

County of Northern Lights

Southside Notikewin Area Structure Plan

March 2013

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1.0 Introduction

1.1 Purpose

The purpose of the Southside Notikewin Area Structure Plan is to facilitate the subdivision and development of 19 unserviced country residential lots ranging in size from 1.8 ha (4.4 ac) to 4.4 ha (10.8 ac) from Lot 1, Block 1, Plan 1124489 (formerly a portion of SE 2-92-23-W5M and SW 1-92-23-W5M).

1.2 Location

The plan area is located in the County of Northern Lights, and approximately 4.2 kilometers (km) to the northeast of the Town of Manning and approximately 3 km east of Highway 35 on Township Road 920, as shown on Figure 1 - Location Map.

The subject property is legally described as: Lot 1, Block 1, Plan 1124489.

1.3 Plan Area

The Southside Notikewin Area Structure Plan (ASP) area comprises 66.92 ha (165.36 ac), and is generally defined by:

- Township Road 920 to the south;
- The Canadian National Railway Right-of-Way to the west;
- The north property line; and
- The Notikewin River to the east.

There are four encumbrances on title for utility rights-of-way that will not affect the future development of the subject lands.

1.4 Land Ownership

Although the total Plan area is 66.92 ha (165.36 ac), the titled area for Lot 1, Block 1, Plan 1124489 is approximately 92.56 ha (228.72 ac). A 10.74 ha (26.53 ac) portion of Lot 1, located in the northeast corner of the titled area, is fragmented from the Plan area by the Notikewin River and therefore not included as part of this Plan. A 14.93 ha (36.90 ac) portion of Lot 1, located adjacent to the eastern boundary of the ASP, is currently developed for agricultural uses. These lands will be subdivided from Lot 1 and will be developed in accordance with the policies of the Municipal Development Plan (MDP) and in accordance with the uses and regulations of the Land Use Bylaw (LUB).

As identified in Table 1: Land Ownership, there is one land owner in the plan area.

Table 1 – Land Ownership

Legal Land Description	Owner	Area (ha)	% of Total
Lot 1, Block 1, Plan 1124489	Southside Professional Health Centre Ltd.	66.92 ha	100
Total		66.92 ha	100

1.5 Legislative Framework

1.5.1 Municipal Government Act

This ASP has been prepared in accordance to the requirements of the Municipal

Government Act, SA 2000 (MGA) The MGA enables municipalities to adopt ASPs to provide a framework for future subdivision and development of an area.

This ASP was prepared in accordance with Section 633 of the MGA. As required the ASP:

- illustrates the sequence of development;
- describes the proposed land uses;
- identifies the potential population; and
- identifies the location of major transportation routes and public utilities.

1.5.2 Manning Intermunicipal Development Plan

The Manning Intermunicipal Development Plan (IDP) was adopted by both the County of Northern Lights and the Town of Manning to provide for the future land use development and establish a policy framework for the future growth and development of the Manning area.

The ASP meets the intent of the policies of the Manning IDP, which allows for country residential development within the subject area, provided development conforms to the detailed provisions of the County of Northern Lights MDP and LUB.

In addition, the ASP conforms to the policies of the IDP, which requires protection of the Notikewin River System. The ASP proposes to dedicate lands adjacent to the Notikewin River Valley as environmental reserve (ER) to protect the natural areas within the river system. In addition, lands adjacent to the ER have been dedicated as municipal reserve (MR) to buffer the Notikewin River Valley from the proposed development.

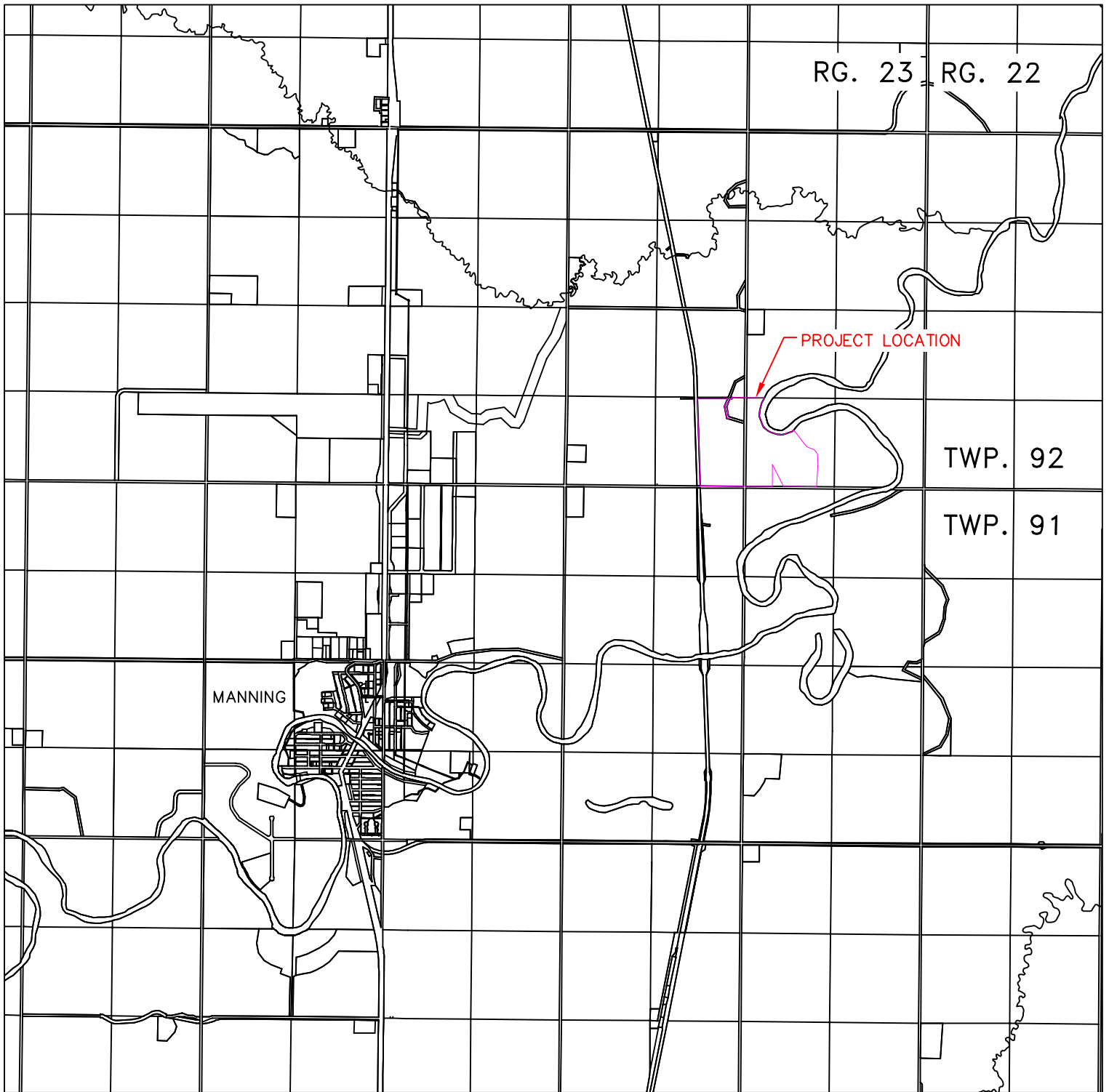
1.5.3 Municipal Development Plan

The Municipal Development Plan (MDP) is the primary policy document for land use planning in the County of Northern Lights. The ASP is located within the Agricultural Policy area of the MDP which permits residential development to be located in appropriate areas as determined by the County.

Any proposal for a multi-lot country residential development that exceeds five parcels is required to prepare an Area Structure Plan. This Area Structure Plan has been prepared in accordance with and conforms to the criteria identified in Policy 3.1.4 of the MDP.

In addition, the proposed multi-lot country residential subdivision has been evaluated based on the criteria identified in Policy 5.2.4 of the Residential Section of the MDP. The applicant has demonstrated that:

- The proposed residential lots are safe from flooding, erosion, subsidence, groundwater inundation or other hazards;
- The proposed residential lots are considered to be compatible with the adjacent land uses and environmentally sensitive areas;
- The proposed residential lots are located within close proximity to other country residential subdivisions and the Town of Manning;
- A geotechnical report has been prepared for the Plan area and the lands are suitable for residential development which will be serviced by cisterns and private sewage disposal systems in the form of sewage holding tanks or treatment mounds;
- The internal roads and accesses to existing roads will be constructed to municipal standards;



AREA STRUCTURE PLAN

Scale: 1:50,000

FIGURE 1
LOCATION MAP
LOT 1, BLOCK 1 PLAN 112 4489
COUNTY OF NORTHERN LIGHTS

- Each proposed lot has a suitable building site;
- Proposed site drainage is adequately addressed through the use of roadside ditches and further site drainage considerations will be addressed at the development permit stage; and
- The impacts of the road system have been considered and circulated to Alberta Transportation for comment.

The propose ASP conforms to the policies and objective of the County of Northern Lights Municipal Development Plan.

1.5.4 Land Use Bylaw

The purpose of the County of Northern Lights Land Use Bylaw 12-61-290 (LUB), as amended, is to regulate the use and development of land and buildings within the County.

The plan area falls within the Airport Protection (AP) District, Zone 2 of the LUB. The purpose of this District is to identify a protection area which recognizes the lands surrounding the Manning airport as significant to its ongoing operations and restricts development within the protection area that could cause conflict. Land uses listed within the Discretionary Uses of Zone 2 include all those Uses contained within the Country Residential Districts (CR1 – 4) of the LUB, subject to the site provisions and additional requirements of the AP District.

The lands subject to this ASP will accommodate future development found within the Country Residential General (CR1) District of the LUB and include accommodate the development of Single Detached Dwellings, Manufactured Homes and Accessory Buildings or Uses, among other uses.

All future development must adhere to and conform with the AP District and Section I, General Regulations, of the LUB. In addition, it is advised that residential development must be setback a minimum of 15 m from the railway branch line which runs adjacent to the west boundary of the Plan area. Development is subject to regulation I24 of the Land Use Bylaw.

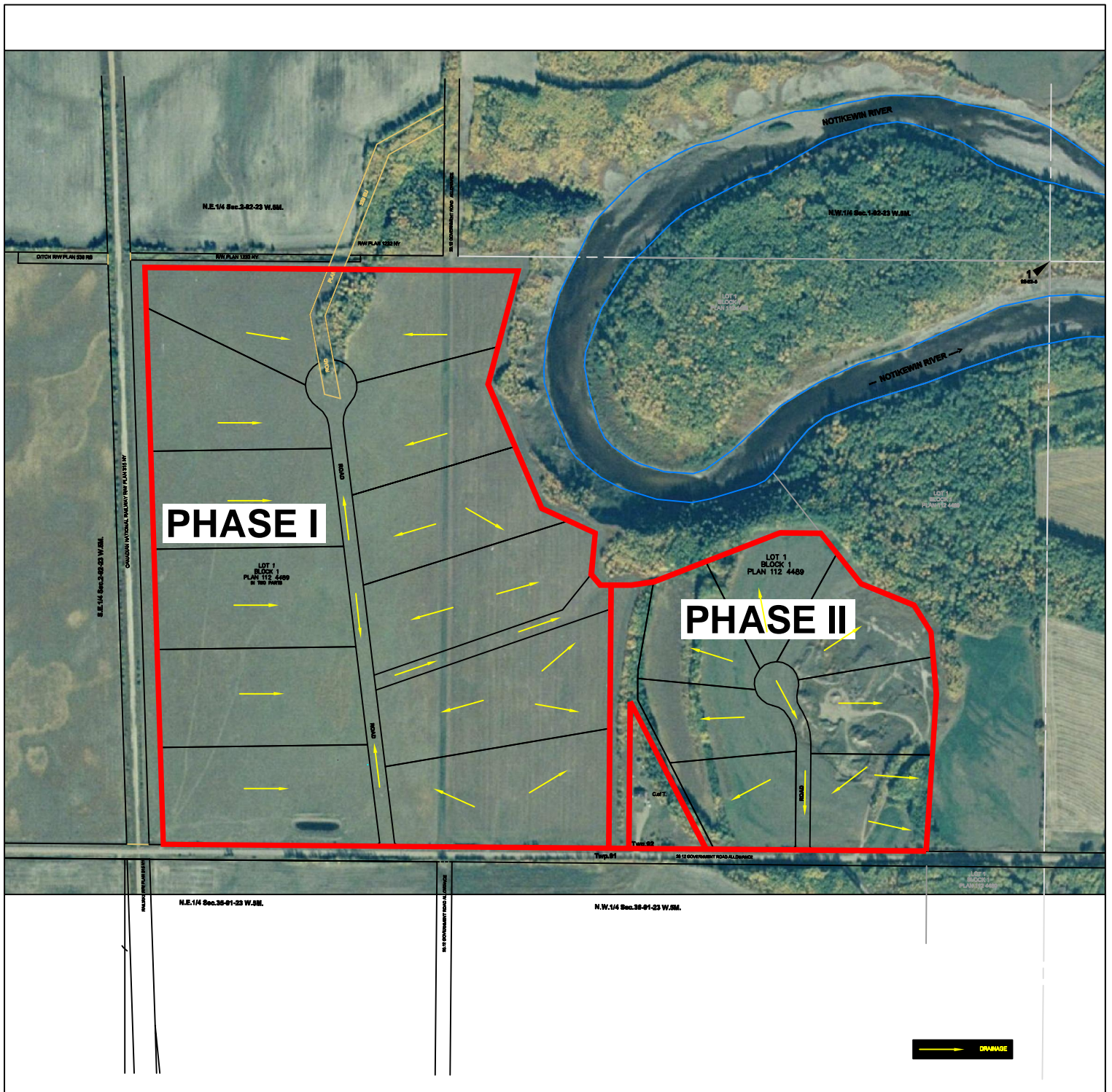
1.6 Existing and Surrounding Land Use

The ASP area is principally cleared and in agricultural production, as shown on Figure 2 – Existing Land Use Map. The northeastern portion of the Plan area, adjacent to the Notikewin River is heavily treed and in a natural state. The land on the eastern bank of the river is not included as part of this plan and is intended to remain in a natural state. The eastern portion of the Plan area contains displaced soils where sand or gravel was excavated.

An Environmental Site Assessment (ESA) has not been conducted, as the Plan area has remained in an undeveloped state and has been primarily been used for agricultural purposes. The landowner has advised that no development has occurred on the site which could negatively impact the future residential land uses.

The following land uses surround the plan area:

- Agriculture to the north;
- The Notikewin River and valley are located to the east and south;
- Agriculture to the west; and



AREA STRUCTURE PLAN

Scale:

HOR. = 1:7500

FIGURE 2
 EXISTING LAND USE MAP
 LOT 1, BLOCK 1 PLAN 112 4489
 COUNTY OF NORTHERN LIGHTS

- An existing farmstead is located along the south boundary of the Plan area.

It should be noted that as the acreages of the proposed ASP are divided out and given their own legal descriptions, the remaining areas east of the Plan area, located both north and south of the Notikewin River are intended to remain as the legal description of Lot1, Block1, Plan112 4489.

1.7 Heritage Resources

Alberta Historic Resources Management conducted a review of the Plan area and concluded that a historic resources impact assessment is not required as the Plan area is deemed to be of no historical significance.

1.8 Geotechnical Assessment

J.R.Paine and Associates Ltd. were hired to do a geotechnical investigation of the Plan area to determine site suitability for residential development. In summary, no major problems for the construction of residential housing are expected as based on the findings, as indicated in Section 7.2-1 of the report. Soils from the test holes were considered suitable for the proposed residential development. Recommendations for foundations and pilings given the existing soil were made. No major problems are anticipated with construction of residential units in the Plan area. It is recommended that proper lot grading away from the houses must be provided to minimize the ingress of surface water into the subsoil. All houses will require at least 1.5 meters of cover to prevent potential frost heave problems, and to minimize movements associated with seasonal variations in moisture content. These and other considerations will be required at the development permit stage.

All test holes drilled in Phase 1 showed a water table a minimum of 6 meters below the existing ground surface. In the eastern most test holes located in the proposed phase 2, 4 out of 5 test holes showed a water table greater than 2.4 meters below the ground surface ranging from 3.2 m to greater than 6.3 m below the existing ground surface. There was 1 test hole in the Phase 2 area which showed a water table of approximately 1.8 meters below the ground surface.

The report recommends that the proposed residential lots shall be serviced by either treatment mounds or sewage holding tanks based on the soil composition and suitability of each specific site. The appropriate sewage disposal system shall be developed in accordance to the 2009 Alberta Private Sewage Systems Standards of Practice.

The Geotechnical report prepared for this ASP identified the depth of the water table within the Plan area, however the scope of the report does not make recommendations on the appropriate form of water systems best suited to service the proposed development. Therefore in the absence of recommendations related to the form of water servicing available to the Plan area, the proposed residential lots are required to be serviced by cisterns for their water needs. Restrictive covenants shall be registered as a condition of subdivision approval, prohibiting the use of wells or other means of groundwater collection.

2.0 Development Concept

2.1 Development Goals

The principle goals of the Southside Notikewin River ASP is to provide a comprehensive framework for the development of the lands along the south bank of the Notikewin River for future residential purposes, and that take full advantage of the proximity, access, and views to the Notikewin River valley. This will be achieved by providing a variety of residential lot sizes, establishing pedestrian linkages to the Notikewin River valley, and ensure the preservation of the river valley as a significant visual and natural amenity feature and ecological system.

2.2 Development Objectives

The Southside Notikewin River ASP is intended to achieve the following objectives:

- To integrate future development with the existing land uses;
- To develop a community that will provide for a variety of lot sizes;
- To identify appropriate locations for municipal reserve;
- To identify a road system for general access;
- To provide a servicing system based on the economical and efficient extension of infrastructure and utilities;
- To preserve the integrity of major natural features and provide opportunities to integrate these features into future development; and
- To retain existing trees and vegetation for natural systems and aesthetic purposes and provided.

2.3 Development Concept

The proposed Development Concept, as illustrated in Figure 3, has been prepared to achieve the purpose, goals and objectives described in this ASP. Residential development is the predominant use in the plan area, with the balance consisting of parkland and the Notikewin River valley.

A summary of the land uses illustrated in Figure 3 is provided in Table 2 below.

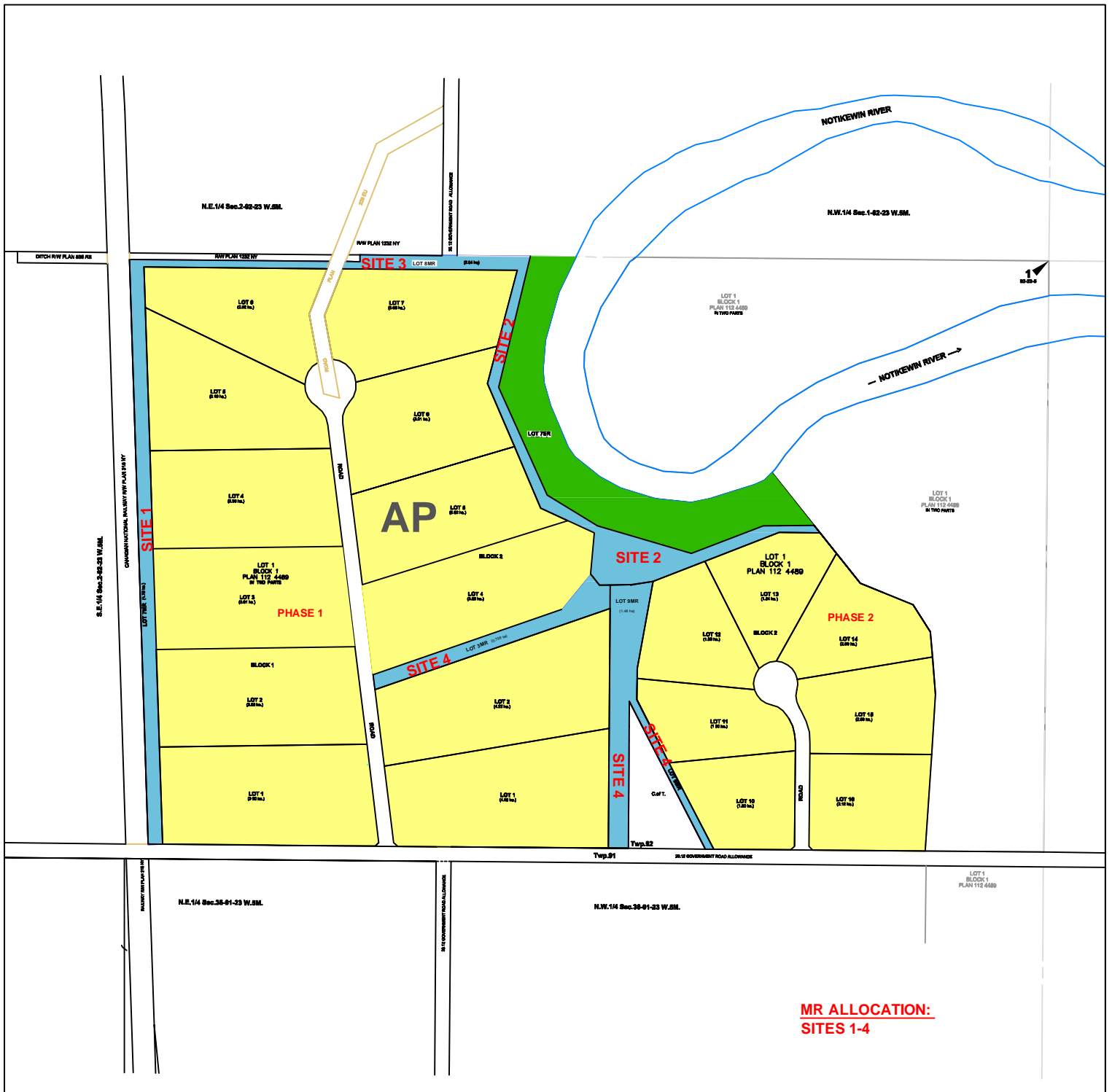
Table 2 – Land Use Statistics

Land Use	Area (ha.)	% of GDA
Gross Area	67.83	
Environmental Reserve	4.59	
Gross Developable Area (GDA)	63.24	100
Municipal Reserve	6.30	10%
Internal Circulation (roads)	2.10	3.3%
Residential	54.84	86.7%

The following policies will be used to guide the future planning, subdivision and development of the plan area.

2.4 Residential

It is the intent of this ASP to promote the development of a diversity of residential lots



AREA STRUCTURE PLAN

Scale:

HOR. = 1:7500

FIGURE 3
 DEVELOPMENT CONCEPT
 LOT 1, BLOCK 1 PLAN 112 4489
 COUNTY OF NORTHERN LIGHTS

ranging in size from 1.8 ha (4.4 ac) to 4.3 ha (10.4 ac). A total population of approximately 57 people can be accommodated in the plan area at full build-out, with approximately 11 of those being of school age as illustrated in Table 3 below.

Table 3 – Population Statistics

Land Use	Area (ha.)	Units	Total Population	Students
Low Density Residential	54.84	19	38 – 57 people	10 - 12

2.5 Municipal Reserve

Municipal reserve has been provided at 6.32 hectares (10% of the GDA), in accordance with the Municipal Government Act. The municipal reserve areas will remain in a natural state and serve as passive recreation areas, and separation from the adjacent railway right-of-way and the Notikewin River valley. The allocation of municipal reserve is illustrated on Figure 3 – Development Concept and described in Table 4 – Allocation of Municipal Reserve.

Table 4 – Allocation of Municipal Reserve

Site	Location	Dimensions	Comments
1	Adjacent to the Railway Right of Way.	Municipal reserve will be dedicated adjacent to the CN railway right-of-way (ROW). The width of the dedication measures 19 m from the railway ROW, which exceeds the 15 m required by Section I24.3 of the LUB.	To date, approximately 750 trees (1 row of willow and 2 rows of spruce) have been planted in order to act as a future sight and sound buffer along the western boundary. The trees will visually aid to obscure the existing metal safety fence put in place by CN
2	Adjacent to the Notikewin River Valley.	Municipal reserve will be dedicated adjacent to the environmental reserve parcel. The width of the dedication measures an average of 15 m and follows the existing top of bank of the river.	Spruce trees will be planted along this part of the municipal reserve in order to enhance the overall ambience of the area overlooking the river valley. A widened area of MR corresponding to the N.E. corner of lot 2 block 2 and the S.E corner of lot 4 block 2 in phase 1 has been created and is accessible by the MR corridor.
3	Adjacent to the north boundary of the plan area.	Municipal reserve will be dedicated adjacent to the north boundary of the plan area. The width of the dedication measures an average of 19 m.	The municipal reserve will serve as a separation space and buffer between the proposed residential development and the adjacent agricultural land.
4	The lands in the central portion of the plan area.	Municipal reserve will be dedicated adjacent to the farmstead, which is outside the plan area and between Phase 1 and 2.	These lands will serve as separation space between an existing dwelling (C. of T. 962 215 543) and the future residential development.

2.6 Environmental Reserve

2.6.1 A concerted effort has been made to maintain the natural tree stands along the Notikewin River valley by incorporating them into the development concept. Many of the tree stands fall within the municipal reserve and environmental reserve areas.

2.7 Transportation

2.7.1 The plan area will be accessed from two locations on Township Road 920. These access points are to be spaced according to Figure 3 – Development Concept Map.

2.7.2 Roads within the plan area will be developed in accordance with the County's municipal servicing standards for gravel roads, at the developer's expense.

2.7.3 Graveled approaches to each proposed lot shall be constructed to municipal standards at the developer's expense. This shall include culverts to allow for optimal drainage of natural runoff.

2.7.4 The former undeveloped road allowance for Range Road 231 was closed in 2010 under bylaw 10-32-274. Associated with this road closure, a portion of Road Plan 229 EU was also closed. The remaining portion of the Road Plan currently connects to the turnaround circle within Phase 1 of the Plan area. The northern portion of Road Plan 229 EU will remain undeveloped until such time as it is within the County's/Developer's best interest to construct.

2.7.5 All costs of compliance to attain municipal approvals are herein also considered to be the expense of the developer.

2.7.6 Access to all lots shall be limited to the proposed road system.

2.8 Servicing

Servicing within the plan area shall be provided in accordance with municipal and provincial standards.

2.8.1 The proposed lots will be serviced with private water systems in the form of cisterns and installed at the individual landowner's expense in accordance with provincial requirements.

- A. Municipal water servicing to the plan area is available via the Northern Lights Water Co- Operative waterline which runs along the southern boundary of the plan area, parallel to Township Road 920.
- B. For Phase 1 of the development, the developer will construct a branchline tying into the Northern Lights Water Co- Operative waterline. The branchline will have a north/south alignment and will be located adjacent to road right-of-way. Easements on private property will be required to accommodate the branchline.
- C. Connection to the branchline water co-operative will be at the individual landowner's expense.
- D. For Phase 2 of the development, access to the Northern Lights Water Co- Operative waterline may be available, subject to application to the County.

2.8.2 Sewage disposal shall be provided via either sewage holding tanks or treatment mounds, based on each lot's specific site conditions and soil suitability, and installed by individual lot owners in compliance with the Alberta Private Sewage Systems Standard of Practice 2009 or later.

2.8.3 Storm water runoff for the plan area shall be maintained at pre-development rates in accordance with provincial standards. Any required storage of storm water shall be accommodated in on-site. A storm water management plan will be required at the time of subdivision.

2.8.4 Shallow utilities, including power, phone and natural gas, shall be constructed and installed along the primary roadways within easy access to the property lines, in accordance with the requirements of the utility companies and the County of Northern Lights at the developer's expense. Individual lot owners will be responsible for the connection of these shallow utilities to their lots.

3.0 Plan Implementation

3.1 Development Staging

The plan area will be developed in two phases in accordance with the staging plan shown in Figure 4. Phase 1 is located in the western portion of the plan area, and Phase 2 is located in the eastern portion of the plan area.

Prior to subdivision approval, the developer shall enter into a Development Agreement with the municipality and will address items such as off-site levies, landscaping requirements, engineering standards and specifications, and any other items deemed necessary by the County. If off-site costs are required, the developer will be required to provide them prior to subdivision approval.

3.2 Land Use Bylaw

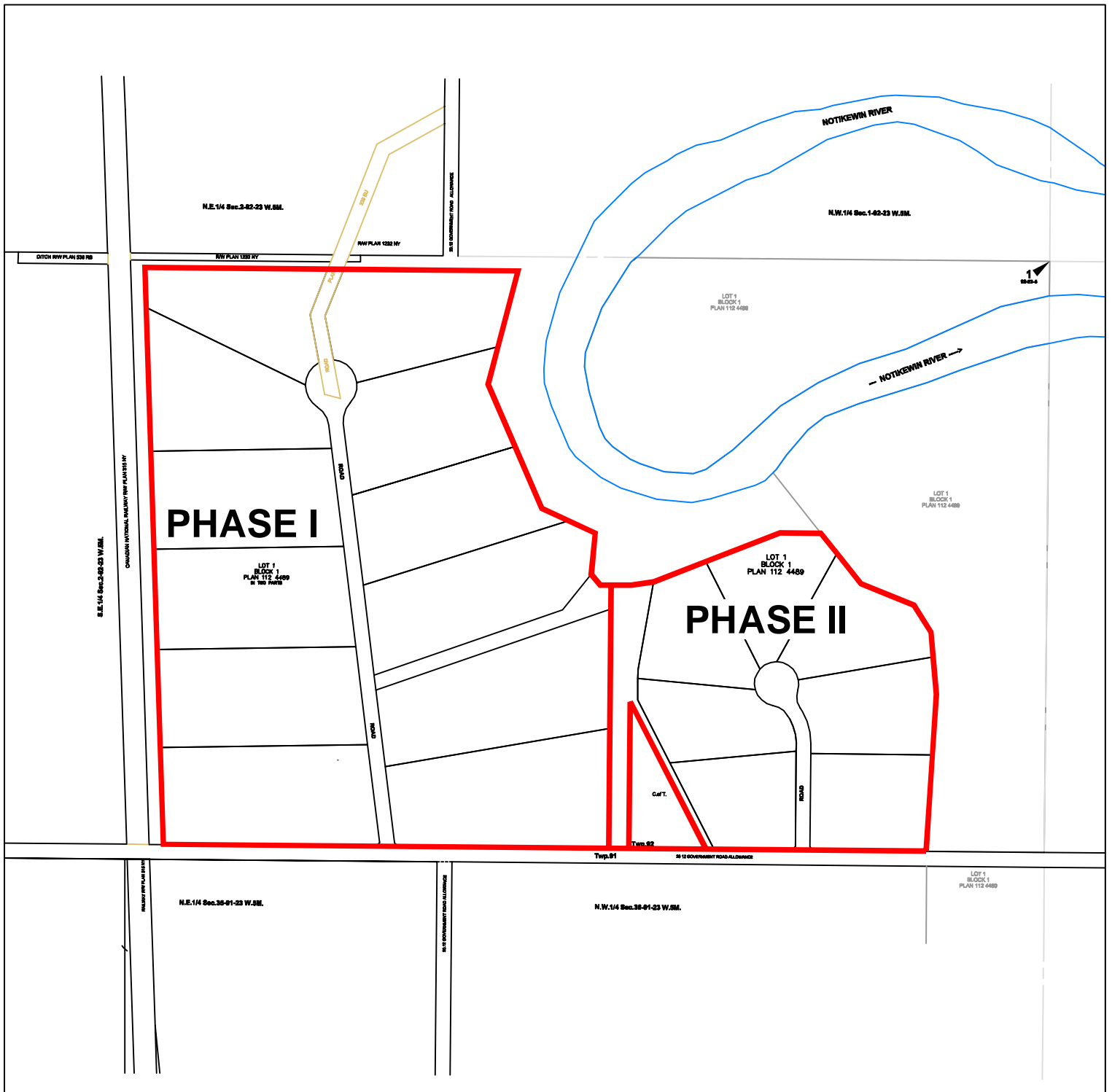
The proposed lots are intended for country residential land uses and will correspond with the Country Residential General (CR1) District of the LUB. The proposed lots will range in size from 1.8 ha (4.4 ac) to 4.4 ha (10.8 ac).

3.3 Geotechnical Studies

Geotechnical studies may be required by the Development Authority to confirm the adequacy of the proposed lots for building sites, and to confirm setbacks for building sites relative to the edge of the Notikewin River Valley.

3.4 Plan Monitoring

The County of Northern Lights will monitor the implementation of the Southside Notikewin Area Structure Plan, to ensure conformity with this plan and other existing statutory plans.



AREA STRUCTURE PLAN

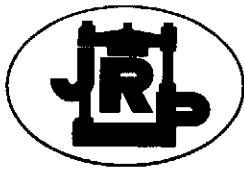
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FIGURE 4
 DEVELOPMENT STAGING CONCEPT
 LOT 1, BLOCK 1 PLAN 112 4489
 COUNTY OF NORTHERN LIGHTS

Appendix A

Geotechnical Investigation



J.R. Paine & Associates Ltd.

CONSULTING AND TESTING ENGINEERS
EDMONTON — GRANDE PRAIRIE — PEACE RIVER

7710 – 102 Avenue
Peace River, Alberta
T8S 1M5

January 20, 2012
File No. PR4684-2

SOUTHSIDE PROFESSIONAL HEALTHCARE CENTRE LTD.
6918 – 77th Street
Edmonton, Alberta
T8W 6V2

ATTENTION: Wayne Steinke

Dear Sir:

**Re: Geotechnical Investigation
Proposed Acreage Subdivision
Lot 1, Block 1, Plan 112 4489
SW1 & SE2-92-23-5, Northeast of Manning
County of Northern Lights, Alberta**

Please find enclosed our report with respect to the above noted investigation. In brief, this report presents the data and construction recommendations concerning the geotechnical aspects for the proposed acreage subdivision construction.

Thank you for the privilege of providing this service to your organization. We will be pleased to meet with you to review the contents of this report at your convenience.

Yours truly,

J.R. PAINE & ASSOCIATES LTD.

Robert Rau, P. Eng.

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REPORT NO: PR4684-2

**GEOTECHNICAL INVESTIGATION
PROPOSED ACREAGE SUBDIVISION
LOT 1, BLOCK 1, PLAN 112 4489
SW1 & SE2-92-23-5, NORTHEAST OF MANNING
COUNTY OF NORTHERN LIGHTS, ALBERTA**

December, 2011

**J.R. PAINE & ASSOCIATES LTD.
7710 – 102 Avenue
Peace River, Alberta
T8S 1M5**

**PHONE: (780)624-4966
FAX: (780)624-3430**

REPORT NO: PR4684-2

**GEOTECHNICAL INVESTIGATION
PROPOSED ACREAGE SUBDIVISION
LOT 1, BLOCK 1, PLAN 112 4489
SW1 & SE2-92-23-5, NORTHEAST OF MANNING
COUNTY OF NORTHERN LIGHTS, ALBERTA**

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GEOTECHNICAL INVESTIGATION

PROJECT: Proposed Acreage Subdivision

LOCATION: SW1 & SE2-92-23-5, Northeast of Manning
County of Northern Lights, Alberta

CLIENT: Southside Professional Healthcare Centre Ltd.
6918 – 77th Street
Edmonton, Alberta
T8W 6V2

ATTENTION: Wayne Steinke

1.0 INTRODUCTION

This report presents the results of the geotechnical investigation and analysis made on the site of the proposed acreage subdivision located in the County of Northern Lights, northeast of Manning, Alberta. The objective of this investigation was to determine the nature and condition of the existing subsurface soils and watertable to aid in subdivision design and construction. Any environmental, flooding, or slope stability issues are beyond the scope of this report.

Authorization to proceed with the work was given by Wayne Steinke in September, 2011. The fieldwork was conducted on October 13 and 14, 2011.

2.0 SITE AND PROJECT DESCRIPTION

The study area is located approximately 3 kilometres northeast of Manning, Alberta, in the County of Northern Lights. The site is located approximately 3 kilometres east of Highway 35 on the north side of Township Road 920, and is comprised of portions of SW1 & SE2-92-23-5. The legal address of the site is Lot 1, Block 1, Plan 112 4489. The site is bounded to the west by a railway and to the northeast by the Notikewin River. The western portion of the site is comprised mostly of agricultural farmland with some treed areas, while the eastern portion of the site is a lower bench area, comprised of an acreage residence and agricultural farmland. It is understood that some former gravel pit operations have also been conducted on the eastern, lower portion of the site.

This project is understood to consist of subdividing approximately 12 lots in the upper western portion of the site (Phase 1), each having an approximate area of 7 to 11 acres, and

another 7 lots in the lower eastern portion of the site (Phase 2), each having an approximate area of 4 to 5 acres. It has also been indicated that two gravel access roads will be constructed off Township Road 920, one accessing each phase. Additionally, it is understood that water supply for these lots will be provided by drilled water wells or will be hauled and delivered to cistern systems, and private sewage disposal will be required on each lot.

3.0 FIELD INVESTIGATION

The soils investigation for this project was undertaken on October 13 and 14, 2011, utilizing a track mounted drill rig owned and operated by Frontier Enviro-Drilling Ltd. of Grande Prairie, Alberta. A total of 13 testholes were advanced within the proposed acreage subdivision area, with 8 testholes in the proposed Phase 1 area and 5 testholes in the proposed Phase 2 area. The testholes were advanced to a depth of 6.3 metres below existing ground surface. The testholes were advanced at locations chosen by our firm. The testholes were surveyed for location and elevation by Midwest Surveys, who also provided a detailed subdivision plan to our firm which included the testhole locations. This plan was utilized in the overall site plan, which is located in the Appendix.

The testholes were advanced with 150 millimetre diameter solid stem augers in 1.5 metre increments. A continuous visual description was recorded on site, which included the soil types, depths, moisture, transitions, and other pertinent observations. Disturbed samples were removed from the auger cuttings at 750 millimetre intervals for laboratory testing. Shelby Tube samples or Standard Penetration Tests with split spoon sampling were also taken at regular 1.5 metre intervals in the testholes.

Following the drilling operation, slotted piezometric standpipes were inserted into all of the testholes for watertable level determination. The testholes were backfilled with cuttings, and a bentonite seal was placed at the surface. Watertable readings were obtained by our firm on October 24 and November 14, 2011, 10 and 31 days after drilling had been completed.

4.0 LABORATORY TESTING

All disturbed samples returned to the laboratory were tested for moisture content. In addition, the plastic and liquid limits of the Atterberg Series and soluble soil sulphate concentrations were determined on selected fine grained samples, and a sieve analyses were conducted on various coarse-grained samples. A hydrometer grain size analysis was also conducted

on various near surface samples. The results of all laboratory and field testing are included on the testhole logs in the Appendix.

5.0 SOIL CONDITIONS

A detailed description of the soils encountered is found on the attached testhole logs in the Appendix. In general, the soil conditions at this site consisted of surficial organic silt, underlain by native silty clay materials in the upper western portion of the site and mainly by native silt and sand materials in the lower eastern portion of the site. In all of the testholes, an underlying clay till deposit was encountered below the clay or silt/sand materials.

In all of the testholes, a surficial deposit of organic silt material was the first soil encountered. This material was clayey, was damp to moist with a friable consistency, and was dark brown or black in colour. Generally approximately 25 to 75 millimetres of this material were noted in most of the testholes, although Testholes 11-7, 11-10, and 11-11 featured approximately 100 to 200 millimetres of this material, and Testhole 11-13 featured essentially none of this material. It should be noted that the amount of surficial organic silt material is known only at the testhole location, and may vary away from the testhole.

In the testholes in the western portion of the site (Phase 1), a native deposit of silty clay material was noted below the surficial organic silt. This clay was generally high plastic, although some slightly less plastic areas were noted in the uppermost portions of the material in several testholes, and was brown or grey/brown in colour. The uppermost clay was generally damp to moist with a stiff to very stiff consistency, becoming moister at depth. The clay was encountered to depths of approximately 2.8 to 5.4 metres in Testholes 11-1 to 11-8, which were located in the western portion (Phase 1) of the site.

In the testholes in the lower eastern portion of the site (Phase 2), native clayey silt materials were noted below the surficial organic silt in Testholes 11-9, 11-10, and 11-12, with clay materials encountered in Testholes 11-11 and 11-13. The silt was generally low plastic, with a firm, moist consistency. In Testhole 11-11 the material encountered was a high plastic clay with a moist, very stiff consistency, and in Testhole 11-13 the clay material was lower plastic with a damp to moist, firm consistency. The silt or clay materials were encountered to depths of approximately 0.8 to 1.7 metres. Below these materials in Testholes 11-9 to 11-12, a sand material was encountered. The upper portion of the sand was generally damp, silty, and fine grained, with the sand becoming medium to coarse grained, gravelly, and sometimes

saturated at depth. The sand was encountered to depths of approximately 2.6 to 4.3 in these four testholes.

Below the silty clay soils in 11-1 to 11-8 and in Testhole 11-13, and below the sand material in Testholes 11-9 to 11-12, a deposit of clay till material was encountered. The clay till had a moist, stiff to very stiff consistency, and was grey/brown or grey in colour. The till was low to medium plastic, and was silty and sandy and often contained traces of pebbles, oxides, and gravel. The clay till material was still being encountered at termination depth of 6.3 metres in all the testholes.

No accumulations of free water or slough material were noted during or at the completion of drilling in any of the testholes in the western portion (Phase 1) of the site. However, some slough material was noted during and at the completion of drilling in Testholes 11-9 to 11-12 in the lower, eastern portion (Phase 2) of the site, mainly associated with the sand material.

6.0 GROUNDWATER CONDITIONS

The groundwater table was low or non-existent in the 8 testholes in the western portion of the site, and was highly varying ranging from low to high in the 5 testholes in the eastern portion of the site. Two sets of watertable readings were taken, with the results as follows:

**Groundwater Table Readings
(Metres Below Ground Surface)**

Testhole #	Elevation	Depth to Watertable		Watertable Elevation November 14/11
		October 24/11 (10 or 11 day)	November 14/11 (31 or 32 day)	
11-1	469.29	dry @ 6.30	dry @ 6.30	<462.99
11-2	469.63	dry @ 6.30	6.20	463.43
11-3	469.14	dry @ 6.30	dry @ 6.30	<462.84
11-4	469.35	dry @ 6.30	dry @ 6.30	<463.05
11-5	469.20	dry @ 6.30	dry @ 6.30	<462.90
11-6	469.09	dry @ 6.30	dry @ 6.30	<462.79
11-7	468.91	dry @ 6.30	dry @ 6.30	<462.61
11-8	469.23	dry @ 6.30	6.11	463.12
11-9	463.49	3.33	3.24	460.25
11-10	464.33	dry @ 6.30	6.08	458.25
11-11	461.88	2.67	1.80	460.08
11-12	463.71	dry @ 6.30	dry @ 6.30	<457.41
11-13	460.15	5.06	4.48	455.67

It should be noted that water table levels may fluctuate on a seasonal or yearly basis with the highest readings obtained in the spring or after periods of heavy rainfall. The above readings are estimated to be below average seasonal levels, with higher levels expected in spring and after periods of precipitation.

7.0 RECOMMENDATIONS

7.1 General Suitability For Development

1. The soils noted in the testholes are considered geotechnically suitable for the proposed development. No significant problems are foreseen with regard to residential or accessory building construction. In addition, no major concerns are anticipated for construction of access roads, driveways, or other surface utilities. The testholes featured a low or non-existent watertable in the western portion of the site, and a watertable varying from 1.8 to 6.3 metres below existing ground surface in the eastern portion of the site. Depending on the type of building foundation chosen and the final elevation of surface utilities, some additional measures may be required to address any watertable issues in the eastern portion of the site.
2. It should be noted that the depth to the watertable in the proposed subdivision area must satisfy requirements of applicable subdivision authorities. One such authority is Alberta Environmental Protection. As defined by the "Draft - Environmental Guidelines for the Review of Subdivisions in Alberta" as published by Alberta Environmental Protection, September, 1998, a high watertable area is an area where "*the water table is within 1.8 metres (6 feet) of the ground surface during the frost free period up until the end of August; and within 2.4 metres (8 feet) of the ground surface during the remainder of the year.*"

The testholes in the western portion of the site (Phase 1) have all stabilized with a watertable a minimum of 6 metres below the existing ground surface, therefore it is not believed that any portions of this portion of the study area would be considered a "*high watertable area*", and the watertable would not be a "*constraint to development*", as defined by Alberta Environmental Protection.

In the lower eastern portion of the site, four of the five testholes showed a watertable greater than 2.4 metres below the ground surface, ranging from 3.2 metres to

greater than 6.3 metres below existing ground surface. However, Testhole 11-11 showed a watertable at approximately 1.80 metres below ground surface, which according to the definitions used by Alberta Environmental Protection, identifies the area of this testhole as a “high watertable area”, and should be considered.

The local authority is the County of Northern Lights, and this authority may have separate requirements that must be met. However, with the watertable a minimum of 3.2 metres below ground surface in all testholes except Testhole 11-11, it is not likely that their requirements would identify any additional high watertable areas than those identified by the Alberta Environmental Protection definition.

3. Another stipulation outlined in the “Draft - Environmental Guidelines for the Review of Subdivisions in Alberta” as published by Alberta Environmental Protection, September, 1998, is that any serviced or unserviced residential lot must have “*Suitable Development Area*” that is *suitable for the construction and sustainable use of a residence, ancillary buildings, an access road, a privately owned domestic water well and a private sewage disposal system*”. One constraint pertains to the slope of the land under consideration. The guidelines specify that the Suitable Development Area “*is level or has slopes not exceeding a grade of 15% (8.53°) in an upland non-valley area*”, and “*not exceeding 12.3% (7°) in a valley*”. Profiles of the existing slope and the proposed slope of the subdivision area have not been provided, but should be reviewed to ensure that these conditions are met.

7.2 **House Foundations**

1. No major problems are anticipated with construction of residential units on the non-organic native soils encountered throughout this site. However, some attention should be paid to the high or medium to high plastic soils which were encountered in the testholes. Some of the soils were at or below optimum moisture content. If they take on moisture, these soils will swell, and would be a concern below footings and slabs. To minimize the risk of swelling, it is important to avoid changes in moisture content both during construction and throughout the life of the project.
2. Proper lot grading away from the houses must be provided to minimize the ingress of surface water into the subsoil. All houses will require at least 1.5 metres of earthen cover to prevent potential frost heave problems, and to minimize movements associated with

- seasonal variations in moisture content. The amount of cover should be increased to 2.5 metres for exterior isolated footings or for footings of non-continuously heated structures.
3. Final lot grading is unknown at this time. However, it is expected that final lot grades will largely correspond to existing conditions. If general lot grading will produce areas of fill extending to depths below that of footing elevations, it is strongly recommended that house excavations be inspected by qualified geotechnical personnel prior to foundation construction. Generally, it is not recommended that footings be constructed on non engineered fill. In such cases, the following alternatives are commonly recommended:
 - i) Removal of the fill down to native soil and replacement with a compacted coarse clean granular material, or concrete. A normal footing foundation may then be utilized.

or

 - ii) Utilize a pile foundation.
4. Other foundation types besides footings should be evaluated for the specific site conditions on which they are to be used. In the case of pile foundations, some installation problems may be encountered if deep piles are attempted in the lower eastern area of the site near Testholes 11-9 and 11-11, where saturated sand was encountered. Some accumulations of wet, slough material were present during drilling and at the completion of these two testholes, and similar conditions can be expected in pileholes drilled nearby. While it is not likely that casing of the piles would be required, pileholes may experience some ingressing slough material and/or groundwater. Therefore, at the very least, pile concrete should be on-site during the pile drilling to allow for quick concrete placement.
5. Engineered fill may be considered in areas where low elevations necessitate deep fill zones. This option should be reviewed prior to implementation by a geotechnical consultant to evaluate site conditions and borrow material sources. Basically, engineered fill is fill which is placed in a controlled manner under the full-time inspection of a qualified soils technician. The fill is placed and compacted to a minimum 98 percent of its Standard Proctor Density near its optimum moisture content, in maximum 150 millimetre lifts. All organic soils and non-engineered fill must first be stripped from the engineered fill area. Engineered fill construction requires full-time monitoring and

extensive testing by the geotechnical consultant during construction. However, proper placement of engineered fill will negate the need for pile foundations in deep lot fill areas, and possibly reduce the foundation costs to the builders and developer.

6. No loose, disturbed, remoulded or slough material should be allowed to remain in the open footing excavations. Hand cleaning is advised if an acceptable surface cannot be prepared by mechanical equipment. In order to reduce the disturbance to the bearing surface, all basement excavations should be advanced by a backhoe operating remote from the bearing surface.
7. Footing excavations should be protected from drying, rain, snow, freezing and the ingress of surface or groundwater. Care should be taken to ensure that all exposed soils are protected from excessive drying or wetting.
8. A 150 millimetre layer of free draining sand or sand-gravel mixture should be placed immediately below all floor slabs. This material should be uniformly compacted to 98 percent of the corresponding Standard Proctor Density at optimum moisture content.
9. A non-deteriorating vapour barrier should be placed immediately below the floor slab to prevent desiccation of the subgrade material.
10. The watertable at this site was generally low or moderate, measured at greater than 3.2 metres below existing ground surface in all of the testholes except one. Therefore, no issues on house construction with regard to the watertable are envisioned unless significant cuts to the site are planned for the majority of the site.

However, Testhole 11-11 showed a watertable at approximately 1.80 metres below ground surface, indicating that it is located in a high watertable area. If house construction is allowed in this high watertable area, temporary dewatering may be required for basement excavations advanced below the watertable. In addition, some other measures are recommended, as outlined in the following items.

11. At a minimum, peripheral weeping tile lines will be required for all houses. All lines should be placed at or slightly below footing elevation and connected to ensure positive drainage to a sump pump. It is important that the sump pump discharge is directed well away from the foundations. The weeping tile lines will require a suitable clean tile rock drainage filter, with a minimum of 150 millimetres of rock wrapped in filter cloth around the line.

It is recommended that basements located near the water table utilize interior drains

and clean tile rock beneath the floor in addition to perimeter drains. It is important that the sump pump discharge is directed well away from the foundations, especially in high watertable areas. Where the watertable remains above footing elevation even in winter, some de-icing and maintenance will likely be required at the sump pump discharge point. The recommended configuration for houses with footing elevations located below or near the watertable is illustrated in the Appendix.

12. The time span between the start of excavation to installation of basement footings, walls, peripheral weeping tile, and backfilling operations should be minimized in order to prevent any problems developing within the excavation due to ingressing of ground or surface waters or desiccation of the subsoil.
13. It is recommended that floor joists be placed prior to backfilling the excavation in order to minimize any detrimental effects on the foundation walls caused by backfilling operations.
14. During cold weather construction, it is essential that all interior fill and load bearing materials remain frost free. Recommended cold weather construction practices, with respect to hoarding and heating of the forms and the fresh concrete, should be followed. In order to minimize the potential frost heave problems, the interior of the building must be heated as soon as the walls have been poured. The period in which the excavation is left open due to freezing conditions should be as short as possible. If doubts remain as to the suitability of the foundation during construction, the builder should consult a qualified geotechnical engineer.
15. Tests on selected soil samples indicated negligible to moderate concentrations of water soluble soil sulphates. Based on C.S.A. Standards A23.1-09, class of exposure S-3 should be applied to the design requirements for concrete in contact with the soil and susceptible to sulphate degradation. The class S-3 exposure requires Type MS (moderate sulphate resistant hydraulic cement) or HS (high sulphate resistant hydraulic cement), and a minimum 56 day concrete strength of 30 MPa, as well as other requirements as given in the noted C.S.A. guideline. All concrete exposed to freezing conditions should be air entrained to between 5 and 7 percent. Other exposure factors should be considered when choosing a minimum strength for the concrete. Concrete should conform to CSA Standards A23.1-04.

7.3 Private Sewage Disposal

1. Private sewage disposal systems are regulated by the "Alberta Private Sewage Systems Standard of Practice 2009" as published by Safety Codes Council, and the "Draft - Environmental Guidelines for the Review of Subdivisions in Alberta" as published by Alberta Environmental Protection, September, 1998, and should conform to these references.
2. The "Alberta Private Sewage Systems Standard of Practice 2009" considers the suitability for private sewage disposal systems for various sites based on the depth of the watertable, as well as on the soil texture classification of the site soils. The site textures are classified by grain size, and as such, hydrometer grain size analysis was conducted on several of the collected soil samples.

The soil conditions below the surficial topsoil material at this site consisted mainly of silty clay materials in the western portion of the site, and silt and sand materials in the lower eastern portion of the site. An underlying clay till material was noted in all areas. Hydrometer grain size analysis on sample of each of these materials resulted in the following grain size compositions and the resultant soil classifications:

Soil Classification
As Per Alberta Private Sewage Systems Standard of Practice

Testhole	Sample Depth	% Sand/Silt/Clay	Classification
11-7	0.8 m	2.6 / 22.4 / 75.0	Heavy Clay
11-7	1.5 m	1.1 / 28.2 / 70.7	Heavy Clay
11-8	0.8 m	1.0 / 33.3 / 65.7	Heavy Clay
11-8	1.5 m	2.0 / 20.9 / 77.1	Heavy Clay
11-10	0.8 m	3.5 / 57.5 / 38.9	Silty Clay Loam
11-11	0.8 m	87.0 / 10.0 / 3.0	Sand
11-11	1.5 m	93.6 / 3.7 / 2.7	Sand
11-12	0.8 m	6.0 / 63.5 / 30.5	Silty Clay Loam

3. One consideration for private sewage disposal is the depth to the watertable or any impervious layer. The "Alberta Private Sewage Systems Standards of Practice 2009" state that the vertical separation between the point of effluent infiltration into the soil and the watertable or other impervious layer must be a minimum of:

- 1.5 metres for primary treated effluent meeting the criteria of Level 1 effluent as defined by the standards
- 0.9 metres for secondary treated effluent meeting the criteria of Level 2 effluent as defined by the standards, typically after secondary treatment has occurred utilizing a sand filter, a re-circulating gravel filter, or other packaged sewage treatment systems.
- 0.9 metres for a treatment mound, as measured from the bottom of the mound's 300 millimetre thick sand layer

The watertable readings at this site are mostly 3.2 metres or greater below existing ground surface in the testholes, which would satisfy the watertable level criteria governing on-site domestic sewage treatment. However, one testhole (Testhole 11-11) showed a high watertable of 1.8 metres below ground surface. If development is allowed within this high watertable area, it appears that the requirement for discharge of primary treated effluent would not be met, while the requirements for secondary treated effluent and for treatment mounds may be met depending on the depth of the infiltration point.

4. Another consideration is the rate that the soils will absorb effluent. Table 8.1.1.10 in the "Alberta Private Sewage Systems Standards of Practice 2009" lists the appropriate effluent loading rates and hydraulic linear loading rates for various soil textures that should be used in designing soil based treatment systems or treatment field systems. Generally, soil textures which are more permeable feature larger capacities to accept effluent, although a limit is reached where coarse sand and gravel allow effluent to travel too quickly through the soils, and are therefore not recommended. Conversely, the less permeable soil textures have lower capacities to accept effluent, requiring larger disposal areas. A limit is also reached where the standards deem the soils too impermeable to accept effluent, and the soil textures for clay, heavy clay, and silty clay materials are not recommended for use.

Based on the results of the grain size analyses conducted, the "Alberta Private Sewage Systems Standards of Practice 2009" classify the soils encountered in the testholes in the western portion of the site as "heavy clay", which the standards dictate are not suitable for disposal fields. In the eastern portion of the site, the soils are classified as "silty clay loam" and "sand" which are considered suitable for disposal fields, using linear loading rates as outlined in Table 8.1.1.10 in the standards. It should be noted, however, that pressure distribution of the effluent is required where sand soils are present.

5. An alternative to disposal fields is to employ a treatment mound. Treatment mound design criteria are discussed in Section 8.4 of the “Alberta Private Sewage Systems Standards of Practice”. As mentioned in Point 3, one requirement for use of a treatment mound is a minimum separation of 0.9 metres between the bottom of the treatment mound and any watertable or other impervious layer, which most of this site meets, although the depth of the infiltration point should be considered in the area of Testhole 11-11, where a watertable at 1.8 metres below ground surface was noted.

The standards also specify that a treatment mound can only be utilized as a final treatment component where a minimum of the first 300 millimetres of in-situ (original) soil below the treatment mound has an assigned loading rate given in Table 8.1.1.10. The “silty clay loam” and the “sand” materials in the eastern portion of the site would be considered suitable, while the near surface “heavy clay” materials in the western portion of this site are not considered suitable and do not have rates specified in the table, indicating that this portion of the site would not be suitable for supporting a treatment mound.

However, it may be worth exploring whether placing a minimum of 300 millimetres of suitably textured, imported fill material below the treatment mound is permitted to meet this criteria. The standards indicate that the placement of fill can be utilized to ensure adequate separation of the mound from the watertable or impervious layer, but are not clear on whether this is allowed to ensure that the minimum of 300 millimetres of suitable soil is present. If this is a desired option, it is recommended that firms with experience in installing treatment mounds be consulted for their input, as well as the local authority.

6. An additional alternative to disposal fields or a treatment mound is to employ a sewage holding tank. These tanks are periodically pumped out by a vacuum truck and the sewage is disposed of off site into a proper sewage treatment system. However, local authorities should be consulted for their opinion on holding tanks, as some Counties and Municipal Districts in Alberta do not allow holding tanks. Where holding tanks are not allowed, self contained packaged systems are also an option. Two providers of such systems are Orenco Systems Incorporated and Singulair.

7.4 Surface Utilities

1. Testholes 11-1, 11-3, 11-5, 11-6, 11-9, and 11-10 were advanced near the proposed roadways of this development. The inorganic clay or silt materials located below the surficial organic materials in these testholes are considered adequate as subgrade, although some minor amounts of drying may be required get this material near optimum moisture content. Care must be taken not to allow any excess moisture into these soils, as some of these soils are sensitive to moisture content.
2. All vegetation, topsoil, and any other deleterious materials should be completely removed from the road areas prior to construction.
3. If fill is required to bring the subgrade up to design elevation, it is recommended that medium or high plastic clay be used. All fill should be placed in lifts not greater than 150 millimetres in thickness, and should be compacted to a minimum of 98 percent of Standard Proctor Density, near optimum moisture content. If high plastic clay materials are utilized, they should be compacted at above optimum moisture content to minimize the risk of future swelling and softening.
4. Subgrade preparation should consist of scarification of the top 150 millimeters of soil, adjusting the moisture content to near optimum moisture content, and re-compaction to at least 100 percent of Standard Proctor Density. All subgrade should be proof rolled after final compaction and any areas showing visible deflections should be inspected and repaired as required. It is recommended that in all cases the subgrade be inspected by qualified personnel during construction to determine the recommended subgrade treatment.
5. Positive drainage of at least 2 percent of the subgrade and surface should be maintained. All subgrade and surfaces should be sloped to provide adequate drainage, as this is critical for good long-term structure performance. In addition, it is recommended that ditch bottoms be set at a minimum of 1.2 metres below the top of the pavement, and that they be properly graded and maintained to prevent water ponding.
6. It is believed that the access road at this site will have a gravel surface. The following non-staged road structure may be applied to the proposed roadway.

Recommended Non-Staged Road Structure

Crushed Gravel (20 mm)	50 mm	(2")
Prepared Subgrade	150 mm	(6")

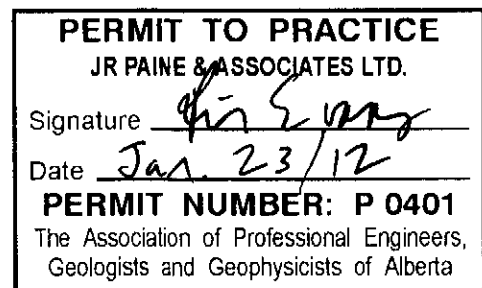
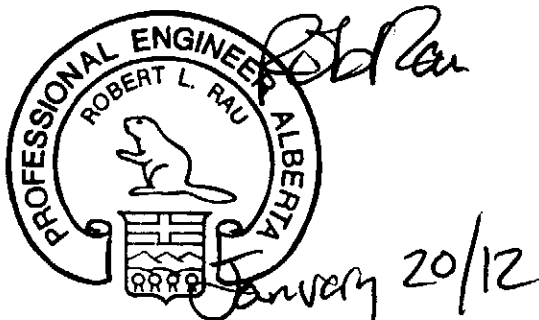
7. As with all gravel surface roads, periodic maintenance will be required. Maintenance costs can be minimized by ensuring adequate crowning or cross drainage of the road surface, as well as proper ditch drainage. Utilizing a thicker gravel structure may also help minimize maintenance costs.

8.0 CLOSURE

This report has been prepared for the exclusive and confidential use of Southside Professional Healthcare Centre Ltd. Use of this report is limited to the subject proposed acreage subdivision only. The recommendations given are based on the subsurface soil conditions encountered during test boring, current construction techniques and generally accepted engineering practices. No other warranty, expressed or implied, is made. Due to geological randomness of many soils formations, no interpolation of soil conditions between or away from the testholes has been made or implied. Soil conditions are known only at the test boring location. Should other soils be encountered during construction or other information pertinent become available, the undersigned should be contacted as the recommendations may be altered or modified.

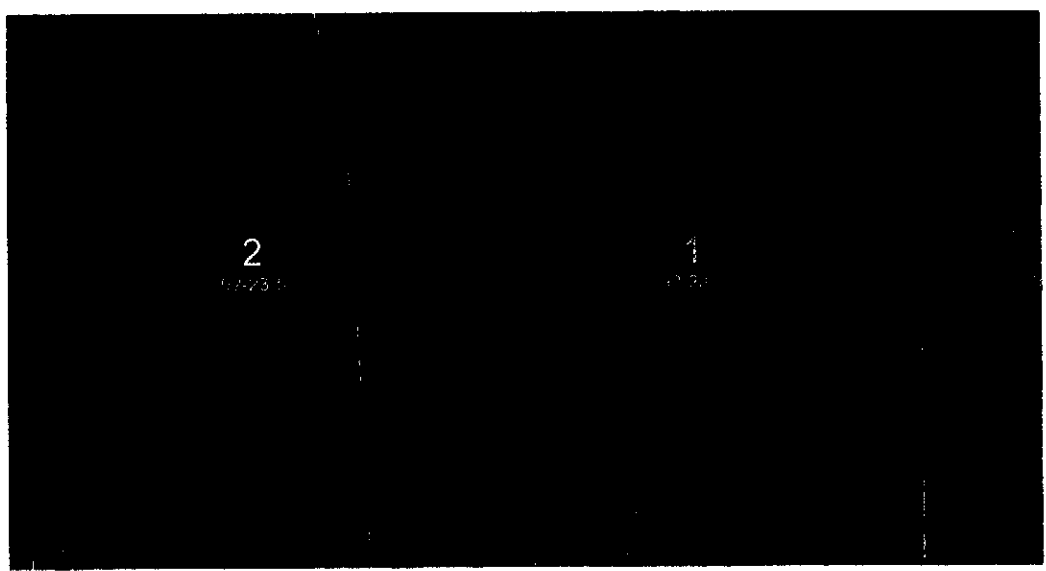
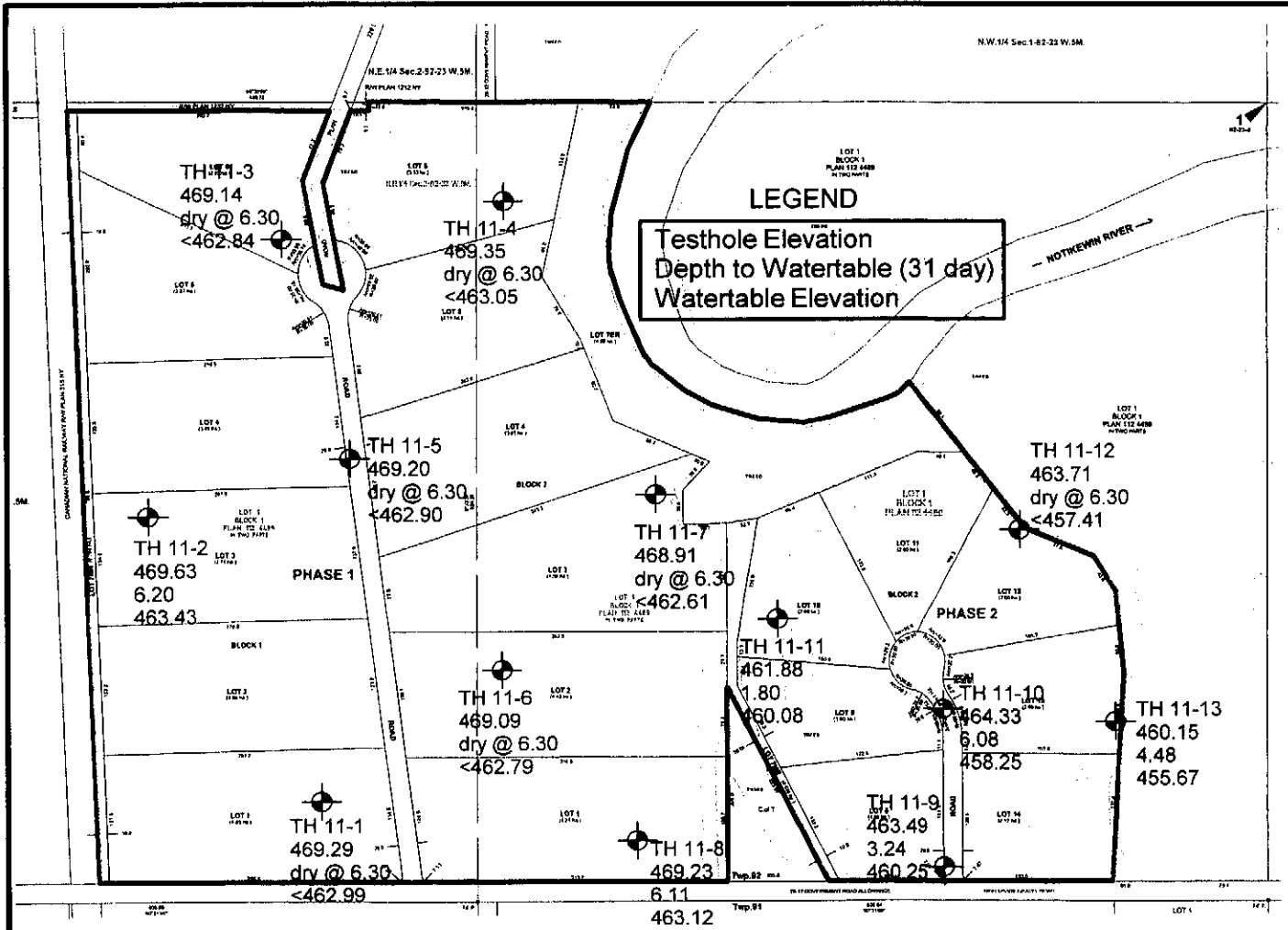
We trust this information is satisfactory. If you should have any further questions, please contact our office.

Respectfully Submitted:
 J.R. PAINE & ASSOCIATES LTD.



Robert Rau, P. Eng.

APPENDIX

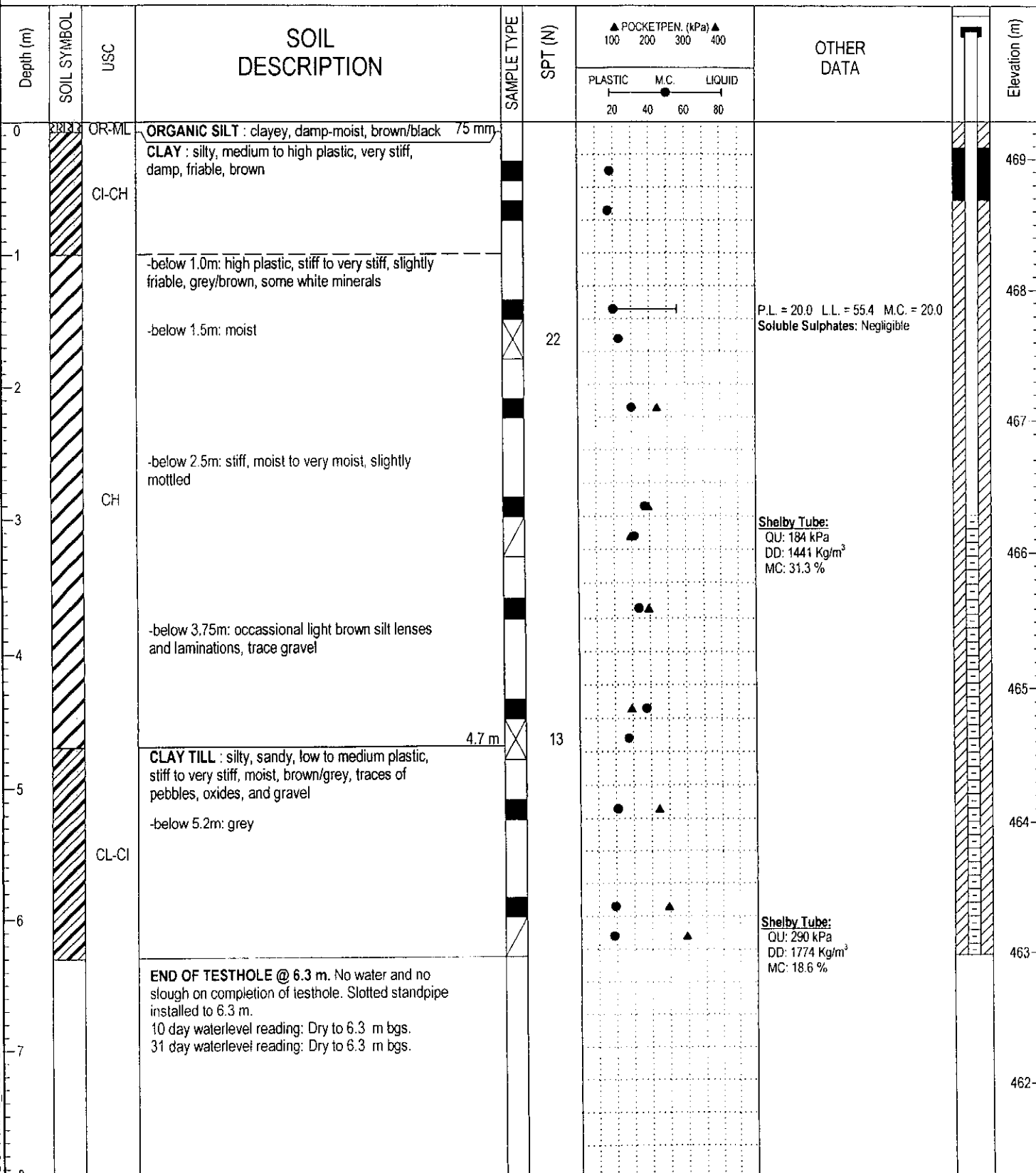


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CONSULTING AND TESTING ENGINEERS

**Approximate Testhole Locations
Proposed Acreage Subdivision
Lot 1, Block 1, Plan 112 4489
SW1 & SE2-92-23-5, NE of Manning
County of Northern Lights, Alberta**

SCALE: NTS	DATE: October 14, 2011
FILE #: PR4684-2	FIGURE #: 1

PROJECT: Proposed Acreage Subdivision		PROJECT NO: PR4684-2	BOREHOLE NO: 11-1
CLIENT: Southside Professional Healthcare Centre Ltd.		DRILL METHOD: Solid Stem Auger	ELEVATION: 469.29 m
OWNER:		LOCATION: SW1 & SE2-92-23-5, Northeast of Manning, County of Northern Lights, Alberta	
SAMPLE TYPE	<input type="checkbox"/> SHELBY TUBE	<input checked="" type="checkbox"/> CORE SAMPLE	<input checked="" type="checkbox"/> SPT SAMPLE
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE	<input type="checkbox"/> PEA GRAVEL	<input type="checkbox"/> SLOUGH
		<input type="checkbox"/> GROUT	<input type="checkbox"/> DRILL CUTTINGS
			<input type="checkbox"/> SAND



JRP PR 4684-2.GPJ JRPVZ_3.GDT 20/11/12



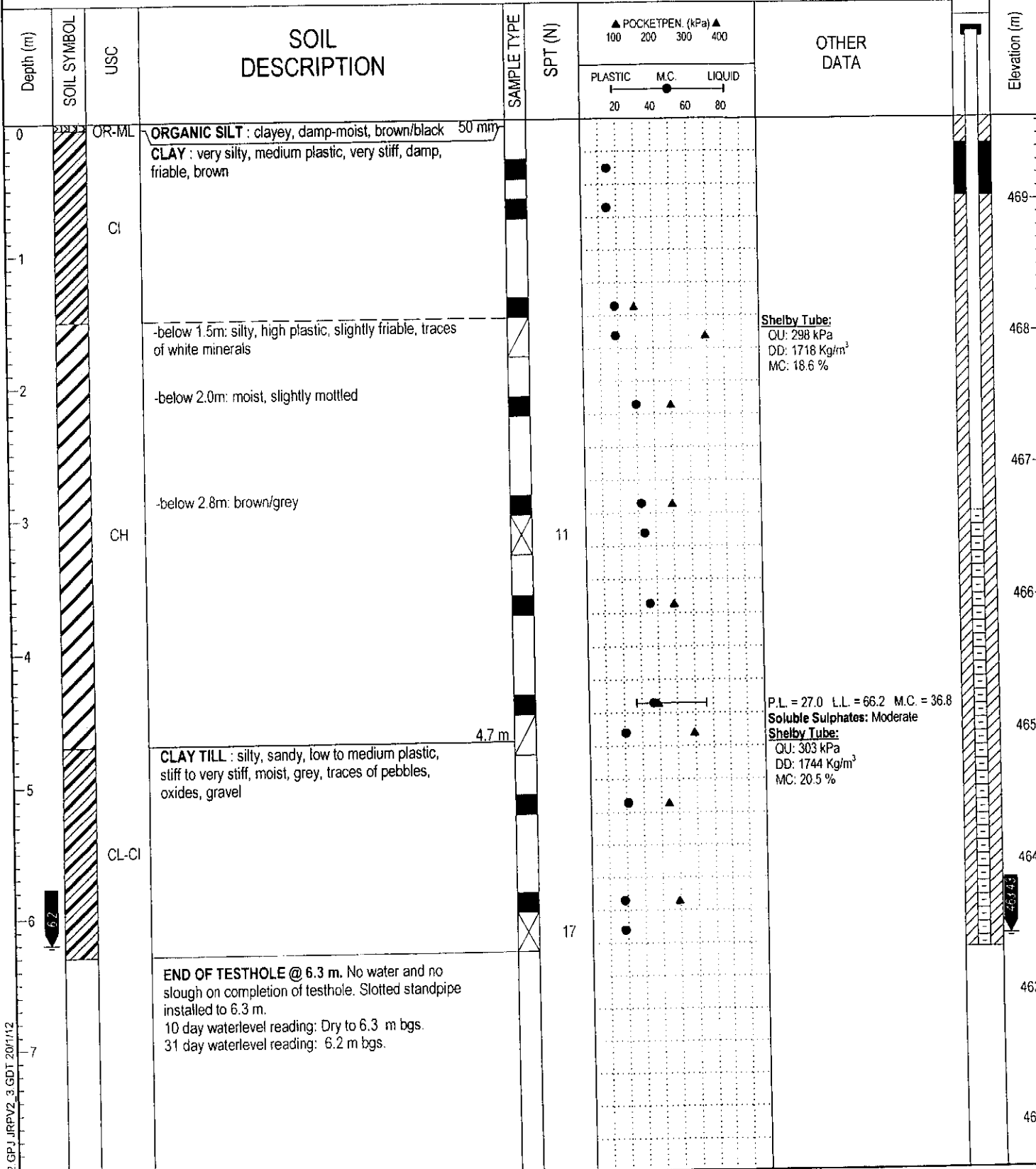
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LOGGED BY: D Rohatyn
REVIEWED BY: R Rau
Fig. No: 2

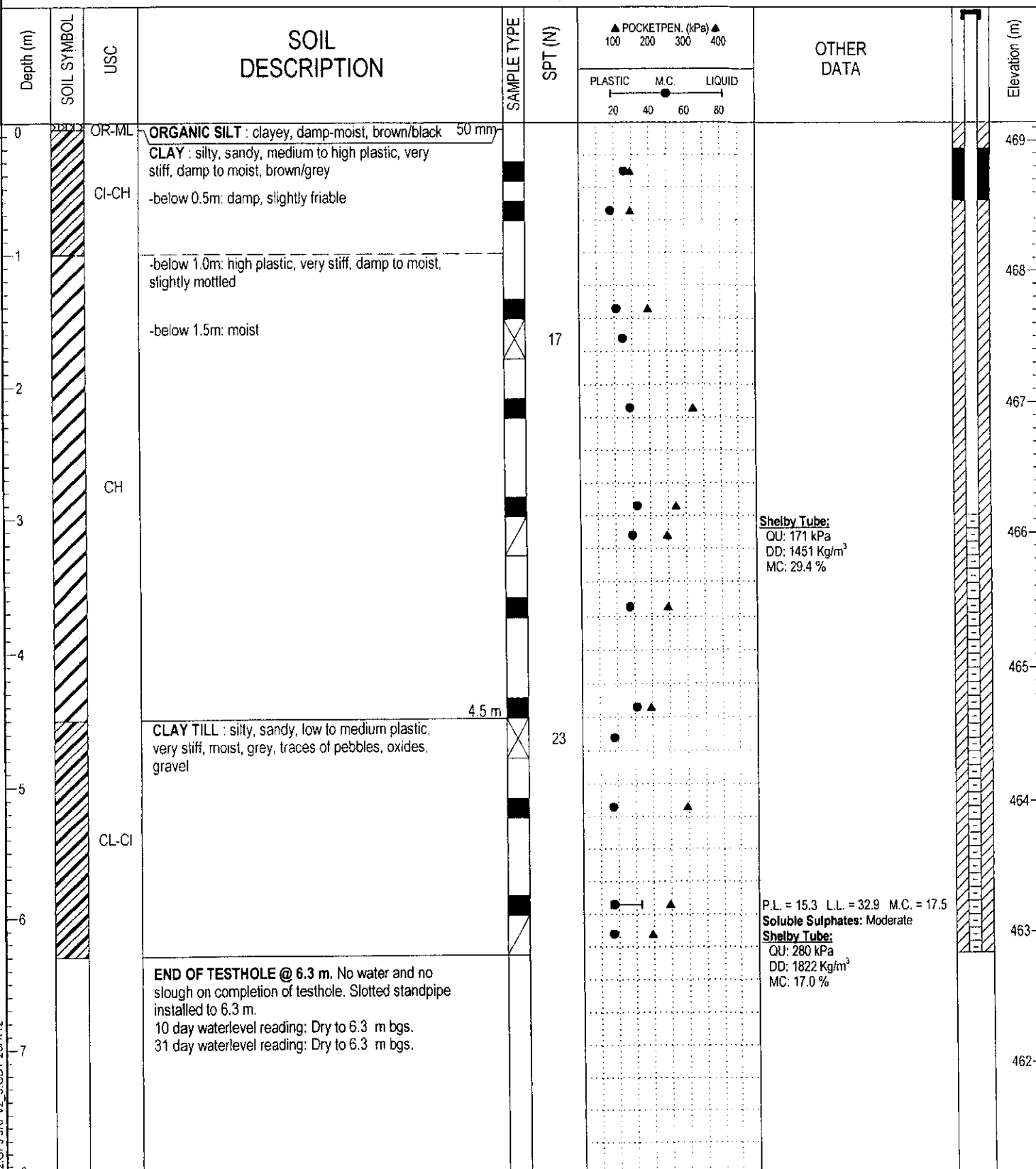
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COMPLETION DATE: 14/10/11
Page 1 of 1

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CLIENT: Southside Professional Healthcare Centre Ltd.		DRILL METHOD: Solid Stem Auger	ELEVATION: 469.63 m
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BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE	<input type="checkbox"/> PEA GRAVEL	<input type="checkbox"/> SLOUGH
	<input type="checkbox"/> GROUT	<input checked="" type="checkbox"/> DRILL CUTTINGS	<input type="checkbox"/> SAND



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	PROJECT: PR 4684-2 GPJ JRPV2_3 GDT 20/1/12			Page 1 of 1
	JRP PR 4684-2 GPJ JRPV2_3 GDT 20/1/12			

PROJECT: Proposed Acreage Subdivision		PROJECT NO: PR4684-2	BOREHOLE NO: 11-3
CLIENT: Southside Professional Healthcare Centre Ltd.		DRILL METHOD: Solid Stem Auger	ELEVATION: 469.14 m
OWNER:		LOCATION: SW1 & SE2-92-23-5, Northeast of Manning, County of Northern Lights, Alberta	
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JRP PR 4684-2.GPJ JRPV2_3.GDT 20/11/12



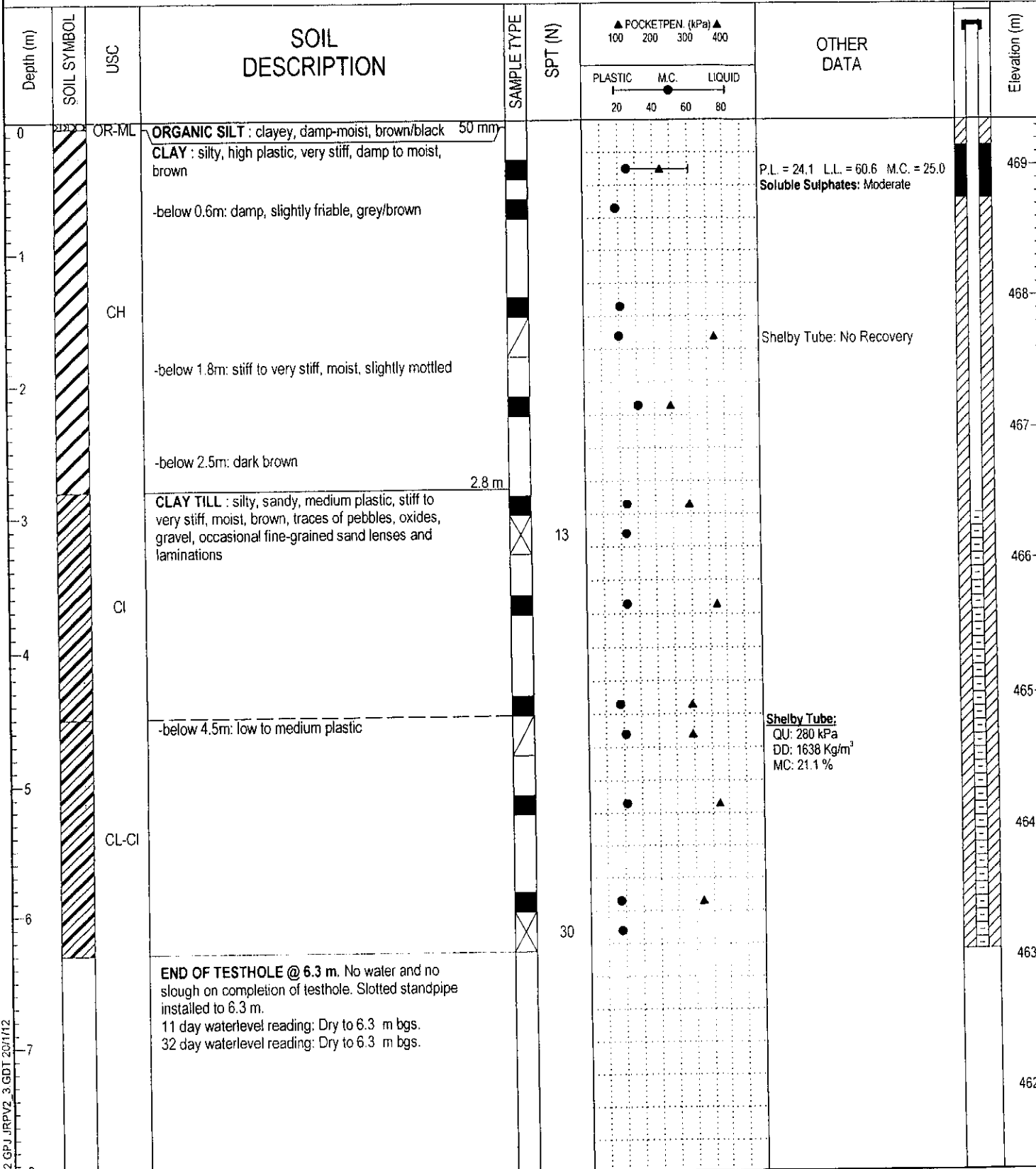
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LOGGED BY: D Rohatyn
REVIEWED BY: R Rau
Fig. No: 4

COMPLETION DEPTH: 6.30 m
COMPLETION DATE: 14/10/11
Page 1 of 1

PROJECT: Proposed Acreage Subdivision		PROJECT NO: PR4684-2	BOREHOLE NO: 11-4
CLIENT: Southside Professional Healthcare Centre Ltd.		DRILL METHOD: Solid Stem Auger	ELEVATION: 469.35 m
OWNER:		LOCATION: SW1 & SE2-92-23-5, Northeast of Manning, County of Northern Lights, Alberta	
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BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE	<input type="checkbox"/> PEA GRAVEL	<input type="checkbox"/> SLOUGH
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JRP PR 4684-2 GPJ JRPV2_3.GDT 2011/12



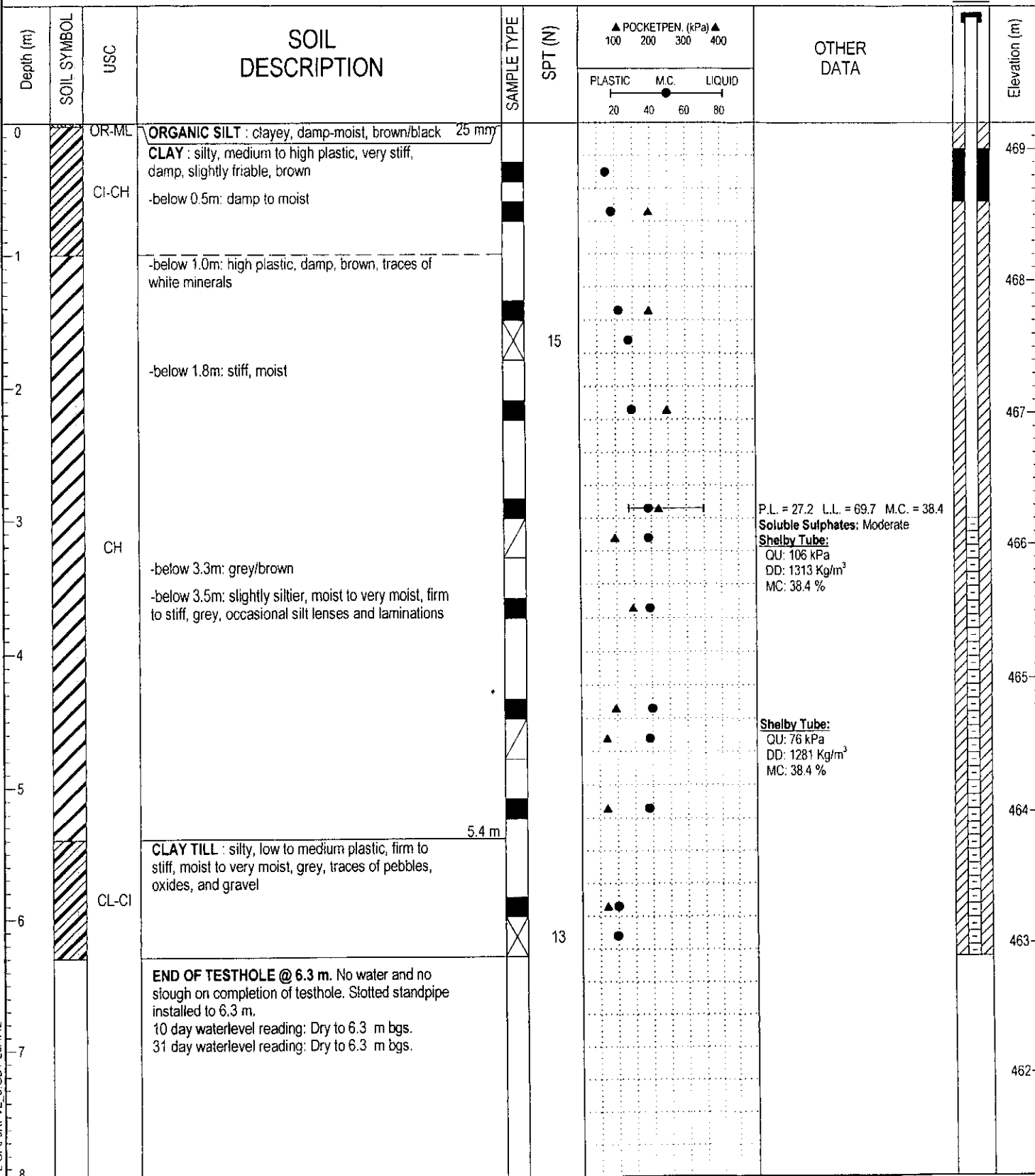
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LOGGED BY: D Rohatyn
 REVIEWED BY: R Rau
 Fig. No: 5

COMPLETION DEPTH: 6.30 m
 COMPLETION DATE: 13/10/11
 Page 1 of 1

PROJECT: Proposed Acreage Subdivision		PROJECT NO: PR4684-2	BOREHOLE NO: 11-5
CLIENT: Southside Professional Healthcare Centre Ltd.		DRILL METHOD: Solid Stem Auger	ELEVATION: 469.2 m
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	<input type="checkbox"/> GROUT	<input checked="" type="checkbox"/> DRILL CUTTINGS	<input type="checkbox"/> SAND



JRP PR 4684-2 CFJ JRPV2_3.GDT 20/1/12



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REVIEWED BY: R Rau

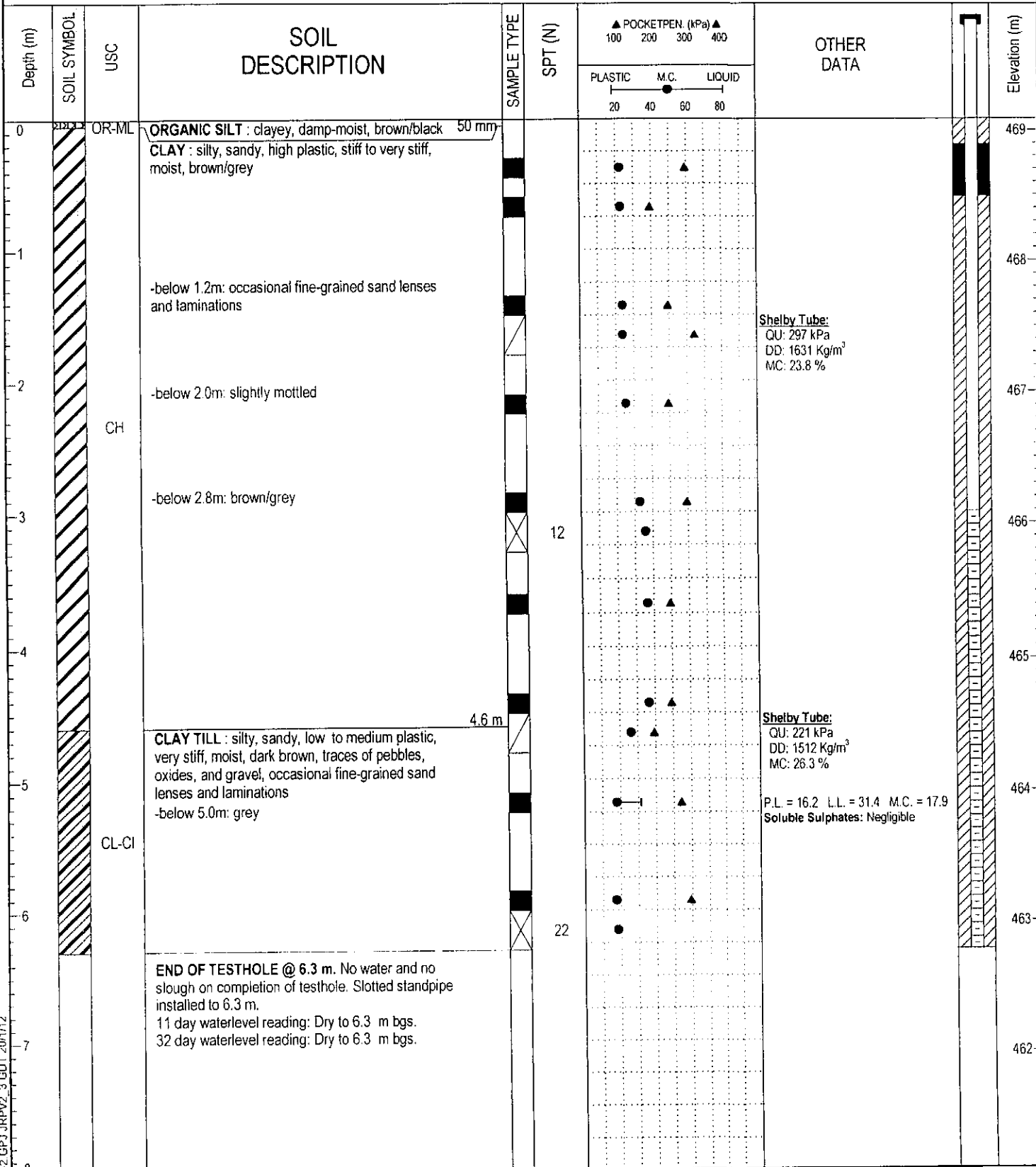
Fig. No: 6

COMPLETION DEPTH: 6.30 m

COMPLETION DATE: 14/10/11

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PROJECT: Proposed Acreage Subdivision		PROJECT NO: PR4684-2	BOREHOLE NO: 11-6
CLIENT: Southside Professional Healthcare Centre Ltd.		DRILL METHOD: Solid Stem Auger	ELEVATION: 469.09 m
OWNER:		LOCATION: SW1 & SE2-92-23-5, Northeast of Manning, County of Northern Lights, Alberta	
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BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE	<input type="checkbox"/> PEA GRAVEL	<input type="checkbox"/> SLOUGH
		<input type="checkbox"/> GROUT	<input type="checkbox"/> DRILL CUTTINGS
			<input type="checkbox"/> SAND



JRP PR 4684-2 GP1 JRPV2 3 GDT 20/1/12



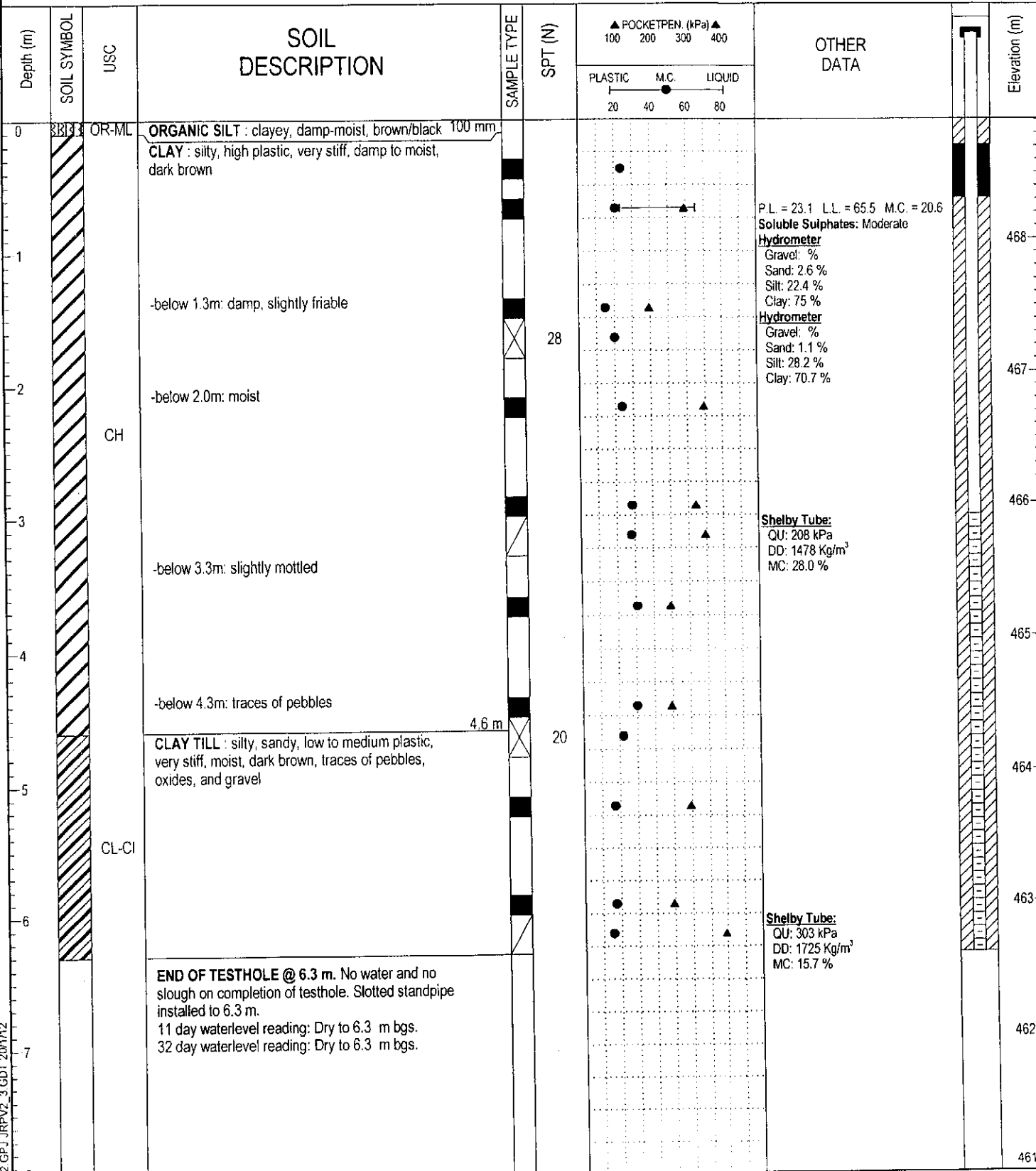
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Fig. No: 7

COMPLETION DEPTH: 6.30 m
COMPLETION DATE: 13/10/11
Page 1 of 1

PROJECT: Proposed Acreage Subdivision		PROJECT NO: PR4684-2	BOREHOLE NO: 11-7
CLIENT: Southside Professional Healthcare Centre Ltd.		DRILL METHOD: Solid Stem Auger	ELEVATION: 468.91 m
OWNER:		LOCATION: SW1 & SE2-92-23-5, Northeast of Manning, County of Northern Lights, Alberta	
SAMPLE TYPE	<input checked="" type="checkbox"/> SHELBY TUBE	<input checked="" type="checkbox"/> CORE SAMPLE	<input checked="" type="checkbox"/> SPT SAMPLE
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE	<input checked="" type="checkbox"/> PEA GRAVEL	<input checked="" type="checkbox"/> SLOUGH
		<input checked="" type="checkbox"/> GROUT	<input checked="" type="checkbox"/> DRILL CUTTINGS
			<input checked="" type="checkbox"/> SAND



JRP PR 4684-2 GPJ JRPV2_3 GDT 2011/12



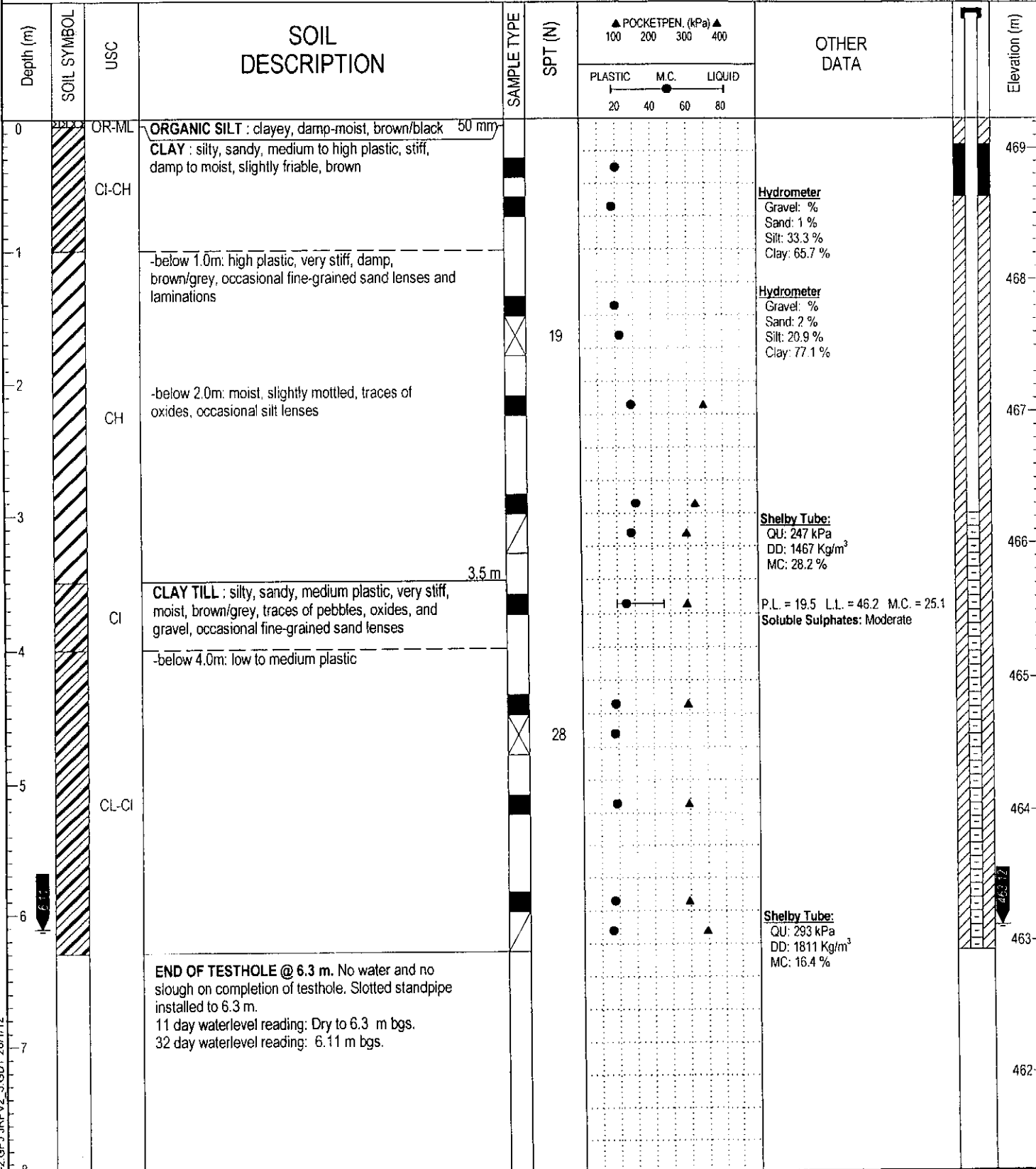
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REVIEWED BY: R Rau
Fig. No: 8

COMPLETION DEPTH: 6.30 m
COMPLETION DATE: 13/10/11
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PROJECT: Proposed Acreage Subdivision		PROJECT NO: PR4684-2	BOREHOLE NO: 11-8
CLIENT: Southside Professional Healthcare Centre Ltd.		DRILL METHOD: Solid Stem Auger	ELEVATION: 469.23 m
OWNER:		LOCATION: SW1 & SE2-92-23-5, Northeast of Manning, County of Northern Lights, Alberta	
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	<input type="checkbox"/> CORE SAMPLE	<input type="checkbox"/> SPT SAMPLE	<input type="checkbox"/> GRAB SAMPLE
	<input type="checkbox"/> NO RECOVERY		
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE	<input type="checkbox"/> PEA GRAVEL	<input type="checkbox"/> SLOUGH
	<input type="checkbox"/> GROUT	<input type="checkbox"/> DRILL CUTTINGS	<input type="checkbox"/> SAND



JRP-PR-4684-2-GPJ-JRPV2-3-GDT-2011/12

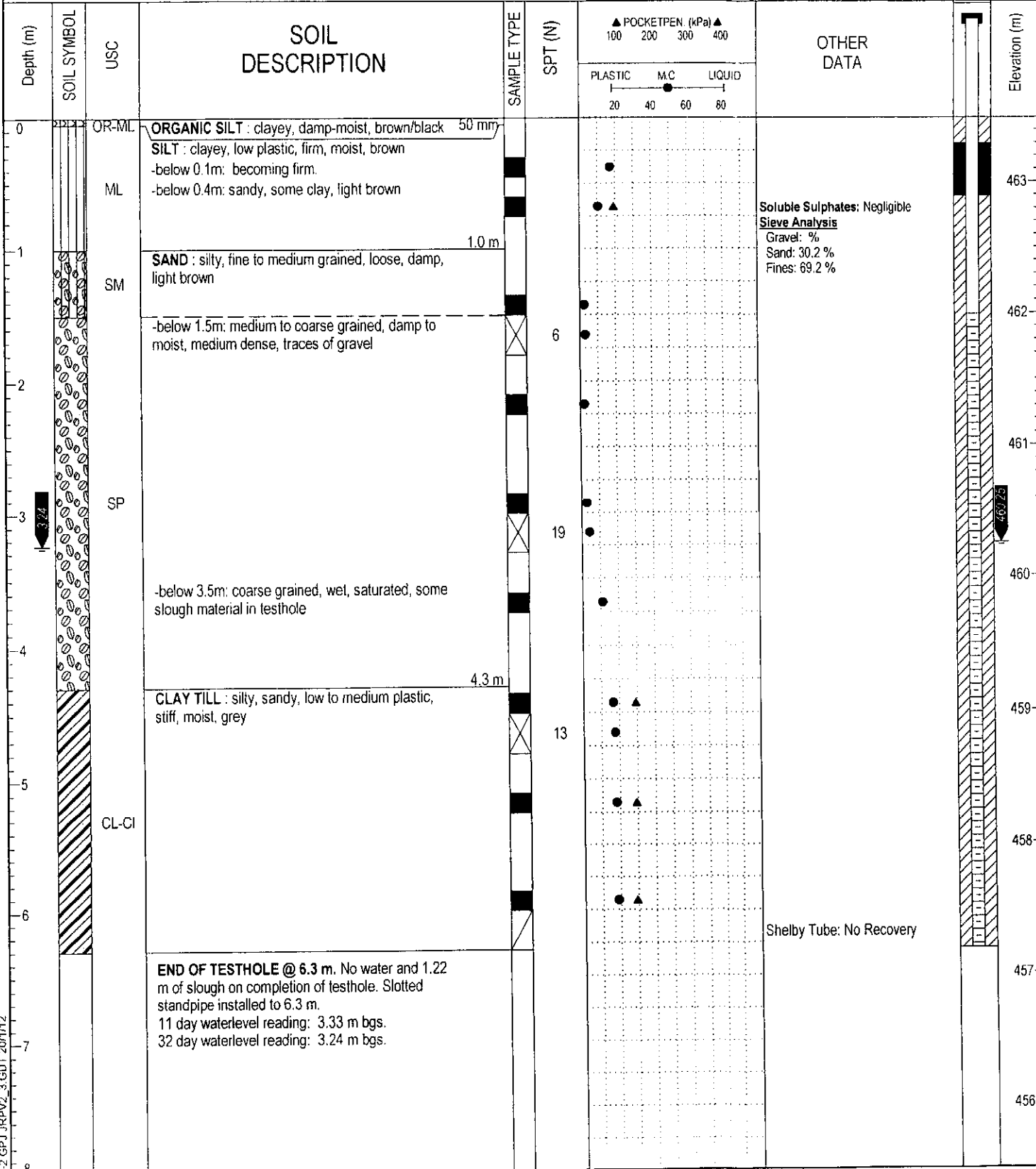


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REVIEWED BY: R Rau	COMPLETION DATE: 13/10/11
Fig. No: 9	Page 1 of 1

PROJECT: Proposed Acreage Subdivision		PROJECT NO: PR4684-2	BOREHOLE NO: 11-9
CLIENT: Southside Professional Healthcare Centre Ltd.		DRILL METHOD: Solid Stem Auger	ELEVATION: 463.49 m
OWNER:		LOCATION: SW1 & SE2-92-23-5, Northeast of Manning, County of Northern Lights, Alberta	
SAMPLE TYPE	<input checked="" type="checkbox"/> SHELBY TUBE	<input checked="" type="checkbox"/> CORE SAMPLE	<input checked="" type="checkbox"/> SPT SAMPLE
	<input type="checkbox"/> GRAB SAMPLE	<input type="checkbox"/> NO RECOVERY	
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE	<input type="checkbox"/> PEA GRAVEL	<input type="checkbox"/> SLOUGH
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JRP PR 4684-2 GPJ JRPV2_3.GDT 20/11/12



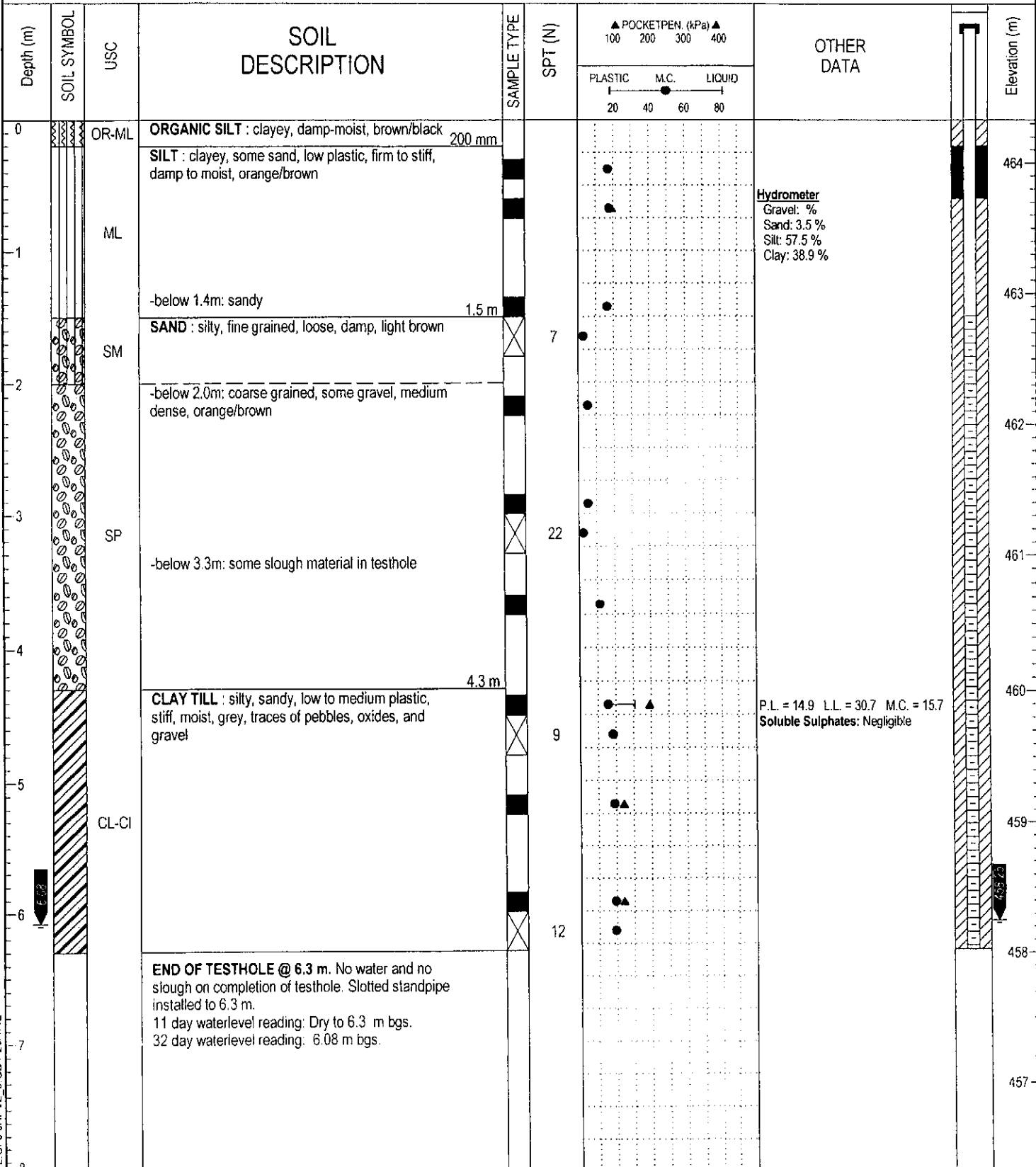
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Fig. No: 10

COMPLETION DEPTH: 6.30 m
COMPLETION DATE: 13/10/11
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PROJECT: Proposed Acreage Subdivision		PROJECT NO: PR4684-2	BOREHOLE NO: 11-10
CLIENT: Southside Professional Healthcare Centre Ltd.		DRILL METHOD: Solid Stem Auger	ELEVATION: 464.33 m
OWNER:		LOCATION: SW1 & SE2-92-23-5, Northeast of Manning, County of Northern Lights, Alberta	
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	<input checked="" type="checkbox"/> GRAB SAMPLE	<input type="checkbox"/> NO RECOVERY	
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE	<input type="checkbox"/> PEA GRAVEL	<input type="checkbox"/> SLOUGH
	<input type="checkbox"/> GROUT	<input type="checkbox"/> DRILL CUTTINGS	<input type="checkbox"/> SAND



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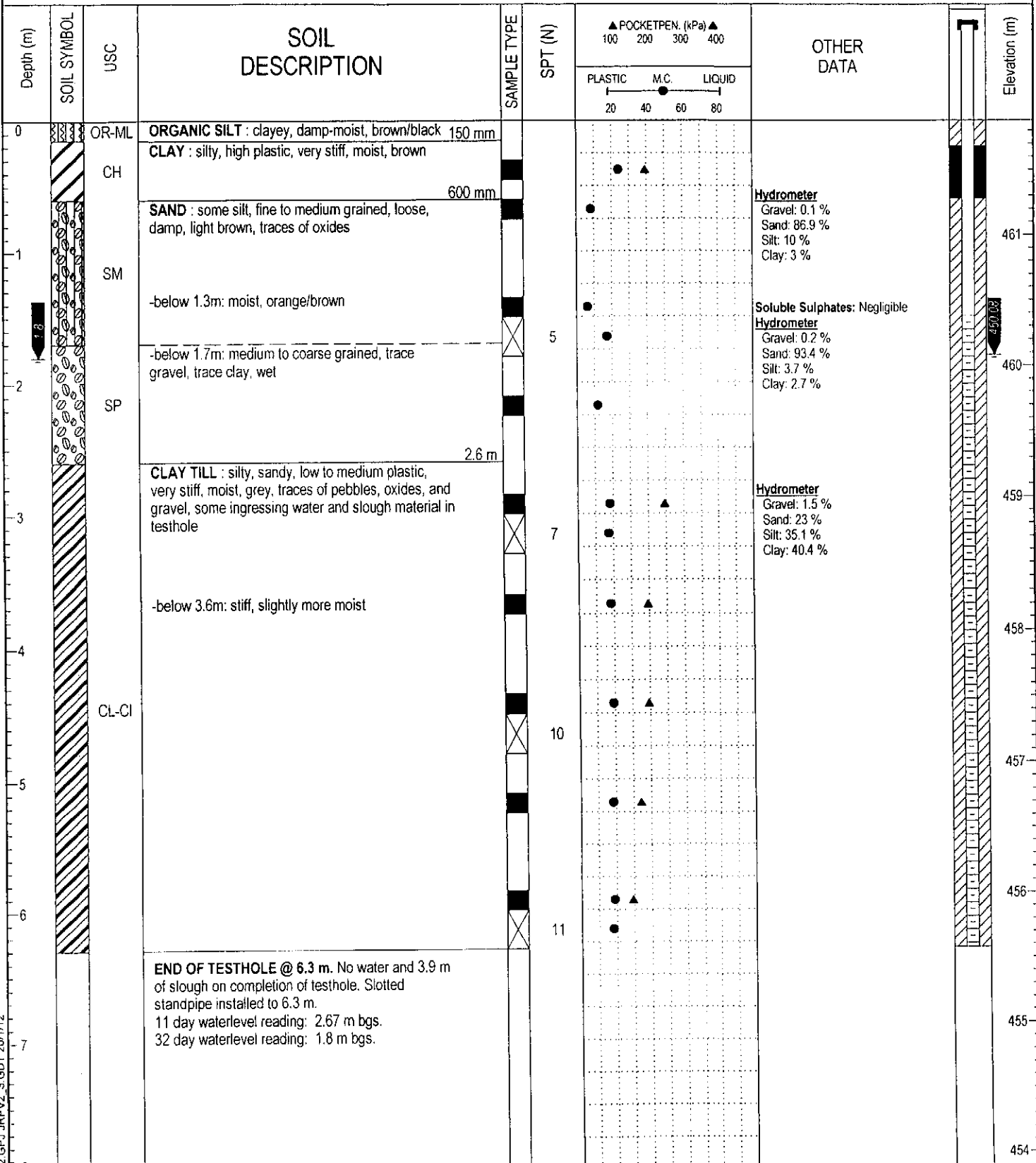
REVIEWED BY: R Rau

Fig. No: 11

COMPLETION DEPTH: 6.30 m

COMPLETION DATE: 13/10/11

PROJECT: Proposed Acreage Subdivision		PROJECT NO: PR4684-2	BOREHOLE NO: 11-11
CLIENT: Southside Professional Healthcare Centre Ltd.		DRILL METHOD: Solid Stem Auger	ELEVATION: 461.88 m
OWNER:		LOCATION: SW1 & SE2-92-23-5, Northeast of Manning, County of Northern Lights, Alberta	
SAMPLE TYPE	<input checked="" type="checkbox"/> SHELBY TUBE	<input checked="" type="checkbox"/> CORE SAMPLE	<input checked="" type="checkbox"/> SPT SAMPLE
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE	<input checked="" type="checkbox"/> PEA GRAVEL	<input checked="" type="checkbox"/> SLOUGH
	<input type="checkbox"/> GRAB SAMPLE	<input type="checkbox"/> NO RECOVERY	<input type="checkbox"/> GROUT
	<input type="checkbox"/> DRILL CUTTINGS	<input type="checkbox"/> SAND	



JRP PR 4684-2.GPJ JRPV2_3.GDT 20/11/12



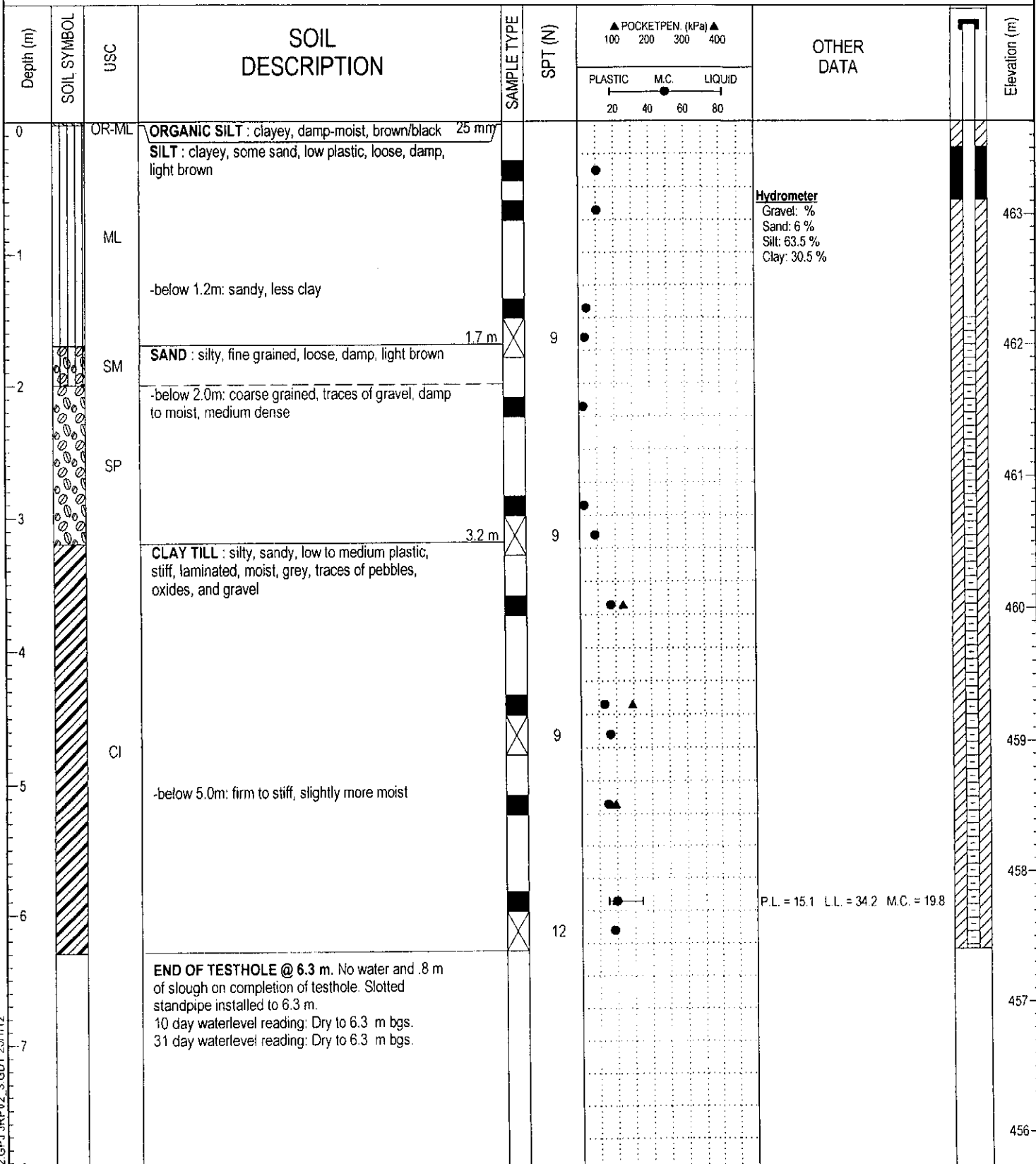
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REVIEWED BY: R Rau
Fig. No: 12

COMPLETION DEPTH: 6.30 m
COMPLETION DATE: 13/10/11
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PROJECT: Proposed Acreage Subdivision		PROJECT NO: PR4684-2	BOREHOLE NO: 11-12
CLIENT: Southside Professional Healthcare Centre Ltd.		DRILL METHOD: Solid Stem Auger	ELEVATION: 463.71 m
OWNER:		LOCATION: SW1 & SE2-92-23-5, Northeast of Manning, County of Northern Lights, Alberta	
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	<input type="checkbox"/> GRAB SAMPLE	<input type="checkbox"/> NO RECOVERY	
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE	<input type="checkbox"/> PEA GRAVEL	<input type="checkbox"/> SLOUGH
	<input type="checkbox"/> GROUT	<input checked="" type="checkbox"/> DRILL CUTTINGS	<input type="checkbox"/> SAND



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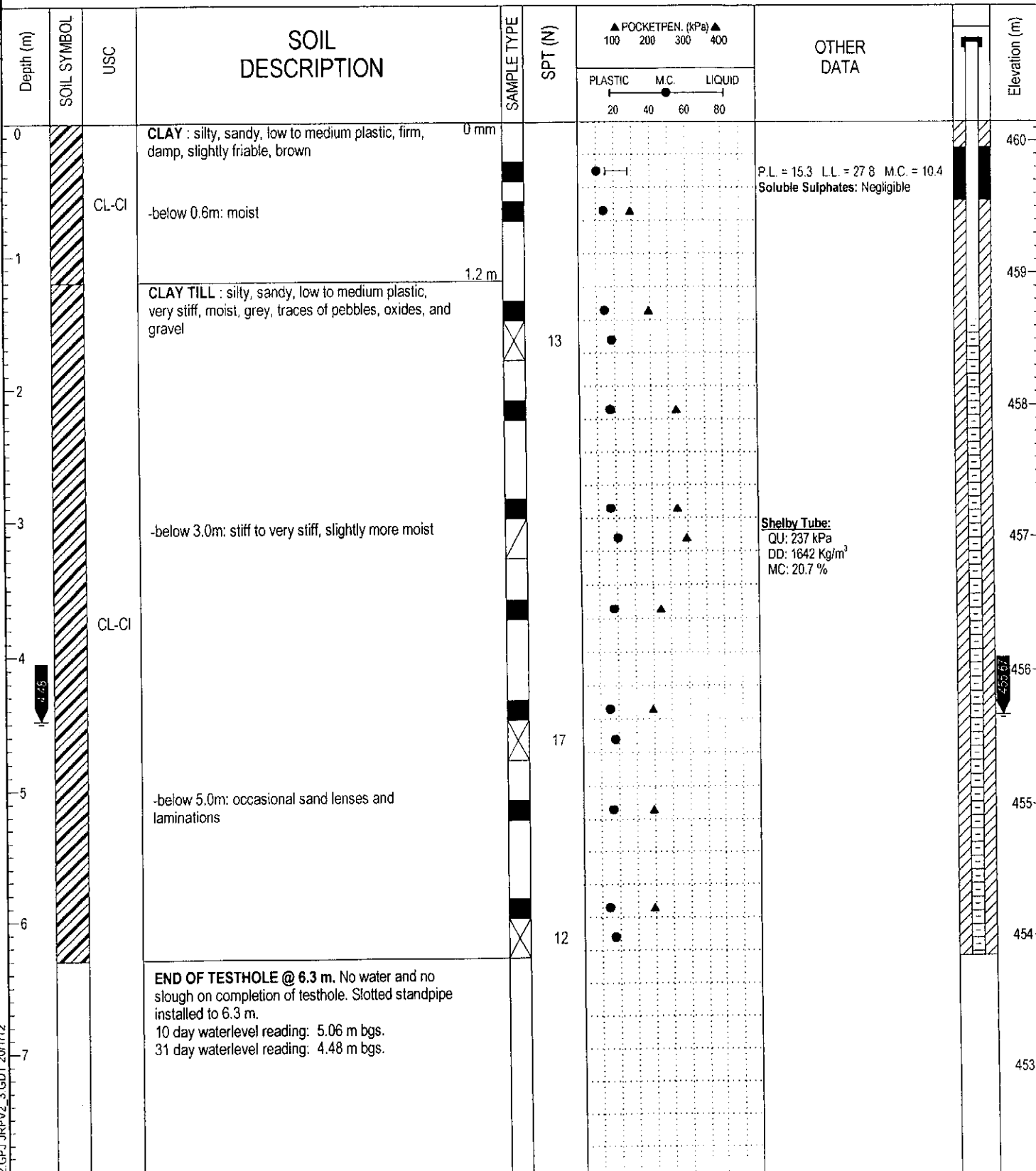
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 Fig. No: 13

COMPLETION DEPTH: 6.30 m
 COMPLETION DATE: 14/10/11
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PROJECT: Proposed Acreage Subdivision		PROJECT NO: PR4684-2	BOREHOLE NO: 11-13
CLIENT: Southside Professional Healthcare Centre Ltd.		DRILL METHOD: Solid Stem Auger	ELEVATION: 460.15 m
OWNER:		LOCATION: SW1 & SE2-92-23-5, Northeast of Manning, County of Northern Lights, Alberta	
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BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE	<input type="checkbox"/> PEA GRAVEL	<input type="checkbox"/> SLOUGH
		<input type="checkbox"/> GRAB SAMPLE	<input type="checkbox"/> NO RECOVERY
		<input type="checkbox"/> GROUT	<input type="checkbox"/> DRILL CUTTINGS
			<input type="checkbox"/> SAND



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Fig. No: 14

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COMPLETION DATE: 14/10/11
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