



**Wastewater Servicing Assessment
Proposed Residential Subdivision**

Part of Lot 13, Concession 2, Geographic Township of Erin
Ospringle, Town of Erin

Client:

Mr. Terrell Heard
Spirit of Pentecost
3029 Clayhill Road, P.O. Box 20059
Mississauga, ON L5B 4L7

Date: September 5, 2019
File No.: 00091-2
Document No.: 00091-2.01

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Proposed Residential Subdivision**

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Prepared by:

A handwritten signature in blue ink, appearing to read "D.J. Morlock", written over a horizontal line.

David Morlock, P.Eng.
Consulting Engineer

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1 Introduction

This report by FlowSpec Engineering (“FlowSpec”) presents a wastewater servicing assessment in support of a proposed subdivision in Ospringle, which is to be comprised of 13 single-family residential lots. This assessment is intended to supplement an associated functional servicing assessment by IBI Group.

Neither municipal nor communal wastewater servicing are available in Ospringle, the nearest such servicing availability being 9 km distant in either Acton or Rockwood. Therefore, sanitary servicing of the proposed subdivision is to be performed by individual private onsite Class 4 wastewater treatment systems (“WTS”) (i.e., treatment and dispersal of wastewater to a subsurface leaching bed). Of note, water servicing of Ospringle is performed by individual private wells; and the same servicing strategy is to be employed for the proposed subdivision.

The purpose of this assessment is to derive preliminary design criteria and conceptualize a wastewater servicing (i.e., leaching bed) layout on each proposed residential lot in conformance with the requirements of the Ontario Building Code (“OBC”) and using the lot fabric derived by IBI Group.

In performing this assessment, FlowSpec incorporated findings from a geotechnical investigation and hydrogeological assessment of the site performed by Chung & Vander Doelen Engineering (“CVD”).

2 Site Characterization

2.1 Site Description

The site is located on the east side of the Ospringle settlement area (adjacent to Wellington Road 124 and Second Line) and has an area of 3.6 ha. Currently agricultural in use, the site is surrounded by a combination of agricultural, residential, commercial, and church properties.

The ground-surface topography of the site ascends gently at about 2 to 4 percent grade in a southwesterly direction, crests in a knoll near the west corner of the site, and then descends moderately to the west and south, as depicted on Drawing 1 in Appendix A (base drawing prepared by IBI Group).

As described above, water servicing of the abutting properties is performed by individual private wells. In particular, shallow dug wells service several of the residential properties along the northeast side of the site along Wellington Road 124.

The site does not lie within a municipal wellhead protection area.

2.2 Subsurface Soil Stratigraphy and Groundwater Conditions

CVD explored the subsurface of the site on May 3, 2018 by advancing six boreholes, all completed as monitoring wells. Results of the exploration were provided in CVD’s November 16, 2018 report (file no. G18675). The encountered soil stratigraphy and groundwater conditions are described on borehole logs which are enclosed in Appendix B. The location and elevation of each borehole are depicted on Drawing 1 in Appendix A. CVD subsequently measured groundwater levels in the monitoring wells on May 11 and July 31, 2018. CVD also performed laboratory-derived particle-size analysis of several collected soil samples, and the resulting particle-size distribution curves are enclosed in Appendix B.

On the basis of the above-referenced CVD report, the shallow soil stratigraphy was generally comprised of surficial topsoil overlying varying deposits of sand and silt, sandy silt, and sandy silt till. Seasonal variation was captured, as the depth to groundwater fluctuated from 0.65 to 1.35 m during the May 11 event to 2.1 to 3.2 m during the July 31 event. CVD generated a groundwater flow figure from the July 31 measurements, which is enclosed in Appendix B. The figure depicts flow in an arcing but generally northerly direction which approximates the ground-surface topography.

3 Parameters

The principal parameters used for design of a WTS are percolation time (i.e., soil infiltration rate) and wastewater flow (theoretical peak daily flow calculated using a fixed formula from the OBC).

3.1 Percolation Time

A preliminary percolation time was assessed by: i) classifying each relevant soil encountered during the subsurface exploration using the Unified Soil Classification System and correlating with a percolation time using OBC Supplementary Standard SB-6, "Percolation Time and Soil Descriptions", and ii) compensating for proposed earth-filling operations, which will raise the ground surface by ± 1 to 3 m. The assessment is summarized in the following table:

| Soil Description | Unified Soil Classification | Percolation Time (min/cm) |
|--|-----------------------------|---------------------------|
| Sand and Silt, trace gravel | SM-ML | 25 |
| Sandy Silt | ML | 25 |
| Sandy Silt Till, trace gravel and clay | ML | 35 |
| Filled soil as described below (similarly-textured to native soils) | ML | 50 |

The proposed filling operations will cause all of the proposed WTS leaching beds to be founded on filled soil.

The above-referenced CVD report provides recommendations for filling procedures, equipment, and soil-type in the proposed leaching bed areas. Adherence to these recommendations is critical to preventing over-compaction of the native and filled soils in these areas, which would reduce their permeability and increase their percolation time. Such impact could reduce hydraulic capacity of a leaching bed, and potentially accelerate premature failure.

Notwithstanding the recommendations made by CVD, some degree of compaction is anticipated during filling operations; and therefore, a conservative overall percolation time of 50 min/cm was used for this assessment.

It is recommended that test pits be excavated on a lot-by-lot basis when designing each individual WTS, in order to verify post-grading soil stratigraphy and compaction, and to provide the opportunity for adjustment of the percolation time for design (and related size and cost of the leaching bed), if warranted.

3.2 Wastewater Flow

A maximum wastewater flow (i.e., theoretical peak daily flow) was calculated for this assessment using an anticipated maximum potential residential occupancy and flow-rates prescribed in OBC Table 8.2.1.3.A. The calculation is summarized in the following table:

| Occupancy Data | | Theoretical Peak Daily Wastewater Flow (L/day) |
|---|---|--|
| A | 4 bedrooms | 2,000 |
| B | 0 bedrooms over 5 | 0 |
| C | 300 m ² (3,200 ft ²) finished floor area (above-grade storeys only) | 1,000 |
| D | 40 plumbing fixture units from OBC Table 7.4.9.3. (i.e., approximately four bathrooms, kitchen, and laundry) | 1,000 |
| Total = A + (greater of B, C, and D) | | 3,000 |

A maximum theoretical peak daily wastewater flow of 3,000 L/day was used for this assessment.

4 Assessment

Wastewater servicing of the proposed subdivision is predicated on the following factors:

- percolation time (described in Section 3.1);
- wastewater flow (described in Section 3.2);
- footprint of residential building envelope; and
- spatial accommodation of driveway and any ancillary structures (e.g., shed, deck, pool).

It is also important to note that the hydrogeological assessment of the site by CVD infers possible interception of the abutting properties along Wellington Road 124 by the effluent-receiving shallow groundwater regime. Therefore, the proposed WTS configuration is predicated on replacement of any shallow dug wells on these properties with deep drilled wells.

With consideration for the factors described above, it is recommended that each WTS be comprised of the following key components: i) Level IV (i.e., tertiary) treatment system with the capability of removing 30% of wastewater-derived nitrogen, and ii) Type A dispersal leaching bed. A preliminary wastewater servicing layout for each proposed lot is depicted on Drawing 1 in Appendix A, and is reflective of proposed lot grading.

4.1 Key Components

4.1.1 Level IV Treatment System

A Level IV (i.e., tertiary) treatment system performs aerobic biological reduction of wastewater-derived suspended solids and five-day biochemical oxygen demand (i.e., organics) to concentrations which permit higher hydraulic loading to and lesser resulting space for a leaching bed, as compared to using septic tank treatment only.

The OBC mandates annual sampling and laboratory-analysis of effluent from a Level IV treatment system to demonstrate compliance with concentration standards for suspended solids and five-day biochemical oxygen demand. Due to the functional complexity and effluent quality standards inherent in a Level IV treatment system, the owner is legally required to enter into and arrange ongoing payment for a perpetual maintenance/servicing agreement with the manufacturer.

Depending on the type of Level IV treatment system used (various proprietary technologies are available) and lot grading, an effluent pump may be required (either internal to the treatment system or in a separate tank) to lift treated effluent to the leaching bed. The pump is equipped with a high-level float which triggers an external audible/visual warning alarm in the event of malfunction.

The Level IV treatment system is recommended to be approved for such use under CAN/BNQ 3680-600, "Onsite Residential Wastewater Treatment Technologies". Examples of currently-approved Level IV treatment technologies include Ecoflo, Norweco Hydro-Kinetic, and Waterloo Biofilter. Supplementary treatment equipment may also be required to achieve the 30% nitrogen removal described above.

4.1.2 Type A Dispersal Leaching Bed

A Type A dispersal leaching bed performs final treatment and dispersal of effluent to the subsurface. Specifically, the bed consists of a layer of imported stone containing a series of perforated gravity distribution pipes, and underlain by a layer of imported sand fill with a percolation time of 6 to 10 min/cm. The imported sand fill layer extends laterally beyond the raised perimeter of the stone layer into a tapered mantle. A typical cross-section detail is depicted on Drawing 2 in Appendix A.

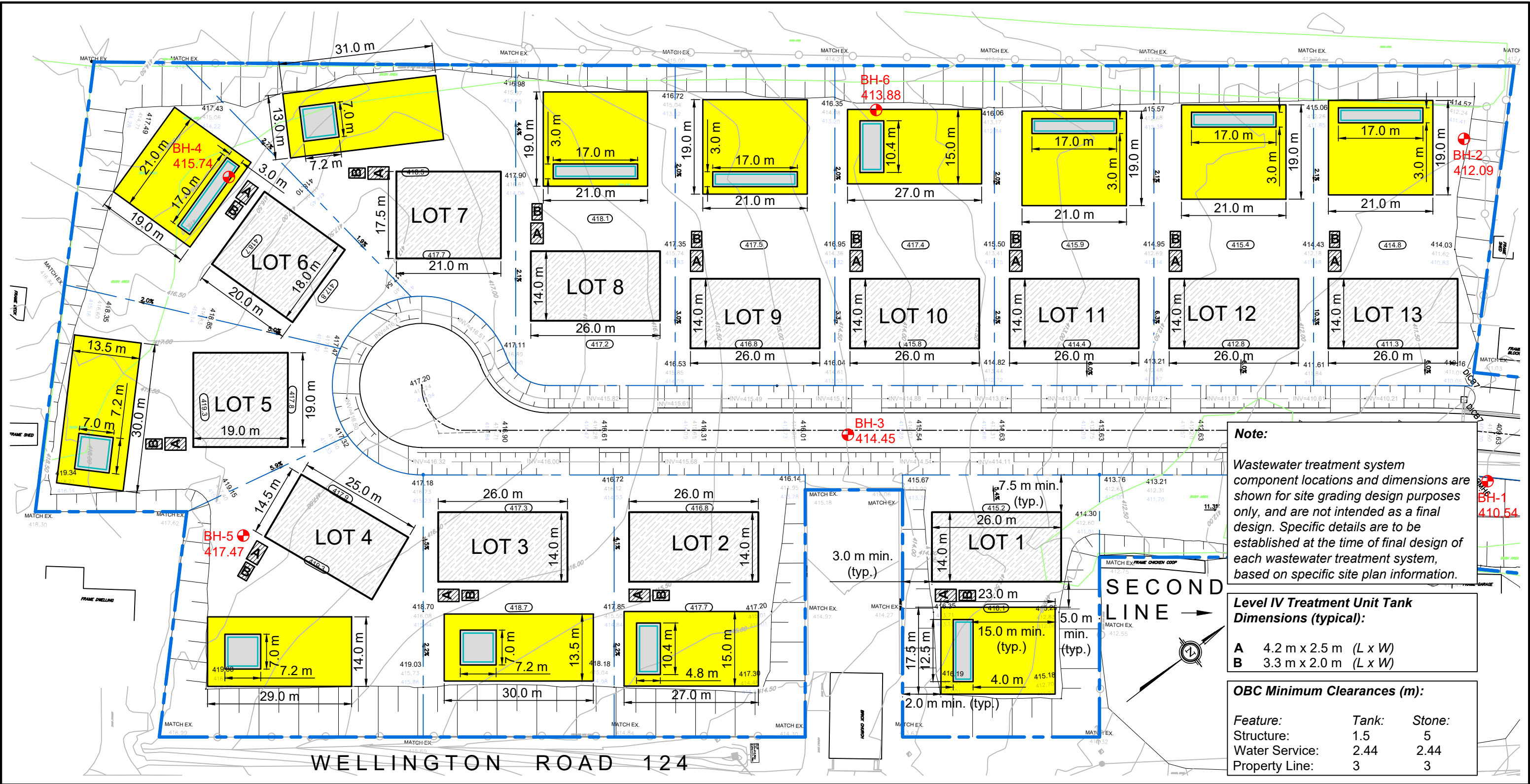
Effluent distributes across the surface of the sand fill layer via the distribution pipe network and stone layer, infiltrates into the sand fill and migrates laterally across the leaching bed, and infiltrates into the underlying soil. Supplementary aerobic biological reduction of residual wastewater-derived suspended solids and five-day biochemical oxygen demand (i.e., organics) occurs at and immediately below the interface of the stone and underlying sand fill. Further die-off of pathogens is achieved through the unsaturated sand fill via vertical separation of the bed from groundwater. Further reduction of contaminant concentrations is achieved via horizontal separation of the bed from potentially sensitive receptors (e.g., water-supply wells).

The Type A dispersal leaching bed is recommended to be configured into an area of about 400 m². The preliminary illustrations on Drawing 1 are reflective of proposed lot grading, with the above-referenced stone portion intended to be partially raised and sand-mantle oriented in the downhill direction. Proposed earth-filling operations (as described in Section 3.1) will raise the ground-surface by ±1 to 3 m, thereby creating the required vertical separation from the leaching beds to groundwater. Any known or encountered field tiles are to be intercepted and rerouted with non-perforated pipe, in order to prevent under-draining and short-circuiting of effluent from any nearby leaching beds.

4.2 Lot Area

On the basis of the above discussion regarding leaching bed area, it is the professional opinion of FlowSpec that the lot areas derived by IBI Group and depicted on Drawing 1 in Appendix A are sufficient to accommodate wastewater servicing of the proposed subdivision.

Appendix A: Drawings



Note:
Wastewater treatment system component locations and dimensions are shown for site grading design purposes only, and are not intended as a final design. Specific details are to be established at the time of final design of each wastewater treatment system, based on specific site plan information.

Level IV Treatment Unit Tank Dimensions (typical):

| | |
|---|-----------------------|
| A | 4.2 m x 2.5 m (L x W) |
| B | 3.3 m x 2.0 m (L x W) |

OBC Minimum Clearances (m):

| Feature: | Tank: | Stone: |
|----------------|-------|--------|
| Structure: | 1.5 | 5 |
| Water Service: | 2.44 | 2.44 |
| Property Line: | 3 | 3 |



Legend:

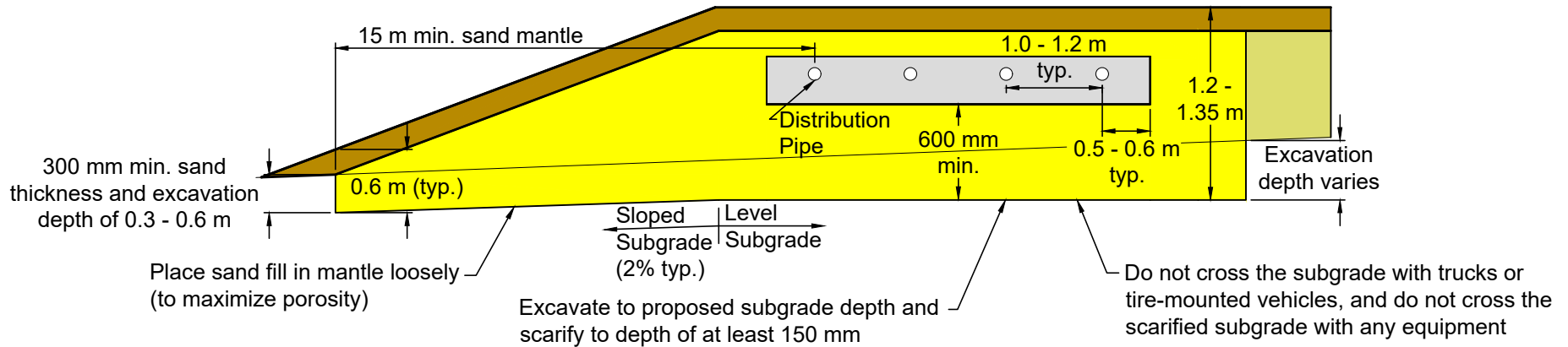
- Proposed Residence Envelope (schematic)
- Proposed Leaching Bed Envelope (400 m² schematic)
- Proposed Stone Envelope (50 m² schematic)
- Proposed Leaching Bed Distribution Pipe Envelope
- Proposed Level IV Treatment Unit Tank
- Borehole Location (CVD)
- Borehole Ground Surface Elev. (m)

Dwg. Ref.: IBI Group, Project No. 111618, Figure 4, September, 2018

| | | | |
|-----------|--|------|---------|
| Client: | Spirit of Pentecost | | |
| Project: | Wastewater Servicing Assessment Proposed Residential Subdivision | | |
| Location: | Part of Lot 13, Concession 2, Geog. Twp. of Erin Ospringe, Town of Erin | | |
| Drawing: | Layout Plan | | |
| No. | Revision | Date | Checked |

| | |
|--------------|-------------------|
| Drawn: | DFIII |
| Checked: | DM |
| Date: | September 5, 2019 |
| Scale: | 0 10 20 1:750 |
| File No.: | 00091-2 |
| Drawing No.: | 1 |

Typical Type A Dispersal Leaching Bed Longitudinal Cross-Section:



Legend:

- Proposed Stone
- Proposed Sand Fill (T = 6 to 10 min/cm)
- Proposed Permeable Topsoil
- Proposed Fill
- Existing Ground Surface (approx.)
- Proposed Ground Surface

Note:

This typical cross-section is shown for site grading design purposes only, and is not intended as a final design. Specific details are to be established at the time of final design of each wastewater treatment system, based on specific site plan information.



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| | | | |
|--|----------|-------------------------|---------|
| Client: Spirit of Pentecost | | Drawn: DFIII | |
| Project: Wastewater Servicing Assessment Proposed Residential Subdivision | | Checked: DM | |
| Location: Part of Lot 13, Concession 2, Geog. Twp. of Erin Ospringe, Town of Erin | | Date: September 5, 2019 | |
| Drawing: Typical Leaching Bed Cross-Section | | Scale: Not to Scale | |
| | | File No.: 00091-2 | |
| | | Drawing No.: 2 | |
| No. | Revision | Date | Checked |

Appendix B: Documentation from Chung & Vander Doelen Engineering

FILE No: H16051

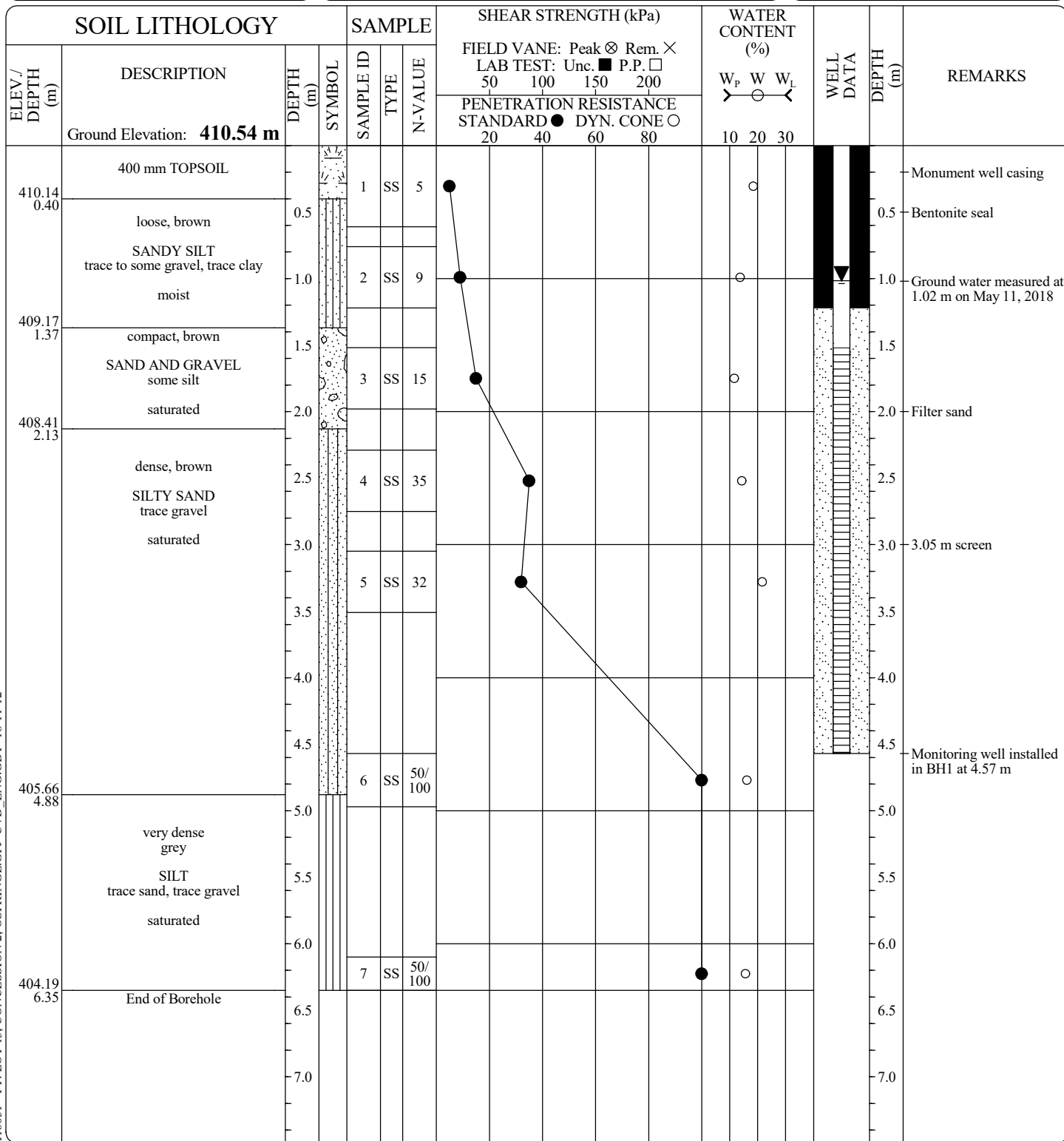
BOREHOLE No. 1



Client: **Spirit of Pentecost**
Project: **Proposed Residential Development**
Location: **Part of Lot 13, Concession 2, Town of Erin (Ospringle)**

EQUIPMENT DATA

Machine: **Diedrich D-50T**
Method: **Hollow Stem Auger**
Size: **107 mm ID**
Date: **May 03 - 18 TO May 03 - 18**



CVD BOREHOLE (2017) H16051 - PT. LOT 13, CONCESSION 2, OSPRINGLE.GPJ CVD_ENG.GDT 18-11-12

**CHUNG & VANDER DOELEN
ENGINEERING LTD.**

311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

PROJECT MANAGER: **LC**

FILE No: H16051

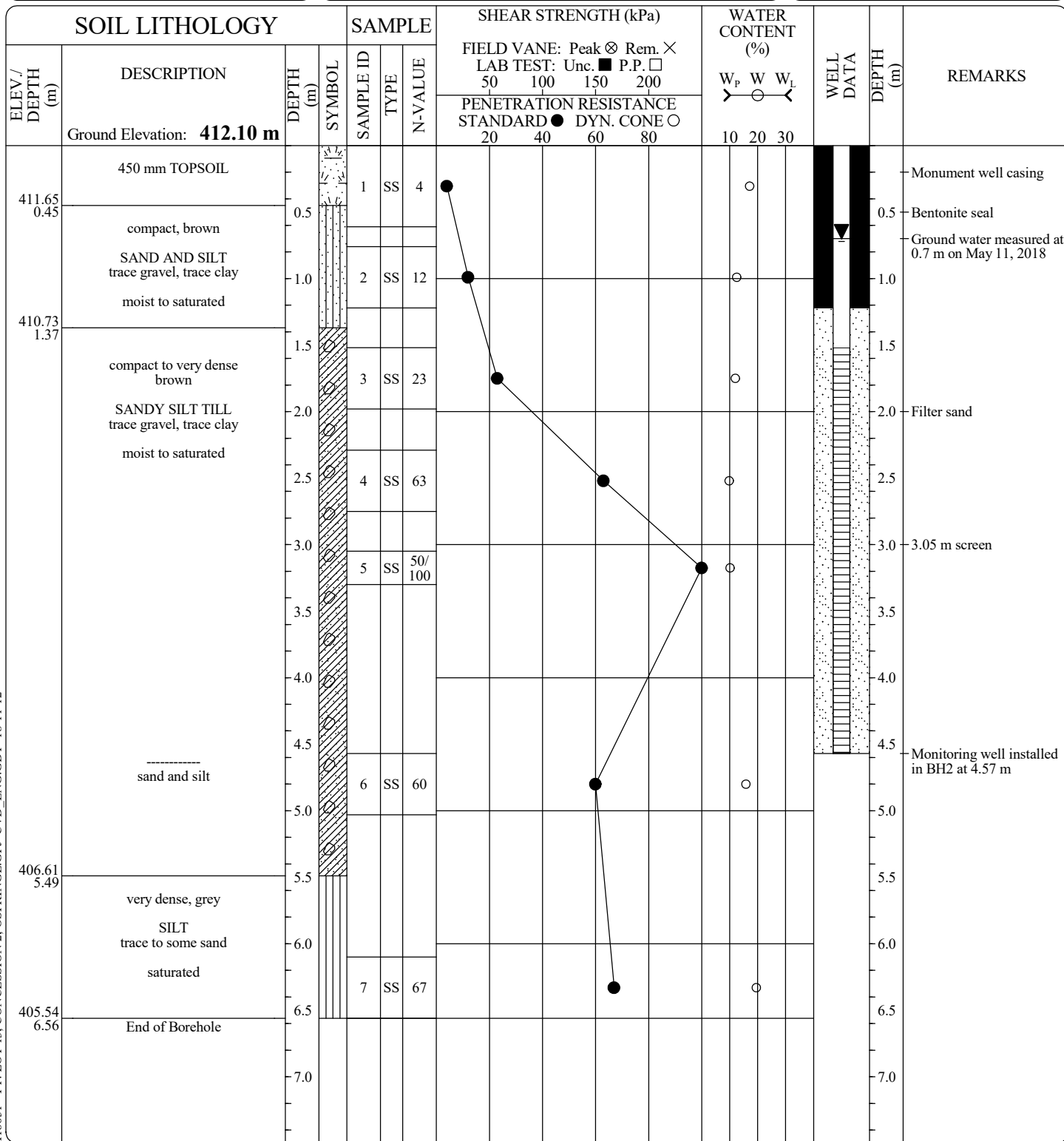
BOREHOLE No. 2



Client: **Spirit of Pentecost**
Project: **Proposed Residential Development**
Location: **Part of Lot 13, Concession 2, Town of Erin (Ospringle)**

EQUIPMENT DATA

Machine: **Diedrich D-50T**
Method: **Hollow Stem Auger**
Size: **107 mm ID**
Date: **May 03 - 18 TO May 03 - 18**



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PROJECT MANAGER: **LC**

FILE No: H16051

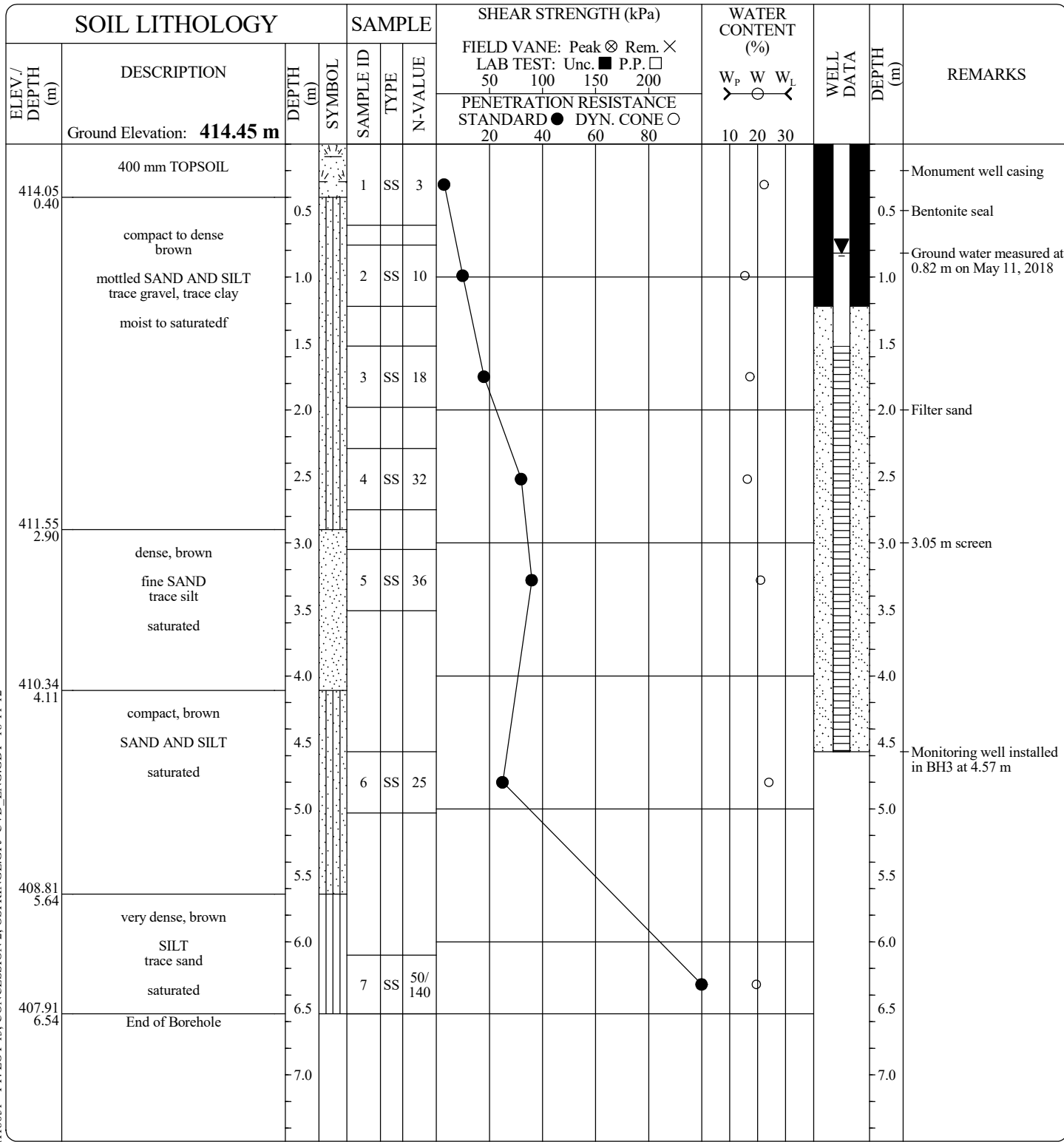
BOREHOLE No. 3



Client: **Spirit of Pentecost**
Project: **Proposed Residential Development**
Location: **Part of Lot 13, Concession 2, Town of Erin (Ospringe)**

EQUIPMENT DATA

Machine: **Diedrich D-50T**
Method: **Hollow Stem Auger**
Size: **107 mm ID**
Date: **May 03 - 18 TO May 03 - 18**



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PROJECT MANAGER: **LC**

FILE No: H16051

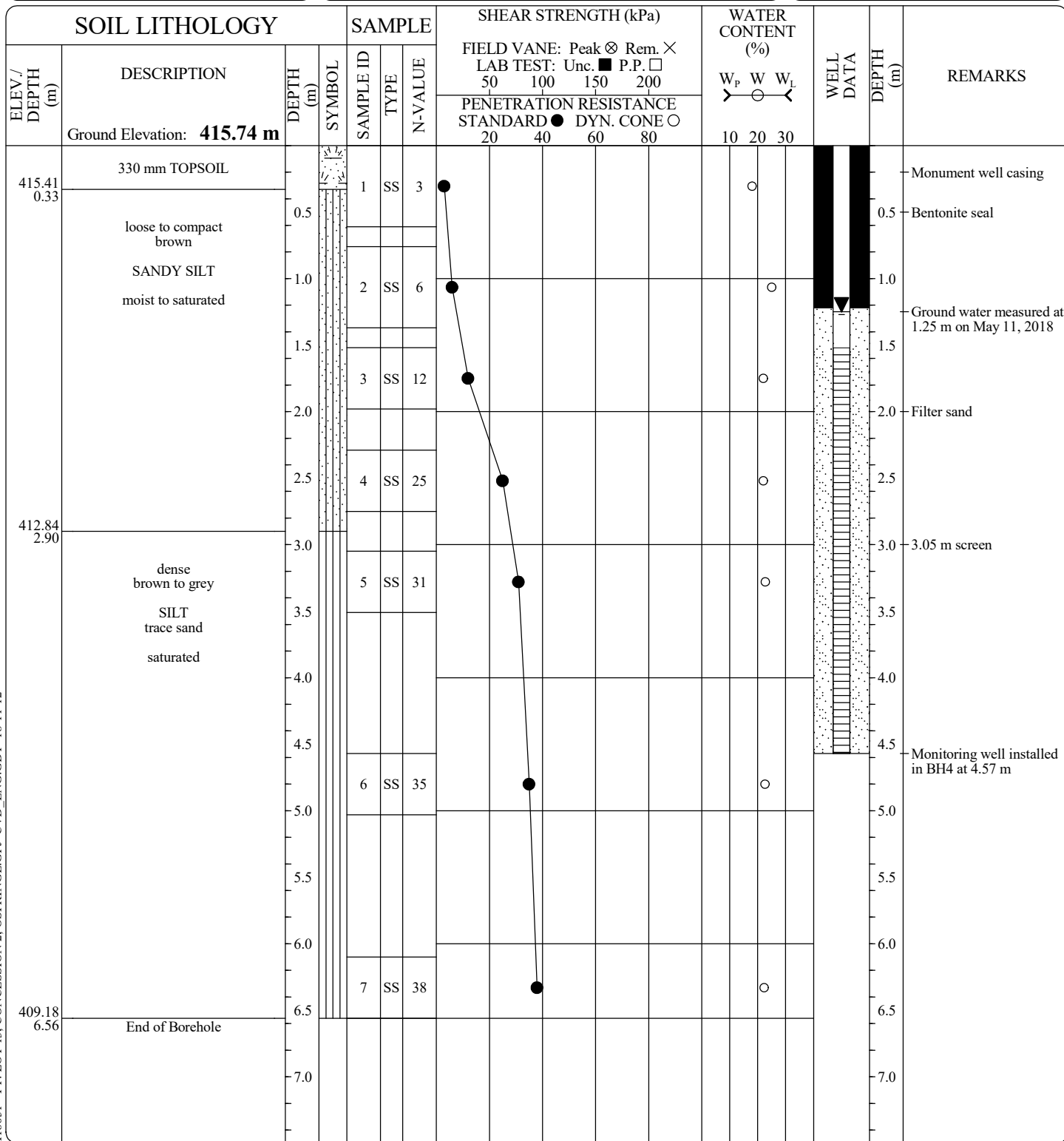
BOREHOLE No. 4



Client: **Spirit of Pentecost**
Project: **Proposed Residential Development**
Location: **Part of Lot 13, Concession 2, Town of Erin (Ospringe)**

EQUIPMENT DATA

Machine: **Diedrich D-50T**
Method: **Hollow Stem Auger**
Size: **107 mm ID**
Date: **May 03 - 18 TO May 03 - 18**



CVD BOREHOLE (2017) H16051 - PT. LOT 13, CONCESSION 2, OSPRINGE.GPJ CVD_ENG.GDT 18-11-12

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PROJECT MANAGER: **LC**

FILE No: H16051

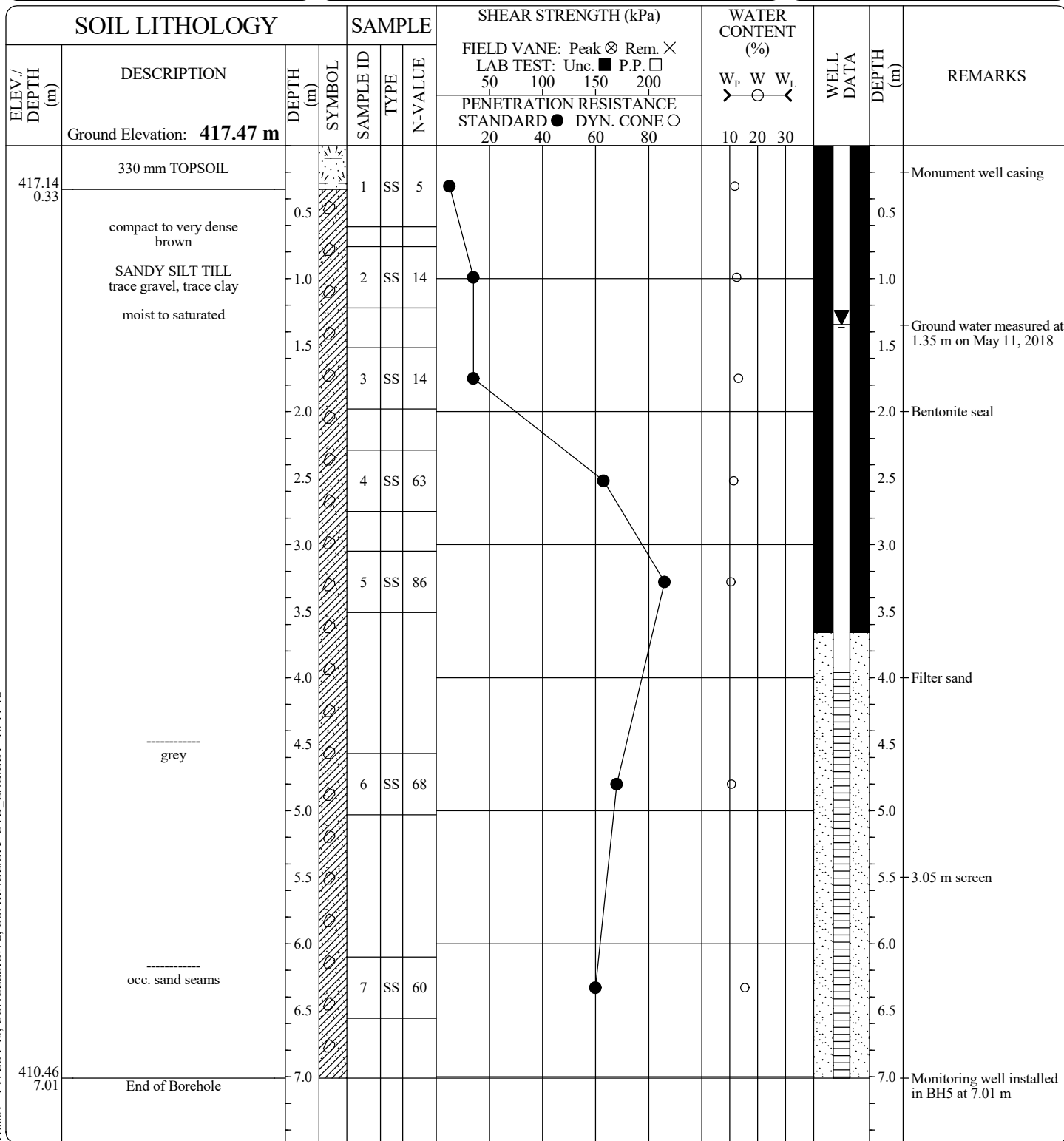
BOREHOLE No. 5



Client: **Spirit of Pentecost**
Project: **Proposed Residential Development**
Location: **Part of Lot 13, Concession 2, Town of Erin (Ospringle)**

EQUIPMENT DATA

Machine: **Diedrich D-50T**
Method: **Hollow Stem Auger**
Size: **107 mm ID**
Date: **May 03 - 18 TO May 03 - 18**



CVD BOREHOLE (2017) H16051 - PT. LOT 13, CONCESSION 2, OSPRINGLE.GPJ CVD_ENG.GDT 18-11-12

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PROJECT MANAGER: **LC**

FILE No: H16051

BOREHOLE No. 6



Client: **Spirit of Pentecost**

Project: **Proposed Residential Development**

Location: **Part of Lot 13, Concession 2, Town of Erin (Ospringle)**

EQUIPMENT DATA

Machine: **Diedrich D-50T**

Method: **Hollow Stem Auger**

Size: **107 mm ID**

Date: **May 03 - 18 TO May 03 - 18**

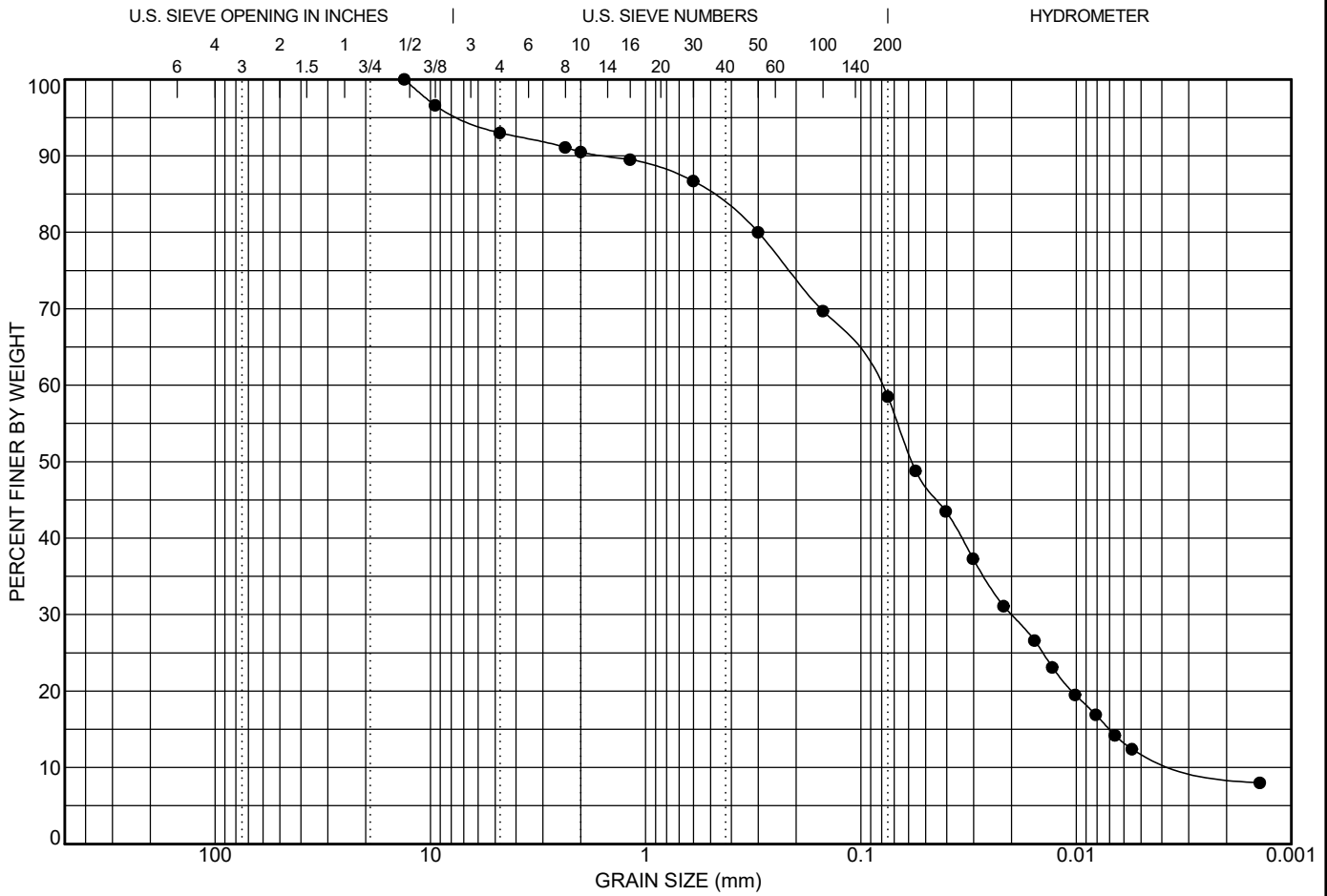
| SOIL LITHOLOGY | | | SAMPLE | | | SHEAR STRENGTH (kPa) | | | | WATER CONTENT (%) | | | WELL DATA | DEPTH (m) | REMARKS | |
|-----------------|---|-----------|----------|-----------|------|----------------------|--|--|--|-------------------|---|--|-----------|-----------|---------|---|
| ELEV./DEPTH (m) | DESCRIPTION | DEPTH (m) | SYMBOL | SAMPLE ID | TYPE | N-VALUE | FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 | | | | PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80 | | | | | W _p |
| 413.58 0.30 | 300 mm TOPSOIL | 0.30 | [Symbol] | | | | | | | | | | | | | Monument well casing |
| | brown SAND AND SILT trace gravel moist to saturated | 0.5 | [Symbol] | | | | | | | | | | | | | 0.5 Bentonite seal Ground water measured at 0.64 m on May 11, 2018 |
| | | 1.0 | [Symbol] | | | | | | | | | | | | | 1.0 |
| | | 1.5 | [Symbol] | | | | | | | | | | | | | 1.5 |
| | | 2.0 | [Symbol] | | | | | | | | | | | | | 2.0 Filter sand |
| | | 2.5 | [Symbol] | | | | | | | | | | | | | 2.5 |
| 410.83 3.05 | dense to very dense brown to grey SILT trace sand saturated | 3.05 | [Symbol] | 1 | SS | 39 | | | | | | | | | | 3.05 3.05 m screen |
| | | 3.5 | [Symbol] | | | | | | | | | | | | | 3.5 |
| | | 4.0 | [Symbol] | | | | | | | | | | | | | 4.0 |
| | | 4.5 | [Symbol] | | | | | | | | | | | | | 4.5 |
| 408.85 5.03 | End of Borehole | 5.03 | [Symbol] | 2 | SS | 51 | | | | | | | | | | 5.03 Monitoring well installed in BH6 at 4.57 m |
| | | 5.5 | [Symbol] | | | | | | | | | | | | | 5.5 |
| | | 6.0 | [Symbol] | | | | | | | | | | | | | 6.0 |
| | | 6.5 | [Symbol] | | | | | | | | | | | | | 6.5 |
| | | 7.0 | [Symbol] | | | | | | | | | | | | | 7.0 |

CVD BOREHOLE (2017) H16051 - PT. LOT 13, CONCESSION 2, OSPRINGLE.GPJ CVD_ENG.GDT 18-11-12

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PROJECT MANAGER: **LC**



| | | | | | | |
|---------|--------|------|--------|--------|------|--------------|
| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
| | coarse | fine | coarse | medium | fine | |

| | | | | | | | | | | | | |
|----|----|----|------|-------|------|-------|------|-------|---------|-------|-------|-------|
| LL | PL | PI | Cc | Cu | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
| | | | 1.87 | 31.56 | 13.2 | 0.082 | 0.02 | 0.003 | 7.0 | 34.5 | 58.5 | |

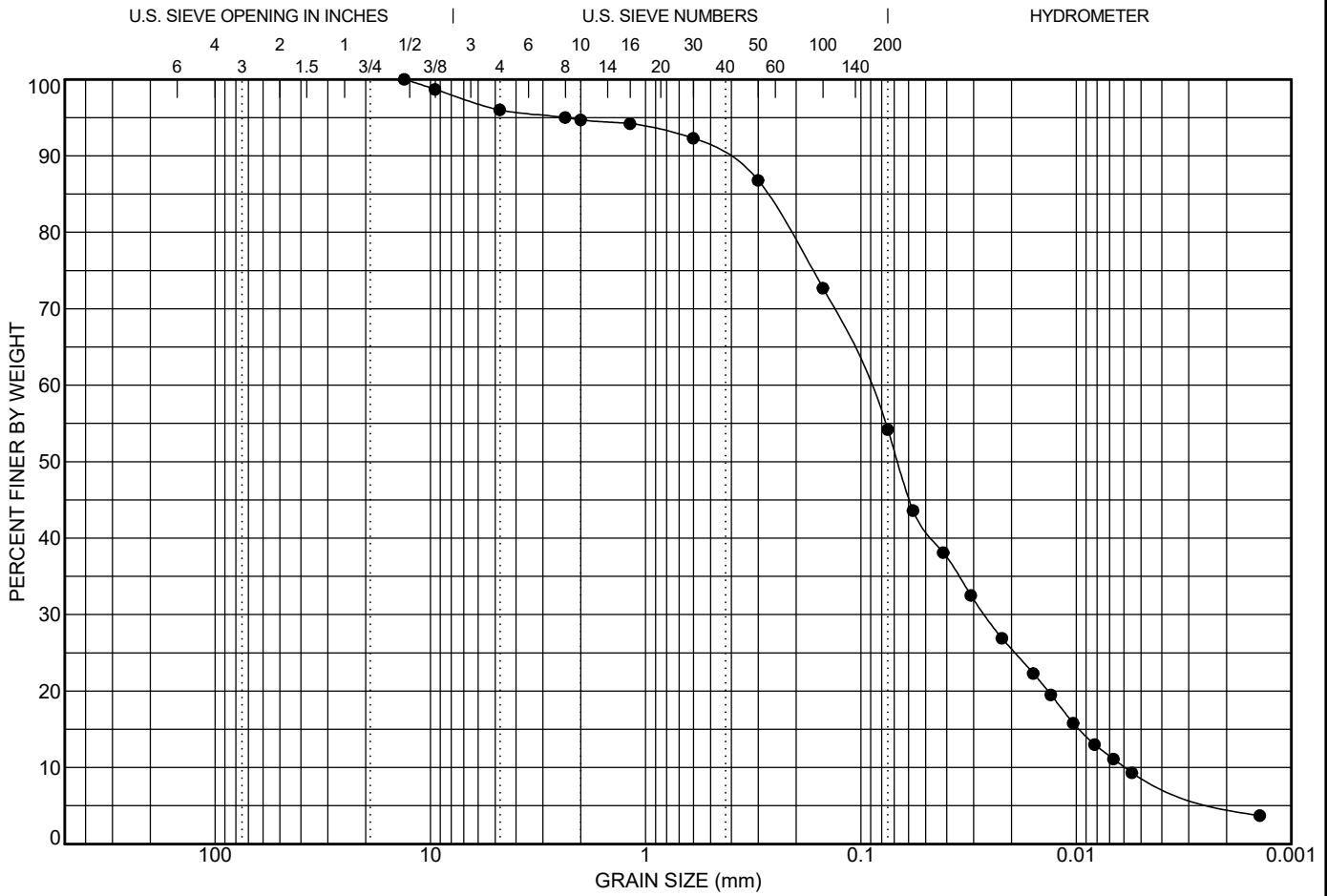
| | | | |
|---|------------------------|------------------------|--------------------------|
| Date: Jul. 03 - 2018 Client: Spirit of Pentecost Contractor: Source: Sampled From: BH 2 - SA 2, 0.76 to 1.22 m depth Sample No.: 2-2 Date Sampled: May. 03 - 2018 Sampled By: LC Lab No.: 3145 Date Tested: May. 31 - 2018 Type of Material: Sand and Silt, trace gravel, trace clay | Sieve Size (mm) | Percent Passing | No Specifications |
| | | | |



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 e-mail: info@cvdengineering.com

GRAIN SIZE DISTRIBUTION

Project: Proposed Residential Development
Location: Part of Lot 13, Concession 2, Town of Erin (Ospringe)
File No.: H16051
Enclosure No.: 7



| | | | | | | |
|---------|--------|------|--------|--------|------|--------------|
| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
| | coarse | fine | coarse | medium | fine | |

| | | | | | | | | | | | | |
|----|----|----|------|-------|------|-------|-------|-------|---------|-------|-------|-------|
| LL | PL | PI | Cc | Cu | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
| | | | 1.27 | 15.69 | 13.2 | 0.093 | 0.027 | 0.006 | 4.0 | 41.8 | 54.2 | |

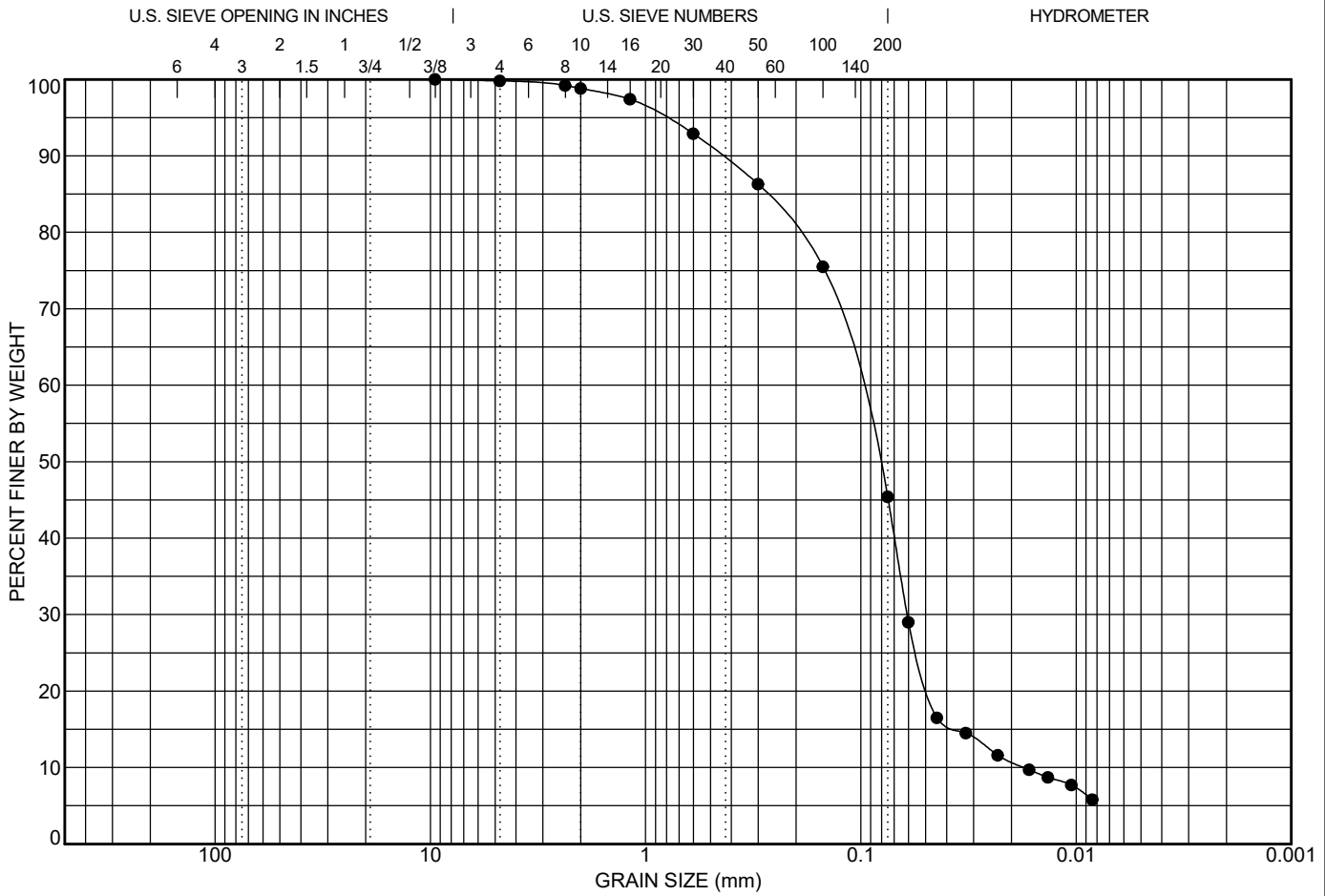
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|---|------------------------|------------------------|--------------------------|
| Date: Jul. 03 - 2018 Client: Spirit of Pentecost Contractor: Source: Sampled From: BH 3 - SA 2, 0.76 to 1.22 m depth Sample No.: 3-2 Date Sampled: May. 03 - 2018 Sampled By: LC Lab No.: 3146 Date Tested: May. 31 - 2018 Type of Material: Sand and Silt, trace gravel, trace clay | Sieve Size (mm) | Percent Passing | No Specifications |
| | | | |



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GRAIN SIZE DISTRIBUTION

Project: Proposed Residential Development
Location: Part of Lot 13, Concession 2, Town of Erin (Ospringe)
File No.: H16051
Enclosure No.: 8



| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| LL | PL | PI | Cc | Cu | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|----|----|----|------|------|------|-------|-------|-------|---------|-------|-------|-------|
| | | | 2.03 | 6.03 | 9.5 | 0.105 | 0.061 | 0.017 | 0.2 | 54.4 | 45.4 | |

| Date: | Jul. 03 - 2018 | <table border="1"> <thead> <tr> <th>Sieve Size (mm)</th> <th>Percent Passing</th> <th>No Specifications</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table> | Sieve Size (mm) | Percent Passing | No Specifications | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------|-----------------------------------|---|-------------------|-----------------|-------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Sieve Size (mm) | Percent Passing | | No Specifications | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Client: | Spirit of Pentecost | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Contractor: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Source: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sampled From: | BH 3 - SA 4, 2.29 to 2.74 m depth | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sample No.: | 3-4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Date Sampled: | May. 03 - 2018 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sampled By: | LC | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lab No.: | 3147 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Date Tested: | May. 31 - 2018 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Type of Material: | Sand and Silt, trace gravel | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

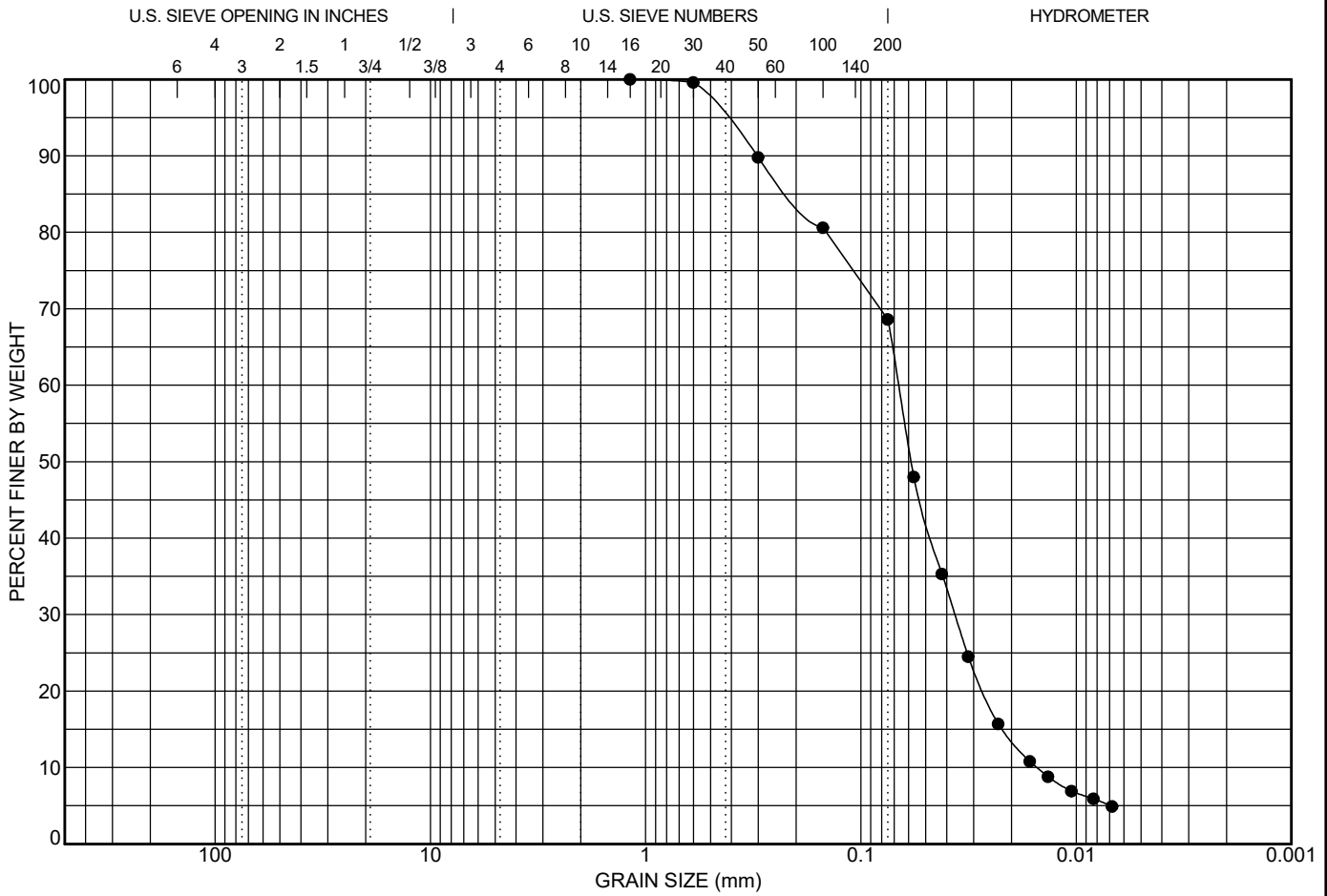
DM - NO SPECIFICATIONS H16051 - PT. LOT 13, CONCESSION 2, OSPRINGE, GPI LAW LNDN, GDT, 18-11-12



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GRAIN SIZE DISTRIBUTION

Project: Proposed Residential Development
 Location: Part of Lot 13, Concession 2, Town of Erin (Ospringle)
 File No.: H16051
 Enclosure No.: 9



| | | | | | | |
|---------|--------|------|--------|--------|------|--------------|
| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
| | coarse | fine | coarse | medium | fine | |

| LL | PL | PI | Cc | Cu | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|----|----|----|------|------|------|-------|-------|-------|---------|-------|-------|-------|
| | | | 1.32 | 4.40 | 1.18 | 0.067 | 0.037 | 0.015 | 0.0 | 31.4 | 68.6 | |

Date: Jul. 03 - 2018
Client: Spirit of Pentecost
Contractor:
Source:
Sampled From: BH 4 - SA 2, 0.76 to 1.22 m depth
Sample No.: 4-2
Date Sampled: May. 03 - 2018
Sampled By: LC
Lab No.: 3148
Date Tested: May. 31 - 2018
Type of Material: Sandy Silt

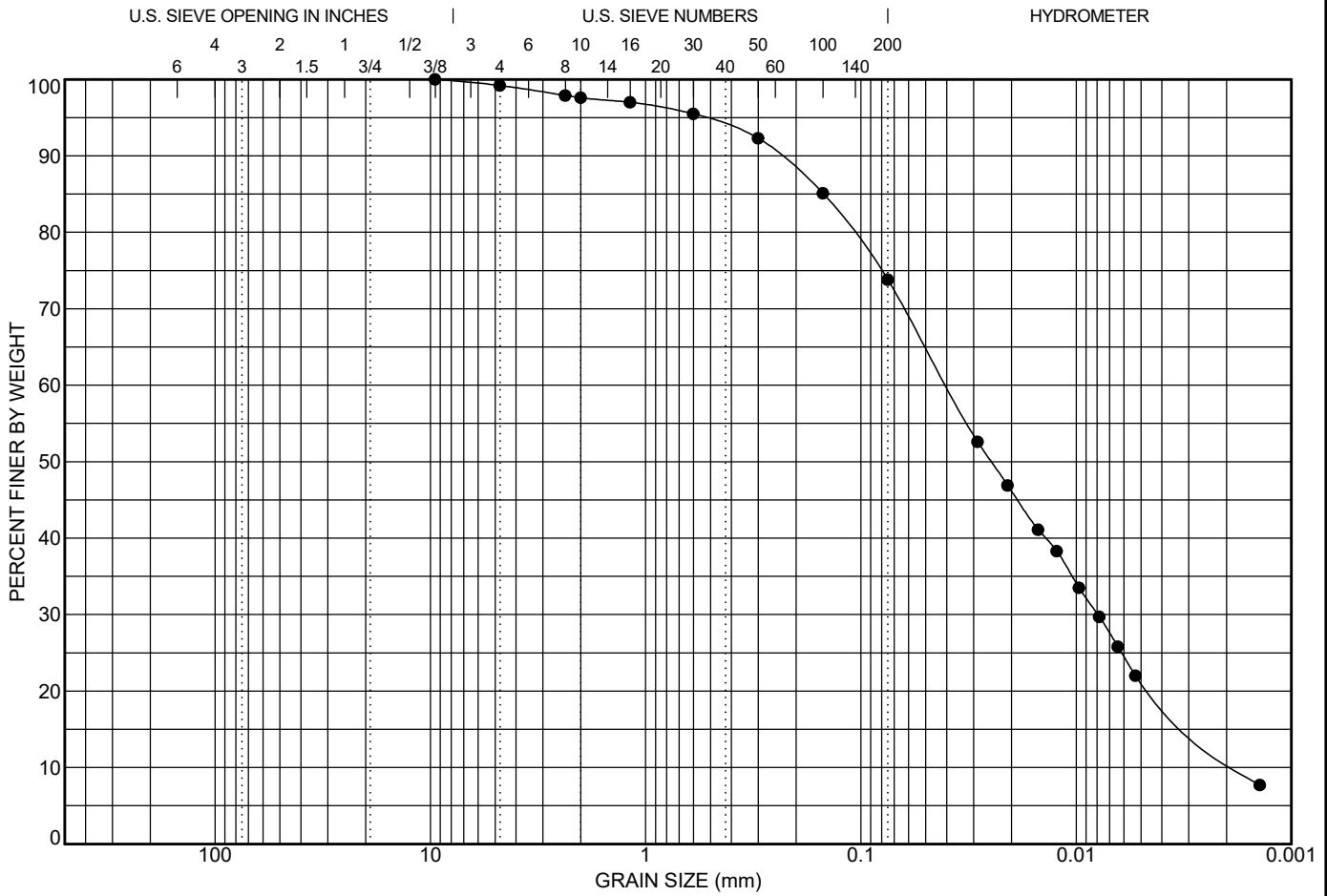
| Sieve Size (mm) | Percent Passing | No Specifications |
|-----------------|-----------------|-------------------|
| 75 | 31.4 | |
| 60 | | |
| 40 | | |
| 30 | | |
| 20 | | |
| 15 | | |
| 10 | | |
| 7.5 | | |
| 6 | | |
| 4.75 | | |
| 3.75 | | |
| 3 | | |
| 2.5 | | |
| 2 | | |
| 1.5 | | |
| 1.18 | | |
| 0.85 | | |
| 0.75 | | |
| 0.6 | | |
| 0.425 | | |
| 0.3 | | |
| 0.25 | | |
| 0.2 | | |
| 0.15 | | |
| 0.106 | | |
| 0.075 | | |
| 0.06 | | |
| 0.0425 | | |
| 0.03 | | |
| 0.025 | | |
| 0.02 | | |
| 0.015 | | |
| 0.0106 | | |
| 0.0075 | | |



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 e-mail: info@cvdengineering.com

GRAIN SIZE DISTRIBUTION

Project: Proposed Residential Development
Location: Part of Lot 13, Concession 2, Town of Erin (Ospringe)
File No.: H16051
Enclosure No.: 10



| | | | | | | |
|---------|--------|------|--------|--------|------|--------------|
| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
| | coarse | fine | coarse | medium | fine | |

| LL | PL | PI | Cc | Cu | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|----|----|----|------|-------|------|------|-------|-------|---------|-------|-------|-------|
| | | | 0.90 | 23.14 | 9.5 | 0.04 | 0.008 | 0.002 | 0.8 | 25.4 | 73.8 | |

Date: Jul. 03 - 2018
Client: Spirit of Pentecost
Contractor:
Source:
Sampled From: BH 5 - SA 2, 0.76 to 1.22 m depth
Sample No.: 5-2
Date Sampled: May. 03 - 2018
Sampled By: LC
Lab No.: 3149
Date Tested: May. 31 - 2018
Type of Material: Sandy Silt Till, trace gravel, trace clay

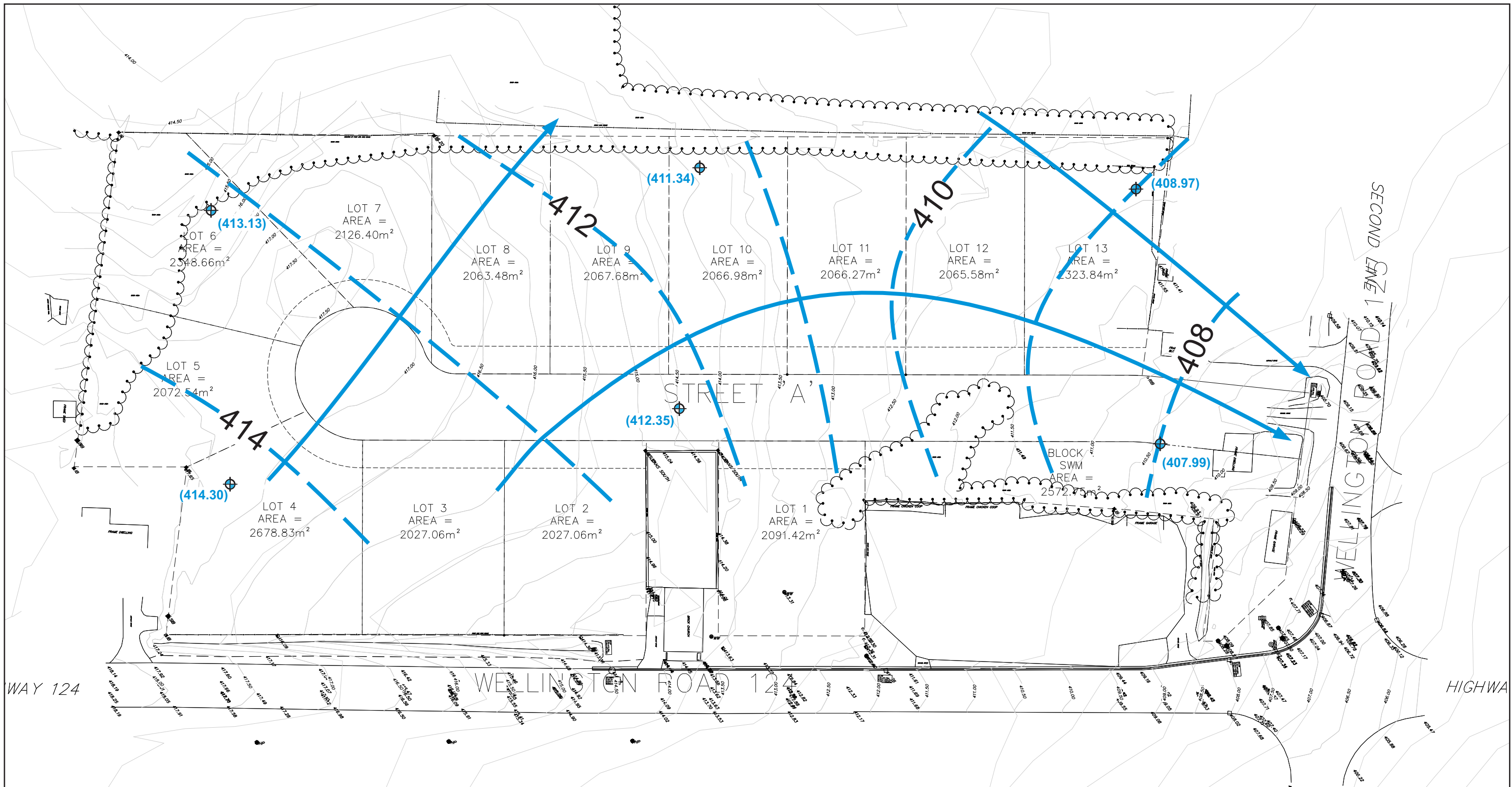
| Sieve Size (mm) | Percent Passing | No Specifications |
|-----------------|-----------------|-------------------|
| | | |







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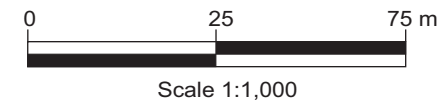
GRAIN SIZE DISTRIBUTION

Project: Proposed Residential Development
Location: Part of Lot 13, Concession 2, Town of Erin (Ospringe)
File No.: H16051
Enclosure No.: 11



LEGEND

-  **BH1** Borehole / Monitoring Well
-  **(413.63)** Measured Water Table Elevation (mASL) (July 31, 2018)
-  **412** Interpreted Water Table Contour (mASL) (July 31, 2018)
-  Interpreted Groundwater Flow Direction



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Figure 2
 Interpreted Water Table Configuration

Hydrogeological Investigation
 Part of Lot 13, Concession 2