Front Road Trunk Watermain Interconnection and Portsmouth Pumping Station Forcemain and Watermain Extension, Kingston, Ontario

June, 2014

Prepared for:
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Project No. 131-18048-00

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June 17, 2014

Matt Morkem
Utilities Kingston
P.O. Box 790
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Re: Front Road Trunk Watermain Interconnection and Portsmouth Pumping Station Watermain and Forcemain Extension, Kingston, Ontario

Dear Mr. Morkem:

We are pleased to submit this report on subsurface conditions and installation recommendations for the proposed watermain interconnection and forcemain extension to be constructed in Kingston, Ontario. The report was requested to provide input to trench and trenchless excavation and construction procedures for project, and is based on information from a borehole drilling and laboratory testing program.

The report describes the investigation methodology and findings, and was completed in accordance with the Terms of Reference provided to WSP.

We trust that the report meets your present requirements. Please contact us if you have any questions.

Yours truly,
WSP Canada Inc.

K. Zen Keizars, M.Sc., P. Geo.
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1. Introduction

WSP Canada Inc. (formerly GENIVAR Inc.) was retained by Utilities Kingston to complete a geotechnical subsurface investigation for the proposed construction of the Front Road trunk watermain interconnection and Portsmouth pumping station forcemain extension in Kingston, Ontario. The investigated route extends from approximately 30 m east of Sir John A. MacDonald Boulevard to 500 m west of Sand Bay Lane. This report discusses the site physical setting, investigation procedures and findings, and our recommendations for design and construction of trench/trenchless structures for the forcemain and watermain, and roadway reinstatement for the project.

2. Physical Setting

This investigation transects zones of residential and industrial land zones. No bedrock outcrops or significant surface water bodies were present within the investigated areas. Local vegetation generally consists of gentrified grasses and deciduous trees.

Ground elevations along the investigation route range from approximately 75 meters above sea level (mASL) to 95 mASL. Elevations generally decrease westward from Sir John A. MacDonald Boulevard to the westward extents of the investigation near the Dupont/Invista Plant.

Geological mapping shows the investigation area to be within limestone and clay plains (The Physiography of Southern Ontario, Chapman and Putnam, 1972, 1984; Map 2227; 1:1000000 Scale Quaternary geology, seamless coverage of the Province of Ontario, Ontario Geological Survey, 2000). Regional native soil deposits surrounding the investigation area include Pleistocene age fine-textured glaciolacustrine deposits composed of silt and clay with minor amounts of sand and gravel (Surficial Geology of Southern Ontario; OGS, 2010).

Bedrock in this region underlies a shallow layer of surficial soil, (*1:500000 Scale Quaternary geology, seamless coverage of the Province of Ontario, Ontario Geological Survey, 2000*). The region hosts the Middle Ordovician Gull River and Bobcaygeon Formations (*Geology of the Kingston Area Queen's University, 2008; MRD 126 – Revision 1, 1:250,000 Scale Bedrock Geology of Ontario, MNDM, 2011*). The Gull River Formation is characteristically comprised of very fine grained, grey to brown limestone and dolostone, whereas the Bobcaygeon Formation is characteristically comprised of brown to grey-brown fossiliferous limestone (*Paleozoic Geology of Southern Ontario; OGS, 2007*). Most of the boreholes were terminated upon reaching refusal on presumed bedrock. Bedrock coring was not undertaken. Boreholes completed for this investigation reached refusal at depths of 0.7 to 8.4 meters below ground level (average3.3 mBGL).

3. Investigation Procedures

3.1 Borehole Investigation

The subject borehole investigation was completed between September 3, and September 16, 2013 and advanced forty-seven (47) boreholes, designated as BH13-1 to BH13-47, from existing ground level to refusal depths (presumed bedrock) ranging 0.7 m to 8.4 m. Table 1 summarizes the borehole information.

Table 3-1: Summary of Borehole Information

Borehole Identification	Monitoring Well Identification	Easting (UTM zone 18)	Northing (UTM zone 18)	Approximate Ground Level Elevation (mASL)	Depth of Borehole (mBGL)	Presumed Conditions at Borehole Termination
BH13-1		379223	4897558	92.111	2.3	Presumed Bedrock
BH13-2		379147	4897539	89.658	2.1	Presumed Bedrock
BH13-3		379053	4897543	85.386	1.2	Presumed Bedrock
BH13-4		379003	4897526	82.253	2.1	Presumed Bedrock
BH13-5		378919	4897529	78.282	3.7	Presumed Bedrock
BH13-6	MW1	378878	4897527	77.294	6.6	Silty Clay
BH13-7		378841	4897535	76.372	4.3	Sand
BH13-8	MW2	378809	4897529	77.254	6.1	Presumed Bedrock
BH13-9		378700	4897520	81.021	3.5	Granular Fill
BH13-10		378621	4897513	83.376	3.7	Presumed Bedrock
BH13-11		378798	4897575	77.110	1.4	Presumed Bedrock
BH13-12		378693	4897580	79.493	1.4	Presumed Bedrock
BH13-13		378634	4897562	82.386	2.0	Presumed Bedrock
BH13-14		378560	4897521	85.285	1.7	Presumed Bedrock
BH13-15		378461	4897506	89.430	1.6	Presumed Bedrock
BH13-16		378395	4897491	92.314	3.2	Presumed Bedrock
BH13-17		378325	4897494	93.060	1.7	Presumed Bedrock
BH13-18		378245	4897483	93.324	2.0	Presumed Bedrock
BH13-19		378162	4897476	93.934	0.9	Presumed Bedrock
BH13-20		378071	4897478	93.783	1.2	Presumed Bedrock
BH13-21		377987	4897473	94.011	2.1	Presumed Bedrock
BH13-22		377886	4897470	94.635	1.7	Presumed Bedrock
BH13-23		377806	4897460	93.934	1.4	Presumed Bedrock
BH13-24		377691	4897457	92.876	1.7	Presumed Bedrock
BH13-25		377569	4897455	88.342	0.7	Presumed Bedrock
BH13-26		377482	4897450	84.028	4.3	Presumed Bedrock
BH13-27		377414	4897446	80.789	4.3	Presumed Bedrock
BH13-28		377344	4897448	78.228	4.3	Presumed Bedrock
BH13-29		377265	4897451	76.837	4.3	Presumed Bedrock
BH13-30		377195	4897455	76.317	4.0	Presumed Bedrock
BH13-31		377120	4897458	76.345	4.3	Presumed Bedrock
BH13-32		377051	4897462	77.212	3.9	Presumed Bedrock
BH13-33		376961	4897475	77.647	4.3	Presumed Bedrock
BH13-34		376913	4897475	77.173	2.0	Presumed Bedrock
BH13-35		376913	4897476	77.141	6.1	Silt
BH13-36	MW3	376725	4897481	76.293	8.4	Presumed Bedrock
BH13-37		376648	4897473	76.265	5.0	Presumed Bedrock
BH13-38		376596	4897469	76.319	4.3	Presumed Bedrock
BH13-39		376544	4897454	76.183	6.6	Presumed Bedrock
BH13-40	MW4	376475	4897444	76.401	7.3	Presumed Bedrock
BH13-41		376368	4897429	76.041	4.3	Presumed Bedrock
BH13-42		376302	4897409	76.080	1.4	Presumed Bedrock
BH13-43		376218	4897406	76.642	3.4	Presumed Bedrock
BH13-44		376162	4897410	77.032	2.1	Presumed Bedrock
BH13-45		376092	4897393	78.010	2.6	Presumed Bedrock
BH13-46		376021	4897390	79.456	3.1	Presumed Bedrock
BH13-47		376948	4897399	80.625	2.7	Presumed Bedrock

Buried utility locates were obtained in advance of drilling, and where necessary prescribed borehole locations were moved slightly to avoid conflicts with known services. WSP worked with several agencies and private contractors to secure proper clearances, including the Cataraqui Region Conservation Authority (CRCA).

Drilling and soil sampling was completed using truck-mounted commercial drill rigs operating under the supervision of WSP engineering staff. Boreholes were advanced to the sampling depths by means of 150 mm outside diameter (OD) continuous flight hollow stem augers. Sampling was completed at 0.75 m to 1.5 m intervals using a split-spoon core barrel driven in accordance with Standard Penetration Test (SPT) procedures (ASTM D1586). SPT N-values were recorded for the sampled intervals as the number of blows required to drive a split-spoon sampler 305 mm into the soil, using a 63.5 kilogram (kg) drop hammer falling 750 mm.

Sampled soil materials from pavement layers and discrete subsurface units were logged in the field using visual and tactile methods, and were then placed in labelled plastic bags for transport, future reference, possible laboratory testing, and storage. Soils for laboratory moisture content testing were placed in sealed laboratory jars for transport.

Groundwater conditions within the boreholes were observed during drilling, prior to backfilling. Upon completion of drilling, the boreholes were backfilled with drill cuttings mixed with bentonite hole plug. Backfill material was compacted with the drill rig. Where necessary, WSP returned to borehole locations to add additional material where the backfill had settled slightly. Some additional minor settlement of the borehole fill may occur over time and additional fill material may be required. The boreholes are considered to be abandoned in accordance with O. Reg. 903 requirements, as amended.

3.2 Laboratory Testing Program

Table 3-1 below summarizes the laboratory testing program completed for soil samples obtained from the boreholes. Selected soil samples were submitted for laboratory tests to confirm the textural field descriptions in the borehole logs.

Table 3-2: Summary of Physical Tests

Laboratory Test	ASTM Standard	Number of Samples
Natural Moisture Content	ASTM D2216	203
Particle Size Analysis	ASTM D422, D4318	28

Soil tests were completed at WSP's CCIL certified laboratory. Test results are presented on the borehole logs included in Appendix B.

Analytical chemical testing was performed on select soil and water samples. Testing was completed by Caduceon Laboratories Inc., a CALA-certified laboratory. A toxicology characteristic leaching procedure (TCLP) was completed for one (1) selected soil sample. Table 3-3 below summarizes the chemical testing program. Laboratory test certificates are presented in Appendix C.

Table 3-3: Summary of Chemical Tests

Chemical Test	Number of Soil Samples Analysed	Number of Water Samples Analysed
Petroleum hydrocarbons (PHC)	20	6
Volatile organic carbons (VOC)	20	6
Inorganic Metals	20	6
Polycyclic aromatic hydrocarbons (PAH)	20	6
Polychlorinated biphenyls (PCB)	10	6

4. Subsurface Conditions

Subsurface conditions were assessed at the forty-seven (47) borehole locations designated as BH13-1 through BH13-47. Detailed borehole logs are provided in Appendix A and laboratory test results are included in Appendix B.

4.1 Subsurface Unit Descriptions

Descriptions of individual subsurface units encountered in the boreholes are provided in this section.

4.1.1 Asphalt

All boreholes completed in this investigation penetrated a layer of asphalt (hot laid mix) 50 mm to 200 mm in thickness, and averaging 128 mm in thickness along the route of the investigation. Asphalt was laid upon either granular fill or coarse granular fill at all borehole locations.

4.1.2 Fill

Three forms of anthropogenic fill were recognized as subsurface layers during this investigation. These include Granular Fill, Coarse Granular Fill, and two forms of Common Fill, including Clayey Silt and Silt and Clay Fill, and Silty Sand to Sandy Silt Fill.

Common fill was identified from native materials of the same type by the existence of granular or coarse granular fill both above and below the common fill layer. The characteristics of the four types of fill are detailed below.

4.1.3 Granular Fill

A layer of brown granular fill was encountered beneath the asphalt at approximately ¾ of the borehole locations, ranging in thickness from 100 mm to borehole termination depths (3.4 meters, BH13-9). The average thickness of this fill layer is 1.3 meters. Granular fill directly overlies presumed bedrock at borehole location BH13-25, and extended below borehole termination depths at borehole location BH13-9.

Granular fill layers are brown to black gravelly sand with trace-to-some silt, and a trace organic component. The gravel component of the granular fill is grey. Recycled asphalt fragments were observed in this layer at several of the borehole locations.

The granular fill was found to be moist to wet within the upper zones below the asphalt; and moist to saturated in lower zones at the time of the investigation. Laboratory natural moisture content analyses completed on samples obtained from the granular fill yielded results ranging from 0 % to 73 %, with an average of 5.6 %. High moisture content results are indicative of fill with an organic soil component.

SPT N-values recorded for granular fill layers varied from 6 blows per 305 mm of penetration to 50 blows per 160 mm of penetration, and averaging 34 blows per 305 mm of penetration. The granular fill has a loose to very dense, but more typically dense relative density.

4.1.3.1 Coarse Granular Fill

A layer of brown coarse granular fill was encountered beneath layers of asphalt at approximately 25 % of the borehole locations, and below layers of granular fill at borehole locations BH13-2, BH13-5, BH13-6, BH13-24, BH13-34, BH13-39, and BH13-40. Coarse granular fill layers range in thickness from 0.3 to 4.1 m (average 1.1 m). Coarse granular fill layers extend to a maximum observed depth of 4.2 mBGL, and extend to borehole termination depths at BH13-16, BH13-19, BH13-24, BH13-33, BH13-34, and BH13-42. Course granular fill directly overlies presumed bedrock at the following borehole locations: BH13-11, BH13-12, BH13-16, BH13-19, BH13-24, BH13-33, BH13-34, BH13-42, BH13-46, and BH13-47.

The coarse granular fill was found to be moist to saturated at the time of the investigation. Laboratory natural moisture content analyses conducted on samples obtained from the granular fill yielded results ranging from 0% to 19%, with an average of 5.6%.

Coarse granular fill layers comprise grey to brown gravel to layers of sandy gravel, with a trace to some silt and clay. Layers of coarse granular fill were moist to dry. Results of particle size distribution analyses for coarse granular fill are summarized as follows.

Table 4-1: Particle Size Summary of Coarse Granular Fill Layers

Parameter	Percent composition	Number of Samples
Gravel (2 mm to 60 mm)	30 to 87	11
Sand (0.06 mm to 2 mm)	10 to 39	11
Silt (0.002 mm to 0.06 mm)	3 to 25	11
Clay (< 0.002 mm)	4 to 11	6

SPT N-values with the coarse fill unit varied from 5 to 55 blows per 305 mm of penetration, with an average of approximately 26. As such, the coarse granular fill has loose to very dense, but more typically compact relative density.

4.1.3.2 Common Fill - Clayey Silt, Silt and Clay, Silty Sand, and Sandy Silt Fill

Layers of common fill comprising clayey silt, silt and clay, silty sand, or sandy silt fill was encountered at borehole locations BH13-8, BH13-11, BH13-12, and BH13-13, BH13-46, and BH13-47. The common fill material is bracketed above and below by layers of granular fill or coarse granular fill. Common fill directly overlies presumed bedrock at borehole BH13-15.

The non-plastic common fill layers, including the silty sand fill and sandy silt fill, were found to be moist to saturated at the time of the investigation. Clayey silt fill and silt and clay fill layers showed plastic characteristics, and were assessed as drier than plastic limit (DTPL) to about plastic limit (APL) in BH13-12 and BH13-13. Laboratory natural moisture content analyses completed on samples obtained from the common fill yielded results ranging from approximately 8 % to 20 %.

Clayey silt and silt and clay fill layers are brown, and silty sand and sandy silt fill layers are reddish brown to brown. Both layers were observed to have trace to some gravel content. A soil particle size analysis completed on a sample of the silt and clay fill layer at borehole location BH13-12 is summarized in Table 4-2.

Table 4-2: Particle Size Summary of Silt and Clay Fill Layer

Parameter	Percent composition
Gravel (2 mm to 60 mm)	12
Sand (0.06 mm to 2 mm)	26
Silt (0.002 mm to 0.06 mm)	31
Clay (< 0.002 mm)	31

The SPT N-values recorded for the common fill layers varied from 4 to 8 blows per 305 mm of penetration. In view of these results, the silty sand and sandy silt fills have a very loose to loose relative density and the clayey silt and silt and clay fills have a very soft to soft consistency.

4.1.4 Sand

A stratum of sand was encountered underlying the granular fill and coarse granular fill at borehole locations BH13-2, BH13-6, BH13-7, BH13-10, BH13-28, BH13-31, BH13-32, BH13-35, BH13-36, BH13-37, and BH13-39. The thickness of the sand ranges from 0.4 m to 3.2 m, and was encountered at depths

ranging from 0.8 mBGL to 4.7 mBGL. Sand material directly overlies the presumed bedrock at borehole locations BH13-2, BH13-28, BH13-31, BH13-32, and BH13-38. The sand layers continued below a borehole termination depth of 4.3 mBGL at borehole location BH13-7.

The sand was found to be moist to saturated at the time of the investigation, which was confirmed by laboratory natural moisture content test results ranging from 3% to 36%. High moisture content is indicative of sand containing organic material (see below).

Sand layers are grey to orange brown to brown with trace amounts of gravel. Trace wood fragments, organic material, and occasional mollusc shells were found in this layer. Interbeds of silt, organic rich layers or peat layers were observed at borehole locations BH13-7, BH13-37. Soil particle size analyses for sand layers are summarized in Table 4-3.

Table 4-3: Particle Size Summary of Sand Layers

Parameter	Percent composition	Number of Samples
Gravel (2 mm to 60 mm)	3	1
Sand (0.06 mm to 2 mm)	85 to 95	2
Silt (0.002 mm to 0.06 mm)	5 to 9	2
Clay (< 0.002 mm)	3	1

SPT N-values recorded for the sand varied from 2 blows to 18 blows per 305 mm of penetration. These results indicate that the sand has a very loose to compact relative density.

4.1.5 Sandy Silt and Sand and Silt

Strata of sandy silt and/or sand and silt were encountered below coarse granular fill layers at borehole locations BH13-1, BH13-4 and BH13-27, BH13-30. Silty sand was encountered below a layer of granular fill at borehole location BH13-8. The sandy silt or sand and silt layers overlie gravel and sand rich layers at borehole locations BH13-1, and BH13-4 or clayey silt at borehole location BH13-8, BH13-27, and BH13-30.

Sandy silt and sand and silt layers range from 0.2 m to 0.6 m in thickness, and were encountered at depths ranging from 0.8 mBGL to 4.9 mBGL. Sandy silt and sand and silt layers extended directly to bedrock at borehole locations BH13-27, BH13-36 and BH13-39.

The sandy silt and sand and silt strata were found to be moist to saturated at the time of the investigation, which were confirmed by laboratory natural moisture content test results ranging from 1% to 89%.

Results of particle size distribution analyses are summarized in Table 4-4.

Table 4-4: Particle Size Summary of Sandy Silt or Sand and Silt Layers

Parameter	Percent composition	Number of Samples
Gravel (2 mm to 60 mm)	16 to 18	2
Sand (0.06 mm to 2 mm)	26 to 32	3
Silt (0.002 mm to 0.06 mm)	34 to 63	3
Clay (< 0.002 mm)	5 to 22	3

The SPT N-values recorded for the sandy silt and sand and silt strata varied from 3 to 50 blows per 50 mm of penetration, and averaging 45 blows per 305 mm of penetration.

These results indicate that the relative density of the sandy silt and sand and silt ranges from very loose to very dense, but more typically dense.

4.1.6 Gravel, Gravelly Sand, Gravel and Sand

Gravel, gravelly sand, and gravel and sand material was encountered at boreholes BH13-1, BH13-4, BH13-7, BH13-8, BH13-10, and BH13-17, and not west of Portsmouth Avenue. These layers range from 0.3 m to 1 m in thickness, and were encountered at depths ranging from 1.4 mBGL to 4.4 mBGL. This material extends to presumed bedrock at boreholes BH13-9, BH13-10, and BH13-17.

The gravelly material was found to be moist to saturated at the time of the investigation, and laboratory natural moisture content tests yielded results ranging from 1% to 69%. Higher moisture contents are indicative of material containing organics and/or finer soil fractions.

Gravel, gravelly sand, and gravel and sand layers are dark brown to brown to grey, with trace to some silt and clay. A soil particle size analysis completed on a sample of the silt and clay fill layer at borehole location BH13-12 is summarized in Table 4-5.

Table 4-5: Particle Size Summary of Gravel, Gravelly Sand, and Gravel and Sand Layers

Parameter	Percent composition	Number of Samples
Gravel (2 mm to 60 mm)	35 to 65	4
Sand (0.06 mm to 2 mm)	26 to 57	4
Silt (0.002 mm to 0.06 mm)	6 to 18	4
Clay (< 0.002 mm)	2	1

SPT N-values recorded for the gravel, gravelly sand, and gravel and sand layers varied from 4 to 50 blows per 25 mm of penetration, with an average of 50 blows per 150 mm of penetration. These results indicate that the aforementioned materials have a very loose to very dense relative density, but more typically very dense.

4.1.7 Silty Sand

Silty sand material was encountered at boreholes BH13-1, BH13-3, BH13-8, BH13-13, BH13-14, BH13-38 and BH13-43. Units range from 0.1 m to 0.8 m in thickness and were encountered at depths ranging from 0.9 mBGL to 6.1 mBGL. Silty sand extends to presumed bedrock at boreholes BH13-1, BH13-3, BH13-8, BH13- 13, and BH13-14.

The silty sand was found to be dry to saturated at the time of the investigation, which was confirmed by laboratory natural moisture content test results ranging from 2% to 69%.

Silty sand layers are generally grey to dark grey, but were found to be brown at borehole locations BH13-8 and BH13-14. A soil particle size analysis completed on material sampled from silty sand layers is summarized in Table 4-6.

Table 4-6: Particle Size Summary of Silty Sand Layer

Parameter	Percent composition	Number of Samples
Gravel (2 mm to 60 mm)	28	1
Sand (0.06 mm to 2 mm)	40	1
Silt and Clay (< 0.06 mm)	32	1

SPT N-values recorded for the silty sand varied from 2 to 50 blows per 125 mm of penetration, with an average of 50 blows per 150 mm of penetration. These results indicate that the silty sand has a very loose to very dense, but more typically very dense relative density.

4.1.8 Silt

Strata of silt containing a trace of sand and a trace to some clay were encountered at borehole locations BH13-27, BH13-29, BH13-35, BH13-40, BH13-44 and BH13-45. Silt strata were not encountered east of borehole location BH13-27, roughly equivalent to the base of the hill beginning at Country Club Drive. The silt layers range from 0.2 m to 2.2 m in thickness, and were encountered at depths ranging from 1.5 mBGL to 6.1 mBGL. Silt layers extend to the presumed bedrock at borehole locations BH13- 29, BH13-40, and BH13-44. BH13-35 was terminated in the silt stratum at a depth of 6.1 mBGL.

The silt was found to be generally saturated, but localized moist zones were encountered at the time of the investigation. Laboratory natural moisture content tests yielded results ranging from 8 % to 28 %.

Based on the SPT N-values varying from 2 to 50 blows per 125 mm of penetration, the silt has a very loose to very dense relative density.

4.1.9 Sandy Clay

Strata of sandy clay containing a trace of gravel were encountered at three borehole locations: BH13-5, BH-43 and BH13-45. Units range from 0.7 m to 0.8 m in thickness, and were encountered at depths of 1.4 mBGL to 6.6 mBGL. Sandy clay layers extend to presumed bedrock at borehole location BH13-5.

Moisture conditions at the time of the investigation indicate that sandy clay layers had relative low plasticity at BH13-45 and intermediate plasticity at boreholes BH13-5 and BH13-43. The material was described as APL to WTPL at the time of the investigation, and laboratory natural moisture content analyses completed for sandy clay layers ranged from 11 % to 24 %.

Based on the SPT N-values varying from 8 to 50 blows per 125 mm of penetration, the sandy clay has soft to hard consistency.

4.1.10 Clayey Silt, Silty Clay, and Silt and Clay

Strata of clayey silt, silty clay, and silt and clay were encountered in fifteen of the boreholes at depths ranging from 0.8 mBGL to 4.3 mBGL. The thickness of these strata varied from 0.4 m to 3.1 m. Clayey silt, silty clay, and silt and clay layers extend to presumed bedrock at borehole locations BH13-18, BH13-20, BH13-21, BH13-22, BH13-23, BH13-26, BH13-37, and BH13-41.

Clayey silt, silty clay, and silt and clay layers showed plastic characteristics, and were observed to be DTPL to APL east of borehole location BH13-39 corresponding to the INVISTA and DUPONT railway. These layers were WTPL west of the railway crossing. Laboratory natural moisture content tests completed on samples obtained from clayey silt, silty clay and silt and clay yielded results ranging from approximately 2 % to 30 %.

Clayey silt, silty clay, and silt and clay layers were observed as brown to orangey brown to grey and dark grey, with trace to some gravel. Results of a analysis particle size distribution analysis completed on material sampled from sandy clay layers is summarized in Table 4-7.

Table 4-7: Particle Size Summary of Clayey Silt, Silty Clay, and Silt and Clay Layer

Parameter	Percent composition	Number of Samples
Gravel (2 mm to 60 mm)	2 to 12	2
Sand (0.06 mm to 2 mm)	2 to 26	3
Silt (0.002 mm to 0.06 mm)	31 to 43	3
Clay (< 0.002 mm)	31 to 55	3

SPT N-values recorded for clayey silt, silty clay, and silt and clay layers varied from 1 blow per 305 mm of penetration to 57 blows per 305 mm of penetration. As such, clayey silt, silty clay, and silt and clay layers ranges from soft to hard.

4.1.11 Bedrock

At borehole refusal, augers were advanced into presumed bedrock. Coring was not performed on bedrock, however, augur behaviour, bedrock chips and bedrock flour were recovered and consistent with expected bedrock. Bedrock along the forcemain and watermain route is expected to be horizontally bedded limestone with occasional shaley interbeds common in the Kingston area (Simcoe Group). Based on auger probes to the rock surface, the bedrock is deemed to be hard and competent. The estimated ISRM Grade is R4 (Strong Rock), with presumed fair to good RQD. Bedrock grade and competence are expected to increase with depth, as typical, and expected unconfined compressive strength is in the 50-70 MPa range. Fractures and weathering, potential pseudo-karstic features and weaker material should be anticipated in the upper 1m zone in localized areas.

4.2 Groundwater Conditions

Groundwater conditions were observed in the open boreholes upon completion of drilling. Measured levels and determined elevations of recorded groundwater seepage are summarized as follows.

Table 4-8: Summary of Groundwater Levels

Borehole and Monitoring Well Identification	Easting (UTM zone 18)	Northing (UTM zone 18)	Groundwater Seepage (mBGL)	Date Measured (2013)	Measured Groundwater Levels (mBGL)	Date Measured (2013)	Approximate Groundwater Elevations (mASL) [1]
BH13-1	379223	4897558	dry	Sept 9			dry
BH13-2	379147	4897539	dry	Sept 9			dry
BH13-3	379053	4897543	dry	Sept 9			dry
BH13-4	379003	4897526	dry	Sept 9			dry
BH13-5	378919	4897529	dry	Sept 6			dry
BH13-6 (MW-1)	378878	4897527	5.5	Sept 6	2.59	Oct 24	74.7 / *71.7*
BH13-7	378841	4897535	2.9	Sept 5			*73.5*
BH13-8 (MW-2)	378809	4897529	1.8	Sept 9	2.37	Oct 24	74.9 / *75.4*
BH13-9	378700	4897520	dry	Sept 5			dry
BH13-10	378621	4897513	dry	Sept 5			dry
BH13-11	378798	4897575	dry	Sept 10			dry
BH13-12	378693	4897580	dry	Sept 10			dry
BH13-13	378634	4897562	dry	Sept 10			dry
BH13-14	378560	4897521	dry	Sept 10			dry
BH13-15	378461	4897506	dry	Sept 10			dry
BH13-16	378395	4897491	dry	Sept 4			dry
BH13-17	378325	4897494	dry	Sept 4			dry
BH13-18	378245	4897483	dry	Sept 4			dry
BH13-19	378162	4897476	dry	Sept 4			dry
BH13-20	378071	4897478	dry	Sept 4			dry
BH13-21	377987	4897473	dry	Sept 11			dry
BH13-22	377886	4897470	dry	Sept 10			dry
BH13-23	377806	4897460	dry	Sept 10			dry
BH13-24	377691	4897457	dry	Sept 12			dry
BH13-25	377569	4897455	dry	Sept 12			dry
BH13-26	377482	4897450	dry	Sept 12			dry
BH13-27	377414	4897446	dry	Sept 12			dry
BH13-28	377344	4897448	3.0	Sept 12			*75.2*
BH13-29	377265	4897451	2.7	Sept 12			*74.1*
BH13-30	377195	4897455	1.5	Sept 11			*74.8*
BH13-31	377120	4897458	1.5	Sept 12			*74.8*
BH13-32	377051	4897462	2.4	Sept 11			*74.8*
BH13-33	376961	4897475	2.3	Sept 11			*75.3*
BH13-34	376913	4897475	dry	Sept 11			dry
BH13-35	376913	4897476	1.8	Sept 11			*75.3*

Borehole and Monitoring Well Identification	Easting	Northing	Groundwater Seepage (mBGL)	Date Measured (2013)	Measured Groundwater Levels (mBGL)	Date Measured (2013)	Approximate Groundwater Elevations (mASL) [1]
	(UTM zone 18)						
BH13-36 (MW-3)	376725	4897481		Sept 14	1.16	Oct 24	75.1
BH13-37	376648	4897473	1.5	Sept 14			*74.7*
BH13-38	376596	4897469	dry	Sept 14			dry
BH13-39	376544	4897454	dry	Sept 14			dry
BH13-40 (MW-4)	376475	4897444	dry	Sept 13	1.63	Oct 24	74.7
BH13-41	376368	4897429	dry	Sept 16			dry
BH13-42	376302	4897409	dry	Sept 03			dry
BH13-43	376218	4897406	2.4	Sept 03			*74.2*
BH13-44	376162	4897410	dry	Sept 03			dry
BH13-45	376092	4897393	dry	Sept 03			dry
BH13-46	376021	4897390	dry	Sept 03			dry
BH13-47	376948	4897399	dry	Sept 03			dry

[1] Italics indicates groundwater seepage noted during drilling.

In summary, groundwater, wet soil and/or seepage was observed in the following sections of the project:

- → Low-lying section of Kings Street West, at borehole locations BH13-6 through BH13-8, proximal to the Portsmouth Pumping Station, between Gardiner Street and Young Street.
- → Low-lying section of Kings Street West, at borehole locations Bh13-28 and BH13-33.
- → Low-lying section of Front Road, at borehole locations BH13-35 through BH13-37, proximal to the interface of the Little Cataraque River and Lake Ontario.
- → A single borehole at borehole location BH13-43, west of Sandy Bay Lane, proximal to the Invista/Dupont Plant.

4.3 Geochemical Conditions

At the time of the investigation, odours described as associated with organic volatiles were reported at borehole locations BH13-2 and BH13-7.

Selected samples from the boreholes were submitted for laboratory geochemical analysis. Analytical results for soils were compared to the Table 3: Full Depth Generic Site Condition Standards for a non-potable groundwater condition, with coarse-textured soils, for institutional/commercial/community property uses, as outlined in the *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 15, 2011),* hereinafter referred to as the "MOE 2011 Table 3 SCS".

Geochemical laboratory analyses of soil samples, including toxicology leachate characteristics procedure (TCLP) extraction, indicate that soils show elevated levels (relative to the Table 3 SCS's) of boron, cadmium, mercury, molybdenum, and zinc metals at borehole locations BH13-1, BH13-3, BH13-8, BH13-12, BH13-13, BH13-14, and BH13-22. Additionally, laboratory analyses of soil samples show elevated levels of poly-chlorinated biphenyls (PCB's), petroleum hydrocarbons (>C10 – C16), and benzo(a)pyrene at borehole locations BH13-1, BH13-3, BH13-6, BH13-8, BH13-12, BH13-13, BH13-14, BH13-22, and BH13-25. Chemical test results are summarized in Tables 1 and 2. Exceedences are indicated below. Further detail is provided in the laboratory reports included as Appendix D.

Table 4-9: Summary of Chemical Exceedences for Soils (Maximum concentration and location)

Parameter	MOE SCS's Table 3 (O.Reg 153) (µg/g)	Maximum Measured Concentration (µg/g)	Borehole Locations Reporting Exceedences
Boron	120	625.0	BH13-1, BH13-12
Cadmium	1.9	31.3	BH13-1, BH13-3, BH13-8, BH13-12, BH13-13, BH13-14, BH13-22
Mercury	3.9	34.3	BH13-1, BH13-3, BH13-8, BH13-12, BH13-13, BH13-14, BH13-22
Molybdenum	40.0	290.0	BH13-3, BH13-8, BH13-12, BH13-13
Zinc	340.0	1000.0	BH13-10
Poly-Chlorinated Biphenyls (PCB's)	1.1	38.9	BH13-1, BH13-3, BH13-8, BH13-12, BH13-13, BH13-14, BH13-22
PHC F2 (>C10-C16)	230.0	3530.0	BH13-6, BH13-9, BH13-25
Benzo(a)pyrene	0.3	0.5	BH13-13

Chemical test results for groundwater samples are summarized in Table 4-10 below. Provincial Water Quality Objectives (PWQO's) and City of Kingston Sewer Use By-Law (SUB) criteria are provided for comparison, to asses dewatering discharge requirements. Laboratory Certificates of Analysis for the testing are included in Appendix B.

Table 4-10: Summary of Groundwater Quality

Parameter	PWQO's (µg/L)	SUB (ug/LL	Maximum Measured Concentration (µg/g)
Boron	0.2		95
Copper	0.005	2	0.9
Lead	0.005	1	0.54

Water sampled from groundwater monitoring wells met the Table 3 SCS's, and City of Kingston Sewer Use By-Law criteria, but exceed PWQO criteria for boron, copper, and lead at all groundwater monitoring well locations. A slightly elevated petroleum hydrocarbon F2 (<C10-C16) concentration was observed in groundwater sampled from MW-3.

Based on the laboratory results, soils at the following eleven (11) borehole locations would require continued testing and disposal: BH13-1, BH13-3, BH13-6, BH13-8, BH13-9 BH13-10, BH13-12, BH13-13, BH13-14, BH13-22, BH13-25.

5. Recommendations for Forcemain Extension Installation

5.1 Forcemain and Watermain Alignment

The proposed watermain interconnection and forcemain extension is to be constructed along Front Road and King Street, will cross a series of cut and fill zones with subsurface conditions described as in Section 4 of this report. Subject to the selected invert depth, the pipe will be constructed in relatively dense or hard native soil or fill, or within sound limestone bedrock. Geotechnical inspections are required during construction to confirm conditions, construction procedures and requirements.

The alignment is required to cross a variety of legal boundaries and other utilities during completion. The horizontal and vertical alignment of the proposed trunk sanitary sewer is governed at minimum by the following criteria:

- → Located within easement as much as possible;
- → Minimize necessary expansion of easement limits;
- → Avoid existing utilities;
- → Installation below 1.4 metre frost depth; and
- → A reasonable alignment minimizing construction costs and impact on surrounding properties and utilities.

The required minimum pipe installation depth of 1.4 m results in varied founding materials along the proposed route. The 1.4 m minimum pipe depth between borehole locations BH13-29 through BH13-41 approach the water level of Lake Ontario (approximately 74 mASL), and dewatering volumes will likely reflect this. Presumed watermain founding materials are summarized in Table 5-1, below.

Table 5-1: Summary of Presumed Watermain Founding Materials According to Borehole Location

Borehole Location	Presumed Watermain Founding Material (as per Figures 1a through 1d)
BH13-1	Sand
BH13-2	Fill
BH13-3	Presumed Bedrock
BH13-4	Silt
BH13-5 through BH13-6	Fill
BH13-7	Sand and Silt
BH13-8 through BH13-10	Fill
BH13-14 through BH13-25	Presumed Bedrock
BH13-26	Clay
BH13-27	Silt
BH13-28	Sand
BH13-29	Clay
BH13-30 through BH13-32	Sand
BH13-33	Fill
BH13-34	Presumed Bedrock
BH13-35 through BH13-39	Sand
BH13-40 through BH13-41	Fill
BH13-42	Presumed Bedrock
BH13-43	Sand
BH13-44	Silt
BH13-45	Clay
BH13-46 through BH13-47	Fill

5.2 Undercrossings

The proposed pipe alignment will be required at the existing CN railway crossing between borehole locations BH13-39 and BH13-40, and at Little Cataraque Creek, between boreholes BH13-34 and BH13-38. Based on the expected pipe depth (greater than 1.4 m) the watermain will be founded in sand and fill at these locations. Presumed pipe invert depths cross shallow bedrock at borehole location BH13-34.

Bedrock is deemed to be hard and competent with fractures and weathering features in the upper 1 m, typical in the Kingston area. Rock competence is expected to increase with depth.Tunneling, such as horizontal directional drilling (HDD) or jack and bore, will be required in the undercrossing areas. Tunneling procedures and depths below the CNR shall respect the requirements and conditions of the railway authorities. It should be anticipated that a steel liner will be required for this crossing, depending on the tunnel depth, to provide long term stability. Settlement monitoring and mitigative action plans will be required during tunnel installation, as per CN specifications. Details provided by the contractor.

The proposed watermain invert depths cross a section which contains presumed foundings in sand, fill, and bedrock materials at Little Cataraque Creek. As such, a tunnel at least 2 m below the bedrock surface or the channel bottom should be used to install the pipe at these two crossings. Existing bedrock

Anti-seepage collars should be considered at the ends to protect the creek from potential loss of base flow into the pipe trench. Inspections should be conducted to confirm that groundwater seepage from the tunnel bore under the creek is not large.

5.3 Roadside Safety

Construction performed as part of the forcemain extension will require construction proximal to traffic areas. Appropriate safety measures should be observed at all times.

5.4 Open Cut Excavations

It is expected that open cut excavations will be used given the relatively shallow construction depths proposed. Based on the borehole information, trenches will encounter layers of anthopogenic fill and native sand and gravel layers, as well as silt and clay-rich layers. Close spaced filtered sumps maybe needed in areas where silt-rich and sand-rich materials are prevalent. Moderate to heavy flow should be anticipated from saturated silty sand and/or sand and gravel layers, and some form of dewatering will be required to maintain soil stability in this area. In most cases, gravity drainage and pumping from deep filtered wells should suffice. Otherwise vacuum well-points may be necessary to effectively lower the water table to at least 0.5 m below the bottom of construction trenches. All dewatering should be in accordance with OPSS 517, and no more than 15 m of trench should be opened in advance of the completed pipe system (OPSS 401). Dewatering is discussed further in Section 5.7.

5.5 Use of Trench Boxes for Trench Wall Support

Where permissible under OHSA, contractors often select to utilize trench boxes for temporary trench support. While in many situations, the use of trench boxes can result in a high rate of productivity in trenching, it is not without some technical drawbacks. These include:

- → Increased loss of ground relative to many other shoring methods; and
- → Reduced ability to compact backfill between the trench wall and trench box.

Ground loss, ravelling and/or loosening of soils will occur when using a trench box prior to its installation and while moving the box. It is important that the trench not be over-excavated to ensure a tight fit between the box and the trench walls. Figure 2 outlines expected trench excavation dimensions. Trench boxes must be installed expediently. When moving the box, the void space between its outer walls and the trench must be backfilled and compacted. This may require raising the box sequentially prior to sliding it laterally. If this is not done, post-construction settlements may occur along the trench walls.

In areas where new service lines encroach on existing utility trenches or backfill to structures, unstable trench conditions may occur, particularly where granular backfill, clear stone, or poorly compacted fill of any type are present. In such cases, ravelling of the pre-existing fill and high rates of water infiltration through utility bedding can potentially occur which can, in severe cases, put the stability of adjacent utility in jeopardy. As such, a higher standard of care in shoring is needed where piping is located closer than 0.75H to an adjacent trench, where H is the depth of the deeper cut. The use of trench boxes is poorly suited in this instance, since they do not provide adequate lateral support to the sides of the cut and

considerable loss of ground can occur prior to insertion of the box. Closed sheeting or other pre-installed shoring measures are more suitable in these conditions.

5.6 Excavation and Construction Comments

All excavations should be carried out in accordance with the Safety Regulation of the Province of Ontario (i.e. Occupational Health and Safety Act (OHSA) Reg. 213/91), as well as SP105 S19-Protection Systems. Figure 2 is a drawing illustrating key points of interest for the excavation, based upon OPSD requirements.

The boreholes show that the excavations for construction of the proposed pipe can be expected to extend primarily through clayey silt, clay and silt, and silty sandy soils type. These soils can be classified as follows:

Clayey Silt/Silt and Clay	Type 2 above water level Type 3 below water level
Silty Sand\Sandy Soils	Type 3 above water level Type 4 below water level

Excavations in soil should be possible using heavy equipment such as a hydraulic excavator.

5.7 Dewatering

It is expected that localized dewatering will be required to control groundwater and excavation stability for open cut pipe construction. Specific excavation requirements must be evaluated in terms of the expected mixed soil and groundwater seepage conditions. If shafts or pits are required for tunneling at undercrossings, enhanced groundwater control and shoring may be required to prevent destabilization, ground loss and settlement.

Groundwater table can be lowered by about 0.5 m by pumping from strategically placed, filtered sumps and gravity drainage. For more extensive draw-down of water levels, vacuum well-points and/or deep wells (as per OPSS 517) would be required, especially when sandy soils are encountered within the excavation. The Contractor should be requested to provide dewatering plans for review, prior to construction.

Estimated hydraulic conductivity of expected materials in the excavations range from 10-4 to 10-6 m/s for the silty sands and less than 10-6 m/s for the clayey silts and finer soils. Hydraulic conductivity of the shallow bedrock is controlled by fracturing and jointing, but based on experience should be less than 10-5 m/s.

Based on assumed hydraulic properties, a 15 meter long by 3 meter wide trench in silty sand is expected to require a dewatering rate of less than 20,000 L/day. In the event that prolonged dewatering rates exceed 50,000 L/day, a Category 3 Permit To Take Water (PTTW) will be required from the Ministry of the Environment (MOE) Application for a PTTW should be made at least 3 months in advance of construction, if significant dewatering is anticipated. A hydrogeological impact study prepared by a QP will be required for this application.

5.8 Bedding Material

Compact to stiff soils and sound bedrock will provide adequate support for the proposed watermain pipe, and will allow the use of normal Class B Type bedding. The bedding should confirm to the current Ontario Provincial Standard Specifications and/or minimum standards set by the City, as listed on Figure 2.

Based on a pipe diameter of 1050 mm, the recommended minimum thickness of granular bedding below the invert of the trench sewer pipe is 300 mm. The thickness of the bedding may, however, have to be increased depending on the pipe diameter or in accordance with local standards, or if wet or disturbed subgrade conditions are encountered, especially when the soil at the trench base level consists of wet silt

or weaker layers of sand. The bedding material should consist of well graded granular material, such as Granular A or B as per OPSS 1010, and should be shaped to receive the bottom half of the pipe, and compacted to at least 95% SPMDD. Where necessary, to prevent fines migration, an approved geotextile separator should be installed along the sides of the trench and wrapped around poorly graded bedding materials.

5.9 Cover Material

Compacted cover material should be placed on the trunk sewer pipe to a minimum depth of 2.0 m of earth cover or equivalent insulation to provide for adequate frost protection. The bedding material should consist of well graded granular material, such as Granular A or B as per OPSS 1010-3.

To avoid damaging or laterally dislocating the trunk sewer pipe, extra care should be exercised during the compaction of the fill adjacent to and immediately on top of the pipe, and no compaction using power operated tractors or rolling equipment should be made until at least 900 mm of cover material exists over the pipe arch (OPSS 401.07.10.05).

Cover material should be placed in maximum 300 mm thick layers at optimum moisture content. Each layer should be compacted to 95% SPMDD to within 2 m of finished surface grade. Compaction equipment should be restricted in size as per standard conventions. Backfilling operations for utility pipes should be carried out simultaneously on both sides of the pipes, as per OPS construction specifications.

5.10 Reuse of Existing Material

Based on visual and tactile examinations, the onsite fill and native soils are considered suitable for re-use as backfill in construction trenches provided that these soils are environmentally acceptable. Otherwise, disposal of the material is required. Moisture content of backfill materials should be close to optimum at the time of construction. The wet and saturated clayey silt or silt and clay soils should not be re-used as backfill due to high moisture content, unless the soil is spread out and dried sufficiently before re-use. For the clayey soil to be used as backfill, the material will have to pulverized and placed in thin layers, and compacted with appropriate equipment (e.g. sheepsfoot roller). As such, it may not be practical to reuse this material. Unsuitable materials such as organic soils, boulders, cobbles, frozen soils, etc. should not be used for backfilling.

5.11 Pavement Reinstatement

Existing roadways should be reinstated to the existing condition and structure, unless upgrades are specified based on traffic projections and/or existing standards and/or specifications. Existing asphalt thickness is 50 mm to 200 mm (average 128 mm), based on the borehole information. Therefore, the following minimum pavement thickness design is suggested, which provides a Granular Base Equivalency (GBE) of 570 mm.

- → Surface Course 50 mm HL3
- → Binder Course 60 mm HL8
- → Base Course 275 mm OPSS 1010 Granular A
- → Subbase Course 350 mm OPSS 1010 Granular B

Granular pavement sub-base and base materials should be compacted to at least 98% of Standard Proctor Maximum Dry Density (SPMDD) per ASTM D698. Paving should be conducted as per OPSS 313.

5.12 ULS Bearing Capacity and Seismic Site Class

Structures made to bear directly on sound limestone bedrock (Grade R4) may be designed for an ultimate geotechnical resistance (ULS) of 5 MPa. The net geotechnical reaction at serviceability limit state (SLS) is 3 MPa, for an estimated total settlement of 25 mm. Geotechnical inspection of the rock surface is required during construction to verify conditions and estimated rock strength.

The parameters for determination of Site Classification for Seismic Site Response are set out in Table 4.1.8.4A of the Ontario Building Code (2006). The classification is based on the determination of the average shear wave velocity in the top 30 metres of the site stratigraphy, where shear wave velocity (vs) measurements have been taken. Alternatively, the classification is estimated on the basis of rational analysis of undrained shear strength (su) or penetration resistance (N-values). Tables 4.1.8.4.B and 4.1.8.4.C. of the same code provide the applicable acceleration and velocity based site coefficients. Based on the borehole information the seismic site class may be assumed as Type C (shallow sound rock).

Slab-on-grade structures must be supported on standard strip footings. Footings should be situated below frost penetration depth, or to the limestone bedrock, or should be suitably insulated if set at a higher grade. The design frost penetration depth at the site should be taken as 1.4 m. Topsoil, if any, should be stripped from below floor slab areas, and an engineered base should be designed to distribute floor loadings to the subgrade. WSP should be contacted with the final designs of proposed structures when available to determine the base parameters for the Engineered Fill used to distribute the load of any slab-on-grade structures.

At the time of foundation construction, foundation excavations must be reviewed by a certified Geotechnical Engineer to confirm suitable bearing capacity of the Engineered Fill. A certified Geotechnical Engineer must inspect the foundation subgrade immediately after excavation, and must inspect the foundation subgrade immediately prior to placement of concrete for footings.

6. Closure

The data presented in this report, and the quality thereof, is based on a scope of work authorized by the Client. While we believe the borehole information to be representative of site conditions, subsurface conditions between and beyond the test hole locations may vary. WSP accepts no liability for use of or reliance on the report information by third parties, without express written consent.

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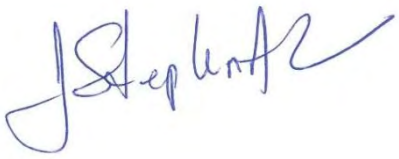

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Tables

Table 1 – Select Summary of Soil Laboratory Analysis

Table 2 – Summary of Groundwater Laboratory Analyses

Table 1 - **Summary of Laboratory Soil Analyses for Borehole Locations Having Exceedences.**
Project: **Front Road Trunk Watermain Interconnection and Portsmouth Pumping Station Forcemain and Watermain Extension**
Project Number: **131-18048-00**

Parameter	Table 1 O.Reg 153	Table 3 O.Reg 153	Units	BH13-1 (SS1) 0.1 to 0.8	BH13-1 (SS2) 0.8 to 1.4	BH13-3 (SS2) 2.5 to 4.0	BH13-6 SS1 0 to 2 mBGL	BH13-8 SS1 0.1 to 0.9	BH13-8 SS2 2.5 to 4.0	BH13-9 SS1 0 to 2 mBGL	BH13-9 SS2 2.5 to 4.0	BH13-10 SS1 0 to 2 mBGL	BH13-10 SS5 2.9 to 3.7 mBGL	BH13-12 SS1 0.1 to 0.7 mBGL	BH13-13 SS1 0.1 to 0.6 mBGL	BH13-13 SS3 1.6 to 2.0 mBGL	BH13-14 SS3 1.6 to 1.7 mBGL	BH13-14 SS1 0.1 to 0.9 mBGL	BH13-16 SS1 0 to 2 mBGL	BH13-19 SS2 2.5 to 4.0 mBGL	BH13-22 SS2 2.4 to 4.0 mBGL	BH13-25 AS1 0.1 to 0.7 mBGL	BH13-29 SS3/4 5.0 to 9.0 mBGL	BH13-40 SS4 7.5 to 9.0 mBGL	BH13-42 SS1 0 to 2 mBGL	BH13-47 SS1 0.2 to 0.7 mBGL
Cobalt	3.8	80	µg/g		30.1	12.1			19.4		3		6	27.8	16.3		24.2				22.3	0.5	8.1	2.5		
Mercury	0.27	3.9	µg/g		22.2	22.3			24.6		< 0.005		0.010	24.8	34.3		22.8				17.3	0.009	0.026	0.007		
Molybdenum	2	40	µg/g		10.1	52.8			290		< 1		< 1	56.3	68.2		25.4				13.1	0.6	0.5	1.2		
Silver	1.5	40	µg/g		19.3	7.6			9.5		0.6		0.2	20.3	11.7		20.4				13.6	0.02	0.08	0.04		
Zinc	290	340	µg/g		0.39	0.23			0.34		10		1000	0.37	0.31		0.47				0.50	< 30	70	< 30		
Poly-Chlorinated Biphenyls (PCB's)	0.3	1.1	µg/g		38.9	10.1	< 0.5		22.1	< 0.5		< 0.5		33.5	18.5		22.2				33.5	< 0.5	< 0.5	< 0.5		
Monochlorobenzene (Chlorobenzene)	0.05	2.4	µg/g	< 0.02			< 0.02	< 0.02		< 0.02		< 0.02				< 0.02		< 0.02	< 0.02	0.15		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Ethylbenzene	0.05	9.5	µg/g	< 0.05			< 0.02	< 0.05		< 0.02		< 0.02				< 0.05		< 0.05	< 0.05	0.16		< 0.02	< 0.02	< 0.02	< 0.05	< 0.05
Styrene	0.5	34	µg/g	< 0.05			< 0.05	< 0.05		< 0.05		< 0.05				< 0.05		< 0.05	< 0.05	0.15		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	1	68	µg/g	< 0.2			< 0.02	< 0.2		< 0.02		< 0.02				< 0.2		< 0.2	0.3	0.4		< 0.02	< 0.02	< 0.02	< 0.2	< 0.2
Xylene, m,p,o-	0.05	26	µg/g	< 0.03			-	< 0.03		-		-				< 0.03		< 0.03	0.37	0.53		-	-	-	< 0.03	< 0.03
PHC F2 (>C10-C16)	10	230	µg/g	< 40			3530	< 50		380		70				< 5		6	< 30	< 5		910	50	20	< 20	< 30
PHC F3 (>C16-C34)	240	1700	µg/g	77			NDP	211		NDP		NDP				60		50	80	40		NDP	NDP	NDP	250	550
PHC F4 (>C34-C50)	120	3300	µg/g	612			1.9	790		2.1		2.2				70		160	330	100		3.6	10.7	7.3	800	650
Acenaphthylene	0.093	0.15	µg/g	< 0.1			< 0.9	< 0.1		< 0.4		< 0.02				0.121		< 0.02	< 0.01	< 0.02		< 0.2	0.056	< 0.005	< 0.008	< 0.02
Benzo(a)anthracene	0.36	0.96	µg/g	< 0.1			< 0.9	< 0.1		< 0.4		< 0.02				0.631		< 0.02	< 0.01	0.021		< 0.2	0.056	< 0.005	0.017	< 0.02
Benzo(a)pyrene	0.3	0.3	µg/g	< 0.1			< 2	< 0.1		< 0.8		< 0.04				0.461		< 0.02	< 0.01	0.018		< 0.5	0.084	< 0.01	0.015	< 0.02
Benzo(b)fluoranthene	0.48	0.96	µg/g	< 0.1			< 0.9	< 0.1		< 0.4		< 0.02				0.625		< 0.02	< 0.01	0.027		< 0.2	0.028	< 0.005	0.020	< 0.02
Fluoranthene	0.69	9.6	µg/g	< 0.1			< 0.9	< 0.1		< 0.4		< 0.02				1.55		< 0.02	< 0.01	0.036		< 0.2	0.023	< 0.005	0.018	< 0.02
Phenanthrene	0.69	12	µg/g	< 0.1				< 0.1								0.718		< 0.02	< 0.01	0.015					0.035	0.0378
Pyrene	1	96	µg/g	< 0.1				< 0.1								1.43		< 0.02	< 0.01	0.033					0.033	0.0210

Table 3 - O.Reg. 153, Ind./Commercial/Community Soil Std
Table 8 - O.Reg. 153, Generic site condition standards for use within 30 m of a water body in a potable ground water condition

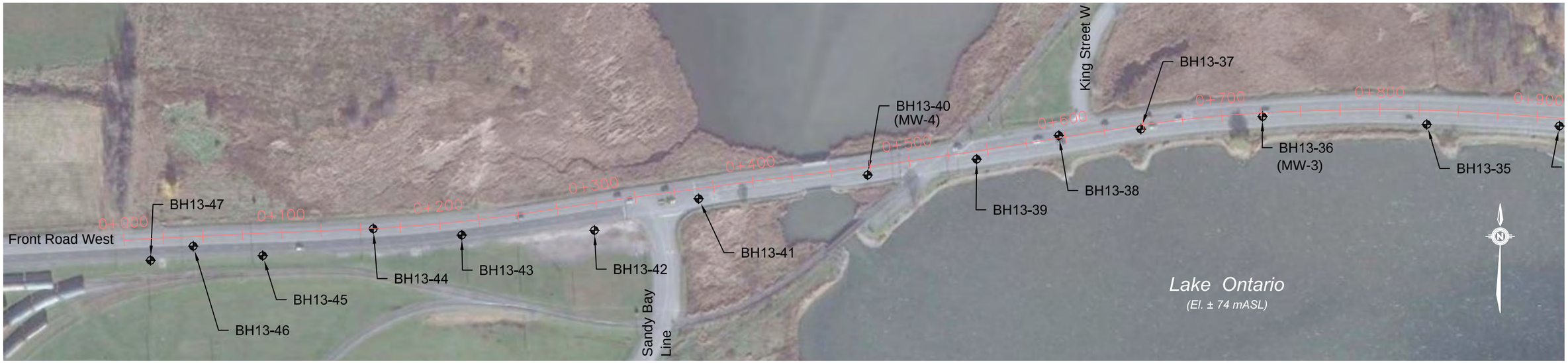
Table 1 - **Summary of Laboratory Groundwater Analyses.**
Project: **Front Road Trunk Watermain Interconnection and Portsmouth Pumping Station Forcemain and Watermain Extension**
Project Number: **131-18048-00**

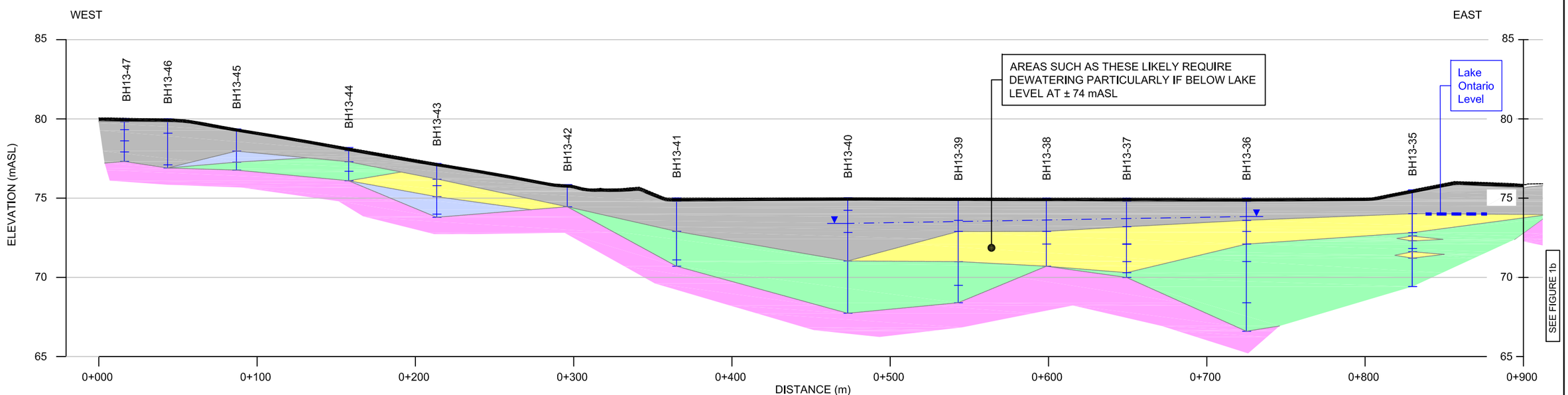
Parameter	PWQO	SUB	T8 (NPGW) O.Reg 153	T3 (NPGW) O.Reg 153	Units	MW1-W005	MW1-W006	MW2-W004	MW3-W003	MW4-W001	MW4-W002
Barium	--	--	1000	29000	µg/L	123	128	249	284	216	239
Beryllium			4	67	µg/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Boron	0.2		5000	45000	µg/L	78	76	60	24	89	95
Cadmium	0.0005	0.2	2.1	2.7	µg/L	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*
Chromium	0.0099	0.5	50	810	µg/L	*< 1.1*	*< 1.1*	*1.7*	*< 1.1*	*< 1.1*	*1.2*
Cobalt	0.0009	5	3.8	66	µg/L	*< 0.2*	*< 0.2*	*< 0.2*	*1*	*< 0.2*	*< 0.2*
Copper	0.005	2	69	87	µg/L	0.5	0.3	0.7	0.9	0.5	0.6
Lead	0.005	1	10	25	µg/L	0.43	0.42	0.54	0.38	0.5	0.52
Molybdenum			70	9200	µg/L	1.2	1.2	0.8	2.7	1.4	1.5
Nickel	0.025	2	100	490	µg/L	*< 0.6*	*< 0.6*	*< 0.6*	*1.6*	*< 0.6*	*< 0.6*
Silver	0.0001	5	1.2	1.5	µg/L	*< 0.03*	*< 0.03*	*< 0.03*	*< 0.03*	*< 0.03*	*< 0.03*
Thallium	0.0003		2	510	µg/L	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*
Uranium	0.005		20	420	µg/L	*< 0.3*	*< 0.3*	*< 0.3*	*5.2*	*0.5*	*0.6*
Vanadium	0.006		6.2	250	µg/L	*< 0.4*	*0.5*	*0.9*	*0.5*	*0.7*	*0.7*
Zinc	0.02	2	890	1100	µg/L	*< 5*	*< 5*	*< 5*	*< 5*	*< 5*	*< 5*
Acenaphthene			4.1	600	µg/L	< 0.05	< 0.05	< 0.05	< 0.06	< 0.05	< 0.05
Acenaphthylene			1	1.8	µg/L	< 0.05	< 0.05	< 0.05	< 0.06	< 0.05	< 0.05
Anthracene			1	2.4	µg/L	< 0.05	< 0.05	< 0.05	< 0.06	< 0.05	< 0.05
Benzo(a)anthracene			1	4.7	µg/L	0.05	0.07	< 0.05	< 0.06	< 0.05	< 0.05
Benzo(a)pyrene			0.01	0.81	µg/L	0.047	0.061	0.018	0.006	< 0.005	< 0.005
Benzo(b)fluoranthene			0.1	0.75	µg/L	0.06	0.08	< 0.05	< 0.06	< 0.05	< 0.05
Benzo(b+k)fluoranthene			0.2	0.4	µg/L	< 0.1	0.12	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene				0.2	µg/L	< 0.05	0.07	< 0.05	< 0.06	< 0.05	< 0.05
Benzo(k)fluoranthene			0.1	0.4	µg/L	< 0.05	< 0.05	< 0.05	< 0.06	< 0.05	< 0.05
Chrysene			0.1	1	µg/L	0.06	0.06	< 0.05	< 0.06	< 0.05	< 0.05
Dibenzo(a,h)anthracene			0.2	0.52	µg/L	< 0.05	< 0.05	< 0.05	< 0.06	< 0.05	< 0.05
Fluoranthene			0.41	130	µg/L	0.12	0.16	< 0.05	0.06	< 0.05	< 0.05
Fluorene			120	400	µg/L	< 0.05	< 0.05	< 0.05	0.09	< 0.05	< 0.05
Indeno(1,2,3,-cd)pyrene			0.2	0.2	µg/L	0.05	0.07	< 0.05	< 0.06	< 0.05	< 0.05
Methylnaphthalene,1-			3.2	1800	µg/L	< 0.05	< 0.05	< 0.05	1.51	< 0.05	< 0.05
Methylnaphthalene,2-			3.2	1800	µg/L	< 0.05	< 0.05	< 0.05	1.09	< 0.05	< 0.05
Naphthalene			11	1400	µg/L	0.05	0.06	< 0.05	1.83	0.06	< 0.05
Phenanthrene			1	580	µg/L	< 0.05	< 0.05	< 0.05	0.11	< 0.05	< 0.05
Pyrene			4.1	68	µg/L	0.12	0.15	< 0.05	0.07	< 0.05	< 0.05
Acetone			2700	130000	µg/L	< 30	< 30	< 30	< 30	< 30	< 30
Benzene	100	10	5	44	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane			16	85000	µg/L	< 2	< 2	< 2	< 2	< 2	< 2
Bromoform	60		25	380	µg/L	< 5	< 5	< 5	< 5	< 5	< 5
Bromomethane	0.9		0.89	5.6	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Carbon Tetrachloride			0.79	0.79	µg/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Monochlorobenzene (Chlorobenzene)	15		30	630	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chloroform		40	2.4	2.4	µg/L	< 1	< 1	< 1	< 1	< 1	< 1
Dibromochloromethane	40		25	820000	µg/L	< 2	< 2	< 2	< 2	< 2	< 2
Dichlorobenzene,1,2-		50	3	4600	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorobenzene,1,3-			59	9600	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorobenzene,1,4-		80	1	8	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorodifluoromethane			590	4400	µg/L	< 2	< 2	< 2	< 2	< 2	< 2
Dichloroethane,1,1-			5	320	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichloroethane,1,2-			1.6	1.6	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichloroethylene,1,1-			1.6	1.6	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichloroethene, cis-1,2-			1.6	1.6	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichloroethene, trans-1,2-			1.6	1.6	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichloropropane,1,2-			5	16	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichloropropene 1,3- cis+trans			0.5	5.2	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene			2.4	2300	µg/L	< 0.5	< 0.5	< 0.5	1	< 0.5	< 0.5
Dibromoethane,1,2- (Ethylene Dibromide)	5		0.2	0.25	µg/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Hexane			51	51	µg/L	< 5	< 5	< 5	< 5	< 5	< 5
Methyl Ethyl Ketone	400	8000	1800	470000	µg/L	< 20	< 20	< 20	< 20	< 20	< 20
Methyl Isobutyl Ketone			640	140000	µg/L	< 20	< 20	< 20	< 20	< 20	< 20
Methyl-t-butyl Ether			0.12	190	µg/L	< 2	< 2	< 2	< 2	< 2	< 2
Dichloromethane (Methylene Chloride)		210	50	610	µg/L	< 5	< 5	< 5	< 5	< 5	< 5
Styrene			5.4	1300	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethane,1,1,1,2-			1.1	3.3	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethane,1,1,2,2-			1	3.2	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethylene		500	1.6	1.6	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Toluene	0.8	16	22	18000	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethane,1,1,1-	10		200	640	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethane,1,1,2-	800		4.7	4.7	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	20	70	1.6	1.6	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichlorofluoromethane			150	2500	µg/L	< 5	< 5	< 5	< 5	< 5	< 5
Vinyl Chloride		40	0.5	0.5	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Xylene, m,p,o-		940	300	4200	µg/L	< 1.1	< 1.1	< 1.1	3.2	< 1.1	< 1.1
PHC F1 (C6-C10)			420	750	µg/L	< 50	< 50	< 50	< 50	< 50	< 50
PHC F2 (>C10-C16)			150	150	µg/L	< 50	< 50	< 50	110	< 50	< 50
PHC F3 (>C16-C34)			500	500	µg/L	< 400	< 400	< 400	< 500	< 400	< 400
PHC F4 (>C34-C50)			500	500	µg/L	< 400	< 400	< 400	< 500	< 400	< 400

1. PWQO: Provincial Water Quality Objectives, July 1999
2. SUB: City of Kingston Sewer Use By-Law Criteria
3. Italic: MDL exceeds PWQO
4. Green Highlight: exceeds Table 9 - O.Reg. 153, Generic site condition standards for use within 30 m of a water body in a potable ground water condition
5. Yellow Highlight: exceeds Table 3 - O.Reg. 153, full depth generic site condition standards in a non-potable ground water condition

Figures

Figure 1(a to d) – Plan and Profile for Preliminary Design





LEGEND

- ASPHALT SURFACE (50 T0 200 mm) (Average 125 mm Thickness)
- FILL (REFERS TO LAYERS DESCRIBED IN SECTION 4.1.2)
- SAND (REFERS TO SOILS DESCRIBED IN SECTIONS 4.1.3, 4.1.4 & 4.1.5)
- SILT (REFERS TO SOILS DESCRIBED IN SECTION 4.1.7)
- CLAY (REFERS TO SOILS DESCRIBED IN SECTIONS 4.1.8 & 4.1.9)
- BEDROCK (REFERS TO BEDROCK DESCRIBED IN SECTION 4.1.10)
- GROUNDWATER TABLE

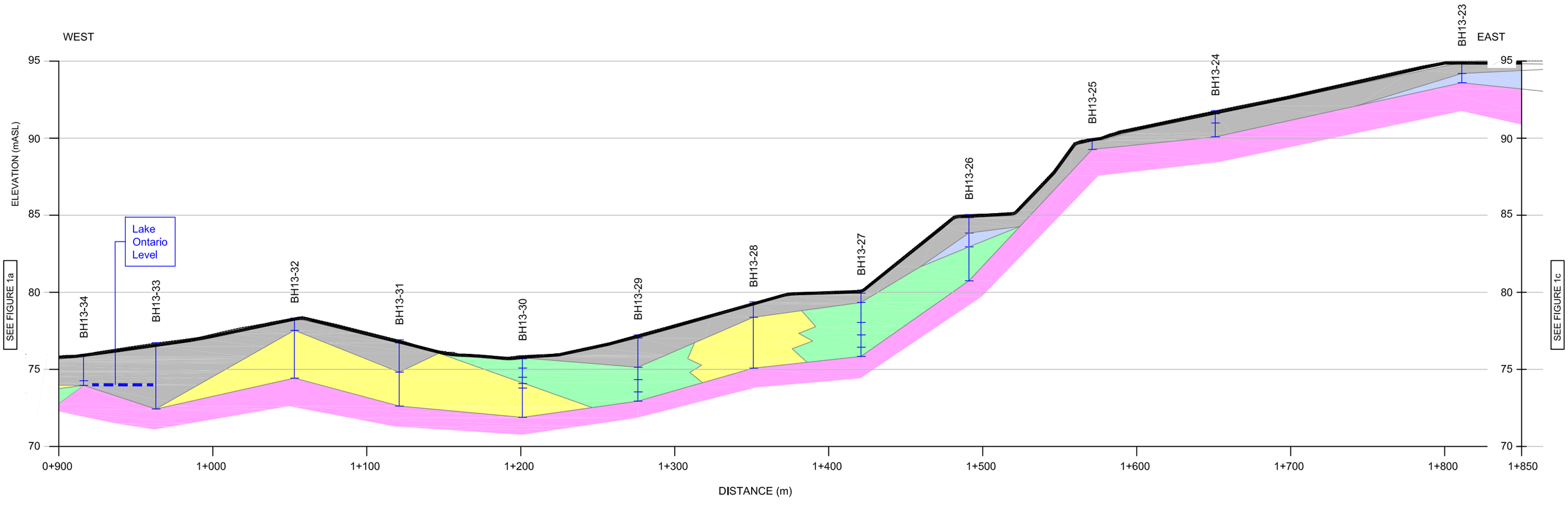
FRONT ROAD TRUNK WATERMAIN INTERCONNECTION AND PORTSMOUTH PUMPING STATION WATERMAIN AND FORCEMAIN EXTENSION, KINGSTON, ONTARIO
FOR UTILITIES KINGSTON

PLAN AND PROFILE FOR PRELIMINARY DESIGN

DATE: FEBRUARY 2014	SCALE: Horz 1:2500, Vert 1:250
PROJECT: 131-18048-00	FILE NO.: 131-18048-00 base

WSP

FIGURE 1a



LEGEND

- ASPHALT SURFACE (50 T0 200 mm) (Average 125 mm Thickness)
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- SILT (REFERS TO SOILS DESCRIBED IN SECTION 4.1.7)
- CLAY (REFERS TO SOILS DESCRIBED IN SECTIONS 4.1.8 & 4.1.9)
- BEDROCK (REFERS TO BEDROCK DESCRIBED IN SECTION 4.1.10)
- GROUNDWATER TABLE

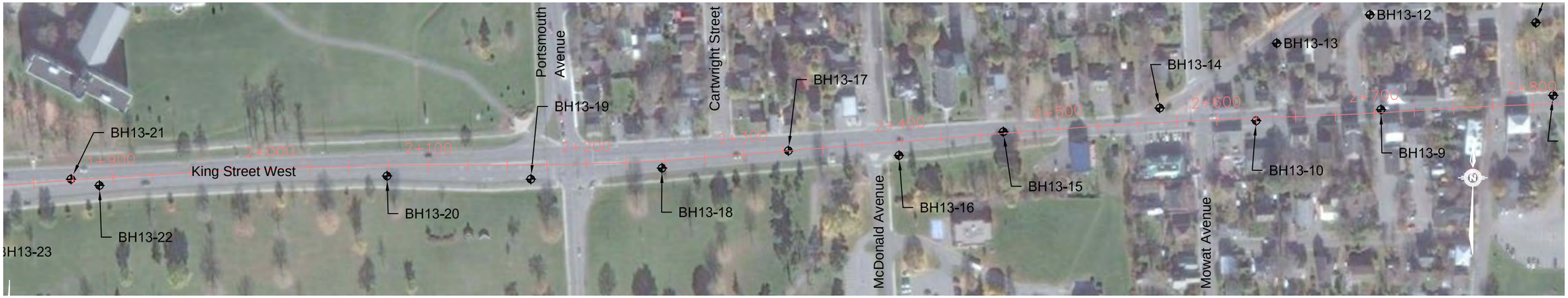
FRONT ROAD TRUNK WATERMAIN INTERCONNECTION AND PORTSMOUTH PUMPING STATION WATERMAIN AND FORCEMAIN EXTENSION, KINGSTON, ONTARIO
FOR UTILITIES KINGSTON

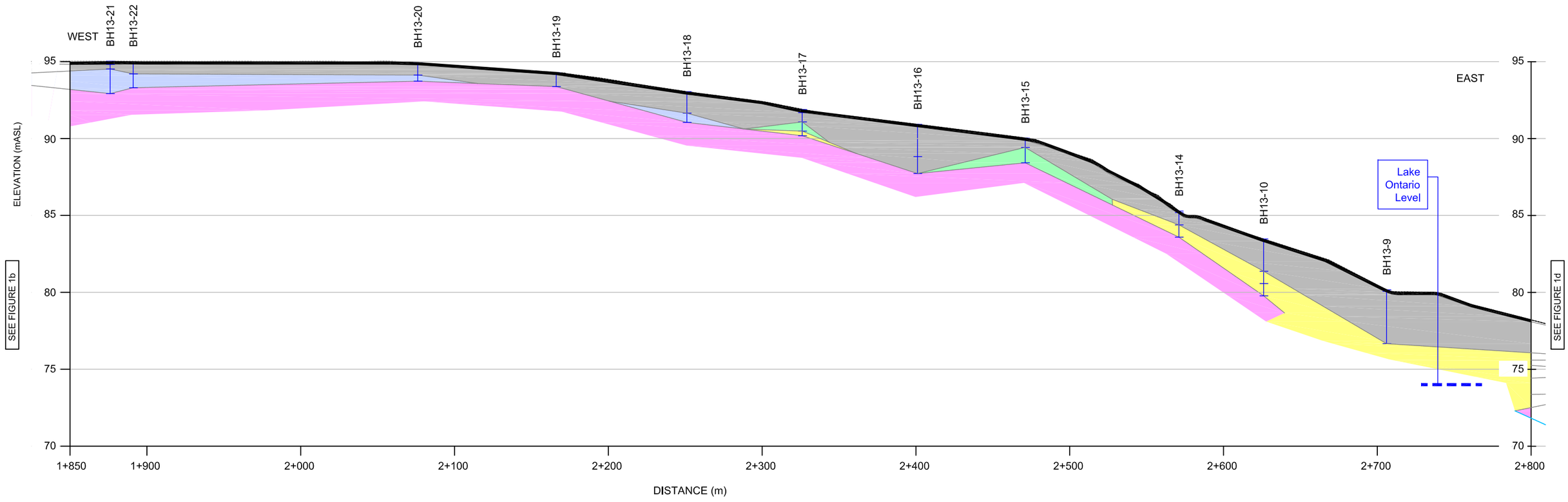
PLAN AND PROFILE FOR PRELIMINARY DESIGN

DATE: FEBRUARY 2014	SCALE: Horz 1:2500, Vert 1:250
PROJECT: 131-18048-00	FILE NO.: 131-18048-00 base

WSP

FIGURE 1b





LEGEND

- ASPHALT SURFACE (50 T0 200 mm) (Average 125 mm Thickness)
- FILL (REFERS TO LAYERS DESCRIBED IN SECTION 4.1.2)
- SAND (REFERS TO SOILS DESCRIBED IN SECTIONS 4.1.3, 4.1.4 & 4.1.5)
- SILT (REFERS TO SOILS DESCRIBED IN SECTION 4.1.7)
- CLAY (REFERS TO SOILS DESCRIBED IN SECTIONS 4.1.8 & 4.1.9)
- BEDROCK (REFERS TO BEDROCK DESCRIBED IN SECTION 4.1.10)
- GROUNDWATER TABLE

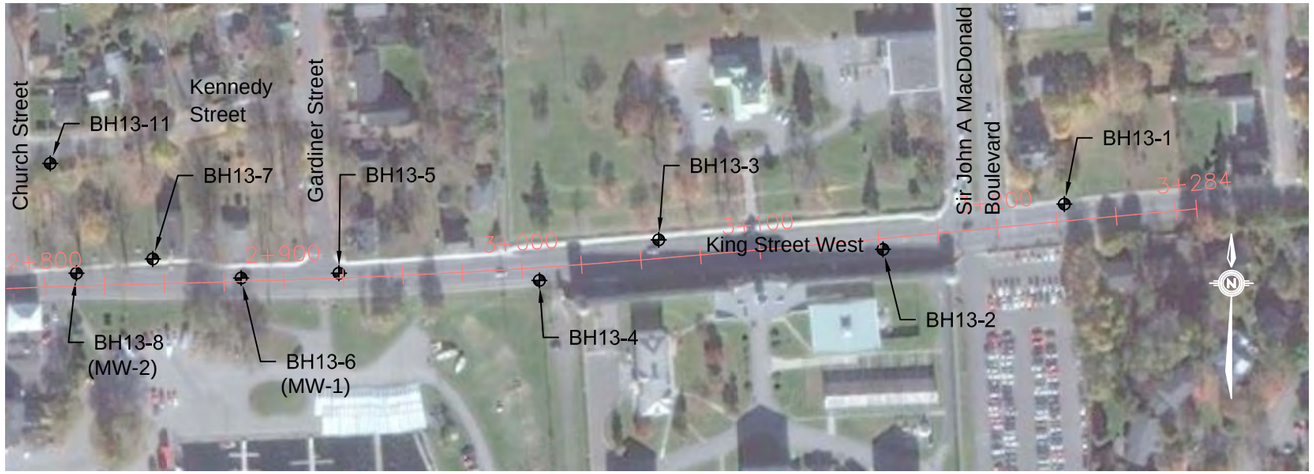
FRONT ROAD TRUNK WATERMAIN INTERCONNECTION AND PORTSMOUTH PUMPING STATION WATERMAIN AND FORCEMAIN EXTENSION, KINGSTON, ONTARIO
FOR UTILITIES KINGSTON

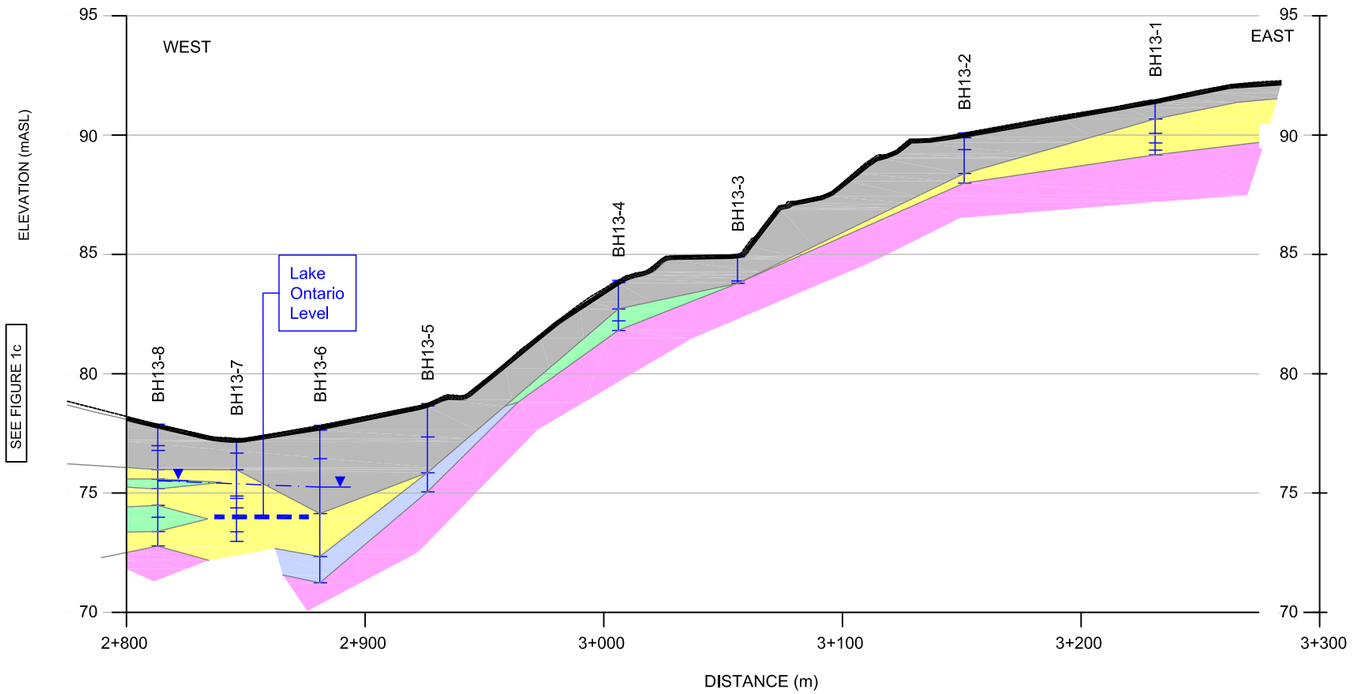
PLAN AND PROFILE FOR PRELIMINARY DESIGN

DATE: FEBRUARY 2014	SCALE: Horz 1:2500, Vert 1:250
PROJECT: 131-18048-00	FILE NO.: 131-18048-00 base

WSP

FIGURE 1c





LEGEND

- ASPHALT SURFACE (50 T0 200 mm) (Average 125 mm Thickness)
- FILL (REFERS TO LAYERS DESCRIBED IN SECTION 4.1.2)
- SAND (REFERS TO SOILS DESCRIBED IN SECTIONS 4.1.3, 4.1.4 & 4.1.5)
- SILT (REFERS TO SOILS DESCRIBED IN SECTION 4.1.7)
- CLAY (REFERS TO SOILS DESCRIBED IN SECTIONS 4.1.8 & 4.1.9)
- BEDROCK (REFERS TO BEDROCK DESCRIBED IN SECTION 4.1.10)
- GROUNDWATER TABLE

FRONT ROAD TRUNK WATERMAIN INTERCONNECTION AND PORTSMOUTH PUMPING STATION WATERMAIN AND FORCEMAIN EXTENSION, KINGSTON, ONTARIO FOR UTILITIES KINGSTON

PLAN AND PROFILE FOR PRELIMINARY DESIGN

DATE: FEBRUARY 2014	SCALE: Horz 1:2500, Vert 1:250
PROJECT: 131-18048-00	FILE NO.: 131-18048-00 base

WSP

FIGURE 1d

Appendix A

Borehole Explanation Forms

Borehole Logs

BOREHOLE LOG EXPLANATION FORM

This explanatory section provides the background to assist in the use of the borehole logs. Each of the headings used on the borehole log, is briefly explained.

DEPTH

This column gives the depth of interpreted geologic contacts in metres below ground surface.

STRATIGRAPHIC DESCRIPTION

This column gives a description of the soil based on a tactile examination of the samples and/or laboratory test results. Each stratum is described according to the following classification and terminology.

Soil Classification*		Terminology	Proportion
Clay	<0.002 mm		
Silt	0.002 to 0.06 mm	"trace" (e.g. trace sand)	<10%
Sand	0.06 to 2 mm	"some" (e.g. some sand)	10% - 20%
Gravel	2 to 60 mm	adjective (e.g. sandy)	20% - 35%
Cobbles	60 to 200 mm	"and" (e.g. and sand)	35% - 50%
Boulders	>200 mm	noun (e.g. sand)	>50%

* Extension of MIT Classification system unless otherwise noted.

The use of the geologic term "till" implies that both disseminated coarser grained (sand, gravel, cobbles or boulders) particles and finer grained (silt and clay) particles may occur within the described matrix.

The compactness of cohesionless soils and the consistency of cohesive soils are defined by the following:

COHESIONLESS SOIL		COHESIVE SOIL	
Compactness	Standard Penetration Resistance "N", Blows / 0.3 m	Consistency	Standard Penetration Resistance "N", Blows / 0.3 m
Very Loose	0 to 4	Very Soft	0 to 2
Loose	4 to 10	Soft	2 to 4
Compact	10 to 30	Firm	4 to 8
Dense	30 to 50	Stiff	8 to 15
Very Dense	Over 50	Very Stiff	15 to 30
		Hard	Over 30

The moisture conditions of cohesionless and cohesive soils are defined as follows.

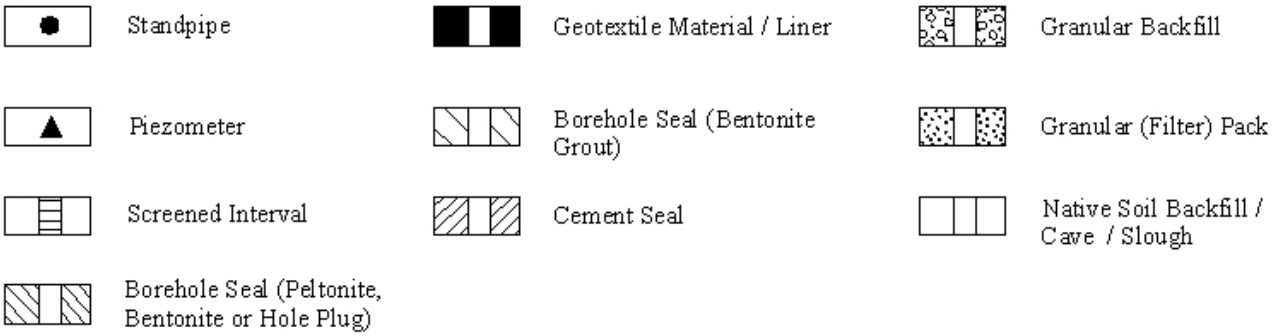
COHESIONLESS SOILS	COHESIVE SOILS		
Dry	DTPL	-	Drier Than Plastic Limit
Moist	APL	-	About Plastic Limit
Wet	WTPL	-	Wetter Than Plastic Limit
Saturated	MWTPL	-	Much Wetter Than Plastic Limit

STRATIGRAPHY

Symbols may be used to pictorially identify the interpreted stratigraphy of the soil and rock strata.

MONITOR DETAILS

This column shows the position and designation of standpipe and/or piezometer ground water monitors installed in the borehole. Also the water level may be shown for the date indicated.



Where monitors are placed in separate boreholes, these are shown individually in the "Monitor Details" column. Otherwise, monitors are in the same borehole. For further data regarding seals, screens, etc., the reader is referred to the summary of monitor details table.

SAMPLE

These columns describe the sample type and number, the "N" value, the water content, the percentage recovery, and Rock Quality Designation (RQD), of each sample obtained from the borehole where applicable. The information is recorded at the approximate depth at which the sample was obtained. The legend for sample type is explained below.

SS	=	Split Spoon	GS	=	Grab Sample
ST	=	Thin Walled Shelby Tube	CS	=	Channel Sample
AS	=	Auger Flight Sample	WS	=	Wash Sample
CC	=	Continuous Core	RC	=	Rock Core

$$\% \text{ Recovery} = \frac{\text{Length of Core Recovered Per Run}}{\text{Total Length of Run}} \times 100$$

Where rock drilling was carried out, the term RQD (Rock Quality Designation) is used. The RQD is an indirect measure of the number of fractures and soundness of the rock mass. It is obtained from the rock cores by summing the length of core recovered, counting only those pieces of sound core that are 100 mm or more in length. The RQD value is expressed as a percentage and is the ratio of the summed core lengths to the total length of core run. The classification based on the RQD value is given below.

RQD Classification	RQD (%)
Very poor quality	< 25
Poor quality	25 - 50
Fair quality	50 - 75
Good quality	75 - 90
Excellent quality	90 - 100

TEST DATA

The central section of the log provides graphs which are used to plot selected field and laboratory test results at the depth at which they were carried out. The plotting scales are shown at the head of the column.

Dynamic Penetration Resistance - The number of blows required to advance a 51 mm diameter, 60º steel cone fitted to the end of 45 mm OD drill rods, 0.3 m into the subsoil. The cone is driven with a 63.5 kg hammer over a fall of 750 mm.

Standard Penetration Resistance - Standard Penetration Test (SPT) "N" Value - The number of blows required to advance a 51 mm diameter standard split-spoon sampler 300 mm into the subsoil, driven by means of a 63.5 kg hammer falling freely a distance of 750 mm. In cases where the split spoon does not penetrate 300 mm, the number of blows over the distance of actual penetration in millimetres is shown as $\frac{xBlows}{mm}$

Water Content - The ratio of the mass of water to the mass of oven-dry solids in the soil expressed as a percentage.

W_P - Plastic Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

W_L - Liquid Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

REMARKS

The last column describes pertinent drilling details, field observations and/or provides an indication of other field or laboratory tests that were performed.

BOREHOLE NO. BH13-1

PROJECT NAME: PORTSMOUTH PUMPING STATION | **PROJECT NO.:** 131-18048-00

CLIENT: UTILITIES KINGSTON | **DATE COMPLETED:** Sep 09, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON | **SUPERVISOR:** KAR

GROUND ELEVATION: 92.1 mASL (Approximate) | **REVIEWER:** KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 125 mm:										
	COARSE GRANULAR FILL: GREY GRAVELY SAND TO SANDY GRAVEL, TRACE SILT, MOIST, DENSE			SS1	50	3	50	34	50		BOREHOLE OPEN AND DRY UPON COMPLETION
0.8											
1.0	SANDY SILT: BROWN SANDY SILT, SOME CLAY, SOME GRAVEL, MOIST, COMPACT			SS2	22	9	83	04 / 15			GSA SS2: GRAVEL 18% SAND 26% SILT 34% CLAY 22%
1.4	GRAVELY SAND: BROWN GRAVELY SAND, TRACE SILT, TRACE CLAY, WET, COMPACT			SS3	25	8	78	16.7 / 0			
1.8											
2.0	GRAVEL: GREY GRAVEL, SOME SAND, OCCASIONAL ROCK FRAGMENTS, COMPACT										
2.1											
2.3	SILTY SAND: GREY SILTY SAND, SOME GRAVEL, OCCASIONAL ROCK FRAGMENTS, MOIST, VERY DENSE			SS4	50/ 0mm	5	0	20.3	50		GSA AS4: GRAVEL 28% SAND 40% SILT&CLAY 32%
	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 2.3 m DEPTH ON PRESUMED BEDROCK										
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-2

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 09, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 89.7 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	ASPHALT - 150 mm:										
	GRANULAR FILL: DARK BROWN TO BLACK SAND, SOME GRAVEL, TRACE SILT, TRACE ORGANICS, ASPHALT FRAGMENTS, MOIST, COMPACT			SS1	28	3	83				
0.7	COARSE GRANULAR FILL: BROWN AND GREY GRAVEL AND SAND, MOIST, COMPACT			SS2	16	10	44				SLIGHT ODOUR OF POTENTIAL CONTAMINATION/ VOLATILES
1.0	- SOME SAND										
1.7	SAND: BROWN SAND, SOME GRAVEL, TRACE SILT, SOME CLAY, WET, COMPACT			SS3	13	24	44				
2.0											
2.1	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 2.1 m DEPTH ON PRESUMED BEDROCK										BOREHOLE OPEN AND DRY UPON COMPLETION
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-3

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 09, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 85.4 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 100 mm:										
	COARSE GRANULAR FILL: GREY SANDY GRAVEL, TRACE SILT, MOIST, DENSE			SS1	45	3	56	28.4	45		
	BROWN GRAVEL, VERY DENSE			SS2	50/ 125mm	5	55	17.4	50		
1.0				AS3		2		20.3			BOREHOLE OPEN AND DRY UPON COMPLETION
1.1											
1.2	SILTY SAND: GREY SILTY SAND, TRACE GRAVEL, OCCASIONAL ROCK FRAGMENTS, MOIST, VERY DENSE										
	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 1.2 m DEPTH ON PRESUMED BEDROCK										
2.0											
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-4

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 09, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 82.3 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 100 mm:										
	COARSE GRANULAR FILL: GREY TO BROWN SANDY GRAVEL, SOME SILT, MOIST, DENSE			SS1	34	4	61				GSA SS1: GRAVEL 48% SAND 35% SILT&CLAY 17%
1.0	- TRACE CLAY, WET, LOOSE			SS2	6	8	61				
1.2	SANDY SILT: DARK BROWN SANDY SILT, SOME TO TRACE CLAY, TRACE GRAVEL, WET TO SATURATED, VERY DENSE			SS3	50/ 125mm	8	133		50		
1.7	GRAVEL: GREY AND TAN GRAVEL, SOME SAND, MOIST, VERY DENSE			AS4							
2.0	- DRILL FLOUR										
2.1	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 2.1 m DEPTH ON PRESUMED BEDROCK										BOREHOLE OPEN AND DRY UPON COMPLETION
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-5

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 06, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 78.3 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 125 mm:										
	GRANULAR FILL: GREY TO BLACK GRAVELY SAND, TRACE SILT, MOIST, DENSE TO COMPACT			SS1	38	2	67				
1.0				SS2	16	1	44				
1.4	COARSE GRANULAR FILL: GREY GRAVEL, SOME TO TRACE SAND, TRACE SILT, MOIST, COMPACT TO LOOSE			SS3	14	2	67				
2.0				SS4	8	0	33				
2.9	SANDY CLAY: BROWN SANDY CLAY, SOME SILT, TRACE GRAVEL, APL TO WTPL, FIRM			SS5	8	13	0				BOREHOLE CAVED AT 2.7 m DEPTH UPON COMPLETION
3.0											
3.7	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 3.7 m DEPTH ON PRESUMED BEDROCK										
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-6

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00
CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 06, 2013
BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR
GROUND ELEVATION: 77.3 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0	ASPHALT - 200 mm:										
0.2	GRANULAR FILL: GREY TO BLACK SAND, SOME GRAVEL, TRACE SILT, MOIST, DENSE TO COMPACT			SS1	32	5	83	100			
1.0				SS2	19	16	39	39			
1.4	COARSE GRANULAR FILL: GREY TO BROWN GRAVEL, SOME SAND, TRACE SILT, WET, COMPACT			SS3	18	6	39	38			
2.0	- SATURATED			SS4	16	19	56	31			GSA SS4: GRAVEL 87% SAND 10% SILT 3%
3.0	- BRICK FRAGMENTS			SS5	22	14	44	26			SWITCH TO HOLLOW STEM DUE TO CAVING OF SOILS. HARD DRILLING DUE TO COBBLES
3.7	SAND: GREY SAND, TRACE TO SOME SILT, TRACE GRAVEL, TRACE CLAY, TRACE WOOD FRAGMENTS AND ORGANICS, SATURATED, LOOSE			SS6	6	36	78	12			
5.0				SS7	6	24	100	11			GSA SS7: GRAVEL 3% SAND 85% SILT 9% CLAY 3%
5.5	SILTY CLAY: DARK GREY SILTY CLAY, TRACE ORGANICS, APL, FIRM										GROUNDWATER AT 5.5 m BELOW GROUND SURFACE IN OPEN BOREHOLE
6.0				SS8	6	29	100	4			
6.6	BOREHOLE TERMINATED AT 6.6 m DEPTH IN SILTY CLAY										
7.0											
8.0											
9.0											
10.0											

WSP

BOREHOLE NO. BH13-7

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 05, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 76.4 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 100 mm:										
	GRANULAR FILL: DARK BROWN GRAVELY SAND, TRACE SILT, MOIST, COMPACT			SS1	17	3	56				SLIGHT ORGANIC SMELL OBSERVED
0.6	COARSE GRANULAR FILL: COARSE GRAVEL, TRACE SILT, MOIST, COMPACT			SS2	12		0				
1.0											
1.3	SAND: DARK BROWN TO BROWN SAND, SOME SILT, SOME CLAY, TRACE GRAVEL, SATURATED, VERY LOOSE			SS3	3	9	28				
2.0											
2.4											
2.5	ORGANIC MATERIAL: LIGHT BROWN WOOD FRAGMENTS AND ORGANICS, COMPACT			SS4	11	29	39				GROUNDWATER AT 2.9 m BELOW GROUND SURFACE IN OPEN BOREHOLE
2.9	SAND: DARK BROWN TO BROWN SAND, SOME SILT, SOME CLAY, TRACE GRAVEL, SATURATED, VERY LOOSE			SS5	4	51	67				
3.0											
	GRAVEL: BROWN GRAVEL, SOME SILT, SOME SAND, SATURATED, LOOSE										BOREHOLE CAVED AT 3.7 m DEPTH UPON COMPLETION
3.9											
4.0	SAND: DARK BROWN SAND, SOME SILT, TRACE ORGANICS, WET TO SATURATED, LOOSE			SS6	3	35	75				
4.3	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 4.3 m DEPTH IN SAND										
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-8

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 09, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 77.3 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 125 mm:										
	COARSE GRANULAR FILL: BROWN GRAVELY SAND TO SANDY GRAVEL, TRACE SILT, MOIST, COMPACT			SS1	15	6	33	48			
	- SOME SILT, TRACE CLAY, WET										GSA SS2A: GRAVEL 46% SAND 36% SILT & CLAY 18%
1.0 0.9	CLAYEY SILT FILL: BROWN CLAYEY SILT, SOME SAND, TRACE GRAVEL, MOIST TO WET, COMPACT TO LOOSE			SS2	11	13	50	43 / 35			
	- SOME GRAVEL, SATURATED			SS3	9	12	44	34			
2.0											GROUNDWATER AT 1.8 m BELOW GROUND SURFACE IN OPEN BOREHOLE
2.1	GRANULAR FILL: BROWN GRAVEL, SOME SAND, TRACE SILT, TRACE CLAY, SATURATED, LOOSE			SS4	10	73	50	24		>>	
2.9											
3.0	SILTY SAND: BROWN TO DARK GREY SANDY SILT TO SILTY SAND, TRACE TO SOME CLAY, TRACE GRAVEL, SATURATED, VERY LOOSE			SS5	3	69	50	22 / 21			
3.3	SANDY SILT: DARK GREY GRAVEL AND SANDY SILT, SOME CLAY, TRACE ORGANICS, WET, VERY LOOSE									>>	
3.7	SANDY GRAVEL: DARK BROWN SANDY GRAVEL, SOME SILT, SOME CLAY, SATURATED, LOOSE			SS6	7	34	33	22			GSA SS6: GRAVEL 56% SAND 22% SILT 11% CLAY 11%
4.0											
4.4	SANDY SILT: BROWN SANDY SILT, TRACE GRAVEL, TRACE CLAY, SATURATED, VERY LOOSE			SS7	3	89	100	26 / 28			
4.9	ORGANIC SILT: DARK BROWN ORGANIC SILT, TRACE SAND, TRACE CLAY, WET TO VERY WET, VERY LOOSE									>>	
5.0											
5.5	SILTY SAND: GREY SILTY SAND, SOME TO TRACE CLAY, OCCASIONAL ROCK FRAGMENTS, MOIST TO WET										
6.0				AS8		14		35			
6.1	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 6.1 m DEPTH ON PRESUMED BEDROCK										
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-9

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 05, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 81.0 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 100 mm:										
	GRANULAR FILL: GREY GRAVELY SAND, SOME SILT, MOIST, COMPACT TO VERY DENSE			SS1	57	2	56	23	57		
1.0				SS2	28	2	56	19			
	- TRACE SILT										BOREHOLE CAVED AT 1.5 m DEPTH UPON COMPLETION, DRY
2.0				SS3	21	3	78	13			
	- DARK GREY, MOIST TO WET										
				SS4	41	4	56	14	41		
3.0											
				SS5	61	6	44	15	61		
3.5	BOREHOLE TERMINATED AT 3.5 m DEPTH IN GRAVELY SAND FILL										POTENTIALLY LOCATED IN A UTILITY TRENCH BELOW EXISTING BEDROCK SURFACE
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-10

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 05, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 83.4 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 125 mm:										
	GRANULAR FILL: GREY GRAVELY SAND, SOME SILT, MOIST, VERY DENSE TO DENSE			SS1	81	2	78	29	81		
1.0				SS2	69	1	94	23	69		
				SS3	34	2	83	15			BOREHOLE CAVED AT 1.5 m DEPTH UPON COMPLETION, DRY
2.0											
2.1	SAND: DARK GREY SAND, SOME TO TRACE GRAVEL, TRACE SILT, MOIST, COMPACT			SS4	18	3	61	17			
2.9											
3.0	GRAVEL AND SAND: GREY GRAVEL AND SAND, TRACE SILT, WET TO MOIST, VERY DENSE			SS5	94	1	61	18	94		WIRE AND METAL DEBRIS OBSERVED ON AUGERS
3.7	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 3.7 m DEPTH ON PRESUMED BEDROCK										
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-11

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 10, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 77.1 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 50 mm:										RECYCLED ASPHALT FRAGMENTS
	GRANULAR FILL: BROWN TO BLACK GRAVELY SAND, TRACE TO SOME SILT, MOIST, COMPACT			SS1	15	16	67				
0.6	SILTY SAND FILL: REDDISH BROWN TO BROWN SILTY SAND TO SANDY SILT, SOME TO TRACE GRAVEL, SOME TO TRACE CLAY, WET, LOOSE			SS2	8	8	72				
1.0											
1.4	COARSE GRANULAR FILL: GREY CRUSHED LIMESTONE, TRACE SAND, DRY, LOOSE										BOREHOLE OPEN AND DRY UPON COMPLETION
	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 1.4 m DEPTH ON PRESUMED BEDROCK										
2.0											
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-12

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 10, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 79.5 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 50 mm:										
	GRANULAR FILL: BROWN GRAVELY SAND, SOME SILT, TRACE CLAY, MOIST TO WET, COMPACT			SS1	19	7	72	41			
0.7	SILT AND CLAY: BROWN SANDY SILT AND CLAY, SOME GRAVEL, MOIST TO WET/ DTPL TO APL, VERY STIFF			AS2	17	20	67	44			GSA AS2: GRAVEL 12% SAND 26% SILT 31% CLAY 31%
1.1	COARSE GRANULAR FILL: GREY SANDY GRAVEL, SOME SILT, DRY, COMPACT										
1.4	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 1.4 m DEPTH ON PRESUMED BEDROCK										BOREHOLE OPEN AND DRY UPON COMPLETION
2.0											
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-13

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00
CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 10, 2013
BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR
GROUND ELEVATION: 82.4 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 50 mm:										
	GRANULAR FILL: DARK GREY GRAVELY SAND, SOME SILT, TRACE CLAY, MOIST TO WET, COMPACT			SS1	24	11	72	39			
0.6	SILTY CLAY FILL: BROWN CLAYEY SILT TO SILTY CLAY, TRACE TO SOME SAND, APL, STIFF			SS2	8	21	50	38			
1.0											
1.6	COARSE GRANULAR FILL: GREY AND BROWN GRAVEL AND SAND, TRACE SILT, TRACE CLAY, MOIST TO WET, VERY DENSE			SS3	50/ 50mm	12	100	53 / 13	50		
1.8											
2.0	SILTY SAND: GREY SILTY SAND, TRACE GRAVEL, DRY, VERY DENSE										BOREHOLE OPEN AND DRY UPON COMPLETION
2.0	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 2.0 m DEPTH ON PRESUMED BEDROCK										
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-14

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 10, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 85.3 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - NOT MEASURED:										
	GRANULAR FILL: GREY GRAVELY SAND TO SANDY GRAVEL, TRACE SILT, MOIST, VERY DENSE			SS1	56	1	67	37	56		
1.0	0.9 SILTY SAND: BROWN GRAVELY SILTY SAND, SOME CLAY, MOIST, COMPACT			SS2	15	7	72	35			GSA SS2: GRAVEL 25% SAND 31% SILT 26% CLAY 18%
	1.6										
	1.7 SILTY SAND: GREY SILTY SAND, TRACE GRAVEL, DRY, VERY DENSE			SS3	50/ 125mm	10	100	20	50		BOREHOLE OPEN AND DRY UPON COMPLETION
2.0	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 1.7 m DEPTH ON PRESUMED BEDROCK										
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-15

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00
CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 05, 2013
BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR
GROUND ELEVATION: 89.4 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 125 mm:										
	GRANULAR FILL: GREY GRAVELY SAND, TRACE SILT, MOIST, COMPACT			SS1	28	2	44				
0.6	CLAYEY SILT: BROWN CLAYEY SILT, TRACE TO SOME SAND, APL, FIRM			SS2	7	10	67				
1.0											
				SS3	50/ 25mm	16	600		50		
1.6	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 1.6 m DEPTH ON PRESUMED BEDROCK										BOREHOLE OPEN AND DRY UPON COMPLETION
2.0											
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-16

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 04, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 92.3 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 125 mm:										
	GRANULAR FILL: GREY GRAVELY SAND TO SANDY GRAVEL, TRACE TO SOME SILT, MOIST, DENSE TO COMPACT			SS1	62	2	67	41	62		LOCATED IN UTILITY TRENCH
1.0				SS2	42	1	78	33	42		
				SS3	28	1	56	32			BOREHOLE CAVED AT 1.5 m DEPTH UPON COMPLETION, DRY
2.0											2 mm DIA. COPPER WIRE WITH ORANGE COATING
2.1	COARSE GRANULAR FILL: GREY GRAVEL, TRACE SAND, TRACE SILT, MOIST			AS4		1		36			
3.0	- SANDY GRAVEL, WET										
3.2	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 3.2 m DEPTH ON PRESUMED BEDROCK			AS5		12		30			
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-17

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 04, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 93.1 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	ASPHALT - 150 mm:										
	GRANULAR FILL: GREY GRAVELY SAND, SOME SILT, MOIST, DENSE			SS1	43	1	67		43		BOREHOLE OPEN AND DRY UPON COMPLETION
0.8											
1.0	CLAYEY SILT: BROWN CLAYEY SILT, SOME SAND, TRACE GRAVEL, DTPL TO APL, STIFF			SS2	13	18	50				
1.4											
	GRAVELY SAND: BROWN GRAVELY SAND, SOME SILT, SOME CLAY, MOIST, COMPACT			SS3	50/ 25mm	10	33		50		GSA SS3A: GRAVEL 30% SAND 35% SILT 24% CLAY 11%
1.7	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 1.7 m DEPTH ON PRESUMED BEDROCK										
2.0											
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-18

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 04, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 93.3 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 125 mm:										
	GRANULAR FILL: GREY GRAVELY SAND TO SANDY GRAVEL, SOME SILT, MOIST, DENSE			SS1	50	1	78		50		
1.0				SS2	34	1	67				
1.4	SILTY CLAY: BROWN SILTY CLAY, SOME SAND, TRACE GRAVEL, DTPL TO APL, HARD			SS3	57	20	33		57		
2.0											
2.0	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 2.0 m DEPTH ON PRESUMED BEDROCK										BOREHOLE OPEN AND DRY UPON COMPLETION
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-19

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 04, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 93.9 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 125 mm:										
	COARSE GRANULAR FILL: GREY SANDY GRAVEL, SOME SILT, TRACE CLAY, MOIST, VERY DENSE			SS1	55	2	72	33	55		GSA SS1: GRAVEL 47% SAND 34% SILT 15% CLAY 4% BOREHOLE OPEN AND DRY UPON COMPLETION
				SS2	50/ 125mm	5	56	36	50		
0.9	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 0.9 m DEPTH ON PRESUMED BEDROCK										
1.0											
2.0											
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-20

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00
CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 04, 2013
BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR
GROUND ELEVATION: 93.8 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 125 mm:										
	GRANULAR FILL: GREY GRAVELY SAND, SOME SILT, MOIST, DENSE			SS1	36	0	67				
0.8											
1.0	SILTY CLAY: BROWN SILTY CLAY, TRACE SAND, DTPL, VERY STIFF			SS2	24	27	78				
1.2	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 1.2 m DEPTH ON PRESUMED BEDROCK										BOREHOLE OPEN AND DRY UPON COMPLETION
2.0											
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-21

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00
CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 11, 2013
BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR
GROUND ELEVATION: 94.0 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	ASPHALT - 150 mm:										
0.5	GRANULAR FILL: GREY GRAVELY SAND, SOME SILT, MOIST, COMPACT			SS1	21	3	83				
1.0	SILTY CLAY: BROWN SILTY CLAY TO SILT AND CLAY, TRACE SAND, TRACE GRAVEL, DTPL, STIFF TO VERY STIFF			SS2	14	27	94				GSA SS2: SAND 2% SILT 43% CLAY 55%
	- TRACE TO SOME SAND			SS3	20	27	100				
2.0											
2.1	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 2.1 m DEPTH ON PRESUMED BEDROCK										BOREHOLE OPEN AND DRY UPON COMPLETION
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-22

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 10, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 94.6 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 125 mm:										
	GRANULAR FILL: LIGHT BROWN GRAVELY SAND, SOME SILT, MOIST, VERY DENSE			SS1	93	2	83	38	93		
0.8											
1.0	SILTY CLAY: BROWN TO GREY CLAYEY SILT TO SILTY CLAY, TRACE TO SOME SAND, DTPL, STIFF TO HARD			SS2	11	29	72	24 / 36			
				SS3	50/ 50mm	23	225	34	50		
1.7	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 1.7 m DEPTH ON PRESUMED BEDROCK										BOREHOLE OPEN AND DRY UPON COMPLETION
2.0											
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-23

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 10, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 93.9 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.1	ASPHALT - 125 mm:										
	COARSE GRANULAR FILL: DARK BROWN TO BROWN SANDY GRAVEL, SOME SILT, MOIST, COMPACT			SS1	13	15	61				
0.8											
1.0	SILTY CLAY: BROWN TO GREY CLAYEY SILT TO SILTY CLAY, TRACE TO SOME SAND, DTPL, VERY STIFF			SS2	15	5	67				GSA SS2A: GRAVEL 47% SAND 35% SILT 18%
1.4	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 1.4 m DEPTH ON PRESUMED BEDROCK										BOREHOLE OPEN AND DRY UPON COMPLETION
2.0											
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-24

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 12, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: DCL

GROUND ELEVATION: 92.9 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.2	ASPHALT - 150 mm:										
	GRANULAR FILL: BROWN GRAVELY SAND, SOME SILT, MOIST			AS1							
0.8											
1.0	COARSE GRANULAR FILL: GREY SAND AND GRAVEL, SOME SILT, MOIST, DENSE TO VERY DENSE			SS2	48	6	33		48		
				SS3	50/ 125mm	4	28		50		
1.7	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 1.7 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										BOREHOLE OPEN AND DRY UPON COMPLETION
2.0											
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-25

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 12, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: DCL

GROUND ELEVATION: 88.3 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.1	ASPHALT - 125 mm:										
	GRANULAR FILL: BROWN GRAVELY SANDY SILT, MOIST			AS1		1		25.6			OUTCROP TO THE NORTH
0.7	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 0.7 m BELOW GROUND SURFACE ON PRESUMED BEDROCK									•	BOREHOLE OPEN AND DRY UPON COMPLETION
1.0											
2.0											
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-26

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 12, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: DCL

GROUND ELEVATION: 84.0 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	ASPHALT - 150 mm :										
	GRANULAR FILL: BROWN GRAVELY SAND AND SILT, MOIST, DENSE			AS1							
1.0				SS2	34	11	39				
1.2	SILT AND CLAY: DARK BROWN SILT AND CLAY, SOME FINE SAND, TRACE GRAVEL, MOIST, COMPACT			SS3	26	27	33				GSA SS3: GRAVEL 2% SAND 16% SILT 35% CLAY 47%
2.0											
2.1	CLAYEY SILT: BROWN CLAYEY SILT, TRACE FINE SAND, DTPL TO APL, VERY STIFF			SS4	18	29	50				
3.0				SS5	16	29	89				
4.0				SS6	18	28	78				
4.3	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 4.3 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										BOREHOLE OPEN AND DRY UPON COMPLETION
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-27

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 12, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: DCL

GROUND ELEVATION: 80.8 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	ASPHALT - 150 mm:										
	GRANULAR FILL: BROWN GRAVELY SAND AND SILT, MOIST			AS1		1					
0.8											
1.0	SAND AND SILT: GREY GRAVELY SAND AND SILT, FRACTURED LIMESTONE, MOIST, DENSE TO VERY DENSE			SS2	35	1	56				
				SS3	50/ 50mm	1	33		50		
2.0											
2.1	CLAYEY SILT: BROWN CLAYEY SILT, TRACE FINE SAND, TRACE GRAVEL, APL, STIFF			SS4	13	21	56				
2.9											
3.0	SILT: BROWN SILT, SOME CLAY, TRACE FINE SAND, MOIST, COMPACT			SS5	26	28	56				
3.7											
4.0	SANDY SILT: BROWN SILTY FINE SAND TO SANDY SILT, SOME CLAY, TRACE GRAVEL, MOIST, DENSE			SS6	31	31	72				
4.3	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 4.3 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										BOREHOLE OPEN AND DRY UPON COMPLETION
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-28

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 12, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: DCL

GROUND ELEVATION: 78.2 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.1	ASPHALT - 125 mm:										
	GRANULAR FILL: BROWN GRAVELY FINE SAND AND SILT, MOIST			AS1		1					
1.0				SS2	21	7	67				
1.0	SAND: BROWN FINE SAND, TRACE TO SOME SILT, MOIST, COMPACT TO VERY LOOSE										
	- MOTTLED ORANGEY BROWN			SS3	11	10	56				
2.0											
	- MEDIUM GRAINED SAND			SS4	5	14	72				
3.0											
	- SATURATED			SS5	4	21	56				GROUNDWATER AT 3.0 m BELOW GROUND SURFACE IN OPEN BOREHOLE GSA SS5: SAND 95% SILT 5%
4.0											
	- GREY			SS6	2		6				BOREHOLE OPEN TO 4.0 m DEPTH ON COMPLETION
4.3	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 4.3 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

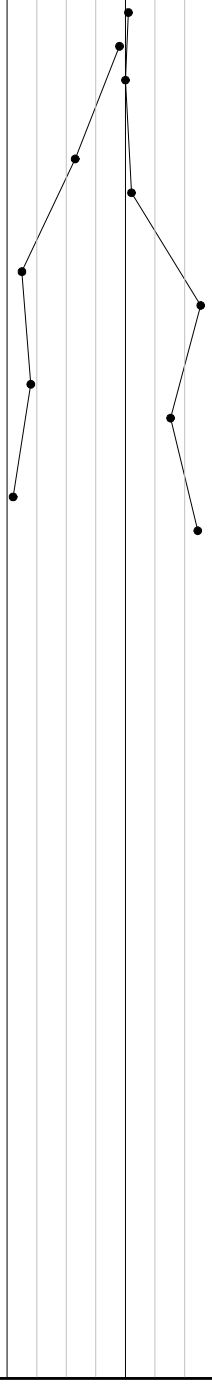
BOREHOLE NO. BH13-29

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00
CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 12, 2013
BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR
GROUND ELEVATION: 76.8 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	REMARKS
0.0									
0.2	ASPHALT - 150 mm :								
	GRANULAR FILL: BROWN GRAVELY SANDY SILT, MOIST, DENSE TO COMPACT			AS1		1		25.8	
1.0				SS2	38	0	44	27.1	BOREHOLE CAVED AT 1.2 m DEPTH UPON COMPLETION, DRY
	- TRACE CLAY, TRACE ORGANICS			SS3	23	2		29.4	
2.0									
2.1	ORGANIC SILT: DARK GREY ORGANIC SILT, SOME PEAT, SOME CLAY, TRACE SAND, TRACE GRAVEL, WET, LOOSE			SS4	5	25	44	27.4	
2.9	CLAYEY SILT: DARK GREY CLAYEY SILT, TRACE FINE SAND, APL, STIFF			SS5	8	15	50	26.2	GROUNDWATER AT 2.7 m BELOW GROUND SURFACE IN OPEN BOREHOLE
3.0									
3.7	SILT: GREY SILT, SOME FINE SAND, SOME CLAY, SATURATED, VERY LOOSE			SS6	2	24	44	25.7	
4.0									
4.3	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 4.3 m BELOW GROUND SURFACE ON PRESUMED BEDROCK								
5.0									
6.0									
7.0									
8.0									
9.0									
10.0									

CONE PENETRATION "N" VALUE 10 20 30 — SHEAR STRENGTH

WATER CONTENT % 10 20 30 — W_P W_L



GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-30

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00
CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 11, 2013
BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR
GROUND ELEVATION: 76.3 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.2	ASPHALT - 150 mm :										
0.2	GRANULAR FILL: GRAVELY SAND, TRACE SILT, MOIST			AS1		3					
0.8	SANDY SILT: GREY SANDY SILT, SOME FINE GRAVEL, MOIST, DENSE										
1.0	GRAVELY SILT: GREY GRAVELY SILT, SOME FINE SAND, MOIST, COMPACT			SS2	31	3	50				
1.4	SANDY SILT: BROWNISH GREY SANDY SILT, SOME GRAVEL, MOIST, COMPACT			SS3	25	16	78				GROUNDWATER AT 1.5 m BELOW GROUND SURFACE IN OPEN BOREHOLE
1.8	SAND: BROWN FINE SAND, WET, COMPACT TO LOOSE										
2.1	ORGANIC SAND AND SILT: DARK BROWN ORGANIC SAND AND SILT, SOME PEAT, SATURATED			SS4	19	60	50				>>
3.0	- SOME CLAY, SOME GRAVEL			SS5	5	95	67				GSA SS5: GRAVEL 16% SAND 32% SILT 33% CLAY 19% >>
4.0	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 4.0 m BELOW GROUND SURFACE ON PRESUMED BEDROCK			SS6	5	1	6				BOREHOLE OPEN TO 4.0 m DEPTH ON COMPLETION
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-31

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 12, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 76.3 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P – W_L)	REMARKS
0.0											
0.2	ASPHALT - 150 mm:										
	GRANULAR FILL: GREY GRAVELY SILTY SAND TO SANDY GRAVEL, SOME SILT, MOIST, COMPACT			AS1		1					
1.0				SS2	23	2	67				
				SS3	12	3	22				GROUNDWATER AT 1.5 m BELOW GROUND SURFACE IN OPEN BOREHOLE BOREHOLE CAVED AT 1.8 m DEPTH UPON COMPLETION, DRY
2.0											
2.1	SAND: ORANGEY BROWN FINE SAND, SOME SILT, SOME GRAVEL, SATURATED, VERY LOOSE TO LOOSE			SS4	3	26	56				
3.0											
				SS5	2	29	44				
4.0				SS6	10	27	44				
4.3	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 4.3 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-32

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 11, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: DCL

GROUND ELEVATION: 77.2 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 100 mm:										
	GRANULAR FILL: BROWN GRAVELY SAND, SOME SILT, MOIST			AS1		1		33.4			
0.8											
1.0	SAND: BROWN FINE SAND, SOME TO TRACE SILT, MOIST, LOOSE TO VERY DENSE			SS2	11	20	33	23.6			
	- MOIST TO WET			SS3	5	18	67	28.7.			
2.0											
	- SATURATED			SS4	13	22	71	27.4			GROUNDWATER AT 2.4 m BELOW GROUND SURFACE IN OPEN BOREHOLE
3.0											
	- GREY			SS5	21	20	108	29.7			
4.0	3.9										
	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 3.9 m BELOW GROUND SURFACE ON PRESUMED BEDROCK			SS6	50/ 125mm	17	28	28.2	50		BOREHOLE OPEN TO 4.0 m DEPTH ON COMPLETION
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-33

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 11, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 77.6 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0									10 20 30	10 20 30	
0.2	ASPHALT - 150 mm:										
	COARSE GRANULAR FILL: GREY SANDY GRAVEL TO GRAVELY SAND, SOME TO TRACE SILT, MOIST, DENSE TO LOOSE			SS1	39	2	72				
1.0				SS2	13	1	50				
				SS3	42	0	44		42		BOREHOLE CAVED AT 1.5 m DEPTH UPON COMPLETION, DRY
2.0											
	- SATURATED			SS4	13	13	39				GROUNDWATER AT 2.3 m BELOW GROUND SURFACE IN OPEN BOREHOLE
3.0											
	- SOME SILT & FINE SAND			SS5	15		0				
4.0											
	- BROWN			SS6	5	12	17				
4.3	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 4.3 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-34

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00
CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 11, 2013
BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR
GROUND ELEVATION: 77.2 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P W_L)	REMARKS
0.0											
0.1	ASPHALT - 100 mm:										
	GRANULAR FILL: GREY GRAVELY SAND, TRACE TO SOME SILT, MOIST, DENSE TO VERY DENSE			SS1	33	4	83				
1.0				SS2	56	2	67		56		
1.7											
	COARSE GRANULAR FILL: LIGHT GREY SANDY GRAVEL, SOME SILT, TRACE CLAY, COMPACT			SS3	14	1	61				GSA SS3: GRAVEL 56% SAND 27% SILT 12% CLAY 5%
2.0	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 2.0 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-35

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 11, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 77.1 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 125 mm :										
	GRANULAR FILL: GREY GRAVELY SAND, SOME SILT, MOIST, DENSE TO COMPACT			SS1	33	3	67				
1.0				SS2	20	2	56				
1.5	SAND: DARK GREY SAND, TRACE SILT, SATURATED, COMPACT TO LOOSE			SS3	11	27	33				GROUNDWATER AT 1.8 m BELOW GROUND SURFACE IN OPEN BOREHOLE
2.0	- OCCASIONAL MOLLUSC SHELLS			SS4	6	28	100				
2.7											BOREHOLE CAVED AT 2.7 m DEPTH UPON COMPLETION, DRY
2.9	SILT: BROWN SILT, TRACE CLAY, WET TO SATURATED, LOOSE										
3.0											
3.2	SAND: DARK GREY MEDIUM SAND, TRACE SILT, TRACE MEDIUM GRAVEL, SATURATED, COMPACT			SS5	12	23	100				
3.7	SILT : LIGHT BROWN SILT, SOME SAND, TRACE CLAY, WET/APL, STIFF										
3.9											
4.0				SS6	16	22	100				
4.3	SAND: DARK GREY SAND, TRACE TO SOME GRAVEL, TRACE SILT, SATURATED, COMPACT										
	SILT: LIGHT BROWN SILT, TRACE TO SOME SAND, TRACE CLAY, WET/APL, COMPACT										
	DRILLED TO 6.1 m - NO SAMPLING, NO BEDROCK:										
5.0											
6.0											
6.1	BOREHOLE TERMINATED AT 6.1 m BELOW GROUND SURFACE, BEDROCK NOT ENCOUNTERED.										
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-36

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00
CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 14, 2013
BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: DCL
GROUND ELEVATION: 76.3 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P W_L)	REMARKS
0.0											
0.2	ASPHALT - 150 mm:										
	GRANULAR FILL: BROWN GRAVELY SAND, SOME SILT, MOIST, COMPACT			AS1							
1.0				SS2	26	0	22				
1.4	SAND: GREY FINE SAND, SOME SILT, SATURATED, VERY LOOSE										SOME ORANGE STAINING
				SS3	3	31	33				
2.0											
2.1	PEAT: BROWN PEAT, WET, VERY LOOSE, SATURATED			SS4	2	294	28				>>
2.9	CLAYEY SILT: GREY CLAYEY SILT, TRACE FINE SAND, APL, SOFT			SS5	4	30	94				
3.0											
4.0	SANDY SILT: MOTTLED GREY AND BROWN SANDY SILT, TRACE CLAY, SATURATED, LOOSE			SS6	10	25	67				
5.0											
6.0											
	- BROWN			SS7	5	26	100				GSA SS7: SAND 32% SILT 63% CLAY 5%
6.6	DROVE CONE TO REFUSAL:										
7.0											
8.0											
8.4	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 8.4 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-37

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00
CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 14, 2013
BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: DCL
GROUND ELEVATION: 76.3 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 (W_P – W_L)	REMARKS
0.0											
0.2	ASPHALT - 150 mm:										
	GRANULAR FILL: BROWN GRAVELY SAND, SOME SILT, MOIST, DENSE TO COMPACT			AS1		43					
1.0				SS2	31	4	44			>>	
1.8				SS3	14	29	72				GROUNDWATER AT 1.5 m BELOW GROUND SURFACE IN OPEN BOREHOLE
2.0	SAND: GREY FINE SAND, SOME SILT, SATURATED, LOOSE										
				SS4	10	25	50				
2.9											BOREHOLE CAVED AT 2.7 m DEPTH UPON COMPLETION, DRY
3.0	SAND AND PEAT: GREY SAND AND PEAT, SATURATED, VERY LOOSE			SS5	2	75	33			>>	
4.0											
4.0	SAND: GREY FINE SAND, SOME SILT, WET, VERY LOOSE										
4.7											
5.0	CLAYEY SILT: MOTTLED GREY AND BROWN CLAYEY SILT, TRACE FINE SAND, APL, VERY STIFF			SS6	18	23	56				
5.0	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 5.0 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-38

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 14, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: DCL

GROUND ELEVATION: 76.3 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE 10 20 30 / SHEAR STRENGTH	WATER CONTENT % 10 20 30 / W_P W_L	REMARKS
0.0											
0.2	ASPHALT - 150 mm:										
	GRANULAR FILL: BROWN GRAVELY SAND AND SILT, MOIST			AS1		3					
1.0	- SOME SILT, COMPACT TO LOOSE			SS2	23	3	67				BOREHOLE CAVED AT 1.2 m DEPTH UPON COMPLETION, DRY
				SS3	6	11	22				GROUNDWATER AT 1.5 m BELOW GROUND SURFACE IN OPEN BOREHOLE
2.0											
2.1	SILTY SAND: GREY SILTY SAND, SOME ORGANICS, WET TO SATURATED, VERY LOOSE			SS4	2	51	50			>>	
2.9											
3.0	SAND: GREY SAND, SOME TO TRACE SILT, TRACE CLAY, SATURATED, LOOSE			SS5	8	22	28				
4.0	- GRAVELY, SOME PEAT, WET			SS6	6	21	33				GSA SS6: GRAVEL 35% SAND 57% SILT 6% CLAY 2%
4.3	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 4.3 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-39

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00
CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 14, 2013
BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: DCL
GROUND ELEVATION: 76.2 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	ASPHALT - 150 mm:										
	GRANULAR FILL: BROWN GRAVELY SAND AND SILT, MOIST			AS1							
	- COMPACT			SS2	23	1	39				
1.4	COARSE GRANULAR FILL: GREY CRUSHED LIMESTONE, SATURATED, COMPACT			SS3	12	1	11				BOREHOLE CAVED AT 1.5 m DEPTH UPON COMPLETION, DRY
2.1	SAND: GREY FINE SAND, SOME TO TRACE SILT, SATURATED, LOOSE TO VERY LOOSE			SS4	9	22	61				
	- ROOTS			SS5	1	23	67				
4.0	CLAYEY SILT: GREY CLAYEY SILT, SOME FINE SAND, WTPL, VERY SOFT			SS6	1	27	67				
5.5	SANDY SILT: GREY SANDY SILT, DILATENT, SATURATED, COMPACT			SS7	17	18	83				
6.6	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 6.6 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-40

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00
CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 13, 2013
BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: DCL
GROUND ELEVATION: 76.4 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 125 mm:										
	GRANULAR FILL: DARK GREY SILT AND SAND, SOME FINE GRAVEL, MOIST			AS1		2					
0.8											
1.0	COARSE GRANULAR FILL: GREY SANDY SILTY GRAVEL, MOIST, DENSE TO COMPACT			SS2	34	4	54				
2.0				SS3	20		42				
2.2											
	COARSE GRANULAR FILL: GREY SANDY CRUSHED LIMESTONE, SOME SILT, SATURATED, DENSE			SS4	44	5	63		44		GSA SS4: GRAVEL 57% SAND 31% SILT 12%
3.0				SS5	35	9	61				
4.0	4.0										
	ORGANIC SILT: BROWN ORGANIC SILT AND PEAT, TRACE FINE SAND, TRACE CLAY, SATURATED, LOOSE TO VERY LOOSE			SS6	4	15	67				GSA SS6: SAND 66% SILT 26% CLAY 8%
5.0											
6.0				SS7	2	63	75			>>	
7.0											
7.3	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 7.3 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-41

PROJECT NAME: PORTSMOUTH PUMPING STATION | **PROJECT NO.:** 131-18048-00

CLIENT: UTILITIES KINGSTON | **DATE COMPLETED:** Sep 16, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON | **SUPERVISOR:** DCL

GROUND ELEVATION: 76.0 mASL (Approximate) | **REVIEWER:** KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	ASPHALT - 150 mm:										
	GRANULAR FILL: BROWN GRAVELY SAND AND SILT, MOIST			AS1		0					
	- GREY, SOME SILT, COMPACT			SS2	28	2	89				
1.0											
	- SATURATED			SS3	19	10	17				BOREHOLE CAVED AT 1.5 m DEPTH UPON COMPLETION, DRY
2.0											
2.1	ORGANIC SILT: BROWN ORGANIC SILT, SOME PEAT, SOME SAND, MOIST, LOOSE TO VERY LOOSE			SS4	5	15	50				
3.0											
				SS5	3	28	0				
	- WET										
3.9											
4.0	CLAYEY SILT: GREY GREEN CLAYEY SILT, WTPL, STIFF			SS6	10	2	39				
4.3	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 4.3 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-42

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00
CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 03, 2013
BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR
GROUND ELEVATION: 76.1 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 125 mm:										
	COARSE GRANULAR FILL: GREY SANDY GRAVEL, TRACE TO SOME SILT, MOIST, DENSE TO COMPACT			SS1	34	2	56	66.8			
1.0				SS2	20	2	61	53			GSA SS2: GRAVEL 62% SAND 26% SILT 12%
1.4	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 1.4 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										BOREHOLE OPEN AND DRY UPON COMPLETION
2.0											
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-43

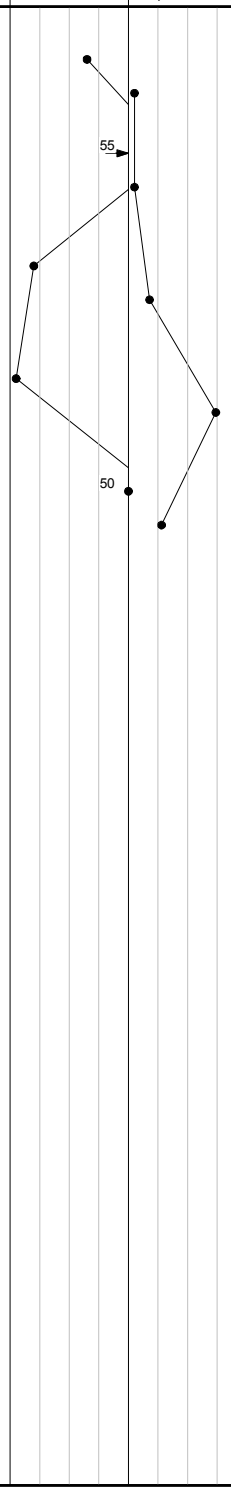
PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 03, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 76.6 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 125 mm:										
	COARSE GRANULAR FILL: GREY SAND AND GRAVEL FILL, TRACE SILT, MOIST, COMPACT TO VERY DENSE			SS1	26	2	61				
1.0				SS2	55	2	61				
1.0	SILTY SAND: DARK GREY SILTY SAND, TRACE GRAVEL, WET TO MOIST, VERY DENSE										
1.4	SAND: DARK BROWN SAND, SOME GRAVEL, SOME SILT, MOIST, LOOSE			SS3	8	7	33				
2.0											
2.1	SILTY CLAY: ORANGEY BROWN SILTY CLAY, TRACE TO SOME SAND, WTPL, SOFT			SS4	2	29	89				GROUNDWATER AT 2.4 m BELOW GROUND SURFACE IN OPEN BOREHOLE BOREHOLE CAVED AT 2.6 m DEPTH UPON COMPLETION, DRY
3.0											
3.2											
3.4	SANDY CLAY: ORANGEY BROWN SANDY CLAY, SOME SILT, TRACE GRAVEL, APL, HARD			SS5	50/ 125mm	11	94				
	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 3.4 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											



GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-44

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00
CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 03, 2013
BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR
GROUND ELEVATION: 77.0 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	ASPHALT - 150 mm:										
	COARSE GRANULAR FILL: GREY SILTY SANDY GRAVEL, TRACE CLAY, MOIST, DENSE TO COMPACT			SS1	33	3	61	47			GSA SS1: GRAVEL 37% SAND 31% SILT 25% CLAY 7%
0.9											
1.0	SANDY SILT: BROWN SANDY SILT, SATURATED, COMPACT			SS2	13	3	78	53			
1.5											
	SILT: BROWN SILT, TRACE CLAY, TRACE SAND, SATURATED, VERY LOOSE			SS3	2	7	100	50			
2.0											
2.1	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 2.1 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										BOREHOLE OPEN AND DRY UPON COMPLETION
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-45

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00
CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 03, 2013
BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR
GROUND ELEVATION: 78.0 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.1	ASPHALT - 125 mm:										
	COARSE GRANULAR FILL: GREY SAND AND GRAVEL, MOIST, COMPACT			SS1	17	4	61				
1.0				SS2	20	3	67				
1.4	SANDY CLAY: BROWN SANDY CLAY, SOME SILT, TRACE GRAVEL, MOIST TO SATURATED, COMPACT			SS3	15	24	72				
2.0											
2.1	SILT: BROWN SOME FINE SAND, TRACE CLAY, SATURATED, VERY DENSE			SS4	50/ 125mm	8	100		50		
2.6	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 2.6 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										BOREHOLE OPEN AND DRY UPON COMPLETION
3.0											
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

WSP

BOREHOLE NO. BH13-46

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00
CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 03, 2013
BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR
GROUND ELEVATION: 79.5 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0	ASPHALT - 175 mm:										
0.2	GRANULAR FILL: GREY GRAVELY SAND, SOME SILT, MOIST, VERY DENSE			SS1	75	2	61				
0.9	SANDY SILT FILL: BROWN SANDY SILT, TRACE CLAY, TRACE GRAVEL, MOIST, COMPACT			SS2	25	11	56				
1.0											
2.0	- WET TO SATURATED, LOOSE			SS3	8	16	39				
				SS4	19	24	78				
2.9											
3.0	COARSE GRANULAR FILL: GREY LIMESTONE GRAVEL, VERY DENSE			SS5	50/ 25mm		100				
3.1	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 3.1 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										BOREHOLE OPEN AND DRY UPON COMPLETION
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

WSP

BOREHOLE NO. BH13-47

PROJECT NAME: PORTSMOUTH PUMPING STATION
PROJECT NO.: 131-18048-00

CLIENT: UTILITIES KINGSTON
DATE COMPLETED: Sep 03, 2013

BOREHOLE TYPE: CONTINUOUS FLIGHT AUGER/ 50 mm OD SPLIT SPOON
SUPERVISOR: KAR

GROUND ELEVATION: 80.6 mASL (Approximate)
REVIEWER: KZK

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE EAGLE 2 (ppm)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											
0.2	ASPHALT - 175 mm:										
	GRANULAR FILL: GREY GRAVELY SAND, SOME SILT, MOIST, DENSE			SS1	35	3	83	45			
0.7											
1.0	GRANULAR FILL: BROWN GRAVEL, SOME SILT, SOME SAND, TRACE CLAY, MOIST, COMPACT			SS2	17	7	44	42			GSA SS2: GRAVEL 47% SAND 23% SILT 23% CLAY 7%
1.4											
	SANDY SILT FILL: BROWN SANDY SILT, TRACE GRAVEL, WET, LOOSE			SS3	4	11	33	32			
2.0											
2.1											
	COARSE GRANULAR FILL: GREY SANDY CRUSHED LIMESTONE, SOME SILT, TRACE CLAY, WET TO MOIST, VERY DENSE			SS4	50/ 75mm	8	33	28	50		GSA SS4: GRAVEL 36% SAND 39% SILT 18% CLAY 7%
2.7											
3.0	BOREHOLE TERMINATED UPON AUGER REFUSAL AT 2.7 m BELOW GROUND SURFACE ON PRESUMED BEDROCK										BOREHOLE OPEN AND DRY UPON COMPLETION
4.0											
5.0											
6.0											
7.0											
8.0											
9.0											
10.0											

GENIVAR GEOTECH (M) EAGLE 2 READINGS 131-18048-00.GPJ JAGGER HIMS BASIC.GDT 4-24-14

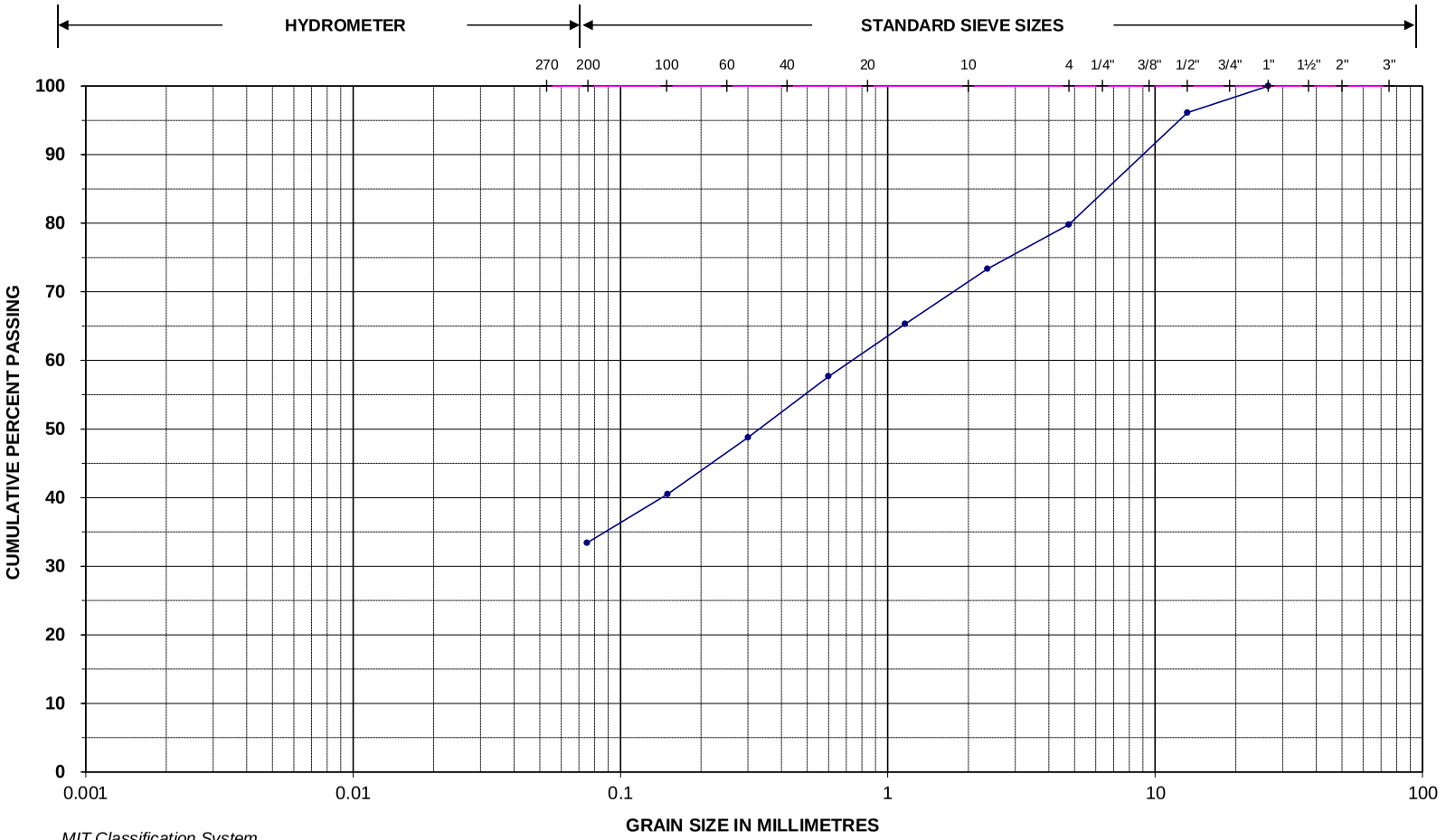
WSP

Appendix B

Particle Size Distribution Results

GENIVAR

PARTICLE SIZE DISTRIBUTION



MIT Classification System

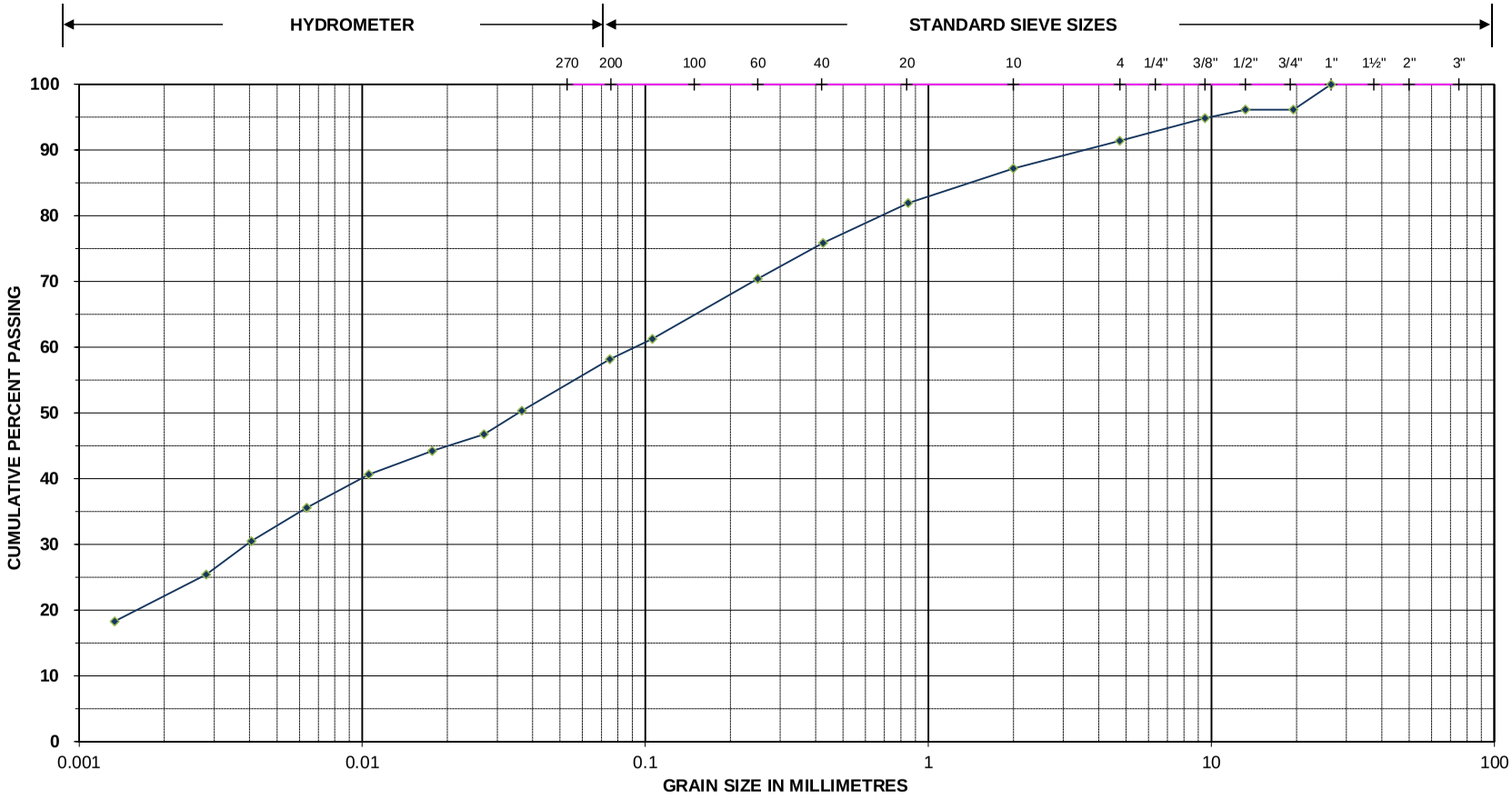
CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name:	Portsmouth Pumping Station / Front Street	**Project No.:**	131-18048-00
Location ID.:	BH13-1	**Sample No./Depth:**	AS4 / 2.29-2.34m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine
37.5 mm	100.0	**1.16 mm**	65.3
26.5 mm	100.0	**0.60 mm**	57.7
13.2 mm	96.1	**0.30 mm**	48.8
4.75 mm	79.8	**0.15 mm**	40.5
2.36 mm	73.3	**0.075 mm**	33.4

GENIVAR

PARTICLE SIZE DISTRIBUTION ASTM D422



MIT Classification System

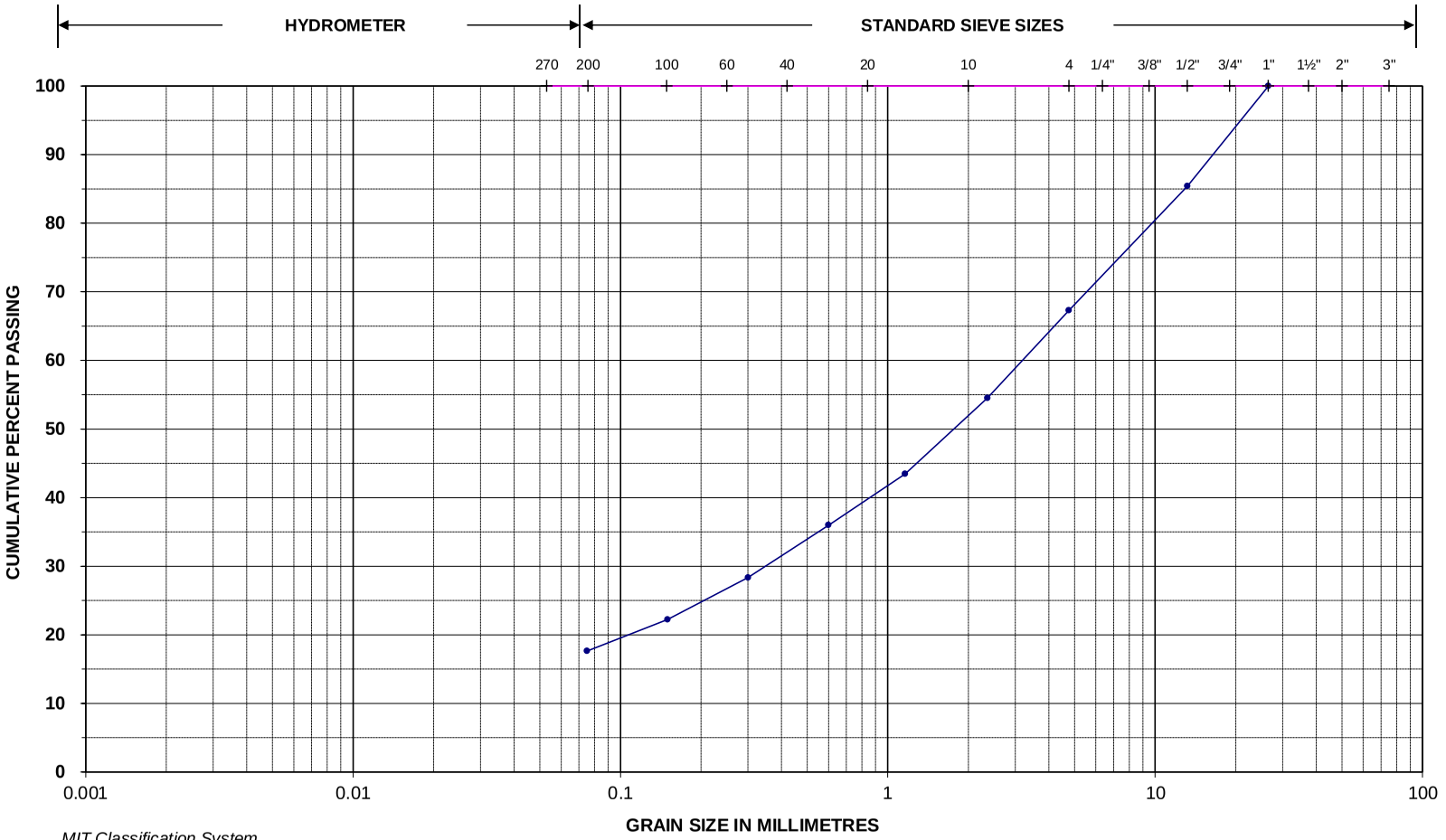
CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Porstmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-1
Sample No./Depth: SS2 / 0.8-1.2m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer	% passing
26.5 mm	100.0	**0.850 mm**	82.0	0.037	50.3
13.2 mm	96.2	**0.425 mm**	75.9	0.018	44.2
9.50 mm	96.2	**0.250 mm**	70.4	0.006	35.6
4.75 mm	91.4	**0.106 mm**	61.3	0.003	25.4
2.00 mm	87.2	**0.075 mm**	58.2	0.001	18.3

GENIVAR

PARTICLE SIZE DISTRIBUTION



MIT Classification System

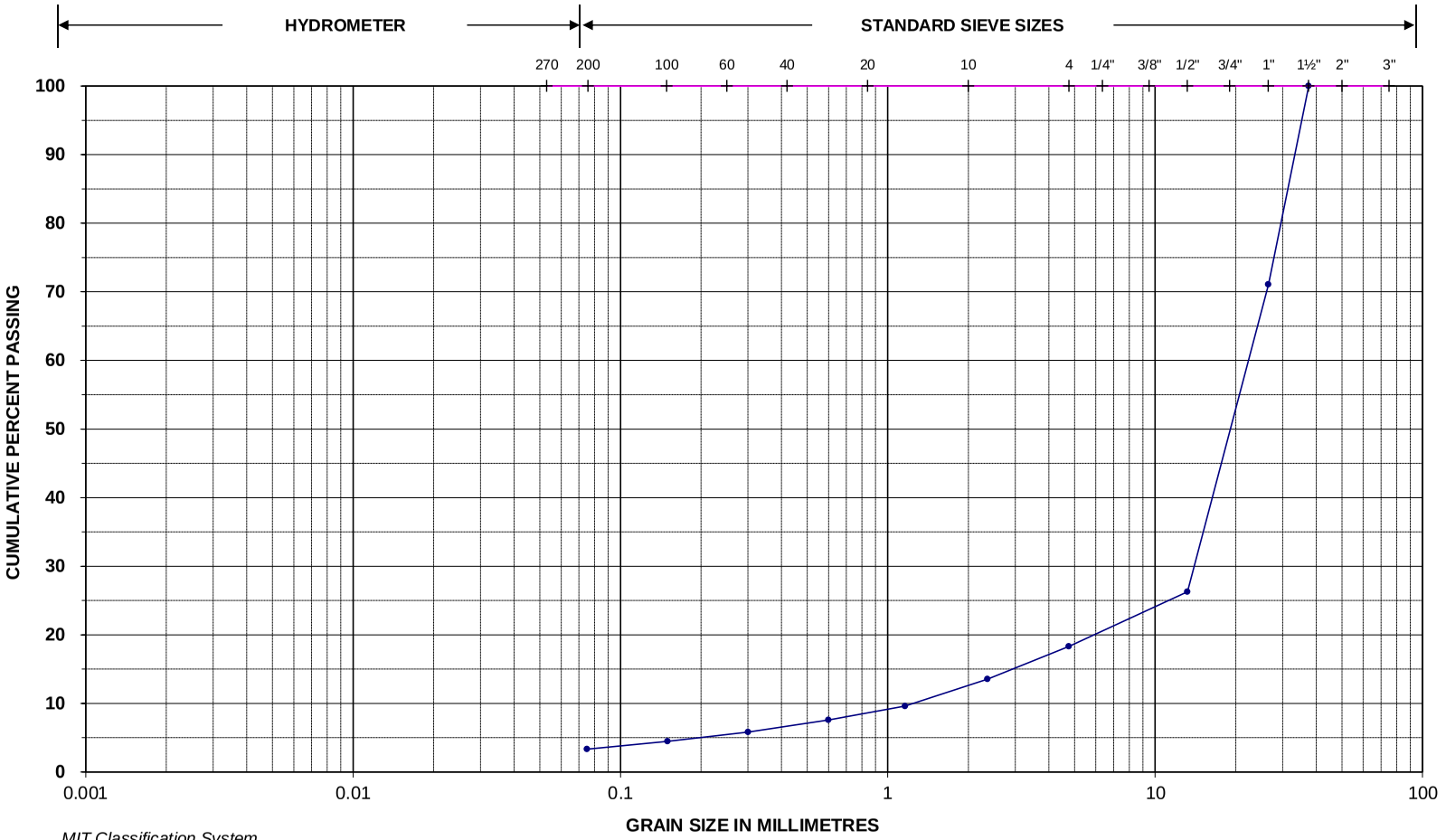
CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Portsmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-4
Sample No./Depth: SS1 / 0.2-0.8m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine
37.5 mm	100.0	**1.16 mm**	43.5
26.5 mm	100.0	**0.60 mm**	36.0
13.2 mm	85.4	**0.30 mm**	28.3
4.75 mm	67.3	**0.15 mm**	22.2
2.36 mm	54.5	**0.075 mm**	17.7

GENIVAR

PARTICLE SIZE DISTRIBUTION



MIT Classification System

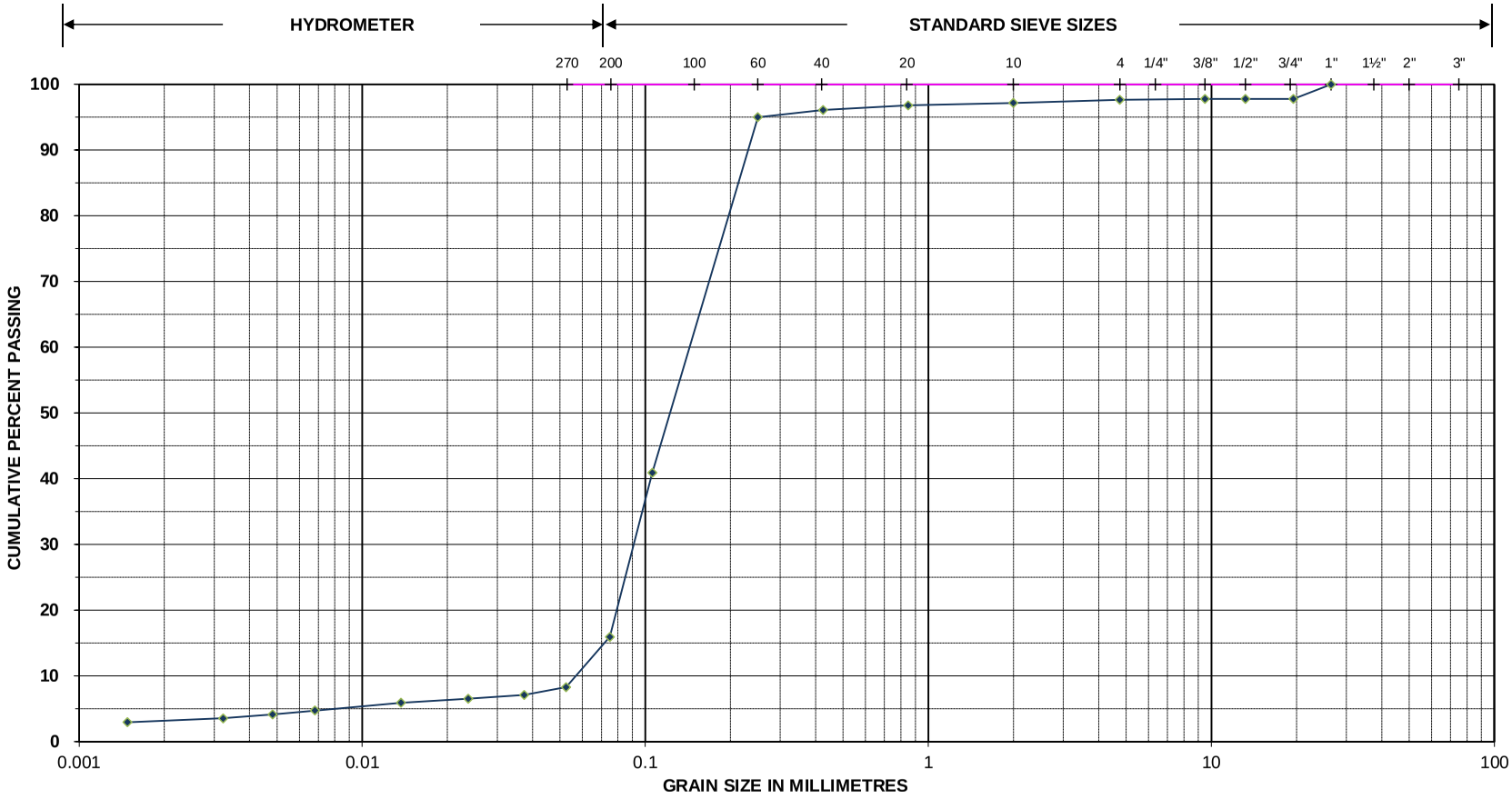
CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Portsmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-6
Sample No./Depth: SS4 / 2.3-2.7m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine
37.5 mm	100.0	**1.16 mm**	9.6
26.5 mm	71.1	**0.60 mm**	7.6
13.2 mm	26.3	**0.30 mm**	5.8
4.75 mm	18.3	**0.15 mm**	4.5
2.36 mm	13.6	**0.075 mm**	3.3

GENIVAR

PARTICLE SIZE DISTRIBUTION ASTM D422



MIT Classification System

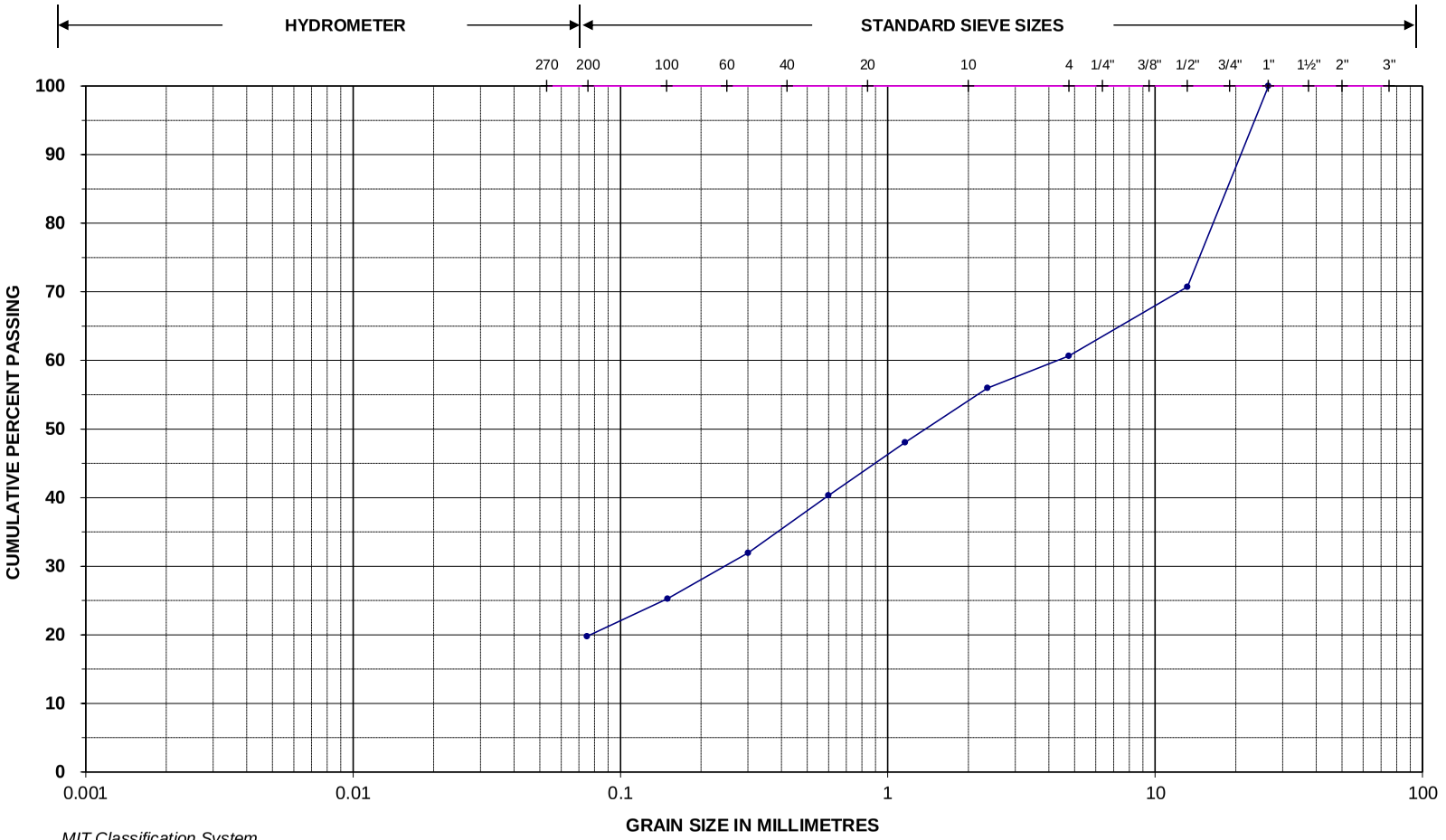
CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Porstmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-6
Sample No./Depth: SS7 / 4.6-5.0m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer	% passing
26.5 mm	100.0	**0.850 mm**	96.8	0.053	8.3
13.2 mm	97.8	**0.425 mm**	96.1	0.024	6.5
9.50 mm	97.8	**0.250 mm**	95.0	0.007	4.7
4.75 mm	97.7	**0.106 mm**	40.9	0.003	3.6
2.00 mm	97.2	**0.075 mm**	15.9	0.001	3.0

GENIVAR

PARTICLE SIZE DISTRIBUTION



MIT Classification System

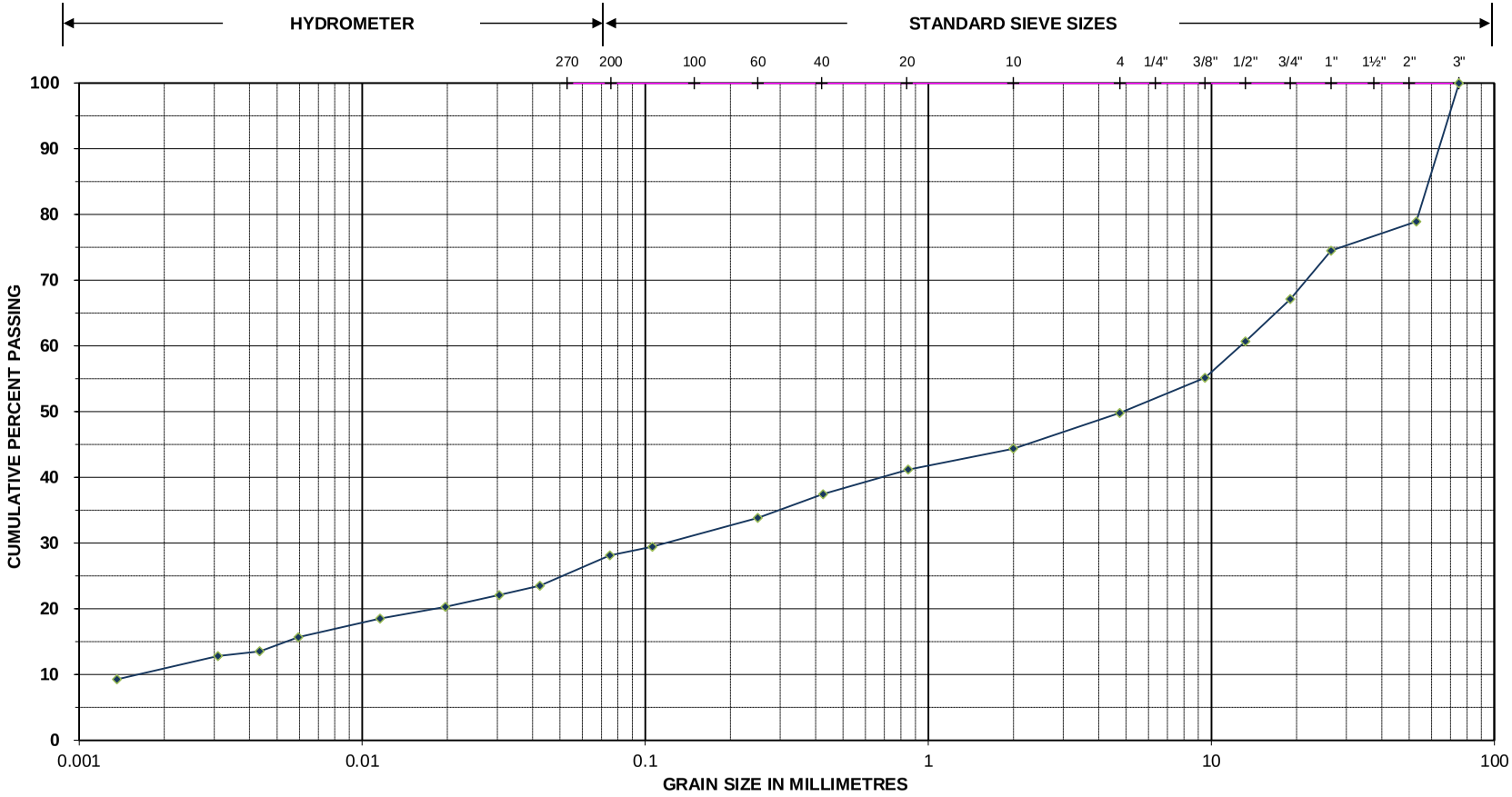
CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name:	Portsmouth Pumping Station / Front Street	**Project No.:**	131-18048-00
Location ID.:	BH13-8	**Sample No./Depth:**	SS2A

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine
37.5 mm	100.0	**1.16 mm**	48.0
26.5 mm	100.0	**0.60 mm**	40.3
13.2 mm	70.7	**0.30 mm**	31.9
4.75 mm	60.6	**0.15 mm**	25.3
2.36 mm	56.0	**0.075 mm**	19.8

GENIVAR

PARTICLE SIZE DISTRIBUTION ASTM D422



MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Porstmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-8
Sample No./Depth: SS6 / 3.8-4.3 m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer (mm)	% Passing
53.0 mm	78.9	**0.850 mm**	41.2	**0.042**	23.5
19.0 mm	67.1	**0.425 mm**	37.5	**0.020**	20.3
13.2 mm	60.7	**0.250 mm**	33.9	**0.006**	15.7
4.75 mm	49.8	**0.106 mm**	29.5	**0.003**	12.8
2.00 mm	44.4	**0.075 mm**	28.2	**0.001**	9.3

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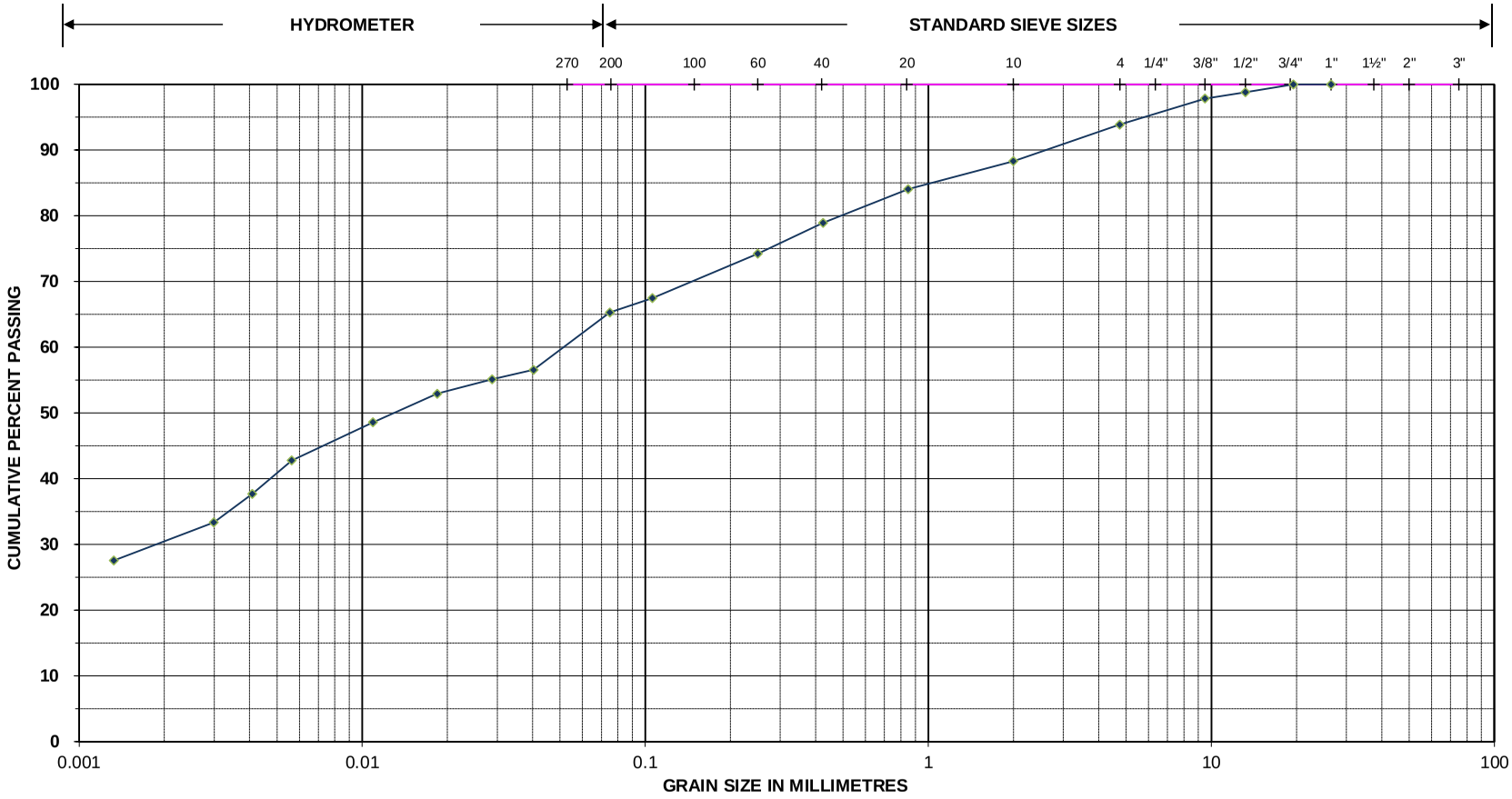

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Porstmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-12
Sample No./Depth: AS2 / 0.8-1.2

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer	% passing
26.5 mm	100.0	**0.850 mm**	84.1	0.040	56.6
13.2 mm	100.0	**0.425 mm**	78.9	0.018	52.9
9.50 mm	98.8	**0.250 mm**	74.2	0.006	42.8
4.75 mm	93.9	**0.106 mm**	67.5	0.003	33.4
2.00 mm	88.3	**0.075 mm**	65.3	0.001	27.6

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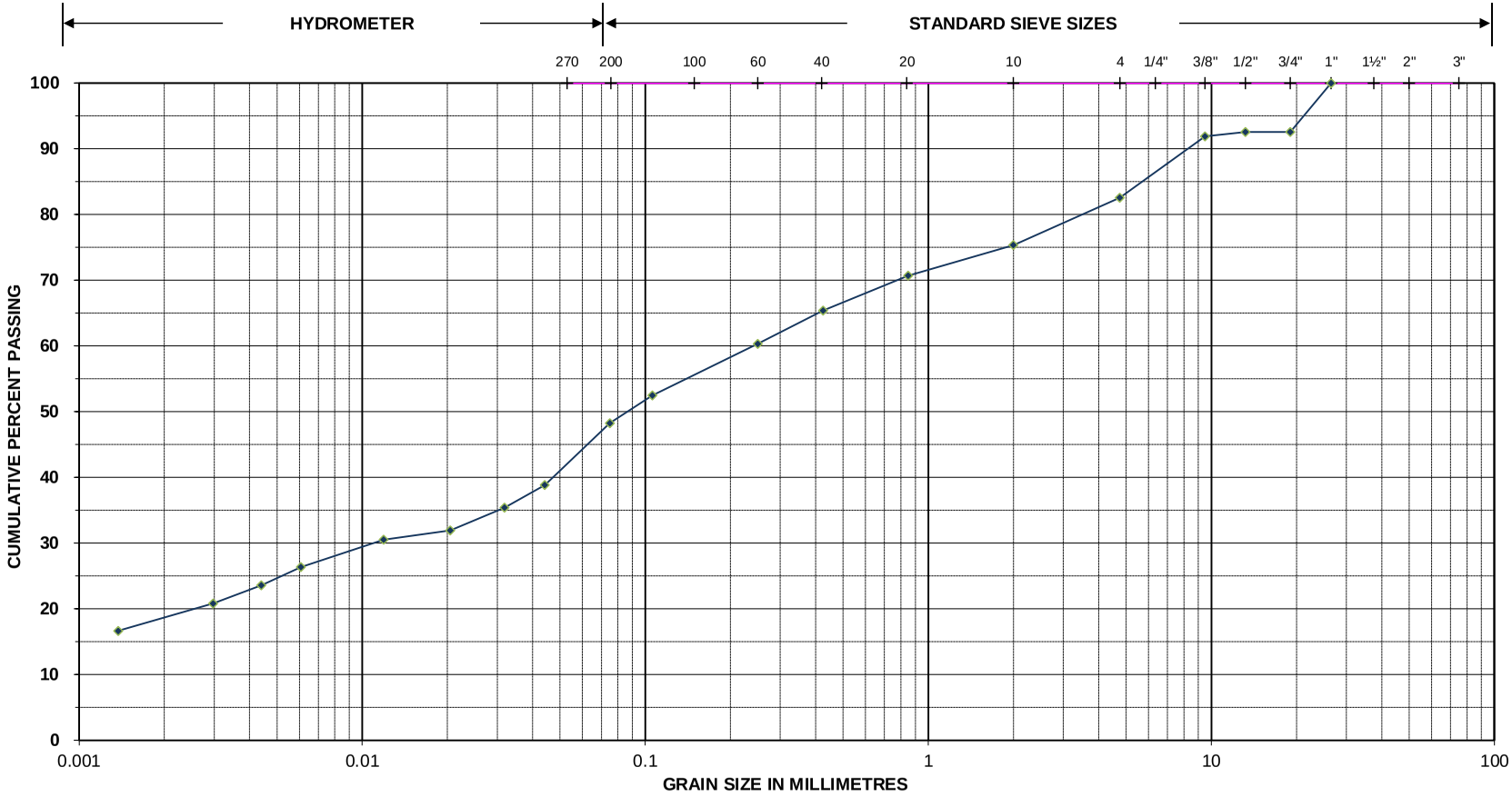

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Porstmouth Pumping Station / Front Street **Project No.:** 131-18048-00

Location ID.: BH13-14 **Sample No./Depth:** SS2

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer	% passing
26.5 mm	100.0	**0.850 mm**	70.7	0.044	38.9
13.2 mm	92.6	**0.425 mm**	65.4	0.020	31.9
9.50 mm	92.6	**0.250 mm**	60.3	0.006	26.4
4.75 mm	82.6	**0.106 mm**	52.5	0.003	20.8
2.00 mm	75.3	**0.075 mm**	48.3	0.001	16.7

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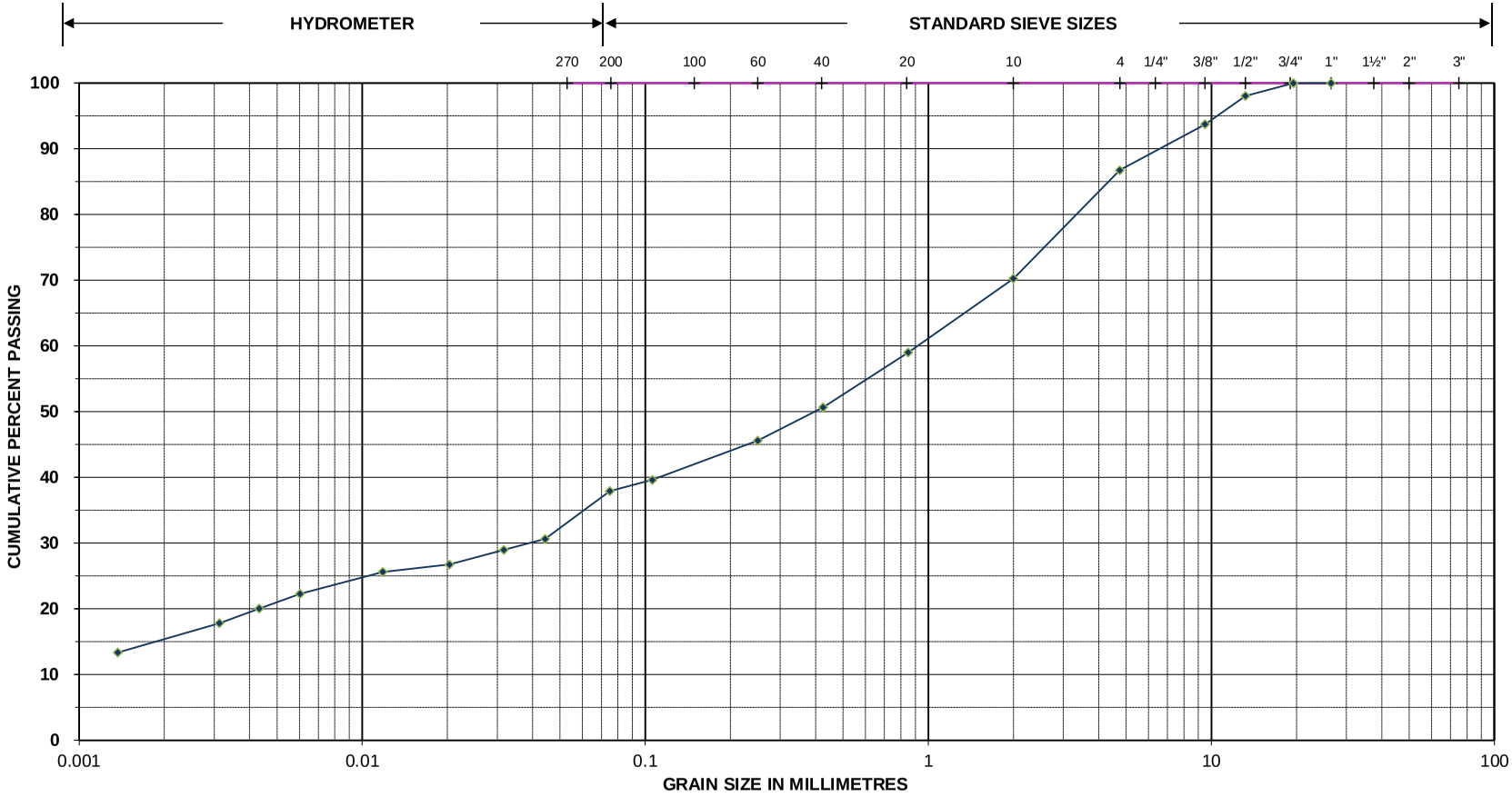

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Porstmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-17
Sample No./Depth: SS3A / 1.5-1.6 m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer	% passing
26.5 mm	100.0	**0.850 mm**	59.0	**0.044**	30.6
13.2 mm	100.0	**0.425 mm**	50.7	**0.020**	26.7
9.50 mm	93.7	**0.250 mm**	45.6	**0.006**	22.3
4.75 mm	86.7	**0.106 mm**	39.6	**0.003**	17.8
2.00 mm	70.3	**0.075 mm**	37.9	**0.001**	13.4

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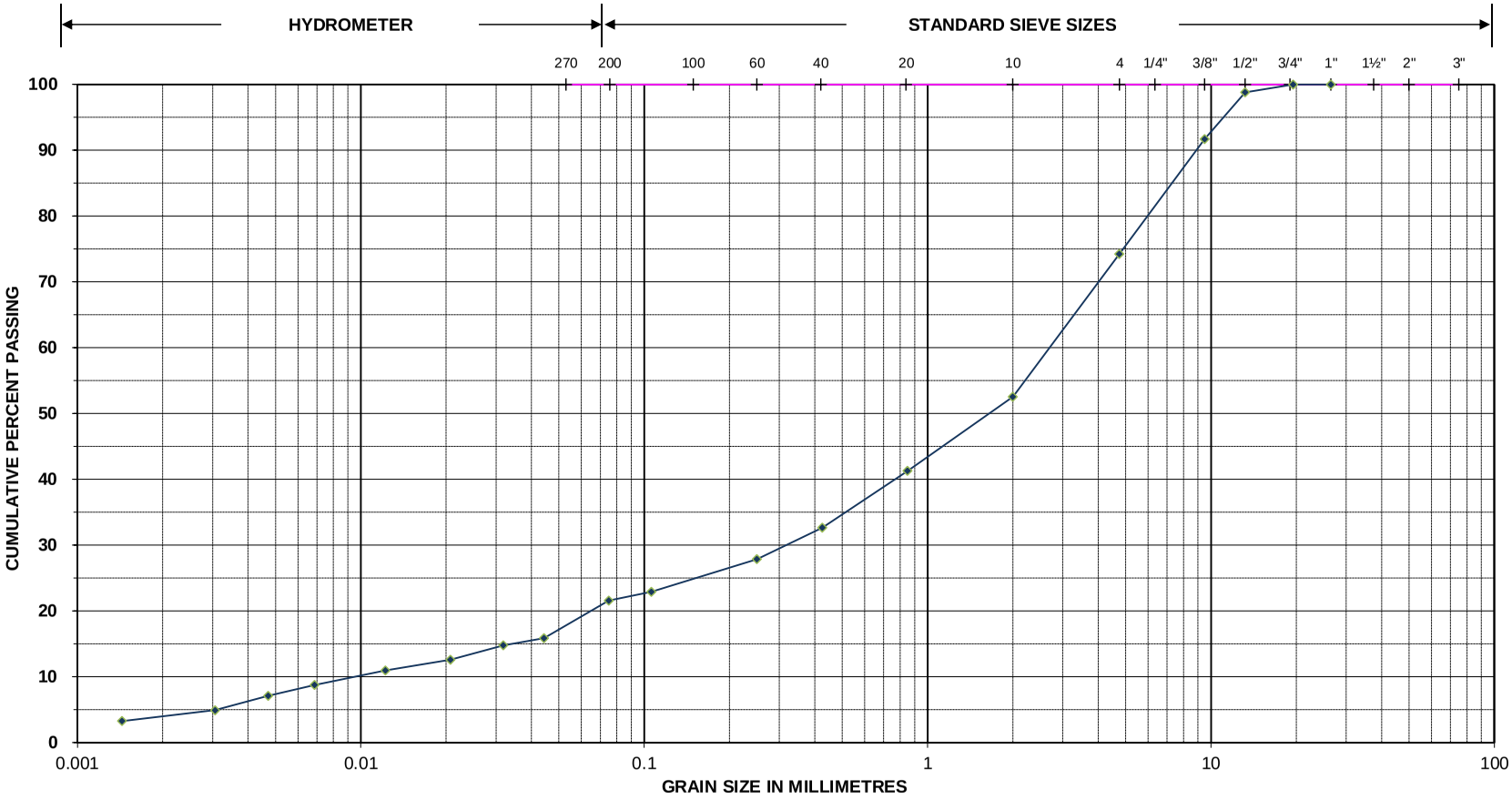

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Porstmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-19
Sample No./Depth: SS1 / 0.2-0.6m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer	% passing
26.5 mm	100.0	**0.850 mm**	41.3	0.044	15.9
13.2 mm	100.0	**0.425 mm**	32.7	0.021	12.6
9.50 mm	98.8	**0.250 mm**	27.9	0.007	8.8
4.75 mm	74.2	**0.106 mm**	22.9	0.003	4.9
2.00 mm	52.5	**0.075 mm**	21.6	0.001	3.3

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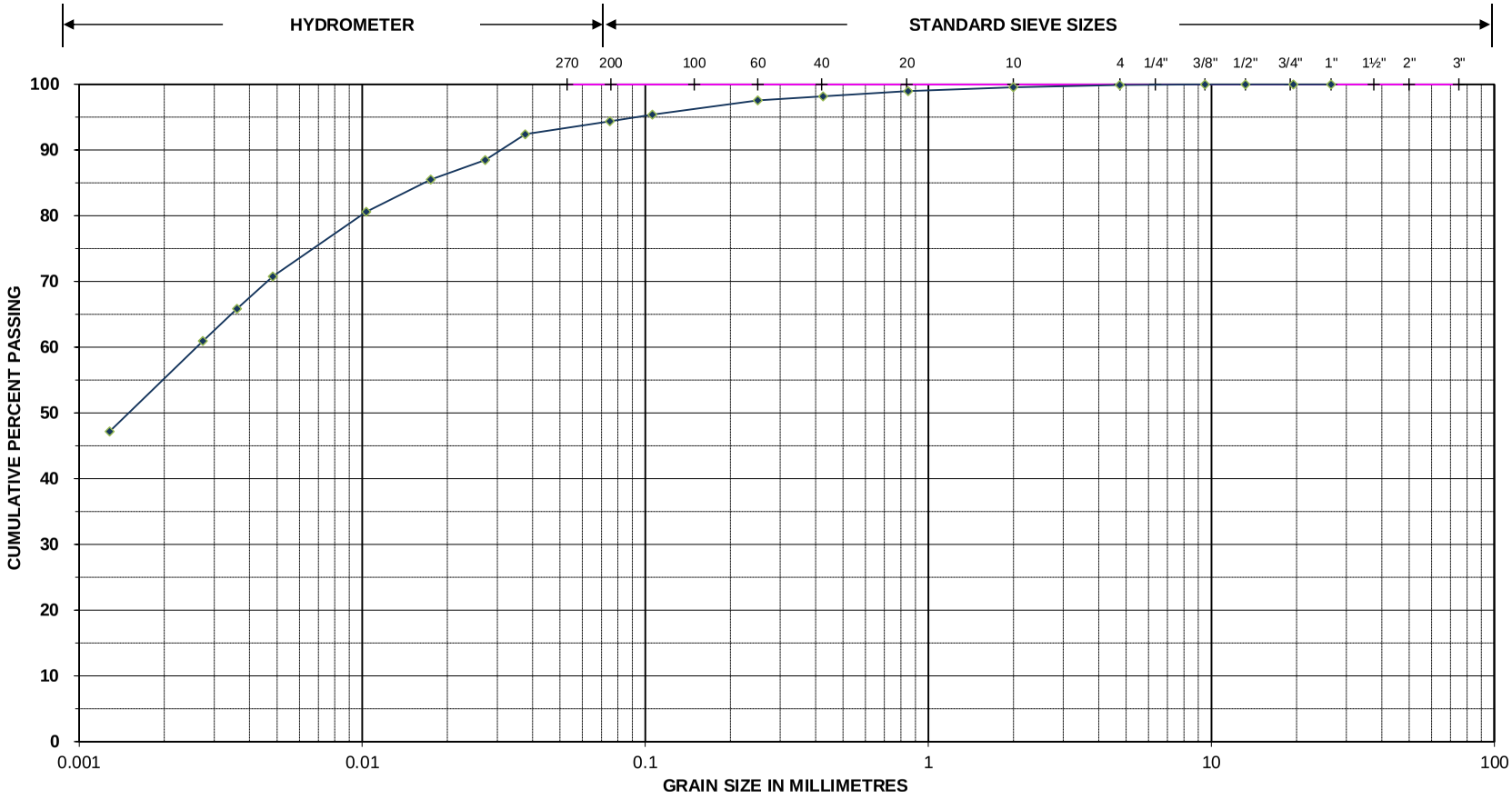

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Porstmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-21
Sample No./Depth: SS2

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer	% passing
26.5 mm	100.0	**0.850 mm**	99.0	0.038	92.4
13.2 mm	100.0	**0.425 mm**	98.2	0.017	85.5
9.50 mm	100.0	**0.250 mm**	97.6	0.005	70.8
4.75 mm	99.9	**0.106 mm**	95.4	0.003	61.0
2.00 mm	99.6	**0.075 mm**	94.4	0.001	47.2

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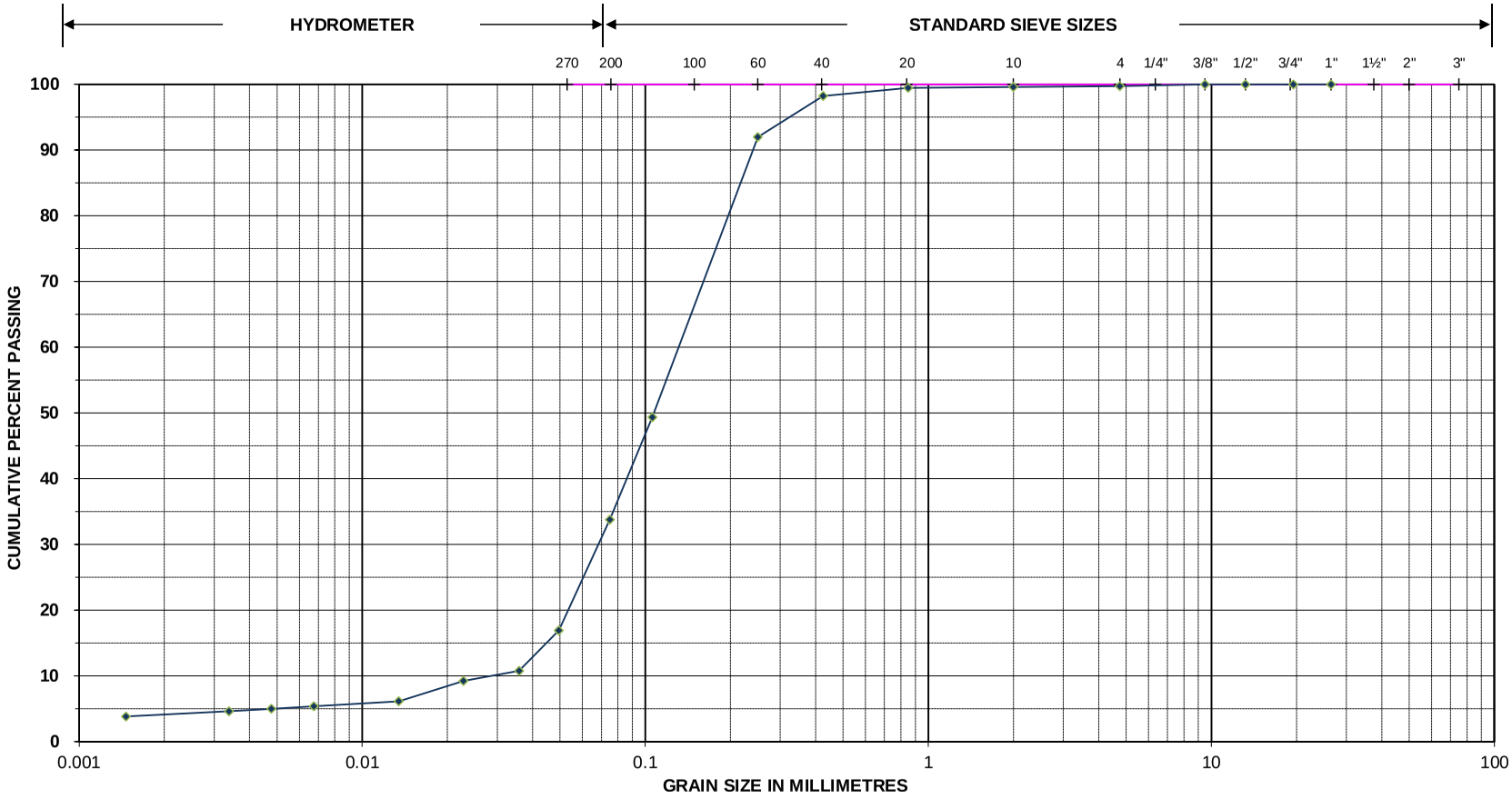

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Porstmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-22
Sample No./Depth: SS5 / 3.0-3.7m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer	% passing
26.5 mm	100.0	**0.850 mm**	99.5	0.050	16.9
13.2 mm	100.0	**0.425 mm**	98.2	0.023	9.2
9.50 mm	100.0	**0.250 mm**	92.0	0.007	5.4
4.75 mm	99.7	**0.106 mm**	49.4	0.003	4.6
2.00 mm	99.6	**0.075 mm**	33.8	0.001	3.8

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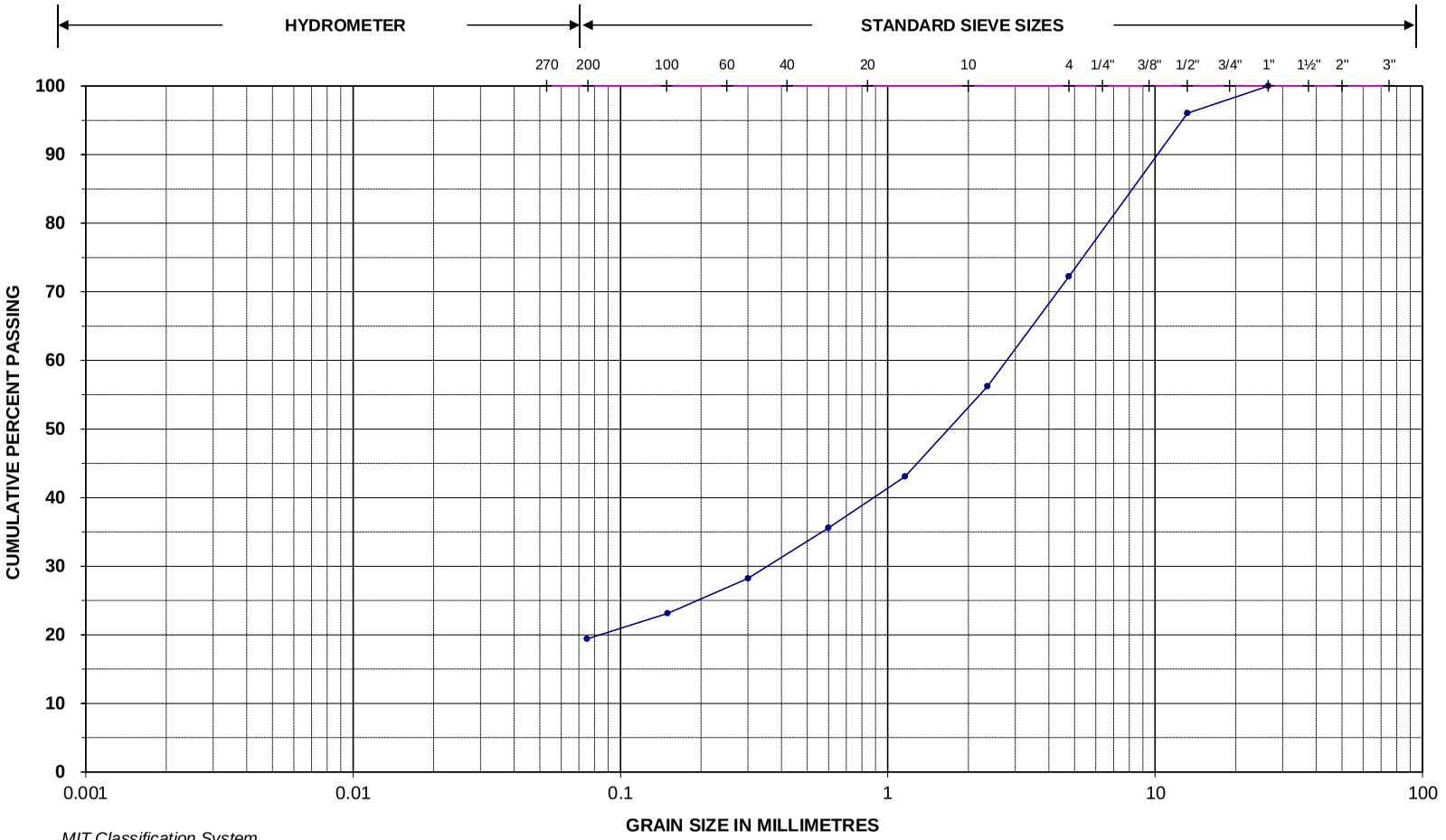

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name:	Portsmouth Pumping Station / Front Street	**Project No.:**	131-18048-00
Location ID.:	BH13-23	**Sample No./Depth:**	SS2A / 0.6-0.8m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine
37.5 mm	100.0	**1.16 mm**	43.1
26.5 mm	100.0	**0.60 mm**	35.6
13.2 mm	96.0	**0.30 mm**	28.2
4.75 mm	72.2	**0.15 mm**	23.1
2.36 mm	56.2	**0.075 mm**	19.4

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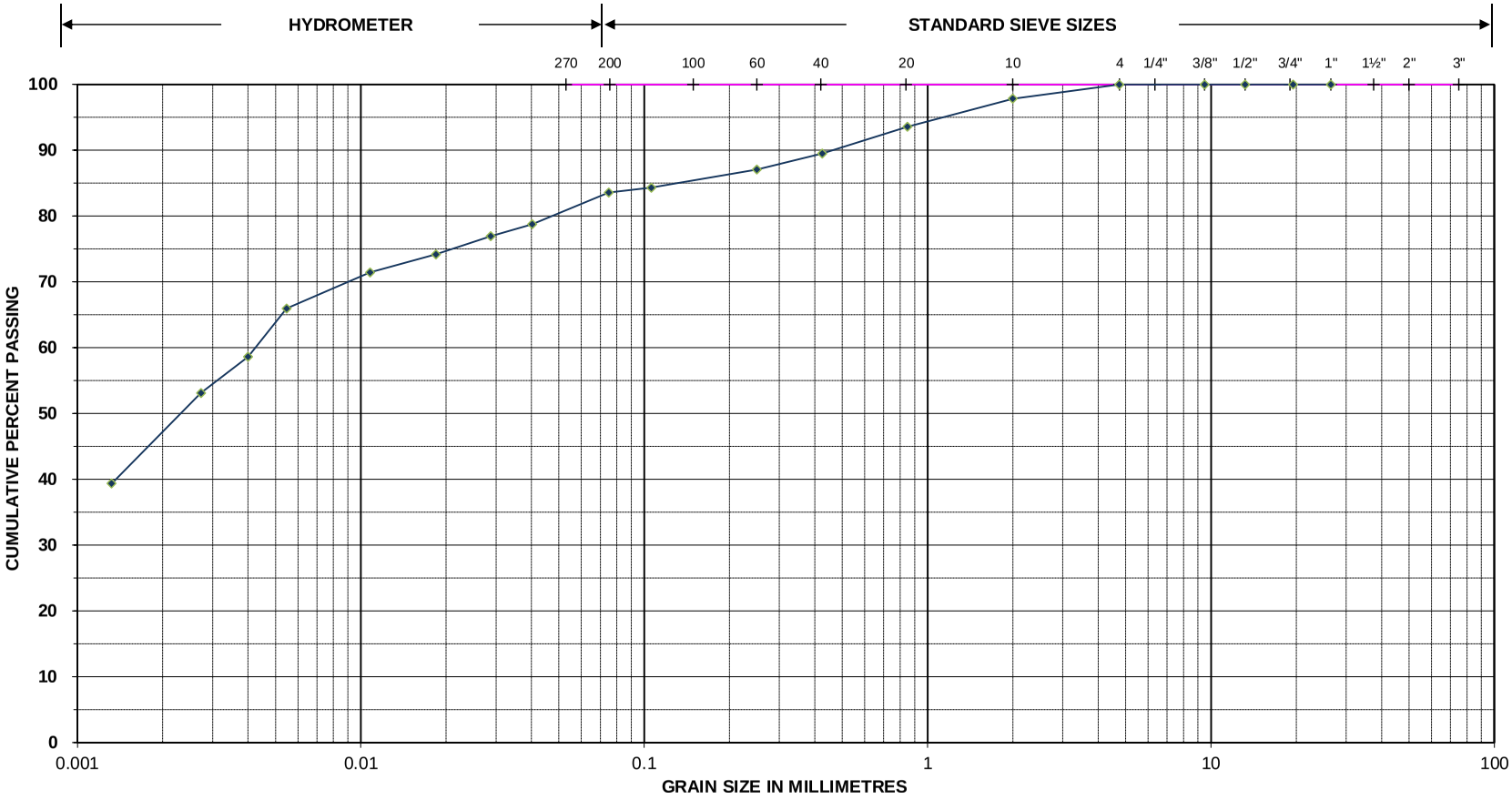

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Porstmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-26
Sample No./Depth: SS3 / 1.5-2.0m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer	% passing
26.5 mm	100.0	**0.850 mm**	93.6	0.040	78.8
13.2 mm	100.0	**0.425 mm**	89.5	0.018	74.2
9.50 mm	100.0	**0.250 mm**	87.1	0.005	65.9
4.75 mm	100.0	**0.106 mm**	84.3	0.003	53.1
2.00 mm	97.8	**0.075 mm**	83.6	0.001	39.4

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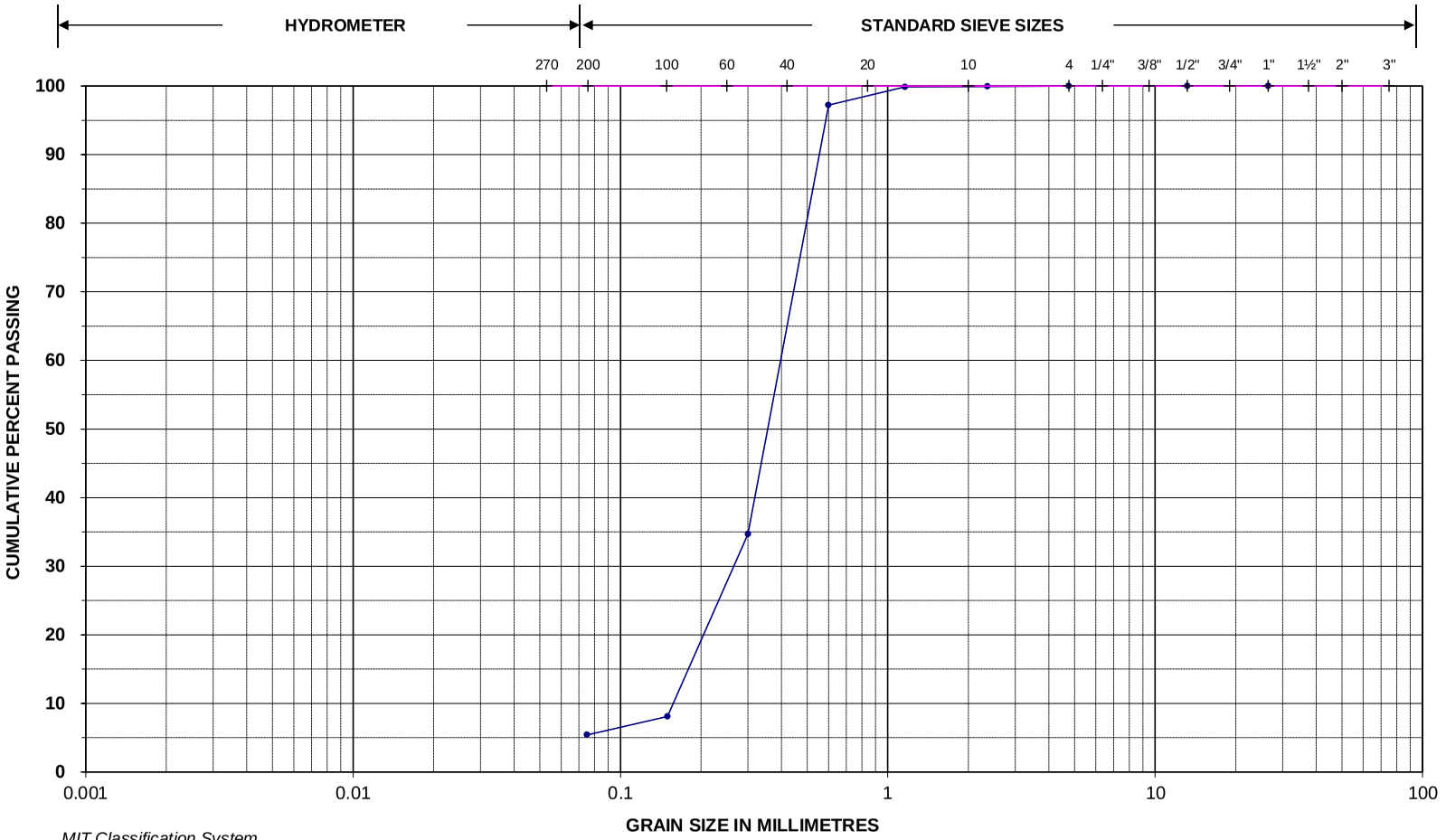

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Portsmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-28
Sample No./Depth: SS5 / 3.0-3.5m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine
37.5 mm	100.0	**1.16 mm**	99.9
26.5 mm	100.0	**0.60 mm**	97.2
13.2 mm	100.0	**0.30 mm**	34.7
4.75 mm	100.0	**0.15 mm**	8.1
2.36 mm	99.9	**0.075 mm**	5.4

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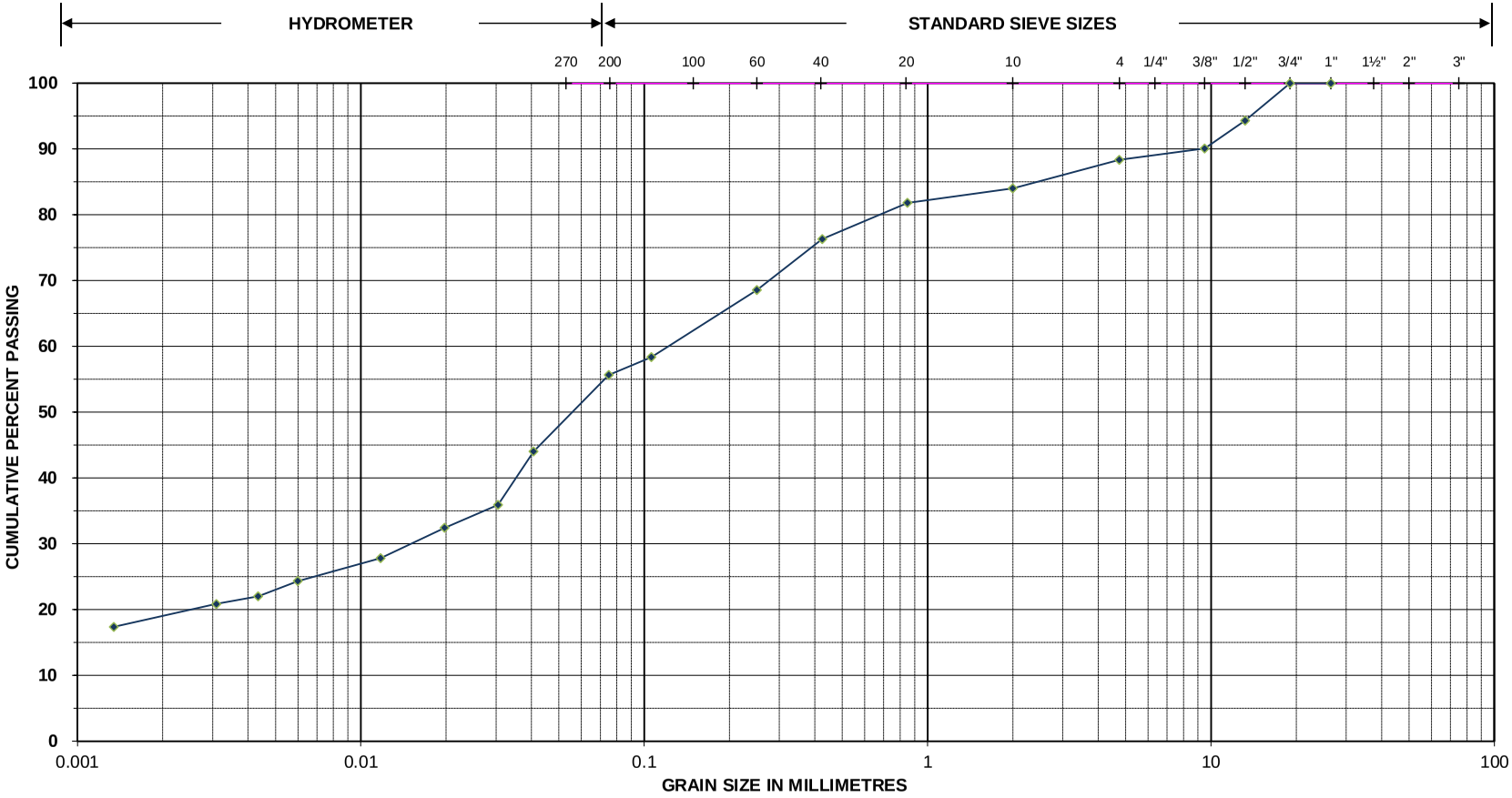

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Porstmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-30
Sample No./Depth: SS5 / 3.0-3.5 m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer	% passing
26.5 mm	100.0	**0.850 mm**	81.8	0.041	44.0
13.2 mm	100.0	**0.425 mm**	76.3	0.020	32.4
9.50 mm	94.3	**0.250 mm**	68.6	0.006	24.3
4.75 mm	88.4	**0.106 mm**	58.4	0.003	20.9
2.00 mm	84.0	**0.075 mm**	55.7	0.001	17.4

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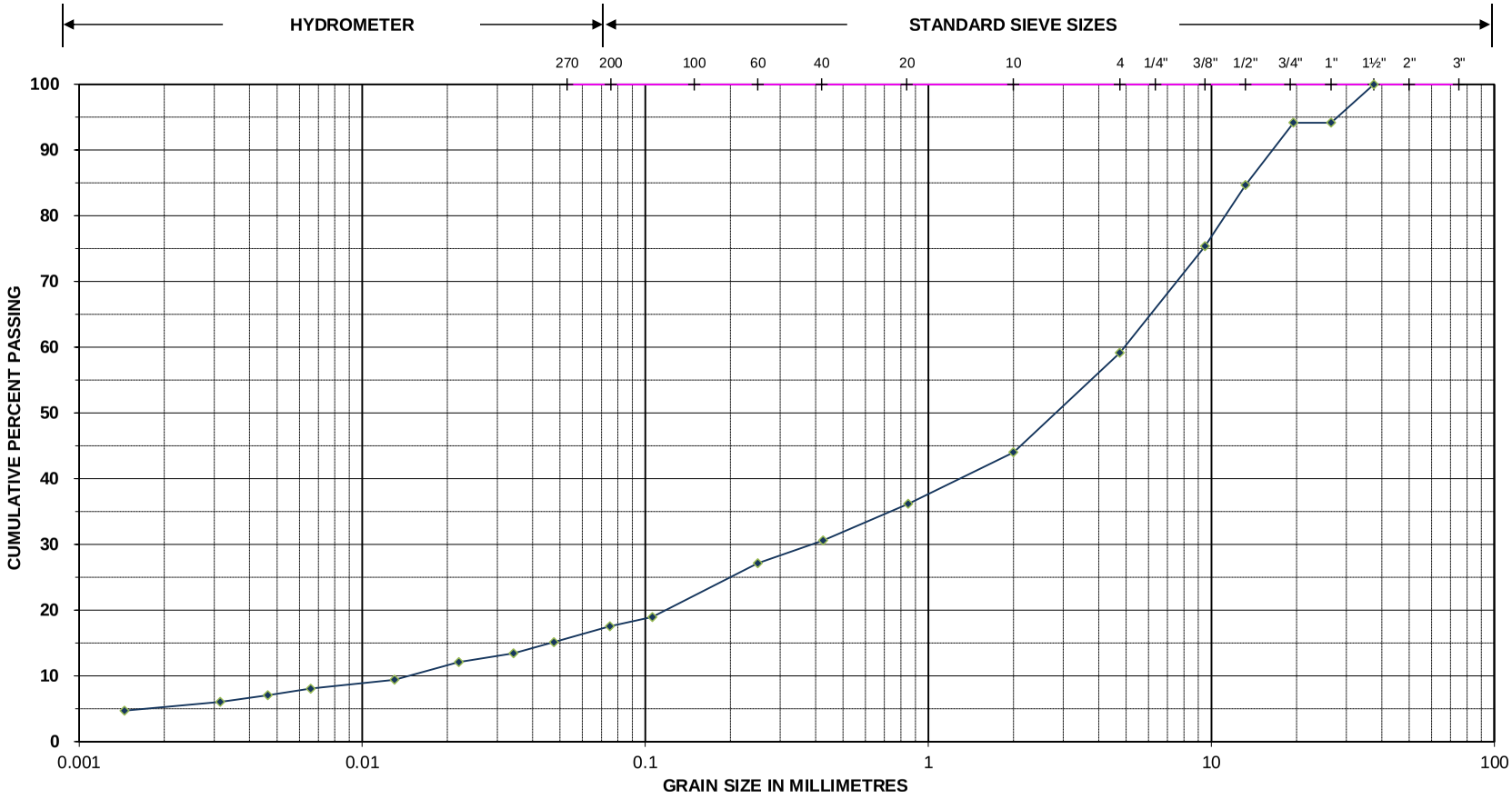

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Porstmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-34
Sample No./Depth: SS3 / 1.5-2.0m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer	% passing
26.5 mm	94.2	**0.850 mm**	36.2	0.048	15.1
13.2 mm	94.2	**0.425 mm**	30.6	0.022	12.1
9.50 mm	84.7	**0.250 mm**	27.1	0.007	8.1
4.75 mm	59.2	**0.106 mm**	19.0	0.003	6.1
2.00 mm	44.0	**0.075 mm**	17.5	0.001	4.7

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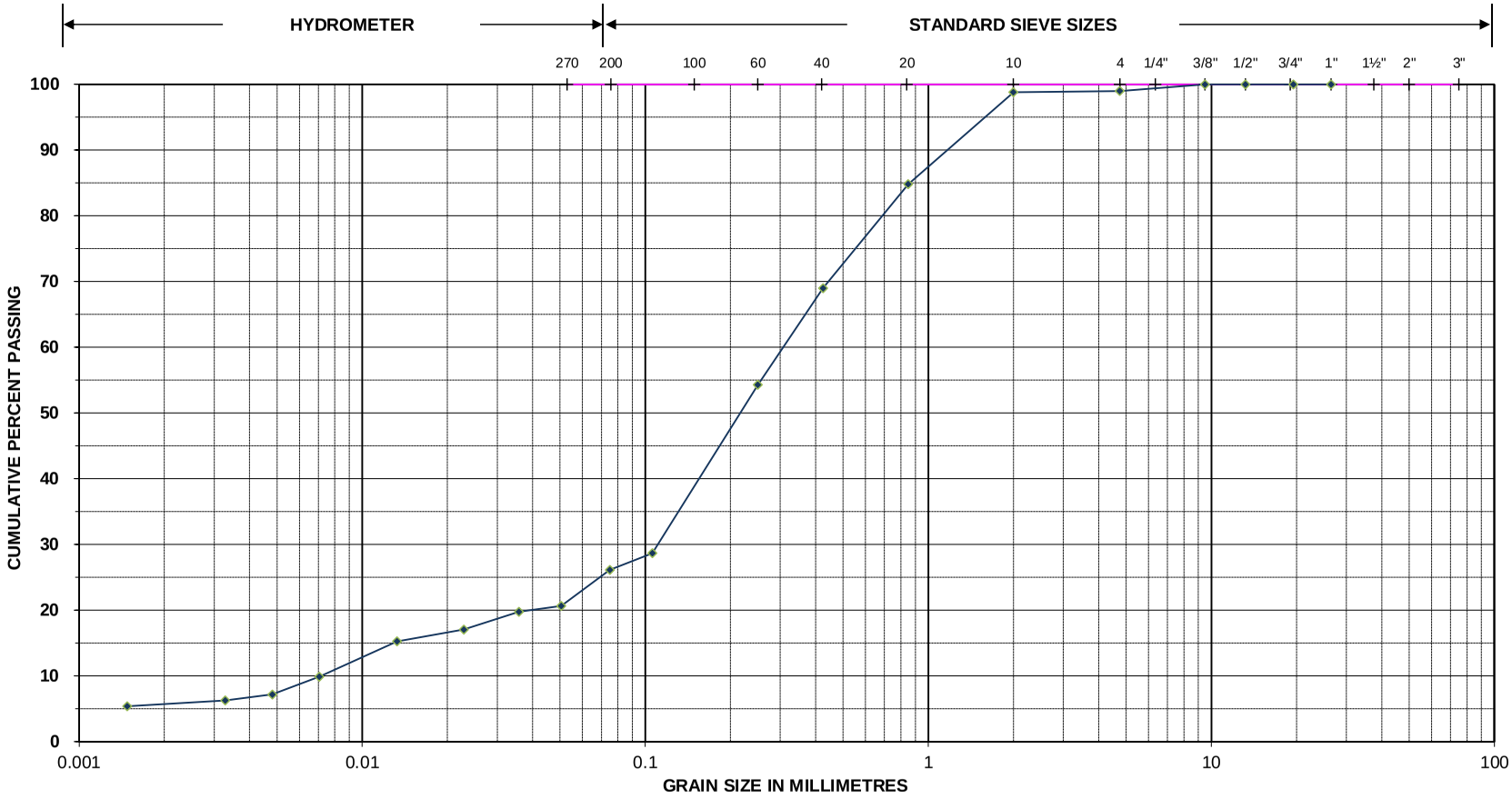

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name:	Porstmouth Pumping Station / Front Street	**Project No.:**	131-18048-00
Location ID.:	BH13-36	**Sample No./Depth:**	SS4 / 2.3-2.7m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer	% passing
26.5 mm	100.0	**0.850 mm**	84.8	0.051	20.7
13.2 mm	100.0	**0.425 mm**	69.0	0.023	17.1
9.50 mm	100.0	**0.250 mm**	54.3	0.007	9.9
4.75 mm	99.0	**0.106 mm**	28.7	0.003	6.3
2.00 mm	98.8	**0.075 mm**	26.1	0.001	5.4

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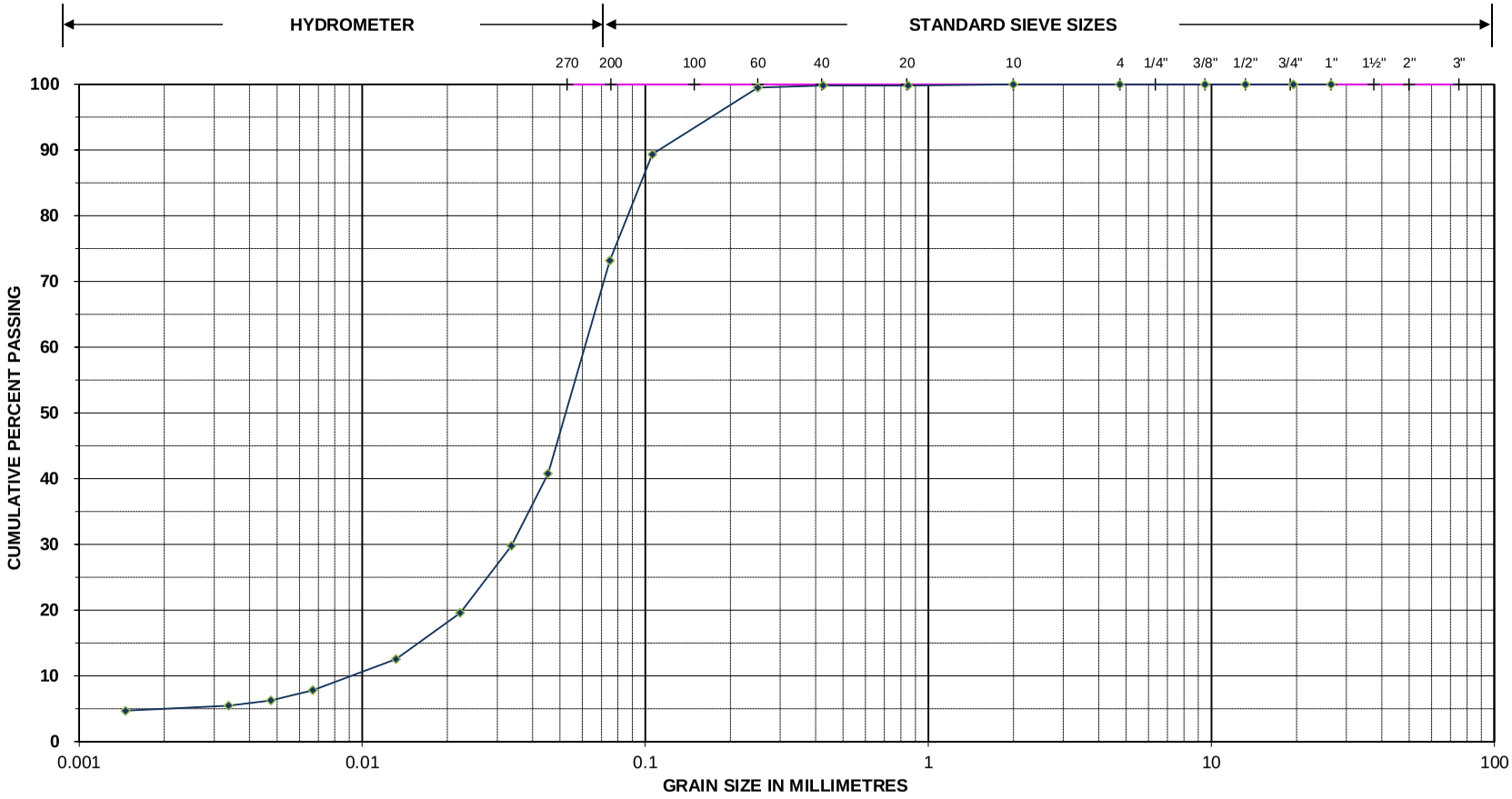

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Porstmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-36
Sample No./Depth: SS7 / 6.1-6.6m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer	% passing
26.5 mm	100.0	**0.850 mm**	99.8	0.045	40.8
13.2 mm	100.0	**0.425 mm**	99.8	0.022	19.6
9.50 mm	100.0	**0.250 mm**	99.5	0.007	7.8
4.75 mm	100.0	**0.106 mm**	89.4	0.003	5.5
2.00 mm	100.0	**0.075 mm**	73.2	0.001	4.7

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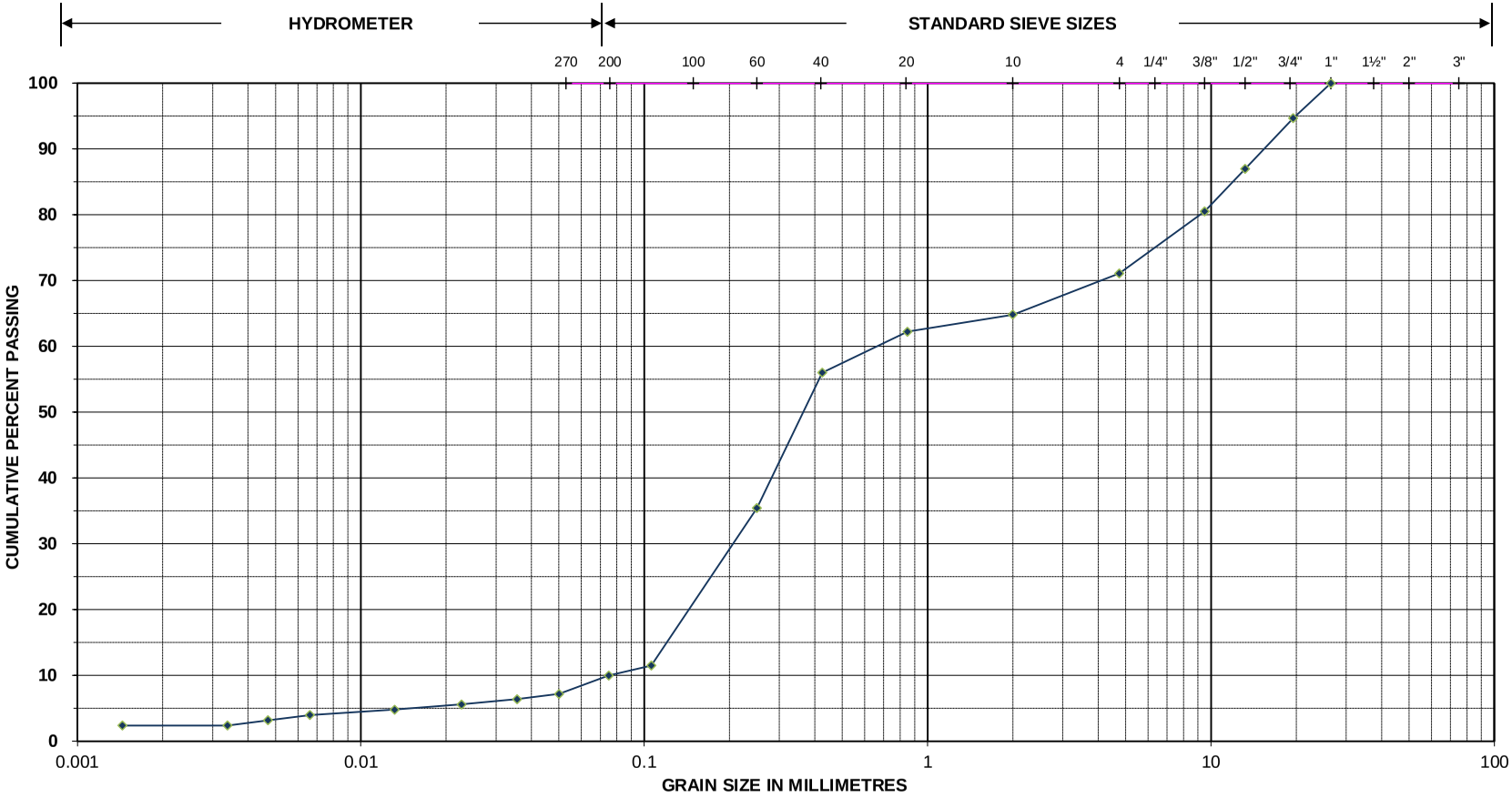

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name:	Porstmouth Pumping Station / Front Street	**Project No.:**	131-18048-00
Location ID.:	BH13-38	**Sample No./Depth:**	SS6 / 3.8-4.3 m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer (mm)	% Passing
26.5 mm	100.0	**0.850 mm**	62.2	**0.050**	7.2
13.2 mm	94.7	**0.425 mm**	56.0	**0.023**	5.6
9.50 mm	80.5	**0.250 mm**	35.4	**0.007**	4.0
4.75 mm	71.1	**0.106 mm**	11.5	**0.003**	2.4
2.00 mm	64.8	**0.075 mm**	10.0	**0.001**	2.4

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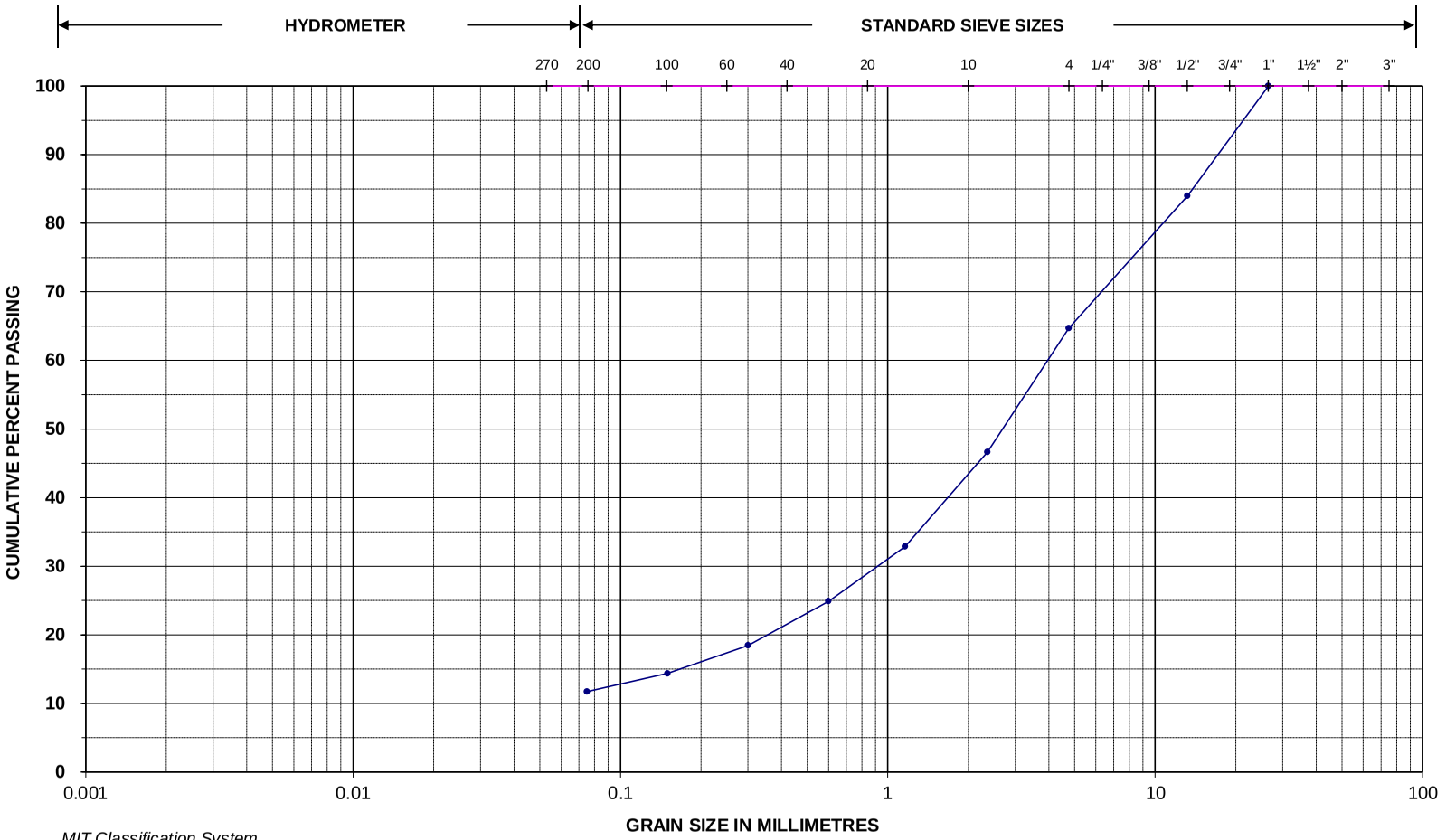

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name:	Portsmouth Pumping Station / Front Street	**Project No.:**	131-18048-00
Location ID.:	BH13-40	**Sample No./Depth:**	SS4 / 2.3-2.9m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine
37.5 mm	100.0	**1.16 mm**	32.9
26.5 mm	100.0	**0.60 mm**	24.9
13.2 mm	84.0	**0.30 mm**	18.4
4.75 mm	64.7	**0.15 mm**	14.4
2.36 mm	46.6	**0.075 mm**	11.7

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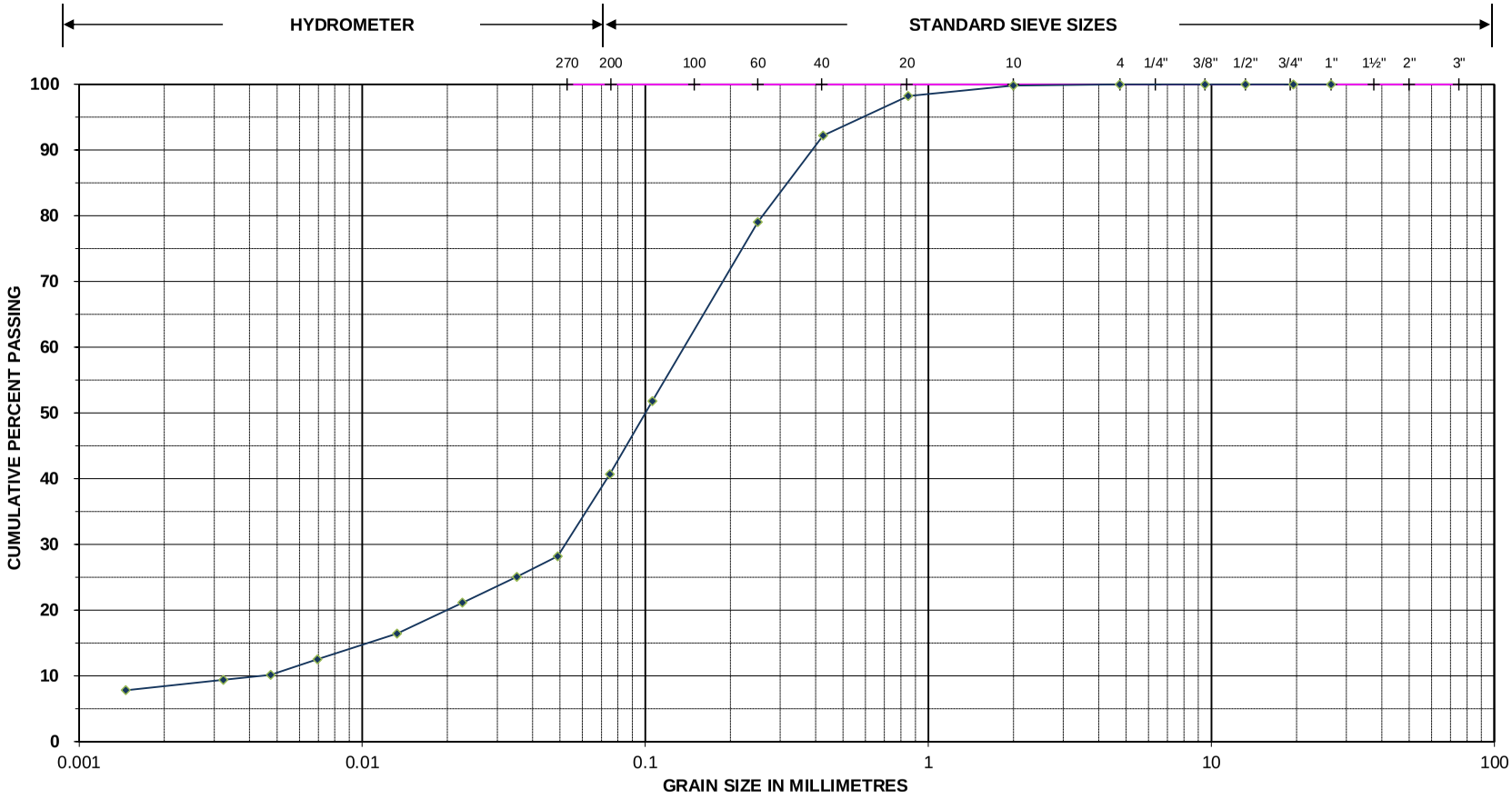

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Porstmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-40
Sample No./Depth: SS6 / 4.6-5.2m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer	% passing
26.5 mm	100.0	**0.850 mm**	98.2	0.049	28.2
13.2 mm	100.0	**0.425 mm**	92.2	0.023	21.2
9.50 mm	100.0	**0.250 mm**	79.1	0.007	12.5
4.75 mm	100.0	**0.106 mm**	51.8	0.003	9.4
2.00 mm	99.8	**0.075 mm**	40.7	0.001	7.8

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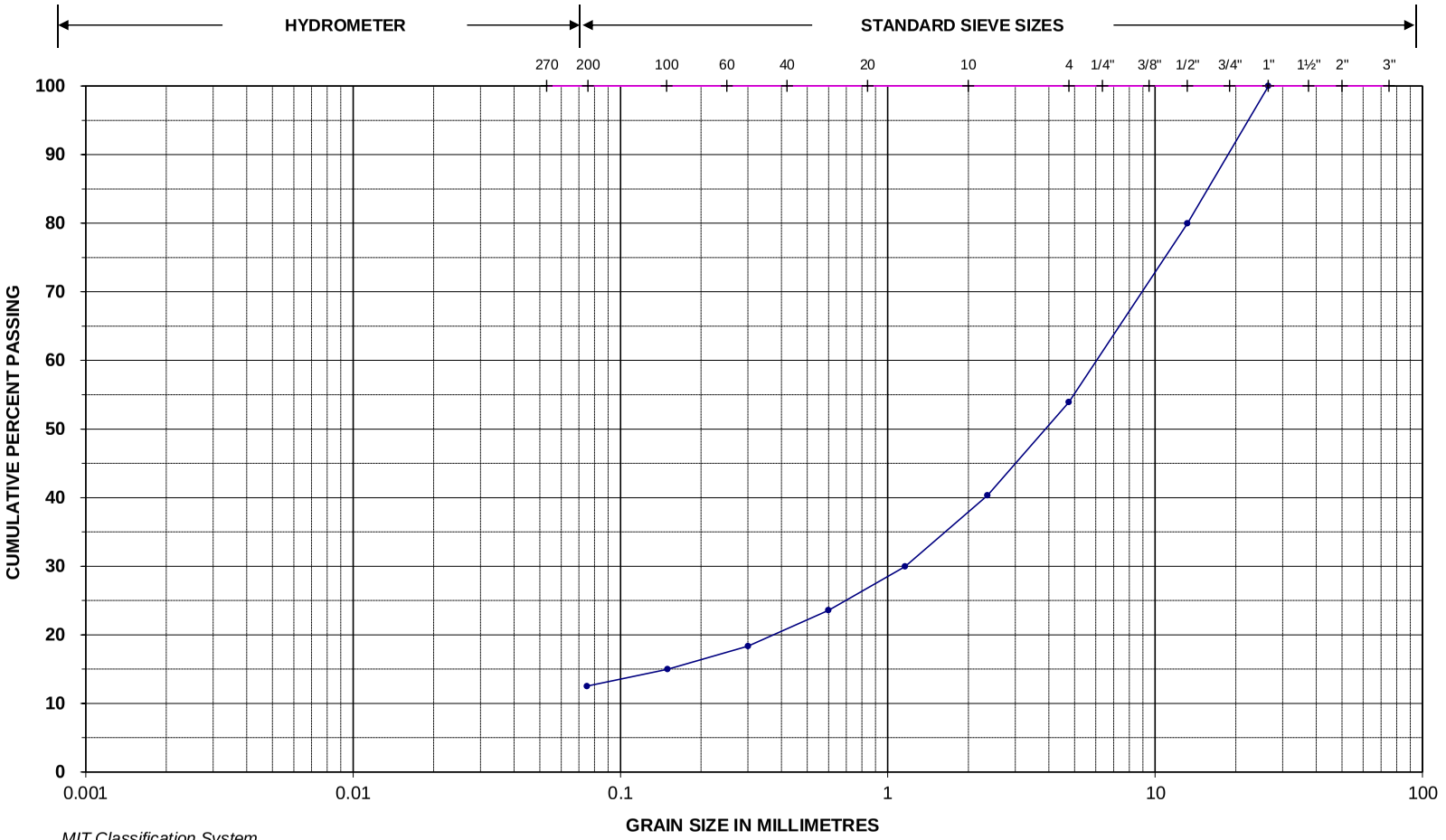

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name:	Portsmouth Pumping Station / Front Street	**Project No.:**	131-18048-00
Location ID.:	BH13-42	**Sample No./Depth:**	SS2 / 0.8-1.2m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine
37.5 mm	100.0	**1.16 mm**	30.0
26.5 mm	100.0	**0.60 mm**	23.6
13.2 mm	80.0	**0.30 mm**	18.3
4.75 mm	53.9	**0.15 mm**	15.0
2.36 mm	40.3	**0.075 mm**	12.5

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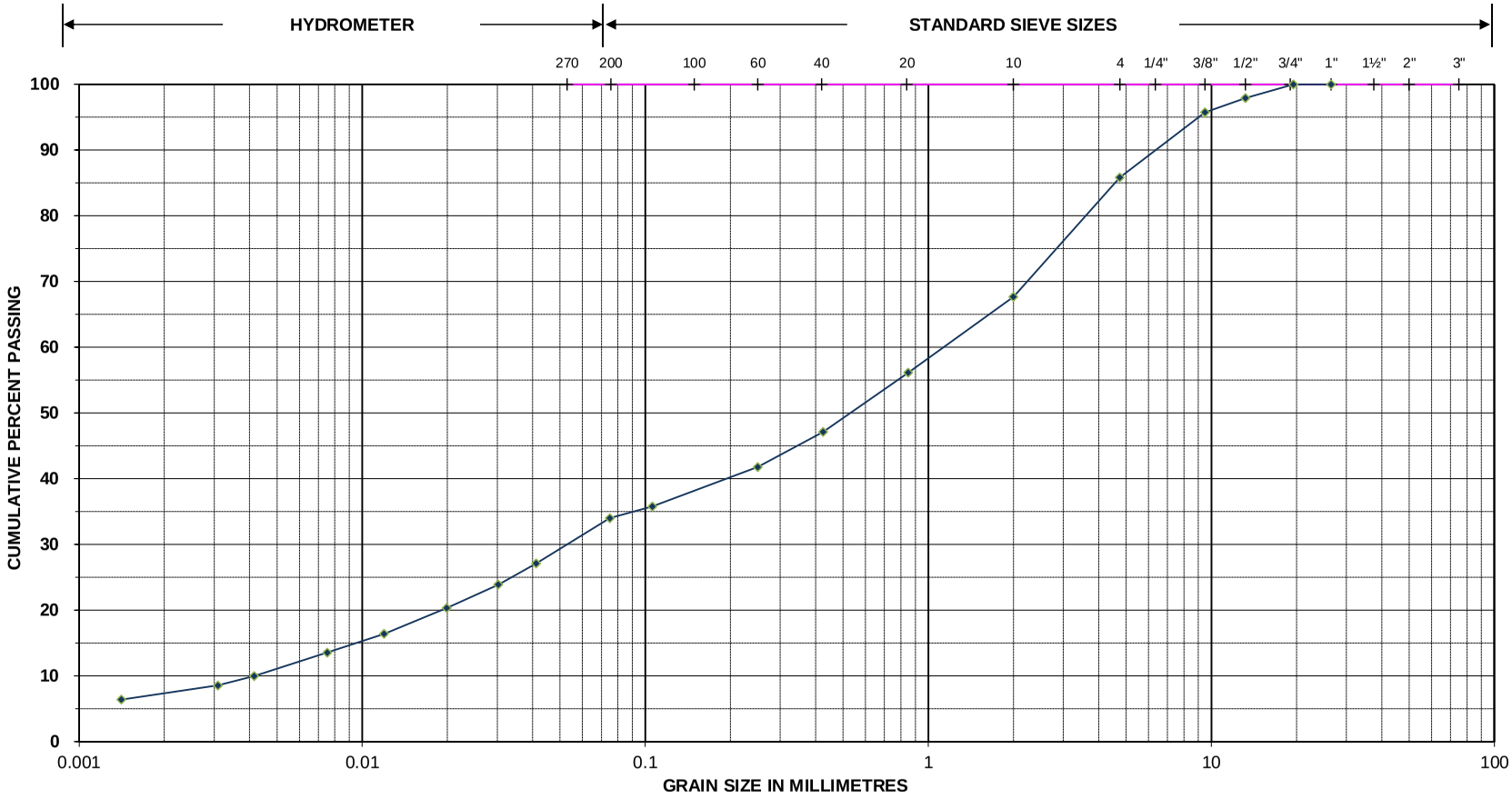

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Porstmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-44
Sample No./Depth: SS1 / 0.2-0.6m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer	% passing
26.5 mm	100.0	**0.850 mm**	56.1	0.041	27.1
13.2 mm	100.0	**0.425 mm**	47.1	0.020	20.3
9.50 mm	97.9	**0.250 mm**	41.8	0.008	13.6
4.75 mm	85.8	**0.106 mm**	35.8	0.003	8.6
2.00 mm	67.7	**0.075 mm**	34.0	0.001	6.4

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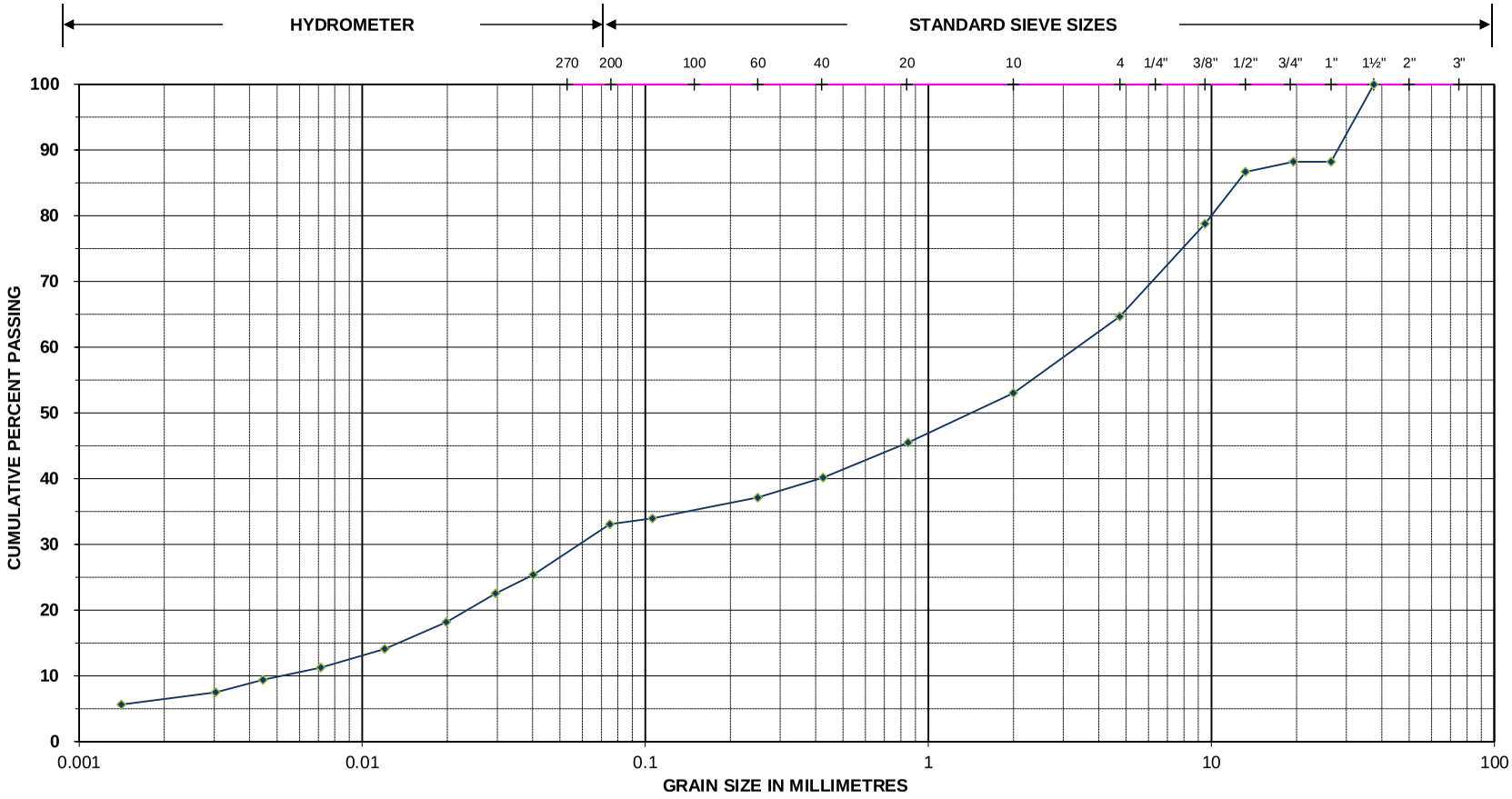

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Porstmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-47
Sample No./Depth: SS2 / 0.8-1.2m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer	% passing
26.5 mm	88.2	**0.850 mm**	45.5	0.040	25.4
13.2 mm	88.2	**0.425 mm**	40.2	0.020	18.2
9.50 mm	86.7	**0.250 mm**	37.1	0.007	11.3
4.75 mm	64.7	**0.106 mm**	34.0	0.003	7.5
2.00 mm	53.1	**0.075 mm**	33.1	0.001	5.6

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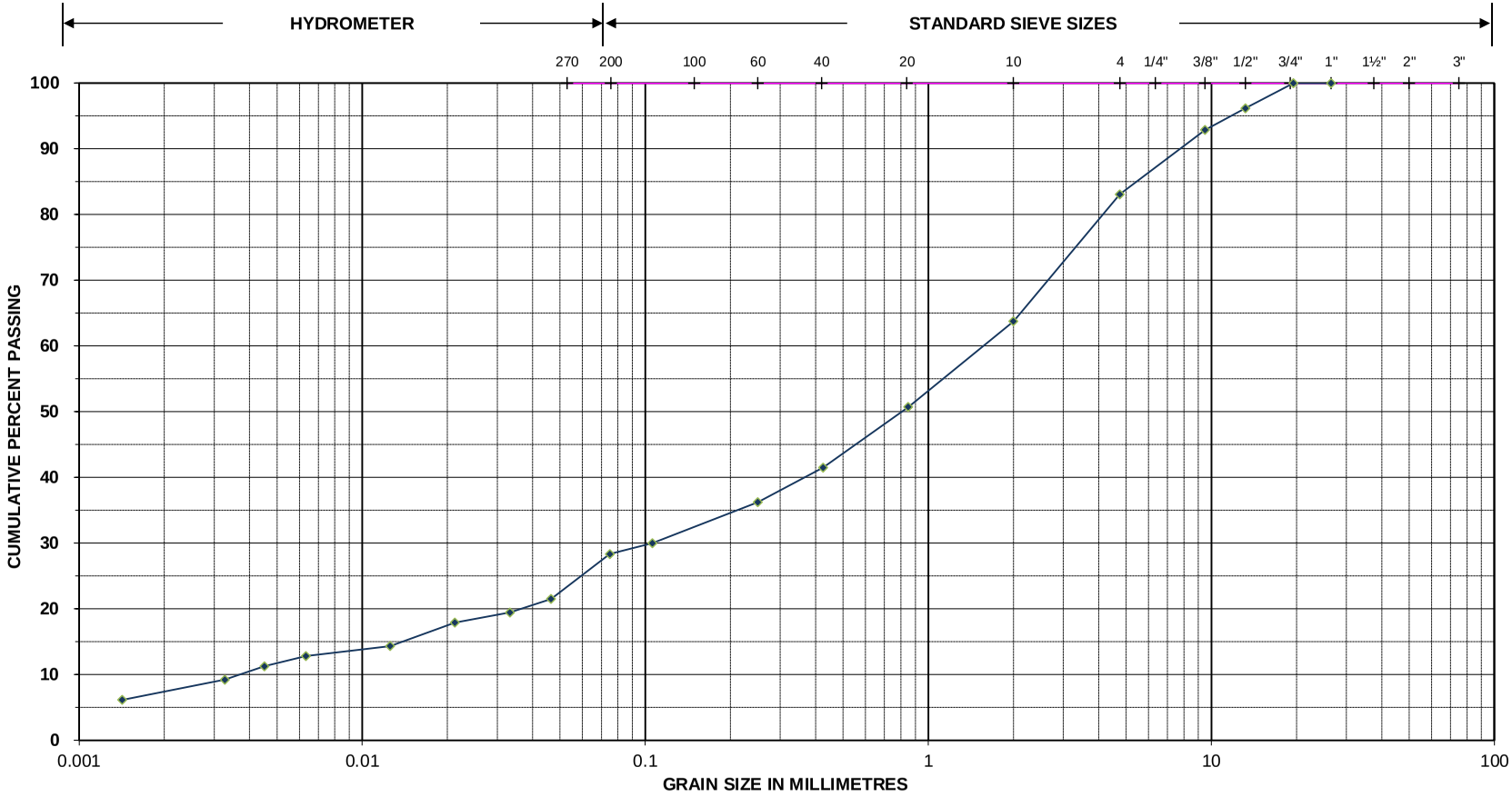

MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: Porstmouth Pumping Station / Front Street
Project No.: 131-18048-00
Location ID.: BH13-47
Sample No./Depth: SS4 / 2.3-2.5 m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer	% passing
26.5 mm	100.0	**0.850 mm**	50.7	**0.046**	21.5
13.2 mm	100.0	**0.425 mm**	41.5	**0.021**	17.9
9.50 mm	92.9	**0.250 mm**	36.2	**0.006**	12.8
4.75 mm	83.1	**0.106 mm**	30.0	**0.003**	9.2
2.00 mm	63.8	**0.075 mm**	28.3	**0.001**	6.1

Appendix C

Laboratory Certificates of Analysis

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32310

REPORT No. B13-23276 (i)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 04-Sep-13
DATE REPORTED: 11-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-42-SS2	BH13-44-SS1	BH13-47-SS3	
			Sample I.D.		B13-23276-2	B13-23276-3	B13-23276-8	
			Date Collected		03-Sep-13	03-Sep-13	03-Sep-13	
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Antimony	µg/g	0.4	EPA 200.8	09-Sep-13/R	< 0.4	< 0.4	< 0.4	
Arsenic	µg/g	0.5	EPA 200.8	09-Sep-13/R	< 0.5	< 0.5	< 0.5	
Barium	µg/g	0.4	EPA 200.8	09-Sep-13/R	150	101	110	
Beryllium	µg/g	0.05	EPA 200.8	09-Sep-13/R	0.25	0.25	0.45	
Boron	µg/g	0.5	EPA 200.8	09-Sep-13/R	17.1	19.7	8.9	
Boron (HWS)	µg/g	0.02	MOE 3470	09-Sep-13/R	0.78	0.89	0.85	
Cadmium	µg/g	0.03	EPA 200.8	09-Sep-13/R	< 0.03	0.10	0.07	
Chromium	µg/g	0.4	EPA 200.8	09-Sep-13/R	12.1	13.4	20.8	
Chromium (VI)	µg/g	0.5	EPA7196A	09-Sep-13/O	< 0.5	< 0.5	< 0.5	
Cobalt	µg/g	0.2	EPA 200.8	09-Sep-13/R	0.7	2.3	5.8	
Copper	µg/g	0.4	EPA 200.8	09-Sep-13/R	7.9	11.6	16.0	
Lead	µg/g	0.1	EPA 200.8	09-Sep-13/R	9.8	35.6	7.7	
Mercury	µg/g	0.005	EPA7471A	11-Sep-13/R	< 0.005	< 0.005	< 0.005	
Molybdenum	µg/g	0.1	EPA 200.8	09-Sep-13/R	0.6	0.5	0.7	
Nickel	µg/g	0.4	EPA 200.8	09-Sep-13/R	6.8	8.9	12.6	
Selenium	µg/g	0.1	EPA 200.8	09-Sep-13/R	0.1	0.1	0.3	
Silver	µg/g	0.01	EPA 200.8	09-Sep-13/R	0.05	0.06	0.05	

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

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DATE REPORTED: 11-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-42-SS2	BH13-44-SS1	BH13-47-SS3	
			Sample I.D.		B13-23276-2	B13-23276-3	B13-23276-8	
			Date Collected		03-Sep-13	03-Sep-13	03-Sep-13	
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Thallium	µg/g	0.02	EPA 200.8	09-Sep-13/R	0.12	< 0.02	< 0.02	
Uranium	µg/g	0.02	EPA 200.8	09-Sep-13/R	0.37	0.33	0.53	
Vanadium	µg/g	0.8	EPA 200.8	09-Sep-13/R	11.3	13.0	34.5	
Zinc	µg/g	30	EPA 200.8	09-Sep-13/R	< 30	< 30	30	

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

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DATE RECEIVED: 04-Sep-13
DATE REPORTED: 11-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-42-SS1	BH13-44-SS2	BH13-44-SS3	BH13-47-SS1
			Sample I.D.		B13-23276-1	B13-23276-4	B13-23276-5	B13-23276-6
			Date Collected		03-Sep-13	03-Sep-13	03-Sep-13	03-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Poly-Chlorinated Biphenyls (PCB's)	µg/g	0.3	EPA 8080	06-Sep-13/K			< 0.3	
Aroclor	-		-	06-Sep-13			-	
Acetone	µg/g	0.5	EPA 8260	06-Sep-13/R	< 0.5	< 0.5		< 0.5
Benzene	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Bromodichloromethane	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Bromoform	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Bromomethane	µg/g	0.05	EPA 8260	06-Sep-13/R	< 0.05	< 0.05		< 0.05
Carbon Tetrachloride	µg/g	0.05	EPA 8260	06-Sep-13/R	< 0.05	< 0.05		< 0.05
Monochlorobenzene (Chlorobenzene)	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Chloroform	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Dibromochloromethane	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Dichlorobenzene,1,2-	µg/g	0.05	EPA 8260	06-Sep-13/R	< 0.05	< 0.05		< 0.05
Dichlorobenzene,1,3-	µg/g	0.05	EPA 8260	06-Sep-13/R	< 0.05	< 0.05		< 0.05
Dichlorobenzene,1,4-	µg/g	0.05	EPA 8260	06-Sep-13/R	< 0.05	< 0.05		< 0.05
Dichlorodifluoromethane	µg/g	0.05	EPA 8260	06-Sep-13/R	< 0.05	< 0.05		< 0.05
Dichloroethane,1,1-	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

C.O.C.: G32310

REPORT No. B13-23276 (ii)

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Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 04-Sep-13
DATE REPORTED: 11-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-42-SS1	BH13-44-SS2	BH13-44-SS3	BH13-47-SS1
			Sample I.D.		B13-23276-1	B13-23276-4	B13-23276-5	B13-23276-6
			Date Collected		03-Sep-13	03-Sep-13	03-Sep-13	03-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Dichloroethane,1,2-	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Dichloroethylene,1,1-	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Dichloroethene, cis-1,2-	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Dichloroethene, trans-1,2-	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Dichloropropane,1,2-	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Dichloropropene, cis-1,3-	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Dichloropropene, trans-1,3-	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Dichloropropene 1,3-cis+trans	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Ethylbenzene	µg/g	0.05	EPA 8260	06-Sep-13/R	< 0.05	< 0.05		< 0.05
Dibromoethane,1,2-(Ethylene Dibromide)	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Hexane	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Methyl Ethyl Ketone	µg/g	0.5	EPA 8260	06-Sep-13/R	< 0.5	< 0.5		< 0.5
Methyl Isobutyl Ketone	µg/g	0.5	EPA 8260	06-Sep-13/R	< 0.5	< 0.5		< 0.5
Methyl-t-butyl Ether	µg/g	0.05	EPA 8260	06-Sep-13/R	< 0.05	< 0.05		< 0.05
Dichloromethane (Methylene Chloride)	µg/g	0.05	EPA 8260	06-Sep-13/R	< 0.05	< 0.05		< 0.05

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

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DATE REPORTED: 11-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-42-SS1	BH13-44-SS2	BH13-44-SS3	BH13-47-SS1
			Sample I.D.		B13-23276-1	B13-23276-4	B13-23276-5	B13-23276-6
			Date Collected		03-Sep-13	03-Sep-13	03-Sep-13	03-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Styrene	µg/g	0.05	EPA 8260	06-Sep-13/R	< 0.05	< 0.05		< 0.05
Tetrachloroethane,1,1,1,2-	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Tetrachloroethane,1,1,2,2-	µg/g	0.05	EPA 8260	06-Sep-13/R	< 0.05	< 0.05		< 0.05
Tetrachloroethylene	µg/g	0.05	EPA 8260	06-Sep-13/R	< 0.05	< 0.05		< 0.05
Toluene	µg/g	0.2	EPA 8260	06-Sep-13/R	< 0.2	< 0.2		< 0.2
Trichlorobenzene,1,2,4-	µg/g	0.05	EPA 8260	06-Sep-13/R	< 0.05	< 0.05		< 0.05
Trichloroethane,1,1,1-	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Trichloroethane,1,1,2-	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Trichloroethylene	µg/g	0.05	EPA 8260	06-Sep-13/R	< 0.05	< 0.05		< 0.05
Trichlorofluoromethane	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Vinyl Chloride	µg/g	0.02	EPA 8260	06-Sep-13/R	< 0.02	< 0.02		< 0.02
Xylene, m,p-	µg/g	0.03	EPA 8260	06-Sep-13/R	< 0.03	< 0.03		< 0.03
Xylene, o-	µg/g	0.03	EPA 8260	06-Sep-13/R	< 0.03	< 0.03		< 0.03
Xylene, m,p,o-	µg/g	0.03	EPA 8260	06-Sep-13/R	< 0.03	< 0.03		< 0.03
PHC F1 (C6-C10)	µg/g	10	CWS Tier 1	06-Sep-13/R	< 10	< 10		< 10
Comment-purgeable	-		-	06-Sep-13	-	-		-
PHC F2 (>C10-C16)	µg/g	5	CWS Tier 1	09-Sep-13/K	< 20 [1]	< 5		< 30 [1]

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

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P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-42-SS1	BH13-44-SS2	BH13-44-SS3	BH13-47-SS1
			Sample I.D.		B13-23276-1	B13-23276-4	B13-23276-5	B13-23276-6
			Date Collected		03-Sep-13	03-Sep-13	03-Sep-13	03-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
PHC F3 (>C16-C34)	µg/g	10	CWS Tier 1	09-Sep-13/K	250	20		550
PHC F4 (>C34-C50)	µg/g	10	CWS Tier 1	09-Sep-13/K	800	40		650
Comment-extractable	-		-	09-Sep-13	NDP	NDP		NDP
% moisture	%			09-Sep-13/K	4.0	19.6	30.6	3.0

1 . Note: Elevated MDL due to sample matrix.

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SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-47-SS2			
			Sample I.D.		B13-23276-7			
			Date Collected		03-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Poly-Chlorinated Biphenyls (PCB's)	µg/g	0.3	EPA 8080	06-Sep-13/K	< 0.3			
Aroclor	-		-	06-Sep-13	-			
Acetone	µg/g	0.5	EPA 8260	06-Sep-13/R				
Benzene	µg/g	0.02	EPA 8260	06-Sep-13/R				
Bromodichloromethane	µg/g	0.02	EPA 8260	06-Sep-13/R				
Bromoform	µg/g	0.02	EPA 8260	06-Sep-13/R				
Bromomethane	µg/g	0.05	EPA 8260	06-Sep-13/R				
Carbon Tetrachloride	µg/g	0.05	EPA 8260	06-Sep-13/R				
Monochlorobenzene (Chlorobenzene)	µg/g	0.02	EPA 8260	06-Sep-13/R				
Chloroform	µg/g	0.02	EPA 8260	06-Sep-13/R				
Dibromochloromethane	µg/g	0.02	EPA 8260	06-Sep-13/R				
Dichlorobenzene,1,2-	µg/g	0.05	EPA 8260	06-Sep-13/R				
Dichlorobenzene,1,3-	µg/g	0.05	EPA 8260	06-Sep-13/R				
Dichlorobenzene,1,4-	µg/g	0.05	EPA 8260	06-Sep-13/R				
Dichlorodifluoromethane	µg/g	0.05	EPA 8260	06-Sep-13/R				
Dichloroethane,1,1-	µg/g	0.02	EPA 8260	06-Sep-13/R				

Michelle Dubien
Lab Manager

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Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

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WATERWORKS NO.

			Client I.D.		BH13-47-SS2			
			Sample I.D.		B13-23276-7			
			Date Collected		03-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Dichloroethane,1,2-	µg/g	0.02	EPA 8260	06-Sep-13/R				
Dichloroethylene,1,1-	µg/g	0.02	EPA 8260	06-Sep-13/R				
Dichloroethene, cis-1,2-	µg/g	0.02	EPA 8260	06-Sep-13/R				
Dichloroethene, trans-1,2-	µg/g	0.02	EPA 8260	06-Sep-13/R				
Dichloropropane,1,2-	µg/g	0.02	EPA 8260	06-Sep-13/R				
Dichloropropene, cis-1,3-	µg/g	0.02	EPA 8260	06-Sep-13/R				
Dichloropropene, trans-1,3-	µg/g	0.02	EPA 8260	06-Sep-13/R				
Dichloropropene 1,3-cis+trans	µg/g	0.02	EPA 8260	06-Sep-13/R				
Ethylbenzene	µg/g	0.05	EPA 8260	06-Sep-13/R				
Dibromoethane,1,2-(Ethylene Dibromide)	µg/g	0.02	EPA 8260	06-Sep-13/R				
Hexane	µg/g	0.02	EPA 8260	06-Sep-13/R				
Methyl Ethyl Ketone	µg/g	0.5	EPA 8260	06-Sep-13/R				
Methyl Isobutyl Ketone	µg/g	0.5	EPA 8260	06-Sep-13/R				
Methyl-t-butyl Ether	µg/g	0.05	EPA 8260	06-Sep-13/R				
Dichloromethane (Methylene Chloride)	µg/g	0.05	EPA 8260	06-Sep-13/R				

Michelle Dubien
Lab Manager

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Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

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Fax: 613-544-2770

DATE RECEIVED: 04-Sep-13
DATE REPORTED: 11-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-47-SS2			
			Sample I.D.		B13-23276-7			
			Date Collected		03-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Styrene	µg/g	0.05	EPA 8260	06-Sep-13/R				
Tetrachloroethane,1,1,1,2-	µg/g	0.02	EPA 8260	06-Sep-13/R				
Tetrachloroethane,1,1,2,2-	µg/g	0.05	EPA 8260	06-Sep-13/R				
Tetrachloroethylene	µg/g	0.05	EPA 8260	06-Sep-13/R				
Toluene	µg/g	0.2	EPA 8260	06-Sep-13/R				
Trichlorobenzene,1,2,4-	µg/g	0.05	EPA 8260	06-Sep-13/R				
Trichloroethane,1,1,1-	µg/g	0.02	EPA 8260	06-Sep-13/R				
Trichloroethane,1,1,2-	µg/g	0.02	EPA 8260	06-Sep-13/R				
Trichloroethylene	µg/g	0.05	EPA 8260	06-Sep-13/R				
Trichlorofluoromethane	µg/g	0.02	EPA 8260	06-Sep-13/R				
Vinyl Chloride	µg/g	0.02	EPA 8260	06-Sep-13/R				
Xylene, m,p-	µg/g	0.03	EPA 8260	06-Sep-13/R				
Xylene, o-	µg/g	0.03	EPA 8260	06-Sep-13/R				
Xylene, m,p,o-	µg/g	0.03	EPA 8260	06-Sep-13/R				
PHC F1 (C6-C10)	µg/g	10	CWS Tier 1	06-Sep-13/R				
Comment-purgeable	-		-	06-Sep-13				
PHC F2 (>C10-C16)	µg/g	5	CWS Tier 1	09-Sep-13/K				

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32310 **REPORT No. B13-23276 (ii)**

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 04-Sep-13
DATE REPORTED: 11-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-47-SS2			
			Sample I.D.		B13-23276-7			
			Date Collected		03-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
PHC F3 (>C16-C34)	µg/g	10	CWS Tier 1	09-Sep-13/K				
PHC F4 (>C34-C50)	µg/g	10	CWS Tier 1	09-Sep-13/K				
Comment-extractable	-		-	09-Sep-13				
% moisture	%			09-Sep-13/K	4.0			

1 . Note: Elevated MDL due to sample matrix.

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32310

REPORT No. B13-23276 (iii)

Report To:

Genivar Inc
294 Rink St, Suite 103
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Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 04-Sep-13
DATE REPORTED: 11-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-42-SS1	BH13-44-SS2	BH13-47-SS1	
			Sample I.D.		B13-23276-1	B13-23276-4	B13-23276-6	
			Date Collected		03-Sep-13	03-Sep-13	03-Sep-13	
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acenaphthene	µg/g	0.005	EPA 8270	05-Sep-13/K	< 0.008	< 0.005	< 0.02	
Acenaphthylene	µg/g	0.005	EPA 8270	05-Sep-13/K	< 0.008	< 0.005	< 0.02	
Anthracene	µg/g	0.005	EPA 8270	05-Sep-13/K	< 0.008	< 0.005	< 0.02	
Benzo(a)anthracene	µg/g	0.005	EPA 8270	05-Sep-13/K	0.017	< 0.005	< 0.02	
Benzo(a)pyrene	µg/g	0.005	EPA 8270	05-Sep-13/K	0.015	< 0.005	< 0.02	
Benzo(b)fluoranthene	µg/g	0.005	EPA 8270	05-Sep-13/K	0.020	< 0.005	< 0.02	
Benzo(b+k)fluoranthene	µg/g	0.01	EPA 8270	05-Sep-13/K	0.027	< 0.01	< 0.04	
Benzo(g,h,i)perylene	µg/g	0.005	EPA 8270	05-Sep-13/K	0.025	< 0.005	< 0.02	
Benzo(k)fluoranthene	µg/g	0.005	EPA 8270	05-Sep-13/K	< 0.008	< 0.005	< 0.02	
Chrysene	µg/g	0.005	EPA 8270	05-Sep-13/K	0.018	< 0.005	< 0.02	
Dibenzo(a,h)anthracene	µg/g	0.005	EPA 8270	05-Sep-13/K	< 0.008	< 0.005	< 0.02	
Fluoranthene	µg/g	0.005	EPA 8270	05-Sep-13/K	0.018	< 0.005	< 0.02	
Fluorene	µg/g	0.005	EPA 8270	05-Sep-13/K	0.008	< 0.005	< 0.02	
Indeno(1,2,3,-cd)pyrene	µg/g	0.005	EPA 8270	05-Sep-13/K	0.008	< 0.005	< 0.02	
Methylnaphthalene,1-	µg/g	0.005	EPA 8270	05-Sep-13/K	0.022	< 0.005	0.0252	
Methylnaphthalene,2-	µg/g	0.005	EPA 8270	05-Sep-13/K	0.040	< 0.005	0.0504	
Naphthalene	µg/g	0.005	EPA 8270	05-Sep-13/K	0.012	< 0.005	< 0.02	

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32310 **REPORT No. B13-23276 (iii)**

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 04-Sep-13
DATE REPORTED: 11-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-42-SS1	BH13-44-SS2	BH13-47-SS1	
			Sample I.D.		B13-23276-1	B13-23276-4	B13-23276-6	
			Date Collected		03-Sep-13	03-Sep-13	03-Sep-13	
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Phenanthrene	µg/g	0.005	EPA 8270	05-Sep-13/K	0.035	< 0.005	0.0378	
Pyrene	µg/g	0.005	EPA 8270	05-Sep-13/K	0.033	< 0.005	0.0210	

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32311

REPORT No. B13-23377 (i)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 05-Sep-13
DATE REPORTED: 12-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-19-SS1	BH13-16-SS3		
			Sample I.D.		B13-23377-2	B13-23377-5		
			Date Collected		04-Sep-13	04-Sep-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Antimony	µg/g	0.4	EPA 200.8	09-Sep-13/R	< 0.4	< 0.4		
Arsenic	µg/g	0.5	EPA 200.8	09-Sep-13/R	< 0.5	< 0.5		
Barium	µg/g	0.4	EPA 200.8	09-Sep-13/R	35.6	36.9		
Beryllium	µg/g	0.05	EPA 200.8	09-Sep-13/R	0.14	0.14		
Boron	µg/g	0.5	EPA 200.8	09-Sep-13/R	7.9	8.7		
Boron (HWS)	µg/g	0.02	MOE 3470	09-Sep-13/R	0.25	0.44		
Cadmium	µg/g	0.03	EPA 200.8	09-Sep-13/R	< 0.03	< 0.03		
Chromium	µg/g	0.4	EPA 200.8	09-Sep-13/R	5.5	5.0		
Chromium (VI)	µg/g	0.5	EPA7196A	09-Sep-13/O	< 0.5	< 0.5		
Cobalt	µg/g	0.2	EPA 200.8	09-Sep-13/R	< 0.2	< 0.2		
Copper	µg/g	0.4	EPA 200.8	09-Sep-13/R	4.7	3.9		
Lead	µg/g	0.1	EPA 200.8	09-Sep-13/R	4.5	5.9		
Mercury	µg/g	0.005	EPA7471A	11-Sep-13/R	< 0.005	< 0.005		
Molybdenum	µg/g	0.1	EPA 200.8	09-Sep-13/R	0.4	0.4		
Nickel	µg/g	0.4	EPA 200.8	09-Sep-13/R	2.9	2.2		
Selenium	µg/g	0.1	EPA 200.8	09-Sep-13/R	0.1	0.1		
Silver	µg/g	0.01	EPA 200.8	09-Sep-13/R	0.06	0.02		

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32311

REPORT No. B13-23377 (i)

Report To:

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Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 05-Sep-13
DATE REPORTED: 12-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-19-SS1	BH13-16-SS3		
			Sample I.D.		B13-23377-2	B13-23377-5		
			Date Collected		04-Sep-13	04-Sep-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Thallium	µg/g	0.02	EPA 200.8	09-Sep-13/R	< 0.02	< 0.02		
Uranium	µg/g	0.02	EPA 200.8	09-Sep-13/R	0.34	0.36		
Vanadium	µg/g	0.8	EPA 200.8	09-Sep-13/R	5.5	5.6		
Zinc	µg/g	30	EPA 200.8	09-Sep-13/R	< 30	< 30		

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32311

REPORT No. B13-23377 (ii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 05-Sep-13
DATE REPORTED: 12-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-19-SS2	BH13-16-SS1	BH13-16-SS2	
			Sample I.D.		B13-23377-1	B13-23377-3	B13-23377-4	
			Date Collected		04-Sep-13	04-Sep-13	04-Sep-13	
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Poly-Chlorinated Biphenyls (PCB's)	µg/g	0.3	EPA 8080	10-Sep-13/K			< 0.3	
Aroclor	-		-	10-Sep-13			-	
Acetone	µg/g	0.5	EPA 8260	09-Sep-13/R	< 0.5	< 0.5		
Benzene	µg/g	0.02	EPA 8260	09-Sep-13/R	0.11	< 0.02		
Bromodichloromethane	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Bromoform	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Bromomethane	µg/g	0.05	EPA 8260	09-Sep-13/R	< 0.05	< 0.05		
Carbon Tetrachloride	µg/g	0.05	EPA 8260	09-Sep-13/R	< 0.05	< 0.05		
Monochlorobenzene (Chlorobenzene)	µg/g	0.02	EPA 8260	09-Sep-13/R	0.15	< 0.02		
Chloroform	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Dibromochloromethane	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Dichlorobenzene,1,2-	µg/g	0.05	EPA 8260	09-Sep-13/R	< 0.05	< 0.05		
Dichlorobenzene,1,3-	µg/g	0.05	EPA 8260	09-Sep-13/R	< 0.05	< 0.05		
Dichlorobenzene,1,4-	µg/g	0.05	EPA 8260	09-Sep-13/R	< 0.05	< 0.05		
Dichlorodifluoromethane	µg/g	0.05	EPA 8260	09-Sep-13/R	< 0.05	< 0.05		
Dichloroethane,1,1-	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		

Elevated MDLs due to sample matrix interferences

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32311

REPORT No. B13-23377 (ii)

Report To:

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Attention: Zenas Keizars

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285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 05-Sep-13
DATE REPORTED: 12-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-19-SS2	BH13-16-SS1	BH13-16-SS2	
			Sample I.D.		B13-23377-1	B13-23377-3	B13-23377-4	
			Date Collected		04-Sep-13	04-Sep-13	04-Sep-13	
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Dichloroethane,1,2-	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Dichloroethylene,1,1-	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Dichloroethene, cis-1,2-	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Dichloroethene, trans-1,2-	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Dichloropropane,1,2-	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Dichloropropene, cis-1,3-	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Dichloropropene, trans-1,3-	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Dichloropropene 1,3-cis+trans	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Ethylbenzene	µg/g	0.05	EPA 8260	09-Sep-13/R	0.16	< 0.05		
Dibromoethane,1,2-(Ethylene Dibromide)	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Hexane	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Methyl Ethyl Ketone	µg/g	0.5	EPA 8260	09-Sep-13/R	< 0.5	< 0.5		
Methyl Isobutyl Ketone	µg/g	0.5	EPA 8260	09-Sep-13/R	< 0.5	< 0.5		
Methyl-t-butyl Ether	µg/g	0.05	EPA 8260	09-Sep-13/R	< 0.05	< 0.05		
Dichloromethane (Methylene Chloride)	µg/g	0.05	EPA 8260	09-Sep-13/R	< 0.05	< 0.05		

Elevated MDLs due to sample matrix interferences

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32311

REPORT No. B13-23377 (ii)

Report To:

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Attention: Zenas Keizars

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285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 05-Sep-13
DATE REPORTED: 12-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-19-SS2	BH13-16-SS1	BH13-16-SS2	
			Sample I.D.		B13-23377-1	B13-23377-3	B13-23377-4	
			Date Collected		04-Sep-13	04-Sep-13	04-Sep-13	
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Styrene	µg/g	0.05	EPA 8260	09-Sep-13/R	0.15	< 0.05		
Tetrachloroethane,1,1,1,2-	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Tetrachloroethane,1,1,2,2-	µg/g	0.05	EPA 8260	09-Sep-13/R	< 0.05	< 0.05		
Tetrachloroethylene	µg/g	0.05	EPA 8260	09-Sep-13/R	< 0.05	< 0.05		
Toluene	µg/g	0.2	EPA 8260	09-Sep-13/R	0.4	0.3		
Trichlorobenzene,1,2,4-	µg/g	0.05	EPA 8260	09-Sep-13/R	< 0.05	< 0.05		
Trichloroethane,1,1,1-	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Trichloroethane,1,1,2-	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Trichloroethylene	µg/g	0.05	EPA 8260	09-Sep-13/R	< 0.05	< 0.05		
Trichlorofluoromethane	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Vinyl Chloride	µg/g	0.02	EPA 8260	09-Sep-13/R	< 0.02	< 0.02		
Xylene, m,p-	µg/g	0.03	EPA 8260	09-Sep-13/R	0.37	0.26		
Xylene, o-	µg/g	0.03	EPA 8260	09-Sep-13/R	0.17	0.12		
Xylene, m,p,o-	µg/g	0.03	EPA 8260	09-Sep-13/R	0.53	0.37		
PHC F1 (C6-C10)	µg/g	10	CWS Tier 1	09-Sep-13/R	< 10	10		
Comment-purgeable	-		-	09-Sep-13	-	NDP		
PHC F2 (>C10-C16)	µg/g	5	CWS Tier 1	09-Sep-13/K	< 5	< 30		

Elevated MDLs due to sample matrix interferences

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32311

REPORT No. B13-23377 (ii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 05-Sep-13
DATE REPORTED: 12-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

	Client I.D.	BH13-19-SS2	BH13-16-SS1	BH13-16-SS2	
	Sample I.D.	B13-23377-1	B13-23377-3	B13-23377-4	
	Date Collected	04-Sep-13	04-Sep-13	04-Sep-13	

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
PHC F3 (>C16-C34)	µg/g	10	CWS Tier 1	09-Sep-13/K	40	80		
PHC F4 (>C34-C50)	µg/g	10	CWS Tier 1	09-Sep-13/K	100	330		
Comment-extractable	-		-	09-Sep-13	NDP	NDP		
% moisture	%			12-Sep-13/K	4.3	2.5	2.4	

Elevated MDLs due to sample matrix interferences

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32311

REPORT No. B13-23377 (iii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 05-Sep-13
DATE REPORTED: 12-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-19-SS2	BH13-16-SS1		
			Sample I.D.		B13-23377-1	B13-23377-3		
			Date Collected		04-Sep-13	04-Sep-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acenaphthene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.02	< 0.01		
Acenaphthylene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.02	< 0.01		
Anthracene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.02	< 0.01		
Benzo(a)anthracene	µg/g	0.005	EPA 8270	10-Sep-13/K	0.021	< 0.01		
Benzo(a)pyrene	µg/g	0.005	EPA 8270	10-Sep-13/K	0.018	< 0.01		
Benzo(b)fluoranthene	µg/g	0.005	EPA 8270	10-Sep-13/K	0.027	< 0.01		
Benzo(b+k)fluoranthene	µg/g	0.01	EPA 8270	10-Sep-13/K	0.04	< 0.02		
Benzo(g,h,i)perylene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.02	< 0.01		
Benzo(k)fluoranthene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.02	< 0.01		
Chrysene	µg/g	0.005	EPA 8270	10-Sep-13/K	0.027	< 0.01		
Dibenzo(a,h)anthracene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.02	< 0.01		
Fluoranthene	µg/g	0.005	EPA 8270	10-Sep-13/K	0.036	< 0.01		
Fluorene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.02	< 0.01		
Indeno(1,2,3,-cd)pyrene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.02	< 0.01		
Methylnaphthalene,1-	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.02	< 0.01		
Methylnaphthalene,2-	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.02	< 0.01		
Naphthalene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.02	< 0.01		

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32311 **REPORT No. B13-23377 (iii)**

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 05-Sep-13
DATE REPORTED: 12-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-19-SS2	BH13-16-SS1		
			Sample I.D.		B13-23377-1	B13-23377-3		
			Date Collected		04-Sep-13	04-Sep-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Phenanthrene	µg/g	0.005	EPA 8270	10-Sep-13/K	0.015	< 0.01		
Pyrene	µg/g	0.005	EPA 8270	10-Sep-13/K	0.033	< 0.01		

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32314

REPORT No. B13-23473 (i)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 06-Sep-13
DATE REPORTED: 13-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-9-SS2	BH13-10-SS5	BH13-6-SS2	
			Sample I.D.		B13-23473-2	B13-23473-4	B13-23473-6	
			Date Collected		05-Sep-13	05-Sep-13	05-Sep-13	
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Antimony	µg/g	0.5	EPA 6020	10-Sep-13/O	< 0.5	< 0.5	< 0.5	
Arsenic	µg/g	0.5	EPA 6020	10-Sep-13/O	0.6	1.1	3.5	
Barium	µg/g	1	EPA 6010	10-Sep-13/O	113	39	109	
Beryllium	µg/g	0.2	EPA 6010	10-Sep-13/O	< 0.2	0.3	0.3	
Boron	µg/g	0.5	EPA 6010	10-Sep-13/O	14.6	12.6	9.3	
Boron (HWS)	µg/g	0.02	MOE3470	10-Sep-13/O	0.80	0.26	0.13	
Cadmium	µg/g	0.5	EPA 6010	10-Sep-13/O	< 0.5	< 0.5	< 0.5	
Chromium	µg/g	1	EPA 6010	10-Sep-13/O	21	35	66	
Chromium (VI)	µg/g	0.5	EPA7196A	10-Sep-13/O	< 0.5	< 0.5	< 0.5	
Cobalt	µg/g	1	EPA 6010	10-Sep-13/O	3	6	5	
Copper	µg/g	1	EPA 6010	10-Sep-13/O	12	15	21	
Lead	µg/g	5	EPA 6010	10-Sep-13/O	6	18	75	
Mercury	µg/g	0.005	EPA7471A	12-Sep-13/R	< 0.005	0.010	< 0.005	
Molybdenum	µg/g	1	EPA 6010	10-Sep-13/O	< 1	< 1	1	
Nickel	µg/g	1	EPA 6010	10-Sep-13/O	19	31	35	
Selenium	µg/g	0.5	EPA 6020	10-Sep-13/O	< 0.5	< 0.5	< 0.5	
Silver	µg/g	0.2	EPA 6010	10-Sep-13/O	0.6	0.2	0.3	

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32314

REPORT No. B13-23473 (i)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 06-Sep-13
DATE REPORTED: 13-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-9-SS2	BH13-10-SS5	BH13-6-SS2	
			Sample I.D.		B13-23473-2	B13-23473-4	B13-23473-6	
			Date Collected		05-Sep-13	05-Sep-13	05-Sep-13	
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Thallium	µg/g	0.1	EPA 6020	10-Sep-13/O	0.1	0.2	0.1	
Uranium	µg/g	0.1	EPA 6020	10-Sep-13/O	0.2	0.3	0.3	
Vanadium	µg/g	1	EPA 6010	10-Sep-13/O	5	8	14	
Zinc	µg/g	3	EPA 6010	10-Sep-13/O	10	1000	42	

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32314

REPORT No. B13-23473 (ii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 06-Sep-13
DATE REPORTED: 13-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-9-SS1	BH13-10-SS1	BH13-6-SS1	
			Sample I.D.		B13-23473-1	B13-23473-3	B13-23473-5	
			Date Collected		05-Sep-13	05-Sep-13	05-Sep-13	
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acetone	µg/g	0.5	EPA 8260	10-Sep-13/R	< 0.5	< 0.5	< 0.5	
Benzene	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Bromodichloromethane	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Bromoform	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Bromomethane	µg/g	0.05	EPA 8260	10-Sep-13/R	< 0.05	< 0.05	< 0.05	
Carbon Tetrachloride	µg/g	0.05	EPA 8260	10-Sep-13/R	< 0.05	< 0.05	< 0.05	
Monochlorobenzene (Chlorobenzene)	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Chloroform	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Dibromochloromethane	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Dichlorobenzene,1,2-	µg/g	0.05	EPA 8260	10-Sep-13/R	< 0.05	< 0.05	< 0.05	
Dichlorobenzene,1,3-	µg/g	0.05	EPA 8260	10-Sep-13/R	< 0.05	< 0.05	< 0.05	
Dichlorobenzene,1,4-	µg/g	0.05	EPA 8260	10-Sep-13/R	< 0.05	< 0.05	< 0.05	
Dichlorodifluoromethane	µg/g	0.05	EPA 8260	10-Sep-13/R	< 0.05	< 0.05	< 0.05	
Dichloroethane,1,1-	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Dichloroethane,1,2-	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Dichloroethylene,1,1-	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Dichloroethene, cis-1,2-	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

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DATE RECEIVED: 06-Sep-13
DATE REPORTED: 13-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-9-SS1	BH13-10-SS1	BH13-6-SS1	
			Sample I.D.		B13-23473-1	B13-23473-3	B13-23473-5	
			Date Collected		05-Sep-13	05-Sep-13	05-Sep-13	
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Dichloroethene, trans-1,2-	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Dichloropropane,1,2-	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Dichloropropene, cis-1,3-	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Dichloropropene, trans-1,3-	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Dichloropropene 1,3-cis+trans	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Ethylbenzene	µg/g	0.05	EPA 8260	10-Sep-13/R	< 0.05	< 0.05	< 0.05	
Dibromoethane,1,2- (Ethylene Dibromide)	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Hexane	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Methyl Ethyl Ketone	µg/g	0.5	EPA 8260	10-Sep-13/R	< 0.5	< 0.5	< 0.5	
Methyl Isobutyl Ketone	µg/g	0.5	EPA 8260	10-Sep-13/R	< 0.5	< 0.5	< 0.5	
Methyl-t-butyl Ether	µg/g	0.05	EPA 8260	10-Sep-13/R	< 0.05	< 0.05	< 0.05	
Dichloromethane (Methylene Chloride)	µg/g	0.05	EPA 8260	10-Sep-13/R	< 0.05	< 0.05	< 0.05	
Styrene	µg/g	0.05	EPA 8260	10-Sep-13/R	< 0.05	< 0.05	< 0.05	
Tetrachloroethane,1,1,1,2-	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Tetrachloroethane,1,1,2,2-	µg/g	0.05	EPA 8260	10-Sep-13/R	< 0.05	< 0.05	< 0.05	

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

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CERTIFICATE OF ANALYSIS

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REPORT No. B13-23473 (ii)

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DATE RECEIVED: 06-Sep-13
DATE REPORTED: 13-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-9-SS1	BH13-10-SS1	BH13-6-SS1	
			Sample I.D.		B13-23473-1	B13-23473-3	B13-23473-5	
			Date Collected		05-Sep-13	05-Sep-13	05-Sep-13	
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Tetrachloroethylene	µg/g	0.05	EPA 8260	10-Sep-13/R	< 0.05	< 0.05	< 0.05	
Toluene	µg/g	0.2	EPA 8260	10-Sep-13/R	< 0.2	< 0.2	< 0.2	
Trichlorobenzene,1,2,4-	µg/g	0.05	EPA 8260	10-Sep-13/R	< 0.05	< 0.05	< 0.05	
Trichloroethane,1,1,1-	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Trichloroethane,1,1,2-	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Trichloroethylene	µg/g	0.05	EPA 8260	10-Sep-13/R	< 0.05	< 0.05	< 0.05	
Trichlorofluoromethane	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Vinyl Chloride	µg/g	0.02	EPA 8260	10-Sep-13/R	< 0.02	< 0.02	< 0.02	
Xylene, m,p-	µg/g	0.03	EPA 8260	10-Sep-13/R	< 0.03	< 0.03	< 0.03	
Xylene, o-	µg/g	0.03	EPA 8260	10-Sep-13/R	< 0.03	< 0.03	< 0.03	
Xylene, m,p,o-	µg/g	0.03	EPA 8260	10-Sep-13/R	< 0.03	< 0.03	< 0.03	
PHC F1 (C6-C10)	µg/g	10	CWS Tier 1	10-Sep-13/R	< 10	< 10	< 10	
Comment-purgeable	-		-	10-Sep-13	-	-	-	
PHC F2 (>C10-C16)	µg/g	5	CWS Tier 1	12-Sep-13/K	< 20 1	< 20 1	< 100 1	
PHC F3 (>C16-C34)	µg/g	10	CWS Tier 1	12-Sep-13/K	170	40	578	
PHC F4 (>C34-C50)	µg/g	10	CWS Tier 1	12-Sep-13/K	380	70	3530	
Comment-extractable	-		-	12-Sep-13	NDP	NDP	NDP	

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32314

REPORT No. B13-23473 (ii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 06-Sep-13
DATE REPORTED: 13-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-9-SS1	BH13-10-SS1	BH13-6-SS1	
			Sample I.D.		B13-23473-1	B13-23473-3	B13-23473-5	
			Date Collected		05-Sep-13	05-Sep-13	05-Sep-13	
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
% moisture	%			13-Sep-13/K	2.1	2.2	1.9	

1 . Note: Elevated MDL due to sample matrix.

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32314

REPORT No. B13-23473 (iii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 06-Sep-13
DATE REPORTED: 13-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-9-SS1	BH13-10-SS1	BH13-6-SS1	
			Sample I.D.		B13-23473-1	B13-23473-3	B13-23473-5	
			Date Collected		05-Sep-13	05-Sep-13	05-Sep-13	
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acenaphthene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	< 0.02	< 0.9	
Acenaphthylene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	< 0.02	< 0.9	
Anthracene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	< 0.02	< 0.9	
Benzo(a)anthracene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	< 0.02	< 0.9	
Benzo(a)pyrene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	< 0.02	< 0.9	
Benzo(b)fluoranthene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	< 0.02	< 0.9	
Benzo(b+k)fluoranthene	µg/g	0.01	EPA 8270	10-Sep-13/K	< 0.8	< 0.04	< 2	
Benzo(g,h,i)perylene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	< 0.02	< 0.9	
Benzo(k)fluoranthene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	< 0.02	< 0.9	
Chrysene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	< 0.02	< 0.9	
Dibenzo(a,h)anthracene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	< 0.02	< 0.9	
Fluoranthene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	< 0.02	< 0.9	
Fluorene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	< 0.02	< 0.9	
Indeno(1,2,3,-cd)pyrene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	< 0.02	< 0.9	
Methylnaphthalene,1-	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	< 0.02	< 0.9	
Methylnaphthalene,2-	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	< 0.02	< 0.9	
Naphthalene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	< 0.02	< 0.9	

Elevated MDLs due to sample matrix interferences

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32314

REPORT No. B13-23473 (iii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 06-Sep-13
DATE REPORTED: 13-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-013550-00
WATERWORKS NO.

			Client I.D.		BH13-9-SS1	BH13-10-SS1	BH13-6-SS1	
			Sample I.D.		B13-23473-1	B13-23473-3	B13-23473-5	
			Date Collected		05-Sep-13	05-Sep-13	05-Sep-13	
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Phenanthrene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	0.029	< 0.9	
Pyrene	µg/g	0.005	EPA 8270	10-Sep-13/K	< 0.4	< 0.02	< 0.9	

Elevated MDLs due to sample matrix interferences

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G33907/G33904 **REPORT No. B13-23929 (i)**

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 17-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-3-SS2	BH13-8-SS2	BH13-1-SS2	BH13-13-SS1
			Sample I.D.		B13-23929-2	B13-23929-4	B13-23929-6	B13-23929-7
			Date Collected		09-Sep-13	09-Sep-13	09-Sep-13	09-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Poly-Chlorinated Biphenyls (PCB's)	µg/g	0.3	EPA 8080	13-Sep-13/K	< 0.3			
Aroclor	-		-	13-Sep-13	-			
Antimony	µg/g	0.4	EPA 200.8	16-Sep-13/R	< 0.4	< 0.4	< 0.4	0.7
Arsenic	µg/g	0.5	EPA 200.8	16-Sep-13/R	1.4	1.9	1.4	2.2
Barium	µg/g	0.4	EPA 200.8	16-Sep-13/R	117	95.4	526	124
Beryllium	µg/g	0.05	EPA 200.8	16-Sep-13/R	0.28	0.39	0.71	0.40
Boron	µg/g	0.5	EPA 200.8	16-Sep-13/R	12.2	9.9	18.5	14.4
Boron (HWS)	µg/g	0.02	MOE 3470	17-Sep-13/R	0.41	0.44	1.10	0.46
Cadmium	µg/g	0.03	EPA 200.8	16-Sep-13/R	0.08	0.13	0.05	0.12
Chromium	µg/g	0.4	EPA 200.8	16-Sep-13/R	12.1	19.4	30.1	16.3
Chromium (VI)	µg/g	0.5	EPA7196A	13-Sep-13/O	< 0.5	< 0.5	< 0.5	< 0.5
Cobalt	µg/g	0.2	EPA 200.8	16-Sep-13/R	2.2	4.7	7.5	4.7
Copper	µg/g	0.4	EPA 200.8	16-Sep-13/R	22.3	24.6	22.2	34.3
Lead	µg/g	0.1	EPA 200.8	16-Sep-13/R	52.8	290	10.1	68.2
Mercury	µg/g	0.005	EPA7471A	16-Sep-13/R	0.009	0.064	< 0.005	0.041
Molybdenum	µg/g	0.1	EPA 200.8	16-Sep-13/R	0.3	1.1	0.4	0.5
Nickel	µg/g	0.4	EPA 200.8	16-Sep-13/R	7.6	9.5	19.3	11.7

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G33907/G33904

REPORT No. B13-23929 (i)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 17-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-3-SS2	BH13-8-SS2	BH13-1-SS2	BH13-13-SS1
			Sample I.D.		B13-23929-2	B13-23929-4	B13-23929-6	B13-23929-7
			Date Collected		09-Sep-13	09-Sep-13	09-Sep-13	09-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Selenium	µg/g	0.1	EPA 200.8	16-Sep-13/R	0.3	0.5	0.6	0.5
Silver	µg/g	0.01	EPA 200.8	16-Sep-13/R	0.05	0.28	0.11	0.12
Thallium	µg/g	0.02	EPA 200.8	16-Sep-13/R	0.03	0.04	0.09	0.08
Uranium	µg/g	0.02	EPA 200.8	16-Sep-13/R	0.23	0.34	0.39	0.31
Vanadium	µg/g	0.8	EPA 200.8	16-Sep-13/R	10.1	22.1	38.9	18.5
Zinc	µg/g	30	EPA 200.8	16-Sep-13/R	40	50	50	50

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G33907/G33904

REPORT No. B13-23929 (i)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

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285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 17-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-12-SS1	BH13-14-SS2	BH13-14-SS3	BH13-22-SS2
			Sample I.D.		B13-23929-9	B13-23929-11	B13-23929-12	B13-23929-15
			Date Collected		09-Sep-13	10-Sep-13	10-Sep-13	10-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Poly-Chlorinated Biphenyls (PCB's)	µg/g	0.3	EPA 8080	13-Sep-13/K		< 0.3		< 0.3
Aroclor	-		-	13-Sep-13		-		-
Antimony	µg/g	0.4	EPA 200.8	16-Sep-13/R	< 0.4		< 0.4	< 0.4
Arsenic	µg/g	0.5	EPA 200.8	16-Sep-13/R	2.5		3.3	1.4
Barium	µg/g	0.4	EPA 200.8	16-Sep-13/R	625		89.6	97.5
Beryllium	µg/g	0.05	EPA 200.8	16-Sep-13/R	0.81		0.68	0.54
Boron	µg/g	0.5	EPA 200.8	16-Sep-13/R	16.9		31.3	10.6
Boron (HWS)	µg/g	0.02	MOE 3470	17-Sep-13/R	1.08		0.61	1.23
Cadmium	µg/g	0.03	EPA 200.8	16-Sep-13/R	0.11		0.07	0.06
Chromium	µg/g	0.4	EPA 200.8	16-Sep-13/R	27.8		24.2	22.3
Chromium (VI)	µg/g	0.5	EPA7196A	13-Sep-13/O	< 0.5		< 0.5	< 0.5
Cobalt	µg/g	0.2	EPA 200.8	16-Sep-13/R	9.6		7.9	7.0
Copper	µg/g	0.4	EPA 200.8	16-Sep-13/R	24.8		22.8	17.3
Lead	µg/g	0.1	EPA 200.8	16-Sep-13/R	56.3		25.4	13.1
Mercury	µg/g	0.005	EPA7471A	16-Sep-13/R	0.006		< 0.005	0.008
Molybdenum	µg/g	0.1	EPA 200.8	16-Sep-13/R	0.7		0.9	0.5
Nickel	µg/g	0.4	EPA 200.8	16-Sep-13/R	20.3		20.4	13.6

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G33907/G33904 **REPORT No. B13-23929 (i)**

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 17-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-12-SS1	BH13-14-SS2	BH13-14-SS3	BH13-22-SS2
			Sample I.D.		B13-23929-9	B13-23929-11	B13-23929-12	B13-23929-15
			Date Collected		09-Sep-13	10-Sep-13	10-Sep-13	10-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Selenium	µg/g	0.1	EPA 200.8	16-Sep-13/R	0.6		0.5	0.5
Silver	µg/g	0.01	EPA 200.8	16-Sep-13/R	0.11		0.14	0.05
Thallium	µg/g	0.02	EPA 200.8	16-Sep-13/R	0.41		0.21	0.08
Uranium	µg/g	0.02	EPA 200.8	16-Sep-13/R	0.37		0.47	0.50
Vanadium	µg/g	0.8	EPA 200.8	16-Sep-13/R	33.5		22.2	33.5
Zinc	µg/g	30	EPA 200.8	16-Sep-13/R	50		< 30	40

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G33907/G33904

REPORT No. B13-23929 (ii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 17-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-3-SS1	BH13-3-SS2	BH13-8-SS1	BH13-1-SS1
			Sample I.D.		B13-23929-1	B13-23929-2	B13-23929-3	B13-23929-5
			Date Collected		09-Sep-13	09-Sep-13	09-Sep-13	09-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acetone	µg/g	0.5	EPA 8260	13-Sep-13/R	< 0.5		< 0.5	< 0.5
Benzene	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Bromodichloromethane	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Bromoform	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Bromomethane	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05		< 0.05	< 0.05
Carbon Tetrachloride	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05		< 0.05	< 0.05
Monochlorobenzene (Chlorobenzene)	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Chloroform	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Dibromochloromethane	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Dichlorobenzene,1,2-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05		< 0.05	< 0.05
Dichlorobenzene,1,3-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05		< 0.05	< 0.05
Dichlorobenzene,1,4-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05		< 0.05	< 0.05
Dichlorodifluoromethane	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05		< 0.05	< 0.05
Dichloroethane,1,1-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Dichloroethane,1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Dichloroethylene,1,1-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Dichloroethene, cis-1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

C.O.C.: G33907/G33904 **REPORT No. B13-23929 (ii)**

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 17-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-3-SS1	BH13-3-SS2	BH13-8-SS1	BH13-1-SS1
			Sample I.D.		B13-23929-1	B13-23929-2	B13-23929-3	B13-23929-5
			Date Collected		09-Sep-13	09-Sep-13	09-Sep-13	09-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Dichloroethene, trans-1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Dichloropropane,1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Dichloropropene, cis-1,3-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Dichloropropene, trans-1,3-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Dichloropropene 1,3-cis+trans	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Ethylbenzene	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05		< 0.05	< 0.05
Dibromoethane,1,2- (Ethylene Dibromide)	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Hexane	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Methyl Ethyl Ketone	µg/g	0.5	EPA 8260	13-Sep-13/R	< 0.5		< 0.5	< 0.5
Methyl Isobutyl Ketone	µg/g	0.5	EPA 8260	13-Sep-13/R	< 0.5		< 0.5	< 0.5
Methyl-t-butyl Ether	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05		< 0.05	< 0.05
Dichloromethane (Methylene Chloride)	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05		< 0.05	< 0.05
Styrene	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05		< 0.05	< 0.05
Tetrachloroethane,1,1,1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Tetrachloroethane,1,1,2,2-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05		< 0.05	< 0.05

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G33907/G33904

REPORT No. B13-23929 (ii)

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Peterborough ON K9J 2K2 Canada
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DATE RECEIVED: 11-Sep-13
DATE REPORTED: 17-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-3-SS1	BH13-3-SS2	BH13-8-SS1	BH13-1-SS1
			Sample I.D.		B13-23929-1	B13-23929-2	B13-23929-3	B13-23929-5
			Date Collected		09-Sep-13	09-Sep-13	09-Sep-13	09-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Tetrachloroethylene	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05		< 0.05	< 0.05
Toluene	µg/g	0.2	EPA 8260	13-Sep-13/R	< 0.2		< 0.2	< 0.2
Trichlorobenzene,1,2,4-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05		< 0.05	< 0.05
Trichloroethane,1,1,1-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Trichloroethane,1,1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Trichloroethylene	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05		< 0.05	< 0.05
Trichlorofluoromethane	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Vinyl Chloride	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02		< 0.02	< 0.02
Xylene, m,p-	µg/g	0.03	EPA 8260	13-Sep-13/R	< 0.03		< 0.03	< 0.03
Xylene, o-	µg/g	0.03	EPA 8260	13-Sep-13/R	< 0.03		< 0.03	< 0.03
Xylene, m,p,o-	µg/g	0.03	EPA 8260	13-Sep-13/R	< 0.03		< 0.03	< 0.03
PHC F1 (C6-C10)	µg/g	10	CWS Tier 1	13-Sep-13/R	< 10		< 10	< 10
Comment-purgeable	-		-	13-Sep-13	-		-	-
PHC F2 (>C10-C16)	µg/g	5	CWS Tier 1	17-Sep-13/K	< 5		< 50 [1]	< 40 [1]
PHC F3 (>C16-C34)	µg/g	10	CWS Tier 1	17-Sep-13/K	40		211	77
PHC F4 (>C34-C50)	µg/g	10	CWS Tier 1	17-Sep-13/K	70		790	612
Comment-extractable	-		-	17-Sep-13	NDP		NDP	NDP

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

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DATE RECEIVED: 11-Sep-13
DATE REPORTED: 17-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-3-SS1	BH13-3-SS2	BH13-8-SS1	BH13-1-SS1
			Sample I.D.		B13-23929-1	B13-23929-2	B13-23929-3	B13-23929-5
			Date Collected		09-Sep-13	09-Sep-13	09-Sep-13	09-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
% moisture	%			13-Sep-13/K	2.9	3.5	6.7	3.5

1 Note: Elevated MDL due to sample matrix.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

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DATE RECEIVED: 11-Sep-13
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SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-13-SS3	BH13-12-SS2	BH13-14-SS2	BH13-14-SS1
			Sample I.D.		B13-23929-8	B13-23929-10	B13-23929-11	B13-23929-13
			Date Collected		09-Sep-13	10-Sep-13	10-Sep-13	10-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acetone	µg/g	0.5	EPA 8260	13-Sep-13/R	< 0.5	< 0.5		< 0.5
Benzene	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Bromodichloromethane	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Bromoform	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Bromomethane	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05	< 0.05		< 0.05
Carbon Tetrachloride	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05	< 0.05		< 0.05
Monochlorobenzene (Chlorobenzene)	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Chloroform	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Dibromochloromethane	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Dichlorobenzene,1,2-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05	< 0.05		< 0.05
Dichlorobenzene,1,3-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05	< 0.05		< 0.05
Dichlorobenzene,1,4-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05	< 0.05		< 0.05
Dichlorodifluoromethane	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05	< 0.05		< 0.05
Dichloroethane,1,1-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Dichloroethane,1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Dichloroethylene,1,1-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Dichloroethene, cis-1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

C.O.C.: G33907/G33904 **REPORT No. B13-23929 (ii)**

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DATE RECEIVED: 11-Sep-13
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SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-13-SS3	BH13-12-SS2	BH13-14-SS2	BH13-14-SS1
			Sample I.D.		B13-23929-8	B13-23929-10	B13-23929-11	B13-23929-13
			Date Collected		09-Sep-13	10-Sep-13	10-Sep-13	10-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Dichloroethene, trans-1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Dichloropropane,1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Dichloropropene, cis-1,3-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Dichloropropene, trans-1,3-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Dichloropropene 1,3-cis+trans	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Ethylbenzene	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05	< 0.05		< 0.05
Dibromoethane,1,2-(Ethylene Dibromide)	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Hexane	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Methyl Ethyl Ketone	µg/g	0.5	EPA 8260	13-Sep-13/R	< 0.5	< 0.5		< 0.5
Methyl Isobutyl Ketone	µg/g	0.5	EPA 8260	13-Sep-13/R	< 0.5	< 0.5		< 0.5
Methyl-t-butyl Ether	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05	< 0.05		< 0.05
Dichloromethane (Methylene Chloride)	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05	< 0.05		< 0.05
Styrene	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05	< 0.05		< 0.05
Tetrachloroethane,1,1,1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Tetrachloroethane,1,1,2,2-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05	< 0.05		< 0.05

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

C.O.C.: G33907/G33904 **REPORT No. B13-23929 (ii)**

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SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-13-SS3	BH13-12-SS2	BH13-14-SS2	BH13-14-SS1
			Sample I.D.		B13-23929-8	B13-23929-10	B13-23929-11	B13-23929-13
			Date Collected		09-Sep-13	10-Sep-13	10-Sep-13	10-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Tetrachloroethylene	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05	< 0.05		< 0.05
Toluene	µg/g	0.2	EPA 8260	13-Sep-13/R	< 0.2	< 0.2		< 0.2
Trichlorobenzene,1,2,4-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05	< 0.05		< 0.05
Trichloroethane,1,1,1-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Trichloroethane,1,1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Trichloroethylene	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05	< 0.05		< 0.05
Trichlorofluoromethane	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Vinyl Chloride	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02	< 0.02		< 0.02
Xylene, m,p-	µg/g	0.03	EPA 8260	13-Sep-13/R	< 0.03	< 0.03		< 0.03
Xylene, o-	µg/g	0.03	EPA 8260	13-Sep-13/R	< 0.03	< 0.03		< 0.03
Xylene, m,p,o-	µg/g	0.03	EPA 8260	13-Sep-13/R	< 0.03	< 0.03		< 0.03
PHC F1 (C6-C10)	µg/g	10	CWS Tier 1	13-Sep-13/R	< 10	< 10		< 10
Comment-purgeable	-		-	13-Sep-13	-	-		-
PHC F2 (>C10-C16)	µg/g	5	CWS Tier 1	17-Sep-13/K	< 5	< 5		6
PHC F3 (>C16-C34)	µg/g	10	CWS Tier 1	17-Sep-13/K	60	10		50
PHC F4 (>C34-C50)	µg/g	10	CWS Tier 1	17-Sep-13/K	70	20		160
Comment-extractable	-		-	17-Sep-13	NDP	NDP		NDP

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-13-SS3	BH13-12-SS2	BH13-14-SS2	BH13-14-SS1
			Sample I.D.		B13-23929-8	B13-23929-10	B13-23929-11	B13-23929-13
			Date Collected		09-Sep-13	10-Sep-13	10-Sep-13	10-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
% moisture	%			13-Sep-13/K	13.2	16.8	5.2	1.5

1 . Note: Elevated MDL due to sample matrix.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

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SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-22-SS1	BH13-22-SS2		
			Sample I.D.		B13-23929-14	B13-23929-15		
			Date Collected		10-Sep-13	10-Sep-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acetone	µg/g	0.5	EPA 8260	13-Sep-13/R	< 0.5			
Benzene	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Bromodichloromethane	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Bromoform	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Bromomethane	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Carbon Tetrachloride	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Monochlorobenzene (Chlorobenzene)	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Chloroform	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dibromochloromethane	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dichlorobenzene,1,2-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Dichlorobenzene,1,3-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Dichlorobenzene,1,4-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Dichlorodifluoromethane	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Dichloroethane,1,1-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dichloroethane,1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dichloroethylene,1,1-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dichloroethene, cis-1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

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SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-22-SS1	BH13-22-SS2		
			Sample I.D.		B13-23929-14	B13-23929-15		
			Date Collected		10-Sep-13	10-Sep-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Dichloroethene, trans-1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dichloropropane,1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dichloropropene, cis-1,3-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dichloropropene, trans-1,3-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dichloropropene 1,3-cis+trans	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Ethylbenzene	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Dibromoethane,1,2-(Ethylene Dibromide)	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Hexane	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Methyl Ethyl Ketone	µg/g	0.5	EPA 8260	13-Sep-13/R	< 0.5			
Methyl Isobutyl Ketone	µg/g	0.5	EPA 8260	13-Sep-13/R	< 0.5			
Methyl-t-butyl Ether	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Dichloromethane (Methylene Chloride)	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Styrene	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Tetrachloroethane,1,1,1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Tetrachloroethane,1,1,2,2-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G33907/G33904

REPORT No. B13-23929 (ii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 17-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-22-SS1	BH13-22-SS2		
			Sample I.D.		B13-23929-14	B13-23929-15		
			Date Collected		10-Sep-13	10-Sep-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Tetrachloroethylene	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Toluene	µg/g	0.2	EPA 8260	13-Sep-13/R	< 0.2			
Trichlorobenzene,1,2,4-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Trichloroethane,1,1,1-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Trichloroethane,1,1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Trichloroethylene	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Trichlorofluoromethane	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Vinyl Chloride	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Xylene, m,p-	µg/g	0.03	EPA 8260	13-Sep-13/R	< 0.03			
Xylene, o-	µg/g	0.03	EPA 8260	13-Sep-13/R	< 0.03			
Xylene, m,p,o-	µg/g	0.03	EPA 8260	13-Sep-13/R	< 0.03			
PHC F1 (C6-C10)	µg/g	10	CWS Tier 1	13-Sep-13/R	< 10			
Comment-purgeable	-		-	13-Sep-13	-			
PHC F2 (>C10-C16)	µg/g	5	CWS Tier 1	17-Sep-13/K	7			
PHC F3 (>C16-C34)	µg/g	10	CWS Tier 1	17-Sep-13/K	20			
PHC F4 (>C34-C50)	µg/g	10	CWS Tier 1	17-Sep-13/K	10			
Comment-extractable	-		-	17-Sep-13	NDP			

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G33907/G33904 **REPORT No. B13-23929 (ii)**

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 17-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-22-SS1	BH13-22-SS2		
			Sample I.D.		B13-23929-14	B13-23929-15		
			Date Collected		10-Sep-13	10-Sep-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
% moisture	%			13-Sep-13/K	1.8	11.2		

1 . Note: Elevated MDL due to sample matrix.

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G33907/G33904

REPORT No. B13-23929 (iii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 17-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-3-SS1	BH13-8-SS1	BH13-1-SS1	BH13-13-SS3
			Sample I.D.		B13-23929-1	B13-23929-3	B13-23929-5	B13-23929-8
			Date Collected		09-Sep-13	09-Sep-13	09-Sep-13	09-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acenaphthene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.07	< 0.1	< 0.1	< 0.03
Acenaphthylene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.07	< 0.1	< 0.1	0.121
Anthracene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.07	< 0.1	< 0.1	0.148
Benzo(a)anthracene	µg/g	0.005	EPA 8270	13-Sep-13/K	0.145	< 0.1	< 0.1	0.631
Benzo(a)pyrene	µg/g	0.005	EPA 8270	13-Sep-13/K	0.145	< 0.1	< 0.1	0.461
Benzo(b)fluoranthene	µg/g	0.005	EPA 8270	13-Sep-13/K	0.202	< 0.1	< 0.1	0.625
Benzo(b+k)fluoranthene	µg/g	0.01	EPA 8270	13-Sep-13/K	0.289	< 0.2	< 0.3	0.855
Benzo(g,h,i)perylene	µg/g	0.005	EPA 8270	13-Sep-13/K	0.116	< 0.1	< 0.1	0.181
Benzo(k)fluoranthene	µg/g	0.005	EPA 8270	13-Sep-13/K	0.087	< 0.1	< 0.1	0.230
Chrysene	µg/g	0.005	EPA 8270	13-Sep-13/K	0.116	< 0.1	< 0.1	0.631
Dibenzo(a,h)anthracene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.07	< 0.1	< 0.1	0.049
Fluoranthene	µg/g	0.005	EPA 8270	13-Sep-13/K	0.145	< 0.1	< 0.1	1.55
Fluorene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.07	< 0.1	< 0.1	0.027
Indeno(1,2,3,-cd)pyrene	µg/g	0.005	EPA 8270	13-Sep-13/K	0.087	< 0.1	< 0.1	0.219
Methylnaphthalene,1-	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.07	< 0.1	< 0.1	< 0.03
Methylnaphthalene,2-	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.07	< 0.1	< 0.1	< 0.03
Naphthalene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.07	< 0.1	< 0.1	< 0.03

Elevated MDLs due to sample matrix interferences

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G33907/G33904

REPORT No. B13-23929 (iii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 17-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-3-SS1	BH13-8-SS1	BH13-1-SS1	BH13-13-SS3
			Sample I.D.		B13-23929-1	B13-23929-3	B13-23929-5	B13-23929-8
			Date Collected		09-Sep-13	09-Sep-13	09-Sep-13	09-Sep-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Phenanthrene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.07	< 0.1	< 0.1	0.718
Pyrene	µg/g	0.005	EPA 8270	13-Sep-13/K	0.188	< 0.1	< 0.1	1.43

Elevated MDLs due to sample matrix interferences

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G33907/G33904

REPORT No. B13-23929 (iii)

Report To:

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DATE RECEIVED: 11-Sep-13
DATE REPORTED: 17-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		BH13-12-SS2	BH13-14-SS1	BH13-22-SS1	
			Sample I.D.		B13-23929-10	B13-23929-13	B13-23929-14	
			Date Collected		10-Sep-13	10-Sep-13	10-Sep-13	
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acenaphthene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	< 0.005	
Acenaphthylene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	0.007	
Anthracene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	0.008	
Benzo(a)anthracene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	0.032	
Benzo(a)pyrene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	0.027	
Benzo(b)fluoranthene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	0.044	
Benzo(b+k)fluoranthene	µg/g	0.01	EPA 8270	13-Sep-13/K	< 0.05	< 0.04	0.062	
Benzo(g,h,i)perylene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	0.012	
Benzo(k)fluoranthene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	0.018	
Chrysene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	0.035	
Dibenzo(a,h)anthracene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	< 0.005	
Fluoranthene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	0.059	
Fluorene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	< 0.005	
Indeno(1,2,3,-cd)pyrene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	0.016	
Methylnaphthalene,1-	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	< 0.005	
Methylnaphthalene,2-	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	< 0.005	
Naphthalene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	< 0.005	

Elevated MDLs due to sample matrix interferences

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G33907/G33904 **REPORT No. B13-23929 (iii)**

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 17-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd Trunk Watermain
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

				Client I.D.	BH13-12-SS2	BH13-14-SS1	BH13-22-SS1	
				Sample I.D.	B13-23929-10	B13-23929-13	B13-23929-14	
				Date Collected	10-Sep-13	10-Sep-13	10-Sep-13	
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Phenanthrene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	0.027	
Pyrene	µg/g	0.005	EPA 8270	13-Sep-13/K	< 0.02	< 0.02	0.055	

Elevated MDLs due to sample matrix interferences

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32348

REPORT No. B13-23938 (i)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 18-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-32 SS4			
			Sample I.D.		B13-23938-1			
			Date Collected		11-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Antimony	µg/g	0.4	EPA 200.8	16-Sep-13/R	< 0.4			
Arsenic	µg/g	0.5	EPA 200.8	16-Sep-13/R	< 0.5			
Barium	µg/g	0.4	EPA 200.8	16-Sep-13/R	13.9			
Beryllium	µg/g	0.05	EPA 200.8	16-Sep-13/R	0.28			
Boron	µg/g	0.5	EPA 200.8	16-Sep-13/R	4.9			
Boron (HWS)	µg/g	0.02	MOE 3470	17-Sep-13/R	0.11			
Cadmium	µg/g	0.03	EPA 200.8	16-Sep-13/R	< 0.03			
Chromium	µg/g	0.4	EPA 200.8	16-Sep-13/R	8.2			
Chromium (VI)	µg/g	0.5	EPA7196A	13-Sep-13/O	< 0.5			
Cobalt	µg/g	0.2	EPA 200.8	16-Sep-13/R	3.9			
Copper	µg/g	0.4	EPA 200.8	16-Sep-13/R	8.2			
Lead	µg/g	0.1	EPA 200.8	16-Sep-13/R	1.3			
Mercury	µg/g	0.005	EPA7471A	16-Sep-13/R	< 0.005			
Molybdenum	µg/g	0.1	EPA 200.8	16-Sep-13/R	0.3			
Nickel	µg/g	0.4	EPA 200.8	16-Sep-13/R	5.6			
Selenium	µg/g	0.1	EPA 200.8	16-Sep-13/R	0.3			
Silver	µg/g	0.01	EPA 200.8	16-Sep-13/R	0.01			

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32348

REPORT No. B13-23938 (i)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 18-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-32 SS4			
			Sample I.D.		B13-23938-1			
			Date Collected		11-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Thallium	µg/g	0.02	EPA 200.8	16-Sep-13/R	< 0.02			
Uranium	µg/g	0.02	EPA 200.8	16-Sep-13/R	0.40			
Vanadium	µg/g	0.8	EPA 200.8	16-Sep-13/R	18.0			
Zinc	µg/g	30	EPA 200.8	16-Sep-13/R	< 30			

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32348

REPORT No. B13-23938 (ii)

Report To:

Genivar Inc
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Attention: Zenas Keizars

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Tel: 613-544-2001
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DATE RECEIVED: 11-Sep-13
DATE REPORTED: 18-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-32 SS4			
			Sample I.D.		B13-23938-1			
			Date Collected		11-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acetone	µg/g	0.5	EPA 8260	13-Sep-13/R	< 0.5			
Benzene	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Bromodichloromethane	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Bromoform	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Bromomethane	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Carbon Tetrachloride	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Monochlorobenzene (Chlorobenzene)	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Chloroform	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dibromochloromethane	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dichlorobenzene,1,2-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Dichlorobenzene,1,3-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Dichlorobenzene,1,4-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Dichlorodifluoromethane	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Dichloroethane,1,1-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dichloroethane,1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dichloroethylene,1,1-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dichloroethene, cis-1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32348

REPORT No. B13-23938 (ii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 18-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-32 SS4			
			Sample I.D.		B13-23938-1			
			Date Collected		11-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Dichloroethene, trans-1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dichloropropane,1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dichloropropene, cis-1,3-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dichloropropene, trans-1,3-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Dichloropropene 1,3-cis+trans	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Ethylbenzene	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Dibromoethane,1,2-(Ethylene Dibromide)	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Hexane	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Methyl Ethyl Ketone	µg/g	0.5	EPA 8260	13-Sep-13/R	< 0.5			
Methyl Isobutyl Ketone	µg/g	0.5	EPA 8260	13-Sep-13/R	< 0.5			
Methyl-t-butyl Ether	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Dichloromethane (Methylene Chloride)	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Styrene	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Tetrachloroethane,1,1,1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Tetrachloroethane,1,1,2,2-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32348

REPORT No. B13-23938 (ii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 18-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-32 SS4			
			Sample I.D.		B13-23938-1			
			Date Collected		11-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Tetrachloroethylene	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Toluene	µg/g	0.2	EPA 8260	13-Sep-13/R	< 0.2			
Trichlorobenzene,1,2,4-	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Trichloroethane,1,1,1-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Trichloroethane,1,1,2-	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Trichloroethylene	µg/g	0.05	EPA 8260	13-Sep-13/R	< 0.05			
Trichlorofluoromethane	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Vinyl Chloride	µg/g	0.02	EPA 8260	13-Sep-13/R	< 0.02			
Xylene, m,p-	µg/g	0.03	EPA 8260	13-Sep-13/R	< 0.03			
Xylene, o-	µg/g	0.03	EPA 8260	13-Sep-13/R	< 0.03			
Xylene, m,p,o-	µg/g	0.03	EPA 8260	13-Sep-13/R	< 0.03			
PHC F1 (C6-C10)	µg/g	10	CWS Tier 1	13-Sep-13/R	< 10			
Comment-purgeable	-		-	13-Sep-13	-			
PHC F2 (>C10-C16)	µg/g	5	CWS Tier 1	17-Sep-13/K	< 5			
PHC F3 (>C16-C34)	µg/g	10	CWS Tier 1	17-Sep-13/K	< 10			
PHC F4 (>C34-C50)	µg/g	10	CWS Tier 1	17-Sep-13/K	< 10			
Comment-extractable	-		-	17-Sep-13	-			

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32348

REPORT No. B13-23938 (ii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 18-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-32 SS4			
			Sample I.D.		B13-23938-1			
			Date Collected		11-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
% moisture	%			18-Sep-13/K	15.3			

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32348

REPORT No. B13-23938 (iii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 18-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-32 SS4			
			Sample I.D.		B13-23938-1			
			Date Collected		11-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acenaphthene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Acenaphthylene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Anthracene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Benzo(a)anthracene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Benzo(a)pyrene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Benzo(b)fluoranthene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Benzo(b+k)fluoranthene	µg/g	0.01	EPA 8270	17-Sep-13/K	< 0.01			
Benzo(g,h,i)perylene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Benzo(k)fluoranthene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Chrysene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Dibenzo(a,h)anthracene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Fluoranthene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Fluorene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Indeno(1,2,3,-cd)pyrene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Methylnaphthalene,1-	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Methylnaphthalene,2-	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Naphthalene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32348

REPORT No. B13-23938 (iii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 11-Sep-13
DATE REPORTED: 18-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-32 SS4			
			Sample I.D.		B13-23938-1			
			Date Collected		11-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Phenanthrene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Pyrene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32309

REPORT No. B13-24043 (i)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 12-Sep-13
DATE REPORTED: 18-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-25 AS1	13-29 SS 3/4		
			Sample I.D.		B13-24043-1	B13-24043-2		
			Date Collected		12-Sep-13	12-Sep-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Antimony	µg/g	0.4	EPA 200.8	17-Sep-13/R	< 0.4	< 0.4		
Arsenic	µg/g	0.5	EPA 200.8	17-Sep-13/R	0.6	0.9		
Barium	µg/g	0.4	EPA 200.8	17-Sep-13/R	33.8	95.2		
Beryllium	µg/g	0.05	EPA 200.8	17-Sep-13/R	0.20	0.74		
Boron	µg/g	0.5	EPA 200.8	17-Sep-13/R	15.4	5.7		
Boron (HWS)	µg/g	0.02	MOE 3470	17-Sep-13/R	0.75	0.21		
Cadmium	µg/g	0.03	EPA 200.8	17-Sep-13/R	< 0.03	0.19		
Chromium	µg/g	0.4	EPA 200.8	17-Sep-13/R	7.8	25.5		
Chromium (VI)	µg/g	0.5	EPA7196A	16-Sep-13/O	< 0.5	< 0.5		
Cobalt	µg/g	0.2	EPA 200.8	17-Sep-13/R	0.5	8.1		
Copper	µg/g	0.4	EPA 200.8	17-Sep-13/R	5.6	13.6		
Lead	µg/g	0.1	EPA 200.8	17-Sep-13/R	4.4	9.7		
Mercury	µg/g	0.005	EPA7471A	18-Sep-13/R	0.009	0.026		
Molybdenum	µg/g	0.1	EPA 200.8	17-Sep-13/R	0.6	0.5		
Nickel	µg/g	0.4	EPA 200.8	17-Sep-13/R	6.5	15.8		
Selenium	µg/g	0.1	EPA 200.8	17-Sep-13/R	0.3	0.5		
Silver	µg/g	0.01	EPA 200.8	17-Sep-13/R	0.02	0.08		

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32309

REPORT No. B13-24043 (i)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 12-Sep-13
DATE REPORTED: 18-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-25 AS1	13-29 SS 3/4		
			Sample I.D.		B13-24043-1	B13-24043-2		
			Date Collected		12-Sep-13	12-Sep-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Thallium	µg/g	0.02	EPA 200.8	17-Sep-13/R	0.10	0.09		
Uranium	µg/g	0.02	EPA 200.8	17-Sep-13/R	0.45	0.91		
Vanadium	µg/g	0.8	EPA 200.8	17-Sep-13/R	12.2	45.3		
Zinc	µg/g	30	EPA 200.8	17-Sep-13/R	< 30	70		

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32309

REPORT No. B13-24043 (ii)

Report To:

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Attention: Zenas Keizars

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285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 12-Sep-13
DATE REPORTED: 18-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-25 AS1	13-29 SS 3/4		
			Sample I.D.		B13-24043-1	B13-24043-2		
			Date Collected		12-Sep-13	12-Sep-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acetone	µg/g	0.5	EPA 8260	17-Sep-13/R	< 0.5	< 0.5		
Benzene	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Bromodichloromethane	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Bromoform	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Bromomethane	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05	< 0.05		
Carbon Tetrachloride	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05	< 0.05		
Monochlorobenzene (Chlorobenzene)	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Chloroform	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Dibromochloromethane	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Dichlorobenzene,1,2-	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05	< 0.05		
Dichlorobenzene,1,3-	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05	< 0.05		
Dichlorobenzene,1,4-	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05	< 0.05		
Dichlorodifluoromethane	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05	< 0.05		
Dichloroethane,1,1-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Dichloroethane,1,2-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Dichloroethylene,1,1-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Dichloroethene, cis-1,2-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32309

REPORT No. B13-24043 (ii)

Report To:

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Attention: Zenas Keizars

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285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 12-Sep-13
DATE REPORTED: 18-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-25 AS1	13-29 SS 3/4		
			Sample I.D.		B13-24043-1	B13-24043-2		
			Date Collected		12-Sep-13	12-Sep-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Dichloroethene, trans-1,2-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Dichloropropane,1,2-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Dichloropropene, cis-1,3-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Dichloropropene, trans-1,3-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Dichloropropene 1,3-cis+trans	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Ethylbenzene	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05	< 0.05		
Dibromoethane,1,2-(Ethylene Dibromide)	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Hexane	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Methyl Ethyl Ketone	µg/g	0.5	EPA 8260	17-Sep-13/R	< 0.5	< 0.5		
Methyl Isobutyl Ketone	µg/g	0.5	EPA 8260	17-Sep-13/R	< 0.5	< 0.5		
Methyl-t-butyl Ether	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05	< 0.05		
Dichloromethane (Methylene Chloride)	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05	< 0.05		
Styrene	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05	< 0.05		
Tetrachloroethane,1,1,1,2-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Tetrachloroethane,1,1,2,2-	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05	< 0.05		

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32309

REPORT No. B13-24043 (ii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 12-Sep-13
DATE REPORTED: 18-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-25 AS1	13-29 SS 3/4		
			Sample I.D.		B13-24043-1	B13-24043-2		
			Date Collected		12-Sep-13	12-Sep-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Tetrachloroethylene	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05	< 0.05		
Toluene	µg/g	0.2	EPA 8260	17-Sep-13/R	< 0.2	< 0.2		
Trichlorobenzene,1,2,4-	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05	< 0.05		
Trichloroethane,1,1,1-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Trichloroethane,1,1,2-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Trichloroethylene	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05	< 0.05		
Trichlorofluoromethane	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Vinyl Chloride	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02	< 0.02		
Xylene, m,p-	µg/g	0.03	EPA 8260	17-Sep-13/R	< 0.03	< 0.03		
Xylene, o-	µg/g	0.03	EPA 8260	17-Sep-13/R	< 0.03	< 0.03		
Xylene, m,p,o-	µg/g	0.03	EPA 8260	17-Sep-13/R	< 0.03	< 0.03		
PHC F1 (C6-C10)	µg/g	10	CWS Tier 1	17-Sep-13/R	< 10	< 10		
Comment-purgeable	-		-	17-Sep-13	-	-		
PHC F2 (>C10-C16)	µg/g	5	CWS Tier 1	17-Sep-13/K	< 20 [1]	< 5		
PHC F3 (>C16-C34)	µg/g	10	CWS Tier 1	17-Sep-13/K	230	40		
PHC F4 (>C34-C50)	µg/g	10	CWS Tier 1	17-Sep-13/K	910	50		
Comment-extractable	-		-	17-Sep-13	NDP	NDP		

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32309 **REPORT No. B13-24043 (ii)**

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 12-Sep-13
DATE REPORTED: 18-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-25 AS1	13-29 SS 3/4		
			Sample I.D.		B13-24043-1	B13-24043-2		
			Date Collected		12-Sep-13	12-Sep-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
% moisture	%			18-Sep-13/K	3.6	10.7		

1 . Note: Elevated MDL due to sample matrix.

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32309

REPORT No. B13-24043 (iii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 12-Sep-13
DATE REPORTED: 18-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-25 AS1	13-29 SS 3/4		
			Sample I.D.		B13-24043-1	B13-24043-2		
			Date Collected		12-Sep-13	12-Sep-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acenaphthene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	< 0.02		
Acenaphthylene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	< 0.02		
Anthracene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	< 0.02		
Benzo(a)anthracene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	0.056		
Benzo(a)pyrene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	0.042		
Benzo(b)fluoranthene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	0.056		
Benzo(b+k)fluoranthene	µg/g	0.01	EPA 8270	17-Sep-13/K	< 0.5	0.084		
Benzo(g,h,i)perylene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	0.028		
Benzo(k)fluoranthene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	0.028		
Chrysene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	0.051		
Dibenzo(a,h)anthracene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	< 0.02		
Fluoranthene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	0.112		
Fluorene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	< 0.02		
Indeno(1,2,3,-cd)pyrene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	0.023		
Methylnaphthalene,1-	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	< 0.02		
Methylnaphthalene,2-	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	< 0.02		
Naphthalene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	< 0.02		

Elevated MDLs due to sample matrix interferences

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32309

REPORT No. B13-24043 (iii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 12-Sep-13
DATE REPORTED: 18-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-25 AS1	13-29 SS 3/4		
			Sample I.D.		B13-24043-1	B13-24043-2		
			Date Collected		12-Sep-13	12-Sep-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Phenanthrene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	< 0.02		
Pyrene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.2	0.084		

Elevated MDLs due to sample matrix interferences

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32312

REPORT No. B13-24120 (i)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 13-Sep-13
DATE REPORTED: 19-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-40 SS4			
			Sample I.D.		B13-24120-1			
			Date Collected		13-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Antimony	µg/g	0.4	EPA 200.8	17-Sep-13/R	< 0.4			
Arsenic	µg/g	0.5	EPA 200.8	17-Sep-13/R	1.3			
Barium	µg/g	0.4	EPA 200.8	17-Sep-13/R	76.8			
Beryllium	µg/g	0.05	EPA 200.8	17-Sep-13/R	0.28			
Boron	µg/g	0.5	EPA 200.8	17-Sep-13/R	17.3			
Boron (HWS)	µg/g	0.02	MOE 3470	17-Sep-13/R	0.57			
Cadmium	µg/g	0.03	EPA 200.8	17-Sep-13/R	0.06			
Chromium	µg/g	0.4	EPA 200.8	17-Sep-13/R	16.2			
Chromium (VI)	µg/g	0.5	EPA7196A	18-Sep-13/O	< 0.5			
Cobalt	µg/g	0.2	EPA 200.8	17-Sep-13/R	2.5			
Copper	µg/g	0.4	EPA 200.8	17-Sep-13/R	10.5			
Lead	µg/g	0.1	EPA 200.8	17-Sep-13/R	18.5			
Mercury	µg/g	0.005	EPA7471A	18-Sep-13/R	0.007			
Molybdenum	µg/g	0.1	EPA 200.8	17-Sep-13/R	1.2			
Nickel	µg/g	0.4	EPA 200.8	17-Sep-13/R	10.2			
Selenium	µg/g	0.1	EPA 200.8	17-Sep-13/R	0.3			
Silver	µg/g	0.01	EPA 200.8	17-Sep-13/R	0.04			

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32312

REPORT No. B13-24120 (i)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 13-Sep-13
DATE REPORTED: 19-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-40 SS4			
			Sample I.D.		B13-24120-1			
			Date Collected		13-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Thallium	µg/g	0.02	EPA 200.8	17-Sep-13/R	0.14			
Uranium	µg/g	0.02	EPA 200.8	17-Sep-13/R	0.30			
Vanadium	µg/g	0.8	EPA 200.8	17-Sep-13/R	18.0			
Zinc	µg/g	30	EPA 200.8	17-Sep-13/R	< 30			

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32312

REPORT No. B13-24120 (ii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 13-Sep-13
DATE REPORTED: 19-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-40 SS4			
			Sample I.D.		B13-24120-1			
			Date Collected		13-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acetone	µg/g	0.5	EPA 8260	17-Sep-13/R	< 0.5			
Benzene	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Bromodichloromethane	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Bromoform	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Bromomethane	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05			
Carbon Tetrachloride	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05			
Monochlorobenzene (Chlorobenzene)	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Chloroform	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Dibromochloromethane	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Dichlorobenzene,1,2-	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05			
Dichlorobenzene,1,3-	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05			
Dichlorobenzene,1,4-	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05			
Dichlorodifluoromethane	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05			
Dichloroethane,1,1-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Dichloroethane,1,2-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Dichloroethylene,1,1-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Dichloroethene, cis-1,2-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32312

REPORT No. B13-24120 (ii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 13-Sep-13
DATE REPORTED: 19-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-40 SS4			
			Sample I.D.		B13-24120-1			
			Date Collected		13-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Dichloroethene, trans-1,2-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Dichloropropane,1,2-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Dichloropropene, cis-1,3-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Dichloropropene, trans-1,3-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Dichloropropene 1,3-cis+trans	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Ethylbenzene	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05			
Dibromoethane,1,2-(Ethylene Dibromide)	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Hexane	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Methyl Ethyl Ketone	µg/g	0.5	EPA 8260	17-Sep-13/R	< 0.5			
Methyl Isobutyl Ketone	µg/g	0.5	EPA 8260	17-Sep-13/R	< 0.5			
Methyl-t-butyl Ether	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05			
Dichloromethane (Methylene Chloride)	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05			
Styrene	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05			
Tetrachloroethane,1,1,1,2-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Tetrachloroethane,1,1,2,2-	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05			

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32312

REPORT No. B13-24120 (ii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 13-Sep-13
DATE REPORTED: 19-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-40 SS4			
			Sample I.D.		B13-24120-1			
			Date Collected		13-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Tetrachloroethylene	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05			
Toluene	µg/g	0.2	EPA 8260	17-Sep-13/R	< 0.2			
Trichlorobenzene,1,2,4-	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05			
Trichloroethane,1,1,1-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Trichloroethane,1,1,2-	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Trichloroethylene	µg/g	0.05	EPA 8260	17-Sep-13/R	< 0.05			
Trichlorofluoromethane	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Vinyl Chloride	µg/g	0.02	EPA 8260	17-Sep-13/R	< 0.02			
Xylene, m,p-	µg/g	0.03	EPA 8260	17-Sep-13/R	< 0.03			
Xylene, o-	µg/g	0.03	EPA 8260	17-Sep-13/R	< 0.03			
Xylene, m,p,o-	µg/g	0.03	EPA 8260	17-Sep-13/R	< 0.03			
PHC F1 (C6-C10)	µg/g	10	CWS Tier 1	17-Sep-13/R	< 10			
Comment-purgeable	-		-	17-Sep-13	-			
PHC F2 (>C10-C16)	µg/g	5	CWS Tier 1	19-Sep-13/K	< 5			
PHC F3 (>C16-C34)	µg/g	10	CWS Tier 1	19-Sep-13/K	20			
PHC F4 (>C34-C50)	µg/g	10	CWS Tier 1	19-Sep-13/K	20			
Comment-extractable	-		-	19-Sep-13	NDP			

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32312

REPORT No. B13-24120 (ii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 13-Sep-13
DATE REPORTED: 19-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-40 SS4			
			Sample I.D.		B13-24120-1			
			Date Collected		13-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
% moisture	%			17-Sep-13/K	7.3			

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32312

REPORT No. B13-24120 (iii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 13-Sep-13
DATE REPORTED: 19-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-40 SS4			
			Sample I.D.		B13-24120-1			
			Date Collected		13-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acenaphthene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Acenaphthylene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Anthracene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Benzo(a)anthracene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Benzo(a)pyrene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Benzo(b)fluoranthene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Benzo(b+k)fluoranthene	µg/g	0.01	EPA 8270	17-Sep-13/K	< 0.01			
Benzo(g,h,i)perylene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Benzo(k)fluoranthene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Chrysene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Dibenzo(a,h)anthracene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Fluoranthene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Fluorene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Indeno(1,2,3,-cd)pyrene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Methylnaphthalene,1-	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Methylnaphthalene,2-	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Naphthalene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G32312

REPORT No. B13-24120 (iii)

Report To:

Genivar Inc
294 Rink St, Suite 103
Peterborough ON K9J 2K2 Canada
Attention: Zenas Keizars

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 13-Sep-13
DATE REPORTED: 19-Sep-13
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER: 131-18048-00
WATERWORKS NO.

			Client I.D.		13-40 SS4			
			Sample I.D.		B13-24120-1			
			Date Collected		13-Sep-13			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Phenanthrene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			
Pyrene	µg/g	0.005	EPA 8270	17-Sep-13/K	< 0.005			

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
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nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G31338

REPORT No. B13-28841 (i)

Report To:

Genivar Inc - Kingston
201-1224 Gardiners Rd,
Kingston Ontario K7P 0G2 Canada
Attention: Kevin Clavet

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 04-Nov-13
DATE REPORTED: 08-Nov-13
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		MW4-W001	MW4-W002	MW3-W003	MW2-W004
			Sample I.D.		B13-28841-1	B13-28841-2	B13-28841-3	B13-28841-4
			Date Collected		04-Nov-13	04-Nov-13	04-Nov-13	04-Nov-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Poly-Chlorinated Biphenyls (PCB's)	µg/L	0.05	EPA 8081	07-Nov-13/K	< 0.05	< 0.05	< 0.05	< 0.05
Aroclor	-		-	07-Nov-13	-	-	-	-
Antimony	µg/L	0.5	EPA 200.8	07-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Arsenic	µg/L	0.70	EPA 200.8	07-Nov-13/R	0.99	1.26	0.94	1.47
Barium	µg/L	0.6	EPA 200.8	07-Nov-13/R	216	239	284	249
Beryllium	µg/L	0.1	EPA 200.8	07-Nov-13/R	< 0.1	< 0.1	< 0.1	< 0.1
Boron	µg/L	2	EPA 200.8	07-Nov-13/R	89	95	24	60
Cadmium	µg/L	0.1	EPA 200.8	07-Nov-13/R	< 0.1	< 0.1	< 0.1	< 0.1
Chromium	µg/L	1.1	EPA 200.8	07-Nov-13/R	< 1.1	1.2	< 1.1	1.7
Chromium (VI)	µg/L	10	SM3500CrB	06-Nov-13/R	< 10	< 10	< 10	< 10
Cobalt	µg/L	0.2	EPA 200.8	07-Nov-13/R	< 0.2	< 0.2	1.0	< 0.2
Copper	µg/L	0.3	EPA 200.8	07-Nov-13/R	0.5	0.6	0.9	0.7
Lead	µg/L	0.05	EPA 200.8	07-Nov-13/R	0.50	0.52	0.38	0.54
Mercury	µg/L	0.02	SM 3112B	08-Nov-13/R	< 0.02	< 0.02	0.03	< 0.02
Molybdenum	µg/L	0.3	EPA 200.8	07-Nov-13/R	1.4	1.5	2.7	0.8
Nickel	µg/L	0.6	EPA 200.8	07-Nov-13/R	< 0.6	< 0.6	1.6	< 0.6
Selenium	µg/L	0.5	EPA 200.8	07-Nov-13/R	0.7	0.7	< 0.5	2.5
Silver	µg/L	0.03	EPA 200.8	07-Nov-13/R	< 0.03	< 0.03	< 0.03	< 0.03
Thallium	µg/L	0.1	EPA 200.8	07-Nov-13/R	< 0.1	< 0.1	< 0.1	< 0.1
Uranium	µg/L	0.3	EPA 200.8	07-Nov-13/R	0.5	0.6	5.2	< 0.3
Vanadium	µg/L	0.4	EPA 200.8	07-Nov-13/R	0.7	0.7	0.5	0.9
Zinc	µg/L	5	EPA 200.8	07-Nov-13/R	< 5	< 5	< 5	< 5

Surrogates were not included in PCB sample #3

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G31338

REPORT No. B13-28841 (i)

Report To:

Genivar Inc - Kingston
201-1224 Gardiners Rd,
Kingston Ontario K7P 0G2 Canada
Attention: Kevin Clavet

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 04-Nov-13
DATE REPORTED: 08-Nov-13
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		MW1-W005	MW1-W006		
			Sample I.D.		B13-28841-5	B13-28841-6		
			Date Collected		04-Nov-13	04-Nov-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Poly-Chlorinated Biphenyls (PCB's)	µg/L	0.05	EPA 8081	07-Nov-13/K	< 0.05	< 0.05		
Aroclor	-		-	07-Nov-13	-	-		
Antimony	µg/L	0.5	EPA 200.8	07-Nov-13/R	< 0.5	< 0.5		
Arsenic	µg/L	0.70	EPA 200.8	07-Nov-13/R	0.94	1.16		
Barium	µg/L	0.6	EPA 200.8	07-Nov-13/R	123	128		
Beryllium	µg/L	0.1	EPA 200.8	07-Nov-13/R	< 0.1	< 0.1		
Boron	µg/L	2	EPA 200.8	07-Nov-13/R	78	76		
Cadmium	µg/L	0.1	EPA 200.8	07-Nov-13/R	< 0.1	< 0.1		
Chromium	µg/L	1.1	EPA 200.8	07-Nov-13/R	< 1.1	< 1.1		
Chromium (VI)	µg/L	10	SM3500CrB	06-Nov-13/R	< 10	< 10		
Cobalt	µg/L	0.2	EPA 200.8	07-Nov-13/R	< 0.2	< 0.2		
Copper	µg/L	0.3	EPA 200.8	07-Nov-13/R	0.5	0.3		
Lead	µg/L	0.05	EPA 200.8	07-Nov-13/R	0.43	0.42		
Mercury	µg/L	0.02	SM 3112B	08-Nov-13/R	0.06	< 0.02		
Molybdenum	µg/L	0.3	EPA 200.8	07-Nov-13/R	1.2	1.2		
Nickel	µg/L	0.6	EPA 200.8	07-Nov-13/R	< 0.6	< 0.6		
Selenium	µg/L	0.5	EPA 200.8	07-Nov-13/R	0.8	0.8		
Silver	µg/L	0.03	EPA 200.8	07-Nov-13/R	< 0.03	< 0.03		
Thallium	µg/L	0.1	EPA 200.8	07-Nov-13/R	< 0.1	< 0.1		
Uranium	µg/L	0.3	EPA 200.8	07-Nov-13/R	< 0.3	< 0.3		
Vanadium	µg/L	0.4	EPA 200.8	07-Nov-13/R	< 0.4	0.5		
Zinc	µg/L	5	EPA 200.8	07-Nov-13/R	< 5	< 5		

Surrogates were not included in PCB sample #3

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G31338

REPORT No. B13-28841 (ii)

Report To:

Genivar Inc - Kingston
201-1224 Gardiners Rd,
Kingston Ontario K7P 0G2 Canada
Attention: Kevin Clavet

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 04-Nov-13
DATE REPORTED: 08-Nov-13
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		MW4-W001	MW4-W002	MW3-W003	MW2-W004
			Sample I.D.		B13-28841-1	B13-28841-2	B13-28841-3	B13-28841-4
			Date Collected		04-Nov-13	04-Nov-13	04-Nov-13	04-Nov-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acetone	µg/L	30	EPA 8260	05-Nov-13/R	< 30	< 30	< 30	< 30
Benzene	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane	µg/L	2	EPA 8260	05-Nov-13/R	< 2	< 2	< 2	< 2
Bromoform	µg/L	5	EPA 8260	05-Nov-13/R	< 5	< 5	< 5	< 5
Bromomethane	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Carbon Tetrachloride	µg/L	0.2	EPA 8260	05-Nov-13/R	< 0.2	< 0.2	< 0.2	< 0.2
Monochlorobenzene (Chlorobenzene)	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Chloroform	µg/L	1	EPA 8260	05-Nov-13/R	< 1	< 1	< 1	< 1
Dibromochloromethane	µg/L	2	EPA 8260	05-Nov-13/R	< 2	< 2	< 2	< 2
Dichlorobenzene,1,2-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorobenzene,1,3-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorobenzene,1,4-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorodifluoromethane	µg/L	2	EPA 8260	05-Nov-13/R	< 2	< 2	< 2	< 2
Dichloroethane,1,1-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloroethane,1,2-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloroethylene,1,1-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloroethene, cis-1,2-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloroethene, trans-1,2-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloropropane,1,2-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloropropene, cis-1,3-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloropropene, trans-1,3-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloropropene 1,3-cis+trans	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	1.0	< 0.5
Dibromoethane,1,2- (Ethylene Dibromide)	µg/L	0.2	EPA 8260	05-Nov-13/R	< 0.2	< 0.2	< 0.2	< 0.2
Hexane	µg/L	5	EPA 8260	05-Nov-13/R	< 5	< 5	< 5	< 5

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G31338

REPORT No. B13-28841 (ii)

Report To:

Genivar Inc - Kingston
201-1224 Gardiners Rd,
Kingston Ontario K7P 0G2 Canada
Attention: Kevin Clavet

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 04-Nov-13
DATE REPORTED: 08-Nov-13
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		MW4-W001	MW4-W002	MW3-W003	MW2-W004
			Sample I.D.		B13-28841-1	B13-28841-2	B13-28841-3	B13-28841-4
			Date Collected		04-Nov-13	04-Nov-13	04-Nov-13	04-Nov-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Methyl Ethyl Ketone	µg/L	20	EPA 8260	05-Nov-13/R	< 20	< 20	< 20	< 20
Methyl Isobutyl Ketone	µg/L	20	EPA 8260	05-Nov-13/R	< 20	< 20	< 20	< 20
Methyl-t-butyl Ether	µg/L	2	EPA 8260	05-Nov-13/R	< 2	< 2	< 2	< 2
Dichloromethane (Methylene Chloride)	µg/L	5	EPA 8260	05-Nov-13/R	< 5	< 5	< 5	< 5
Styrene	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethane,1,1,1,2-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethane,1,1,2,2-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethylene	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Toluene	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichlorobenzene,1,2,4-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethane,1,1,1-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethane,1,1,2-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichlorofluoromethane	µg/L	5	EPA 8260	05-Nov-13/R	< 5	< 5	< 5	< 5
Vinyl Chloride	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Xylene, m,p-	µg/L	1.0	EPA 8260	05-Nov-13/R	< 1.0	< 1.0	1.4	< 1.0
Xylene, o-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5	1.9	< 0.5
Xylene, m,p,o-	µg/L	1.1	EPA 8260	05-Nov-13/R	< 1.1	< 1.1	3.2	< 1.1
PHC F1 (C6-C10)	µg/L	50	MOE TPH-E3397A	05-Nov-13/R	< 50	< 50	< 50	< 50
Comment-purgeable	-		-	05-Nov-13	-	-	-	-
PHC F2 (>C10-C16)	µg/L	50	MOE PHC E3421	06-Nov-13/K	< 50	< 50	110	< 50
PHC F3 (>C16-C34)	µg/L	400	MOE PHC E3421	06-Nov-13/K	< 400	< 400	< 500	< 400
PHC F4 (>C34-C50)	µg/L	400	MOE PHC E3421	06-Nov-13/K	< 400	< 400	< 500	< 400
Comment-extractable	-		-	06-Nov-13	-	-	NDP	-

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G31338

REPORT No. B13-28841 (ii)

Report To:

Genivar Inc - Kingston
201-1224 Gardiners Rd,
Kingston Ontario K7P 0G2 Canada
Attention: Kevin Clavet

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 04-Nov-13
DATE REPORTED: 08-Nov-13
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		MW4-W001	MW4-W002	MW3-W003	MW2-W004
			Sample I.D.		B13-28841-1	B13-28841-2	B13-28841-3	B13-28841-4
			Date Collected		04-Nov-13	04-Nov-13	04-Nov-13	04-Nov-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Michelle Dubien
Lab Manager

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SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		MW1-W005	MW1-W006		
			Sample I.D.		B13-28841-5	B13-28841-6		
			Date Collected		04-Nov-13	04-Nov-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acetone	µg/L	30	EPA 8260	05-Nov-13/R	< 30	< 30		
Benzene	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Bromodichloromethane	µg/L	2	EPA 8260	05-Nov-13/R	< 2	< 2		
Bromoform	µg/L	5	EPA 8260	05-Nov-13/R	< 5	< 5		
Bromomethane	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Carbon Tetrachloride	µg/L	0.2	EPA 8260	05-Nov-13/R	< 0.2	< 0.2		
Monochlorobenzene (Chlorobenzene)	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Chloroform	µg/L	1	EPA 8260	05-Nov-13/R	< 1	< 1		
Dibromochloromethane	µg/L	2	EPA 8260	05-Nov-13/R	< 2	< 2		
Dichlorobenzene,1,2-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Dichlorobenzene,1,3-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Dichlorobenzene,1,4-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Dichlorodifluoromethane	µg/L	2	EPA 8260	05-Nov-13/R	< 2	< 2		
Dichloroethane,1,1-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Dichloroethane,1,2-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Dichloroethylene,1,1-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Dichloroethene, cis-1,2-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Dichloroethene, trans-1,2-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Dichloropropane,1,2-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Dichloropropene, cis-1,3-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Dichloropropene, trans-1,3-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Dichloropropene 1,3-cis+trans	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Ethylbenzene	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Dibromoethane,1,2- (Ethylene Dibromide)	µg/L	0.2	EPA 8260	05-Nov-13/R	< 0.2	< 0.2		
Hexane	µg/L	5	EPA 8260	05-Nov-13/R	< 5	< 5		

Michelle Dubien
Lab Manager

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G31338

REPORT No. B13-28841 (ii)

Report To:

Genivar Inc - Kingston
201-1224 Gardiners Rd,
Kingston Ontario K7P 0G2 Canada
Attention: Kevin Clavet

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 04-Nov-13
DATE REPORTED: 08-Nov-13
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		MW1-W005	MW1-W006		
			Sample I.D.		B13-28841-5	B13-28841-6		
			Date Collected		04-Nov-13	04-Nov-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Methyl Ethyl Ketone	µg/L	20	EPA 8260	05-Nov-13/R	< 20	< 20		
Methyl Isobutyl Ketone	µg/L	20	EPA 8260	05-Nov-13/R	< 20	< 20		
Methyl-t-butyl Ether	µg/L	2	EPA 8260	05-Nov-13/R	< 2	< 2		
Dichloromethane (Methylene Chloride)	µg/L	5	EPA 8260	05-Nov-13/R	< 5	< 5		
Styrene	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Tetrachloroethane,1,1,1,2-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Tetrachloroethane,1,1,2,2-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Tetrachloroethylene	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Toluene	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Trichlorobenzene,1,2,4-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Trichloroethane,1,1,1-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Trichloroethane,1,1,2-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Trichloroethylene	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Trichlorofluoromethane	µg/L	5	EPA 8260	05-Nov-13/R	< 5	< 5		
Vinyl Chloride	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Xylene, m,p-	µg/L	1.0	EPA 8260	05-Nov-13/R	< 1.0	< 1.0		
Xylene, o-	µg/L	0.5	EPA 8260	05-Nov-13/R	< 0.5	< 0.5		
Xylene, m,p,o-	µg/L	1.1	EPA 8260	05-Nov-13/R	< 1.1	< 1.1		
PHC F1 (C6-C10)	µg/L	50	MOE TPH-E3397A	05-Nov-13/R	< 50	< 50		
Comment-purgeable	-		-	05-Nov-13	-	-		
PHC F2 (>C10-C16)	µg/L	50	MOE PHC E3421	06-Nov-13/K	< 50	< 50		
PHC F3 (>C16-C34)	µg/L	400	MOE PHC E3421	06-Nov-13/K	< 400	< 400		
PHC F4 (>C34-C50)	µg/L	400	MOE PHC E3421	06-Nov-13/K	< 400	< 400		
Comment-extractable	-		-	06-Nov-13	-	-		

Michelle Dubien
Lab Manager

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G31338

REPORT No. B13-28841 (ii)

Report To:

Genivar Inc - Kingston
201-1224 Gardiners Rd,
Kingston Ontario K7P 0G2 Canada
Attention: Kevin Clavet

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 04-Nov-13
DATE REPORTED: 08-Nov-13
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER:
WATERWORKS NO.

				Client I.D.	MW1-W005	MW1-W006		
				Sample I.D.	B13-28841-5	B13-28841-6		
				Date Collected	04-Nov-13	04-Nov-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				

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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Michelle Dubien
Lab Manager

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REPORT No. B13-28841 (iii)

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Fax: 613-544-2770

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SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		MW4-W001	MW4-W002	MW3-W003	MW2-W004
			Sample I.D.		B13-28841-1	B13-28841-2	B13-28841-3	B13-28841-4
			Date Collected		04-Nov-13	04-Nov-13	04-Nov-13	04-Nov-13
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acenaphthene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05	< 0.06	< 0.05
Acenaphthylene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05	< 0.06	< 0.05
Anthracene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05	< 0.06	< 0.05
Benzo(a)anthracene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05	< 0.06	< 0.05
Benzo(a)pyrene	µg/L	0.005	EPA 8270	07-Nov-13/K	< 0.005	< 0.005	0.006	0.018
Benzo(b)fluoranthene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05	< 0.06	< 0.05
Benzo(b+k)fluoranthene	µg/L	0.1	EPA 8270	07-Nov-13/K	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05	< 0.06	< 0.05
Benzo(k)fluoranthene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05	< 0.06	< 0.05
Chrysene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05	< 0.06	< 0.05
Dibenzo(a,h)anthracene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05	< 0.06	< 0.05
Fluoranthene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05	0.06	< 0.05
Fluorene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05	0.09	< 0.05
Indeno(1,2,3,-cd)pyrene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05	< 0.06	< 0.05
Methylnaphthalene,1-	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05	1.51	< 0.05
Methylnaphthalene,2-	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05	1.09	< 0.05
Naphthalene	µg/L	0.05	EPA 8270	07-Nov-13/K	0.06	< 0.05	1.83	< 0.05
Phenanthrene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05	0.11	< 0.05
Pyrene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05	0.07	< 0.05

Michelle Dubien
Lab Manager

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SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Front Rd.
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		MW1-W005	MW1-W006		
			Sample I.D.		B13-28841-5	B13-28841-6		
			Date Collected		04-Nov-13	04-Nov-13		
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Acenaphthene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05		
Acenaphthylene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05		
Anthracene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05		
Benzo(a)anthracene	µg/L	0.05	EPA 8270	07-Nov-13/K	0.05	0.07		
Benzo(a)pyrene	µg/L	0.005	EPA 8270	07-Nov-13/K	0.047	0.061		
Benzo(b)fluoranthene	µg/L	0.05	EPA 8270	07-Nov-13/K	0.06	0.08		
Benzo(b+k)fluoranthene	µg/L	0.1	EPA 8270	07-Nov-13/K	< 0.1	0.12		
Benzo(g,h,i)perylene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	0.07		
Benzo(k)fluoranthene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05		
Chrysene	µg/L	0.05	EPA 8270	07-Nov-13/K	0.06	0.06		
Dibenzo(a,h)anthracene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05		
Fluoranthene	µg/L	0.05	EPA 8270	07-Nov-13/K	0.12	0.16		
Fluorene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05		
Indeno(1,2,3,-cd)pyrene	µg/L	0.05	EPA 8270	07-Nov-13/K	0.05	0.07		
Methylnaphthalene,1-	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05		
Methylnaphthalene,2-	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05		
Naphthalene	µg/L	0.05	EPA 8270	07-Nov-13/K	0.05	0.06		
Phenanthrene	µg/L	0.05	EPA 8270	07-Nov-13/K	< 0.05	< 0.05		
Pyrene	µg/L	0.05	EPA 8270	07-Nov-13/K	0.12	0.15		

Michelle Dubien
Lab Manager

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