Fine Sand	50	407	325.6	325.6
Total	16,190												**Total**	325.6

2. Area Available for Infiltration

Number of Lots		n	1	
Approximate footprint of proposed garage		H	2800	m^2
Approximate area of paved driveways		d	6355	m^2
Approximate Length of Road		L	0	m
Approximate Width of Road		w	0	m
Total Area of Property			16190	m^2
Impervious Area			9155.0	m^2
	Roads	l x w	0 m^2	
	Driveway	n x d	6355 m^2	
	Warehouse	n x H	2800 m^2	
Area available Infiltration		A	7,035	m^2

3. Nitrate Diluation Calculations

Nitrate Concentration of Infiltration	C_i	0	mg/L
Site Infiltration	$Q_i = A*PI$	2291	m^3
Daily Sewage Volume per Lot [4]	Q_d	3.95	m^3
Maximum Yearly Sewage Volume (water)	$Q_e=365*n*Q_d$	1442	m^3
Nitrate Concentration in Sewage[5]	C_e	20	mg/L
Maximum Allowable Nitrate Concentration at Boundary	C_m	10.0	mg/L
Increase in Nitrate Concentration at Boundaries	$C = (Q_eC_e+Q_iC_i)/(Q_e+Q_i)$	7.73	mg/L

NOTES

1 Table 2: Infiltration Factors, *Hydrogical Technical Information Requirements for Land Development Applications*, Ministry of the Energy and Environment, April 1995.

2 Thornthwaite and Mather's (1957) Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance.

3 Moisture surplus for data for Ottawa ON (Environment Canada Meteorological Service of Canada, 2010).

4 Volume is based on the Ontairo Building Code, Table 8.2.1.3.B with the assumption of a wareshouse being constructed on the Site, with two (2) loading bays and two (2) water closets.

5 As per *Technical Guideline for Individual On-Site Sewage Systems: Water Quality and Impact Risk Assessment*, Ministry of the Energy and Environment, August 1996.

ATTACHMENT A

Topographic Survey Plan

TOPOGRAPHIC SKETCH OF

No. 561 SOMME STREET
CITY OF OTTAWA

FARLEY, SMITH & DENIS SURVEYING LTD. 2024

Scale 1: 300

0 5 10 15 20 25 30 metres

Metric Note
Distances and/or coordinates on this plan are in metres and can be converted to feet by dividing by 0.3048.

Boundary Note
Boundary compiled from Plan 4R-35791.

Elevation Notes
1. Elevations shown are geodetic and are referred to Geodetic Datum CGVD-1928 :1978.
2. It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that it's relative elevation and description agrees with the information shown on this drawing.
3. Not all overhead wires/transformers adjacent to the property have been located along the North property line. Further investigation is needed if a proposed property development would be within 5.0 meters from the nearest overhead wire and/or transformer.

Utility Notes
1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
2. Only visible surface utilities were located.
3. Underground utility data derived from City of Ottawa utility sheet reference: 15281p&p01.
4. Sanitary and storm sewer grades and inverts were derived from: Field measurement.
5. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.

Geographic Location:
PART OF BLOCK 2
REGISTERED PLAN 4M-1388
CITY OF OTTAWA

Notes & Legend

MH-ST	Denotes	Maintenance Hole (Storm)
MH	"	Maintenance Hole (Unidentified)
LS	"	Light Standard
UP	"	Utility Pole
AN	"	Anchor
DI	"	Ditch Inlet
CLF	"	Chain Link Fence
T/G	"	Top of Grade
ICV	"	Irrigation Control Valve
Invert	"	Invert
CSP	"	Corrugated Steel Pipe
+89.75	"	Location of Elevations
+89.75	"	Top of Concrete Curb Elevation
	"	Property Line
OHW	"	Overhead Wires
ST	"	Underground Storm Pipe

Fieldwork completed on the 26th day of April, 2024.

Caution
1. This is not a plan of survey and shall not be used except for the purpose indicated in the title block.
2. This sketch is protected by copyright.

WARNING NO PERSON MAY COPY, REPRODUCE, DISTRIBUTE OR ALTER THIS PLAN IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF FARLEY, SMITH & DENIS SURVEYING LTD. © FARLEY, SMITH & DENIS SURVEYING LTD., 2024.

FARLEY, SMITH & DENIS SURVEYING LTD.

ONTARIO LAND SURVEYORS
CANADA LAND SURVEYORS

Unit 275, 30 COLONNADE ROAD, OTTAWA, ONTARIO K2E 7J6
TEL. (613) 727-8226 E-mail: fsdsurveys@bellnet.ca

FILE No.: 123-24

TOPO 24X36

J:\2024\123-24_561 Somme st_topo sktch\Final\123-24 561 Somme Str_BLK2 RP4M-1388_Topo Skt_F.dwg

ATTACHMENT B

MECP Water Well Records

Ontario — Ministry of the Environment

Measurements recorded in: [X] Metric [ ] Imperial

Well Tag No. *(Place Sticker and/or Print Below)* A068335 **A 068335**

Well Record

Regulation 903 Ontario Water Resources Act

Page _____ of _____

[redacted]

Address of Well Location (Street Number/Name): TW #5 - Rideau

Township: Gloucestor

Lot: 26

Concession: 6

County/District/Municipality: Ottawa Carleton

City/Town/Village: Gloucestor

Province: Ontario

Postal Code:

UTM Coordinates: Zone: 18 Easting: 457043 Northing: 5016848 NAD 83

Municipal Plan and Sublot Number:

Other:

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Soil	Stones	Fill	0	1.21
Gray	Sandy Soil	Stones	Wet	1.21	3.96
Gray	Sandstone		Very Hard	3.96	29.86

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
12.80	0	Grouted Cement	.525m^3

Method of Construction

[ ] Cable Tool [ ] Diamond
[ ] Rotary (Conventional) [ ] Jetting
[X] Rotary ~~(Reverse)~~ Air [ ] Driving
[ ] Boring [ ] Digging
[X] Air percussion
[ ] Other, specify

Well Use

[ ] Public [X] Commercial [ ] Not used
[X] Domestic [ ] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[X] Industrial
[ ] Other, specify Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.86	Steel	.48	+.45	12.80

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

[X] Water Supply
[ ] Replacement Well
[ ] Test Hole
[ ] Recharge Well
[ ] Dewatering Well
[ ] Observation and/or Monitoring Hole
[ ] Alteration (Construction)
[ ] Abandoned, Insufficient Supply
[ ] Abandoned, Poor Water Quality
[ ] Abandoned, other, specify
[ ] Other, specify

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water	Other, specify
27.12	[ ]	[ ] Fresh [X] Untested	
	[ ]	[ ] Fresh [ ] Untested	
	[ ]	[ ] Fresh [ ] Untested	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	12.80	15.86
12.80	29.86	15.23

Results of Well Yield Testing

After test of well yield, water was:
[X] Clear and sand free
[ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 22.85

Pumping rate (l/min / GPM): 54.6

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 9.99

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 22.85

Recommended pump rate (l/min / GPM): 45.5

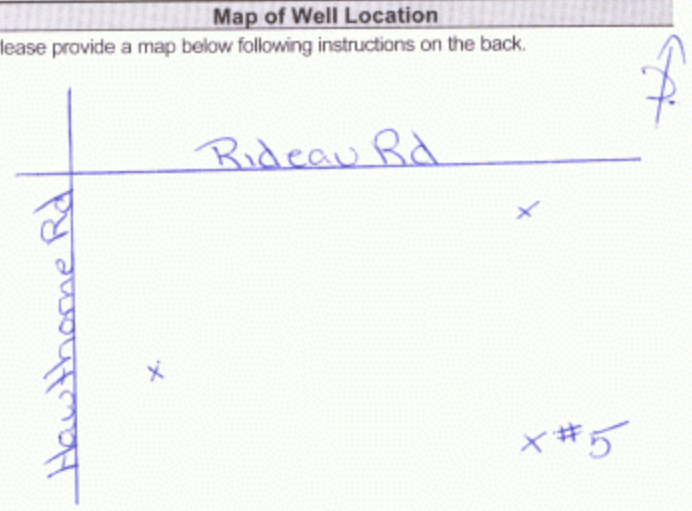
Well production (l/min / GPM):

Disinfected? [X] Yes [ ] No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	6.85		
1	8.03	1	8.97
2	8.35	2	8.69
3	8.60	3	8.55
4	8.76	4	8.46
5	8.88	5	8.40
10	9.20	10	8.23
15		15	
20	9.49	20	8.04
25	9.62	25	7.99
30	9.68	30	7.93
40	9.82	40	7.84
50	9.91	50	7.77
60	9.99	60	7.69

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor: Capital Water Supply Ltd.

Well Contractor's Licence No.: 1558

Business Address (Street Number/Name): Box 490

Municipality: Stittsville

Province: Ontario

Postal Code: K2S1A6

Business E-mail Address: office@capitalwater.ca

Bus. Telephone No. (inc. area code): 6138361766

Name of Well Technician (Last Name, First Name): Miller, Stephen

Well Technician's Licence No.: 0097

Signature of Technician and/or Contractor:

Date Submitted: 2008 10 10

Well owner's information package delivered: [ ] Yes [X] No

Date Package Delivered: 2008 10 07

Date Work Completed: 2008 09 26

Ministry Use Only

Audit No. Z 84410

Received DEC 02 2008

0506E (12/2007)

Ministry's Copy

© Queen's Printer for Ontario, 2007

Ontario Ministry of the Environment

Well Tag No. for Master Well (Place Sticker and/or Print Below)
A 074584 MW 6-08

Master Well Record for Cluster Well Construction

Regulation 903 Ontario Water Resources Act

Page 1 of 2

Master Well Owner's and Land Owner's Information

First Name	Last Name	E-
Orgaworld Canada Real Estate via Tomlinson Environmental Services Inc.		[redacted]

Mailing Address (Street Number/Name, RR)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
5597 Power Road	Ottawa	ON	K1G3NH	6138321067

Location and Construction of the Master Well in the Cluster

Address of Well Location (Street Number/Name, RR)	Township	Lot	Concession
Hawthorne Road at Ridlau Road		26; 27	6

County/District/Municipality	City/Town/Village	Province	Postal Code
	Ottawa	Ontario	

UTM Coordinates	Zone	Easting	Northing	GPS Unit Make	Model	Mode of Operation
NAD 83	18	456400	5016852	Garmin	Etrex	☐ Undifferentiated ☑ Averaged ☐ Differentiated, specify

Overburden and Bedrock Materials *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (Metres) From	Depth (Metres) To
Grey/Brown	very fine sand + silt		dense, moist	0	0.8
Brown	Fill - sand/silt/clay/gravels			0.8	4.7
Grey/Brown	Sand	with silt	compact oxitized	4.7	6.0
Brown	Till - silty sand, gravel			6.0	7.6

Hole Details

Depth (Metres) From	Depth (Metres) To	Diameter (Centimetres)
0	7.6	20

Water Use

☐ Public ☐ Industrial ☐ Not used ☐ Other, specify
☐ Domestic ☐ Commercial ☐ Dewatering
☐ Livestock ☐ Municipal ☑ Monitoring
☐ Irrigation ☐ Test Hole ☐ Cooling & Air Conditioning

Method of Construction

☐ Cable Tool ☐ Air Percussion ☐ Digging
☐ Rotary (Conventional) ☐ Diamond ☐ Boring
☐ Rotary (Reverse) ☐ Jetting ☑ Other, specify HSA
☐ Rotary (Air) ☐ Driving

Status of Well

☑ Test Hole ☐ Abandoned, Insufficient Supply
☐ Replacement Well ☐ Abandoned, Poor Water Quality
☐ Dewatering Well ☐ Other, specify
☐ Alteration (Construction) ☐ Abandoned, other, specify

Construction Details

Inside Diameter (Centimetres)	Material (steel, plastic, fibreglass, concrete, galvanized)	Wall Thickness	Depth (Metres) From	Depth (Metres) To
5.1	PVC	Sched 40	0	3.0

No Casing and Screen Used

Open Hole ☐ Yes ☑ No

Static Water Level Test

1.7 Metres

Screen

☐ Galvanized ☐ Steel ☐ Fibreglass ☐ Concrete ☑ Plastic

Outside Diameter (Centimetres)	Slot No.
5.8	10

Annular Space/Abandonment Sealing Record

Depth Set at (Metres) From	Depth Set at (Metres) To	Type of Sealant Used (Material and Type)	Volume Used (Cubic Metres)
0.6	2.4	Bentonite	66 kgs

Water Details

Water found at Depth		Kind of Water
	Metres ☐ Gas	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals
	Metres ☐ Gas	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals
	Metres ☐ Gas	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals

Disinfected ☐ Yes ☑ No If no, provide reason: Monitoring Well

Date Master Well Completed (yyyy/mm/dd): 2008/07/14

Cluster Information *(Please also fill out the additional Cluster Well Information for Well Construction for each parcel of land and cluster.)*

Total Wells in Cluster	Please indicate Number of Cluster Well Information Log Sheets Submitted
10	1
Total Wells on this Property: unknown	

Location of Well Cluster

Detailed Map must be provided as an attachment no larger than legal size (8.5" x 14"). Sketches are not allowed.

☑ Check box to confirm detailed map is provided as per Section 11.1 (3)

Consent to release additional information concerning the cluster to the Director upon request

Signature of Technician/Contractor: Bruce Downing — Date (yyyy/mm/dd): 2008/10/20

Master Well Owner's/Land Owner's consent to use Cluster Form

[redacted]

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
George Downing Estate Drilling	1814

Business Address (Street No./Name, number, RR)	Municipality
410 Rue Principale	Grenville-sur-la-Rouge

Province	Postal Code	Business E-mail Address
QC	J0V1B0	downing@xplornet.com

Business Phone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
2646 09	Downing, Bruce

Well Technician's Licence No.	Signature of Technician	Date Submitted (yyyy/mm/dd)
	Bruce Downing	2008/10/20

Ministry Use Only

Audit No.	Well Contractor No.
M 02897	
Date Received (yyyy/mm/dd): NOV 26 2008	Date of Inspection (yyyy/mm/dd)
Remarks	

Ministry's Copy

© Queen's Printer for Ontario, 2006

Ontario

Ministry of the Environment

Well Tag No. for Master Well (Print Well Tag No.)
A 074584
A074584

Cluster Well Information for Cluster Well Construction

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Property Owner's Information

First Name	Last Name	Mailing Address (Street No./Name, RR)	Municipality
Orgaworld Canada Real Estate via	Tomlinson Environmental Services Inc.	5597 Power Road	Ottawa

Province	Postal Code	E-mail Address	Telephone No. (inc. area code)
Ontario	K1G3N4	rtomlinson@tomlinsongroup.com	6138221867

[redacted]

upon request

Cluster Well Information

Address of Well Location (Street Number/Name, RR)	Lot	Concession	Township	County/District/Municipality
Hawthorne Road at Rideau Road	26 & 27	6		

City/Town/Village	Province	Postal Code	GPS Unit Make	Model	Unit Mode of Operation
Ottawa	Ontario	K1G3N4			☐ Undifferentiated ☐ Averaged ☐ Differentiated, specify:

Signature of Technician/Contractor: Bruce Downing

Date (yyyy/mm/dd): 2008/10/20

Well # on Sketch	UTM Coordinates Zone	Easting	Northing	Full Depth of Hole (metres)	Hole Diameter (cm)	Method of Construction	Casing Material	Casing Length (metres)	Screen Interval (metres) From	To	Annular Space Sealant Used	Static Water Level (metres)	Abandonment Sealant Used	Comments	Date of Completion (yyyy/mm/dd)
MW 1-08	18	456831	5016712	2.97	20	HSA	PVC	1.5	1.5	2.97	Bentonite	1.3			2008/07/07
MW 2-08	18	456799	5016553	2.77	10	DiA		0.6	0.6	2.77		1.6		overburden from 0 to 0.18	2008/07/08
MW 3-08	18	456533	5016411	17.37	10	DiA		2.13	2.13	17.37		13.2		" " 0 to 0.30	2008/07/09
MW 4-08	18	456474	5016604	2.84	10/20	HSA/DiA		1.22	1.22	2.8		0.7			2008/07/08
MW 5-08	18	456598	5016675	2.77	20	HSA		1.5	1.5	2.77		1.0			2008/07/07
MW 7-08	18	456622	5017219	6.98	20	HSA		3.0	3.0	6.10		3.6			2008/07/14
MW 8-08	18	456687	5017036	4.72	20	HSA		3.0	3.0	4.2		3.0			2008/07/15
MW 9-08	18	457086	5017625	3.66	20	HSA		1.5	1.5	3.0		1.7			2008/07/15
MW 10-08	18	457206	5017303	2.90	20	HSA		1.37	1.37	2.90		1.6			2008/07/15

Well Contractor and Well Technician Information

Business Name of Well Contractor	Business Address (Street Number/Name, RR)	Municipality	Province
George Downing Estate Drilling LTD.	410 Rue Principale	Grenville-sur-la-Rouge	Qc

Postal Code	Business Telephone No. (inc. area code)	Well Contractor's Licence No.	Business E-mail Address
J0V1B0	8192426469	1844	downing@xplornet.com

Name of Well Technician (First Name, Last Name)	Well Technician's Licence No.	Date Submitted (yyyy/mm/dd)	Signature of Technician
Bruce Downing	2173	2008/10/20	Bruce Downing

Date 1st Well in Cluster Constructed (yyyy/mm/dd): 2008/07/07

Date Last Well in Cluster Constructed (yyyy/mm/dd): 2008/07/15

Ministry Use Only

Date Received (yyyy/mm/dd)	Date Inspected (yyyy/mm/dd)
NOV 26 2008	
Audit No. C 01984	Remarks m02897

1991 (11/2006)

Ministry's Copy

© Queen's Printer for Ontario, 2006

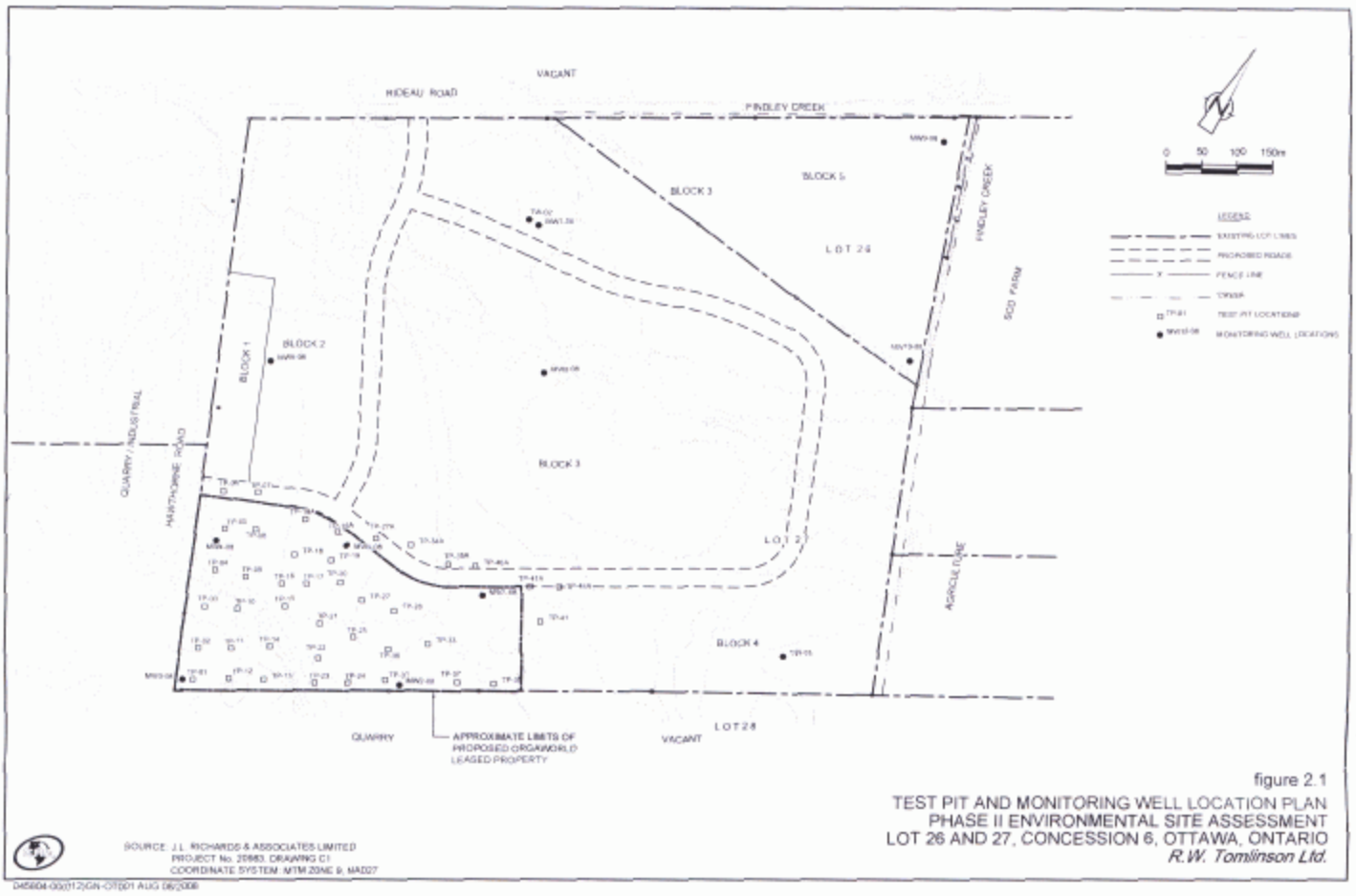


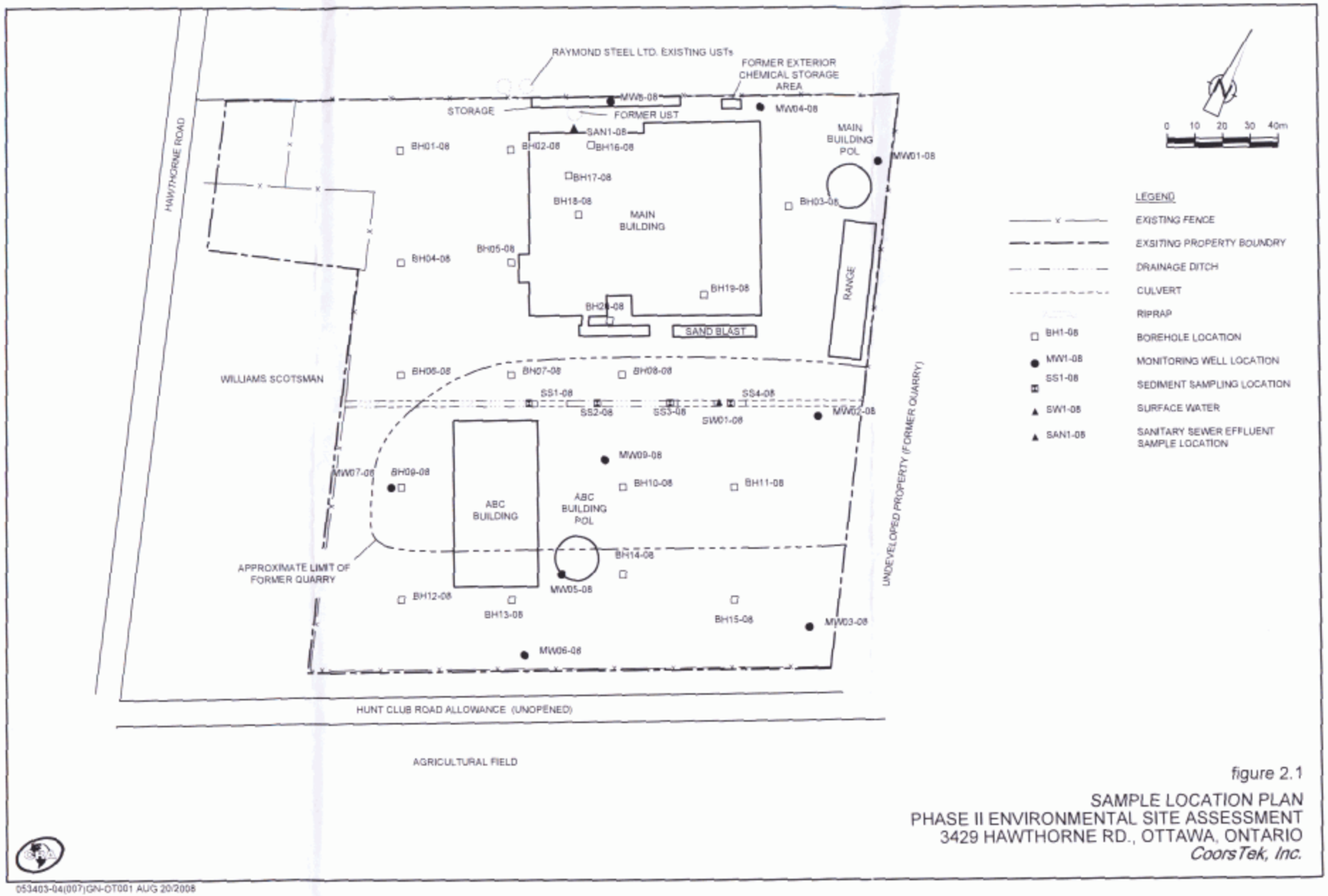
figure 2.1
TEST PIT AND MONITORING WELL LOCATION PLAN
PHASE II ENVIRONMENTAL SITE ASSESSMENT
LOT 26 AND 27, CONCESSION 6, OTTAWA, ONTARIO
R.W. Tomlinson Ltd.

SOURCE: J.L. RICHARDS & ASSOCIATES LIMITED
PROJECT No. 20983, DRAWING C1
COORDINATE SYSTEM: MTM ZONE 9, NAD27

D459804-00(012)GN-OT001 AUG 06/2008

C-1844 m02897 c01984

NOV 26 2008



053403-04(007)GN-OT001 AUG 20/2008

figure 2.1

SAMPLE LOCATION PLAN
PHASE II ENVIRONMENTAL SITE ASSESSMENT
3429 HAWTHORNE RD., OTTAWA, ONTARIO
CoorsTek, Inc.

NOV 26 2008
C-18441 mo2888 c03068

Ontario — Ministry of the Environment

Measurements recorded in: [X] Metric [ ] Imperial

Well Tag No. *(Place Sticker and/or Print Below)* A082844 **A 082844**

Well Record

...ion 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
	Orgaworld		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
c/o 400-179 Colonnade Road	Ottawa	Ontario	K2E 7J4	613 727 0510

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #7 Hawthorne Road	Gloucester	27	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucester	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	456879	5016752		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Soil Stones		Packed	0	4.26
Grey & White	Sandstone		Very Hard	4.26	29.86

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
6.40	0	Grouted Cement	.21m^3

Method of Construction

[ ] Cable Tool [ ] Diamond
[ ] Rotary (Conventional) [ ] Jetting
[X] Rotary (Reverse) Air [ ] Driving
[ ] Boring [ ] Digging
[X] Air percussion
[ ] Other, *specify* ____

Well Use

[ ] Public [ ] Commercial [ ] Not used
[ ] Domestic [ ] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [X] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[ ] Industrial
[ ] Other, *specify* ____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.86	Steel	.48	+.45	6.40

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

[X] Water Supply
[ ] Replacement Well
[ ] Test Hole
[ ] Recharge Well
[ ] Dewatering Well
[X] Observation and/or Monitoring Hole
[ ] Alteration (Construction)
[ ] Abandoned, Insufficient Supply
[ ] Abandoned, Poor Water Quality
[ ] Abandoned, other, *specify* ____
[ ] Other, *specify* ____

Water Details

Water found at Depth (m/ft)	Kind of Water	
9.14-12.19	[ ] Gas	[ ] Fresh [X] Untested [ ] Other, *specify* ____
18.28-21.33	[ ] Gas	[ ] Fresh [X] Untested [ ] Other, *specify* ____
(m/ft)	[ ] Gas	[ ] Fresh [ ] Untested [ ] Other, *specify* ____

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	6.40	15.86
6.40	29.86	15.23

Results of Well Yield Testing

After test of well yield, water was:
[X] Clear and sand free
[ ] Other, *specify* ____

If pumping discontinued, give reason:

Pump intake set at (m/ft): 24.38

Pumping rate (l/min / GPM): 27.3

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 7.01

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 24.38

Recommended pump rate (l/min / GPM): 27.3

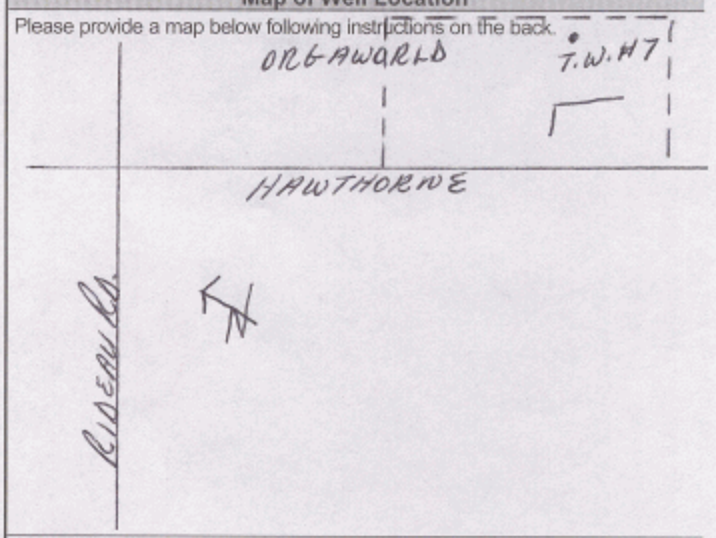
Well production (l/min / GPM):

Disinfected? [X] Yes [ ] No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	4.41		
1	5.20	1	6.07
2	5.57	2	5.68
3	5.78	3	5.46
4	5.94	4	5.33
5	6.05	5	5.25
10	6.37	10	5.01
15	6.52	15	4.89
20	6.60	20	4.81
25	6.68	25	4.76
30	6.72	30	4.72
40	6.81	40	4.65
50	6.86	50	4.61
60	6.89	60	4.58

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality
Box 490	Stittsville

Province	Postal Code	Business E-mail Address
Ontario	K2S 1A6	office@capitalwater.ca

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
613 836 1766	Miller, Stephen

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
0097		2010 05 28

Well owner's information package delivered: [ ] Yes [X] No

Date Package Delivered: 2010 05 27

Date Work Completed: 2010 05 25

Ministry Use Only

Audit No. Z 101832

AUG 04 2010 Received

0506E (12/2007)

Ministry's Copy

© Queen's Printer for Ontario, 2007

Ontario — Ministry of the Environment

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. A 089801

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	APEX DEVELOPMENTS INC.	info@apexdevco.com	

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
206 - 900 Morrison Drive	OHawa	ON	K2H8K7	6134226757

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
35 Sappers Ridge			

County/District/Municipality	City/Town/Village	Province	Postal Code
	OHawa	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	75	75 33' 10	45 18' 31		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
	Fill		loose	0	8
grey	Clay limestone	gravel	packed	8	24
				24	155

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
40	0	High Early Cement	13.95

Results of Well Yield Testing

After test of well yield, water was: ☑ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 130

Pumping rate (l/min / GPM): 10

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 34'

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 130

Recommended pump rate (l/min / GPM):

Well production (l/min / GPM): 15

Disinfected? ☑ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	25		
1	27'	1	31.8
2	28'	2	30.5
3	29'4"	3	29.5
4	30'	4	29.0
5	30'2"	5	28.6
10	31'4"	10	28.3
15	32'2"	15	28.0
20	32'7"	20	27.5
25	33'2"	25	27.0
30	33'5"	30	26.0
40	34'	40	25.0
50	34'6"	50	25.0
60	34'	60	25.0

Method of Construction

☐ Cable Tool ☐ Diamond ☑ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☐ Boring ☐ Digging ☐ Air percussion ☐ Other, specify

Well Use

☑ Public ☐ Commercial ☐ Not used ☐ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
5 5/8	Steel	1.88	40	+2.

Status of Well

☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Water Details

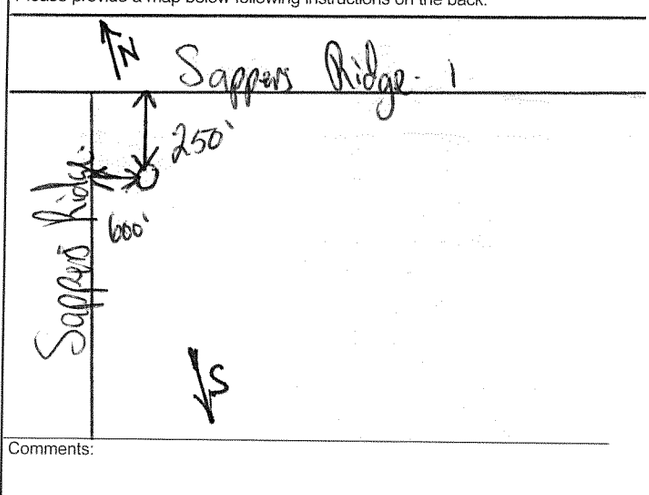
Water found at Depth (m/ft)	Kind of Water	
135	☑ Fresh ☑ Untested ☐ Gas ☐ Other, specify	
	☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify	
	☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify	

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
0	40	10 5/8
40	155	6 1/8

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
J.R. Drilling Co. Ltd.	3749

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
C23 Mitchem Rd., R.R.#5	Shawville	QC	J0X2Y0	info@jrwaterwelldrilling.com

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
8196475184	Moloughney, Brady	3641		2013 08 08

Well owner's information package delivered ☑ Yes ☐ No

Date Package Delivered: 2013 08 06

Date Work Completed: 2013 07 18

Ministry Use Only

Audit No. Z 103282

Received AUG 12 2013

0506E (12/2007)

Ministry's Copy

© Queen's Printer for Ontario, 2007

Ontario — Ministry of the Environment, Conservation and Parks

Tag#:A295280

A295280

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☒ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name/Organization	E-mail Address	☐ Well Constructed by Well Owner
	TECHO-BLOC INC.		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
#5255 Albert-Millichamp	Saint-Hubert	Quebec	J3Y 8Z8	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
5123 Hawthorne Road	[redacted] Gloucester	27	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	[redacted] Ottawa	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 8 3	18	457054	5016813	4m-1388 Part 3-4 / 4R-32280	Block 2

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
	Sandy	Clay & Gravel		0'	15'
Grey	Limestone			15'	80'
Grey & White	Sandstone			80'	83'
Grey & White	Sandstone			83'	116'
Grey & White	Sandstone			116'	122'

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
41'	31'	Neat cement	18.7
31'	0'	Bentonite slurry	16.8

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☒ Air percussion
☐ Other, specify

Well Use

☐ Public ☐ Commercial ☐ Not used
☒ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6 1/4"	Steel	.188"	+2'	41'
6"	Open Hole		41'	122'

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☒ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water	
83	☐	☐ Fresh ☒ Untested	☐ Other, specify
116	☐	☐ Fresh ☒ Untested	☐ Other, specify
	☐	☐ Fresh ☐ Untested	☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0'	41'	9 3/4"
41'	122'	6"

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, specify — Not tested

If pumping discontinued, give reason: X

Pump intake set at (m/ft): 100

Pumping rate (l/min / GPM): 20

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 33.5'

If flowing give rate (l/min/GPM): X

Recommended pump depth (m/ft): 100'

Recommended pump rate (l/min/GPM): 20

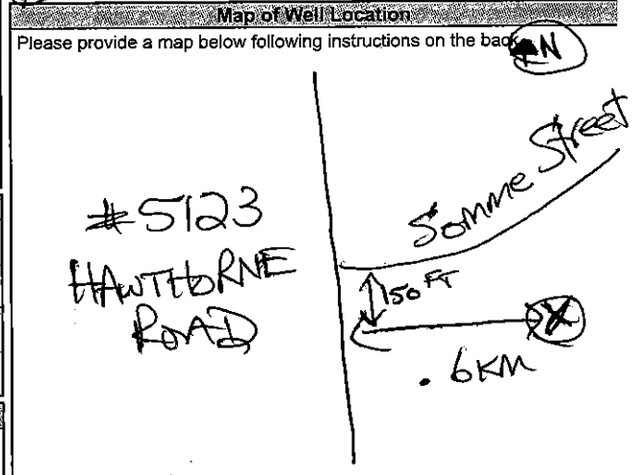
Well production (l/min/GPM): 20

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	26.5"		1' 11" 33.5
1	29.8	1	26.5
2	30.5	2	26.5
3	30.8	3	26.5
4	31.1	4	26.5
5	31.3	5	26.5
10	31.9	10	26.5
15	32.3	15	26.5
20	32.6	20	26.5
25	32.9	25	26.5
30	33.1	30	26.5
40	33.3	40	26.5
50	33.5	50	26.5
60	33.5'	60	26.5'

Map of Well Location

Please provide a map below following instructions on the back.



Comments: 3/4 th-15 GPM Sat @ 100 FT

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Air Rock Drilling Co. Ltd.	7681

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
6659 Franktown Road	Richmond	ON	K0A 2Z0	air-rock@sympatico.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
6138382170	Hogan, Dan	T3058		2020 08 31

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☒ Yes ☐ No	2020 08 22	2020 08 20

Ministry Use Only

Audit No. Z344019

OCT 30 2020

Received

0506E (2020/06) © Queen's Printer for Ontario, 2020

Ministry's Copy

Ontario — Ministry of the Environment, Conservation and Parks

Tag#: A305146 (Print Below)

A305146

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☒ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name/Organization	E-mail Address	☐ Well Constructed by Well Owner
	COPART		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
14185 Dallas Parkway Suite 300	Dallas, Texas	USA	75254	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
300 Somme Street	Gloucester	P/L 26 & 27	6 R.F.

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucester	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	456627	5017085	4M-1388	

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
	Sand	Clay	+ Gravel	0'	13'
Grey & White	Sandstone	w/ Grey limestone	Mix	13'	103'
Grey & White	Sandstone	w/ Grey limestone	mix	103'	134'
Grey & White	Sandstone	w/ Grey	Limestone mix	134'	140'

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
60'	50'	Neat cement	9.36
50'	0'	Bentonite slurry	16.8

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☒ Air percussion
☐ Other, specify

Well Use

☐ Public ☐ Commercial ☐ Not used
☒ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6 1/4"	Steel	.188"	+2'	60'
6 1/8"	Open Hole		60'	140'

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☒ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Water Details

Water found at Depth (m/ft)	Kind of Water	Hole Diameter Depth From	Depth To	Diameter (cm/in)
103 ☐ Gas	☐ Fresh ☒ Untested ☐ Other, specify	0'	60'	9 3/4"
134 ☐ Gas	☐ Fresh ☒ Untested ☐ Other, specify	60'	140'	6 1/8"
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify			

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, specify **Not tested**

If pumping discontinued, give reason: X

Pump intake set at (m/ft): 100

Pumping rate (l/min / GPM): 20

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 30'8"

If flowing give rate (l/min/GPM): X

Recommended pump depth (m/ft): 100'

Recommended pump rate (l/min/GPM): 20

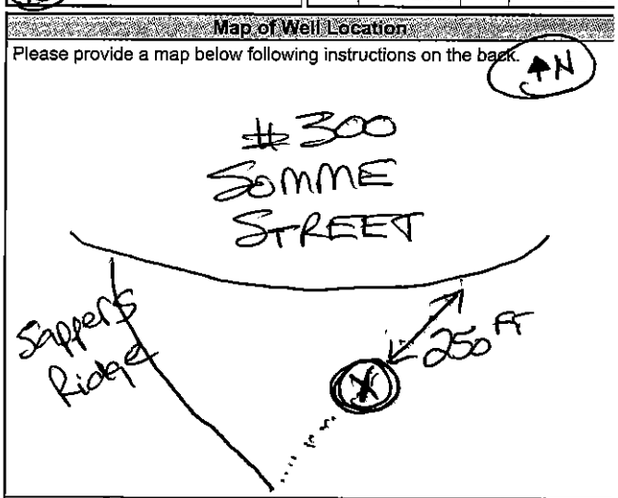
Well production (l/min/GPM): 20

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	25'4"		30'8"
1	27.6	1	25.5
2	28	2	25.5
3	28.2	3	25.5
4	28.3	4	25.5
5	28.4	5	25.5
10	28.6	10	25.5
15	28.7	15	25.5
20	28.8	20	25.5
25	28.9	25	25.8
30	30	30	25.5
40	30.2	40	25.5
50	30.5	50	25.5
60	30'8"	60	25'5"

Map of Well Location

Please provide a map below following instructions on the back.



Comments: 3/4HR 15GPM Set @ 100 FT

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Air Rock Drilling Co. Ltd.	7681

Business Address (Street Number/Name)	Municipality
6659 Franktown Road	Richmond

Province	Postal Code	Business E-mail Address
ON	K0A 2Z0	air-rock@sympatico.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6138382170	Hogan, Dan

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
T3058		2020 09 30

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☒ Yes ☐ No	2020 09 03	2020 09 02

Ministry Use Only

Audit No. Z344053

OCT 30 2020

Received

0506E (2020/06) © Queen's Printer for Ontario, 2020

Ministry's Copy

Ontario — Ministry of the Environment, Conservation and Parks

Well Tag#:A295342 (Below)

A295342

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☒ Imperial

Page _____ of _____

Well Owner's Information

First Name	Last Name/Organization	E-mail Address	☐ Well Constructed by Well Owner
	Paul Lalonde Holdings Inc		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
5146 Bank Street	Ottawa	ON	K1X 1G8	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
5123 Hawthorne Road	Gloucester	27	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Ottawa	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	456956	5016788	4M-1388	Parts 2,3,4

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
	Sandy Till	& Boulders		0′	6′
Grey	Limestone			6′	45′
Grey & White	Sandstone			45′	60′
Grey & White	Sandstone			60′	96′
Grey & White	Sandstone			96′	153′
Grey & White	Sandstone			153′	159′

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
40′	30′	Neat cement	9.36
30′	0′	Bentonite slurry	16.8

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☒ Air percussion
☐ Other, specify _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☒ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, specify _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6 1/4"	Steel	.188"	+2′	40′
6"	Open Hole		40′	159′

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☒ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Water Details

Water found at Depth (m/ft)	Kind of Water	Hole Diameter Depth From	Depth To	Diameter (cm/in)
60 ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify		0′ 40′	9 1/4"
96 ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify		40′ 159′	6"
154 ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify			

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, specify **Not tested**

If pumping discontinued, give reason: X

Pump intake set at (m/ft): 140

Pumping rate (l/min / GPM): 20

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 32'8"

If flowing give rate (l/min/GPM): X

Recommended pump depth (m/ft): 100′

Recommended pump rate (l/min/GPM): 20

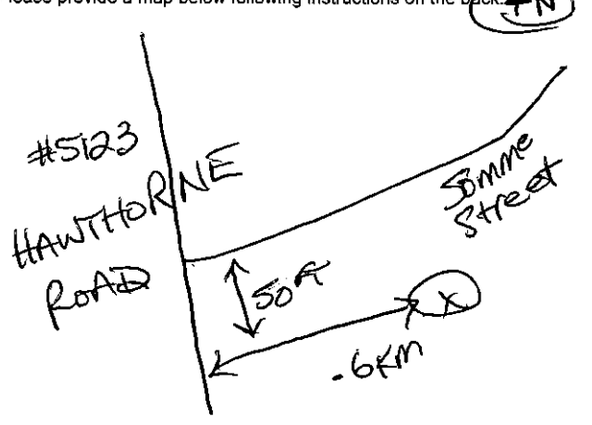
Well production (l/min/GPM): 20

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	27'5"		32'8"
1	29	1	29
2	29.2	2	27.5
3	29.3	3	27.5
4	29.4	4	27.5
5	29.5	5	27.5
10	30.1	10	27.5
15	30.5	15	27.5
20	30.8	20	27.5
25	31	25	27.5
30	31.3	30	27.5
40	31.9	40	27.5
50	32.3	50	27.5
60	32'8"	60	27'5"

Map of Well Location

Please provide a map below following instructions on the back.



Comments:
1 HP - 20 GPM SET @ 100 FT

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Air Rock Drilling Co. Ltd.	7681

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
6659 Franktown Road	Richmond	ON	K0A 2Z0	air-rock@sympatico.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted Y Y Y Y M M D D
6138382170	Hogan, Dan	T3058		2020 08 31

Well owner's information package delivered	Date Package Delivered Y Y Y Y M M D D	Ministry Use Only
☒ Yes ☐ No	2020 08 28	Audit No. Z344069
	Date Work Completed 2020 08 26	Received OCT 30 2020

0506E (2020/06) © Queen's Printer for Ontario, 2020

Ministry's Copy

Ontario — Ministry of the Environment, Conservation and Parks

Well Record for Well Cluster – Part 1 of 3

(Only for Multiple Test Holes or Dewatering Wells)

Regulation 903 Ontario Water Resources Act

All measurements recorded in: ☒ Metric ☐ Imperial

Follow instructions on the front and back of this form. Print or Type

Well Tag No. of Deepest Well: *(Print Well Tag No.)* A290221

Well No. on Drawing of Deepest Well: 109-21

☐ Dewatering wells ☒ Test holes

No. of wells reported 3

Page 1 of 1

Well Cluster Location Information

Address of Well Location (Street Number(s)/Name(s), RR, if available)	Lot(s)	Concession(s)	Geographic Township	County/District/Upper Tier Municipality
300 Somme Street, Beside 5123 Hawthorne Road				

City, Town, Village or Hamlet	Province	GPS Unit Make	Model	Unit Mode of Operation
Ottawa	Ontario	Garmin	Etrex	☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify:

Mandatory Attachments/Additional Information

☒ Land Owner Consent Form must be attached.

☒ Detailed Drawing of All Well Locations must be attached.

I, the person constructing the well, will promptly submit to the Director, on request, any additional information in my custody or control related to any well in the well cluster that I have constructed.

Signature of Technician/Contractor — Date (yyyy/mm/dd): 2021/10/22

Well Details

Well # on Drawing	UTM Coordinates Zone	Easting	Northing	Hole Depth (m/ft)	Hole Diameter (cm/in)	Method of Construction	Casing Material; Diameter (cm/in)	Casing (m/ft) From	Casing (m/ft) To	Screen Interval (m/ft) From	Screen Interval (m/ft) To	Annular Space Material (m/ft) From	Annular Space Material (m/ft) To	Annular Space Material:	Overburden/Bedrock or Abandonment Filing Material Intervals (m/ft)	Static Water Level (m/ft)	Date of Completion (yyyy/mm/dd)
109	18	456697	5017052	6.1	20.3	HSA	5.08	0.1	3.05	3.05	6.1	0.25	2.44	Bentonite	0-4.57 Silt Fill w. sand/clay/gravel/debris, 4.57-6.1 Till	1.465	2021/10/05
110	18	456775	5017046	4.42	20.3	HSA	5.08	0.1	2.9	2.9	4.42	0.25	2.6	Bentonite	" " " "	1.681	2021/10/05
111	18	456825	5017039	3.66	20.3	HSA	5.08	0.1	2.13	2.13	3.66	0.25	1.83	Bentonite	" " " "	1.041	2021/10/05

Well Contractor and Well Technician Information

Business Name of Well Contractor	Business Address (Street Number/Name, RR)	Municipality	Province
George Downing Estate Drilling Ltd	410 ave Principale	Grenville-sur-la-Rouge	QC

Postal Code	Bus. Telephone No.	Well Contractor's Licence No.	Business E-mail Address
J0V1B0	(819)242-6469	1844	info@georgedowningdrilling.com

Name of Well Technician (First Name, Last Name)	Well Technician's Licence No.	Signature of Well Technician	Date Submitted (yyyy/mm/dd)
Stephen Downing	3326		2021/10/22

Date First Well in Cluster Constructed or Abandoned (yyyy/mm/dd)	Date Last Well in Cluster Completed (yyyy/mm/dd)
2021/10/05	2021/10/05

Well Abandonment

Person Abandoning the Wells:

Name N/A

(Print or Type) - See instruction 11 on the back of this form

Ministry Use Only

Date Received (yyyy/mm/dd)	Audit No.
NOV 08 2021	C 53081

Comments:

 © Queen's Printer for Ontario, 2020

Ministry's Copy

Ontario

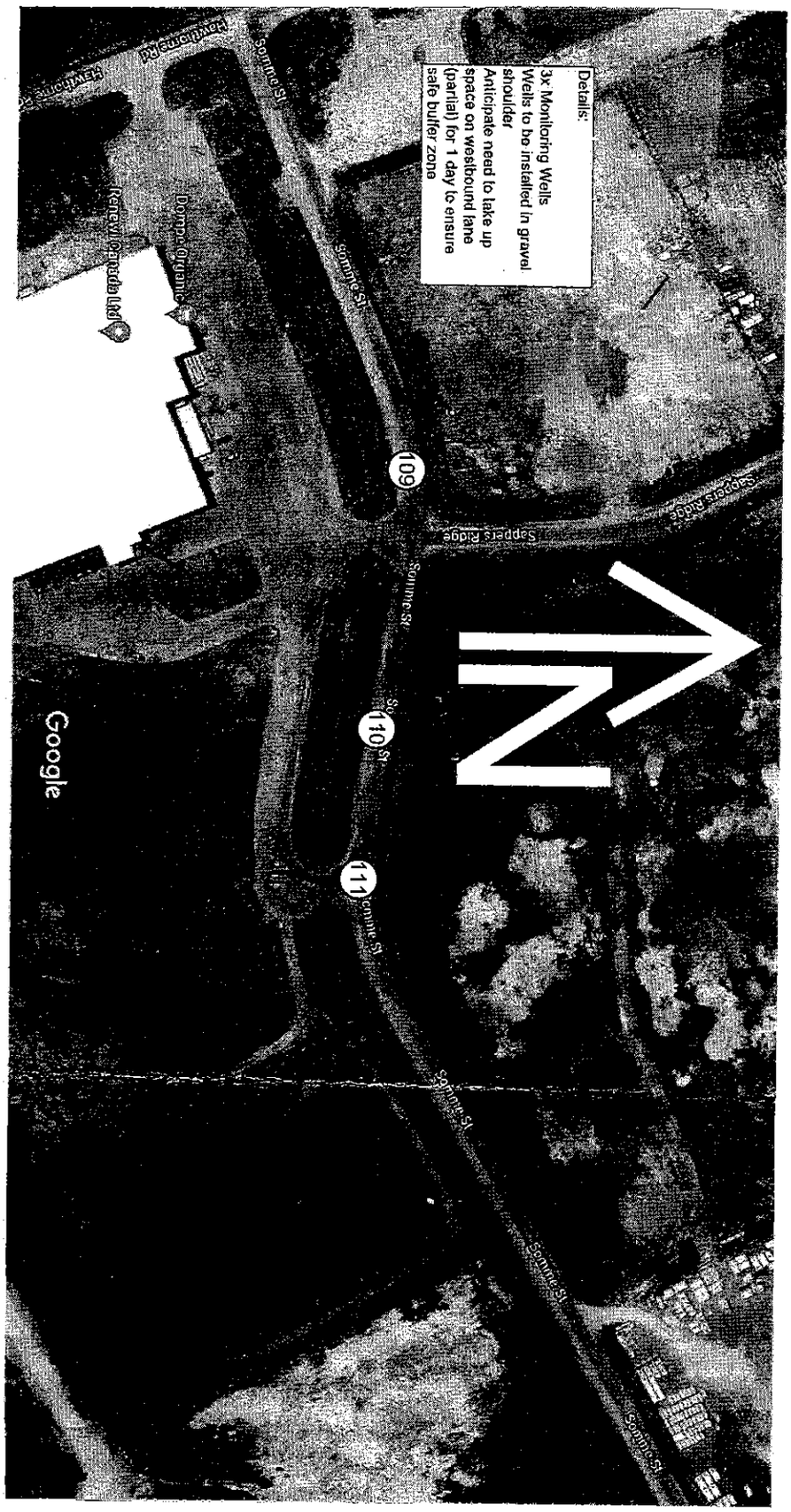
Ministry of the Environment, Conservation and Parks

Well Record for Well Cluster - Part 3 of 3
Detailed Drawing of All Well Locations

Note: This **Well Record for Well Cluster Part 3 - Detailed Drawing of all Well Locations,** must be attached to Parts 1 and 2. The drawing must include all property boundaries, an arrow indicating the North direction, all named roads and sufficient measurements to locate all wells in the cluster in relation to fixed points. The drawing must show the location of each well and each well must be numbered on the drawing to match number used for that well on the **Well Record for Well Cluster Parts 1 and 2.** The well with the well tag must be clearly identified on the Drawing.
UTM coordinates should appear beside each well, if space permits. Additional comments on wells can be included on the drawing

Well Tag Number: # A290221

"Well Record for Well Cluster" Form Audit Number: # C53081



NOV 08 2021

 © Queen's Printer for Ontario, 2020

MINISTRY'S COPY

e-1844
C53081

ATTACHMENT C

On-Site Test Well Record (TW2)

Ontario — Ministry of the Environment, Conservation and Parks

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. (Place Sticker and/or Print Below): Tag#:A364254

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name/Organization	E-mail Address	☐ Well Constructed by Well Owner
	Blackstone Homes design and build ltd		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
561 somme st	Ottawa	Ont	K1G3Y3	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
561 somme st	Gloucester	14	09

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Ottawa	Ontario	K1G3Y3

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	450350	5054620	just a lot	

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Back fill	sand & clay	mix	0	10'
Grey	Gravel	with stones		10'	25'
Grey	Fractured	limestone		25	28'
Grey	Med	limestone		28'	130'

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
41'	0'	15 Bags cement	36
		6 Bags Quick gel	

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☒ Air percussion
☐ Other, specify

Well Use

☐ Public ☐ Commercial ☐ Not used
☒ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6 1/8	steel	.188	41'	+2'

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☒ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Results of Well Yield Testing

After test of well yield, water was:
☒ Clear and sand free
☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 100

Pumping rate (l/min / GPM): 57.6

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 13.52

If flowing give rate (l/min/GPM)

Recommended pump depth (m/ft): 100 ft

Recommended pump rate (l/min/GPM): 57.6

Well production (l/min/GPM): 70

Disinfected? ☒ Yes ☐ No 43

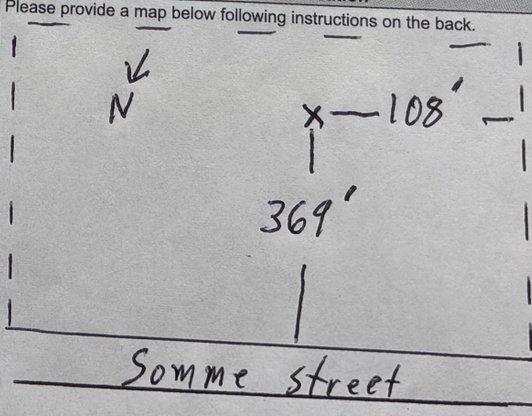
Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	8.5		13.52
1	9.97	1	13.10
2	10.85	2	12.88
3	11.55	3	12.61
4	11.93	4	12.38
5	12.21	5	12.01
10	12.87	10	11.48
15	13.07	15	10.73
20	13.18	20	10.17
25	13.26	25	9.93
30	13.32	30	9.61
40	13.39	40	9.13
50	13.48	50	9.01
60	13.52	60	8.81

Water Details

Water found at Depth	Kind of Water	Hole Diameter Depth From	Hole Diameter Depth To	Hole Diameter (cm/in)
87 (m/ft) ☐ Gas	☒ Fresh ☐ Untested ☐ Other, specify	41'	0'	10"
112 (m/ft) ☐ Gas	☒ Fresh ☐ Untested ☐ Other, specify	41'	130'	6 1/8"
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify			

Map of Well Location

Please provide a map below following instructions on the back.



Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Olympic Drilling Company ltd	7738

Business Address (Street Number/Name)	Municipality
6662 Bank street	Ottawa

Province	Postal Code	Business E-mail Address
Ont	K0A2P0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
613 229 8371	Wayne Renwick

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
1176	Wayne Renwick	2026 04 20

Comments:

Well owner's information package delivered: ☐ Yes ☒ No

Date Package Delivered: Y Y Y Y M M D D

Date Work Completed: 2026 04 20

Ministry Use Only

Audit No. Z397390

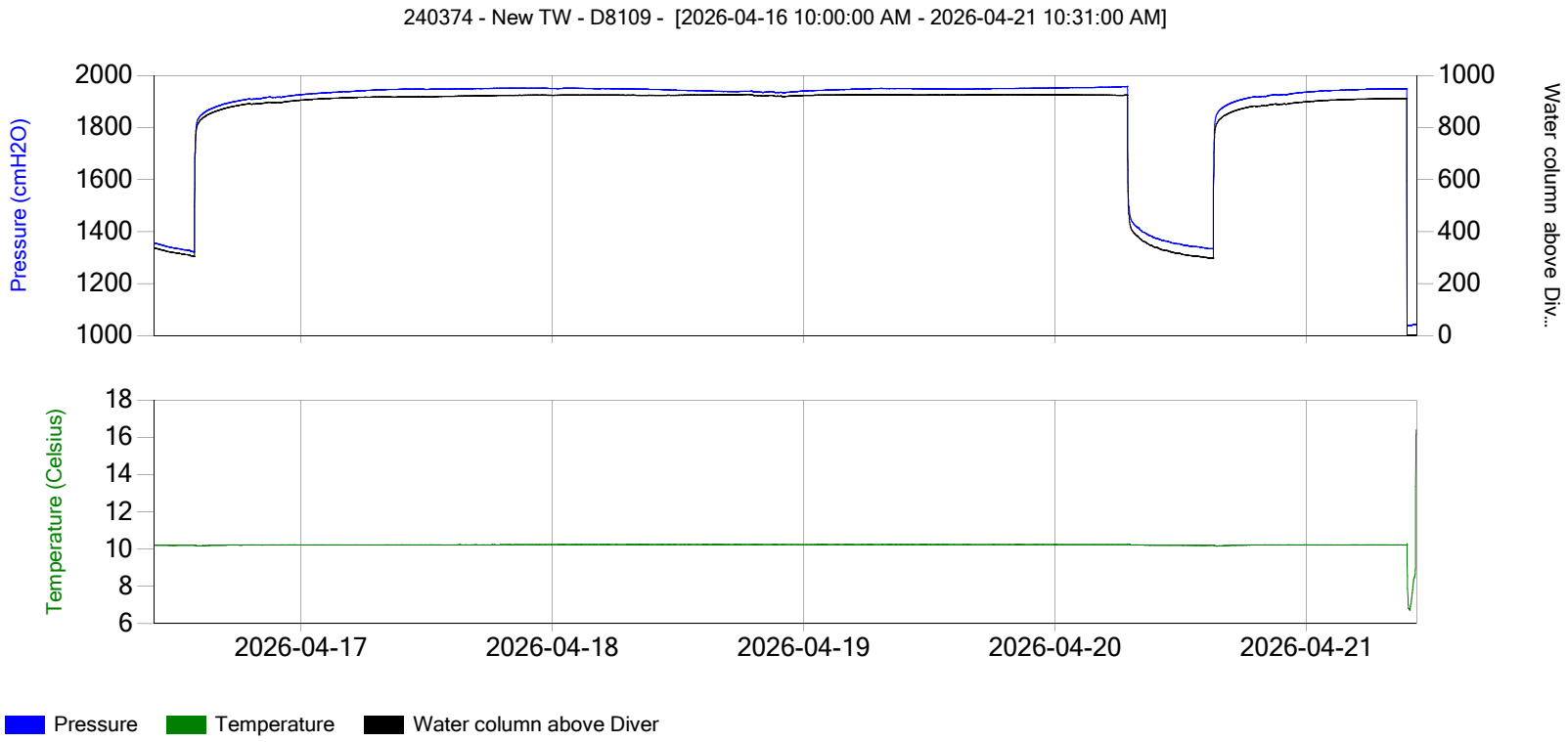
Received

E (2020/06) © Queen's Printer for Ontario, 2020

Ministry's Copy

ATTACHMENT D

Datalogger Print Out


240374 - New TW - D8109 - [2026-04-16 10:00:00 AM - 2026-04-21 10:31:00 AM]
Pressure (cmH2O)
2000
1800
1600
1400
1200
1000
Water column above Div...
1000
800
600
400
200
0
Temperature (Celsius)
18
16
14
12
10
8
6
2026-04-17
2026-04-18
2026-04-19
2026-04-20
2026-04-21
Pressure
Temperature
Water column above Diver

ATTACHMENT E

Field Data Summary Table

8-Hr Pump Test Data - Proposed Land Severance Application
Hydrogeological Assessment & Terrain Anlaysis
561 Somme Street, Ottawa, Ontario
LRL File No. 240374

Date:	2026-04-20	**Technician:**	J. Arthurs
Well Number:	#A364254	**Pump Depth (m BTC):**	29.0
Depth of Well (m BTC):	32.0	**Start Time:**	7:56 AM
Ground Surface Elev. (m):	n/a	**End Time:**	3:56 PM
Top of Casing Elev. (m):	0.89	**Average Pump Rate (L/min):**	57.6
Water Level before Pump In (m BTC)	8.05		

				Field Parameters							
Time[1] (min)	**Water Level (Pump In) (m BTC)**	**Drawdown (m)**	**Flow Rate (L/min)**	**Turbidity (NTU)**	**Residual Chlorine (mg/L)**	**Colour (TCU)**	**pH**	**Temperature (°C)**	**Conductivity (µs)**	**Total Dissolved (mg/L)**	**Notes**
0.0	8.05	0.00									
0.5	9.04	0.99									
1.0	9.97	1.92									
1.5	10.52	2.47									
2.0	10.85	2.80									
2.5	11.26	3.21									
3.0	11.55	3.50									
3.5	11.77	3.72									
4.0	11.93	3.88									
4.5	12.07	4.02									
5.0	12.21	4.16									
6.0	12.42	4.37									
7.0	12.68	4.63									
8.0	12.71	4.66									
9	12.81	4.76									
10	12.87	4.82	57.6								
15	13.07	5.02									
20	13.18	5.13									
25	13.26	5.21									
30	13.32	5.27		12.3		248	8.30	9.2	3648	1876	No odour or colour observed. Appears clear. In field colour measurement does not correspond with observations
40	13.39	5.34		1.72		31	8.42	9.0	1726	836	No odour or colour observed. Appears clear
50	13.48	5.43									
60	13.52	5.47	57.6	1.19	0.01	28	8.43	9.0	1855	867	No odour or colour observed. Appears clear
120	13.84	5.79	57.6	1.52	0.01	9	8.16	9.3	1577	775	No odour or colour observed. Appears clear
180	14.05	6.00	57.6	0.78	0.00	0	8.15	9.7	1527	764	No odour or colour observed. Appears clear
240	14.06	6.01	57.6	0.91	0.00	-7	8.15	9.9	1508	755	Colour is a negative as it was below the level of the 'blank' solution used (DI water)
300	14.15	6.10	57.6	0.76	0.01	7	8.20	9.4	1490	745	No odour or colour observed. Appears clear
360	14.24	6.19	57.6	0.59	0.00	1	8.04	10.1	1489	741	No odour or colour observed. Appears clear
420	14.28	6.23	57.6	1.20	0.01	7	8.12	9.6	1471	734	No odour or colour observed. Appears clear
480	14.34	6.29		0.56	0.01	-3	8.26	9.3	1469	765	
Recovery				**% Recovery**							
0.0	14.34	6.29		19.4							
0.5	13.12	5.07		19.4							
1.0	12.14	4.09		35.0							
1.5	11.49	3.44		45.3							
2.0	11.03	2.98		52.6							
2.5	10.66	2.61		58.5							
3.0	10.40	2.35		62.6							
3.5	10.20	2.15		65.8							
4.0	10.03	1.98		68.5							
4.5	9.91	1.86		70.4							
5.0	9.82	1.77		71.9							
6.0	9.63	1.58		74.9							
7.0	9.57	1.52		75.8							
8.0	9.49	1.44		77.1							
9.0	9.42	1.37		78.2							
10.0	9.38	1.33		78.9							
15.0	9.22	1.17		81.4							
20.0	9.14	1.09		82.7							
25.0	9.07	1.02		83.8							
30.0	9.02	0.97		84.6							
40.0	8.95	0.90		85.7							
50.0	8.90	0.85		86.5							
60.0	8.84	0.79		87.4							
1106.0	8.14	0.09		98.6							Returned to Site on April 21, 2026. Measurement collected at 10:34 AM

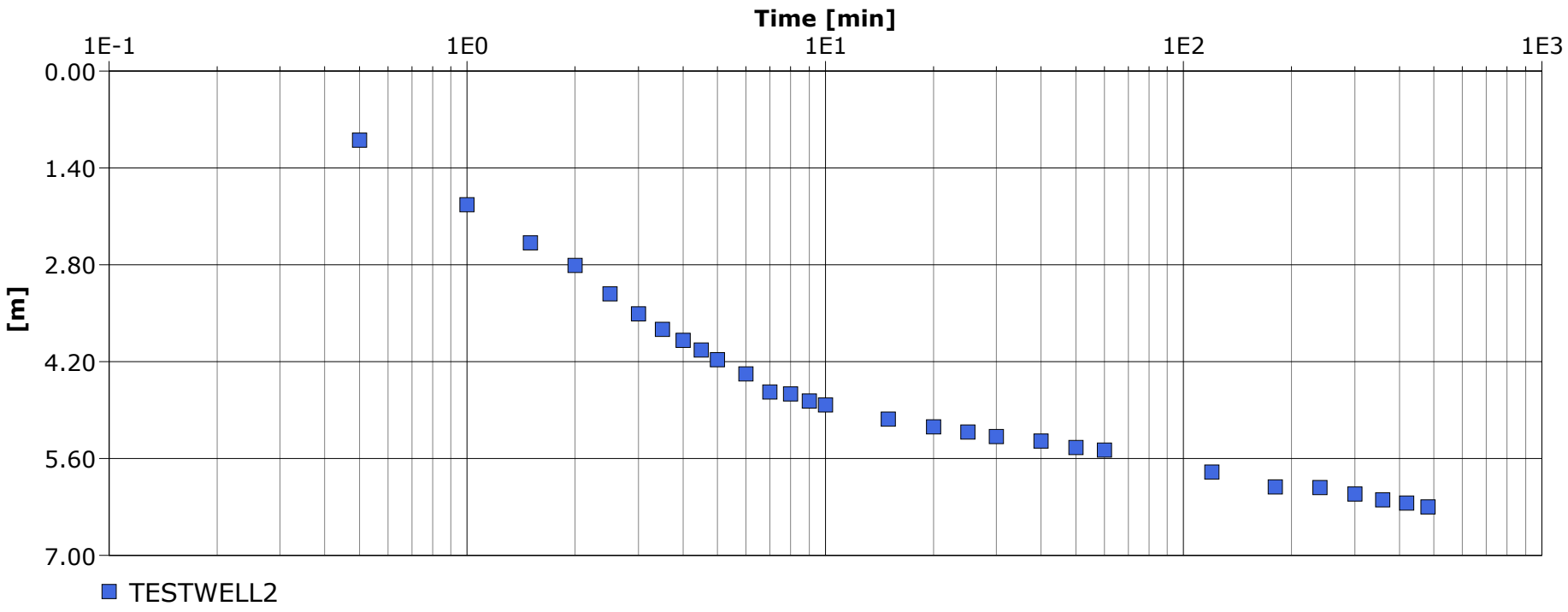
[1] Time elapse from pump turning on or off.
BTC: Below Top of Casing
NM: Not Measured

ATTACHMENT F

Aquifer Test Print Out

	Pumping Test Analysis Report
	Project: Hydrogeological Assessment
	Number: 240374
	Client: Blackstone Granite

Location: Somme Street, Ottawa	Pumping Test: Pumping Test 1	Pumping Well: TESTWELL2
Test Conducted by:		Test Date: 2026-05-04
Analysis Performed by: LRL Engineering	New analysis 1	Analysis Date: 2026-05-04
Aquifer Thickness:	Discharge Rate: 0.0576 [m³/min]	



Calculation using Theis

Observation Well	Transmissivity [m²/d]	Storage coefficient	Radial Distance to PW [m]	
TESTWELL2	6.28×10^{0}	4.79×10^{-2}		

ATTACHMENT G

Laboratory Certificate of Analysis

PARACEL LABORATORIES LTD. | TRUSTED. RESPONSIVE. RELIABLE.

1-800-749-1947
www.paracellabs.com

Certificate of Analysis

LRL Associates Ltd.
5430 Canotek Road
Ottawa, ON K1J 9G2
Attn: Jessica Arthurs

Client PO:
Project: 240374
Custody: 20770

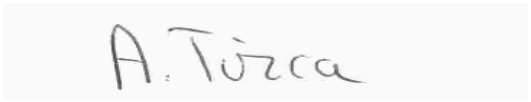
Report Date: 24-Apr-2026
Order Date: 20-Apr-2026

Order #: 2617126

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2617126-01	TW2-4hr
2617126-02	TW2-8hr

Approved By:



Adriana Tirca, B.Eng (Chem)
Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Lab Location	Extraction Date	Analysis Date
Alkalinity, total to pH 4.5	EPA 310.1 - Titration to pH 4.5	Ottawa	21-Apr-26	21-Apr-26
Ammonia, as N	EPA 351.2 - Auto Colour	Ottawa	21-Apr-26	21-Apr-26
Anions	EPA 300.1 - IC	Ottawa	22-Apr-26	22-Apr-26
Colour	SM2120 - Spectrophotometric	Ottawa	21-Apr-26	21-Apr-26
Conductivity	EPA 9050A- probe @25 °C	Ottawa	21-Apr-26	21-Apr-26
Cyanide, free	MOE E3015 - Auto Colour	Ottawa	22-Apr-26	22-Apr-26
Dissolved Organic Carbon	MOE 3247B - Combustion IR	Ottawa	23-Apr-26	23-Apr-26
E. coli	MOE E3407	Ottawa	21-Apr-26	21-Apr-26
Fecal Coliform	SM 9222D	Ottawa	21-Apr-26	21-Apr-26
Heterotrophic Plate Count	SM 9215C	Ottawa	21-Apr-26	21-Apr-26
Metals, ICP-MS	EPA 200.8 - ICP-MS	Ottawa	21-Apr-26	22-Apr-26
PAHs by GC-MS	EPA 625 - GC-MS, extraction	Ottawa	21-Apr-26	22-Apr-26
PCBs, total	EPA 608 - GC-ECD	Ottawa	21-Apr-26	21-Apr-26
pH	SM 4500-H+	Ottawa	21-Apr-26	21-Apr-26
PHC F1	CWS Tier 1 - P&T GC-FID	Ottawa	22-Apr-26	22-Apr-26
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	Ottawa	22-Apr-26	23-Apr-26
Phenolics	EPA 420.2 - Auto Colour, 4AAP	Ottawa	21-Apr-26	21-Apr-26
Hardness	Hardness as CaCO3	Ottawa	21-Apr-26	22-Apr-26
Sulphide	SM 4500SE - Colourimetric	Ottawa	22-Apr-26	22-Apr-26
Tannin/Lignin	SM 5550B - Colourimetric	Ottawa	24-Apr-26	24-Apr-26
Total Coliform	MOE E3407	Ottawa	21-Apr-26	21-Apr-26
Total Dissolved Solids	SM 2540C - gravimetric, filtration	Ottawa	22-Apr-26	24-Apr-26
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	Ottawa	22-Apr-26	22-Apr-26
Turbidity	SM 2130B - Turbidity meter	Ottawa	21-Apr-26	21-Apr-26
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	Ottawa	22-Apr-26	22-Apr-26

Certificate of Analysis

Report Date: 24-Apr-2026

Client: **LRL Associates Ltd.**

Order Date: 20-Apr-2026

Client PO:

Project Description: 240374

	Client ID:	TW2-4hr	TW2-8hr	-	-	-	-
	Sample Date:	20-Apr-26 11:56	20-Apr-26 15:56	-	-		
	Sample ID:	2617126-01	2617126-02	-	-		
	Matrix:	Drinking Water	Drinking Water	-	-		
	MDL/Units						
Microbiological Parameters							
E. coli	1 CFU/100mL	ND	ND	-	-	-	-
Total Coliforms	1 CFU/100mL	ND	ND	-	-	-	-
Fecal Coliforms	1 CFU/100mL	ND	ND	-	-	-	-
Heterotrophic Plate Count	10 CFU/mL	<10	<10	-	-	-	-
General Inorganics							
Alkalinity, total	5 mg/L	623	618	-	-	-	-
Ammonia as N	0.01 mg/L	0.25	0.26	-	-	-	-
Dissolved Organic Carbon	0.5 mg/L	7.6	8.0	-	-	-	-
Colour	2 TCU	5	5	-	-	-	-
Conductivity	5 uS/cm	1690	1690	-	-	-	-
Cyanide, free	0.002 mg/L	-	<0.002	-	-	-	-
Hardness	1 mg/L	861	828	-	-	-	-
pH	0.1 pH Units	7.3	7.4	-	-	-	-
Phenolics	0.001 mg/L	<0.001	<0.001	-	-	-	-
Total Dissolved Solids	10 mg/L	1050	1040	-	-	-	-
Sulphide	0.02 mg/L	<0.02	<0.02	-	-	-	-
Tannin & Lignin	0.1 mg/L	0.3	0.3	-	-	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.5	0.5	-	-	-	-
Turbidity	0.1 NTU	19.4	16.4	-	-	-	-
Anions							
Chloride	1 mg/L	89	89	-	-	-	-
Fluoride	0.1 mg/L	0.2	0.2	-	-	-	-
Nitrate as N	0.1 mg/L	<0.1	<0.1	-	-	-	-
Nitrite as N	0.05 mg/L	<0.05	<0.05	-	-	-	-
Sulphate	1 mg/L	221	221	-	-	-	-
Metals							

Certificate of Analysis

Report Date: 24-Apr-2026

Client: **LRL Associates Ltd.**

Order Date: 20-Apr-2026

Client PO:

Project Description: 240374

	Client ID:	TW2-4hr	TW2-8hr	-	-	-	-
	Sample Date:	20-Apr-26 11:56	20-Apr-26 15:56	-	-		
	Sample ID:	2617126-01	2617126-02	-	-		
	Matrix:	Drinking Water	Drinking Water	-	-		
	MDL/Units						
Metals							
Aluminum	0.001 mg/L	-	0.010	-	-	-	-
Antimony	0.0005 mg/L	-	<0.0005	-	-	-	-
Arsenic	0.001 mg/L	-	<0.001	-	-	-	-
Barium	0.001 mg/L	-	0.188	-	-	-	-
Boron	0.01 mg/L	-	0.20	-	-	-	-
Cadmium	0.0001 mg/L	-	<0.0001	-	-	-	-
Calcium	0.1 mg/L	208	200	-	-	-	-
Chromium	0.001 mg/L	-	<0.001	-	-	-	-
Copper	0.0005 mg/L	-	<0.0005	-	-	-	-
Iron	0.1 mg/L	1.9	1.7	-	-	-	-
Lead	0.0001 mg/L	-	<0.0001	-	-	-	-
Magnesium	0.2 mg/L	82.7	79.8	-	-	-	-
Manganese	0.005 mg/L	0.608	0.621	-	-	-	-
Potassium	0.1 mg/L	12.6	12.4	-	-	-	-
Selenium	0.001 mg/L	-	<0.001	-	-	-	-
Sodium	0.2 mg/L	96.9	96.3	-	-	-	-
Uranium	0.0001 mg/L	-	0.0005	-	-	-	-
Zinc	0.005 mg/L	-	<0.005	-	-	-	-
Volatiles							
Acetone	0.0050 mg/L	-	<0.0050	-	-	-	-
Benzene	0.0005 mg/L	-	<0.0005	-	-	-	-
Bromodichloromethane	0.0005 mg/L	-	<0.0005	-	-	-	-
Bromoform	0.0005 mg/L	-	<0.0005	-	-	-	-
Bromomethane	0.0005 mg/L	-	<0.0005	-	-	-	-
Carbon Tetrachloride	0.0002 mg/L	-	<0.0002	-	-	-	-
Chlorobenzene	0.0005 mg/L	-	<0.0005	-	-	-	-

Certificate of Analysis

Report Date: 24-Apr-2026

Client: **LRL Associates Ltd.**

Order Date: 20-Apr-2026

Client PO:

Project Description: 240374

	Client ID:	TW2-4hr	TW2-8hr	-	-	-	-
	Sample Date:	20-Apr-26 11:56	20-Apr-26 15:56	-	-		
	Sample ID:	2617126-01	2617126-02	-	-		
	Matrix:	Drinking Water	Drinking Water	-	-		
	MDL/Units						
Volatiles							
Chloroethane	0.0010 mg/L	-	<0.0010	-	-	-	-
Chloroform	0.0005 mg/L	-	<0.0005	-	-	-	-
Dibromochloromethane	0.0005 mg/L	-	<0.0005	-	-	-	-
Dichlorodifluoromethane	0.0010 mg/L	-	<0.0010	-	-	-	-
1,2-Dibromoethane	0.0002 mg/L	-	<0.0002	-	-	-	-
1,2-Dichlorobenzene	0.0005 mg/L	-	<0.0005	-	-	-	-
1,3-Dichlorobenzene	0.0005 mg/L	-	<0.0005	-	-	-	-
1,4-Dichlorobenzene	0.0005 mg/L	-	<0.0005	-	-	-	-
1,1-Dichloroethane	0.0005 mg/L	-	<0.0005	-	-	-	-
1,2-Dichloroethane	0.0005 mg/L	-	<0.0005	-	-	-	-
1,1-Dichloroethylene	0.0005 mg/L	-	<0.0005	-	-	-	-
cis-1,2-Dichloroethylene	0.0005 mg/L	-	<0.0005	-	-	-	-
trans-1,2-Dichloroethylene	0.0005 mg/L	-	<0.0005	-	-	-	-
1,2-Dichloroethylene, total	0.0005 mg/L	-	<0.0005	-	-	-	-
1,2-Dichloropropane	0.0005 mg/L	-	<0.0005	-	-	-	-
cis-1,3-Dichloropropylene	0.0005 mg/L	-	<0.0005	-	-	-	-
trans-1,3-Dichloropropylene	0.0005 mg/L	-	<0.0005	-	-	-	-
1,3-Dichloropropene, total	0.0005 mg/L	-	<0.0005	-	-	-	-
Ethylbenzene	0.0005 mg/L	-	<0.0005	-	-	-	-
Hexane	0.0010 mg/L	-	<0.0010	-	-	-	-
Methyl Ethyl Ketone (2-Butanone)	0.0050 mg/L	-	<0.0050	-	-	-	-
Methyl Isobutyl Ketone	0.0050 mg/L	-	<0.0050	-	-	-	-
Methyl tert-butyl ether	0.0020 mg/L	-	<0.0020	-	-	-	-
Methylene Chloride	0.0050 mg/L	-	<0.0050	-	-	-	-
Styrene	0.0005 mg/L	-	<0.0005	-	-	-	-
1,1,1,2-Tetrachloroethane	0.0005 mg/L	-	<0.0005	-	-	-	-

	Client ID:	TW2-4hr	TW2-8hr	-	-	-	-
	Sample Date:	20-Apr-26 11:56	20-Apr-26 15:56	-	-		
	Sample ID:	2617126-01	2617126-02	-	-		
	Matrix:	Drinking Water	Drinking Water	-	-		
	MDL/Units						
Volatiles							
1,1,2,2-Tetrachloroethane	0.0005 mg/L	-	<0.0005	-	-	-	-
Tetrachloroethylene	0.0005 mg/L	-	<0.0005	-	-	-	-
Toluene	0.0005 mg/L	-	<0.0005	-	-	-	-
1,1,1-Trichloroethane	0.0005 mg/L	-	<0.0005	-	-	-	-
1,1,2-Trichloroethane	0.0005 mg/L	-	<0.0005	-	-	-	-
Trichloroethylene	0.0005 mg/L	-	<0.0005	-	-	-	-
Trichlorofluoromethane	0.0010 mg/L	-	<0.0010	-	-	-	-
Vinyl chloride	0.0002 mg/L	-	<0.0002	-	-	-	-
m,p-Xylenes	0.0005 mg/L	-	<0.0005	-	-	-	-
o-Xylene	0.0005 mg/L	-	<0.0005	-	-	-	-
Xylenes, total	0.0005 mg/L	-	<0.0005	-	-	-	-
4-Bromofluorobenzene	Surrogate	-	111%	-	-	-	-
Dibromofluoromethane	Surrogate	-	102%	-	-	-	-
Toluene-d8	Surrogate	-	102%	-	-	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	0.0250 mg/L	-	<0.0250	-	-	-	-
F2 PHCs (C10-C16)	0.1 mg/L	-	<0.1	-	-	-	-
F3 PHCs (C16-C34)	0.1 mg/L	-	<0.1	-	-	-	-
F4 PHCs (C34-C50)	0.1 mg/L	-	<0.1	-	-	-	-
Semi-Volatiles							
Acenaphthene	0.05 ug/L	-	<0.05	-	-	-	-
Acenaphthylene	0.05 ug/L	-	<0.05	-	-	-	-
Anthracene	0.01 ug/L	-	<0.01	-	-	-	-
Benzo [a] anthracene	0.01 ug/L	-	<0.01	-	-	-	-
Benzo [a] pyrene	0.01 ug/L	-	<0.01	-	-	-	-
Benzo [b] fluoranthene	0.05 ug/L	-	<0.05	-	-	-	-

	Client ID:	TW2-4hr	TW2-8hr	-	-	-	-
	Sample Date:	20-Apr-26 11:56	20-Apr-26 15:56	-	-		
	Sample ID:	2617126-01	2617126-02	-	-		
	Matrix:	Drinking Water	Drinking Water	-	-		
	MDL/Units						
Semi-Volatiles							
Benzo [g,h,i] perylene	0.05 ug/L	-	<0.05	-	-	-	-
Benzo [k] fluoranthene	0.05 ug/L	-	<0.05	-	-	-	-
Biphenyl	0.05 ug/L	-	<0.05	-	-	-	-
Chrysene	0.05 ug/L	-	<0.05	-	-	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	-	<0.05	-	-	-	-
Fluoranthene	0.01 ug/L	-	<0.01	-	-	-	-
Fluorene	0.05 ug/L	-	<0.05	-	-	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	-	<0.05	-	-	-	-
1-Methylnaphthalene	0.05 ug/L	-	<0.05	-	-	-	-
2-Methylnaphthalene	0.05 ug/L	-	<0.05	-	-	-	-
Methylnaphthalene (1&2)	0.10 ug/L	-	<0.10	-	-	-	-
Naphthalene	0.05 ug/L	-	<0.05	-	-	-	-
Phenanthrene	0.05 ug/L	-	<0.05	-	-	-	-
Pyrene	0.01 ug/L	-	<0.01	-	-	-	-
2-Fluorobiphenyl	Surrogate	-	87.1%	-	-	-	-
Terphenyl-d14	Surrogate	-	98.3%	-	-	-	-
PCBs							
PCBs, total	0.05 ug/L	-	<0.05	-	-	-	-
Decachlorobiphenyl	Surrogate	-	62.1%	-	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions								
Chloride	ND	1	mg/L					
Fluoride	ND	0.1	mg/L					
Nitrate as N	ND	0.1	mg/L					
Nitrite as N	ND	0.05	mg/L					
Sulphate	ND	1	mg/L					
General Inorganics								
Alkalinity, total	ND	5	mg/L					
Ammonia as N	ND	0.01	mg/L					
Dissolved Organic Carbon	ND	0.5	mg/L					
Colour	ND	2	TCU					
Conductivity	ND	5	uS/cm					
Cyanide, free	ND	0.002	mg/L					
Phenolics	ND	0.001	mg/L					
Total Dissolved Solids	ND	10	mg/L					
Sulphide	ND	0.02	mg/L					
Tannin & Lignin	ND	0.1	mg/L					
Total Kjeldahl Nitrogen	ND	0.1	mg/L					
Turbidity	ND	0.1	NTU					
Hydrocarbons								
F1 PHCs (C6-C10)	ND	0.0250	mg/L					
F2 PHCs (C10-C16)	ND	0.1	mg/L					
F3 PHCs (C16-C34)	0.1	0.1	mg/L					
F4 PHCs (C34-C50)	ND	0.1	mg/L					
Metals								
Aluminum	ND	0.001	mg/L					
Antimony	ND	0.0005	mg/L					
Arsenic	ND	0.001	mg/L					
Barium	ND	0.001	mg/L					
Boron	ND	0.01	mg/L					
Cadmium	ND	0.0001	mg/L					
Calcium	ND	0.1	mg/L					
Chromium	ND	0.001	mg/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Copper	ND	0.0005	mg/L					
Iron	ND	0.1	mg/L					
Lead	ND	0.0001	mg/L					
Magnesium	ND	0.2	mg/L					
Manganese	ND	0.005	mg/L					
Potassium	ND	0.1	mg/L					
Selenium	ND	0.001	mg/L					
Sodium	ND	0.2	mg/L					
Uranium	ND	0.0001	mg/L					
Zinc	ND	0.005	mg/L					
Microbiological Parameters								
E. coli	ND	1	CFU/100mL					
Fecal Coliforms	ND	1	CFU/100mL					
Heterotrophic Plate Count	ND	10	CFU/mL					
Total Coliforms	ND	1	CFU/100mL					
PCBs								
PCBs, total	ND	0.05	ug/L					
Surrogate: Decachlorobiphenyl	*0.204*		*%*	*81.5*	*60-140*			
Semi-Volatiles								
Acenaphthene	ND	0.05	ug/L					
Acenaphthylene	ND	0.05	ug/L					
Anthracene	ND	0.01	ug/L					
Benzo [a] anthracene	ND	0.01	ug/L					
Benzo [a] pyrene	ND	0.01	ug/L					
Benzo [b] fluoranthene	ND	0.05	ug/L					
Benzo [g,h,i] perylene	ND	0.05	ug/L					
Benzo [k] fluoranthene	ND	0.05	ug/L					
Biphenyl	ND	0.05	ug/L					
Chrysene	ND	0.05	ug/L					
Dibenzo [a,h] anthracene	ND	0.05	ug/L					
Fluoranthene	ND	0.01	ug/L					
Fluorene	ND	0.05	ug/L					
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
1-Methylnaphthalene	ND	0.05	ug/L					
2-Methylnaphthalene	ND	0.05	ug/L					
Methylnaphthalene (1&2)	ND	0.10	ug/L					
Naphthalene	ND	0.05	ug/L					
Phenanthrene	ND	0.05	ug/L					
Pyrene	ND	0.01	ug/L					
Surrogate: 2-Fluorobiphenyl	*8.53*		*%*	*85.3*	*50-140*			
Surrogate: Terphenyl-d14	*8.46*		*%*	*84.6*	*50-140*			
Volatiles								
Acetone	ND	0.0050	mg/L					
Benzene	ND	0.0005	mg/L					
Bromodichloromethane	ND	0.0005	mg/L					
Bromoform	ND	0.0005	mg/L					
Bromomethane	ND	0.0005	mg/L					
Carbon Tetrachloride	ND	0.0002	mg/L					
Chlorobenzene	ND	0.0005	mg/L					
Chloroethane	ND	0.0010	mg/L					
Chloroform	ND	0.0005	mg/L					
Dibromochloromethane	ND	0.0005	mg/L					
Dichlorodifluoromethane	ND	0.0010	mg/L					
1,2-Dibromoethane	ND	0.0002	mg/L					
1,2-Dichlorobenzene	ND	0.0005	mg/L					
1,3-Dichlorobenzene	ND	0.0005	mg/L					
1,4-Dichlorobenzene	ND	0.0005	mg/L					
1,1-Dichloroethane	ND	0.0005	mg/L					
1,2-Dichloroethane	ND	0.0005	mg/L					
1,1-Dichloroethylene	ND	0.0005	mg/L					
cis-1,2-Dichloroethylene	ND	0.0005	mg/L					
trans-1,2-Dichloroethylene	ND	0.0005	mg/L					
1,2-Dichloroethylene, total	ND	0.0005	mg/L					
1,2-Dichloropropane	ND	0.0005	mg/L					
cis-1,3-Dichloropropylene	ND	0.0005	mg/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
trans-1,3-Dichloropropylene	ND	0.0005	mg/L					
1,3-Dichloropropene, total	ND	0.0005	mg/L					
Ethylbenzene	ND	0.0005	mg/L					
Hexane	ND	0.0010	mg/L					
Methyl Ethyl Ketone (2-Butanone)	ND	0.0050	mg/L					
Methyl Isobutyl Ketone	ND	0.0050	mg/L					
Methyl tert-butyl ether	ND	0.0020	mg/L					
Methylene Chloride	ND	0.0050	mg/L					
Styrene	ND	0.0005	mg/L					
1,1,1,2-Tetrachloroethane	ND	0.0005	mg/L					
1,1,2,2-Tetrachloroethane	ND	0.0005	mg/L					
Tetrachloroethylene	ND	0.0005	mg/L					
Toluene	ND	0.0005	mg/L					
1,1,1-Trichloroethane	ND	0.0005	mg/L					
1,1,2-Trichloroethane	ND	0.0005	mg/L					
Trichloroethylene	ND	0.0005	mg/L					
Trichlorofluoromethane	ND	0.0010	mg/L					
Vinyl chloride	ND	0.0002	mg/L					
m,p-Xylenes	ND	0.0005	mg/L					
o-Xylene	ND	0.0005	mg/L					
Xylenes, total	ND	0.0005	mg/L					
Surrogate: 4-Bromofluorobenzene	*0.0868*		*%*	*109*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0751*		*%*	*93.9*	*50-140*			
Surrogate: Toluene-d8	*0.0786*		*%*	*98.3*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	17.1	1	mg/L	16.9			1.0	20	
Fluoride	0.22	0.1	mg/L	0.24			8.5	20	
Nitrate as N	ND	0.1	mg/L	ND			NC	20	
Nitrite as N	ND	0.05	mg/L	ND			NC	20	
Sulphate	32.5	1	mg/L	32.4			0.4	20	
General Inorganics									
Alkalinity, total	623	5	mg/L	618			0.8	10	
Ammonia as N	0.070	0.01	mg/L	0.069			1.8	18	
Dissolved Organic Carbon	1.8	0.5	mg/L	1.8			3.2	38	
Colour	5	2	TCU	5			0.0	20	
Conductivity	1690	5	uS/cm	1690			0.5	5	
Cyanide, free	ND	0.002	mg/L	ND			NC	20	
pH	7.3	0.1	pH Units	7.4			0.7	3.3	
Phenolics	ND	0.001	mg/L	ND			NC	10	
Total Dissolved Solids	1010	10	mg/L	1050			3.7	10	
Sulphide	ND	0.02	mg/L	ND			NC	10	
Tannin & Lignin	0.3	0.1	mg/L	0.3			13.2	15	
Total Kjeldahl Nitrogen	0.36	0.1	mg/L	0.49			NC	20	
Turbidity	19.0	0.1	NTU	19.4			2.1	10	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	0.0250	mg/L	ND			NC	30	
Metals									
Aluminum	ND	0.001	mg/L	ND			NC	20	
Antimony	ND	0.0005	mg/L	ND			NC	20	
Arsenic	ND	0.001	mg/L	ND			NC	20	
Barium	0.320	0.001	mg/L	0.302			5.7	20	
Boron	0.08	0.01	mg/L	0.08			0.9	20	
Cadmium	ND	0.0001	mg/L	ND			NC	20	
Calcium	77.4	0.1	mg/L	76.0			1.9	20	
Chromium	ND	0.001	mg/L	ND			NC	20	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Copper	ND	0.0005	mg/L	ND			NC	20	
Iron	0.8	0.1	mg/L	0.8			2.3	20	
Lead	ND	0.0001	mg/L	ND			NC	20	
Magnesium	25.1	0.2	mg/L	25.2			0.4	20	
Manganese	0.155	0.005	mg/L	0.153			1.4	20	
Potassium	2.0	0.1	mg/L	1.9			4.3	20	
Selenium	ND	0.001	mg/L	ND			NC	20	
Sodium	10.5	0.2	mg/L	10.2			3.2	20	
Uranium	0.0007	0.0001	mg/L	0.0007			6.7	20	
Zinc	0.022	0.005	mg/L	0.022			0.5	20	
Microbiological Parameters									
E. coli	ND	1	CFU/100mL	ND			NC	30	
Total Coliforms	ND	1	CFU/100mL	ND			NC	30	
Fecal Coliforms	ND	1	CFU/100mL	ND			NC	30	
Heterotrophic Plate Count	ND	10	CFU/mL	ND			NC	30	
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L	ND			NC	30	
Acenaphthylene	ND	0.05	ug/L	ND			NC	30	
Anthracene	0.056	0.01	ug/L	0.128			78.6	30	QR-04
Benzo [a] anthracene	0.267	0.01	ug/L	0.852			105.0	30	QR-04
Benzo [a] pyrene	0.223	0.01	ug/L	0.730			106.0	30	QR-04
Benzo [b] fluoranthene	0.342	0.05	ug/L	1.02			99.3	30	QR-04
Benzo [g,h,i] perylene	0.163	0.05	ug/L	0.466			96.4	30	QR-04
Benzo [k] fluoranthene	0.105	0.05	ug/L	0.410			119.0	30	QR-04
Biphenyl	ND	0.05	ug/L	ND			NC	30	
Chrysene	0.263	0.05	ug/L	0.829			104.0	30	QR-04
Dibenzo [a,h] anthracene	ND	0.05	ug/L	ND			NC	30	
Fluoranthene	0.452	0.01	ug/L	1.35			99.6	30	QR-04
Fluorene	ND	0.05	ug/L	ND			NC	30	
Indeno [1,2,3-cd] pyrene	0.166	0.05	ug/L	0.524			104.0	30	QR-04
1-Methylnaphthalene	ND	0.05	ug/L	ND			NC	30	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
2-Methylnaphthalene	ND	0.05	ug/L	ND			NC	30	
Naphthalene	ND	0.05	ug/L	ND			NC	30	
Phenanthrene	0.126	0.05	ug/L	0.374			99.2	30	QR-04
Pyrene	0.362	0.01	ug/L	1.21			108.0	30	QR-04
Surrogate: 2-Fluorobiphenyl	*8.37*		*%*		*83.7*	*50-140*			
Surrogate: Terphenyl-d14	*8.38*		*%*		*83.8*	*50-140*			
Volatiles									
Acetone	ND	0.0050	mg/L	ND			NC	30	
Benzene	ND	0.0005	mg/L	ND			NC	30	
Bromodichloromethane	0.0047	0.0005	mg/L	0.0048			1.9	30	
Bromoform	ND	0.0005	mg/L	ND			NC	30	
Bromomethane	ND	0.0005	mg/L	ND			NC	30	
Carbon Tetrachloride	ND	0.0002	mg/L	ND			NC	30	
Chlorobenzene	ND	0.0005	mg/L	ND			NC	30	
Chloroethane	ND	0.0010	mg/L	ND			NC	30	
Chloroform	0.150	0.0005	mg/L	0.135			10.6	30	
Dibromochloromethane	ND	0.0005	mg/L	ND			NC	30	
Dichlorodifluoromethane	ND	0.0010	mg/L	ND			NC	30	
1,2-Dibromoethane	ND	0.0002	mg/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
1,1-Dichloroethane	ND	0.0005	mg/L	ND			NC	30	
1,2-Dichloroethane	ND	0.0005	mg/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.0005	mg/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.0005	mg/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.0005	mg/L	ND			NC	30	
1,2-Dichloropropane	ND	0.0005	mg/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.0005	mg/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.0005	mg/L	ND			NC	30	
Ethylbenzene	ND	0.0005	mg/L	ND			NC	30	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hexane	ND	0.0010	mg/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	0.0050	mg/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	0.0050	mg/L	ND			NC	30	
Methyl tert-butyl ether	ND	0.0020	mg/L	ND			NC	30	
Methylene Chloride	ND	0.0050	mg/L	ND			NC	30	
Styrene	ND	0.0005	mg/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.0005	mg/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.0005	mg/L	ND			NC	30	
Tetrachloroethylene	ND	0.0005	mg/L	ND			NC	30	
Toluene	ND	0.0005	mg/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.0005	mg/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.0005	mg/L	ND			NC	30	
Trichloroethylene	ND	0.0005	mg/L	ND			NC	30	
Trichlorofluoromethane	ND	0.0010	mg/L	ND			NC	30	
Vinyl chloride	ND	0.0002	mg/L	ND			NC	30	
m,p-Xylenes	ND	0.0005	mg/L	ND			NC	30	
o-Xylene	ND	0.0005	mg/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*0.0872*		*%*		*109*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0856*		*%*		*107*	*50-140*			
Surrogate: Toluene-d8	*0.0792*		*%*		*99.0*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	26.9	1	mg/L	16.9	99.6	70-124			
Fluoride	1.07	0.1	mg/L	0.24	82.8	70-130			
Nitrate as N	1.04	0.1	mg/L	ND	104	77-126			
Nitrite as N	0.999	0.05	mg/L	ND	99.9	82-115			
Sulphate	41.3	1	mg/L	32.4	89.1	70-130			
General Inorganics									
Ammonia as N	1.14	0.01	mg/L	0.069	107	85-115			
Dissolved Organic Carbon	17.7	0.5	mg/L	8.0	96.4	73-127			
Cyanide, free	0.044	0.002	mg/L	ND	87.0	70-130			
Phenolics	0.026	0.001	mg/L	ND	103	80-120			
Total Dissolved Solids	88.0	10	mg/L	ND	88.0	78-115			
Sulphide	0.50	0.02	mg/L	ND	99.4	82-118			
Tannin & Lignin	1.2	0.1	mg/L	0.3	86.7	75-125			
Total Kjeldahl Nitrogen	1.43	0.1	mg/L	0.49	94.5	75-125			
Hydrocarbons									
F1 PHCs (C6-C10)	1.85	0.0250	mg/L	ND	92.5	85-115			
F2 PHCs (C10-C16)	1.2	0.1	mg/L	ND	73.2	60-140			
F3 PHCs (C16-C34)	3.5	0.1	mg/L	ND	88.8	60-140			
F4 PHCs (C34-C50)	2.1	0.1	mg/L	ND	83.2	60-140			
Metals									
Aluminum	49.0	0.001	mg/L	0.484	97.0	80-120			
Antimony	45.6	0.0005	mg/L	ND	91.2	80-120			
Arsenic	46.7	0.001	mg/L	0.636	92.2	80-120			
Barium	353	0.001	mg/L	302	101	80-120			
Boron	131	0.01	mg/L	84.6	93.7	80-120			
Cadmium	46.2	0.0001	mg/L	0.0012	92.3	80-120			
Calcium	10800	0.1	mg/L	ND	108	80-120			
Chromium	48.3	0.001	mg/L	0.238	96.2	80-120			
Copper	42.6	0.0005	mg/L	0.0609	85.2	80-120			
Iron	3040	0.1	mg/L	801	89.5	80-120			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Lead	44.4	0.0001	mg/L	0.0787	88.7	80-120			
Magnesium	34100	0.2	mg/L	25200	88.6	80-120			
Manganese	199	0.005	mg/L	153	91.9	80-120			
Potassium	11600	0.1	mg/L	1930	97.1	80-120			
Selenium	49.0	0.001	mg/L	0.103	97.8	80-120			
Sodium	19600	0.2	mg/L	10200	94.0	80-120			
Uranium	50.4	0.0001	mg/L	0.731	99.4	80-120			
Zinc	62.7	0.005	mg/L	22.4	80.6	80-120			
PCBs									
PCBs, total	0.886	0.05	ug/L	ND	88.6	35-135			
Surrogate: Decachlorobiphenyl	*0.233*		*%*		*93.2*	*60-140*			
Semi-Volatiles									
Acenaphthene	7.14	0.05	ug/L	ND	71.4	50-140			
Acenaphthylene	7.14	0.05	ug/L	ND	71.4	50-140			
Anthracene	8.74	0.01	ug/L	0.052	86.9	50-140			
Benzo [a] anthracene	9.39	0.01	ug/L	0.202	91.9	50-140			
Benzo [a] pyrene	9.00	0.01	ug/L	0.175	88.2	50-140			
Benzo [b] fluoranthene	8.94	0.05	ug/L	0.270	86.7	50-140			
Benzo [g,h,i] perylene	6.79	0.05	ug/L	0.152	66.4	50-140			
Benzo [k] fluoranthene	7.95	0.05	ug/L	0.086	78.6	50-140			
Biphenyl	6.30	0.05	ug/L	ND	63.0	50-140			
Chrysene	9.02	0.05	ug/L	0.253	87.7	50-140			
Fluoranthene	9.70	0.01	ug/L	0.336	93.6	50-140			
Fluorene	7.47	0.05	ug/L	ND	74.7	50-140			
Indeno [1,2,3-cd] pyrene	8.60	0.05	ug/L	0.127	84.7	50-140			
1-Methylnaphthalene	6.64	0.05	ug/L	ND	66.4	50-140			
2-Methylnaphthalene	9.12	0.05	ug/L	ND	91.2	50-140			
Naphthalene	6.12	0.05	ug/L	ND	61.2	50-140			
Phenanthrene	8.68	0.05	ug/L	0.214	84.7	50-140			
Pyrene	9.87	0.01	ug/L	0.326	95.4	50-140			
Surrogate: 2-Fluorobiphenyl	*6.01*		*%*		*60.1*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Surrogate: Terphenyl-d14	*8.35*		*%*		*83.5*	*50-140*			
Volatiles									
Acetone	0.0888	0.0050	mg/L	ND	88.8	50-140			
Benzene	0.0482	0.0005	mg/L	ND	120	60-130			
Bromodichloromethane	0.0497	0.0005	mg/L	ND	124	60-130			
Bromoform	0.0481	0.0005	mg/L	ND	120	60-130			
Bromomethane	0.0307	0.0005	mg/L	ND	76.8	50-140			
Carbon Tetrachloride	0.0328	0.0002	mg/L	ND	82.0	60-130			
Chlorobenzene	0.0485	0.0005	mg/L	ND	121	60-130			
Chloroethane	0.0467	0.0010	mg/L	ND	117	50-140			
Chloroform	0.0354	0.0005	mg/L	ND	88.5	60-130			
Dibromochloromethane	0.0478	0.0005	mg/L	ND	119	60-130			
Dichlorodifluoromethane	0.0303	0.0010	mg/L	ND	75.8	50-140			
1,2-Dibromoethane	0.0437	0.0002	mg/L	ND	109	60-130			
1,2-Dichlorobenzene	0.0450	0.0005	mg/L	ND	112	60-130			
1,3-Dichlorobenzene	0.0439	0.0005	mg/L	ND	110	60-130			
1,4-Dichlorobenzene	0.0451	0.0005	mg/L	ND	113	60-130			
1,1-Dichloroethane	0.0485	0.0005	mg/L	ND	121	60-130			
1,2-Dichloroethane	0.0363	0.0005	mg/L	ND	90.8	60-130			
1,1-Dichloroethylene	0.0462	0.0005	mg/L	ND	116	60-130			
cis-1,2-Dichloroethylene	0.0485	0.0005	mg/L	ND	121	60-130			
trans-1,2-Dichloroethylene	0.0444	0.0005	mg/L	ND	111	60-130			
1,2-Dichloropropane	0.0467	0.0005	mg/L	ND	117	60-130			
cis-1,3-Dichloropropylene	0.0345	0.0005	mg/L	ND	86.3	60-130			
trans-1,3-Dichloropropylene	0.0344	0.0005	mg/L	ND	86.0	60-130			
Ethylbenzene	0.0453	0.0005	mg/L	ND	113	60-130			
Hexane	0.0421	0.0010	mg/L	ND	105	60-130			
Methyl Ethyl Ketone (2-Butanone)	0.0955	0.0050	mg/L	ND	95.5	50-140			
Methyl Isobutyl Ketone	0.0929	0.0050	mg/L	ND	92.9	50-140			
Methyl tert-butyl ether	0.0824	0.0020	mg/L	ND	82.4	50-140			
Methylene Chloride	0.0480	0.0050	mg/L	ND	120	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Styrene	0.0364	0.0005	mg/L	ND	91.0	60-130			
1,1,1,2-Tetrachloroethane	0.0429	0.0005	mg/L	ND	107	60-130			
1,1,2,2-Tetrachloroethane	0.0464	0.0005	mg/L	ND	116	60-130			
Tetrachloroethylene	0.0467	0.0005	mg/L	ND	117	60-130			
Toluene	0.0465	0.0005	mg/L	ND	116	60-130			
1,1,1-Trichloroethane	0.0450	0.0005	mg/L	ND	112	60-130			
1,1,2-Trichloroethane	0.0482	0.0005	mg/L	ND	121	60-130			
Trichloroethylene	0.0391	0.0005	mg/L	ND	97.7	60-130			
Trichlorofluoromethane	0.0458	0.0010	mg/L	ND	114	60-130			
Vinyl chloride	0.0314	0.0002	mg/L	ND	78.6	50-140			
m,p-Xylenes	0.0931	0.0005	mg/L	ND	116	60-130			
o-Xylene	0.0481	0.0005	mg/L	ND	120	60-130			
Surrogate: 4-Bromofluorobenzene	*0.0754*		*%*		*94.2*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0802*		*%*		*100*	*50-140*			
Surrogate: Toluene-d8	*0.0743*		*%*		*92.9*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

QC Qualifiers:

QR-04 Duplicate results exceeds RPD limits due to non-homogeneous matrix.

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Benzo[b]fluoranthene results may be biased high due to co-elution with Benzo[j]fluoranthene

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.

- F1 range corrected for BTEX.

- F2 to F3 ranges corrected for appropriate PAHs where available.

- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.

- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

- When reported, data for F4G has been processed using a silica gel cleanup.

Any use of these results implies your agreement that our total liabilty in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

PARACEL

Paracel ID: 2617126

t Blvd.
G 4J8

ibs.com
m

Paracel Order Number	Chain of Custody Ontario Drinking Water Supplies № 20770
26/7/25	

Client Name:	LRL Engineering	Project Ref:	240374	Waterworks Name:	Samples Taken By:
Contact Name:	Jessica Arthurs	Quote #:		Waterworks Number:	Name: Jessica Arthurs
Address:	5430 Canotek Road Ottawa, On K1J 9G2	PO #:		Address: 561 Somme Street	Signature:
After Hours Contact:	Jessica Arthurs	E-mail:	Jarthurs@lrlca	ottawa, on	Page 1 of 1
Telephone:	613 978 0658	Fax:		Public Health Unit:	Turn Around Time Required: ☐ 1 day ☐ 2 day ☐ 3 day ☒ 4 day

Samples Submitted Under: (Indicate ONLY one)
☐ ON REG 170/03 ☐ ON REG 319/08 ☒ Private Well
☐ ON REG 243/07 ☐ Other

Have LSN forms been submitted to MOE/MOHLTC?: ☐ Yes ☒ No ☐ N/A

Are these samples for human consumption?: ☒ Yes ☐ No

All information must be completed before samples will be processed.

Sample Type: R = Raw; T = Treated; D = Distribution; P = Plumbing
Source Type: G = Ground Water; S = Surface Water
Reportable: Requires AWQI reporting as per Regulation - Y = Yes; N = No

	LOCATION NAME	SAMPLE ID	Sample Type: R/T/D/P	Source Type: G / S	Reportable: Y / N	Resample	SAMPLE TAKEN DATE	SAMPLE TAKEN TIME	# of Containers	Free/Combined Chlorine Residual mg/L	Standing / Flushed: S / F (REG 243)	Total Coliform/E. Coli	HPC	Fecal/E. Coli/Form	THM	Subdivision Pkg.	Trace Metals	Free Cyanide	VOC; PHC F1-F4; PCB; PAH
1	outlet	TW2 - 4 hr	R	G	N	N	20/Apr/2026	11:56	9	0.00		X	X	X		X			
2	outlet	TW2 - 8hr	R	G	N	N	20/Apr/2026	15:56	20	0.00		X	X	X		X	X	X	X
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: Drop-off

Relinquished By (Sign):	Received at Depot:	Received at Lab: LTJ
Relinquished By (Print): Jessica Arthurs	Date/Time:	Date/Time: 20/04/26 17:55
Date/Time: April 20, 2026 5:37pm	Temperature: °C	Temperature: 6.6°C
		Verified By: AM 2026/30
		Date/Time:
		pH Verified: ☐ By:

ATTACHMENT H

Moisture Surplus Printouts - Ottawa

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY... 50 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE..... 30 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	27	83	50	299
28- 2	-8.8	57	12	18	1	1	0	29	110	50	356
31- 3	-2.7	66	32	80	5	5	0	107	64	50	422
30- 4	5.9	72	67	69	32	32	0	104	0	50	494
31- 5	13.0	74	74	0	80	79	-1	13	0	32	568
30- 6	18.3	82	82	0	116	97	-19	4	0	14	651
31- 7	20.8	89	89	0	135	94	-41	3	0	5	740
31- 8	19.5	87	87	0	117	83	-34	1	0	9	827
30- 9	14.6	84	84	0	75	66	-9	7	0	20	912
31-10	8.1	77	76	0	36	35	-1	24	0	37	77
30-11	1.3	80	63	8	10	10	0	50	9	49	157
31-12	-7.0	78	26	15	1	1	0	38	47	50	236
AVE	5.9 TTL	911	705	205	608	503	-105	407			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	31	43	0	55
28- 2	2.6	29	15	27	1	1	0	37	59	0	59
31- 3	2.3	28	22	47	4	4	0	53	83	0	65
30- 4	1.7	31	31	84	8	8	0	84	0	2	74
31- 5	1.9	32	32	0	12	11	5	21	0	19	85
30- 6	1.2	38	38	0	9	26	26	17	0	19	93
31- 7	1.2	42	42	0	8	30	31	12	0	14	93
31- 8	1.3	39	39	0	8	30	32	5	0	16	107
30- 9	1.5	38	38	0	8	14	13	20	0	21	110
31-10	1.4	37	37	2	7	7	3	27	0	19	37
30-11	1.7	27	28	9	4	4	0	30	13	6	45
31-12	3.0	30	22	14	1	1	0	29	34	0	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY... 75 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE..... 45 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	27	83	75	299
28- 2	-8.8	57	12	18	1	1	0	29	110	75	356
31- 3	-2.7	66	32	80	5	5	0	107	64	75	422
30- 4	5.9	72	67	69	32	32	0	104	0	75	494
31- 5	13.0	74	74	0	80	80	0	13	0	56	568
30- 6	18.3	82	82	0	116	107	-10	4	0	28	651
31- 7	20.8	89	89	0	135	104	-32	2	0	10	740
31- 8	19.5	87	87	0	117	85	-32	1	0	12	827
30- 9	14.6	84	84	0	75	66	-9	4	0	26	912
31-10	8.1	77	76	0	36	35	-1	15	0	52	77
30-11	1.3	80	63	8	10	10	0	42	9	71	157
31-12	-7.0	78	26	15	1	1	0	36	47	75	236
AVE	5.9 TTL	911	705	205	608	526	-84	384			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	30	43	0	55
28- 2	2.6	29	15	27	1	1	0	37	59	0	59
31- 3	2.3	28	22	47	4	4	0	53	83	0	65
30- 4	1.7	31	31	84	8	8	0	84	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	19	19	17	0	28	93
31- 7	1.2	42	42	0	8	28	30	11	0	22	93
31- 8	1.3	39	39	0	8	29	31	5	0	23	107
30- 9	1.5	38	38	0	8	14	14	17	0	29	110
31-10	1.4	37	37	2	7	7	2	23	0	28	37
30-11	1.7	27	28	9	4	4	0	33	13	11	45
31-12	3.0	30	22	14	1	1	0	30	34	3	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...100 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE..... 60 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	25	83	99	299
28- 2	-8.8	57	12	18	1	1	0	28	110	99	356
31- 3	-2.7	66	32	80	5	5	0	106	64	100	422
30- 4	5.9	72	67	69	32	32	0	104	0	100	494
31- 5	13.0	74	74	0	80	80	0	13	0	81	568
30- 6	18.3	82	82	0	116	112	-4	4	0	47	651
31- 7	20.8	89	89	0	135	115	-21	2	0	19	740
31- 8	19.5	87	87	0	117	88	-29	1	0	18	827
30- 9	14.6	84	84	0	75	66	-8	3	0	32	912
31-10	8.1	77	76	0	36	35	-1	10	0	63	77
30-11	1.3	80	63	8	10	10	0	34	9	91	157
31-12	-7.0	78	26	15	1	1	0	33	47	97	236
AVE	5.9 TTL	911	705	205	608	545	-63	363			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	30	43	5	55
28- 2	2.6	29	15	27	1	1	0	37	59	3	59
31- 3	2.3	28	22	47	4	4	0	53	83	0	65
30- 4	1.7	31	31	84	8	8	0	84	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	12	11	17	0	34	93
31- 7	1.2	42	42	0	8	25	26	11	0	30	93
31- 8	1.3	39	39	0	8	29	30	5	0	30	107
30- 9	1.5	38	38	0	8	14	13	15	0	35	110
31-10	1.4	37	37	2	7	6	2	21	0	36	37
30-11	1.7	27	28	9	4	4	0	34	13	19	45
31-12	3.0	30	22	14	1	1	0	30	34	8	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...125 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE..... 75 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	24	83	122	299
28- 2	-8.8	57	12	18	1	1	0	28	110	123	356
31- 3	-2.7	66	32	80	5	5	0	105	64	125	422
30- 4	5.9	72	67	69	32	32	0	104	0	125	494
31- 5	13.0	74	74	0	80	80	0	13	0	106	568
30- 6	18.3	82	82	0	116	115	-1	4	0	69	651
31- 7	20.8	89	89	0	135	122	-13	2	0	33	740
31- 8	19.5	87	87	0	117	92	-25	1	0	28	827
30- 9	14.6	84	84	0	75	67	-7	3	0	41	912
31-10	8.1	77	76	0	36	35	-1	9	0	74	77
30-11	1.3	80	63	8	10	10	0	27	9	108	157
31-12	-7.0	78	26	15	1	1	0	29	47	119	236
AVE	5.9 TTL	911	705	205	608	560	-47	349			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	31	43	10	55
28- 2	2.6	29	15	27	1	1	0	37	59	8	59
31- 3	2.3	28	22	47	4	4	0	54	83	0	65
30- 4	1.7	31	31	84	8	8	0	84	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	4	17	0	39	93
31- 7	1.2	42	42	0	8	21	23	11	0	37	93
31- 8	1.3	39	39	0	8	26	28	5	0	38	107
30- 9	1.5	38	38	0	8	13	11	14	0	42	110
31-10	1.4	37	37	2	7	6	2	20	0	42	37
30-11	1.7	27	28	9	4	4	0	32	13	25	45
31-12	3.0	30	22	14	1	1	0	30	34	14	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...150 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE..... 90 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	23	83	144	299
28- 2	-8.8	57	12	18	1	1	0	26	110	146	356
31- 3	-2.7	66	32	80	5	5	0	103	64	150	422
30- 4	5.9	72	67	69	32	32	0	104	0	150	494
31- 5	13.0	74	74	0	80	80	0	13	0	131	568
30- 6	18.3	82	82	0	116	116	0	4	0	93	651
31- 7	20.8	89	89	0	135	127	-8	2	0	52	740
31- 8	19.5	87	87	0	117	97	-19	1	0	41	827
30- 9	14.6	84	84	0	75	68	-6	3	0	54	912
31-10	8.1	77	76	0	36	36	-1	8	0	88	77
30-11	1.3	80	63	8	10	10	0	23	9	126	157
31-12	-7.0	78	26	15	1	1	0	26	47	140	236
AVE	5.9 TTL	911	705	205	608	573	-34	336			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	31	43	15	55
28- 2	2.6	29	15	27	1	1	0	37	59	12	59
31- 3	2.3	28	22	47	4	4	0	54	83	0	65
30- 4	1.7	31	31	84	8	8	0	84	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	8	1	17	0	41	93
31- 7	1.2	42	42	0	8	18	18	11	0	42	93
31- 8	1.3	39	39	0	8	22	23	5	0	44	107
30- 9	1.5	38	38	0	8	12	10	14	0	49	110
31-10	1.4	37	37	2	7	6	2	19	0	47	37
30-11	1.7	27	28	9	4	4	0	30	13	31	45
31-12	3.0	30	22	14	1	1	0	29	34	20	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...200 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....120 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	21	83	187	299
28- 2	-8.8	57	12	18	1	1	0	24	110	191	356
31- 3	-2.7	66	32	80	5	5	0	99	64	199	422
30- 4	5.9	72	67	69	32	32	0	103	0	200	494
31- 5	13.0	74	74	0	80	80	0	13	0	181	568
30- 6	18.3	82	82	0	116	116	0	4	0	143	651
31- 7	20.8	89	89	0	135	132	-3	2	0	97	740
31- 8	19.5	87	87	0	117	106	-11	1	0	78	827
30- 9	14.6	84	84	0	75	70	-4	3	0	89	912
31-10	8.1	77	76	0	36	36	0	7	0	123	77
30-11	1.3	80	63	8	10	10	0	19	9	164	157
31-12	-7.0	78	26	15	1	1	0	22	47	182	236
AVE	5.9 TTL	911	705	205	608	589	-18	318			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	30	43	24	55
28- 2	2.6	29	15	27	1	1	0	36	59	20	59
31- 3	2.3	28	22	47	4	4	0	55	83	4	65
30- 4	1.7	31	31	84	8	8	0	83	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	11	10	11	0	48	93
31- 8	1.3	39	39	0	8	16	16	5	0	54	107
30- 9	1.5	38	38	0	8	10	8	14	0	59	110
31-10	1.4	37	37	2	7	6	1	19	0	55	37
30-11	1.7	27	28	9	4	4	0	29	13	41	45
31-12	3.0	30	22	14	1	1	0	28	34	29	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...225 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....135 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	21	83	209	299
28- 2	-8.8	57	12	18	1	1	0	24	110	214	356
31- 3	-2.7	66	32	80	5	5	0	97	64	224	422
30- 4	5.9	72	67	69	32	32	0	103	0	225	494
31- 5	13.0	74	74	0	80	80	0	13	0	206	568
30- 6	18.3	82	82	0	116	116	0	4	0	168	651
31- 7	20.8	89	89	0	135	133	-2	2	0	121	740
31- 8	19.5	87	87	0	117	109	-8	1	0	99	827
30- 9	14.6	84	84	0	75	71	-4	3	0	109	912
31-10	8.1	77	76	0	36	36	0	7	0	143	77
30-11	1.3	80	63	8	10	10	0	18	9	185	157
31-12	-7.0	78	26	15	1	1	0	21	47	204	236
AVE	5.9 TTL	911	705	205	608	594	-14	314			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	30	43	28	55
28- 2	2.6	29	15	27	1	1	0	36	59	24	59
31- 3	2.3	28	22	47	4	4	0	56	83	7	65
30- 4	1.7	31	31	84	8	8	0	82	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	10	7	11	0	49	93
31- 8	1.3	39	39	0	8	14	13	5	0	58	107
30- 9	1.5	38	38	0	8	10	7	14	0	63	110
31-10	1.4	37	37	2	7	6	1	19	0	58	37
30-11	1.7	27	28	9	4	4	0	29	13	44	45
31-12	3.0	30	22	14	1	1	0	28	34	33	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...250 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....150 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	20	83	232	299
28- 2	-8.8	57	12	18	1	1	0	23	110	238	356
31- 3	-2.7	66	32	80	5	5	0	96	64	248	422
30- 4	5.9	72	67	69	32	32	0	102	0	250	494
31- 5	13.0	74	74	0	80	80	0	13	0	231	568
30- 6	18.3	82	82	0	116	116	0	4	0	193	651
31- 7	20.8	89	89	0	135	134	-1	2	0	145	740
31- 8	19.5	87	87	0	117	111	-6	1	0	121	827
30- 9	14.6	84	84	0	75	72	-3	3	0	130	912
31-10	8.1	77	76	0	36	36	0	7	0	164	77
30-11	1.3	80	63	8	10	10	0	18	9	207	157
31-12	-7.0	78	26	15	1	1	0	20	47	226	236
AVE	5.9 TTL	911	705	205	608	598	-10	309			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	32	55
28- 2	2.6	29	15	27	1	1	0	36	59	27	59
31- 3	2.3	28	22	47	4	4	0	56	83	9	65
30- 4	1.7	31	31	84	8	8	0	82	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	9	5	11	0	50	93
31- 8	1.3	39	39	0	8	12	11	5	0	61	107
30- 9	1.5	38	38	0	8	9	6	14	0	66	110
31-10	1.4	37	37	2	7	7	1	19	0	61	37
30-11	1.7	27	28	9	4	4	0	29	13	47	45
31-12	3.0	30	22	14	1	1	0	28	34	36	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...265 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....159 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	20	83	246	299
28- 2	-8.8	57	12	18	1	1	0	23	110	252	356
31- 3	-2.7	66	32	80	5	5	0	96	64	263	422
30- 4	5.9	72	67	69	32	32	0	102	0	265	494
31- 5	13.0	74	74	0	80	80	0	13	0	246	568
30- 6	18.3	82	82	0	116	116	0	4	0	208	651
31- 7	20.8	89	89	0	135	134	-1	2	0	160	740
31- 8	19.5	87	87	0	117	112	-5	1	0	135	827
30- 9	14.6	84	84	0	75	72	-3	3	0	144	912
31-10	8.1	77	76	0	36	36	0	7	0	177	77
30-11	1.3	80	63	8	10	10	0	18	9	221	157
31-12	-7.0	78	26	15	1	1	0	20	47	240	236
AVE	5.9 TTL	911	705	205	608	599	-9	309			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	34	55
28- 2	2.6	29	15	27	1	1	0	36	59	29	59
31- 3	2.3	28	22	47	4	4	0	56	83	10	65
30- 4	1.7	31	31	84	8	8	0	82	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	8	4	11	0	51	93
31- 8	1.3	39	39	0	8	11	10	5	0	62	107
30- 9	1.5	38	38	0	8	9	5	14	0	68	110
31-10	1.4	37	37	2	7	7	1	19	0	62	37
30-11	1.7	27	28	9	4	4	0	29	13	49	45
31-12	3.0	30	22	14	1	1	0	28	34	38	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...275 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....165 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	19	83	255	299
28- 2	-8.8	57	12	18	1	1	0	23	110	261	356
31- 3	-2.7	66	32	80	5	5	0	96	64	272	422
30- 4	5.9	72	67	69	32	32	0	101	0	275	494
31- 5	13.0	74	74	0	80	80	0	13	0	256	568
30- 6	18.3	82	82	0	116	116	0	4	0	218	651
31- 7	20.8	89	89	0	135	135	-1	2	0	170	740
31- 8	19.5	87	87	0	117	113	-4	1	0	144	827
30- 9	14.6	84	84	0	75	72	-2	3	0	153	912
31-10	8.1	77	76	0	36	36	0	7	0	186	77
30-11	1.3	80	63	8	10	10	0	18	9	230	157
31-12	-7.0	78	26	15	1	1	0	20	47	249	236
AVE	5.9 TTL	911	705	205	608	601	-7	307			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	35	55
28- 2	2.6	29	15	27	1	1	0	36	59	30	59
31- 3	2.3	28	22	47	4	4	0	56	83	11	65
30- 4	1.7	31	31	84	8	8	0	81	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	8	3	11	0	51	93
31- 8	1.3	39	39	0	8	11	9	5	0	63	107
30- 9	1.5	38	38	0	8	9	5	14	0	69	110
31-10	1.4	37	37	2	7	7	1	19	0	63	37
30-11	1.7	27	28	9	4	4	0	29	13	50	45
31-12	3.0	30	22	14	1	1	0	28	34	39	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...280 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....168 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	19	83	260	299
28- 2	-8.8	57	12	18	1	1	0	23	110	266	356
31- 3	-2.7	66	32	80	5	5	0	95	64	277	422
30- 4	5.9	72	67	69	32	32	0	101	0	280	494
31- 5	13.0	74	74	0	80	80	0	13	0	261	568
30- 6	18.3	82	82	0	116	116	0	4	0	223	651
31- 7	20.8	89	89	0	135	135	-1	2	0	175	740
31- 8	19.5	87	87	0	117	113	-4	1	0	148	827
30- 9	14.6	84	84	0	75	72	-2	3	0	157	912
31-10	8.1	77	76	0	36	36	0	7	0	191	77
30-11	1.3	80	63	8	10	10	0	18	9	234	157
31-12	-7.0	78	26	15	1	1	0	20	47	254	236
AVE	5.9 TTL	911	705	205	608	601	-7	306			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	35	55
28- 2	2.6	29	15	27	1	1	0	36	59	31	59
31- 3	2.3	28	22	47	4	4	0	56	83	12	65
30- 4	1.7	31	31	84	8	8	0	81	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	8	3	11	0	52	93
31- 8	1.3	39	39	0	8	10	9	5	0	64	107
30- 9	1.5	38	38	0	8	9	5	14	0	69	110
31-10	1.4	37	37	2	7	7	1	19	0	64	37
30-11	1.7	27	28	9	4	4	0	29	13	50	45
31-12	3.0	30	22	14	1	1	0	28	34	39	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...300 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....180 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	19	83	279	299
28- 2	-8.8	57	12	18	1	1	0	23	110	285	356
31- 3	-2.7	66	32	80	5	5	0	95	64	297	422
30- 4	5.9	72	67	69	32	32	0	101	0	300	494
31- 5	13.0	74	74	0	80	80	0	13	0	281	568
30- 6	18.3	82	82	0	116	116	0	4	0	243	651
31- 7	20.8	89	89	0	135	135	0	2	0	194	740
31- 8	19.5	87	87	0	117	114	-3	1	0	167	827
30- 9	14.6	84	84	0	75	73	-2	3	0	176	912
31-10	8.1	77	76	0	36	36	0	7	0	209	77
30-11	1.3	80	63	8	10	10	0	18	9	252	157
31-12	-7.0	78	26	15	1	1	0	20	47	272	236
AVE	5.9 TTL	911	705	205	608	603	-5	306			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	37	55
28- 2	2.6	29	15	27	1	1	0	36	59	33	59
31- 3	2.3	28	22	47	4	4	0	57	83	13	65
30- 4	1.7	31	31	84	8	8	0	81	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	8	2	11	0	52	93
31- 8	1.3	39	39	0	8	10	8	5	0	65	107
30- 9	1.5	38	38	0	8	9	5	14	0	71	110
31-10	1.4	37	37	2	7	7	1	19	0	65	37
30-11	1.7	27	28	9	4	4	0	29	13	52	45
31-12	3.0	30	22	14	1	1	0	28	34	41	56

Ottawa Airport, ON WATER BUDGET MEANS FOR THE PERIOD 1950-2010 DC20492

LAT.... 45.32 WATER HOLDING CAPACITY...400 MM HEAT INDEX... 36.41
LONG... 75.67 LOWER ZONE.....240 MM A..... 1.075

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	-10.6	64	13	15	0	0	0	19	83	375	299
28- 2	-8.8	57	12	18	1	1	0	22	110	382	356
31- 3	-2.7	66	32	80	5	5	0	94	64	395	422
30- 4	5.9	72	67	69	32	32	0	99	0	400	494
31- 5	13.0	74	74	0	80	80	0	13	0	381	568
30- 6	18.3	82	82	0	116	116	0	4	0	343	651
31- 7	20.8	89	89	0	135	135	0	2	0	294	740
31- 8	19.5	87	87	0	117	116	-1	1	0	265	827
30- 9	14.6	84	84	0	75	74	-1	3	0	272	912
31-10	8.1	77	76	0	36	36	0	7	0	305	77
30-11	1.3	80	63	8	10	10	0	18	9	349	157
31-12	-7.0	78	26	15	1	1	0	19	47	369	236
AVE	5.9 TTL	911	705	205	608	606	-2	301			

Ottawa Airport, ON STANDARD DEVIATIONS FOR THE PERIOD 1950-2010 DC20492

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
31- 1	3.0	26	16	18	1	1	0	29	43	44	55
28- 2	2.6	29	15	27	1	1	0	36	59	39	59
31- 3	2.3	28	22	47	4	4	0	57	83	20	65
30- 4	1.7	31	31	84	8	8	0	80	0	2	74
31- 5	1.9	32	32	0	12	12	0	21	0	22	85
30- 6	1.2	38	38	0	9	9	0	17	0	41	93
31- 7	1.2	42	42	0	8	8	0	11	0	53	93
31- 8	1.3	39	39	0	8	8	4	5	0	69	107
30- 9	1.5	38	38	0	8	8	2	14	0	76	110
31-10	1.4	37	37	2	7	7	0	19	0	69	37
30-11	1.7	27	28	9	4	4	0	29	13	57	45
31-12	3.0	30	22	14	1	1	0	28	34	46	56

ATTACHMENT I

Hydro-Kinetic Septic System Specification

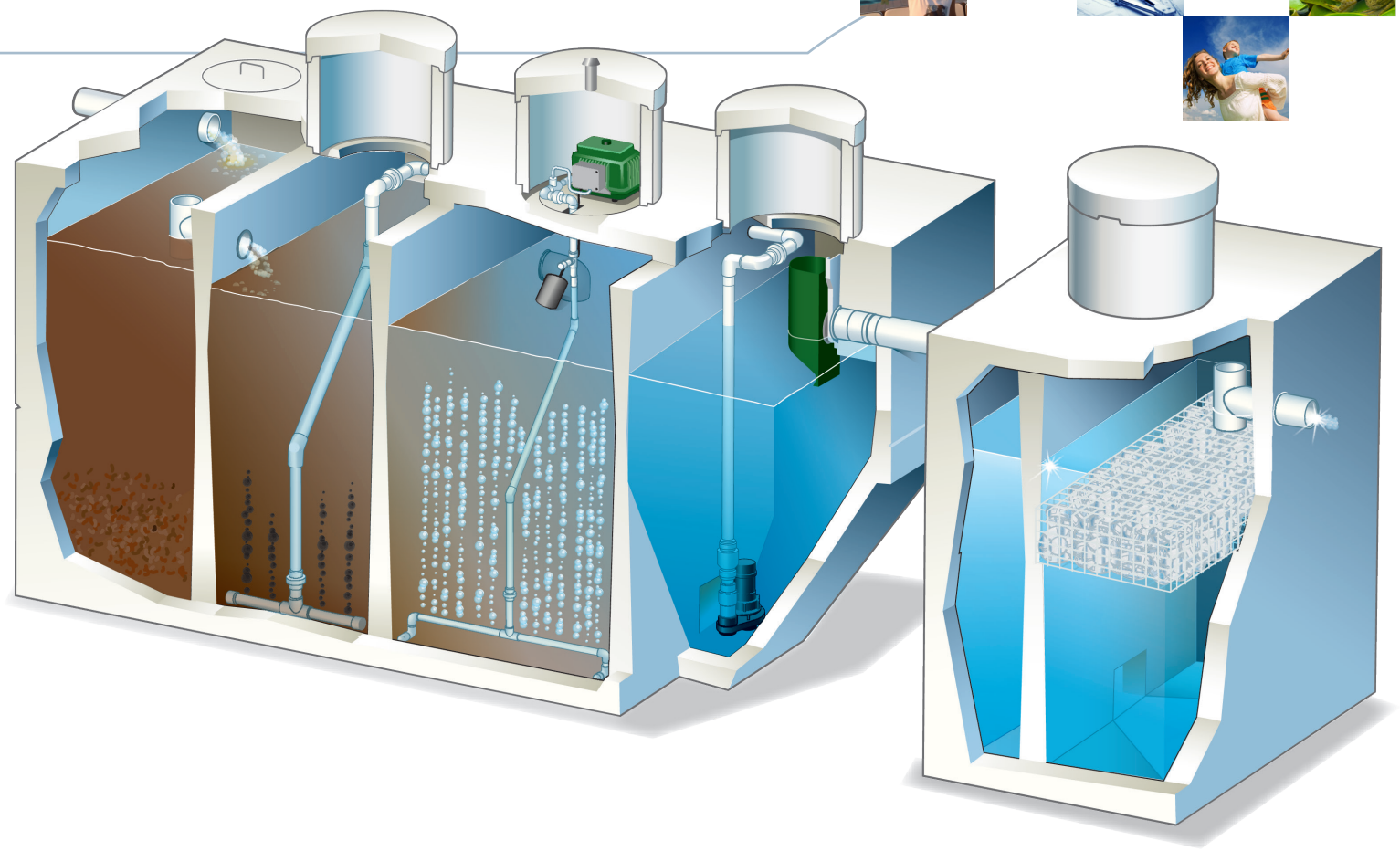
HYDRO-KINETIC® FEU





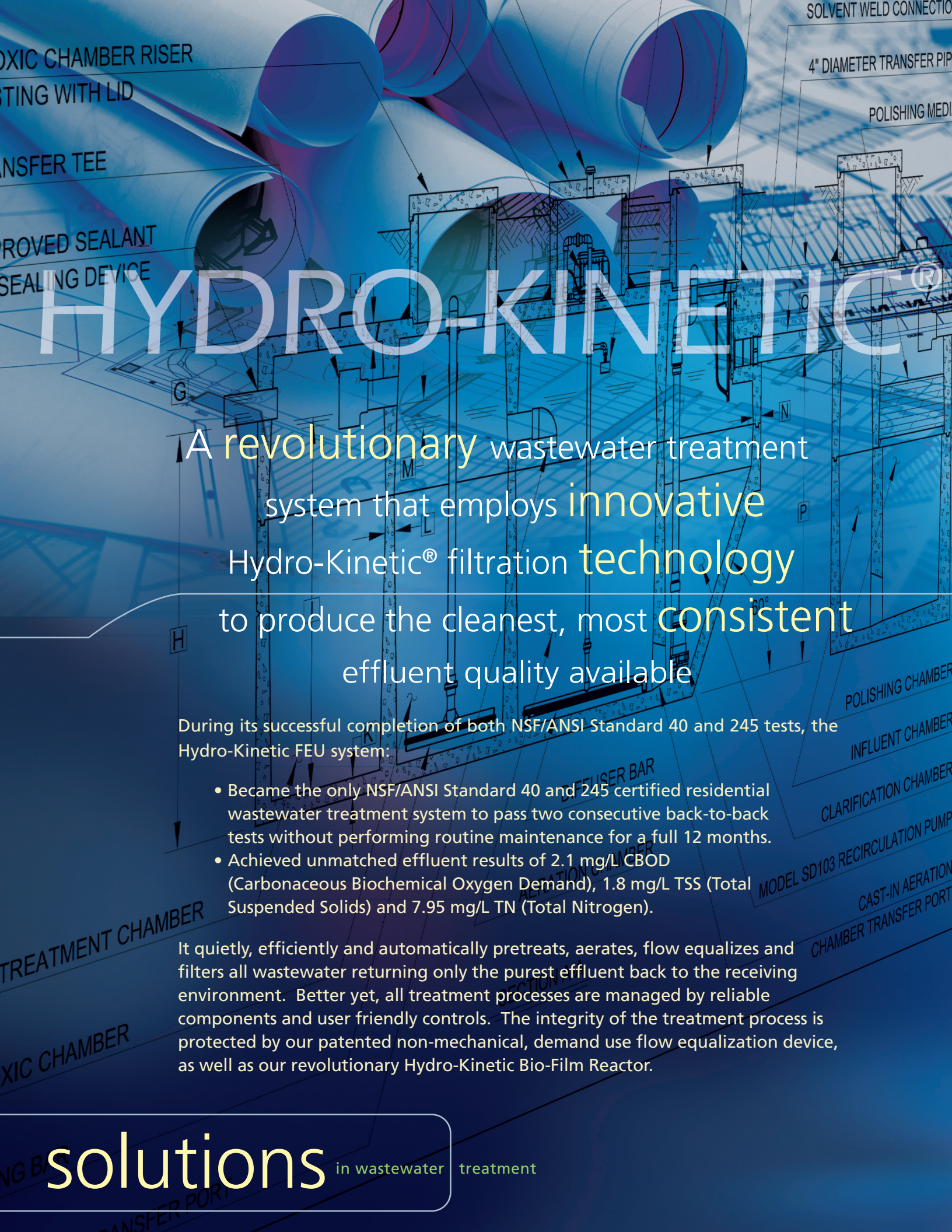






norweco®

Engineering the future of water and wastewater treatment



HYDRO-KINETIC®

A revolutionary wastewater treatment system that employs innovative Hydro-Kinetic® filtration technology to produce the cleanest, most consistent effluent quality available

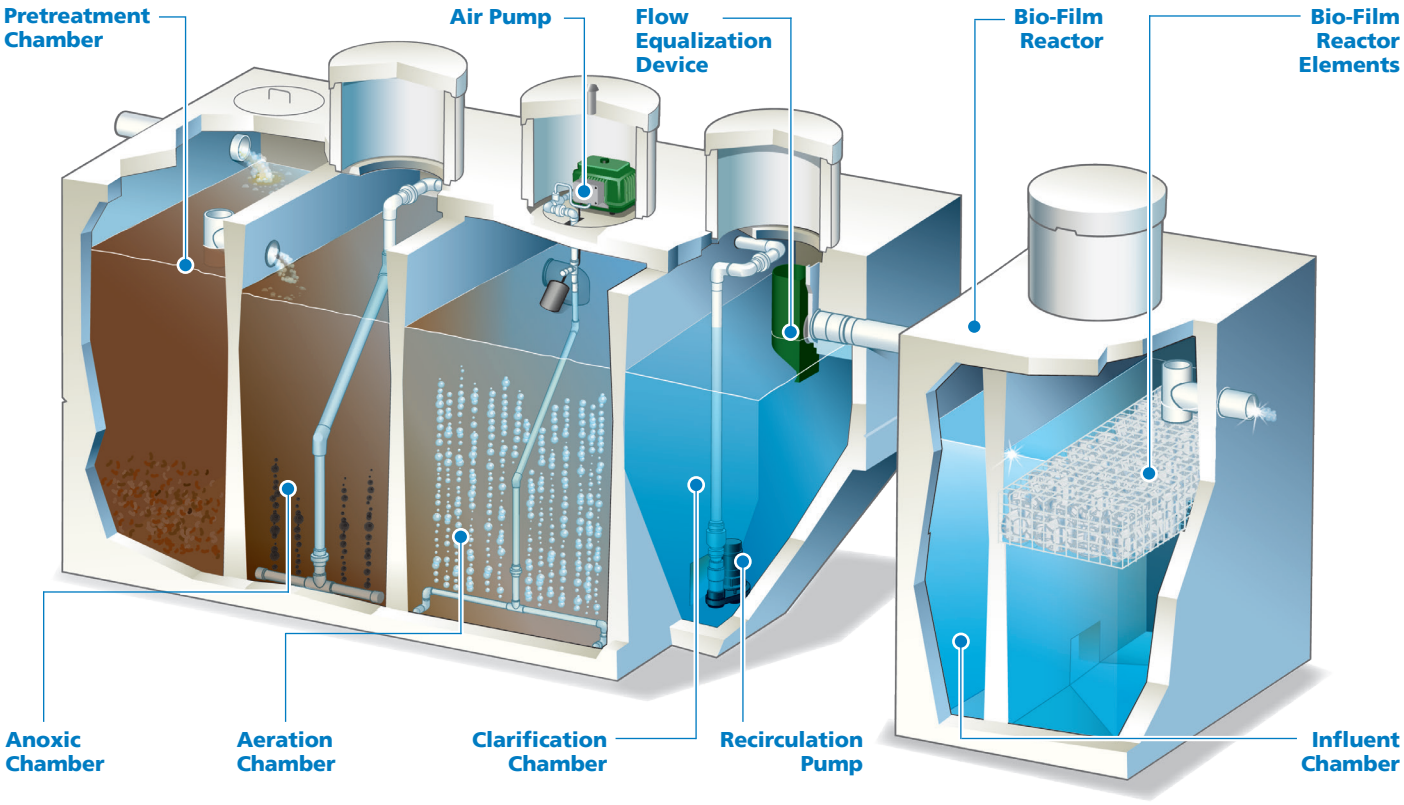
During its successful completion of both NSF/ANSI Standard 40 and 245 tests, the Hydro-Kinetic FEU system:

- Became the only NSF/ANSI Standard 40 and 245 certified residential wastewater treatment system to pass two consecutive back-to-back tests without performing routine maintenance for a full 12 months.
- Achieved unmatched effluent results of 2.1 mg/L CBOD (Carbonaceous Biochemical Oxygen Demand), 1.8 mg/L TSS (Total Suspended Solids) and 7.95 mg/L TN (Total Nitrogen).

It quietly, efficiently and automatically pretreats, aerates, flow equalizes and filters all wastewater returning only the purest effluent back to the receiving environment. Better yet, all treatment processes are managed by reliable components and user friendly controls. The integrity of the treatment process is protected by our patented non-mechanical, demand use flow equalization device, as well as our revolutionary Hydro-Kinetic Bio-Film Reactor.

solutions in wastewater treatment

Revolutionary in design, unparalleled in performance



Pretreatment Chamber
Anaerobic bacteria and gravity precondition the wastewater here to protect the integrity of downstream treatment processes.

Anoxic Chamber
Pretreatment Chamber effluent is mixed with nitrified liquid recirculated from the clarifier in measured doses, via a mixing bar in this chamber. Under carefully controlled conditions, bacteria remove nitrogen by consuming nitrate-bound oxygen during their respiratory process.

Aeration Chamber
Here, safe, living aerobic bacteria convert the wastewater into stable substances. Flow equalization maximizes this biological oxidation and assures proper retention and treatment.

Model A100 Air Pump
Our exclusive Model A100 air pump is a precision engineered electro-mechanical device that has been specifically designed for use in the system. It can be installed below grade or remotely located up to 75 feet from the system.

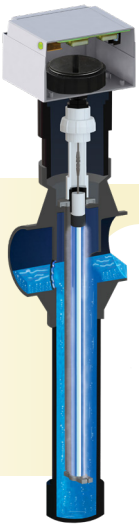
Clarification Chamber
Flow equalization enhances the settling of biologically active substances inside the Clarification Chamber. Pretreated, aerated wastewater has now been converted to clarified liquids for discharge from this chamber.

Model SD103 Recirculation Pump
This highly efficient recirculation pump is installed at the bottom of the Clarification Chamber and is used to transfer nitrified liquid back to the Anoxic Chamber for denitrification.

Flow Equalization Device
Controls flow through the treatment process and regulates the velocity of treated effluent that can leave the system, enhancing the efficiency of the attached growth filtration media in the Hydro-Kinetic system.

Bio-Film Reactor
Flow equalized liquid from the clarifier enters the Bio-Film Reactor where it flows downward and is evenly distributed beneath our exclusive Hydro-Kinetic filtration media. The liquid then travels through the proprietary attached growth filtration media where the final treatment takes place.

Precast Concrete Tank
Every tank is constructed of high quality, non-corrosive materials under rigid quality control standards. The tank, access risers and covers are reinforced precast concrete manufactured locally by your licensed Norweco distributor.

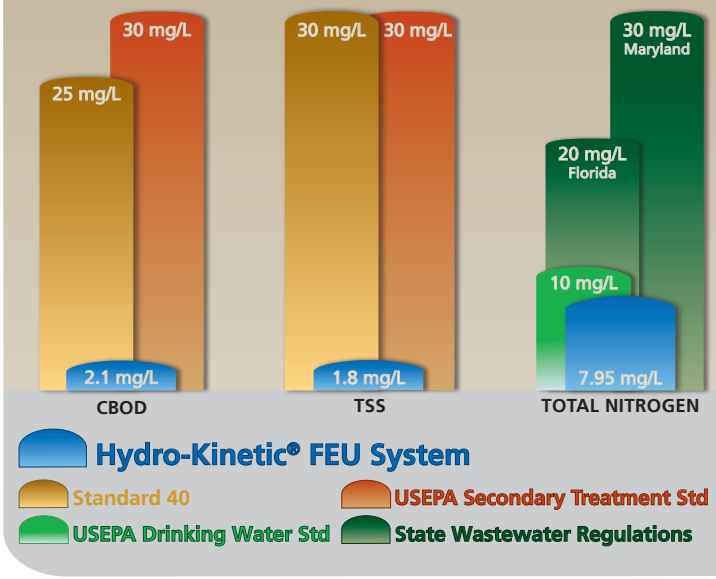


AT 1500 Ultraviolet Disinfection System
CAPABLE OF MEETING EVEN THE MOST STRINGENT ENVIRONMENTAL REQUIREMENTS, THE MODEL AT 1500 UV DISINFECTION SYSTEM REDUCES BACTERIA LEVELS FROM SECONDARY EFFLUENT TO MEET STRICT WATER QUALITY STANDARDS. THE AT 1500 IS THE ONLY UV TREATMENT SYSTEM LISTED BY UNDERWRITERS LABORATORIES FOR RESIDENTIAL APPLICATIONS.

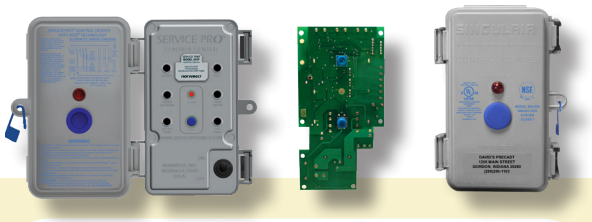
Consider the facts:

- The Hydro-Kinetic FEU system meets or exceeds regulatory standards and is performance certified and listed by NSF International to Standards 40 and 245. The system achieved an astounding effluent quality of 2.1 mg/L CBOD, 1.8 mg/L TSS and 7.95 mg/L TN.
- The system produced these unmatched effluent results while being tested for 12 continuous months without service. The Hydro-Kinetic system passed two consecutive 6 month tests with flying colors, including duplicate multi-stress sequences.
- We have engineered the Model A100 air pump to maximize operational efficiency and increase service life. It requires minimal electricity to operate and utilizes a standard 115V power connection. Multiple air pump mounting locations are available.
- The Model SD103 recirculation pump features a ⅓ horsepower electric motor that is securely mounted in an oil-filled, watertight, corrosion resistant housing with lubricated ball bearings to assure long life. The recirculation pump features a 2" discharge connection.
- The Hydro-Kinetic Bio-Film Reactor provides final treatment of the wastewater to a near pristine state. As liquid flows up through our proprietary attached growth filtration media, final polishing takes place insuring only the highest quality effluent is safely returned to the environment.

Unmatched Effluent Results



- 70-hour retention in the Hydro-Kinetic system insures adequate exposure to all treatment processes and reduces pumping frequency as compared to smaller capacity systems.
- Our patented non-mechanical flow equalization device guarantees that all incoming wastewater is fully treated, regardless of heavy use periods.
- All flow is equalized an average of 50% at the NSF Standard 40/245 600 GPD (gallons per day) design loading pattern.
- Durable, reliable components are safely installed out-of-sight below grade. No exposed power cords or air lines that are above ground.
- Your local licensed Norweco distributor sells, installs and services your Hydro-Kinetic system with pride. You'll find their name and contact info conveniently posted on the system's control center.



SERVICE PRO® Model 801P

EVERY SYSTEM COMES WITH THE SERVICE PRO MODEL 801P CONTROL CENTER THAT USES MCD TECHNOLOGY TO PROVIDE MONITORING, COMPLIANCE AND DIAGNOSTIC FUNCTIONS FOR THE TREATMENT SYSTEM. EACH CONTROL CENTER INCLUDES A TIME CLOCK, ALARM LIGHT, RESET BUTTON, POWER SWITCH, POWER LIGHT, PHONE/NETWORK LIGHT, RECIRCULATION PUMP ALARM, AIR PUMP ALARM, HIGH WATER ALARM AND ADDITIONAL AUXILIARY COMPONENT INPUT.



Blue Crystal® Residential Disinfecting Tablets and Bio-Max® Dechlorination Tablets

PURE CALCIUM HYPOCHLORITE TABLETS FORMULATED FOR USE IN RESIDENTIAL SYSTEMS, BLUE CRYSTAL TABLETS CONTAIN 70% AVAILABLE CHLORINE TO PROVIDE EFFICIENT, RELIABLE DISINFECTION. BIO-MAX TABLETS PROVIDE A CONVENIENT SOURCE TO INSTANTLY REMOVE CHLORINE FROM WASTEWATER, POTABLE WATER AND PROCESS WATER. EACH TABLET CONTAINS 92% SODIUM SULFITE.







Norweco distributors are located throughout the United States and much of the rest of the world. Research, product development, manufacturing, marketing and sales support are conducted inside our offices and factory in Norwalk, Ohio USA. Everyone at Norweco is committed to shaping the future of our industry.

engineering the future

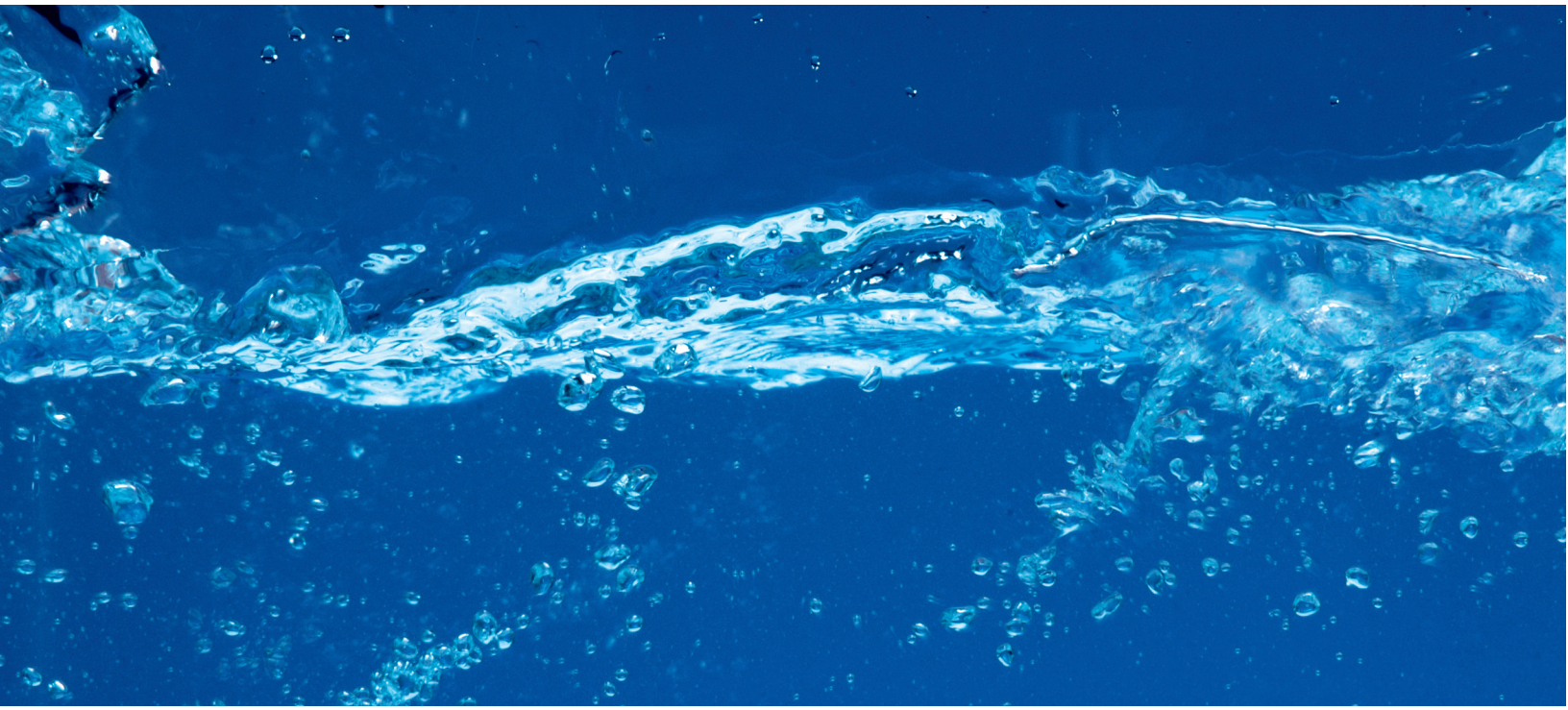
of water and wastewater treatment

Specify Hydro-Kinetic®

As a designer, choosing to incorporate the Hydro-Kinetic system in your project will insure that you achieve successful treatment while offering outstanding quality and reliability. At the same time, the reputation of your company will be protected for years to come. Your local Norweco distributor is fully trained to assist you in the design, installation and operation of a Norweco Hydro-Kinetic FEU (Flow Equalized Upflow) system.

As a homeowner, getting the highest quality product is essential. The Hydro-Kinetic system arrives to the jobsite complete, including delivery, tank setting, equipment installation, plant start-up and service. A series of service and adjustment inspections are prescheduled for the first two years of operation at the time your system is installed. These inspections are included in the sale so that your system continues to perform at the highest level to protect you and your investment. Extended service contracts are also available from your local Norweco distributor.

Today's Answer for the Protection of Tomorrow's Environment



comprehensive protection, guaranteed



The Hydro-Kinetic wastewater treatment system, Service Pro control center, and all Norweco components are warranted against defects in material and workmanship under normal use and service by our comprehensive 2 year Limited Warranty. A Warranty Registration Card and Owner's Manual are included with purchase. Warranty information is detailed on the back page of the Hydro-Kinetic System Owner's Manual.

Other Products

Singulair® Wastewater Treatment Plants
FOR RESIDENTIAL APPLICATIONS

Modulair® Wastewater Treatment Plants
FOR SEMI-COMMERCIAL APPLICATIONS

Travalair® Wastewater Treatment Plants
FEATURING AUTO SLUDGE AND SKIMMER SYSTEM

norweco®

Engineering the future of water and wastewater treatment

220 Republic Street
Norwalk, Ohio, U.S.A. 44857-1156
PH: 419.668.4471
FAX: 419.663.5440
www.norweco.com

The Hydro-Kinetic system components are listed, licensed, and/or certified by each of the following agencies/organizations.

CAN/BNQ 3680-600 2406 NQ 3680-910 2783

Progress Through Service Since 1906

We engineer, manufacture, install, and maintain advanced water and wastewater treatment technologies for residential properties, communities, and commercial properties that are not connected to sewer lines. Norweco treatment systems are in service all over the world.

Norweco®, Norweco.com®, Singulair®, Modulair®, Travalair®, Singulair R3®, Singulair Green®, Ribbit Rivet®, Hydro-Kinetic®, Hydro-Kinetic Bio-Film Reactor®, Evenair®, Lift-Rail®, Microsonic®, Bio-Dynamic®, Bio-Sanitizer®, Bio-Neutralizer®, Bio-Kinetic®, Bio-Static®, Bio-Gem®, Bio-Max®, Bio-Perc®, Blue Crystal®, Phos-4-Fade®, Enviro-C®, ClearCheck®, ChemCheck®, Tri-Max®, Hydra-Max®, Service Pro®, MCD®, TNT®, WASP®, Grease Buster® and "BUSTER" logo are all registered trademarks of Norwalk Wastewater Equipment Company, Inc.

© MMXIX NORWECO / REV. 11/2019 - A

norweco®

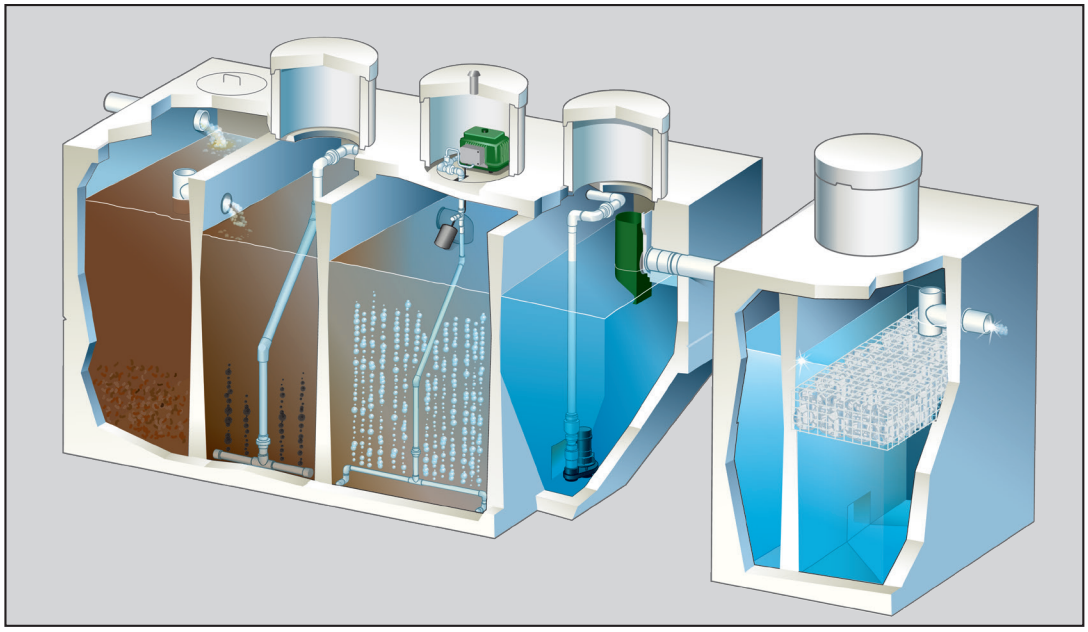
HYDRO-KINETIC®

WASTEWATER TREATMENT SYSTEM
MODEL 600 FEU

SPECIFICATIONS

GENERAL SPECIFICATIONS

The contractor shall furnish and install one complete Hydro-Kinetic wastewater treatment system with all necessary parts and equipment as described in the following specifications. Treatment of the domestic wastewater shall be accomplished by the extended aeration process with non-mechanical flow equalization, pretreatment of the influent and filtration of the final effluent. The treatment system shall provide primary, secondary and tertiary treatment of the wastewater flow, denitrification, and if required, chlorination/dechlorination or ultraviolet disinfection of the effluent prior to discharge. All treatment processes shall be contained within reinforced precast concrete tankage meeting the requirements of ACI Standard 318. The wastewater treatment system shall be a Hydro-Kinetic Model 600 FEU as manufactured by Norweco, Inc., Norwalk, Ohio, USA.



The wastewater treatment system shall include precast concrete tankage providing separate pretreatment, anoxic, aeration, clarification and final filtration chambers. The tankage shall be furnished with cast-in-place inlets, submerged transfer ports, access risers with removable covers, cast-in-place molded plastic vent assembly, cast-in-place clarification outlet coupling and cast-in-place outlet tee. Principal items of electro-mechanical equipment supplied with the Hydro-Kinetic system shall be a Model A100 air pump, Model SD103 recirculation pump, UL Listed Service Pro Model 801P electrical control center with MCD technology, flow equalization device and Hydro-Kinetic FEU filter for final filtration of system effluent.

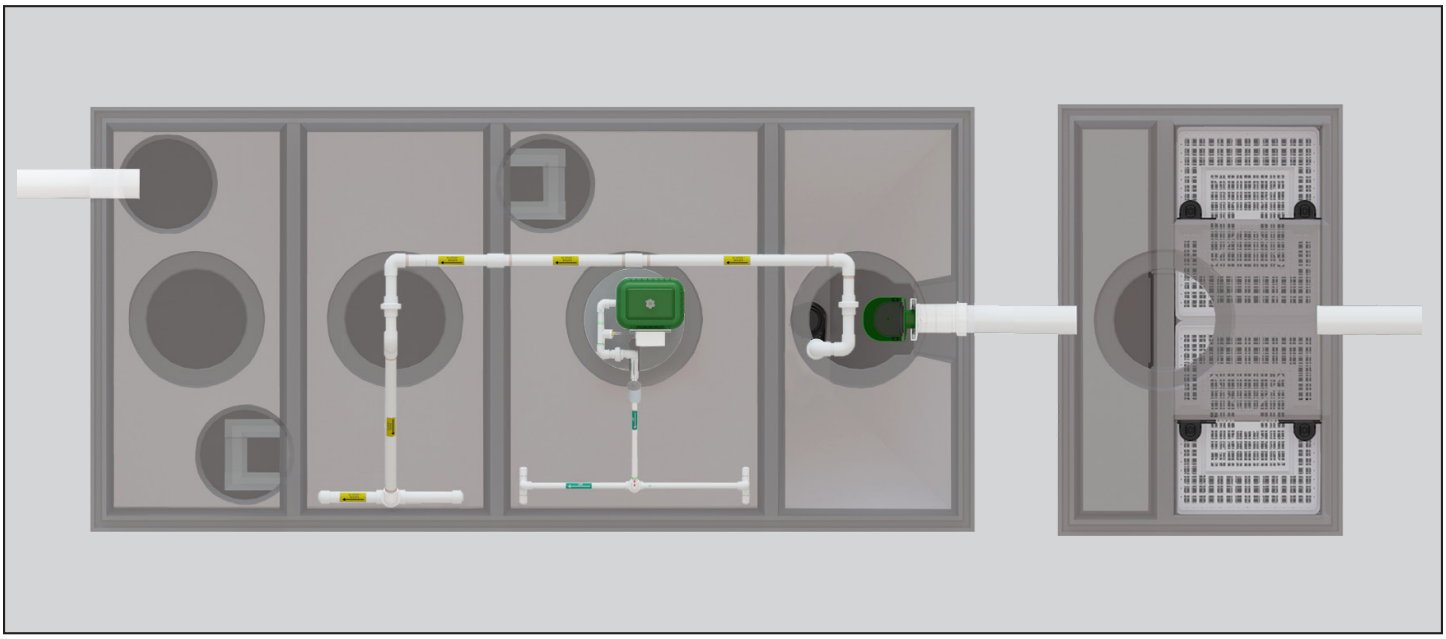
HYDRO-KINETIC®

OPERATING CONDITIONS

Total holding capacity of the system shall provide a minimum of 70 hour retention of the daily flow. The pretreatment chamber shall provide at least 15 hour retention, the anoxic chamber shall provide at least 15 hour retention, the extended aeration chamber shall provide at least 21 hour retention, the clarification chamber shall provide at least 7 hour retention and the Hydro-Kinetic filter shall provide at least 12 hour retention of the daily flow. The non-mechanical flow equalization device shall increase individual chamber and total system retention time in direct proportion to loading. Design of the system shall include a compartmented tank and non-mechanical flow equalization device to insure successful treatment performance without upset even when the significant runoff period is six hours. Hydraulic design considerations of the system and flow equalization device shall be such that intermittent peak flow factors as high as four shall not upset hydraulic reliability within the system. Capability of the system to perform as outlined, when built by an approved manufacturer, shall be certified by an independent testing laboratory and approved for use by the local governing regulatory agency.

PRETREATMENT CHAMBER

All domestic wastewater shall be preconditioned while passing through the pretreatment chamber prior to being introduced to the anoxic chamber. The outlet of the pretreatment chamber shall be equipped with a discharge tee that extends vertically into the liquid so that only the preconditioned flow from the center area of the chamber is displaced to the anoxic chamber. The discharge tee and transfer port shall be of adequate size to handle a peak flow factor of four without restricting the outlet and disturbing hydraulic displacement to the anoxic chamber. A removable inspection cover shall be cast into the top of the pretreatment chamber to allow tank and transfer tee inspection. As a safety measure, the uncovered opening shall be small enough to insure that the tank cannot be entered for inspection or service.



ANOXIC CHAMBER

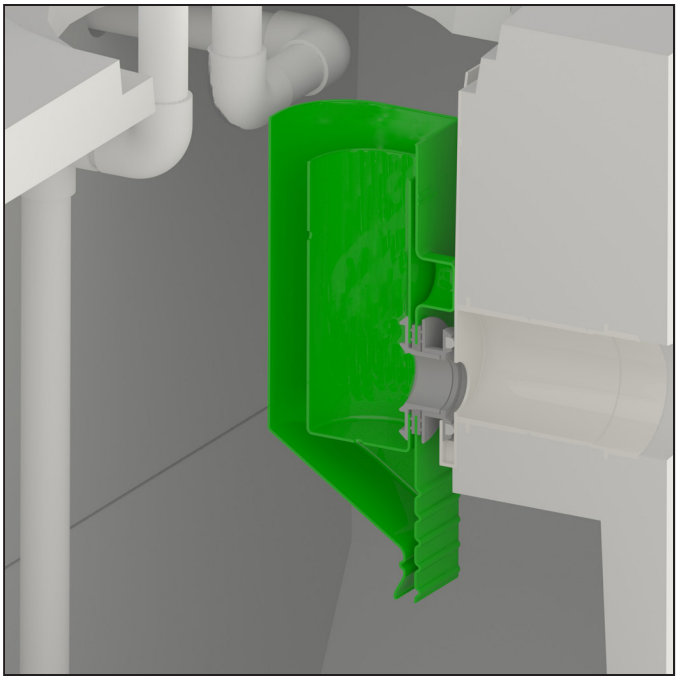
The anoxic chamber shall provide in excess of 15 hour retention of the equalized daily flow. In the anoxic chamber, low oxygen levels shall compel facultative heterotrophic bacteria to use nitrate-bound oxygen in their respiratory process. Nitrified liquid from the clarifier shall enter the chamber in measured doses and nitrogen compounds shall be converted to harmless nitrogen gas which shall escape into the atmosphere. Overall design of the chamber shall insure that effective mixing and suspension of the biomass is maintained in an anoxic condition to insure consistent biological denitrification. Systems that have not been performance certified to reduce Total Nitrogen (TN) to less than 10 mg/L shall not be considered for this application.

AERATION CHAMBER

The extended aeration chamber shall provide in excess of 21 hour retention of the equalized daily flow. The chamber shall be of sufficient size to provide a minimum of 80 cubic feet of tank capacity per pound of applied BOD. The aeration chamber length-width-depth ratio shall be designed to insure uniform tank mixing and provide optimum treatment. The aeration chamber(s) shall be an integral part of the system flow path and constructed of properly reinforced 5,000 PSI, 28 day compression strength precast concrete. All castings used to construct the precast concrete tankage shall be monolithic units with external and internal walls incorporated into each section.

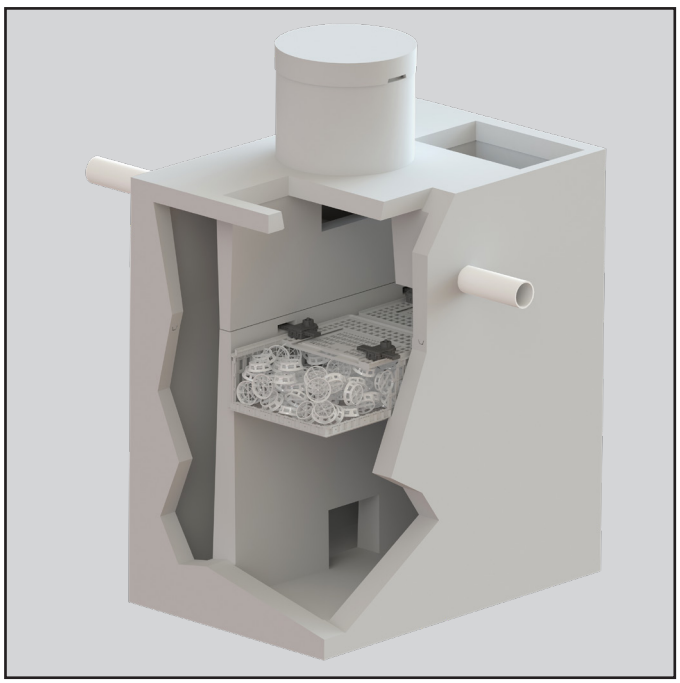
FINAL CLARIFICATION CHAMBER

The final clarification chamber shall consist of 5 functionally independent zones operating together to provide satisfactory settling and clarification of the equalized flow. An inlet zone shall be provided and shall dissipate transfer turbulence at the flow inlet of the clarification chamber. A recirculation pump in the settled sludge zone shall transfer a portion of the wastewater back to the anoxic chamber. Liquid is then displaced into the hopper zone of the clarifier. In this zone, settling by gravity takes place. Three of the four sidewalls are slanted to form a hopper which directs all settled material back to the settled sludge zone. Clarified liquid from the hopper zone shall be displaced into the final settling zone to provide additional clarification of the liquid. The liquid is finally displaced to the outlet zone where the treated effluent shall pass through the flow equalization device and be discharged from the final clarification chamber.



FLOW EQUALIZATION DEVICE

The system shall include a non-mechanical, demand use, flow equalization device. The device shall be installed with the design flow equalization port located below the normal liquid level of the clarifier. If intermittent flow rates exceed the capacity of the design flow port, flow shall be held upstream until the intermittent flow dissipates. If the intermittent flow continues to increase, the liquid level may reach a sustained flow equalization port. With both ports in use, flow through the system increases while continuing to provide flow equalization to upstream and downstream processes. A peak flow equalization port is supplied but should not be required in a properly sized system. The device shall control normal residential flow rates and reduce typical residential flow surges. The flow equalization rate shall be dependent upon the specific loading pattern and the duration of flow surges. At the 600 GPD (gallons per day) NSF Standard 40/245 design loading schedule, minimum performance of the device shall equalize daily flow an average of 50%.

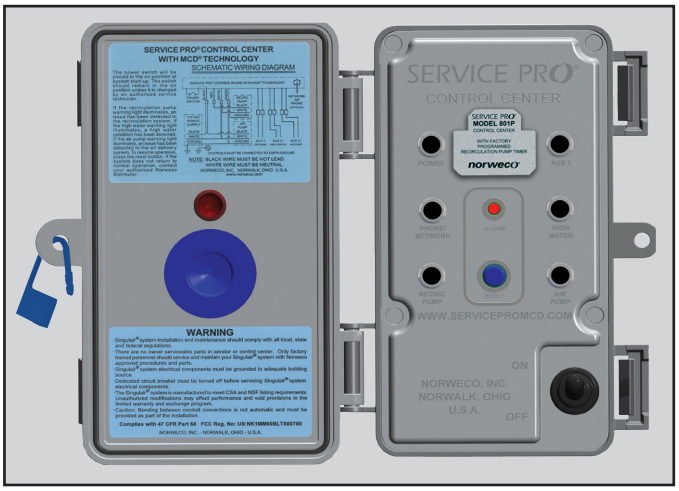


HYDRO-KINETIC® FILTER

Significant reduction of organic matter shall occur in the treatment system prior to the Hydro-Kinetic filter. This Bio-Film reactor shall provide final treatment of the effluent to a near pristine state. Flow equalized liquid from the clarifier shall enter the influent chamber, travel down and be evenly distributed beneath the filtration media. The effects of gravity shall cause solids to settle to the bottom of the tank. As liquid travels up through the proprietary attached growth media, further reduction of organic matter shall take place. Additional settling and consolidation of solids shall take place downstream of the filter media. After passing through the filtration media for final polishing, the highly treated liquid shall flow into the final effluent zone before exiting the Hydro-Kinetic filter through the outlet tee.

MODEL 600 FEU

SERVICE PRO® MODEL 801P ELECTRICAL CONTROL CENTER



The Model 801P control center with MCD technology shall provide Monitoring, Compliance and Diagnostic functions for the treatment system. The pre-wired controls shall be mounted in a lockable NEMA rated enclosure designed specifically for outdoor use. The control center shall be a UL Listed assembly and shall include a time clock, alarm light, reset button, power switch, power light, phone/network light, recirculation pump light, air pump light, high water light and auxiliary alarm light. A pre-programmed time clock shall control the recirculation pump to insure that approximately 400% of the average daily flow is returned to the anoxic chamber. The control center shall monitor recirculation pump current, air pump operation, high water and auxiliary alarm circuitry. In the event of an alarm from the air pump or auxiliary input, the audible and visual alarms shall activate and the optional telemetry system shall report the condition. If abnormal operation of the recirculation pump is detected, a diagnostic sequence shall begin and the visual alarm shall activate. After a factory programmed recovery interval, an automatic restart attempt shall be initiated. If normal pump operation does not resume during 24 programmed recovery and restart cycles, the audible alarm shall activate and the optional telemetry system shall report the condition to the Service Pro monitoring center.



SERVICE PRO® MONITORING CENTER

The Service Pro monitoring center shall include a 256 bit encrypted password protected website for interface with the monitoring center database. Access to the secure website shall be obtained through a unique user name and password that provides tiered access to data from monitored treatment systems. Access level tiers shall include distributors, service providers, regulatory agencies and individual system owners. Distributors and service providers shall be able to create accounts, enter serial numbers for system equipment, maintain service records and grant regulatory agencies access to the information. The monitoring center shall have the capability to schedule future service inspections and provide notification. Individual system owners shall be able to view information regarding their own systems, as well as download instructional information. Integrity of stored data shall be maintained through the use of multiple servers operating in geographically isolated locations.

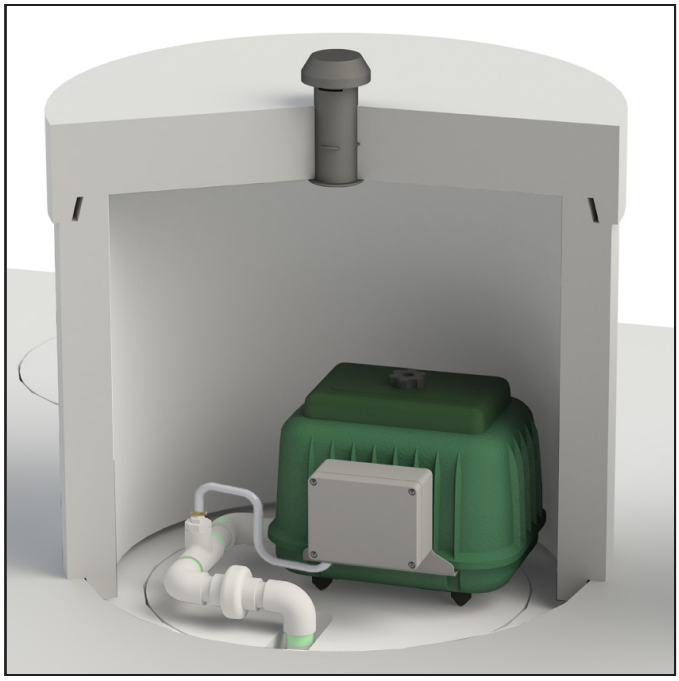
MODEL AT 1500 ULTRAVIOLET DISINFECTION SYSTEM (Optional)

The Hydro-Kinetic system shall be furnished complete with a Model AT 1500 ultraviolet disinfection system. The AT 1500 system shall incorporate a turbulence inducer and dual-pass design to insure pathogenic organisms receive maximum exposure to the ultraviolet light source. Effluent fecal coliform concentrations shall be consistently reduced to less than 200 mg/L. The ultraviolet disinfection system shall be UL Listed under Standard 979 as a residential treatment device and shall include a disinfection chamber, turbulence inducer, extension riser, quartz tube, Teflon cover, ultraviolet bulb and controls. An interlock switch shall be furnished to automatically disable the ultraviolet light source when the disinfection chamber is accessed. Ultraviolet disinfection systems without a residential UL Listing and an interlock switch have not demonstrated compliance with international electrical standards for safety and reliability and shall not be considered for this application.

SPECIFICATIONS

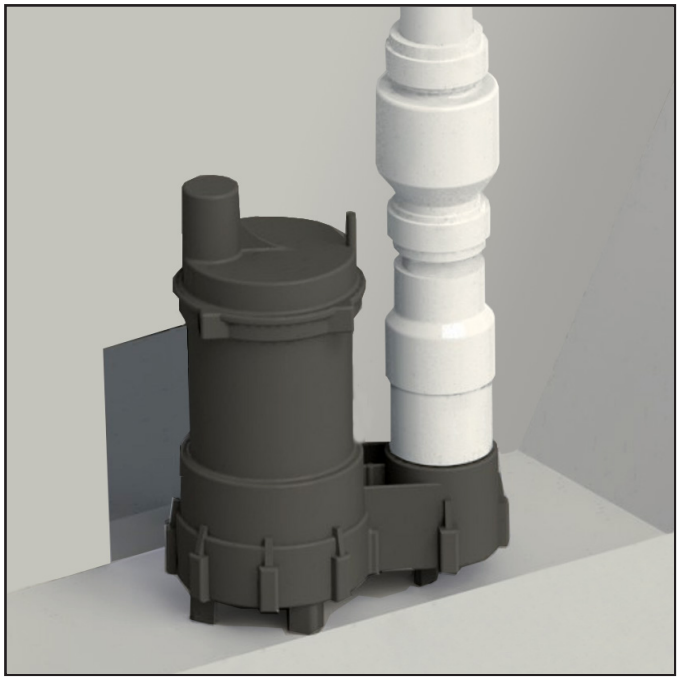
CERTIFIED PERFORMANCE

The wastewater treatment system shall be certified to operate for 12 consecutive months at the rated daily capacity without routine service. This performance shall be demonstrated by a continuous 12 month evaluation performed by an independent ANSI accredited, third-party testing facility. The evaluation shall consist of 2 consecutive ANSI/NSF Standard 40 and 245 evaluations back-to-back, including the stress sequences, with no maintenance allowed in between. When the first six-month evaluation is complete, the second full six-month evaluation shall immediately begin. For the entire certification protocol, the system shall achieve a total test average for the consecutive 12 month period of less than 5 mg/L Biochemical Oxygen Demand (CBOD), less than 5 mg/L Total Suspended Solids (TSS), and less than 10 mg/L Total Nitrogen (TN) in the effluent. Systems unable to meet these effluent quality parameters for at least 12 months of continuous testing by an independent ANSI accredited, third-party testing facility without service do not provide the desired level of effluent quality or service frequency, and shall not be considered for this application.



MODEL A100 AIR PUMP

The Model A100 air pump shall be configured to allow remote mounting or installation within the access riser above the aeration chamber. When installed in the access riser, fresh air shall enter through a molded plastic vent assembly or integral perimeter vent in the access cover above the air pump. Fresh air shall enter the air pump through a filter located under the housing cover and be introduced below the liquid surface through a prefabricated diffuser assembly. Only the plastic diffuser assembly and the air piping shall be installed in contact with the liquid. The Model A100 air pump shall be wired for 115 volt, single phase, 60 cycle operation. The air pump shall include impact-resistant rubber diaphragms and valves which prolong operational life. The unique design and construction shall provide easy maintenance, excellent cooling and quiet operation. The air pump shall continue aerating and mixing the aeration chamber even during high water conditions. Treatment systems that interrupt air delivery during high water conditions disrupt biological activity and shall not be considered for this application.



MODEL SD103 RECIRCULATION PUMP

The Model SD103 submersible recirculation pump shall be wired for 115 volt, single phase, 60 cycle operation and shall be installed in the clarification chamber. The pump motor shall be ⅓ horsepower, operating at 3000 RPM. All openings in the flow path of the recirculation pump shall be of sufficient size to permit the passage of a ¾" diameter sphere. The pump shall be designed to be non-overloading throughout the entire pump curve and shall draw less than 7 full load amps. The pump motor shall contain moisture resistant windings and shall be securely mounted inside an oil-filled, watertight housing for maximum pump life. The stator housing and casing shall be of high grade cast iron or thermoplastic construction.

BLUE CRYSTAL® CHLORINATION SYSTEM (Optional)

The Hydro-Kinetic system shall be furnished complete with a tablet feeder and a six month supply of Blue Crystal disinfecting tablets. Blue Crystal tablets shall be specifically formulated for consistent chlorine dosage and effluent disinfection to the sustained, variable and intermittent flows that are typical of domestic wastewater treatment systems. The tablets shall be manufactured from pure calcium hypochlorite and contain a minimum of 70% available chlorine. Each tablet shall be 2⅝" diameter, compressed to a 1" thickness, weigh approximately 5 ounces and be white in color with blue crystals for easy identification. The tablets shall dissolve in direct proportion to the flow rate, releasing controlled amounts of chlorine.

BIO-MAX® DECHLORINATION SYSTEM (Optional)

The Hydro-Kinetic system shall be furnished complete with a tablet feeder and a six month supply of Bio-Max dechlorination tablets. The dechlorination tablets shall contain 92% sodium sulfite as the active ingredient and shall be specially formulated to chemically neutralize both free and combined chlorine. Each tablet shall be 2⅝" diameter, compressed to a 13⁄16" thickness, weigh approximately 5 ounces and be green in color for easy identification. The tablets shall dissolve slowly, releasing controlled amounts of chemical for the instantaneous removal of residual chlorine from the system effluent.

LIMITED WARRANTY

The wastewater treatment system shall be covered by a two year limited warranty. The Model A100 air pump, Model SD103 recirculation pump, Service Pro Model 801P control center and any other Hydro-Kinetic components purchased from the manufacturer shall be warranted to be free from defects in material and workmanship, under normal use and service, for a period of two years from the date of purchase. A warranty registration card shall be attached to the system before shipment from the factory. A means to register the wastewater treatment system for warranty protection via the internet shall be provided by the manufacturer for the convenience of the distributor, customer and regulatory agency. The distributor shall provide details of the limited warranty to the regulatory agency, contractor and customer as required.

EQUIPMENT MANUFACTURER

The equipment specified herein shall be the product of a manufacturer having a minimum of seven years experience in the construction of prefabricated wastewater treatment equipment and systems. Bids shall be prepared on the basis of the equipment and material specified herein for purposes of determining the low bid. This is not done, however, to eliminate other products or equipment of equal quality and efficiency. If equipment is to be substituted, approval of such substitution must be made prior to execution of any order. It is assumed that substitution will result in a reduction of cost to the contractor and that if accepted, these savings will be passed along by a reduction in the base bid.

PROGRESS THROUGH SERVICE SINCE 1906

norweco®

Engineering the future of water and wastewater treatment

DISTRIBUTED LOCALLY BY:

220 REPUBLIC STREET
NORWALK, OHIO, U.S.A. 44857
TELEPHONE (419) 668-4471
FAX (419) 663-5440
www.norweco.com

Norweco®, Norweco.com®, Singulair®, Modulair®, Travalair®, Singulair R3®, Singulair Green®, Ribbit Rivet®, Hydro-Kinetic®, Hydro-Kinetic Bio-Film Reactor®, Evenair®, Lift-Rail®, Microsonic®, Bio-Dynamic®, Bio-Sanitizer®, Bio-Neutralizer®, Bio-Kinetic®, Bio-Static®, Bio-Gem®, Bio-Max®, Bio-Perc®, Blue Crystal®, Phos-4-Fade®, Enviro-C®, Nitro-Buster®, ClearCheck®, ChemCheck®, Tri-Max®, Hydra-Max®, Service Pro®, MCD®, TNT®, WASP®, Grease Buster® and "BUSTER" logo® are registered trademarks of Norwalk Wastewater Equipment Company, Inc.

©MMXXI NORWECO, INC. / REV.10/2021