Yellowhead County

Bylaw No. 20.09

BEING A BY-LAW TO ADOPT AN AREA STRUCTURE PLAN

WHEREAS, the Municipal Government Act, R.S.A., 2000, and amendments thereto, authorize a Council to adopt an area structure plan for the purpose of providing a framework for subsequent subdivision and development of an area of land;

AND WHEREAS, a public hearing was held in respect to the proposed area structure plan on the date written below;

NOW THEREFORE, the Council for Yellowhead County, in the Province of Alberta, duly assembled, hereby enacts as follows:

1) That the document entitled "Edson North Estates Area Structure Plan", dated July, 2009, part SW 36-53-17-W5M, attached hereto as Schedule "A" is hereby adopted as an Area Structure Plan.

2) This bylaw comes into force at the beginning of the day that it is passed in accordance with Section 189 of the Municipal Government Act, R.S.A., 2000.

READ a first time this 28 Day of JULY A.D., 2009.

PUBLIC HEARING held this 25 Day of AUGUST A.D., 2009.

READ a second time this 27 Day of JULY A.D., 2009~~.~~10

READ a third time this 27 Day of JULY A.D., 2009~~.~~10

SIGNED this 27 Day of JULY A.D., 2009~~.~~10

Mayor Gerald Soroka

Chief Administrative Officer, Jack Ramme

Edson North Estates

(Pt. SW 36-53-17-W5M)

- Proposed Land Use Bylaw Amendment
- Proposed Subdivision
- Area Structure Plan/Supporting Documentation
- Assessment of Site Suitability (Genivar)
- Groundwater Potential Study (Waterline Resources Inc.)

Prepared for:

Marc Chamberland

Prepared/Compiled by:

G.T. Hofmann & Associates

Submitted to:

Yellowhead County

July 2010

TABLE OF CONTENTS

1) INTRODUCTION

The following is submitted in support of two applications. The first is an application to amend the Yellowhead County Land Use Bylaw No. 2.06 to redistrict 13.22 ha. ± in the south east portion of SW 36-53-17-W5M from RD - Rural District to CR - Country Residential District. The other four existing titled areas (ie: the remainder of the subject quarter section) will remain within the RD District. The second is a corresponding application to create a 10-lot country residential subdivision to be known as "Edson North Estates". Following are Figure 1 - Regional Setting/Location Map, Figure 2 - Proposed Land Use Bylaw Amendment and Figure 3 - Concept Plan/Proposed Subdivision (following Page 3).

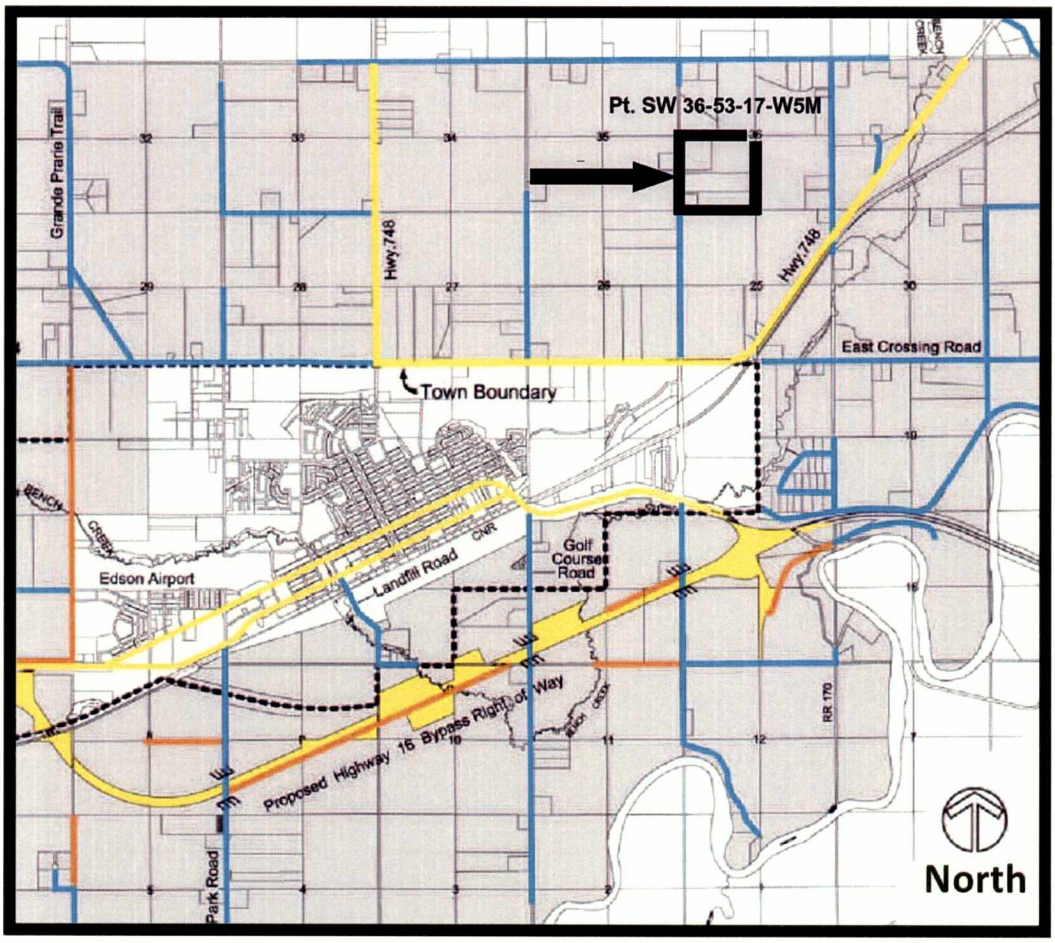
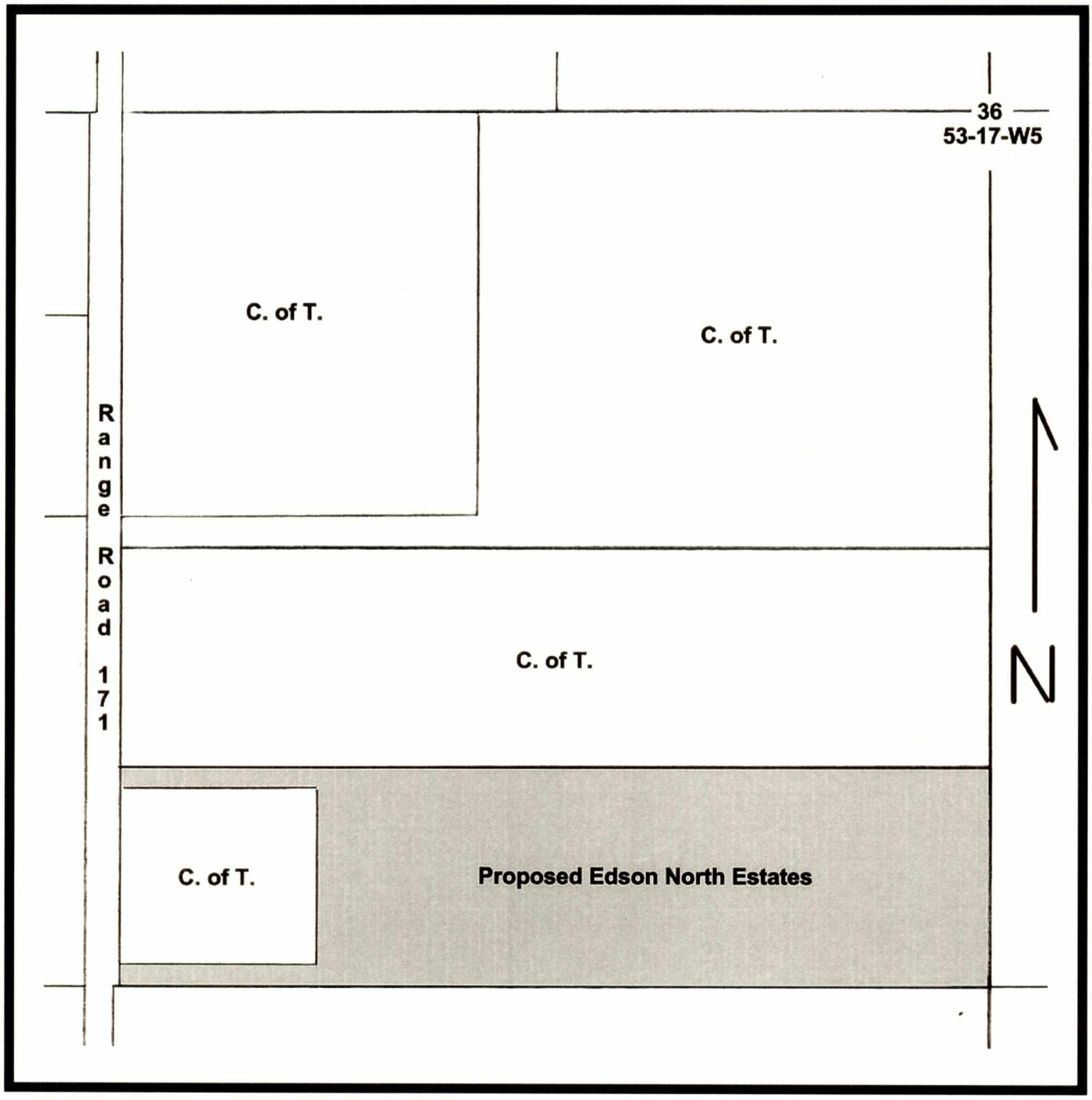


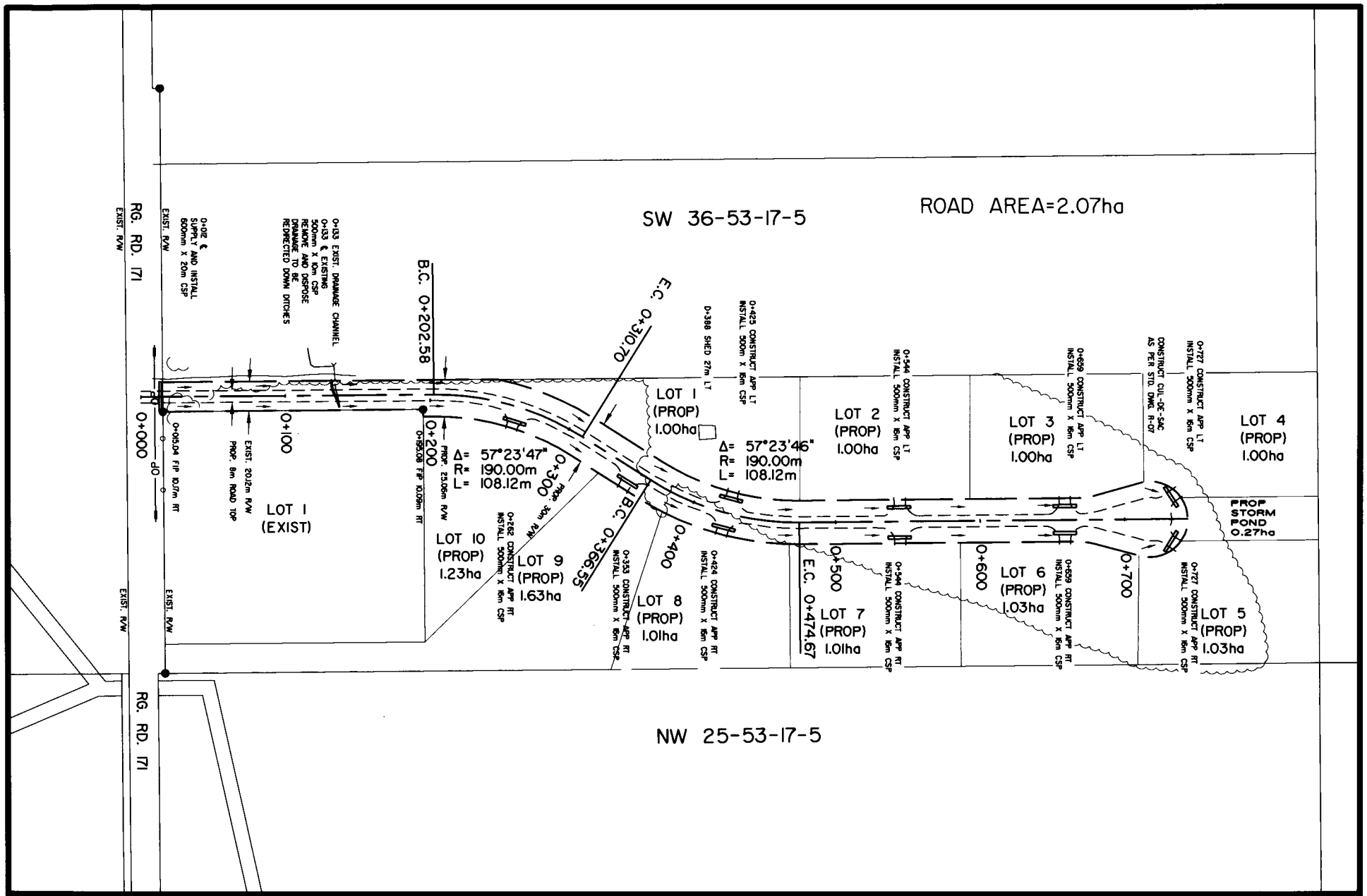
FIGURE 1 - REGIONAL SETTING/LOCATION MAP



Redistrict area indicated (13.22 ha. ±) **from: RD – Rural District**
to: CR – Country Residential District

FIGURE 2 – PROPOSED LAND USE BYLAW AMENDMENT

AIR PHOTO OF SUBJECT PROPERTY



No.	DATE	REVISION	BY	APP

CHAMBERLAND SUBDIVISION
ACCESS ROAD
SITE PLAN

GENIVAR

Designed	
Drawn	JJ
Checked	DL
Approved	
Date	JULY 2010
Project No.	4208145
Contract No.	
Scale	N.T.S
DWG. No.	4208145-04
Revision	0

N:\PROJECT\Projects\CHAMBER\4208145.dwg - 04 - Jul. 22, 2010 5:20pm - jesse.johnston

2) SETTING AND ADJACENT LAND USES

Edson North Estates, containing approximately 13.22 ha ±, is located in a predominantly forested area approximately 1.6 kms along Range Road 171 north of the northern boundary of the Town of Edson - see Regional Context/Location Map. The subject land contains a dwelling and a vehicle garage both of which are accessed via an "access panhandle" running along the southern boundary of the property. Approximately half of the subject land has been cleared, the remainder is heavily treed.

The western 450 m ± of the subject land slopes gently downward from west to east while the slope increases, again, downward from west to east, for most easterly 175 m ±. The highest elevation (at the west end) is approx. 914 m with the lowest elevation of 904 m being at the eastern boundary. The slopes being described, which range from approx. 1.25% at the west end to 2.5% at the eastern end, will neither preclude development of dwellings or the construction of an internal public road.

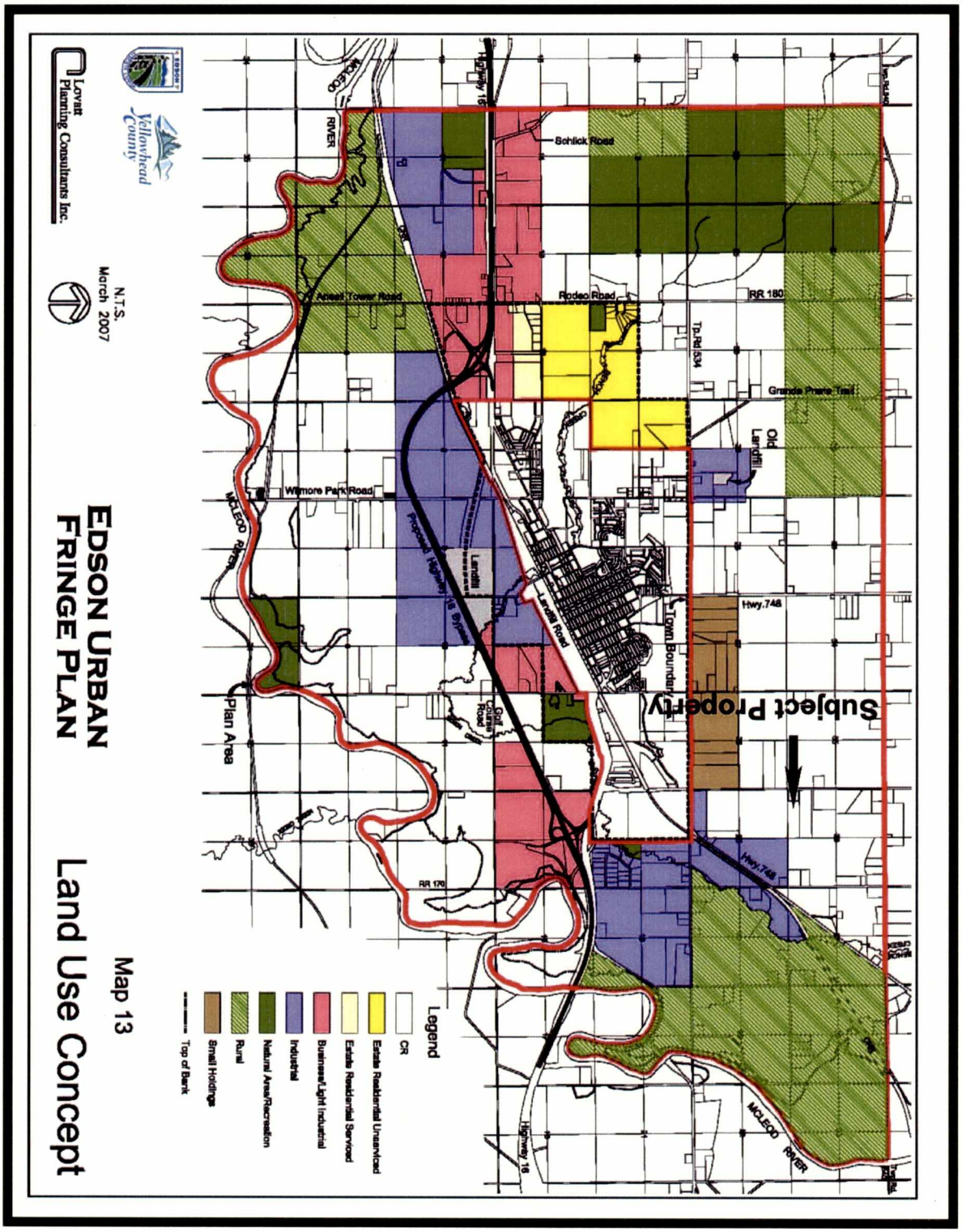
The quarter section (SW 36-53-17-W5M) consists of four other titled areas of various sizes, all of which are developed with residences and related improvements. It was determined in 1998, when the 2.88 ha. residential parcel was subdivided adjacent to Range Road 171, that no environmental reserve would be taken. Deferred Reserve Caveat 982 313 864 in the amount of 1.322 ha. is registered against the existing title.

3) LAND USE POLICY/BYLAW CONTEXT

The subject land is currently within the RD - Rural District of the Land Use Bylaw which does not allow for the proposed number of parcels. Thus, approval of Edson North Estates requires redistricting from the RD - District to the CR - Country Residential District.

It is very important to note that there is support for this proposal in the Edson Urban Fringe Intermunicipal Development Plan (IDP). The subject land is within an area considered suitable for CR development - see Map 13 of the IDP on Page 6.

The CR - District requires a minimum parcel size of 1.0 hectare (~2.5 acres) and does not specify a maximum parcel size. All of the proposed lots are at least 1.0 hectare, each with a developable area of at least 0.4 ha. in accordance with County policy and Alberta Environment's Guidelines. This component is discussed further under Section 5 below, particularly with respect to sewage treatment and availability of potable water. Reference is made to a Site Suitability Report prepared by Genivar as well as a Groundwater Potential Study conducted by Waterline Resources Inc.


Edson Urban Fringe Plan
Land Use Concept
Map 13
N.T.S.
March 2007
Lovatt Planning Consultants Inc.
Yellowhead County
Subject Property
Plan Area
Schlick Road
Rodeo Road
Grande Prairie Trail
Old Landfill
Wilmore Park Road
Landfill Road
Golf Course Road
Hwy.748
Town Boundary
RR 180
RR 170
Twp.Rd.534
McLEOD RIVER
Highway 16
Legend
CR
Estate Residential Unserviced
Estate Residential Serviced
Business/Light Industrial
Industrial
Natural Area/Recreation
Rural
Small Holdings
Top of Bank

4) LAND USE, SUBDIVISION DESIGN, DEVELOPMENT STANDARDS AND DENSITY

The LUB amendment and the proposed subdivision are intended to provide a supply of residential lots in a quiet and secluded residential setting within a very short distance of Edson. The subdivision has been designed to take full advantage of the terrain and existing vegetation to provide as much spacing as possible between building sites in keeping with the intended nature/character of the subdivision.

Proposed Lots 1 through 7 as well as proposed Lot 10 would be undeveloped. Proposed Lot 9 is to contain the existing dwelling while proposed Lot 8 is to contain the existing vehicle garage. The owner/developer intends to build a new home on one of the proposed lots and it is expected that a market exists for the other 9 proposed lots being proposed.

All proposed lots will be serviced with an internal subdivision road (approximately 700 m in length) that will intersect with Range Road 171 immediately north of the residential lot created in 1998. The internal road, which forms a cul-de-sac at the eastern terminus, will be built to the standards and satisfaction of Yellowhead County. The internal road needs to consist of a 20 m ROW for the length of the residential parcel created in 1998 since this was the width of land provided for potential future internal road access when this titled area was created in 1998. Beyond the east boundary of the parcel created in 1998, the internal road will consist of a 30 m ROW. All approaches will be located to provide good sight lines and safe egress from/access to the internal subdivision road. Wherever possible, approaches will be immediately across from one another to ensure proper access management.

Although the dwelling and garage within the existing property access Range Road 171 via a private driveway south of the residential parcel created in 1998, it is understood that this existing approach will be closed off. As Figure 3 indicates, proposed Lot 9 will be accessed via the internal road and this former "access panhandle" will instead be used to service the proposed subdivision with power, gas and phone services. A URW for these services will be registered against proposed Lots 9 and 10 until they reach the 30 m ROW internal road, at which point these services will be within a URW inside the 30 m ROW as is customary. Using the 20 m available south of the parcel created in 1998 for utility servicing in this manner will facilitate the construction of public road only (ie: no utility services to install) within the 20 m available north of the parcel created in 1998.

Regarding the need for adequate water supply for fire suppression, it is understood that there are hydrants located in close enough proximity to the proposed subdivision to satisfy Section 5.1.15 of the Edson Urban Fringe IDP. Also, the owner/developer is prepared to impose fundamental FireSmart principles as they pertain to the development of the individual lots. A sample FireSmart Restrictive Covenant is attached to this document as Appendix 4 which includes the most important elements of FireSmart site development ranging from requiring the use of metal roofing or fire-rated shingles and clearing of understory debris/fuel to prohibiting the use of wood latticing and the storage of firewood and other flammable materials under decks.

There appear to be no sour gas wells or pipelines within the titled area. Circulation of these applications and supporting material to the EUB will reveal if any sour gas or high pressure sweet gas facilities are present within adjacent lands that will have to be accounted for in the design and/or approval of the subdivision.

It is estimated that the proposal will result in a population density of approximately 2.0 persons per gross hectare (ie: assuming 2.5 persons per lot X 10 lots = 25 persons divided by the subdivision area of 13.22 ha.). Even assuming a household size of three persons, the subdivision would only result in ~2.0 persons per gross hectare.

5) SERVICES

The Site Suitability Report conducted by Genivar is presented in Appendix 1. The Genivar Report points out that where amenable sub-surface conditions do not exist for septic fields (e.g. where clay soils exist that provide poor soil percolation/permeability, which exists in the case of almost every test hole examined), the sites can either be altered in order to make the siting of septic fields possible (e.g. by raising ground elevation such that the required 2.4 m to near-surface table is maintained) or alternative methods such as treatment mounds can be can be utilized. The Genivar Report clearly indicates that the use of a treatment mounds are possible in this subdivision.

Treatment mounds are not only an acceptable method of on-site sewage treatment in Alberta, it is a method widely and successfully used in the Province. It appears advisable that all proposed lots use treatment mounds in this proposed subdivision. Thus, each lot proposed is sized and configured such that a treatment mound could be utilized in accordance with the design, construction and siting standards established for such facilities by the Alberta Private Sewage Systems Standard of Practice.

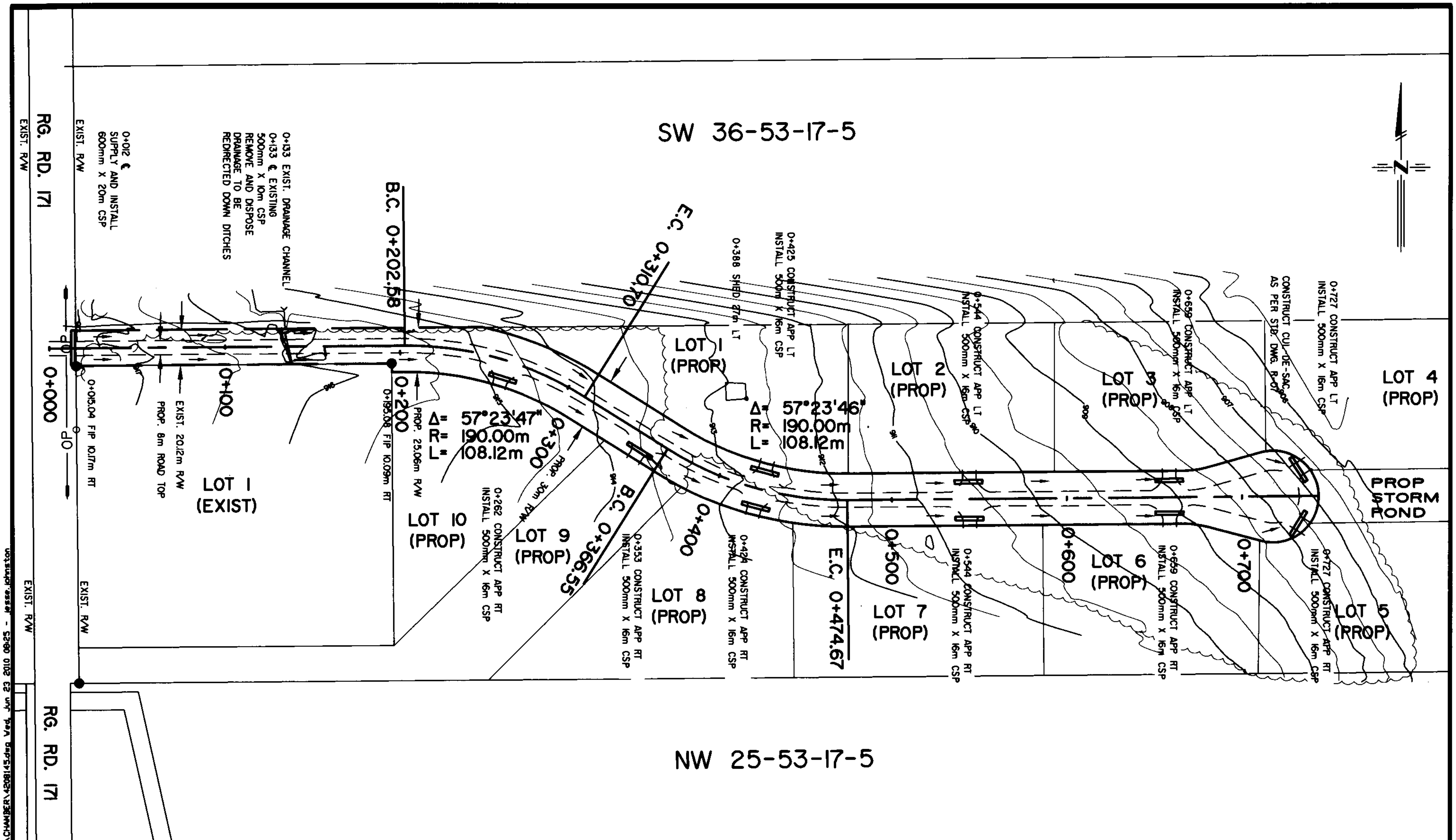
Given the advisability of using treatment mounds due to the clay conditions present on the property, the near-surface water table conditions present are more important in relation to the construction of basements. On this note, the Genivar report shows that test holes on all lots other than proposed Lot 4 were either dry or near-surface water table was well below the recommended 2.4 m. The test hole within proposed Lot 5 indicated a depth to near-surface water table of 2.3 m, which is 0.1 m (just 10 cm) shy of the recommended 2.4 m. This value is so close to falling within the recommended range that very minimal site remediation (ie: raising the dwelling grade elevation by a barely noticeable 10 cm) would make this proposed lot suitable for basement construction.

The test hole in proposed Lot 4 indicated a depth to near-surface water table of 1.43 m (this figure is the averaged value over three test periods), which is approximately 1.0 m short of the recommended depth. However, a storm pond needs to be created at the terminus of the cul-de-sac and the fill available from this excavation will be used to raise the level of the building site within Proposed Lot 4 a sufficient distance to provide the required minimum depth to near-surface water table of 2.4 m. The County can be assured via this Plan and ensure via subdivision approval conditions that the site remediation in Proposed Lot 4 just described is undertaken prior to development. It is therefore reasonable to say that basements can be constructed on all 10 proposed lots in accordance with County policy.

In terms of potable groundwater, the Groundwater Potential Study prepared by Waterline Resources Inc. (see Appendix 2) concludes that underlying aquifers will meet the potable groundwater diversion required for the subdivision (based on 10 lots) in accordance with the Water Act.

It should also be noted that the relatively large parcels will provide for maximum on-lot stormwater absorption/drainage. Moreover, the lay of the land is such that whatever overland storm water flow there would be could be easily channelled from west to east using the internal roadway. The internal cul-de-sac has indeed been designed by Genivar such that stormwater will be directed to the proposed storm pond at the terminus of the cul-de-sac at the eastern/lowest end of the property (see Figure 3 with contours following this Page).

It is understood that the owner/developer will be responsible for all utilities including electric power, natural gas, telephone, etc.



N:\PROJECT\Projects\CHAMBER\4208145.dwg Wed, Jun 23 2010 08:25 - jesse.johnston

No.	DATE	REVISION	BY	APP	Permit	Engineers Stamp

GENIVAR

Project	Drawing	Designed	Scale	Date
CHAMBERLAND ACCESS ROAD	PLAN VIEW SHOWING CONTOURS	JJ	1:2000	JUNE 2010
		Drawn: JJ	Project No.: 4208145	Contract No.
		Checked: DL	Drawing No.: 4208145-02	Revision: 0
		Approved		

6) MUNICIPAL/SCHOOL AUTHORITY IMPACT

Yellowhead County will be in the position of being able to acquire a tax base (as compared to the existing, limited use) at comparatively little cost. Because of on-site servicing, the County would not be responsible for the maintenance of any municipal services.

In terms of municipal reserve (MR), as mentioned previously, Deferred Reserve Caveat (DRC) 982 313 864 in the amount of 1.322 ha is registered against the existing title. Cash-in-lieu for all MR owing is proposed to be paid to the County as a condition of subdivision approval. The issue of environmental reserve (ER) was decided at previous subdivision. Thus, no ER is proposed here. As a result, the County will also have no responsibility for environmental reserve or municipal reserve land.

Of course the County will become responsible for maintenance of the internal road, providing emergency services to the residents, and so forth. However, the low density of the subdivision itself should have little impact on the internal road. In addition, the County already incurs the costs of maintaining the existing roads in the area and this subdivision will provide 10 additional lots (ultimately) contributing to the tax base for maintenance and service provision.

In terms of impact on schools in the area, again, it is difficult to precisely determine the number of school-aged children resulting from this subdivision. In light of this, it is estimated there will be a maximum of 10 school-aged children (assuming an average one school-aged child per household). The effect on the school systems in the area is arguably negligible. In fact, the school bus service already provided to the existing residents in the area could be made more economic by increasing the number of children in the area.

7) CONCLUSION

The foregoing, in our opinion, provides sufficient information with which to evaluate and decide upon the LUB amendment and proposed subdivision, which are entirely consistent with IDP Policy. It also our position that it fully satisfies the need to undertake advance planning in support of the redistricting and subdivision applications.

In conclusion, we ask that the Council of Yellowhead County find this Area Structure Plan and supporting documentation acceptable and proceed with the approvals we seek.

Respectfully submitted,

Greg Hofmann, M.A., ACP MCIP
Principal Consultant

APPENDIX 1) Assessment of Site Suitability for Establishment of Effluent Disposal Fields Prepared by Genivar
{Note: Full Report Attached}

GENIVAR

September 16, 2009 GENIVAR File: 4208145-2

Marc Chamberland
Box 6356
Edson, AB. T7E 1T8

Attention: Mr. Marc Chamberland

Re: Assessment of Site Suitability for Establishment of Effluent Disposal Fields for the proposed Sub-Division within SW-36-53-17-W5

GENIVAR was retained by Mr. Marc Chamberland to assess the subject property with respect to its suitability for establishment of septic fields for wastewater disposal from residential dwellings. The subject site was identified as **SW-36-53-17-W5**, lots 1-10. The location and configuration of the proposed development is shown on the site sketch, contained in Appendix A.

In general, this review involved the following procedures:

- The observation holes were established at the hydrometer test location in order to estimate the separation to the water table.
- Measure and monitor existing water table elevations at the proposed lot within the subdivision.
- Samples of soil were taken at the observation hole to perform hydrometer tests to determine the analysis of the soil.

GENIVAR personnel conducted all tests and site measurements.

This review has been carried out based upon the *Alberta Private Sewage Systems Standard of Practice*, January 1999. The review did not extend to an assessment of the environmental suitability of the site.

Water Table

With respect to the water table, the Standards of Practice requires that a subsurface effluent disposal system, or other systems that use the absorption of effluent into the soil for treatment and disposal, shall maintain a minimum vertical separation of 1.5 m between the lowest points where the effluent infiltrates into the soil. Since the effluent outlet will be placed approximately 0.9 m below the ground surface, this means the depth to the water table below the ground surface should be approximately 2.4 m.

Water table observation holes were established in November 2008 (See Appendix A, Site Sketch). The holes were drilled to a depth of approximately 3.5 m. The approximate observation hole location is shown on the site drawing in Appendix A.

A summary of results is provided in Table 1 below. Numbers have been rounded. The measurements of the water table observation hole can be found in Table 1.

7710 Edgar Industrial Court, Red Deer, Alberta, Canada T4P 4E2
Telephone: 403-342-7650 - Fax: 403-342-7691 - www.genivar.com

Table 1 – Water Observation Hole Results

Water Table Observation Hole Number	Reading Number	Date of Initial Measurement	Water Depth Below Surface (m)	Total Hole Depth (m)
Hole 1	1	November 6, 2008	Dry	3.83 m
Hole 1	2	November 21, 2008	Dry	
Hole 1	3	November 28, 2008	Dry	
Water Table Observation Hole Number	**Reading Number**	**Date of Initial Measurement**	**Water Depth Below Surface (m)**	**Total Hole Depth (m)**
Hole 2	1	November 6, 2008	Dry	3.52 m
Hole 2	2	November 21, 2008	Dry	
Hole 2	3	November 28, 2008	Dry	
Water Table Observation Hole Number	**Reading Number**	**Date of Initial Measurement**	**Water Depth Below Surface (m)**	**Total Hole Depth (m)**
Hole 3	1	November 6, 2008	3.52 m	3.66 m
Hole 3	2	November 21, 2008	3.60 m	
Hole 3	3	November 28, 2008	Dry	
Water Table Observation Hole Number	**Reading Number**	**Date of Initial Measurement**	**Water Depth Below Surface (m)**	**Total Hole Depth (m)**
Hole 4	1	November 6, 2008	1.70 m	3.83 m
Hole 4	2	November 21, 2008	1.21m	
Hole 4	3	November 28, 2008	1.37 m	

Water Table Observation Hole Number	Reading Number	Date of Initial Measurement	Water Depth Below Surface (m)	Total Hole Depth (m)
Hole 5	1	November 6, 2008	2.30 m	3.83 m
Hole 5	2	November 21, 2008	2.30m	
Hole 5	3	November 28, 2008	2.30 m	
Water Table Observation Hole Number	**Reading Number**	**Date of Initial Measurement**	**Water Depth Below Surface (m)**	**Total Hole Depth (m)**
Hole 6	1	November 6, 2008	Dry	4.14 m
Hole 6	2	November 21, 2008	Dry	
Hole 6	3	November 28, 2008	Dry	
Water Table Observation Hole Number	**Reading Number**	**Date of Initial Measurement**	**Water Depth Below Surface (m)**	**Total Hole Depth (m)**
Hole 7	1	November 6, 2008	Dry	3.83 m
Hole 7	2	November 21, 2008	Dry	
Hole 7	3	November 28, 2008	Dry	
Water Table Observation Hole Number	**Reading Number**	**Date of Initial Measurement**	**Water Depth Below Surface (m)**	**Total Hole Depth (m)**
Hole 8	1	November 6, 2008	Dry	4.14 m
Hole 8	2	November 21, 2008	Dry	
Hole 8	3	November 28, 2008	Dry	

Water Table Observation Hole Number	Reading Number	Date of Initial Measurement	Water Depth Below Surface (m)	Total Hole Depth (m)
Hole 10	1	November 6, 2008	Dry	4.14 m
Hole 10	2	November 21, 2008	Dry	
Hole 10	3	November 28, 2008	Dry	

Soil Analysis

Hydrometer tests were conducted to obtain the particle or grain size analysis to establish a soil texture classification (See Appendix B) of the existing soil. A soil grain size analysis is used to determine a soil texture classification that can be related to the hydraulic conductivity of the soil or the rate that the soil will accept water.

The test results showed a combination of clay and clay loam. Clay soil is not suitable without further testing, such as a percolation test, (the clay loam is suitable, but has a limited effluent loading rate). Soil structure and determining the absence of expandable clays may indicate the soil can accommodate a disposal field.

Table 2- Lot suitability results

Location	Soil Type	Suitability
Lot 1 Hole1	**Heavy Clay**	**Not suitable without further testing**
Lot 1 Hole 2	**Heavy Clay**	**Not suitable without further testing**
Lot 2 Hole 1	**Heavy Clay**	**Not suitable without further testing**
Lot 2 Hole 2	**Heavy Clay**	**Not suitable without further testing**

Lot 3 Hole 1	**Heavy Clay**	**Not suitable without further testing**
Lot 3 Hole 2	**Heavy Clay**	**Not suitable without further testing**
Lot 4 Hole 1	**Clay Loam**	**Suitable depending on water table depth and has limited effluent loading**
Lot 4 Hole 2	**Clay**	**Not suitable without further testing**
Lot 5 Hole 1	**Heavy Clay**	**Not suitable without further testing**
Lot 5 Hole 2	**Heavy Clay**	**Not suitable without further testing**
Lot 6 Hole 1	**Heavy Clay**	**Not suitable without further testing**
Lot 6 Hole 2	**Heavy Clay**	**Not suitable without further testing**
Lot 7 Hole 1	**Heavy Clay**	**Not suitable without further testing**
Lot 7 Hole 2	**Heavy Clay**	**Not suitable without further testing**
Lot 8 Hole 1	**Heavy Clay**	**Not suitable without further testing**
Lot 8 Hole 2	**Heavy Clay**	**Not suitable without further testing**
Lot 10 Hole 1	**Heavy Clay**	**Not suitable without further testing**
Lot 10 Hole 2	**Heavy Clay**	**Not suitable without further testing**

Additional Considerations

It may be possible to dispose of effluent by creating a sufficient layer of suitable material between the disposal point and the water table, and disposing of the water

through both downward movement and evaporation. This is usually done through the construction of mounds. A mound is a seepage bed elevated by clean fill. A sketch of a typical system is attached. The sand cap helps avoid undue soil compaction so that pore spaces within the underlying layers are maintained. A covering of 150 mm of topsoil and vegetation helps draw moisture up for disposal by evaporation. The vertical separation between the bottom of the mound rock bed and the restricting soil layer should be 1.5 m. The location of a mound will depend upon the topography of the site. See Appendix C for Mound Details.

This information is very general. Any solution would have to be specific to the site and the proposed development, and be in full compliance with the Alberta Private Sewage Systems Standards of practice, January 1999.

The *Alberta Private Sewage Systems Standard of Practice* identifies a number of considerations with respect to placement of a disposal field. With respect to offset distance requirements, these include:

- 1.5 m from a property line,
- 90 m from a permanent body of water, such as a river, stream or creek,
- 15 m from a water source,
- 15 m from a water course,
- 9 m from a basement, cellar or crawl space,
- 1 m from a dwelling without a basement, cellar or crawl space.

Additional restrictions and details are contained in the standards. The scope of this review did not extend to confirming the suitability of lot layout or specific septic field / mound locations or percolation rates.

Conclusions and Recommendations

Based upon the review of site information, we have the following conclusions and recommendations:

- Initial water table observations indicate sufficient separation between the bottom of the field and the water table for all lots except for Lot 4 and 5.
- Soil conditions appear to be Clay, and Clay loam material.
- Most of the sites appear to be unsuitable with respect to establishment of standard effluent disposal fields due to the high content of clay in the soil. An alternate method such as the use of a mound should be examined, or additional testing completed (percolation test).

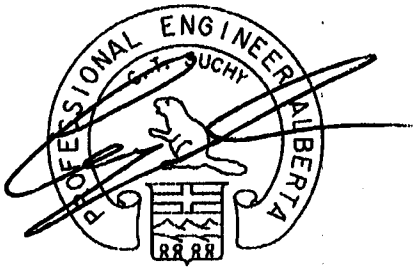
- The location of a disposal field or treatment facility could be limited by site features, such as proximity to watercourses, existing dwellings, slopes and similar issues.
- If the site is considered sensitive, alternate methods of sewage treatment and disposal should be investigated.
- Percolation tests were not performed instead hydrometer tests (Grain or Particle Size Analysis) were done to establish a percentage of sand, silt and clay particles in the soil sample to determine (using the soil classification chart) how coarse (sandy) or fine (clayey) the soil is, affects the ability of the soil to transmit air and water or effluent.
- All work, and subsequent measurements, should conform to the requirements of the *Alberta Private Sewage Systems Standard of Practice.*

Closure

This review is based upon the measurements and observations noted herein. Additional measurements may result in variations. This review does not represent a design of the disposal system nor does it negate the requirement for specific additional on-site tests at the proposed field locations.

This review has been prepared for the sole use of the Owner. Use of this information, in whole or in part, by third parties, or use by any persons or organizations whatsoever for any purposes other than those specifically stated herein, is not permitted without the express written permission of GENIVAR.

Prepared By:



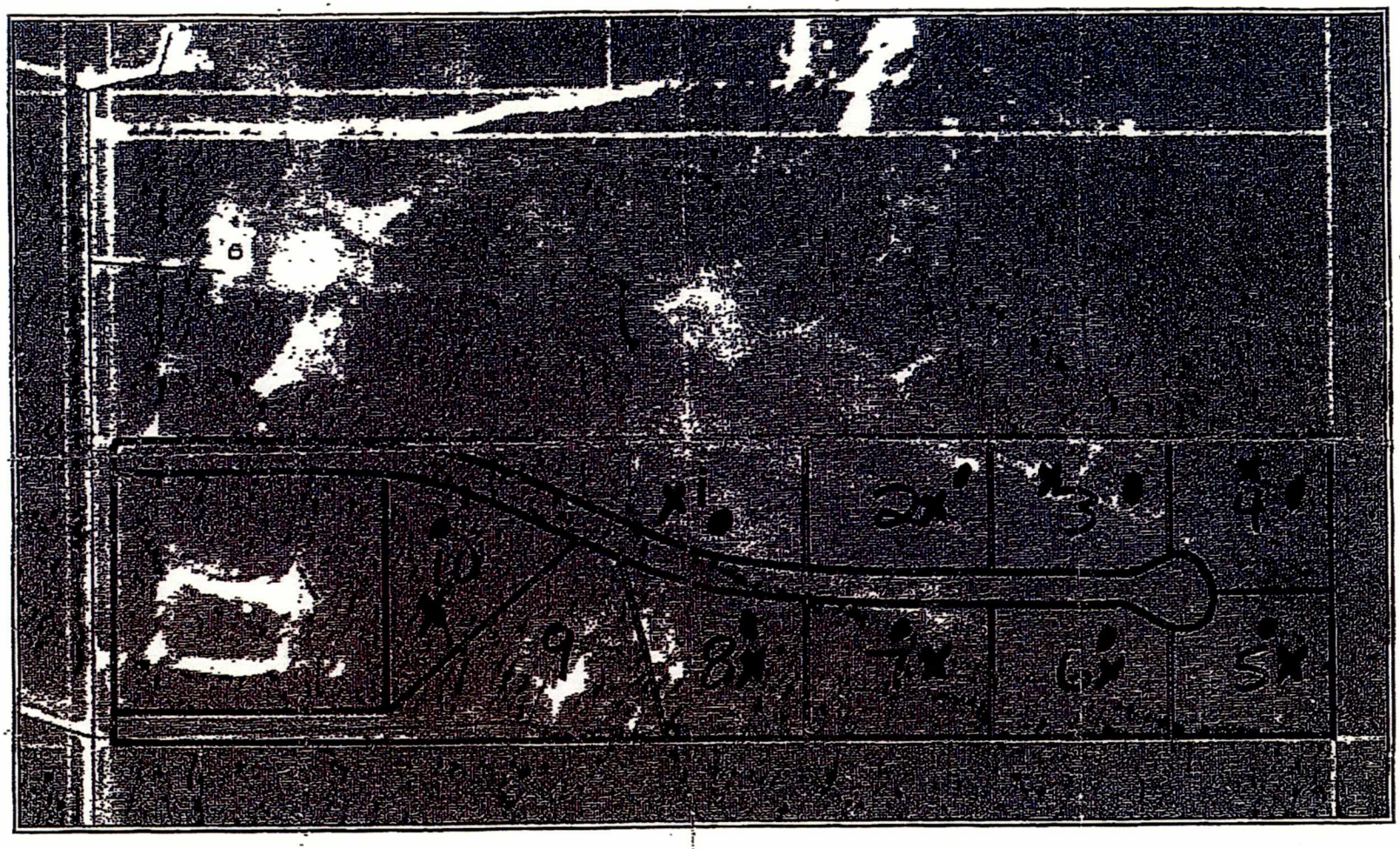
PERMIT TO PRACTICE
GENIVAR CONSULTANTS LIMITED PARTNERSHIP
PERMIT NUMBER: P07641
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

Craig Suchy, P.Eng.
Kate Mclean

GENIVAR

Attachments

APPENDIX A



Edson North Estates Tentative Layout – Air Photo Base

SW 36 - 53 - 17 - W5

X = HYDROMETER # 1 ; WELL LOCATION

● = HYDROMETER # 2

APPENDIX B

EXH Engineering Services Ltd.

PARTICLE SIZE DISTRIBUTION
HYDROMETER ANALYSIS
ASTM D422

General Information

CLIENT	Mark Chamberlin
SAMPLE LOCATION	Lot 10 Hole 2
DATE	November 12, 2008
LAB TECHNICIAN(S)	J. Read

Test Results

GRAVEL (>4.75mm)	%	0
SAND (0.074mm-4.75mm)	%	0
SILT (0.074mm-0.005mm)	%	29
CLAY(<0.005mm)	%	71

Raw Data

TOTAL SAMPLE WT.	(g)	658.9
WT. RETAINED > 4.75mm	(g)	0.0

Hydrometer Info

HYDROMETER TYPE		152 - H
COMPOSITE CORRECTION		7
SPECIFIC GRAVITY (Gs)	(kg/m^3)	2.75
AIR DRY WT. OF TEST SPECIMEN	(g)	50.0
k-FACTOR (from table)		0.01361
CORRECTED SAMPLE WT.	(g)	48.4

Moisture Content

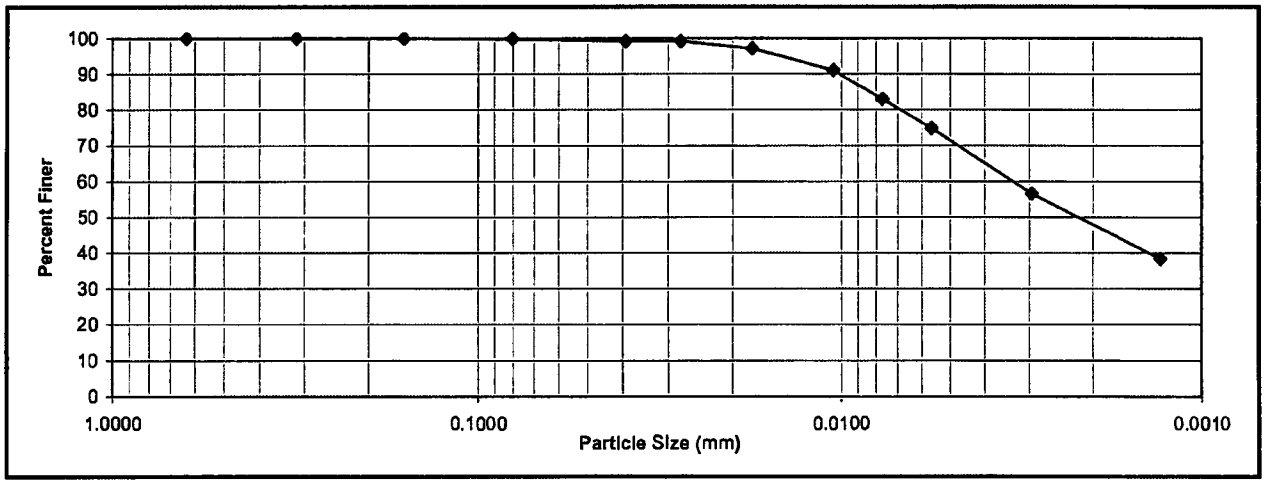
WT. OF PAN	(g)	8.1
WT. OF PAN + AIR DRIED SAMPLE	(g)	110.9
WT. OF PAN + OVEN DRIED SAMPLE	(g)	107.7
WT. OF WATER	(g)	3.2
WT. OF OVEN DRIED	(g)	99.6
HYGROSCOPIC MOISTURE CONTENT	(%)	3.21

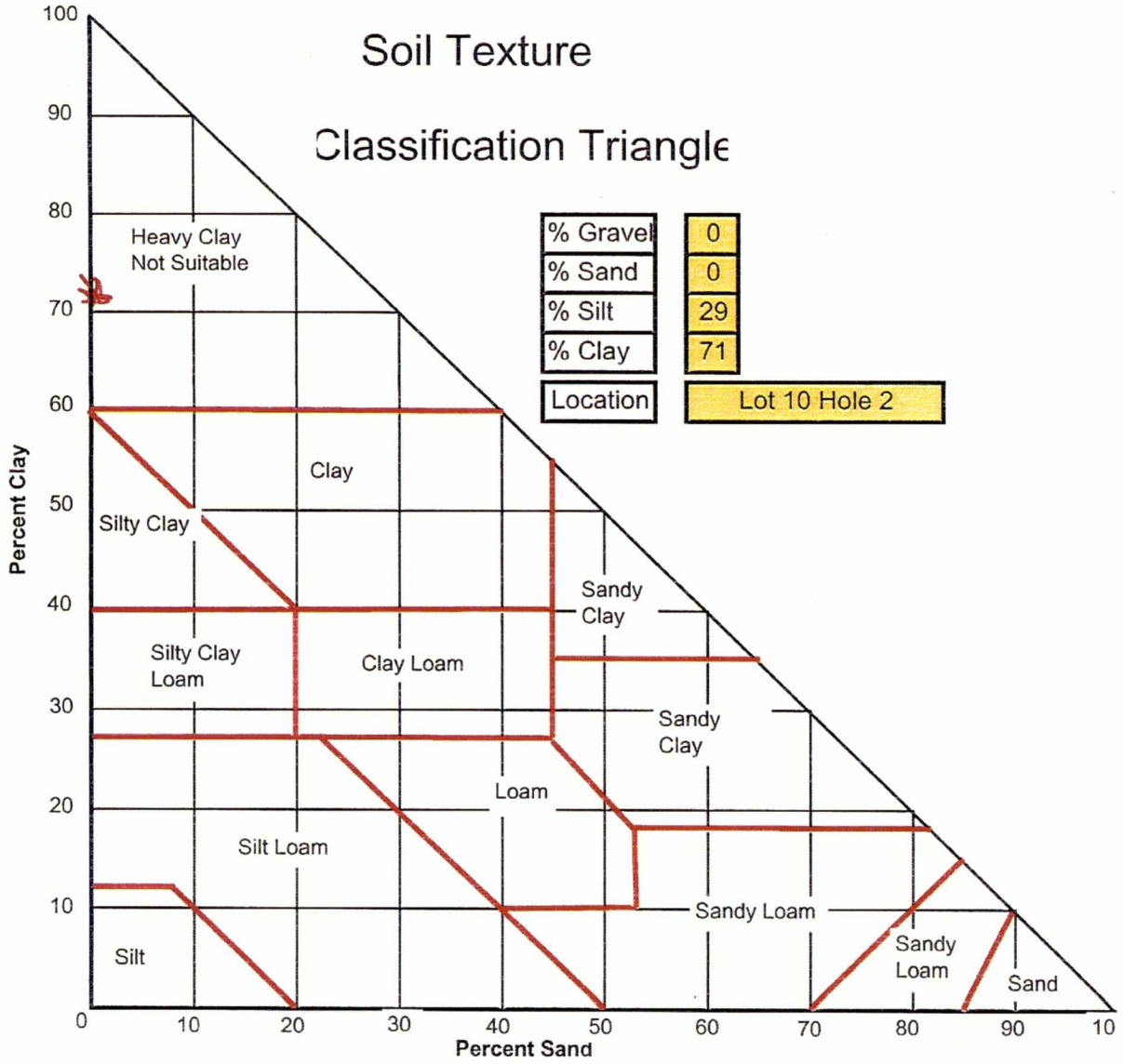
Sieve Analysis on Material from Hydrometer Test

SIEVE SIZE (µm)	WT. RETAINED (g)	WT. PASSING (g)	PERCENT FINER	D (mm)
1250	0.0	48.4	100.00	1.2500
630	0.0	48.4	100.00	0.6300
315	0.0	48.4	100.00	0.3150
160	0.0	48.4	100.00	0.1600
80	0.1	48.3	99.79	0.0800

Hydrometer Test

TIME (min)	HYDROMETER READING	ADJ. HYDROMETER READING	EFFECTIVE DEPTH, L (cm)	PERCENT FINER	D (mm)
1	56	49	8.3	99.13	0.0391
2	56	49	8.3	99.13	0.0276
5	55	48	8.4	97.10	0.0177
15	52	45	8.9	91.03	0.0105
30	48	41	9.6	82.94	0.0077
60	44	37	10.2	74.85	0.0056
250	35	28	11.7	56.64	0.0029
1440	N/A	n/a	13.2	38.44	0.0013




Soil Texture
Classification Triangle
% Gravel 0
% Sand 0
% Silt 29
% Clay 71
Location Lot 10 Hole 2
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Sandy
Loam
Sand
Silt
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

EXH Engineering Services Ltd.

PARTICLE SIZE DISTRIBUTION
HYDROMETER ANALYSIS
ASTM D422

General Information

CLIENT	Mark Chamberlin	GRAVEL (>4.75mm)	%	0
SAMPLE LOCATION	Lot 1 Hole 1	SAND (0.074mm-4.75mm)	%	1
DATE	November 10, 2008	SILT (0.074mm-0.005mm)	%	23
LAB TECHNICIAN(S)	J. Read	CLAY(<0.005mm)	%	76

Test Results

Raw Data

TOTAL SAMPLE WT.	(g)	998.4
WT. RETAINED > 4.75mm	(g)	0.3

Hydrometer Info

HYDROMETER TYPE		152 - H
COMPOSITE CORRECTION		7
SPECIFIC GRAVITY (Gs)	(kg/m^3)	2.75
AIR DRY WT. OF TEST SPECIMEN	(g)	50.0
k-FACTOR (from table)		0.01396
CORRECTED SAMPLE WT.	(g)	48.6

Moisture Content

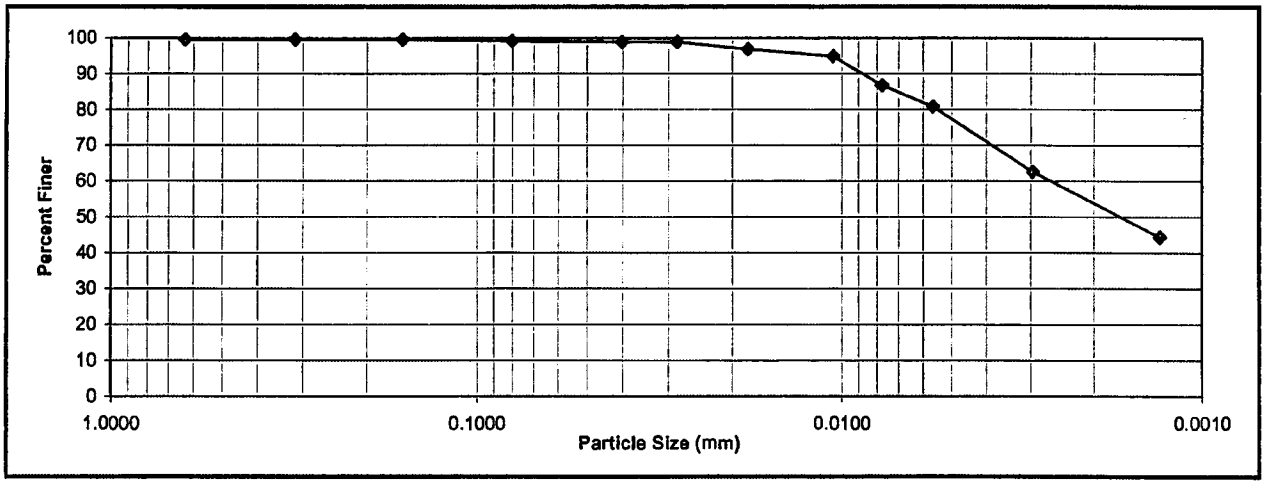
WT. OF PAN	(g)	7.8
WT. OF PAN + AIR DRIED SAMPLE	(g)	107.8
WT. OF PAN + OVEN DRIED SAMPLE	(g)	104.9
WT. OF WATER	(g)	2.9
WT. OF OVEN DRIED	(g)	97.1
HYGROSCOPIC MOISTURE CONTENT	(%)	2.99

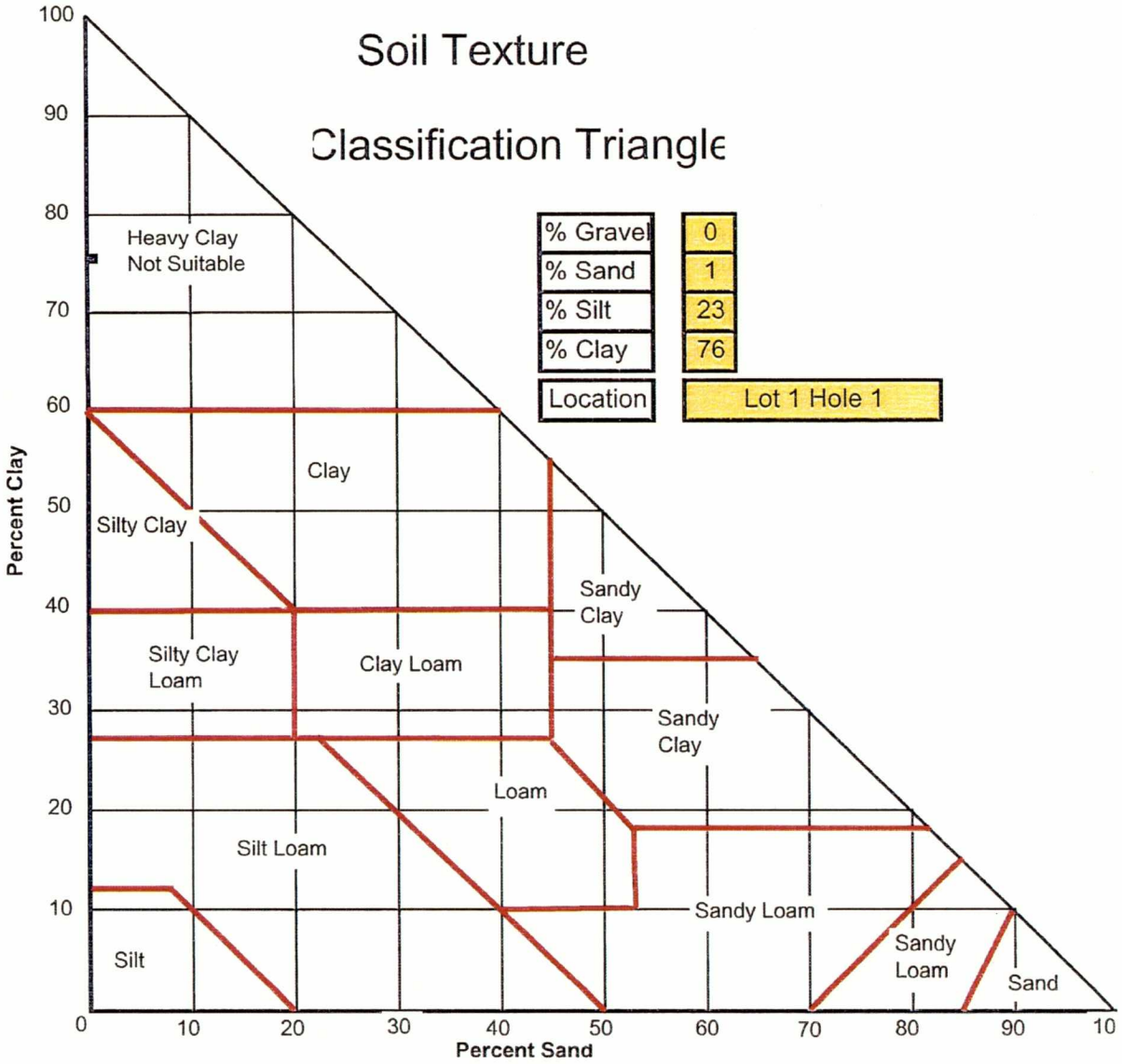
Sieve Analysis on Material from Hydrometer Test

SIEVE SIZE (µm)	WT. RETAINED (g)	WT. PASSING (g)	PERCENT FINER	D (mm)
1250	0.1	48.5	99.76	1.2500
630	0.1	48.4	99.56	0.6300
315	0.0	48.4	99.56	0.3150
160	0.0	48.4	99.56	0.1600
80	0.2	48.2	99.15	0.0800

Hydrometer Test

TIME (min)	HYDROMETER READING	ADJ. HYDROMETER READING	EFFECTIVE DEPTH, L (cm)	PERCENT FINER	D (mm)
1	56	49	8.3	98.88	0.0401
2	56	49	8.3	98.88	0.0284
5	55	48	8.4	96.86	0.0181
15	54	47	8.6	94.84	0.0106
30	50	43	9.2	86.77	0.0077
60	47	40	9.7	80.72	0.0056
250	38	31	11.2	62.56	0.0030
1440	N/A	n/a	12.7	44.39	0.0013




Soil Texture
Classification Triangle
% Gravel 0
% Sand 1
% Silt 23
% Clay 76
Location Lot 1 Hole 1
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Sandy
Loam
Sand
Silt
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

EXH Engineering Services Ltd.

PARTICLE SIZE DISTRIBUTION
HYDROMETER ANALYSIS
ASTM D422

General Information

CLIENT	Mark Chamberlin
SAMPLE LOCATION	Lot 1 Hole 2
DATE	November 4, 2008
LAB TECHNICIAN(S)	J. Read

Test Results

GRAVEL (>4.75mm)	%	0
SAND (0.074mm-4.75mm)	%	2
SILT (0.074mm-0.005mm)	%	25
CLAY(<0.005mm)	%	73

Raw Data

TOTAL SAMPLE WT.	(g)	778.3
WT. RETAINED > 4.75mm	(g)	0.0

Hydrometer Info

HYDROMETER TYPE		152 - H
COMPOSITE CORRECTION		7
SPECIFIC GRAVITY (Gs)	(kg/m^3)	2.75
AIR DRY WT. OF TEST SPECIMEN	(g)	50.0
k-FACTOR (from table)		0.01345
CORRECTED SAMPLE WT.	(g)	48.4

Moisture Content

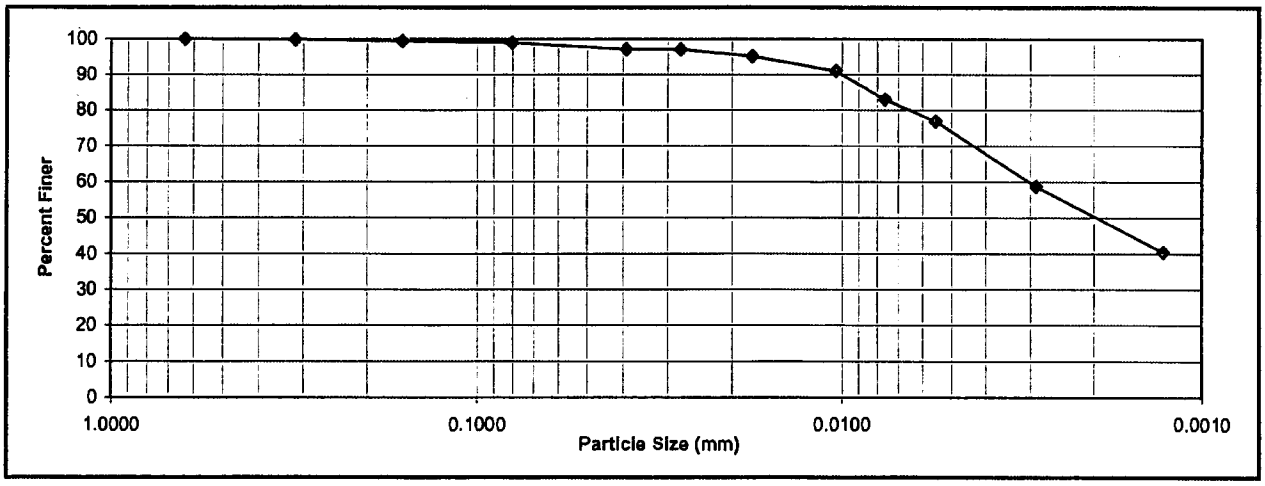
WT. OF PAN	(g)	8.5
WT. OF PAN + AIR DRIED SAMPLE	(g)	117.0
WT. OF PAN + OVEN DRIED SAMPLE	(g)	113.6
WT. OF WATER	(g)	3.4
WT. OF OVEN DRIED	(g)	105.1
HYGROSCOPIC MOISTURE CONTENT	(%)	3.24

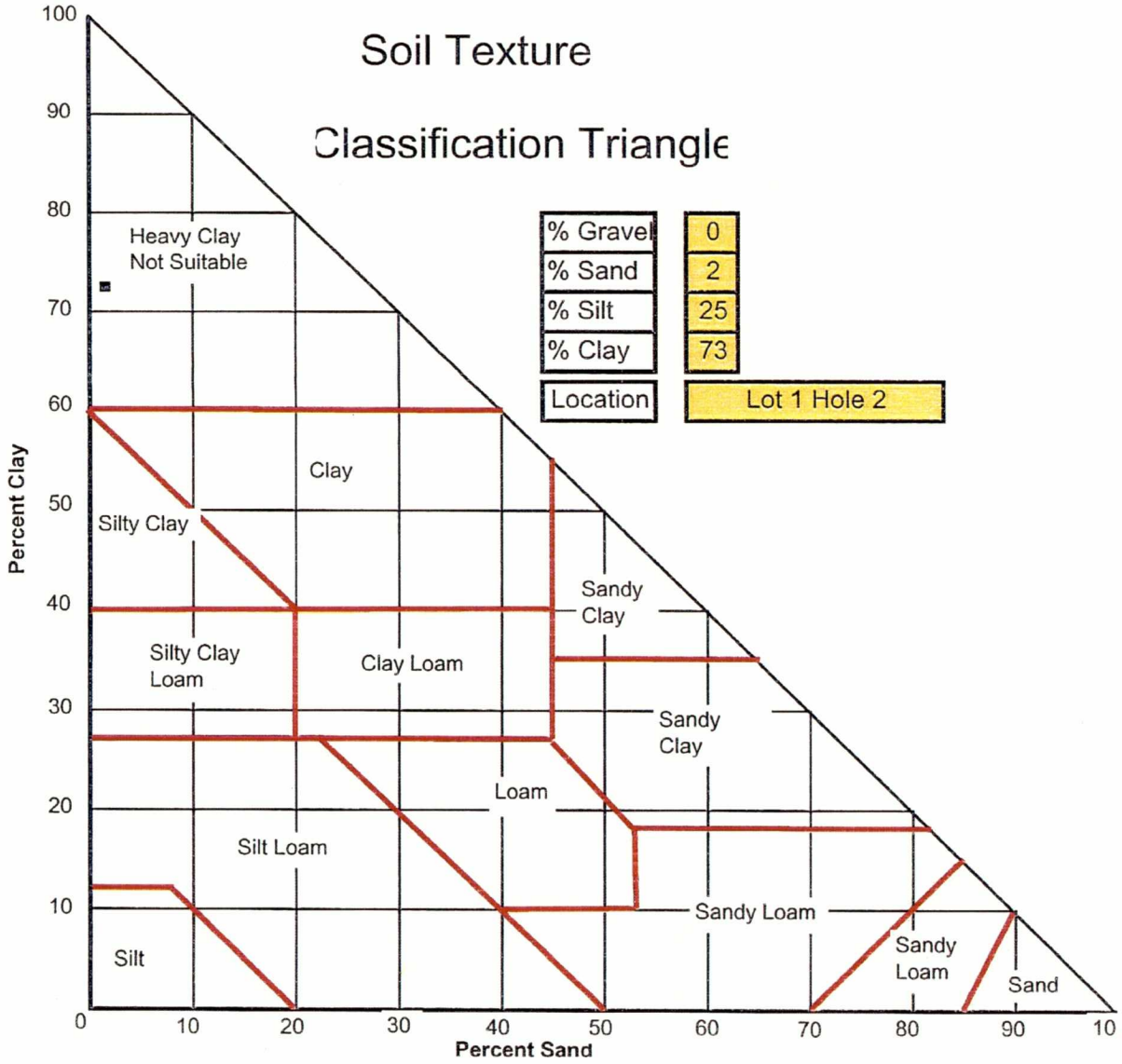
Sieve Analysis on Material from Hydrometer Test

SIEVE SIZE (µm)	WT. RETAINED (g)	WT. PASSING (g)	PERCENT FINER	D (mm)
1250	0.0	48.4	100.00	1.2500
630	0.0	48.4	100.00	0.6300
315	0.1	48.3	99.79	0.3150
160	0.2	48.1	99.38	0.1600
80	0.2	47.9	98.97	0.0800

Hydrometer Test

TIME (min)	HYDROMETER READING	ADJ. HYDROMETER READING	EFFECTIVE DEPTH, L (cm)	PERCENT FINER	D (mm)
1	55	48	8.4	97.12	0.0390
2	55	48	8.4	97.12	0.0276
5	54	47	8.6	95.10	0.0176
15	52	45	8.9	91.05	0.0104
30	48	41	9.6	82.96	0.0076
60	45	38	10.1	76.89	0.0055
250	36	29	11.5	58.68	0.0029
1440	N/A	n/a	13.0	40.47	0.0013




Soil Texture
Classification Triangle
% Gravel 0
% Sand 2
% Silt 25
% Clay 73
Location Lot 1 Hole 2
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Silt
Sandy
Loam
Sand
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

EXH Engineering Services Ltd.

PARTICLE SIZE DISTRIBUTION
HYDROMETER ANALYSIS
ASTM D422

General Information

CLIENT	Mark Chamberlin	GRAVEL (>4.75mm)	%	0
SAMPLE LOCATION	Lot 2 Hole 1	SAND (0.074mm-4.75mm)	%	1
DATE	November 10, 2008	SILT (0.074mm-0.005mm)	%	24
LAB TECHNICIAN(S)	J. Read	CLAY(<0.005mm)	%	75

Test Results

Raw Data

TOTAL SAMPLE WT.	(g)	785.3
WT. RETAINED > 4.75mm	(g)	0.0

Hydrometer Info

HYDROMETER TYPE		152 - H
COMPOSITE CORRECTION		7
SPECIFIC GRAVITY (Gs)	(kg/m^3)	2.75
AIR DRY WT. OF TEST SPECIMEN	(g)	50.0
k-FACTOR (from table)		0.01396
CORRECTED SAMPLE WT.	(g)	48.7

Moisture Content

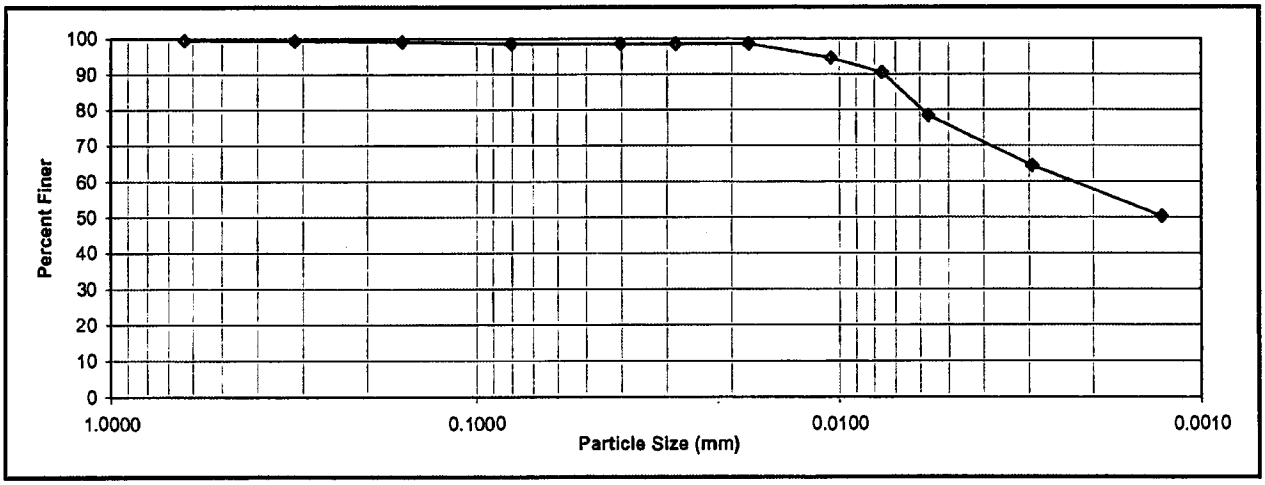
WT. OF PAN	(g)	7.7
WT. OF PAN + AIR DRIED SAMPLE	(g)	108.6
WT. OF PAN + OVEN DRIED SAMPLE	(g)	106.0
WT. OF WATER	(g)	2.6
WT. OF OVEN DRIED	(g)	98.3
HYGROSCOPIC MOISTURE CONTENT	(%)	2.64

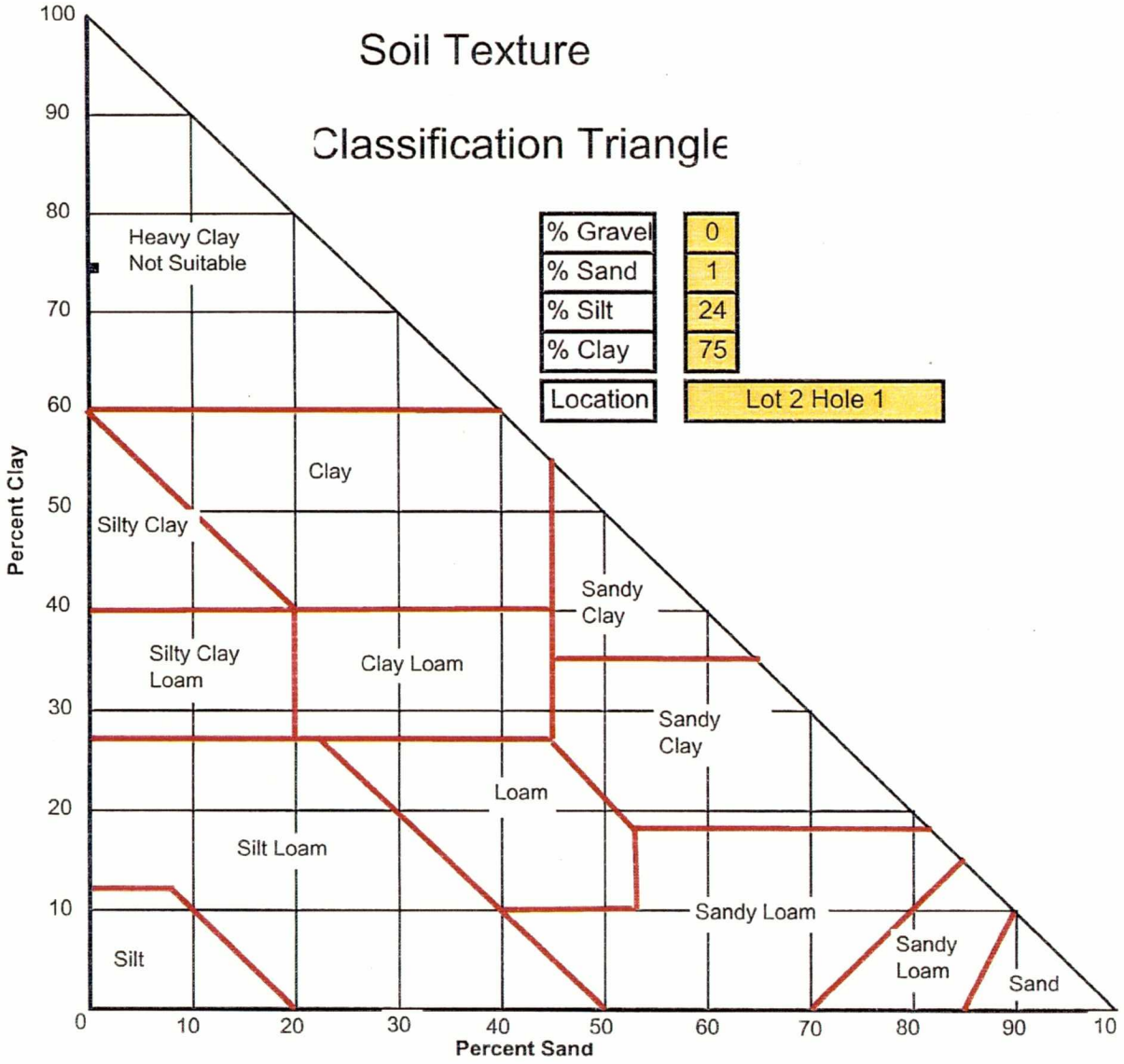
Sieve Analysis on Material from Hydrometer Test

SIEVE SIZE (µm)	WT. RETAINED (g)	WT. PASSING (g)	PERCENT FINER	D (mm)
1250	0.1	48.8	99.79	1.2500
630	0.1	48.5	99.59	0.6300
315	0.1	48.4	99.38	0.3150
160	0.1	48.3	99.18	0.1600
80	0.3	48.0	98.56	0.0800

Hydrometer Test

TIME (min)	HYDROMETER READING	ADJ. HYDROMETER READING	EFFECTIVE DEPTH, L (cm)	PERCENT FINER	D (mm)
1	56	49	8.3	98.58	0.0401
2	56	49	8.3	98.58	0.0284
5	56	49	8.3	98.58	0.0179
15	54	47	8.6	94.56	0.0106
30	52	45	8.9	90.53	0.0076
60	46	39	9.9	78.46	0.0057
250	39	32	11.0	64.38	0.0029
1440	N/A	n/a	12.2	50.30	0.0013




Soil Texture
Classification Triangle
% Gravel 0
% Sand 1
% Silt 24
% Clay 75
Location Lot 2 Hole 1
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Sandy
Loam
Sand
Silt
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

EXH Engineering Services Ltd.

PARTICLE SIZE DISTRIBUTION
HYDROMETER ANALYSIS
ASTM D422

General Information

CLIENT	Mark Chamberlin
SAMPLE LOCATION	Lot 2 Hole 2
DATE	November 4, 2008
LAB TECHNICIAN(S)	J. Read

Test Results

GRAVEL (>4.75mm)	%	0
SAND (0.074mm-4.75mm)	%	1
SILT (0.074mm-0.005mm)	%	25
CLAY(<0.005mm)	%	74

Raw Data

TOTAL SAMPLE WT.	(g)	821.0
WT. RETAINED > 4.75mm	(g)	0.0

Hydrometer Info

HYDROMETER TYPE		152 - H
COMPOSITE CORRECTION		7
SPECIFIC GRAVITY (Gs)	(kg/m^3)	2.75
AIR DRY WT. OF TEST SPECIMEN	(g)	50.0
k-FACTOR (from table)		0.01345
CORRECTED SAMPLE WT.	(g)	48.5

Moisture Content

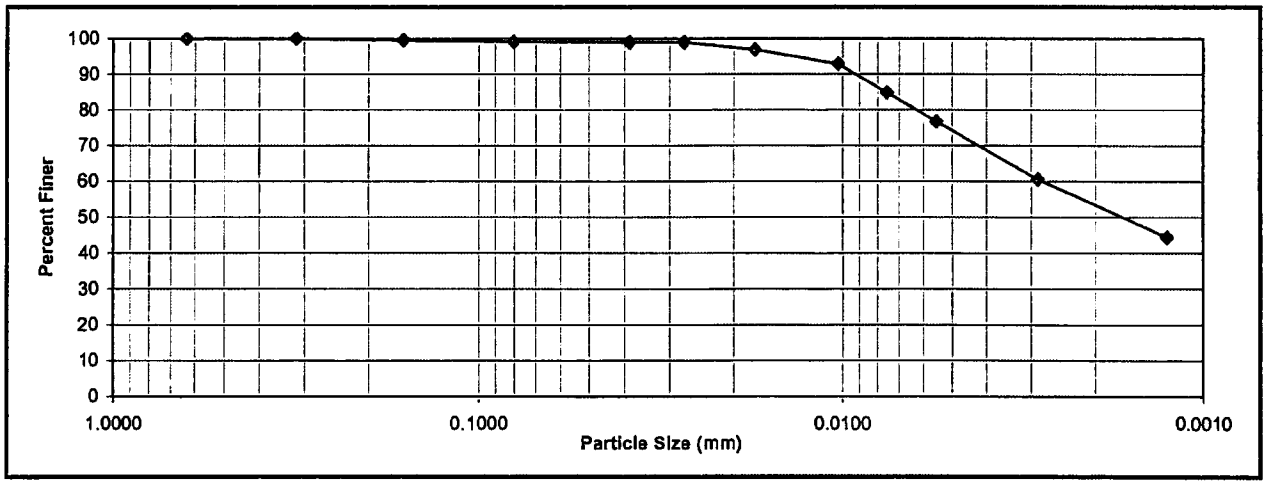
WT. OF PAN	(g)	8.2
WT. OF PAN + AIR DRIED SAMPLE	(g)	122.9
WT. OF PAN + OVEN DRIED SAMPLE	(g)	119.5
WT. OF WATER	(g)	3.4
WT. OF OVEN DRIED	(g)	111.3
HYGROSCOPIC MOISTURE CONTENT	(%)	3.05

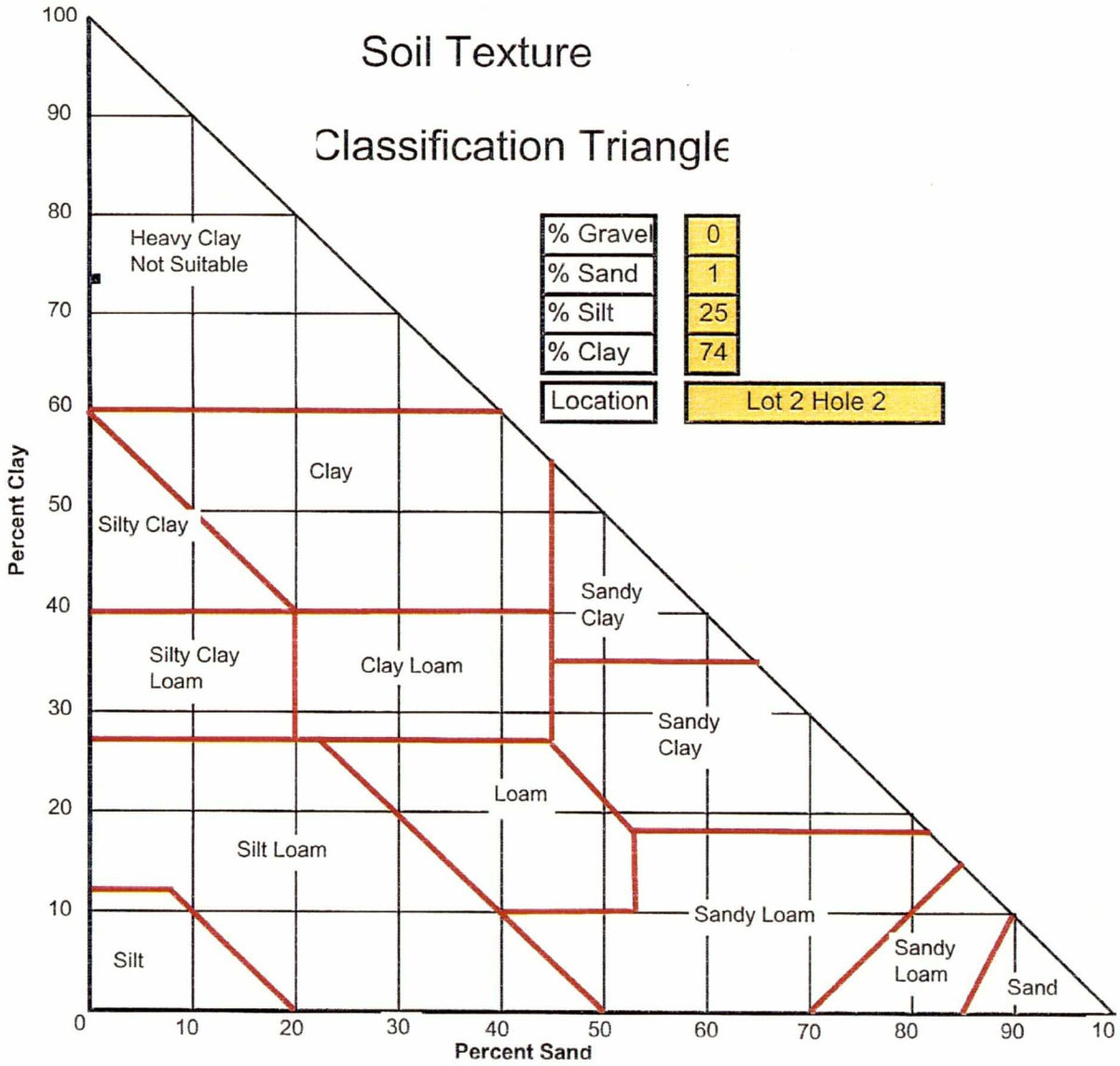
Sieve Analysis on Material from Hydrometer Test

SIEVE SIZE (µm)	WT. RETAINED (g)	WT. PASSING (g)	PERCENT FINER	D (mm)
1250	0.0	48.5	100.00	1.2500
630	0.0	48.5	100.00	0.6300
315	0.0	48.5	100.00	0.3150
160	0.2	48.3	99.59	0.1600
80	0.2	48.1	99.18	0.0800

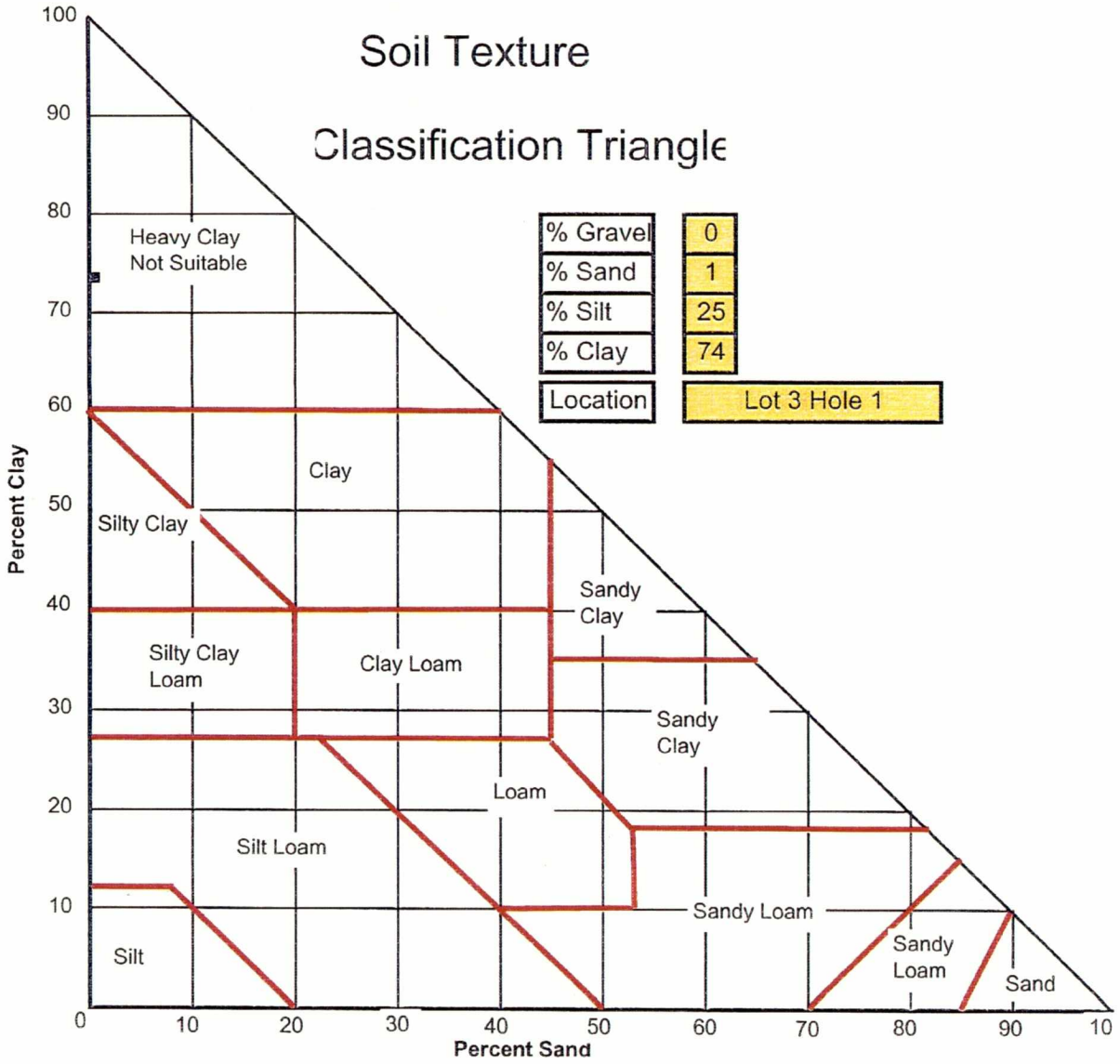
Hydrometer Test

TIME (min)	HYDROMETER READING	ADJ. HYDROMETER READING	EFFECTIVE DEPTH, L (cm)	PERCENT FINER	D (mm)
1	56	49	8.3	98.97	0.0386
2	56	49	8.3	98.97	0.0273
5	55	48	8.4	96.95	0.0175
15	53	46	8.7	92.91	0.0103
30	49	42	9.4	84.83	0.0075
60	45	38	10.1	76.76	0.0055
250	37	30	11.4	60.60	0.0029
1440	N/A	n/a	12.7	44.44	0.0013




Soil Texture
Classification Triangle
% Gravel 0
% Sand 1
% Silt 25
% Clay 74
Location Lot 2 Hole 2
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Silt
Sandy
Loam
Sand
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

the good one Chart 1


Soil Texture
Classification Triangle
% Gravel 0
% Sand 1
% Silt 25
% Clay 74
Location Lot 3 Hole 1
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Silt
Sandy
Loam
Sand
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

EXH Engineering Services Ltd.

PARTICLE SIZE DISTRIBUTION
HYDROMETER ANALYSIS
ASTM D422

General Information

CLIENT	Mark Chamberlin	GRAVEL (>4.75mm)	%	0
SAMPLE LOCATION	Lot 3 Hole 2	SAND (0.074mm-4.75mm)	%	0
DATE	November 10, 2008	SILT (0.074mm-0.005mm)	%	26
LAB TECHNICIAN(S)	J. Read	CLAY(<0.005mm)	%	74

Test Results

Raw Data

TOTAL SAMPLE WT.	(g)	627.2
WT. RETAINED > 4.75mm	(g)	0.0

Hydrometer Info

HYDROMETER TYPE		152 - H
COMPOSITE CORRECTION		7
SPECIFIC GRAVITY (Gs)	(kg/m^3)	2.75
AIR DRY WT. OF TEST SPECIMEN	(g)	50.0
k-FACTOR (from table)		0.01396
CORRECTED SAMPLE WT.	(g)	48.5

Moisture Content

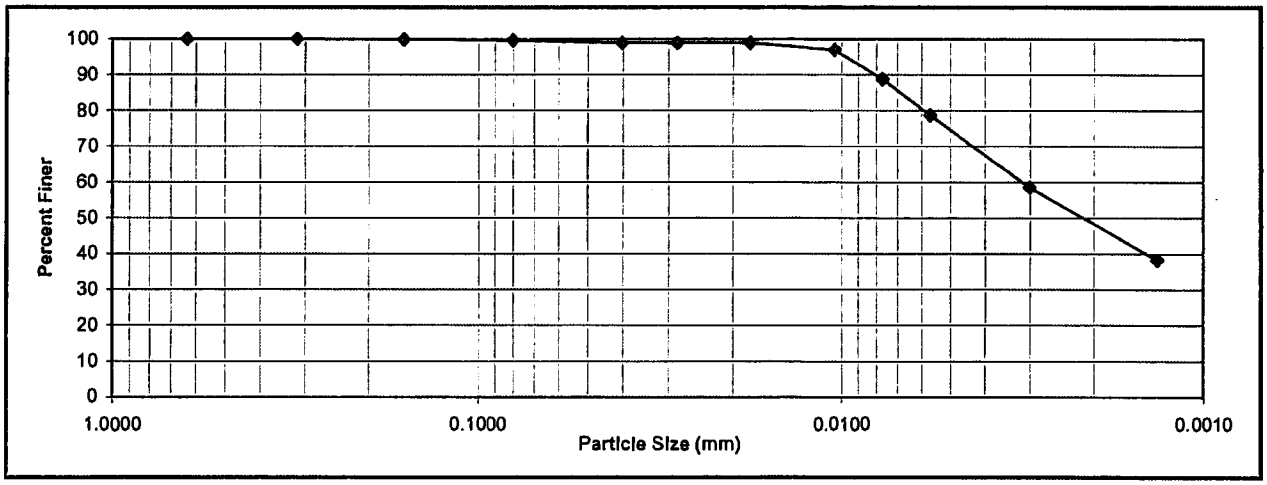
WT. OF PAN	(g)	8.2
WT. OF PAN + AIR DRIED SAMPLE	(g)	110.9
WT. OF PAN + OVEN DRIED SAMPLE	(g)	107.9
WT. OF WATER	(g)	3
WT. OF OVEN DRIED	(g)	99.7
HYGROSCOPIC MOISTURE CONTENT	(%)	3.01

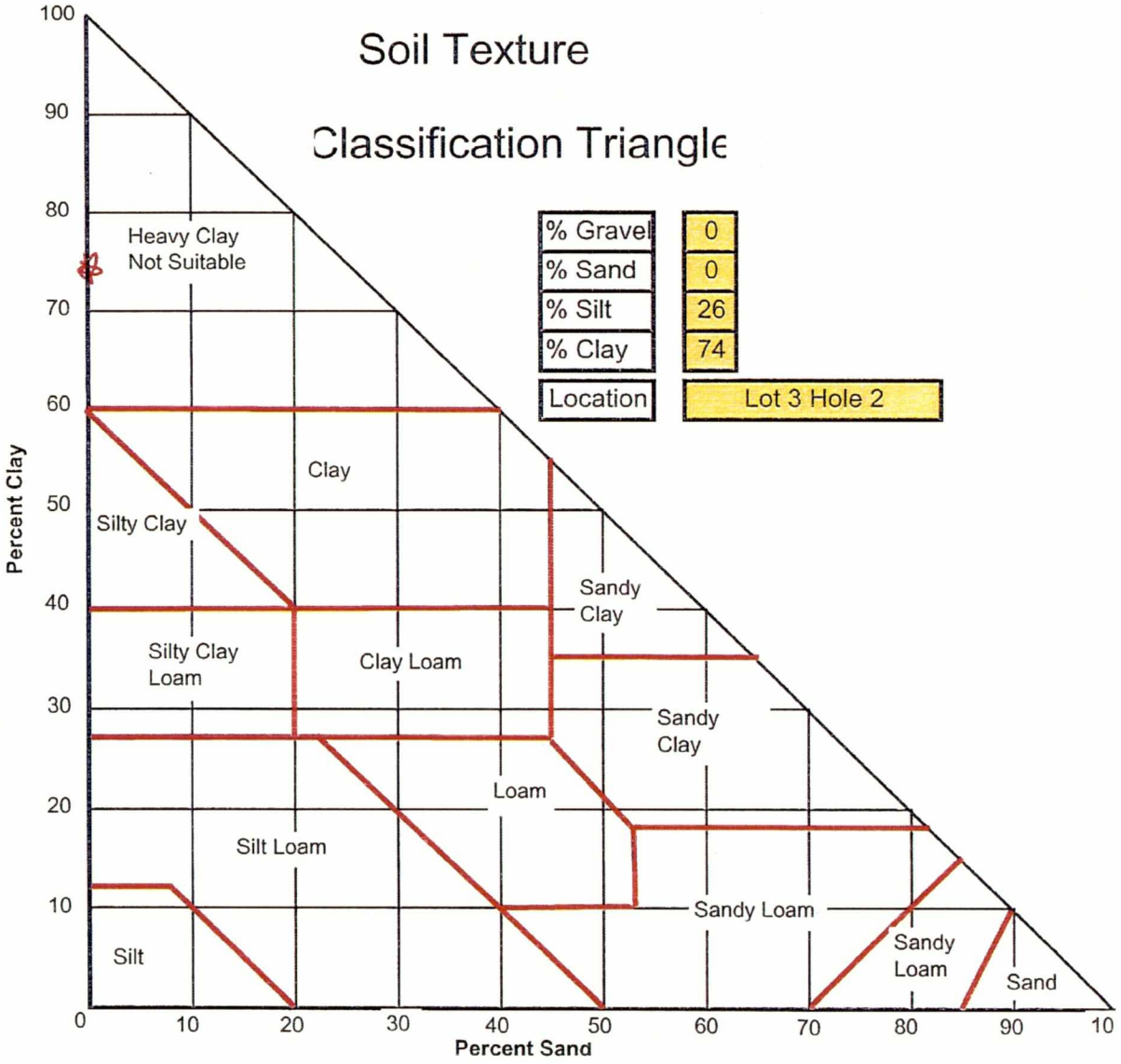
Sieve Analysis on Material from Hydrometer Test

SIEVE SIZE (µm)	WT. RETAINED (g)	WT. PASSING (g)	PERCENT FINER	D (mm)
1250	0.0	48.5	100.00	1.2500
630	0.0	48.5	100.00	0.6300
315	0.0	48.5	100.00	0.3150
160	0.1	48.4	99.79	0.1600
80	0.1	48.3	99.59	0.0800

Hydrometer Test

TIME (min)	HYDROMETER READING	ADJ. HYDROMETER READING	EFFECTIVE DEPTH, L (cm)	PERCENT FINER	D (mm)
1	56	49	8.3	98.93	0.0401
2	56	49	8.3	98.93	0.0284
5	56	49	8.3	98.93	0.0179
15	55	48	8.4	96.91	0.0105
30	51	44	9.1	88.83	0.0077
60	46	39	9.9	78.74	0.0057
250	36	29	11.5	58.55	0.0030
1440	N/A	n/a	13.2	38.36	0.0013




Soil Texture
Classification Triangle
% Gravel 0
% Sand 0
% Silt 26
% Clay 74
Location Lot 3 Hole 2
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Sandy
Loam
Sand
Silt
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

EXH Engineering Services Ltd.

PARTICLE SIZE DISTRIBUTION
HYDROMETER ANALYSIS
ASTM D422

General Information

CLIENT	Mark Chamberlin
SAMPLE LOCATION	Lot 4 Hole 1
DATE	November 4, 2008
LAB TECHNICIAN(S)	J. Read

Test Results

GRAVEL (>4.75mm)	%	0
SAND (0.074mm-4.75mm)	%	36
SILT (0.074mm-0.005mm)	%	25
CLAY(<0.005mm)	%	39

Raw Data

TOTAL SAMPLE WT.	(g)	881.7
WT. RETAINED > 4.75mm	(g)	0.0

Hydrometer Info

HYDROMETER TYPE		152 - H
COMPOSITE CORRECTION		7
SPECIFIC GRAVITY (Gs)	(kg/m^3)	2.75
AIR DRY WT. OF TEST SPECIMEN	(g)	50.0
k-FACTOR (from table)		0.01345
CORRECTED SAMPLE WT.	(g)	48.6

Moisture Content

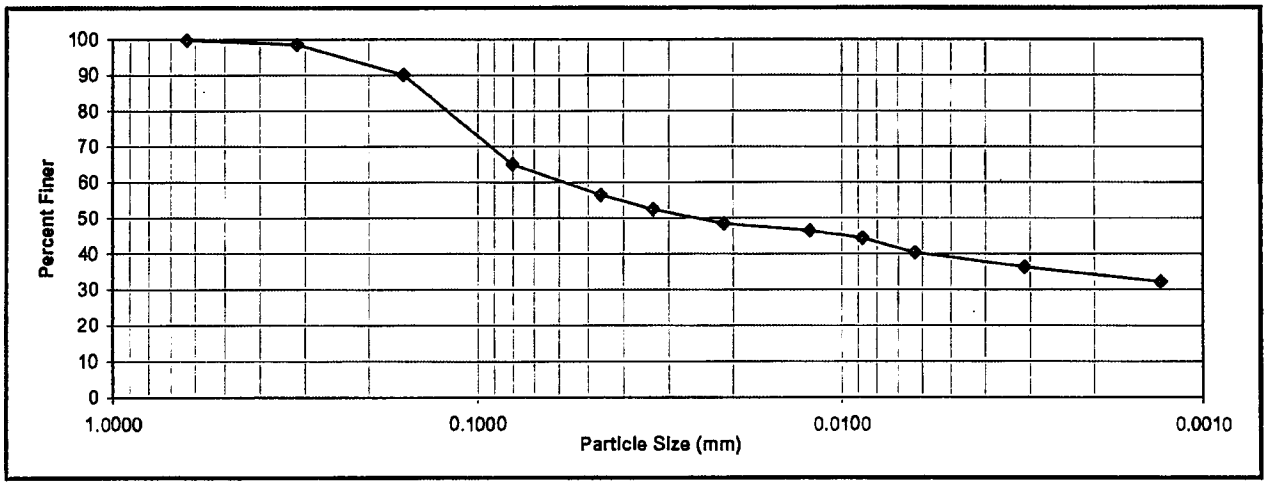
WT. OF PAN	(g)	8.4
WT. OF PAN + AIR DRIED SAMPLE	(g)	123.5
WT. OF PAN + OVEN DRIED SAMPLE	(g)	120.2
WT. OF WATER	(g)	3.3
WT. OF OVEN DRIED	(g)	111.8
HYGROSCOPIC MOISTURE CONTENT	(%)	2.95

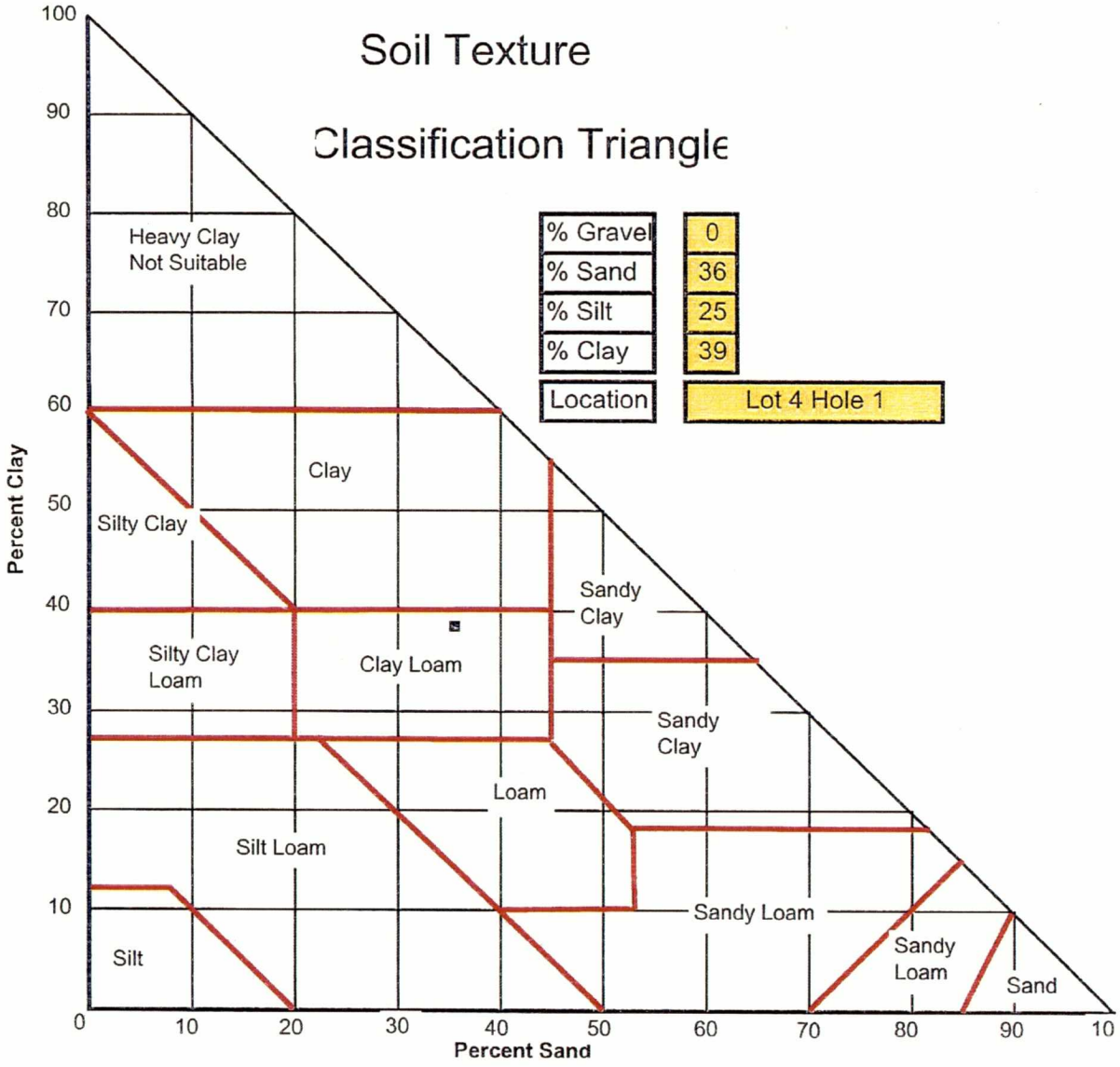
Sieve Analysis on Material from Hydrometer Test

SIEVE SIZE (µm)	WT. RETAINED (g)	WT. PASSING (g)	PERCENT FINER	D (mm)
1250	0.1	48.5	99.79	1.2500
630	0.0	48.5	99.79	0.6300
315	0.6	47.9	98.56	0.3150
160	4.1	43.8	90.12	0.1600
80	12.2	31.6	65.00	0.0800

Hydrometer Test

TIME (min)	HYDROMETER READING	ADJ. HYDROMETER READING	EFFECTIVE DEPTH, L (cm)	PERCENT FINER	D (mm)
1	35	28	11.7	56.50	0.0460
2	33	26	12.0	52.46	0.0330
5	31	24	12.4	48.43	0.0211
15	30	23	12.5	46.41	0.0123
30	29	22	12.7	44.39	0.0087
60	27	20	13.0	40.36	0.0063
250	25	18	13.3	36.32	0.0031
1440	N/A	n/a	13.7	32.29	0.0013




Soil Texture
Classification Triangle
% Gravel 0
% Sand 36
% Silt 25
% Clay 39
Location Lot 4 Hole 1
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Silt
Sandy
Loam
Sand
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

EXH Engineering Services Ltd.

PARTICLE SIZE DISTRIBUTION
HYDROMETER ANALYSIS
ASTM D422

General Information

Test Results

CLIENT	Mark Chamberlin	GRAVEL (>4.75mm)	%	0
SAMPLE LOCATION	Lot 4 Hole 2	SAND (0.074mm-4.75mm)	%	26
DATE	November 4, 2008	SILT (0.074mm-0.005mm)	%	33
LAB TECHNICIAN(S)	J. Read	CLAY(<0.005mm)	%	41

Raw Data

TOTAL SAMPLE WT.	(g)	924.2
WT. RETAINED > 4.75mm	(g)	2.1

Hydrometer Info

HYDROMETER TYPE		152 - H
COMPOSITE CORRECTION		7
SPECIFIC GRAVITY (Gs)	(kg/m^3)	2.75
AIR DRY WT. OF TEST SPECIMEN	(g)	50.0
k-FACTOR (from lable)		0.01345
CORRECTED SAMPLE WT.	(g)	47.5

Moisture Content

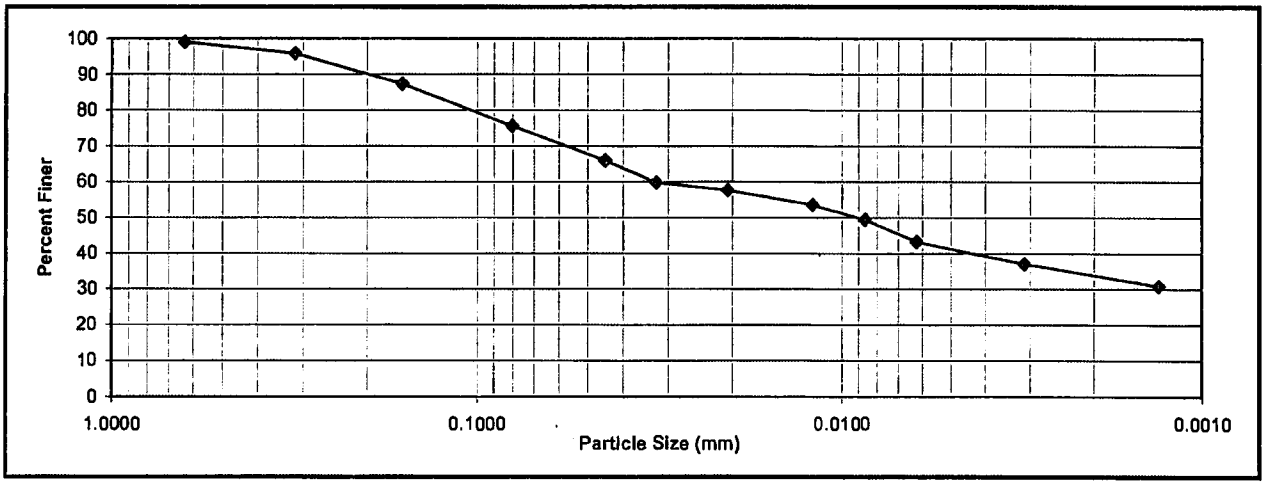
WT. OF PAN	(g)	8.5
WT. OF PAN + AIR DRIED SAMPLE	(g)	114.6
WT. OF PAN + OVEN DRIED SAMPLE	(g)	109.2
WT. OF WATER	(g)	5.4
WT. OF OVEN DRIED	(g)	100.7
HYGROSCOPIC MOISTURE CONTENT	(%)	5.36

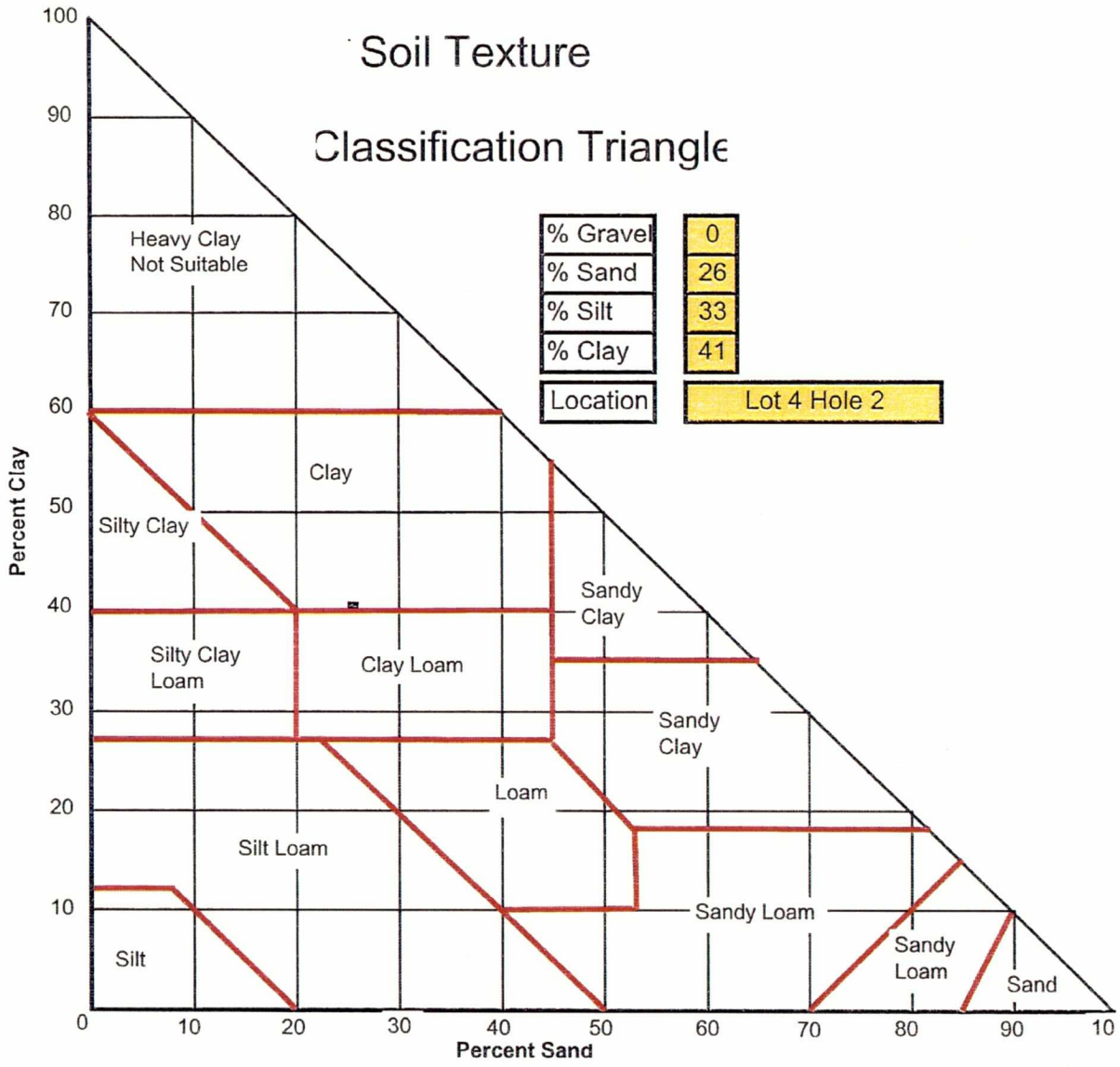
Sieve Analysis on Material from Hydrometer Test

SIEVE SIZE (µm)	WT. RETAINED (g)	WT. PASSING (g)	PERCENT FINER	D (mm)
1250	0.2	47.3	99.35	1.2500
630	0.2	47.1	98.93	0.6300
315	1.5	45.6	95.78	0.3150
160	4.0	41.6	87.37	0.1600
80	5.6	36.0	75.59	0.0800

Hydrometer Test

TIME (min)	HYDROMETER READING	ADJ. HYDROMETER READING	EFFECTIVE DEPTH, L (cm)	PERCENT FINER	D (mm)
1	39	32	11.0	65.93	0.0447
2	36	29	11.5	59.75	0.0323
5	35	28	11.7	57.69	0.0206
15	33	26	12.0	53.57	0.0120
30	31	24	12.4	49.45	0.0086
60	28	21	12.8	43.27	0.0062
250	25	18	13.3	37.09	0.0031
1440	N/A	n/a	13.8	30.91	0.0013




Soil Texture
Classification Triangle
% Gravel 0
% Sand 26
% Silt 33
% Clay 41
Location Lot 4 Hole 2
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Sandy
Loam
Sand
Silt
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

EXH Engineering Services Ltd.

PARTICLE SIZE DISTRIBUTION
HYDROMETER ANALYSIS
ASTM D422

General Information

CLIENT	Mark Chamberlin	GRAVEL (>4.75mm)	%	0
SAMPLE LOCATION	Lot 5 Hole 1	SAND (0.074mm-4.75mm)	%	2
DATE	November 5, 2008	SILT (0.074mm-0.005mm)	%	25
LAB TECHNICIAN(S)	J. Read	CLAY(<0.005mm)	%	73

Test Results

Raw Data

TOTAL SAMPLE WT.	(g)	688.1
WT. RETAINED > 4.75mm	(g)	0.0

Hydrometer Info

HYDROMETER TYPE		152 - H
COMPOSITE CORRECTION		7
SPECIFIC GRAVITY (Gs)	(kg/m^3)	2.75
AIR DRY WT. OF TEST SPECIMEN	(g)	50.0
k-FACTOR (from table)		0.01328
CORRECTED SAMPLE WT.	(g)	48.1

Moisture Content

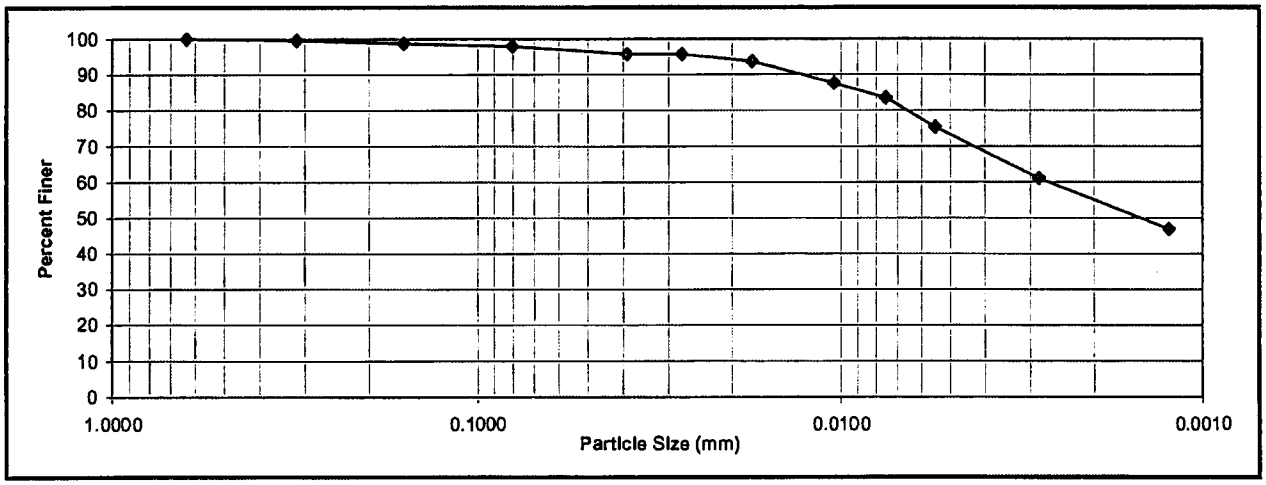
WT. OF PAN	(g)	8.2
WT. OF PAN + AIR DRIED SAMPLE	(g)	114.0
WT. OF PAN + OVEN DRIED SAMPLE	(g)	110.0
WT. OF WATER	(g)	4
WT. OF OVEN DRIED	(g)	101.8
HYGROSCOPIC MOISTURE CONTENT	(%)	3.93

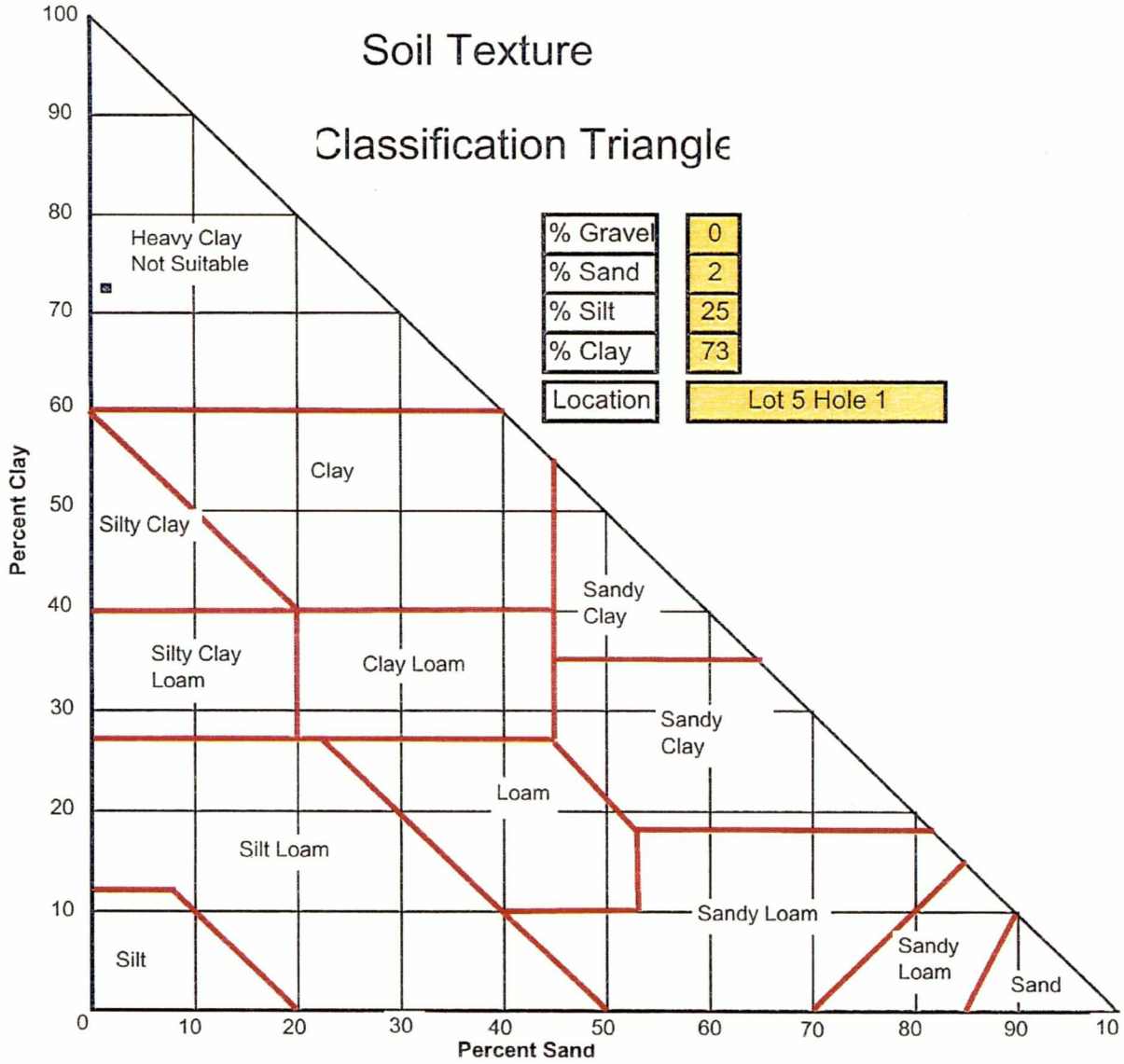
Sieve Analysis on Material from Hydrometer Test

SIEVE SIZE (µm)	WT. RETAINED (g)	WT. PASSING (g)	PERCENT FINER	D (mm)
1250	0.0	48.1	100.00	1.2500
630	0.0	48.1	100.00	0.6300
315	0.2	47.9	99.58	0.3150
160	0.4	47.5	98.75	0.1600
80	0.4	47.1	97.92	0.0800

Hydrometer Test

TIME (min)	HYDROMETER READING	ADJ. HYDROMETER READING	EFFECTIVE DEPTH, L (cm)	PERCENT FINER	D (mm)
1	54	47	8.6	95.74	0.0389
2	54	47	8.6	95.74	0.0275
5	53	46	8.7	93.70	0.0176
15	50	43	9.2	87.59	0.0104
30	48	41	9.6	83.52	0.0075
60	44	37	10.2	75.37	0.0055
250	37	30	11.4	61.11	0.0028
1440	N/A	n/a	12.5	48.85	0.0012




Soil Texture
Classification Triangle
% Gravel 0
% Sand 2
% Silt 25
% Clay 73
Location Lot 5 Hole 1
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Silt
Sandy
Loam
Sand
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

EXH Engineering Services Ltd.

PARTICLE SIZE DISTRIBUTION
HYDROMETER ANALYSIS
ASTM D422

General Information

CLIENT	Mark Chamberlin	GRAVEL (>4.75mm)	%	0
SAMPLE LOCATION	Lot 5 Hole 2	SAND (0.074mm-4.75mm)	%	1
DATE	November 11, 2008	SILT (0.074mm-0.005mm)	%	27
LAB TECHNICIAN(S)	J. Read	CLAY(<0.005mm)	%	72

Test Results

Raw Data

TOTAL SAMPLE WT.	(g)	713.9
WT. RETAINED > 4.75mm	(g)	0.0

Hydrometer Info

HYDROMETER TYPE		152 - H
COMPOSITE CORRECTION		7
SPECIFIC GRAVITY (Gs)	(kg/m^3)	2.75
AIR DRY WT. OF TEST SPECIMEN	(g)	50.0
k-FACTOR (from table)		0.01345
CORRECTED SAMPLE WT.	(g)	48.5

Moisture Content

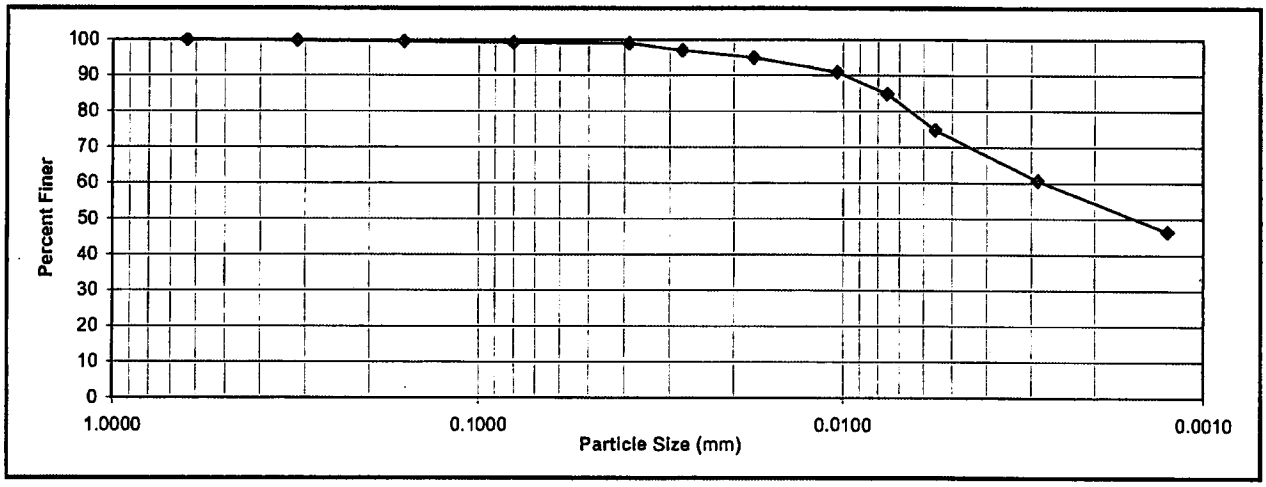
WT. OF PAN	(g)	8.2
WT. OF PAN + AIR DRIED SAMPLE	(g)	115.0
WT. OF PAN + OVEN DRIED SAMPLE	(g)	111.8
WT. OF WATER	(g)	3.2
WT. OF OVEN DRIED	(g)	103.6
HYGROSCOPIC MOISTURE CONTENT	(%)	3.09

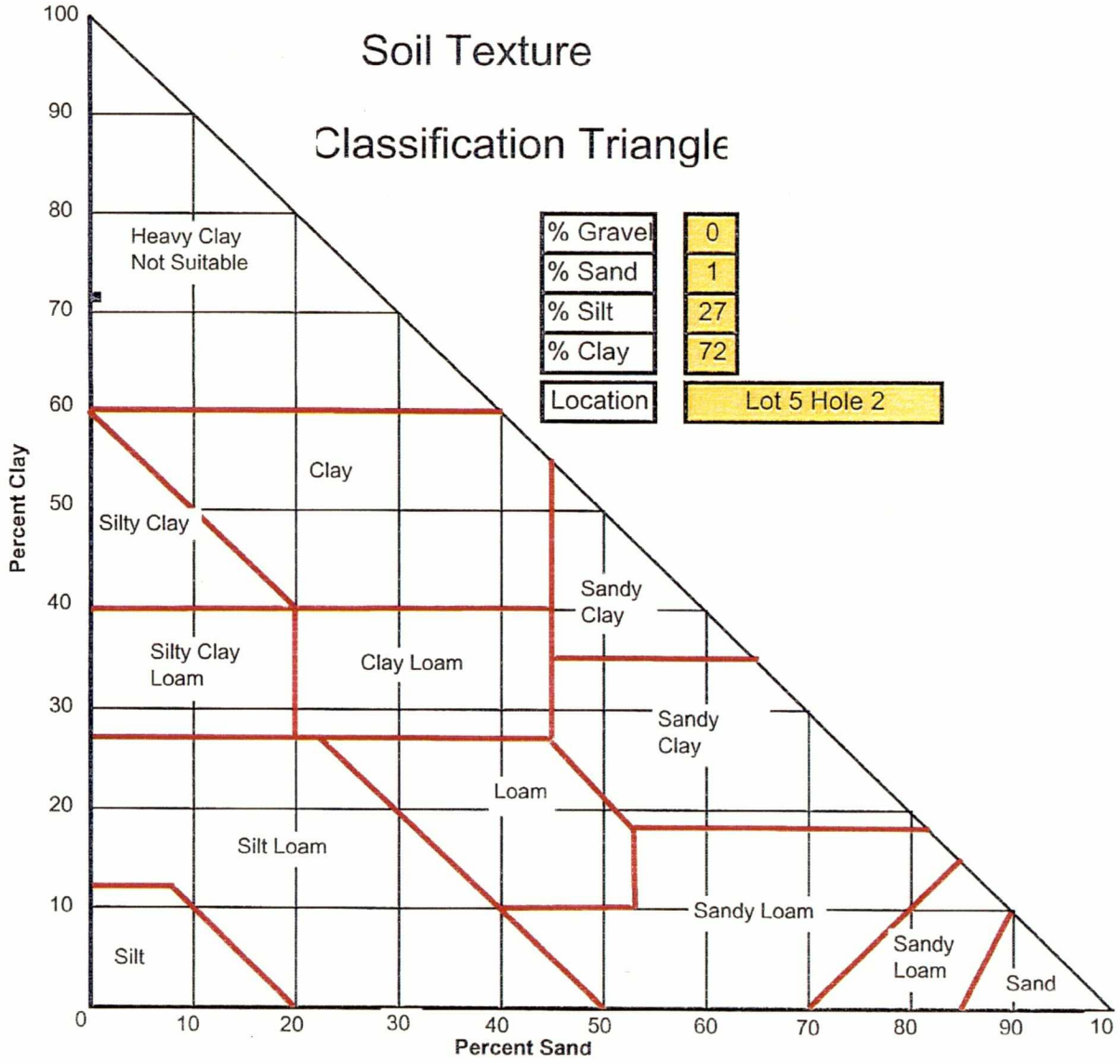
Sieve Analysis on Material from Hydrometer Test

SIEVE SIZE (µm)	WT. RETAINED (g)	WT. PASSING (g)	PERCENT FINER	D (mm)
1250	0.0	48.5	100.00	1.2500
630	0.0	48.5	100.00	0.6300
315	0.1	48.4	99.79	0.3150
160	0.1	48.3	99.59	0.1600
80	0.2	48.1	99.18	0.0800

Hydrometer Test

TIME (min)	HYDROMETER READING	ADJ. HYDROMETER READING	EFFECTIVE DEPTH, L (cm)	PERCENT FINER	D (mm)
1	56	49	8.3	99.01	0.0386
2	55	48	8.4	96.99	0.0276
5	54	47	8.6	94.97	0.0176
15	52	45	8.9	90.92	0.0104
30	49	42	9.4	84.86	0.0075
60	44	37	10.2	74.76	0.0056
250	37	30	11.4	60.62	0.0029
1440	N/A	n/a	12.5	46.47	0.0013




Soil Texture
Classification Triangle
% Gravel 0
% Sand 1
% Silt 27
% Clay 72
Location Lot 5 Hole 2
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Silt
Sandy
Loam
Sand
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

EXH Engineering Services Ltd.

PARTICLE SIZE DISTRIBUTION
HYDROMETER ANALYSIS
ASTM D422

General Information

Test Results

CLIENT	Mark Chamberlin	GRAVEL (>4.75mm)	%	0
SAMPLE LOCATION	Lot 6 Hole 1	SAND (0.074mm-4.75mm)	%	1
DATE	November 5, 2008	SILT (0.074mm-0.005mm)	%	18
LAB TECHNICIAN(S)	J. Read	CLAY(<0.005mm)	%	81

Raw Data

TOTAL SAMPLE WT.	(g)	683.6
WT. RETAINED > 4.75mm	(g)	0.0

Hydrometer Info

HYDROMETER TYPE		152 - H
COMPOSITE CORRECTION		7
SPECIFIC GRAVITY (Gs)	(kg/m^3)	2.75
AIR DRY WT. OF TEST SPECIMEN	(g)	50.0
k-FACTOR (from table)		0.01328
CORRECTED SAMPLE WT.	(g)	48.3

Moisture Content

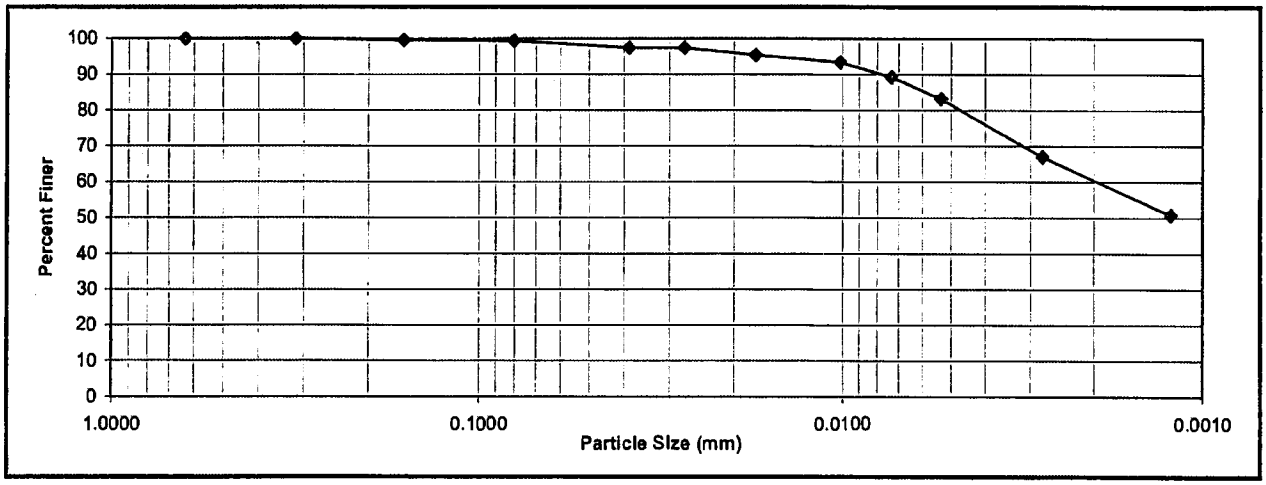
WT. OF PAN	(g)	8.3
WT. OF PAN + AIR DRIED SAMPLE	(g)	109.7
WT. OF PAN + OVEN DRIED SAMPLE	(g)	106.2
WT. OF WATER	(g)	3.5
WT. OF OVEN DRIED	(g)	97.9
HYGROSCOPIC MOISTURE CONTENT	(%)	3.58

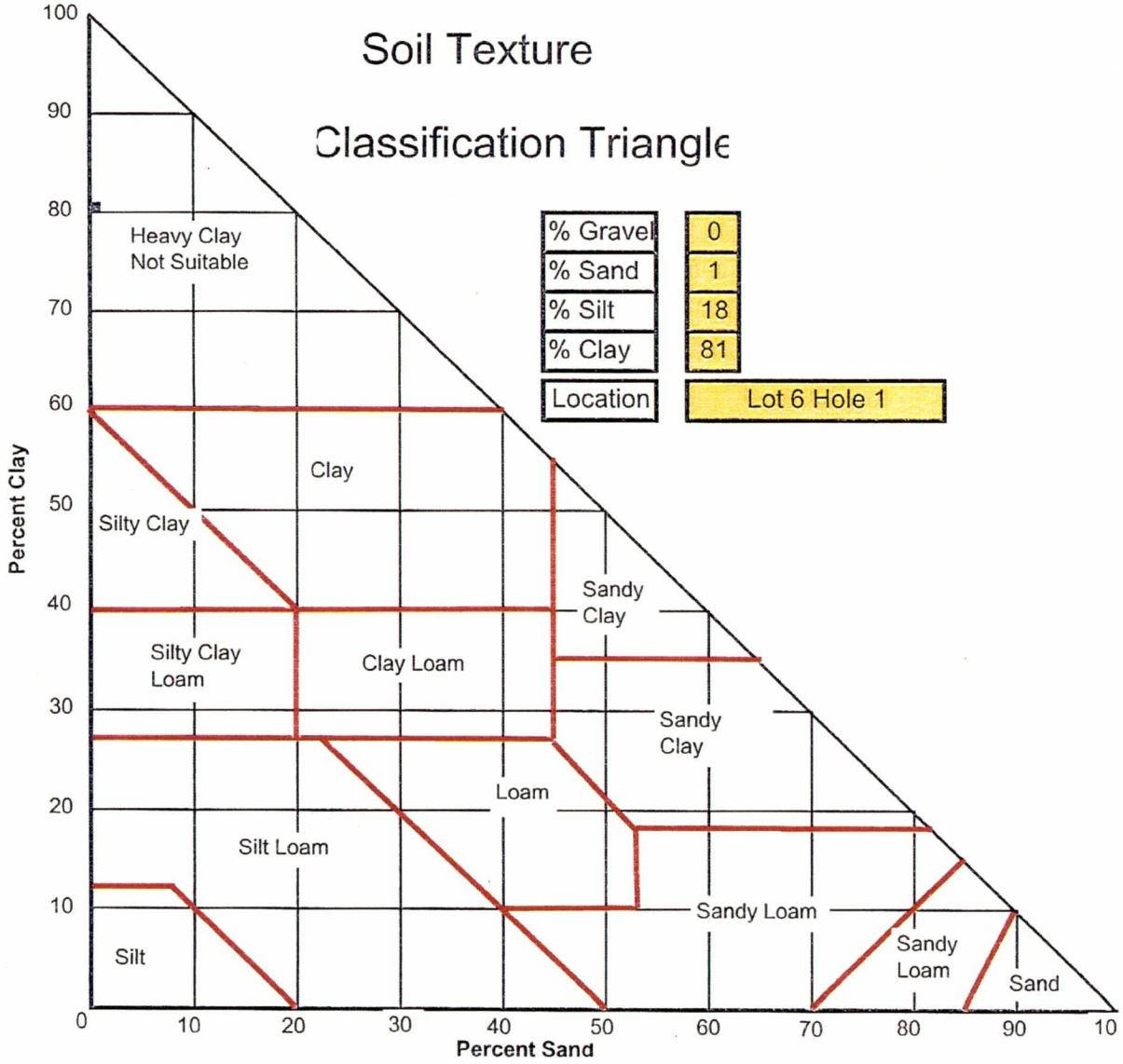
Sieve Analysis on Material from Hydrometer Test

SIEVE SIZE (µm)	WT. RETAINED (g)	WT. PASSING (g)	PERCENT FINER	D (mm)
1250	0.0	48.3	100.00	1.2500
630	0.0	48.3	100.00	0.6300
315	0.0	48.3	100.00	0.3150
160	0.2	48.1	99.59	0.1600
80	0.1	48.0	99.38	0.0800

Hydrometer Test

TIME (min)	HYDROMETER READING	ADJ. HYDROMETER READING	EFFECTIVE DEPTH, L (cm)	PERCENT FINER	D (mm)
1	55	48	8.4	97.44	0.0385
2	55	48	8.4	97.44	0.0272
5	54	47	8.6	95.41	0.0174
15	53	46	8.7	93.38	0.0101
30	51	44	9.1	89.32	0.0073
60	48	41	9.6	83.23	0.0053
250	40	33	10.9	66.99	0.0028
1440	N/A	n/a	12.2	50.75	0.0012




Soil Texture
Classification Triangle
% Gravel 0
% Sand 1
% Silt 18
% Clay 81
Location Lot 6 Hole 1
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Silt
Sandy
Loam
Sand
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

EXH Engineering Services Ltd.

PARTICLE SIZE DISTRIBUTION
HYDROMETER ANALYSIS
ASTM D422

General Information

Test Results

CLIENT	Mark Chamberlin	GRAVEL (>4.75mm)	%	0
SAMPLE LOCATION	Lot 6 Hole 2	SAND (0.074mm-4.75mm)	%	1
DATE	November 5, 2008	SILT (0.074mm-0.005mm)	%	21
LAB TECHNICIAN(S)	J. Read	CLAY(<0.005mm)	%	78

Raw Data

TOTAL SAMPLE WT.	(g)	581.5
WT. RETAINED > 4.75mm	(g)	0.2

Hydrometer Info

HYDROMETER TYPE		152 - H
COMPOSITE CORRECTION		7
SPECIFIC GRAVITY (Gs)	(kg/m^3)	2.75
AIR DRY WT. OF TEST SPECIMEN	(g)	50.0
k-FACTOR (from table)		0.01328
CORRECTED SAMPLE WT.	(g)	48.5

Moisture Content

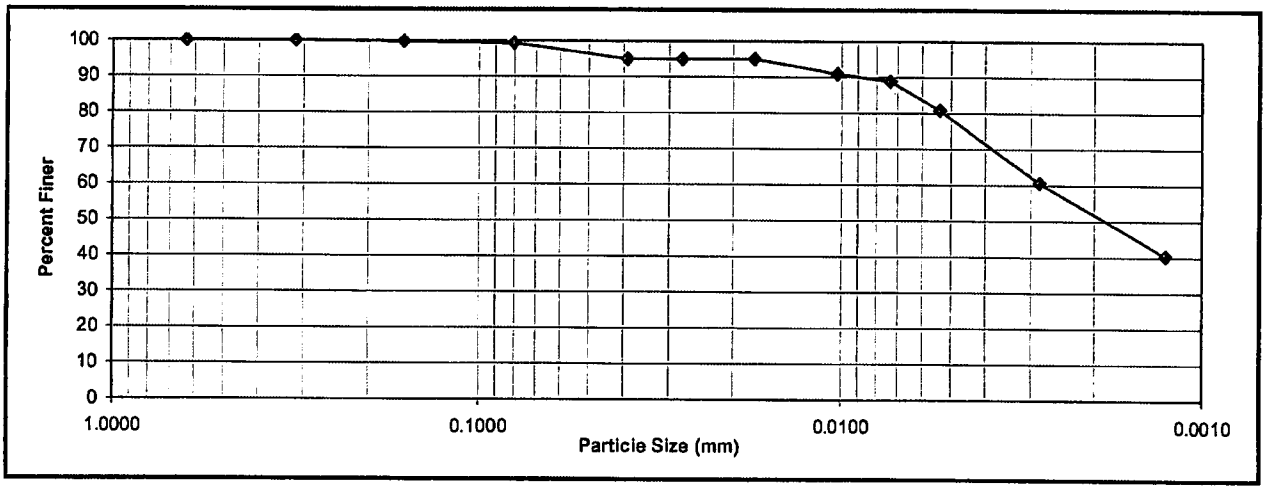
WT. OF PAN	(g)	8.3
WT. OF PAN + AIR DRIED SAMPLE	(g)	108.2
WT. OF PAN + OVEN DRIED SAMPLE	(g)	105.2
WT. OF WATER	(g)	3
WT. OF OVEN DRIED	(g)	96.9
HYGROSCOPIC MOISTURE CONTENT	(%)	3.10

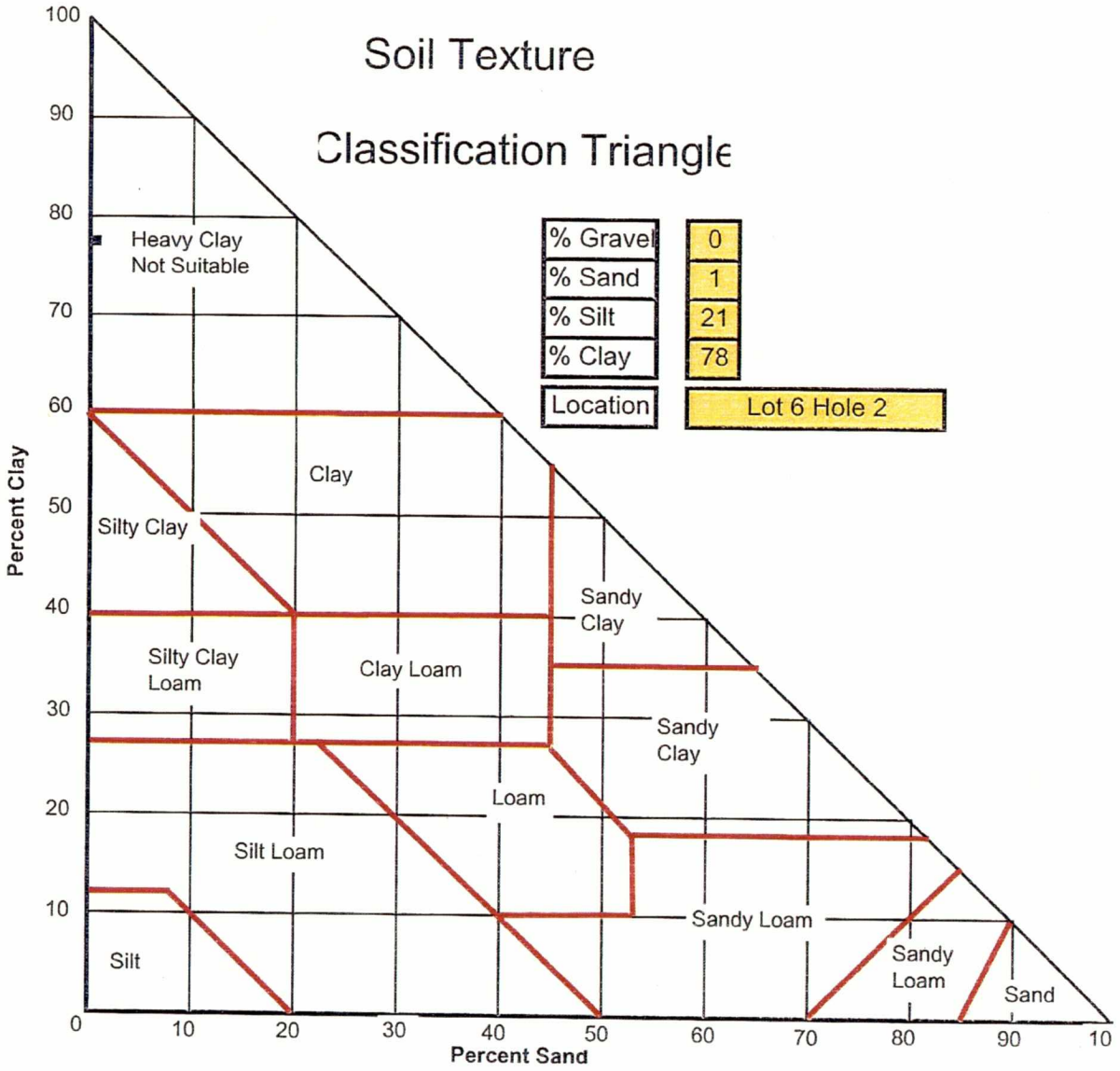
Sieve Analysis on Material from Hydrometer Test

SIEVE SIZE (µm)	WT. RETAINED (g)	WT. PASSING (g)	PERCENT FINER	D (mm)
1250	0.0	48.5	99.97	1.2500
630	0.0	48.5	99.97	0.6300
315	0.0	48.5	99.97	0.3150
160	0.1	48.4	99.76	0.1600
80	0.2	48.2	99.35	0.0800

Hydrometer Test

TIME (min)	HYDROMETER READING	ADJ. HYDROMETER READING	EFFECTIVE DEPTH, L (cm)	PERCENT FINER	D (mm)
1	54	47	8.6	94.94	0.0389
2	54	47	8.6	94.94	0.0275
5	54	47	8.6	94.94	0.0174
15	52	45	8.9	90.90	0.0102
30	51	44	9.1	88.88	0.0073
60	47	40	9.7	80.80	0.0053
250	37	30	11.4	60.60	0.0028
1440	N/A	n/a	13.0	40.40	0.0013




Soil Texture
Classification Triangle
% Gravel 0
% Sand 1
% Silt 21
% Clay 78
Location Lot 6 Hole 2
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Silt
Sandy
Loam
Sand
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

EXH Engineering Services Ltd.

PARTICLE SIZE DISTRIBUTION
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General Information

CLIENT	Mark Chamberlin
SAMPLE LOCATION	Lot 7 Hole 1
DATE	November 11, 2008
LAB TECHNICIAN(S)	J. Read

Test Results

GRAVEL (>4.75mm)	%	0
SAND (0.074mm-4.75mm)	%	1
SILT (0.074mm-0.005mm)	%	26
CLAY(<0.005mm)	%	73

Raw Data

TOTAL SAMPLE WT.	(g)	738.1
WT. RETAINED > 4.75mm	(g)	0.0

Hydrometer Info

HYDROMETER TYPE		152 - H
COMPOSITE CORRECTION		7
SPECIFIC GRAVITY (Gs)	(kg/m^3)	2.75
AIR DRY WT. OF TEST SPECIMEN	(g)	50.0
k-FACTOR (from table)		0.01345
CORRECTED SAMPLE WT.	(g)	48.5

Moisture Content

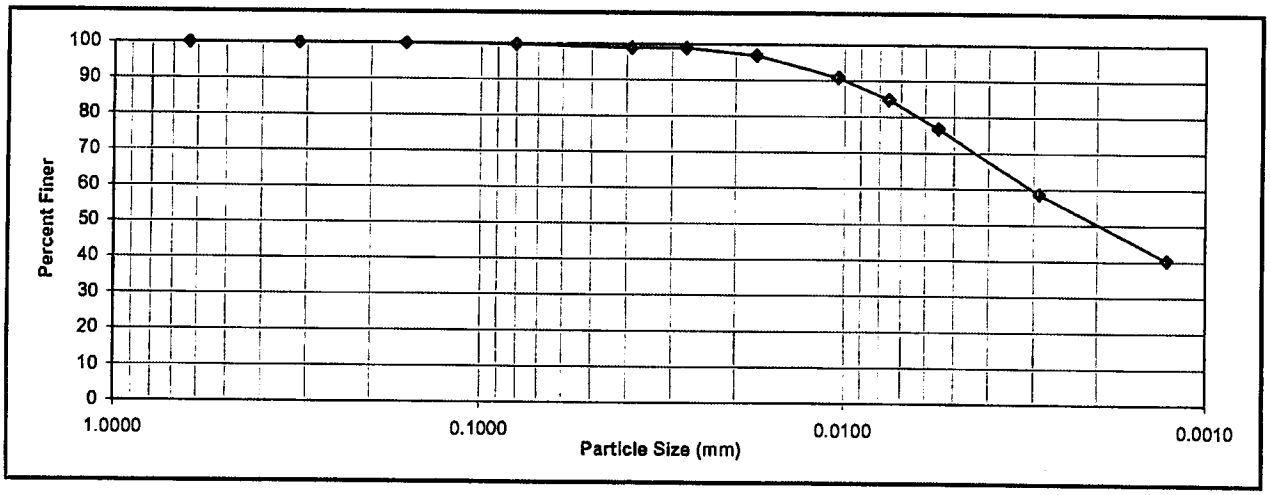
WT. OF PAN	(g)	8.6
WT. OF PAN + AIR DRIED SAMPLE	(g)	117.5
WT. OF PAN + OVEN DRIED SAMPLE	(g)	114.3
WT. OF WATER	(g)	3.2
WT. OF OVEN DRIED	(g)	105.7
HYGROSCOPIC MOISTURE CONTENT	(%)	3.03

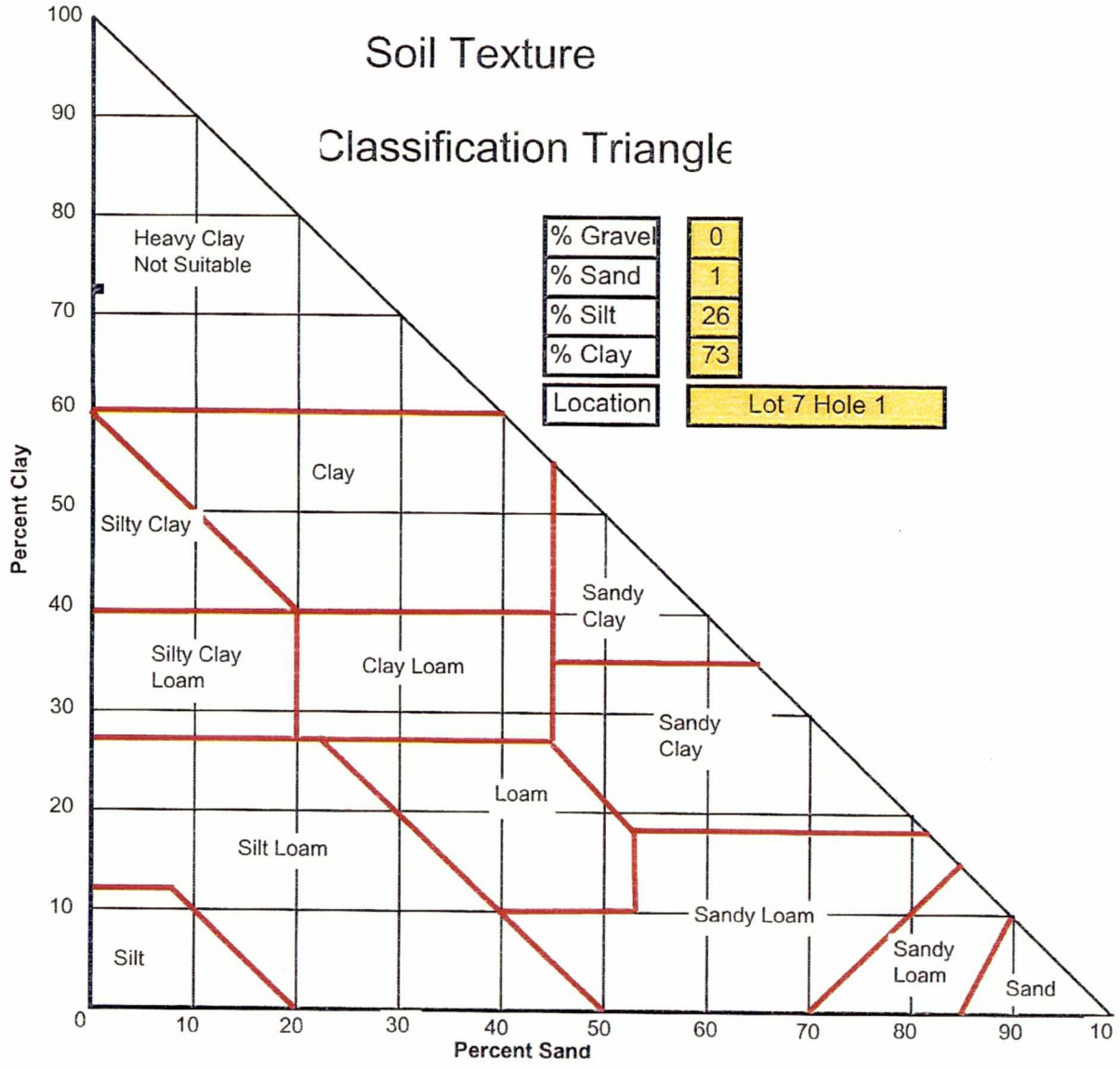
Sieve Analysis on Material from Hydrometer Test

SIEVE SIZE (µm)	WT. RETAINED (g)	WT. PASSING (g)	PERCENT FINER	D (mm)
1250	0.0	48.5	100.00	1.2500
630	0.0	48.5	100.00	0.6300
315	0.0	48.5	100.00	0.3150
160	0.0	48.5	100.00	0.1600
80	0.1	48.4	99.79	0.0800

Hydrometer Test

TIME (min)	HYDROMETER READING	ADJ. HYDROMETER READING	EFFECTIVE DEPTH, L (cm)	PERCENT FINER	D (mm)
1	56	49	8.3	98.95	0.0386
2	56	49	8.3	98.95	0.0273
5	55	48	8.4	96.93	0.0175
15	52	45	8.9	90.87	0.0104
30	49	42	9.4	84.81	0.0075
60	45	38	10.1	76.73	0.0055
250	36	29	11.5	58.56	0.0029
1440	N/A	n/a	13.0	40.39	0.0013




Soil Texture
Classification Triangle
% Gravel 0
% Sand 1
% Silt 26
% Clay 73
Location Lot 7 Hole 1
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Silt
Sandy
Loam
Sand
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

EXH Engineering Services Ltd.

PARTICLE SIZE DISTRIBUTION
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General Information

CLIENT	Mark Chamberlin	GRAVEL (>4.75mm)	%	0
SAMPLE LOCATION	Lot 7 Hole 2	SAND (0.074mm-4.75mm)	%	1
DATE	November 11, 2008	SILT (0.074mm-0.005mm)	%	26
LAB TECHNICIAN(S)	J. Read	CLAY(<0.005mm)	%	73

Raw Data

TOTAL SAMPLE WT.	(g)	590.9
WT. RETAINED > 4.75mm	(g)	0.0

Hydrometer Info

HYDROMETER TYPE		152 - H
COMPOSITE CORRECTION		7
SPECIFIC GRAVITY (Gs)	(kg/m^3)	2.75
AIR DRY WT. OF TEST SPECIMEN	(g)	50.0
k-FACTOR (from table)		0.01345
CORRECTED SAMPLE WT.	(g)	48.6

Moisture Content

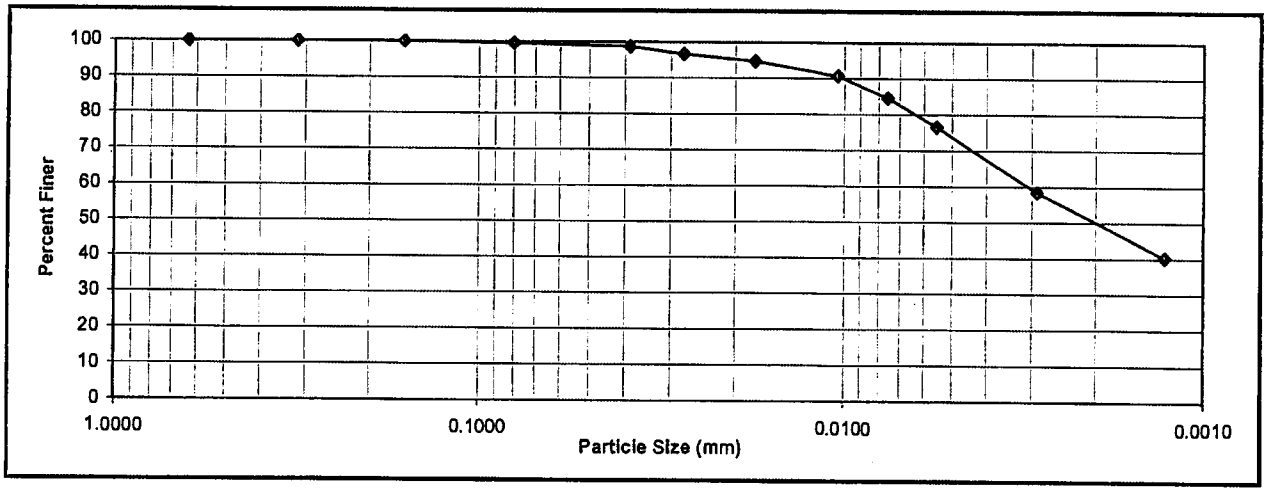
WT. OF PAN	(g)	8.1
WT. OF PAN + AIR DRIED SAMPLE	(g)	111.2
WT. OF PAN + OVEN DRIED SAMPLE	(g)	108.4
WT. OF WATER	(g)	2.8
WT. OF OVEN DRIED	(g)	100.3
HYGROSCOPIC MOISTURE CONTENT	(%)	2.79

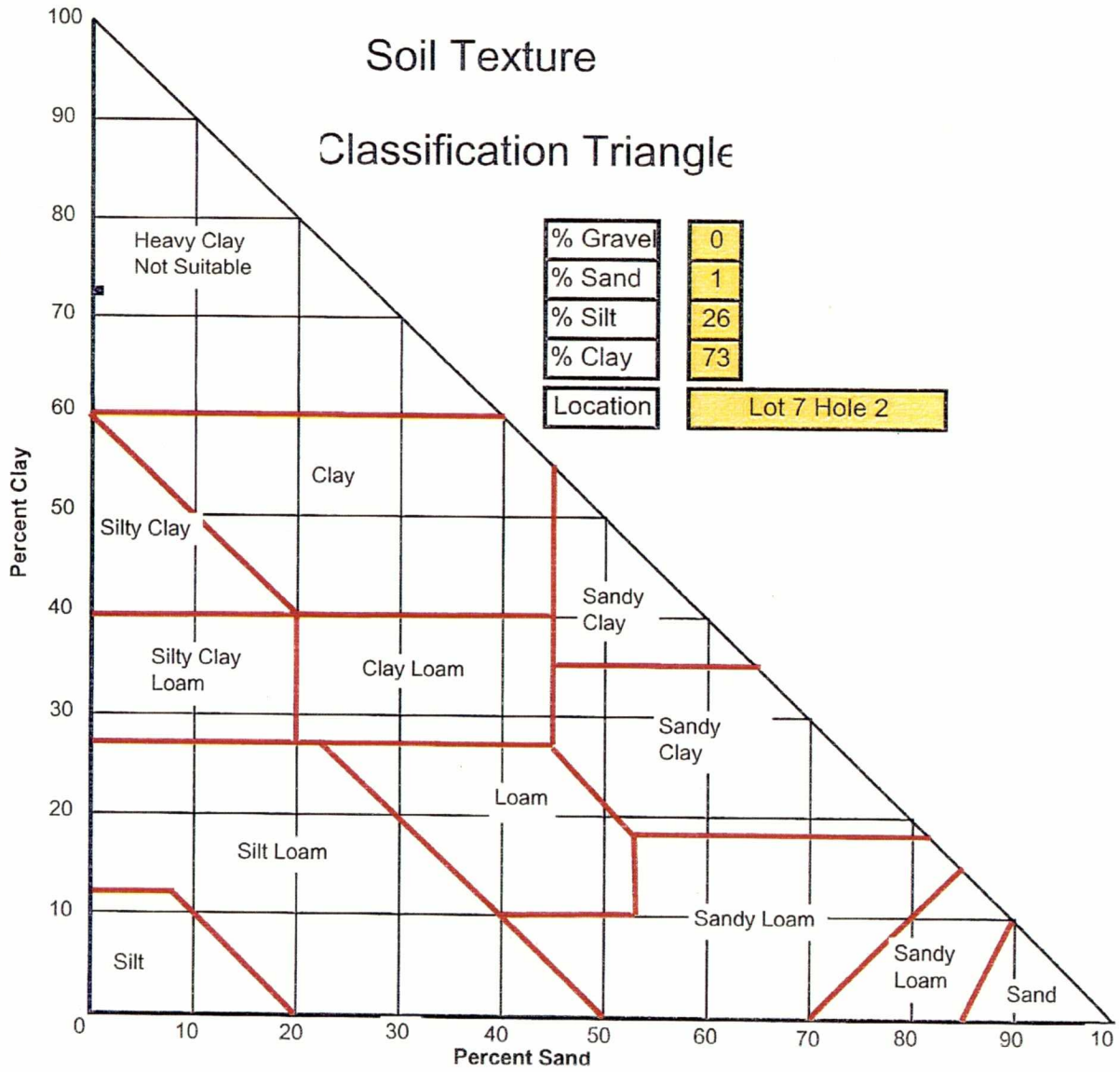
Sieve Analysis on Material from Hydrometer Test

SIEVE SIZE (µm)	WT. RETAINED (g)	WT. PASSING (g)	PERCENT FINER	D (mm)
1250	0.0	48.6	100.00	1.2500
630	0.0	48.6	100.00	0.6300
315	0.0	48.6	100.00	0.3150
160	0.0	48.6	100.00	0.1600
80	0.2	48.4	99.59	0.0800

Hydrometer Test

TIME (min)	HYDROMETER READING	ADJ. HYDROMETER READING	EFFECTIVE DEPTH, L (cm)	PERCENT FINER	D (mm)
1	56	49	8.3	98.72	0.0386
2	55	48	8.4	96.71	0.0276
5	54	47	8.6	94.69	0.0176
15	52	45	8.9	90.66	0.0104
30	49	42	9.4	84.62	0.0075
60	45	38	10.1	76.56	0.0055
250	36	29	11.5	58.43	0.0029
1440	N/A	n/a	13.0	40.29	0.0013




Soil Texture
Classification Triangle
% Gravel 0
% Sand 1
% Silt 26
% Clay 73
Location Lot 7 Hole 2
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Silt
Sandy
Loam
Sand
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

EXH Engineering Services Ltd.

PARTICLE SIZE DISTRIBUTION
HYDROMETER ANALYSIS
ASTM D422

General Information

CLIENT	Mark Chamberlin	GRAVEL (>4.75mm)	%	0
SAMPLE LOCATION	Lot 8 Hole 1	SAND (0.074mm-4.75mm)	%	0
DATE	November 12, 2008	SILT (0.074mm-0.005mm)	%	25
LAB TECHNICIAN(S)	J. Read	CLAY(<0.005mm)	%	75

Test Results

Raw Data

TOTAL SAMPLE WT.	(g)	882.0
WT. RETAINED > 4.75mm	(g)	0.0

Hydrometer Info

HYDROMETER TYPE		152 - H
COMPOSITE CORRECTION		7
SPECIFIC GRAVITY (Gs)	(kg/m^3)	2.75
AIR DRY WT. OF TEST SPECIMEN	(g)	50.0
k-FACTOR (from table)		0.01361
CORRECTED SAMPLE WT.	(g)	48.3

Moisture Content

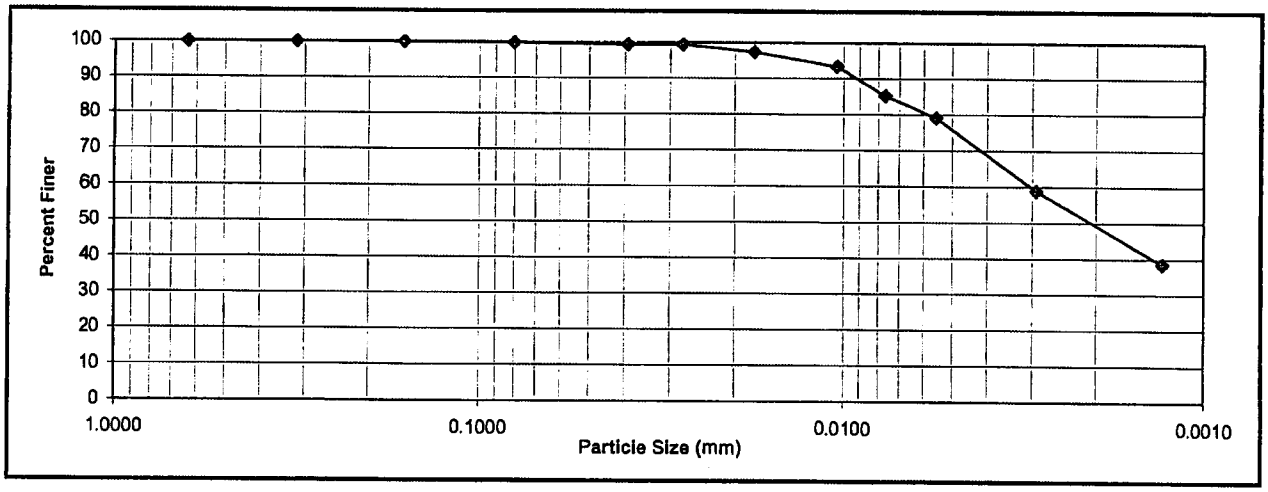
WT. OF PAN	(g)	8.1
WT. OF PAN + AIR DRIED SAMPLE	(g)	111.3
WT. OF PAN + OVEN DRIED SAMPLE	(g)	107.8
WT. OF WATER	(g)	3.5
WT. OF OVEN DRIED	(g)	99.7
HYGROSCOPIC MOISTURE CONTENT	(%)	3.51

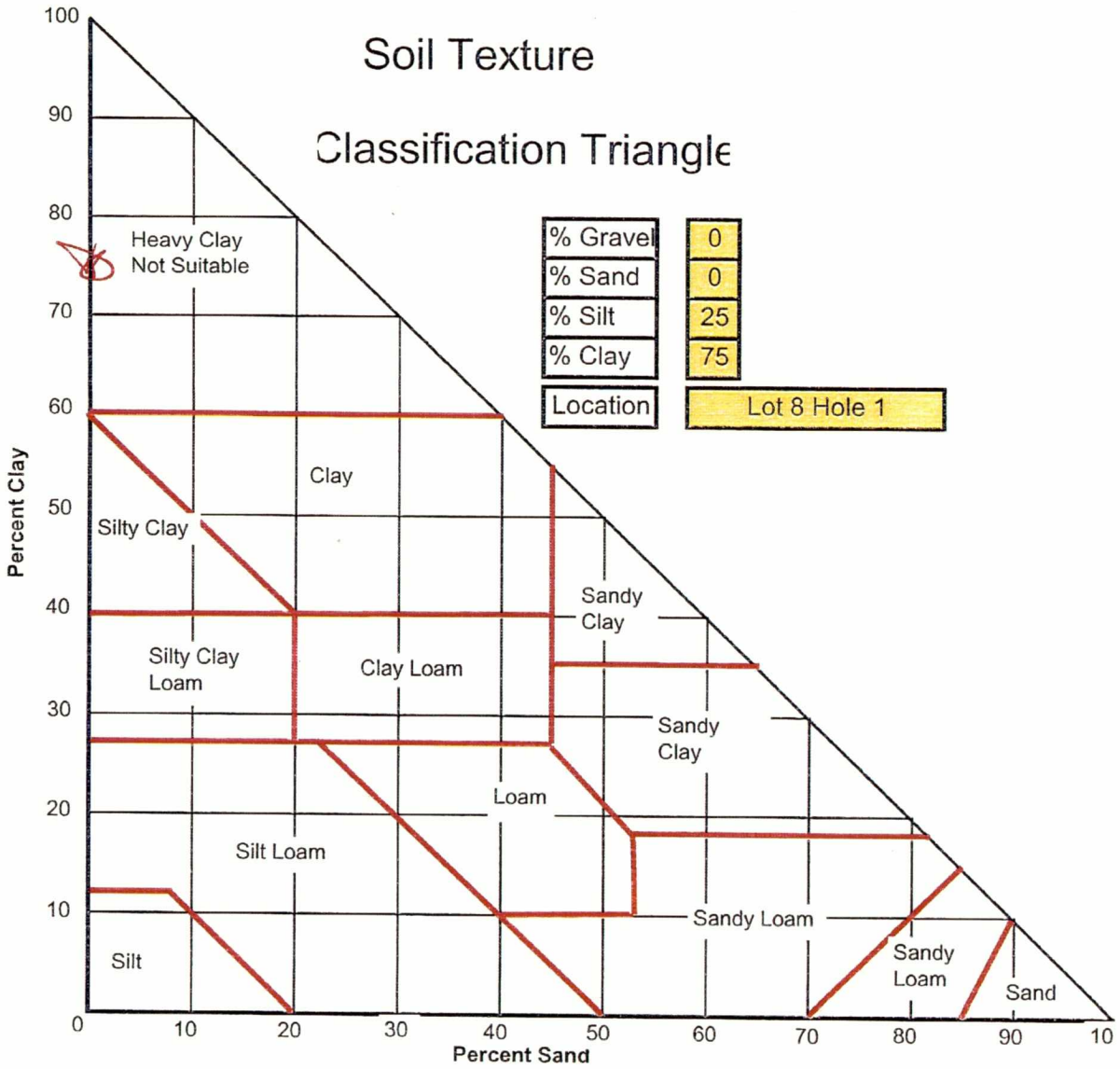
Sieve Analysis on Material from Hydrometer Test

SIEVE SIZE (µm)	WT. RETAINED (g)	WT. PASSING (g)	PERCENT FINER	D (mm)
1250	0.0	48.3	100.00	1.2500
630	0.0	48.3	100.00	0.6300
315	0.0	48.3	100.00	0.3150
160	0.0	48.3	100.00	0.1600
80	0.1	48.2	99.79	0.0800

Hydrometer Test

TIME (min)	HYDROMETER READING	ADJ. HYDROMETER READING	EFFECTIVE DEPTH, L (cm)	PERCENT FINER	D (mm)
1	56	49	8.3	99.41	0.0391
2	56	49	8.3	99.41	0.0276
5	55	48	8.4	97.38	0.0177
15	53	46	8.7	93.33	0.0104
30	49	42	9.4	85.21	0.0076
60	46	39	9.9	79.12	0.0055
250	36	29	11.5	58.84	0.0029
1440	N/A	n/a	13.2	38.55	0.0013




Soil Texture
Classification Triangle
% Gravel 0
% Sand 0
% Silt 25
% Clay 75
Location Lot 8 Hole 1
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Silt
Sandy
Loam
Sand
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

EXH Engineering Services Ltd.

PARTICLE SIZE DISTRIBUTION
HYDROMETER ANALYSIS
ASTM D422

General Information

CLIENT	Mark Chamberlin
SAMPLE LOCATION	Lot 8 Hole 2
DATE	November 11, 2008
LAB TECHNICIAN(S)	J. Read

Test Results

GRAVEL (>4.75mm)	%	0
SAND (0.074mm-4.75mm)	%	0
SILT (0.074mm-0.005mm)	%	24
CLAY(<0.005mm)	%	76

Raw Data

TOTAL SAMPLE WT.	(g)	891.7
WT. RETAINED > 4.75mm	(g)	0.0

Hydrometer Info

HYDROMETER TYPE		152 - H
COMPOSITE CORRECTION		7
SPECIFIC GRAVITY (Gs)	(kg/m^3)	2.75
AIR DRY WT. OF TEST SPECIMEN	(g)	50.0
k-FACTOR (from table)		0.01345
CORRECTED SAMPLE WT.	(g)	48.5

Moisture Content

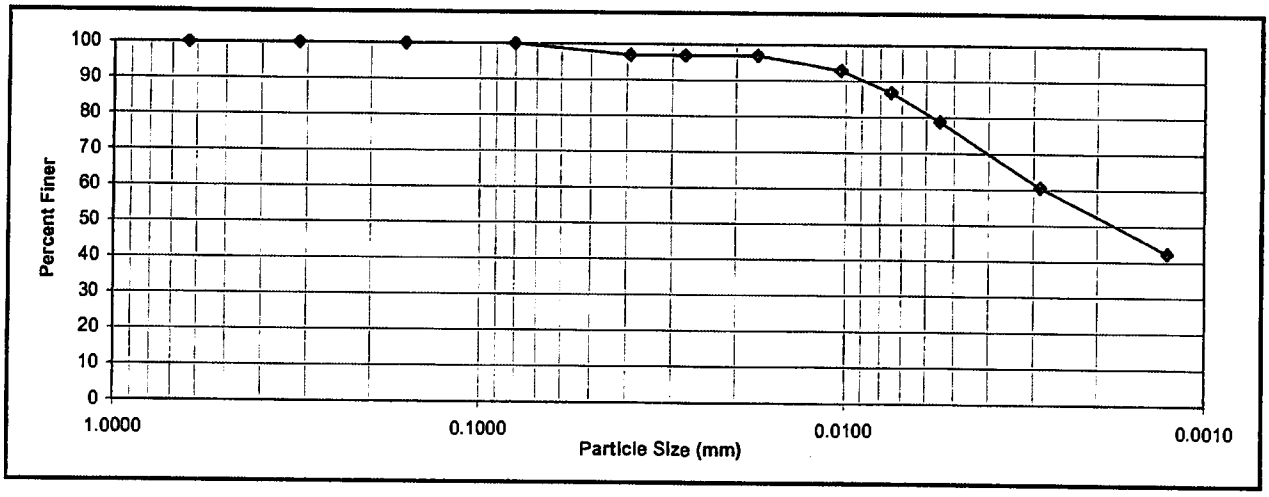
WT. OF PAN	(g)	8.2
WT. OF PAN + AIR DRIED SAMPLE	(g)	110.7
WT. OF PAN + OVEN DRIED SAMPLE	(g)	107.7
WT. OF WATER	(g)	3
WT. OF OVEN DRIED	(g)	99.5
HYGROSCOPIC MOISTURE CONTENT	(%)	3.02

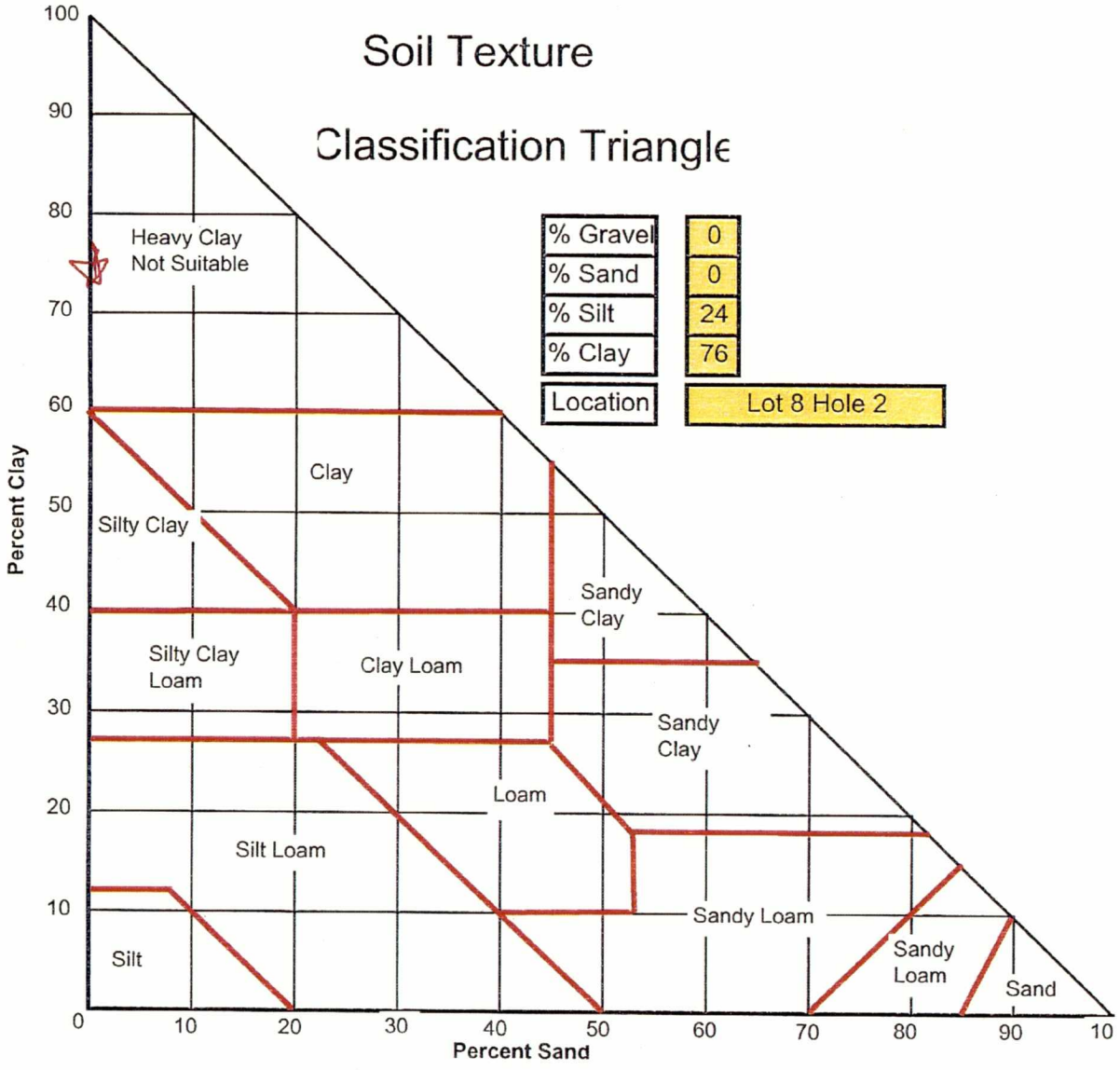
Sieve Analysis on Material from Hydrometer Test

SIEVE SIZE (µm)	WT. RETAINED (g)	WT. PASSING (g)	PERCENT FINER	D (mm)
1250	0.0	48.5	100.00	1.2500
630	0.0	48.5	100.00	0.6300
315	0.0	48.5	100.00	0.3150
160	0.0	48.5	100.00	0.1600
80	0.0	48.5	100.00	0.0800

Hydrometer Test

TIME (min)	HYDROMETER READING	ADJ. HYDROMETER READING	EFFECTIVE DEPTH, L (cm)	PERCENT FINER	D (mm)
1	55	48	8.4	96.92	0.0390
2	55	48	8.4	96.92	0.0276
5	55	48	8.4	96.92	0.0175
15	53	46	8.7	92.88	0.0103
30	50	43	9.2	86.82	0.0075
60	46	39	9.9	78.74	0.0055
250	37	30	11.4	60.57	0.0029
1440	N/A	n/a	12.8	42.40	0.0013




Soil Texture
Classification Triangle
% Gravel 0
% Sand 0
% Silt 24
% Clay 76
Location Lot 8 Hole 2
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Silt
Sandy
Loam
Sand
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

EXH Engineering Services Ltd.

PARTICLE SIZE DISTRIBUTION
HYDROMETER ANALYSIS
ASTM D422

General Information

CLIENT	Mark Chamberlin	GRAVEL (>4.75mm)	%	0
SAMPLE LOCATION	Lot 10 Hole 1	SAND (0.074mm-4.75mm)	%	1
DATE	November 12, 2008	SILT (0.074mm-0.005mm)	%	29
LAB TECHNICIAN(S)	J. Read	CLAY(<0.005mm)	%	70

Test Results

Raw Data

TOTAL SAMPLE WT.	(g)	683.9
WT. RETAINED > 4.75mm	(g)	0.0

Hydrometer Info

HYDROMETER TYPE		152 - H
COMPOSITE CORRECTION		7
SPECIFIC GRAVITY (Gs)	(kg/m^3)	2.75
AIR DRY WT. OF TEST SPECIMEN	(g)	50.0
k-FACTOR (from table)		0.01361
CORRECTED SAMPLE WT.	(g)	48.6

Moisture Content

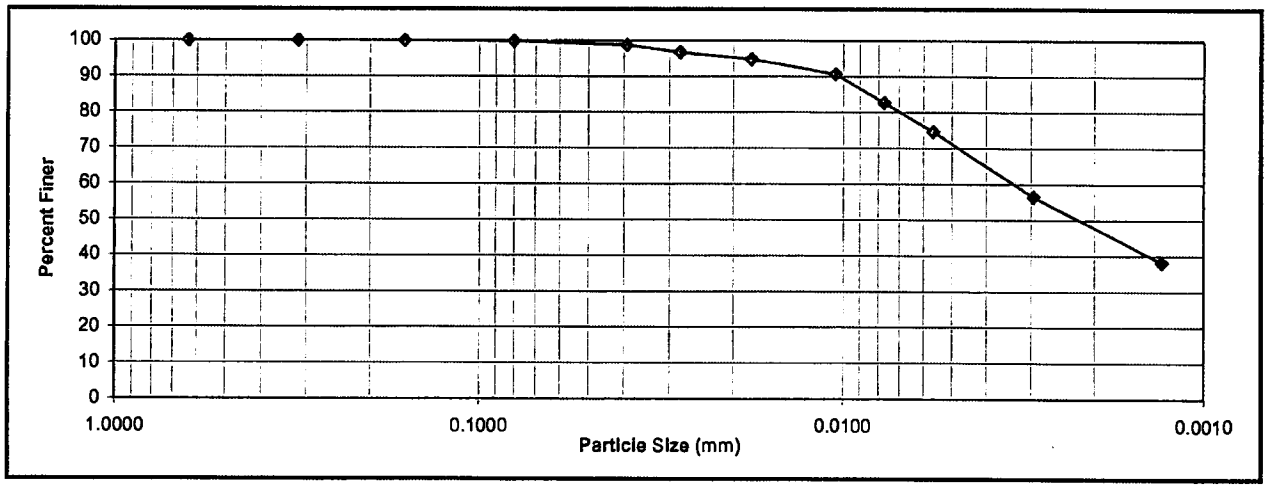
WT. OF PAN	(g)	8.3
WT. OF PAN + AIR DRIED SAMPLE	(g)	109.4
WT. OF PAN + OVEN DRIED SAMPLE	(g)	106.6
WT. OF WATER	(g)	2.8
WT. OF OVEN DRIED	(g)	98.3
HYGROSCOPIC MOISTURE CONTENT	(%)	2.85

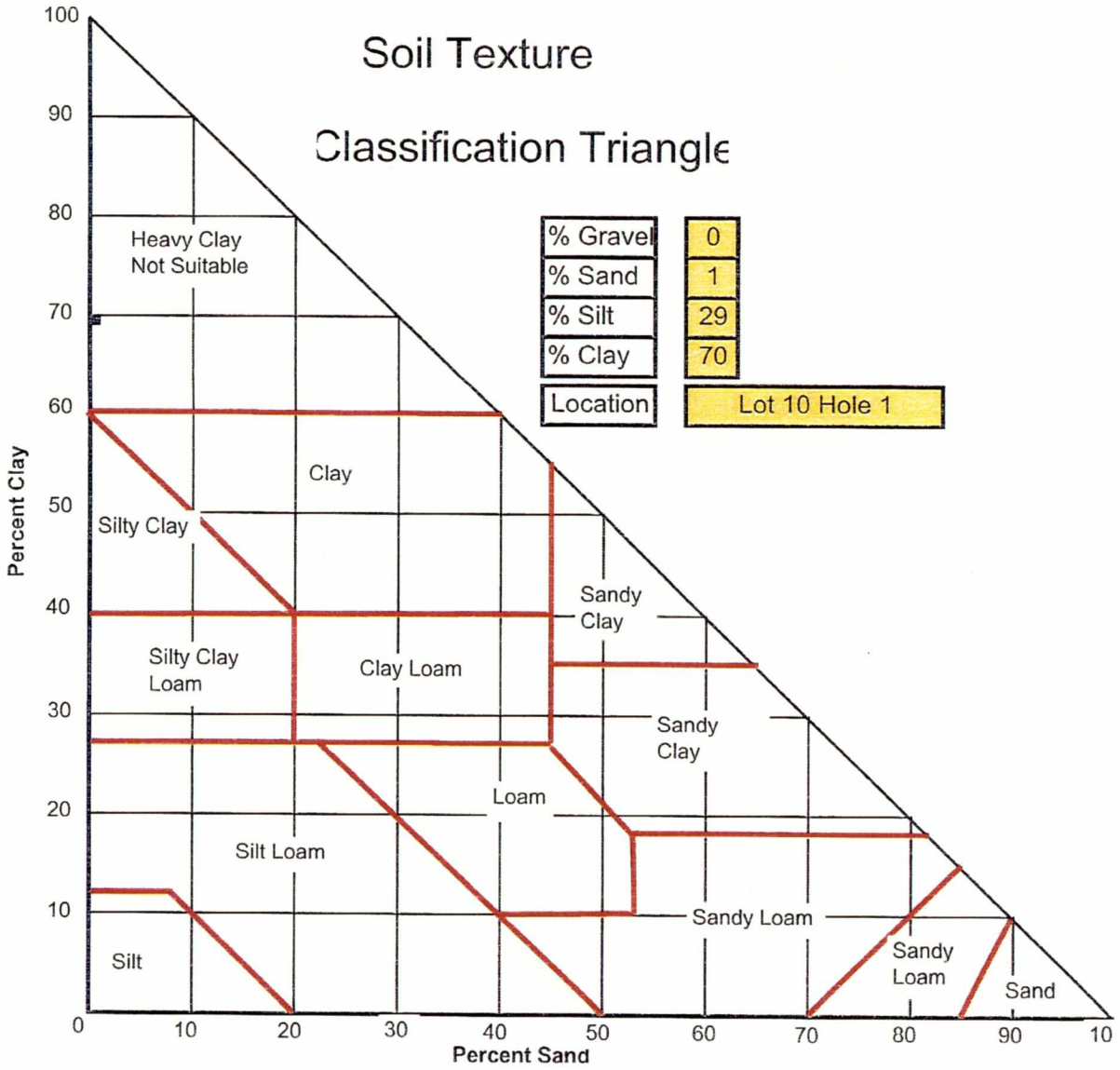
Sieve Analysis on Material from Hydrometer Test

SIEVE SIZE (µm)	WT. RETAINED (g)	WT. PASSING (g)	PERCENT FINER	D (mm)
1250	0.0	48.6	100.00	1.2500
630	0.0	48.6	100.00	0.6300
315	0.0	48.6	100.00	0.3150
160	0.0	48.6	100.00	0.1600
80	0.1	48.5	99.79	0.0800

Hydrometer Test

TIME (min)	HYDROMETER READING	ADJ. HYDROMETER READING	EFFECTIVE DEPTH, L (cm)	PERCENT FINER	D (mm)
1	56	49	8.3	98.78	0.0391
2	55	48	8.4	96.76	0.0279
5	54	47	8.6	94.74	0.0178
15	52	45	8.9	90.71	0.0105
30	48	41	9.6	82.65	0.0077
60	44	37	10.2	74.59	0.0056
250	35	28	11.7	56.44	0.0029
1440	N/A	n/a	13.2	38.30	0.0013




Soil Texture
Classification Triangle
% Gravel 0
% Sand 1
% Silt 29
% Clay 70
Location Lot 10 Hole 1
Heavy Clay
Not Suitable
Clay
Silty Clay
Sandy
Clay
Silty Clay
Loam
Clay Loam
Sandy
Clay
Loam
Silt Loam
Sandy Loam
Silt
Sandy
Loam
Sand
Percent Clay
Percent Sand
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
10

APPENDIX C

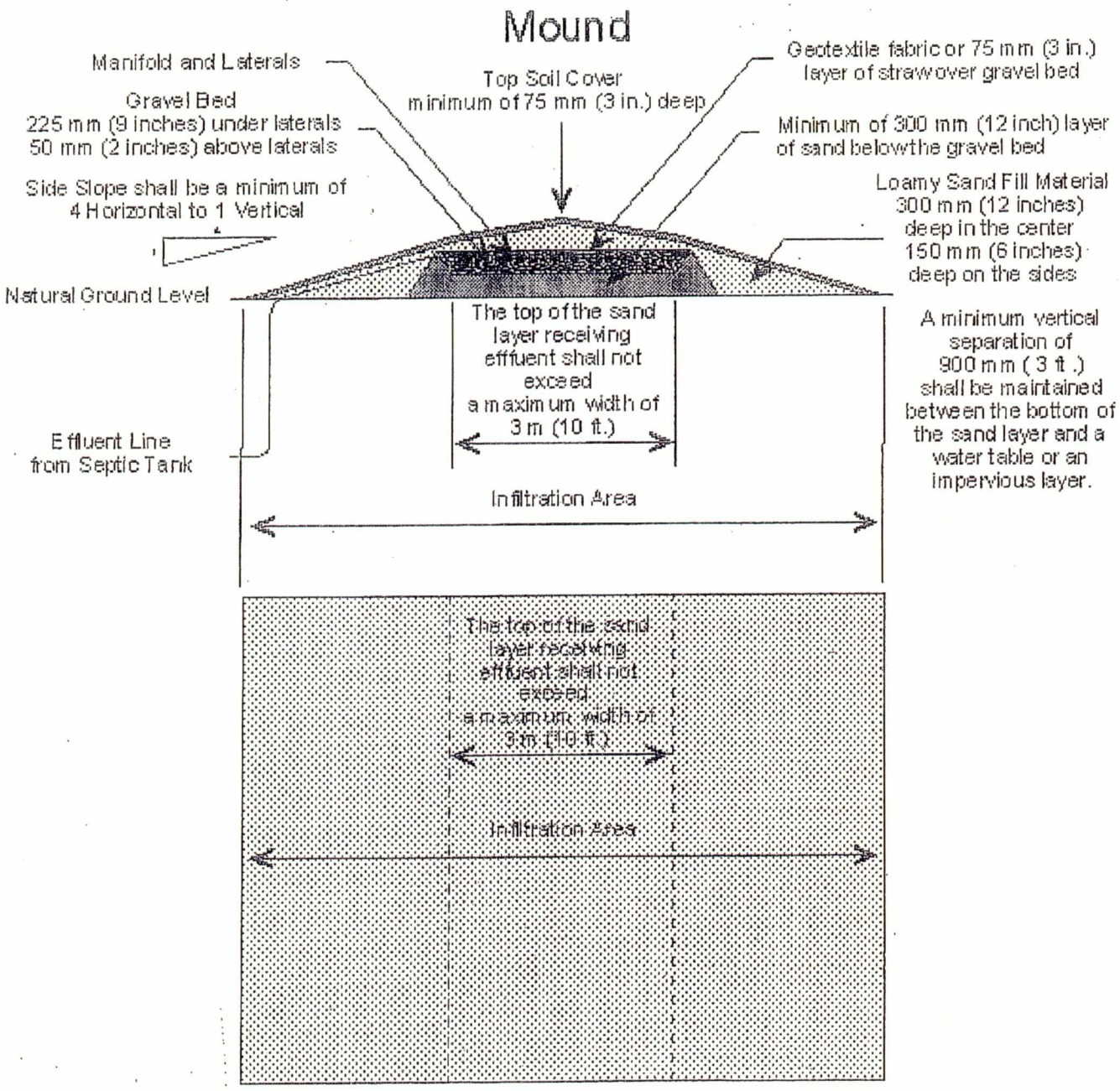

Mound
Manifold and Laterals
Gravel Bed
225 mm (9 inches) under laterals
50 mm (2 inches) above laterals
Side Slope shall be a minimum of
4 Horizontal to 1 Vertical
Natural Ground Level
Top Soil Cover
minimum of 75 mm (3 in.) deep
Geotextile fabric or 75 mm (3 in.)
layer of straw over gravel bed
Minimum of 300 mm (12 inch) layer
of sand below the gravel bed
Loamy Sand Fill Material
300 mm (12 inches)
deep in the center
150 mm (6 inches)
deep on the sides
The top of the sand
layer receiving
effluent shall not
exceed
a maximum width of
3 m (10 ft.)
A minimum vertical
separation of
900 mm (3 ft .)
shall be maintained
between the bottom of
the sand layer and a
water table or an
impervious layer.
Effluent Line
from Septic Tank
Infiltration Area
The top of the sand
layer receiving
effluent shall not
exceed
a maximum width of
3 m (10 ft.)
Infiltration Area

Fig. M1

APPENDIX 2) Groundwater Potential Study
Prepared by Waterline Resources Inc.
{Note: Full Report Attached}

Waterline Resources Inc.

Waterline Resources Inc.
531 - 24 Avenue N.W.
Calgary, Alberta
Canada, T2M 1X4
Tel: (403) 243-5611
Fax: (403) 243-5613
Email: info@waterlineresources.com

October 14, 2009
WL09-1515

Marc Chamberland
Box 6756
Edson, Alberta
T7E 1T8

c/o Genivar Consultants
Unit 131, 135 – 27th St.
Edson, Alberta
T7E 1N9

Attention: Doug Laboucane

Dear Mr. Laboucane:

RE: ADDENDUM LETTER FOR CHAMBERLAND PHASE I GROUNDWATER POTENTIAL STUDY, PROPOSED 10-LOT RESIDENTIAL SUBDIVISION DEVELOPMENT LOCATED WITHIN SW-36-053-17-W5M, NEAR EDSON, ALBERTA.

INTRODUCTION AND BACKGROUND

In January, 2008 Waterline Resources Inc. (Waterline) was retained by Genivar Consultants (Genivar) on behalf of Marc Chamberland (the developer) to complete a Phase I Groundwater Potential Study for a proposed 10-Lot residential subdivision development (the Site). At the time of the report preparation, the planned development location provided to Waterline by Genivar was listed as located within NW-25-053-17-W5M, near Edson, Alberta. Since that time, Genivar has updated the Site location (Revised Site) to be located within SW-36-053-17-W5M (i.e., the quarter section located immediately north of the Site). In light of the Revised Site location, Genivar has asked Waterline to comment as to whether the findings of Waterline's January, 2008 report prepared for the Site would be valid for the revised Site location.

The conclusions of the January, 2008 report prepared for the Site are as follows:

- Information available from published reports and from the AENV database indicates that the wells in the study area are completed to an average depth of 36.02 m bGL, and are completed in fractured sandstone/shale bedrock of the Dalehurst Member of the Paskapoo Formation.

- The estimated sustainable yield from wells completed in shallow bedrock within the general study area is mapped as 23 to 114 L/min and 114 to 455 L/min per single well, in the northern and southern part of the quarter-section, respectively. Based on well records in the AENV database, the average yield from wells located in NW-25-053-17-

W5M and within a 1.0 km radius is calculated at 128.81 L/min. The well tests indicate that the single well yields generally fall within and sometimes above the range of safe yields mapped for the area.

- The groundwater resource development potential appears to be moderate to high and sustained production from aquifers underlying the site could meet the groundwater diversion requirement of the proposed 10-lot residential development (12,500 m^3/year) as specified in the *Act*, without adversely impacting existing users. Site-specific testing would be required to more fully assess the actual aquifer development potential.

- Based on the data available in the AENV Database, the groundwater quality in the upper bedrock in the study area appears to have a TDS concentration in the range of approximately 318 to 530 mg/L, and is characterized as a sodium-bicarbonate type water. This evaluation is based on limited available groundwater chemistry information and a detailed chemistry and bacteriological analysis would be required to confirm groundwater quality beneath the site.

- A field-verified water well survey was not carried out as part of the present study and therefore surrounding groundwater use cannot be confirmed.

- Waterline's conclusion is based on the assessment of potential impacts on local aquifers while only considering present resource utilization and utilization proposed for the subject development. This conclusion assumes that existing and proposed users do not over-exploit the groundwater resource by excessive short-term use and that they maintain consumption within the residential water needs as presented in the Provincial Guidelines.

- If greater detail on the sustainable groundwater development of the aquifers underlying the site is required, an existing site water well could be inspected to determine its applicability for use in completing a 24-hour aquifer test. If the well is acceptable for testing, the test program would consist of installing temporary automated groundwater level monitoring devices (datalogger and transducer) in the well to monitor groundwater levels in the well, and possibly in a surrounding well, while one well is pumped at a constant-rate for 24-hours. Groundwater levels would continue to be monitored for an additional 24-hours once the pump was shut-off. Analysis of the groundwater level versus time data would then be completed to assess the expected long-term yield of the well and aquifer in the area. Greater detail on the test program methodology and costs can be provided on request.

- A communal well field or water supply system might be considered as an alternative to individually serviced lots. Communal water systems allow for better groundwater management. The main reason for this is that community systems must be licensed under the *Water Act* and generally require fewer water wells. In addition, a licensed communal system requires monitoring and reporting of groundwater levels and diversion rates, which are not generally required for privately-owned wells. Greater detail in regards to this system can be provided on request.

DISCUSSION OF REVISED SITE INFORMATION

Waterline completed a review of readily available geology, hydrogeology, groundwater chemistry, water well records and well yields, etc for the Revised Site, and for 36-053-17-W4M. The review shows that the expected well yields and groundwater quality of the Revised Site and original Site are essentially the same. As such, Waterline's findings from the January, 2008 report remain unchanged for the Revised Site. However, as indicated in our January, 2008 report, if greater detail on the sustainable groundwater development of the aquifers underlying the site is required, an existing site water well could be inspected to determine its applicability for use in completing a 24-hour aquifer test. If the well is acceptable for testing, the test program would consist of installing temporary automated groundwater level monitoring devices (datalogger and transducer) in the well to monitor groundwater levels in the well, and possibly in a surrounding well, while one well is pumped at a constant-rate for 24-hours. Groundwater levels would continue to be monitored for an additional 24-hours once the pump was shut-off. Analysis of the groundwater level versus time data would then be completed to assess the expected long-term yield of the well and aquifer in the area. Greater detail on the test program methodology and costs can be provided on request

CLOSURE

The present study should be combined with the results of any future site-specific hydrogeological investigations, should they be completed, to gain a more complete understanding of the site-specific aquifer conditions underlying the study area. This will allow for the results of the present study to be updated, as necessary, and will serve to promote groundwater resource management and protection in the area for current and future users.

The findings presented in this report are based upon a review of published maps and reports, and information available from the AENV water well and approvals databases. This report is intended for use in support of the application for subdivision under the Municipal Government Act, and should not be considered as a Water Management Plan or as an Environmental Site Assessment.

It should be noted that Waterline does not employ health care professionals, and any health related questions with regards to water quality should be discussed with the local health authority.

The enclosed study has been carried out in accordance with generally accepted hydrogeological practices. No other warranty is intended or implied.

Respectfully submitted

Waterline Resources Inc.
APEGGA Permit To Practice No. P07329

Jamie Wills, M.Sc., P.Geol.
Principal Hydrogeologist

Waterline Resources Inc.
531 - 24 Avenue N.W.
Calgary, Alberta
Canada, T2M 1X4
Tel: (403) 243-5611
Fax: (403) 243-5613
Email: info@waterlineresources.com

January, 2008
WL09-1515

Marc Chamberland
Box 6756
Edson, Alberta
T7E 1T8

c/o Genivar Consultants
Unit 131, 135 – 27th St.
Edson, Alberta
T7E 1N9

Attention: Doug Laboucane

Dear Mr. Laboucane:

RE: PHASE I GROUNDWATER POTENTIAL STUDY FOR A PROPOSED 10-LOT RESIDENTIAL SUBDIVISION DEVELOPMENT LOCATED WITHIN NW-25-053-17-W5M, NEAR EDSON, ALBERTA.

INTRODUCTION AND BACKGROUND

Waterline Resources Inc. (Waterline) was retained by Genivar Consultants (Genivar) on behalf of Marc Chamberland (the developer) to complete a Phase I Groundwater Potential Study for a proposed 10-Lot residential subdivision development located within NW-25-053-17-W5M (the site), near Edson, Alberta. The site location is shown on Figure 1.

This report presents a review of area geology, hydrogeology, groundwater chemistry, water well records and well yields, etc., which can be used as a planning tool by the developer to better understand the groundwater development potential at the site. The report also provides information on applicable guidelines with respect to groundwater resource development.

Investigation Guidelines

In terms of water use guidelines, the 1994 Alberta Environment (AENV) publication "interim Guidelines for the Evaluation of Groundwater Supply for Unserviced Residential Subdivisions Using Privately Owned Domestic Water Wells" would apply to the site. These guidelines are recommended for use for unserviced residential subdivisions where the water supply will be provided by privately owned domestic water wells and, where the number of residential parcels within one quarter section is six or more.

As stated in the guidelines, the principle of sustainable development should guide the utilization of groundwater resources. Specifically, the guidelines state that: "the threat of groundwater

shortages and contamination grows with the density of wells and their collective demand on the local groundwater resources". The guidelines also state that as a component of a General Municipal Plan, groundwater availability could be mapped and used as criteria for locating future unserviced residential subdivisions. In any area, continued development of the groundwater resource can ultimately exceed recharge of the aquifers causing groundwater mining, which can result in a lowering of groundwater levels. A regional assessment would have to be completed by/for regulatory authorities in order to assess these impacts on the aquifer system. The results of this type of study should be adopted into groundwater management criteria for future use in locating and managing other developments within the County. This philosophy has been incorporated into the *Water Act* (the *Act*), which came into force January 1, 1999. The *Act* sets up the framework for the future development of "Water Management Plans" within defined watersheds. This approach is also consistent with AENV's move to a wellhead protection and integrated watershed management philosophy.

Section 23 (3) which states that a person residing within a subdivision on a parcel of land has the right to commence and continue the diversion of water only if *"a report certified by a professional engineer, professional geologist or professional geophysicist, as defined in the Engineering, Geological and Geophysical Professions Act, was submitted to the subdivision authority as part of the application for subdivision under the Municipal Government Act, and the report states that the diversion of 1,250 cubic metres of water per year for household purposes under section 21 for each of the households within the subdivision will not interfere with any household users, licensees or traditional agriculture users who exist when the subdivision is approved."*

Relevant to the proposed development at the site, the *Act* specifies that the diversion of 1,250 m^3/year per household (household use as defined in the *Act*) for the proposed new undeveloped lots should not interfere with any household users, licensees or traditional agriculture users who exist when the subdivision is approved. Therefore, an objective of this study is to render a professional opinion, based on a review of readily available information, as to whether aquifers underlying the proposed 10 undeveloped lots in the subject area can sustain production of 12,500 m^3/year (1,250 m^3/year/lot x 10 lots) or continuous production of approximately 23.8 L/min. Furthermore, the study also needs to address whether managed diversion of that groundwater will negatively impact existing users of the groundwater resource, as defined in the *Act*.

In terms of existing water use, there would be an assumption that existing domestic users in the area, and users proposed at the site will utilize less than or equal to 1,250 m^3/year/lot obtained at a daily rate of less than or equal to (1,250 m^3/year/lot ÷ 365 days) 3.43 m^3/day/lot. The 1994 AENV publication "Interim Guidelines For The Evaluation Of Groundwater Supply For Unserviced Residential Subdivisions Using Privately Owned Domestic Water Wells" indicates that residential water needs are estimated to be 0.23 - 0.68 m^3/day/person. Therefore, a water consumption limit of 3.43 m^3/day/lot is considered conservative for an average family.

Information Sources

Information sources included the AENV Provincial Water Well Database (AENV, 2009a), the AENV Authorization/Approval Viewer (AENV, 2009b) and relevant and readily attainable published geology and hydrogeology maps and reports.

GEOLOGY

The surficial geology within the site is mapped as a Pleistocene aged lacustrine deposit (Roed, 1970). This deposit is predominately composed of clay, silt and sand that may be laminated (Roed, 1970). Immediately west of the site however, the surficial geology changes from a lacustrine deposit to a glacial till (Roed, 1970). This till, called the Edson till, includes minor quartzite, granite and metamorphic clasts, in a silt clay matrix of very low carbonate content (Roed, 1970).

Bedrock beneath the site is mapped as the Paskapoo Formation, which is described as a non-marine calcareous cherty sandstone, siltstone and mudstone with minor amounts of conglomerate, limestone, coal and tuft beds (Vogwill, 1983). Furthermore, Hydrogeological Consultants Ltd. (HCL, 2004) maps the bedrock beneath the site as being the Dalehurst Member of the Paskapoo Formation. The Dalehurst Member can be up to 500 m thick and is primarily composed of shale and siltstone with sandstone, bentonite and coal seams or zones (HCL, 2004). Two prominent coal zones within the Dalehurst are the Obed-Marsh Coal (up to 30 m thick) and the Lower Dalehurst Coal (up to 50 m thick, HCL, 2004). The bottom of the Lower Dalehurst Coal is the border between the Dalehurst and Lacombe Members (HCL, 2004).

Figure 2 presents a hydrogeologic cross-section orientated south-north, which extends through the general site location. The cross-section surface trace is shown on Figure 1. The cross-section includes soil and bedrock stratigraphy data obtained from five (5) water wells completed within and adjacent to the site (AENV Well ID No. 0477378, 0365387, 1025045, 1220060 and 1025082). Copies of the completion records for the water wells used in the hydrogeological cross-section are provided for reference in Appendix A.

The geology recorded on water well completion records (AENV, 2009a) for the study area (Figure 1) is consistent with the regional geologic mapping conducted by Roed (1970) and Vogwill (1983) and is logged mainly as clay underlain by layers of shale and sandstone.

HYDROGEOLOGY

AENV Database

The AENV database lists thirteen (13) water well records within approximately a 1.0 km radius of NW-25-53-17-W5M (AENV, 2009a). Information for all records is summarized in Table A1 in Appendix A. Full records are also provided in Appendix A for water well drilling reports used to construct the hydrogeological cross-section. From Table A1, it should be noted that four (4) of the thirteen (13) water wells are located within the proposed quarter section, NW-25-53-17-

W5M. The records within approximately a 1.0 km radius of NW-25-53-17-W5M indicate that groundwater use within the study area is predominately for domestic consumption (9 records) with lesser use for industrial (2 records), stock (1 record) and investigative purposes (1 record).

It should also be noted that of the thirteen (13) water wells identified, only a subset typically represent currently active water wells. A field-verified survey would be required to ascertain the status of these wells.

In addition to the AENV water well database (AENV, 2009a), the AENV Authorization/Approval Viewer database (AENV, 2009b) was searched to provide additional information on potential groundwater use within the study area. No approvals, licenses or registrations under the *Water Act* were identified to be within approximately a 1.0 km radius of the site.

Well Completion Depth and Static Water Level

Water wells in the general site area appear to be completed within 13.72 to 54.86 meters below ground level (m bGL), with a calculated average depth of 36.02 m bGL, primarily in sandstone and shale units of the Paskapoo Formation (Vogwill, 1983). Static groundwater levels, measured in the wells following construction, were measured between 3.05 and 28.96 meters below the top of casing (m bTOC), with a calculated average static groundwater level depth of 18.16 m bTOC.

Aquifer Depth and Well Yield

The main water bearing units developed for domestic water supplies in NW-25-53-17-W5M appear to be sandstone units within the Paskapoo Formation. The groundwater diversion probability for wells in the study area is mapped as 23 to 114 L/min and 114 to 455 L/min, in the northern and southern part of the quarter-section, respectively (Vogwill, 1983). These estimates where obtained from qualitative information such as flow regime and lithology (Vogwill, 1983).

Limited duration well tests, completed by the drilling contractors following well construction, on wells located within a 1.0 km radius of the site, have been conducted in the range of 45.46 to 340.96 L/min, with a calculated average test rate of 128.81 L/min. Therefore, the well tests appear to indicate that the average single well yields are within and sometimes above the range of groundwater probability mapped in the study area by Vogwill (1983).

Groundwater Quality

Based on the Vogwill (1983) report, the regional groundwater quality in the area is mapped as having a total dissolved solids (TDS) concentration in the order of <500 mg/L, with cations dominated by sodium, and anions dominated by bicarbonate. Five (5) AENV (AENV, 2009a) water quality reports for groundwater samples collected from wells located within a 1.0 km radius of the site were reviewed (refer to Table A1 in Appendix A). The chemistry reports have been included for reference in Appendix A. In the reports, the TDS concentrations range from 318 to 530 mg/L, with the analysis indicating that sodium-bicarbonate type groundwater appears to prevail in the study area.

Table 1 presents the dominant laboratory-tested parameter concentrations analyzed from groundwater samples collected from 3 water wells located within a close proximity to the site. In addition, Table 1 also presents the applicable Guidelines for Canadian Drinking Water Quality (GCDWQ, Health Canada, 2008) for reference purposes.

Table 1: Summary of Dominant Chemical Parameters for Selected Area Wells

PARAMETER	Well ID# 0481919	Well ID# 0481923	Well ID# 0365387	GCDWQ (2008)
Location (LSD-SEC-TWP-RGE-W5M)	NW-25-053-17	NE-25-053-17	SW-25-053-17	N/A
Date Sampled (mm/dd/yyyy)	10/12/1973	Not recorded	Not recorded	N/A
pH	7.3	8.4	8.5	6.5-8.5 AO
Electrical Conductivity (EC) uS/cm	800	750	820	N/A
Total Dissolved Solids (TDS) mg/L	409	480	488	≤ 500 AO
Bicarbonate (HCO_3) mg/L	500	N/A	N/A	N/A
Sulphate (SO_4) mg/L	10.0	44.9	19.0	≤ 500 AO
Chloride (Cl) mg/L	3.0	1.1	1.0	≤ 250 AO
Fluoride (F) mg/L	0.21	0.15	0.25	1.5 MAC
Calcium (Ca) mg/L	51.9	9.9	23.3	N/A
Magnesium (Mg) mg/L	30.0	5.3	9.1	N/A
Sodium (Na) mg/L	62.0	177.0	173.5	≤ 200 AO
Total Iron (Fe) mg/L	0.2	0.03	**5.9**	≤ 0.3 AO
Nitrate-N mg/L	0.1	N/A	N/A	10 MAC
Nitrite-N mg/L	1.0	N/A	N/A	1 MAC

Notes: Underlined and **bolded** values indicate exceedance of the GCDWQ (2008) with AO – aesthetic objective or MAC – maximum acceptable concentration, N/A is not applicable or not analyzed.

All measured parameters meet the Guidelines for Canadian Drinking Water Quality (Health Canada, 2008), with the exception of iron, which exceeds the aesthetic objective of 0.3 mg/L in the sample collected at Well ID# 0365387.

The Groundwater Center (TGWC) database (MOW-TECH Ltd., 2008) was also searched within the site location and surrounding eight quarter-sections in order to supplement groundwater chemistry data. The range for the expected groundwater TDS concentration within the Dalehurst Member is 419 – 523 mg/L. This is consistent with the Vogwill (1983) mapping. Copies of the TGWC reports are provided for reference in Appendix B.

A full suite of chemical and bacterial analysis will be required in order to confirm the groundwater quality beneath the proposed site location.

Estimated Groundwater Allocation

The overall estimated groundwater use within approximately a 1.0 km radius of the site is estimated at 12,500 m^3/year (domestic/stock water use for 10 water wells x 1,250 m^3/year per well). This estimate is considered conservative as all of the wells located within the water well search radius are likely not active and all active wells do not likely use the full 1,250 m^3/year allocation. The water use excludes that of the two industrial and one investigation well records, which is unknown.

The planned 10-lot development would increase the area water use by 12,500 m^3/year.

CONCLUSIONS

Based on the data reviewed in the present study, Waterline has reached the following conclusions:

- Information available from published reports and from the AENV database indicates that the wells in the study area are completed to an average depth of 36.02 m bGL, and are completed in fractured sandstone/shale bedrock of the Dalehurst Member of the Paskapoo Formation.

- The estimated sustainable yield from wells completed in shallow bedrock within the general study area is mapped as 23 to 114 L/min and 114 to 455 L/min per single well, in the northern and southern part of the quarter-section, respectively. Based on well records in the AENV database, the average yield from wells located in NW-25-053-17-W5M and within a 1.0 km radius is calculated at 128.81 L/min. The well tests indicate that the single well yields generally fall within and sometimes above the range of safe yields mapped for the area.

- The groundwater resource development potential appears to be moderate to high and sustained production from aquifers underlying the site could meet the groundwater diversion requirement of the proposed 10-lot residential development (12,500 m^3/year) as specified in the *Act*, without adversely impacting existing users. Site-specific testing would be required to more fully assess the actual aquifer development potential.

- Based on the data available in the AENV Database, the groundwater quality in the upper bedrock in the study area appears to have a TDS concentration in the range of approximately 318 to 530 mg/L, and is characterized as a sodium-bicarbonate type water. This evaluation is based on limited available groundwater chemistry information and a detailed chemistry and bacteriological analysis would be required to confirm groundwater quality beneath the site.

- A field verified water well survey was not carried out as part of the present study and therefore surrounding groundwater use cannot be confirmed.

- Waterline's conclusion is based on the assessment of potential impacts on local aquifers while only considering present resource utilization and utilization proposed for the subject development. This conclusion assumes that existing and proposed users do not over-exploit the groundwater resource by excessive short-term use and that they maintain consumption within the residential water needs as presented in the Provincial Guidelines.

- If greater detail on the sustainable groundwater development of the aquifers underlying the site is required, an existing site water well could be inspected to determine its applicability for use in completing a 24-hour aquifer test. If the well is acceptable for

testing, the test program would consist of installing temporary automated groundwater level monitoring devices (datalogger and transducer) in the well to monitor groundwater levels in the well, and possibly in a surrounding well, while one well is pumped at a constant-rate for 24-hours. Groundwater levels would continue to be monitored for an additional 24-hours once the pump was shut-off. Analysis of the groundwater level versus time data would then be completed to assess the expected long-term yield of the well and aquifer in the area. Greater detail on the test program methodology and costs can be provided on request.

- A communal well field or water supply system might be considered as an alternative to individually serviced lots. Communal water systems allow for better groundwater management. The main reason for this is that community systems must be licensed under the *Water Act* and generally require fewer water wells. In addition, a licensed communal system requires monitoring and reporting of groundwater levels and diversion rates, which are not generally required for privately-owned wells. Greater detail in regards to this system can be provided on request.

CLOSURE

The present study should be combined with the results of any future site-specific hydrogeological investigations, should they be completed, to gain a more complete understanding of the site-specific aquifer conditions underlying the study area. This will allow for the results of the present study to be updated, as necessary, and will serve to promote groundwater resource management and protection in the area for current and future users.

The findings presented in this report are based upon a review of published maps and reports, and information available from the AENV water well and approvals databases. This report is intended for use in support of the application for subdivision under the Municipal Government Act, and should not be considered as a Water Management Plan or as an Environmental Site Assessment.

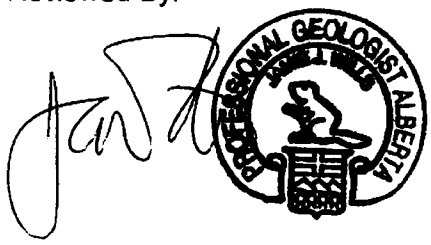
It should be noted that Waterline does not employ health care professionals, and any health related questions with regards to water quality should be discussed with the local health authority.

The enclosed study has been carried out in accordance with generally accepted hydrogeological practices. No other warranty is intended or implied.

Respectfully submitted
Waterline Resources Inc.
APEGGA Permit To Practice No. P07329

Ryan Bjornsen, B.Sc., Geol.I.T.
Project Hydrogeologist

Reviewed By:



Jamie Wills, M.Sc., P.Geol.
Principal Hydrogeologist

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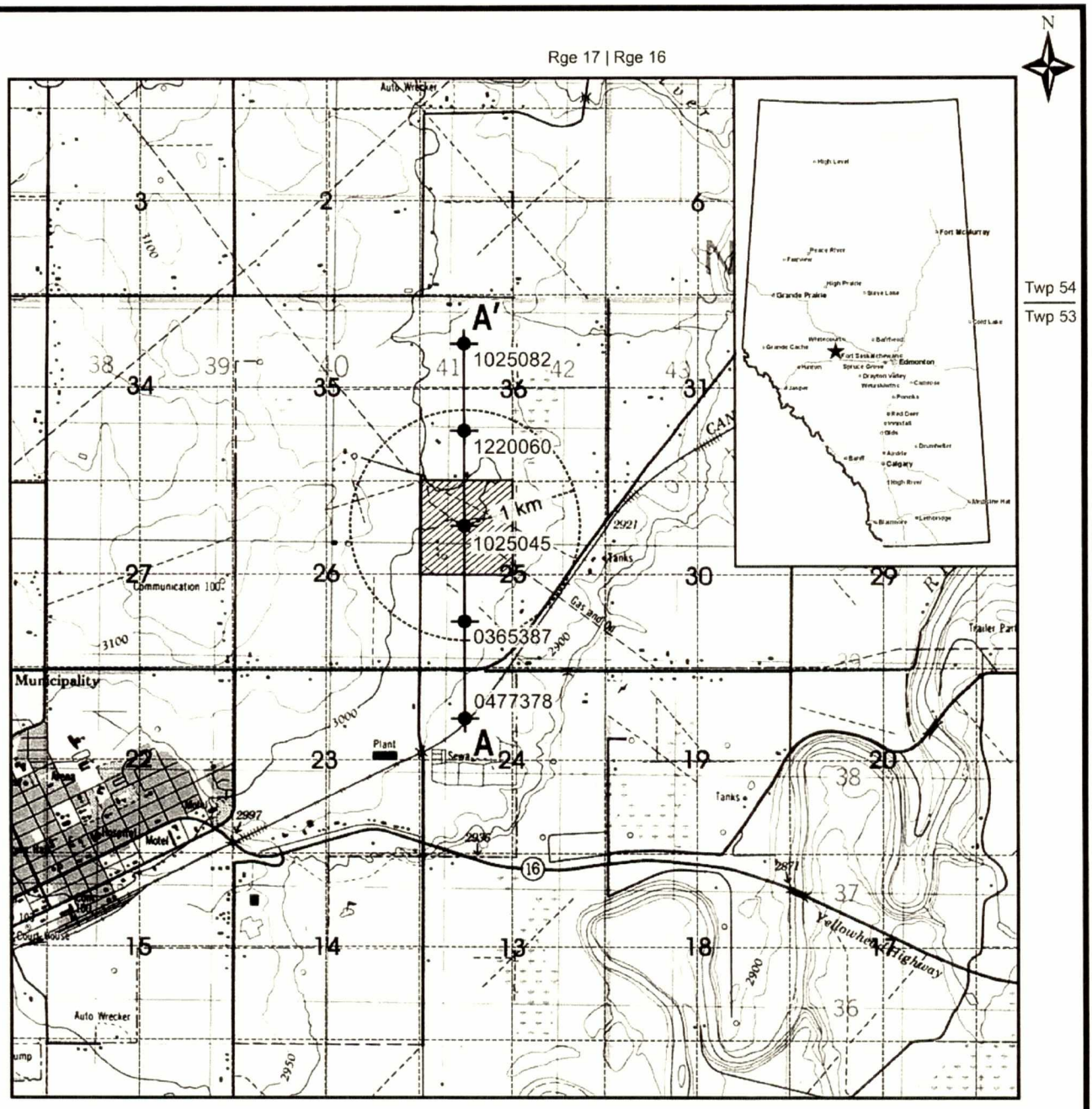
Roed, M.A., 1970. Surficial Geology of Edson. NTS 83F. Map Scale 1:250,000.

Vogwil, R.I.J., 1983. Hydrogeology of the Edson Area, Alberta. Alberta Research Council, Report 79-7. NTS 83F. Map Scale 1:250,000.

FIGURES

Figure 1: Site Location – Local Study Area
Figure 2: Local Hydrogeology Cross Section A-A'



MAP REFERENCE: 1 : 50 000, 83 F/09 (ETOPO)

LEGEND:

0477378	AENV WATER WELL ID #
✦	APPROXIMATE WATER WELL LOCATION
A——A'	CROSS-SECTION TRACE
▨	APPROXIMATE SITE LOCATION
◯	APPROXIMATE STUDY AREA

SCALE = 1 : 50 000

0 m 1000 m 2000 m

PROJECT

Phase I Groundwater Potential Study
Proposed 10-Lot Residential Subdivision Development
NW-25-053-17-W5M, near Edson, Alberta
Submitted to Marc Chamberland c/o Genivar Consultants

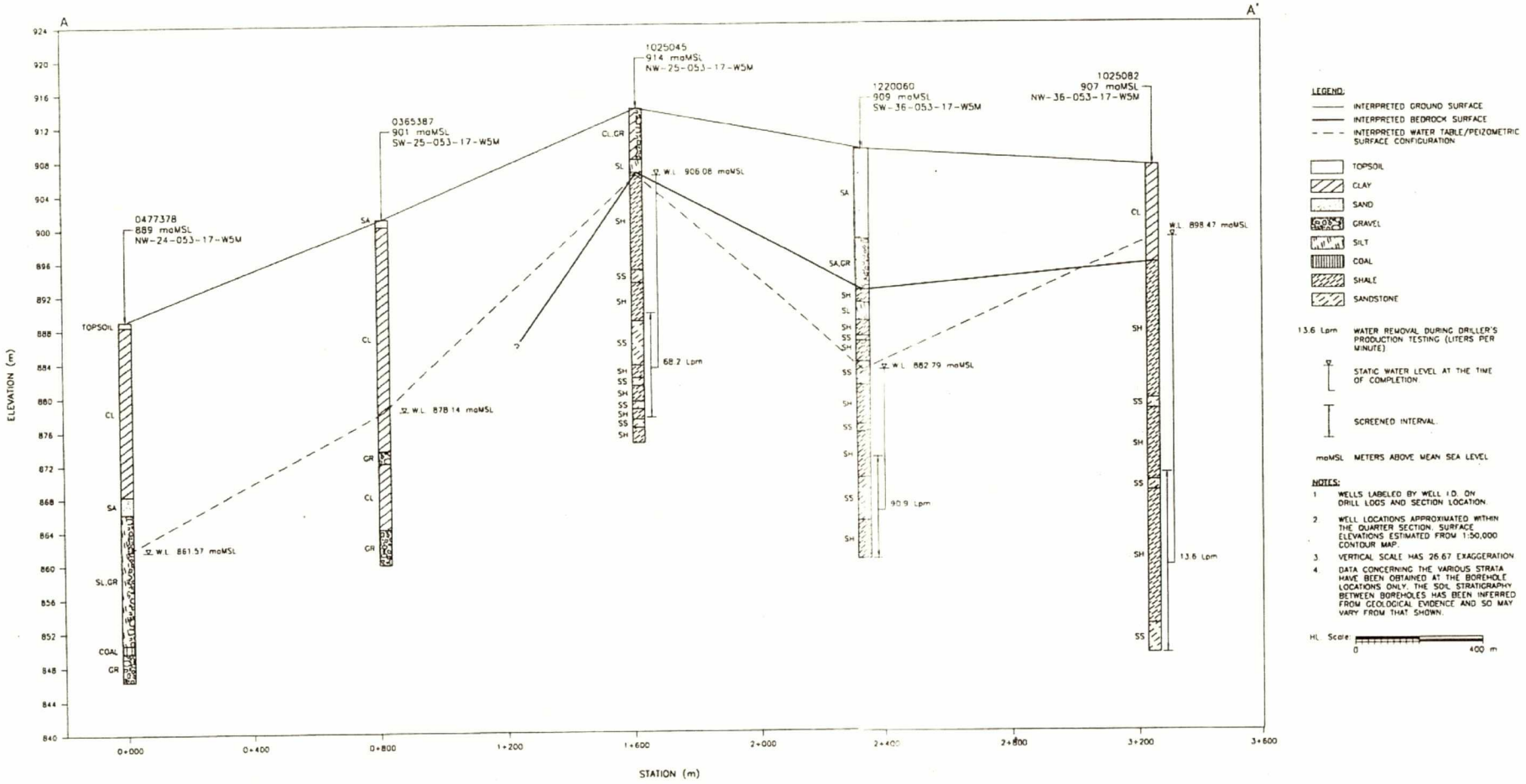
TITLE

SITE LOCATION – LOCAL STUDY AREA

Waterline Resources Inc.
Groundwater Resource and Environmental Consultants

PREPARED BY:	WATERLINE RESOURCES INC.
PROJECT:	WL09-1515
COMPILED BY:	CGD
REVIEWED BY:	
DATE ISSUED:	JANUARY 2009

FIGURE: 1



Phase I Groundwater Potential Study
Proposed 10-Lot Residential Subdivision Development
NW-25-053-17-W5M near Edson, Alberta
Submitted to Marc Chamberland c/o Genivar Consultants

LOCAL HYDROGEOLOGICAL CROSS SECTION A-A'

Waterline Resources Inc.
Groundwater Resource and Environmental Consultants

PREPARED BY: WATERLINE RESOURCES INC.
PROJECT: WL08-1515
COMPILED BY: --
REVIEWED BY: --
DATE: January 2009

FIGURE 2

APPENDIX A

TABLE A1: AENV WATER WELL RECONNAISSANCE REPORT, AENV WATER WELL DRILLING REPORTS AND AENV CHEMICAL ANALYSIS REPORTS

Table A1: Alberta Environment Reconnaissance Report Within Approximately a 1.0 km Radius of NW-25-053-17-W5M

WELL ID	W_M	TWP	RGE	SEC	LSD	DRILLING COMPANY	DATE COMPLETED (M/D/YYYY)	DEPTH (m bGL)	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL (m bTOC)	TEST RATE (Lpm)	CASING PERFS FROM (m bGL)	CASING PERFS TO (m bGL)
356957	5	53	17	36	SW	UNKNOWN DRILLER			Domestic	0	0	0	WALKER, MARLENE				
365387	5	53	17	25	SW	T-CAR HOLDINGS LTD.	9/14/1981	41.15	Stock	1	6	0	BUCKLE, STAN	22.86	90.92		
481919	5	53	17	25	NW	UNKNOWN DRILLER		39.62	Domestic	1	0	0	NELSON, KENNETH				
481920	5	53	17	25	NW	W&G WATER WELLS LTD	8/11/1981	42.67	Domestic	0	8	0	SLUCHINSKI, WERNER	15.24	181.84	36.58	42.67
481921	5	53	17	25	14	TERRY'S WATER WELLS (1980) LTD.	3/2/1983	18.29	Industrial	0	7	0	ALTCO #RIG WELL 42	3.05	340.96		
481922	5	53	17	25	NE	W&G WATER WELLS LTD	2/22/1978	54.86	Industrial	0	12	0	WILLIAM OIL TRANSPORT	22.86	113.65		
481923	5	53	17	25	NE	TERRY'S WATER WELLS (1980) LTD.	3/13/1973	36.58	Domestic	1	8	0	JEWEL, ROY		45.46		
481924	5	53	17	25	NE	TERRY'S WATER WELLS (1980) LTD.	5/25/1989	15.24	Domestic	0	4	0	SEIBEL, LYLE		181.84		
481997	5	53	17	36	SW	W&G WATER WELLS LTD		13.72	Investigation	0	0	0	MILLER, EVAN				
481998	5	53	17	36	SW	LINGO DRLG	9/1/1972	45.72	Domestic	1	8	0	SLUCHINSKI, W.	28.96	45.46		
481999	5	53	17	36	SW	UNKNOWN DRILLER			Domestic	1	0	0	KNETEMAN, LEONARD				
1025045	5	53	17	25	NW	ACCESS WATERWELLS INC.	7/9/2005	39.62	Domestic	0	0	0	SYMES, BRUCE	7.92	68.19	24.38	36.58
1220060	5	53	17	36	SW	CRAIG WATERWELL & DRILLING LTD.	6/20/2007	48.77	Domestic	0	0	0	PEDNEAULT, SEIGE	26.21	90.92	36.58	48.77
							Minimum	13.72						3.05	45.46		
							Maximum	54.86						28.96	340.96		
							Average	36.02						18.16	128.81		

Source: Alberta Environment Water Well Database.

Note: W_M - West of Meridian; TWP - Township; RGE - Range; SEC - Section; LSD - Legal Subdivision; bGL - below ground level; bTOC - below top of casing; L/min liters per minute; CHM - No. of chemistry reports; LT - lines of lithology; PT - lines of pump test data.

Water Well Drilling Report

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

Well I.D.:	1025082
Map Verified:	Not Verified
Date Report Received:	2006/10/17
Measurements:	Metric

1. Contractor & Well Owner Information

Company Name: ACCESS WATERWELLS INC.		Drilling Company Approval No.: 115592
Mailing Address: BOX 7297	City or Town: EDSON AB CA	Postal Code: T7E 1V5
WellOwner's Name: HENAULT, BRIAN & DARLENE	Well Location Identifier:	
P.O. Box Number:	Mailing Address: GEN DEL # 27	Postal Code: T7E 1T1
City: EDSON	Province: AB	Country: CA

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
NW	36	053	17	5

Location in Quarter
M from N Boundary
M from E Boundary

Lot Block Plan

Well Elev: M
How Obtain: Not Obtain

3. Drilling Information

Type of Work: New Well
Reclaimed Well
Date Reclaimed:
Materials Used: Unknown
Method of Drilling: Rotary
Flowing Well: No
Gas Present: No
Rate: Liters
Oil Present: No
Proposed well use: Domestic
Anticipated Water Requirements/day Liters

4. Formation Log

Depth from ground level (meters)	Lithology Description
11.58	Clay
27.74	Shale
28.96	Sandstone
37.49	Shale
38.71	Sandstone
54.56	Shale
57	Sand
57.91	Sandstone

5. Well Completion

Date Started(yyyy/mm/dd): 2004/09/30	Date Completed (yyyy/mm/dd): 2004/09/30
Well Depth: 57.91 M	Borehole Diameter: 15.88 CM
Casing Type: Steel	Liner Type: Plastic
Size OD: 14.13 CM	Size OD: 11.43 CM
Wall Thickness: 0.62 CM	Wall Thickness: 0.64 CM
Bottom at: 30.48 M	Top: 6.1 M Bottom: 57.91 M
Perforations from: 36.58 M to: 57.91 M from: M to: M from: M to: M	Perforations Size: 0.08 CM x 15.24 CM CM x CM CM x CM
Perforated by: Saw	
Seal: Driven from: 0 M	to: 30.48 M
Seal: Unknown from: M	to: M
Seal: Unknown from: M	to: M
Screen Type: Unknown from: M to: M	Screen ID: CM Slot Size: CM
Screen Type: Unknown from: M to: M	Screen ID: CM Slot Size: CM
Screen Installation Method: Unknown	
Fittings Top: Unknown	Bottom: Unknown
Pack: Unknown Grain Size:	Amount: Unknown
Geophysical Log Taken: Retained on Files:	
Additional Test and/or Pump Data Chemistries taken By Driller: No Held:	Documents Held:
Pitless Adapter Type: Drop Pipe Type: Length: M	Diameter: CM
Comments:	

6. Well Yield

Test Date (yyyy/mm/dd): 2004/09/30
Start Time: 11:00 AM
Test Method: Air

Non pumping static level: 8.53 M

Rate of water removal: 13.64 Liters/Min

Depth of pump intake: 57.91 M

Water level at end of pumping: 57.91 M

Distance from top of casing to ground level: 60.96 CM

Depth To water level (meters)

Elapsed Time Drawdown Minutes:Sec	Recovery
1:00	56.69
2:00	55.78
3:00	54.86
4:00	53.95
5:00	53.04
6:00	52.12
7:00	51.21
8:00	50.29
9:00	49.38
10:00	48.46
12:00	47.55
14:00	46.63
16:00	45.72
20:00	44.81
25:00	43.89
30:00	42.98
35:00	42.06
40:00	41.15
50:00	40.23
60:00	39.32
75:00	38.4
90:00	37.49
105:00	36.58
120:00	35.66

Total Drawdown: 49.38 M

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 13.64 Liters/Min

Recommended pump intake: 54.86 M

Type Pump Installed
Pump Type:
Pump Model:
H.P.:
Any further pumptest information? No

7. Contractor Certification

Driller's Name: GRANT SROKA
Certification No.: 13717Q

This well was constructed in accordance with the Water Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.

Signature Yr Mo Day

Water Well Drilling Report

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

Well I.D.:	1220060
Map Verified:	Not Verified
Date Report Received:	2008/04/24
Measurements:	Metric

1. Contractor & Well Owner Information

Company Name: CRAIG WATERWELL & DRILLING LTD.		Drilling Company Approval No.: 118161
Mailing Address: BOX 7983	City or Town: EDSON AB CA	Postal Code: T7E 1W2
WellOwner's Name: PEDNEAULT, SEIGE	Well Location Identifier:	
P.O. Box Number:	Mailing Address: 4319 - 6 AVE	Postal Code: T7E 1A7
City: EDSON	Province: AB	Country: CA

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
SW	36	053	17	5

Location in Quarter
M from N Boundary
M from E Boundary

Lot | Block | Plan

Well Elev: M | How Obtain: Not Obtain

3. Drilling Information

Type of Work: New Well
Reclaimed Well
Date Reclaimed: Materials Used: Unknown
Method of Drilling: Rotary
Flowing Well: No Rate: Liters
Gas Present: No Oil Present: No

Proposed well use: Domestic
Anticipated Water Requirements/day Liters

6. Well Yield

Test Date (yyyy/mm/dd): 2007/06/21 Start Time: 11:00 AM
Test Method: Air
Non pumping static level: 26.21 M
Rate of water removal: 90.92 Liters/Min
Depth of pump intake: 31.09 M
Water level at end of pumping: 31.09 M
Distance from top of casing to ground level: 60.96 CM

Depth To water level (meters)

Drawdown	Elapsed Time Minutes:Sec	Recovery
26.21	0:00	31.09
	1:00	28.65
	2:00	27.43
	3:00	27.43
	4:00	26.21
	5:00	26.21
	7:00	26.21
	8:00	26.21
31.09	9:00	26.21

Total Drawdown: 4.88 M
If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 45.46 Liters/Min
Recommended pump intake: M
Type Pump Installed
Pump Type:
Pump Model:
H.P.:
Any further pumptest information? No

4. Formation Log

Depth from ground level (meters)	Lithology Description
10.67	Sand
16.76	Gray Mixed Sand & Gravel
18.29	Gray Shale
20.42	Siltstone
22.25	Gray Shale
22.86	Salt & Pepper Sandstone
25.3	Gray Shale
28.04	Brown Sandstone
32.61	Gray Shale
33.53	Brown Sandstone
36.58	Bentonitic Shale
39.01	Gray Hard Shale
40.23	Salt & Pepper Sandstone
41.76	Bentonitic Sandstone
44.2	Gray Hard Sandstone
48.77	Dark Gray Shale

5. Well Completion

Date Started(yyyy/mm/dd): 2007/06/20
Date Completed (yyyy/mm/dd): 2007/06/20
Well Depth: 48.77 M
Borehole Diameter: 12.06 CM
Casing Type: Steel
Liner Type: Plastic
Size OD: 14.13 CM
Size OD: 11.43 CM
Wall Thickness: 0.66 CM
Wall Thickness: 0.55 CM
Bottom at: 31.39 M
Top: 18.29 M Bottom: 48.77 M
Perforations from: 36.58 M to: 48.77 M
from: M to: M
from: M to: M
Perforations Size: 0.32 CM x 30.48 CM
CM x CM
CM x CM
Perforated by: Saw
Seal: Driven & Bentonite from: 0 M to: 30.48 M
Seal: Unknown from: M to: M
Seal: Unknown from: M to: M
Screen Type: Unknown from: M to: M
Screen ID: CM
Slot Size: CM
Screen Type: Unknown from: M to: M
Screen ID: CM
Slot Size: CM
Screen Installation Method: Unknown
Fittings
Top: Unknown Bottom: Unknown
Pack: Unknown
Grain Size: Amount: Unknown
Geophysical Log Taken:
Retained on Files:
Additional Test and/or Pump Data
Chemistries taken By Driller: No
Held: Documents Held:
Pitless Adapter Type:
Drop Pipe Type:
Length: M Diameter: CM
Comments:

7. Contractor Certification

Driller's Name: WADE CRAIG
Certification No.: 15507A
This well was constructed in accordance with the Water Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.
Signature Yr Mo Day

Water Well Drilling Report

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

Well I.D.:	1025045
Map Verified:	Not Verified
Date Report Received:	2006/08/27
Measurements:	Metric

1. Contractor & Well Owner Information

Company Name: ACCESS WATERWELLS INC.		Drilling Company Approval No.: 115592
Mailing Address: BOX 7297	City or Town: EDSON AB CA	Postal Code: T7E 1V5
WellOwner's Name: SYMES, BRUCE	Well Location Identifier:	
P.O. Box Number:	Mailing Address: 4315 - 6 AVE	Postal Code: T7E 1A7
City: EDSON	Province: AB	Country: CA

2. Well Location

1/4 or LSD	Sec	Twp	Rge	West of M
NW	25	053	17	5

Location in Quarter
M from N Boundary
M from E Boundary

Lot | Block | Plan

Well Elev: M | How Obtain: Not Obtain

3. Drilling Information

Type of Work: New Well
Reclaimed Well
Date Reclaimed:
Materials Used: Unknown
Method of Drilling: Rotary
Flowing Well: No
Gas Present: No
Rate: Liters
Oil Present: No

Proposed well use: Domestic
Anticipated Water Requirements/day Liters

4. Formation Log

Depth from ground level (meters)	Lithology Description
6.1	Clay & Rocks
7.62	Siltstone
19.2	Shale
20.73	Sandstone
25.3	Shale
30.48	Sandstone
32	Shale
32.92	Sandstone
34.75	Shale
35.66	Sandstone
36.88	Shale
37.8	Sandstone
39.62	Shale

5. Well Completion

Date Started(yyyy/mm/dd): 2005/07/09	Date Completed (yyyy/mm/dd): 2005/07/09
Well Depth: 39.62 M	Borehole Diameter: 15.88 CM
Casing Type: Steel	Liner Type: Plastic
Size OD: 13.97 CM	Size OD: 11.43 CM
Wall Thickness: 0.48 CM	Wall Thickness: 0.64 CM
Bottom at: 24.99 M	Top: 21.34 M Bottom: 39.62 M
Perforations from: 24.38 M to: 36.58 M from: M to: M from: M to: M	Perforations Size: 0.08 CM x 15.24 CM CM x CM CM x CM
Perforated by: Saw	
Seal: Driven from: 0 M	to: 24.99 M
Seal: Unknown from: M	to: M
Seal: Unknown from: M	to: M
Screen Type: Unknown from: M to: M	Screen ID: CM Slot Size: CM
Screen Type: Unknown from: M to: M	Screen ID: CM Slot Size: CM
Screen Installation Method: Unknown	
Fittings Top: Unknown	Bottom: Unknown
Pack: Unknown Grain Size:	Amount: Unknown
Geophysical Log Taken: Retained on Files:	
Additional Test and/or Pump Data Chemistries taken By Driller: No Held:	Documents Held:
Pitless Adapter Type: Drop Pipe Type: Length: M	Diameter: CM
Comments:	

6. Well Yield

Test Date (yyyy/mm/dd): 2005/07/09	Start Time: 11:00 AM
Test Method: Air	
Non pumping static level:	7.92 M
Rate of water removal:	68.19 Liters/Min
Depth of pump intake:	39.62 M
Water level at end of pumping:	39.62 M
Distance from top of casing to ground level:	60.96 CM

Depth To water level (meters) Drawdown	Elapsed Time Minutes:Sec	Recovery
	0:00	39.62
	1:00	33.53
	2:00	28.96
	3:00	25.91
	4:00	23.47
	5:00	21.03
	6:00	18.9
	7:00	16.76
	8:00	14.94
	9:00	13.11
	10:00	11.58
	12:00	10.06
	14:00	8.84
	16:00	8.23
	20:00	7.92

Total Drawdown: 31.7 M

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 68.19 Liters/Min

Recommended pump intake: 36.58 M

Type Pump Installed
Pump Type:
Pump Model:
H.P.:
Any further pumptest information? No

7. Contractor Certification

Driller's Name: GRANT SROKA
Certification No.: 13717Q

This well was constructed in accordance with the Water Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.

Signature Yr Mo Day

Water Well Drilling Report

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

Well I.D.:	0365387
Map Verified:	Map
Date Report Received:	1981/10/27
Measurements:	Metric

1. Contractor & Well Owner Information

Company Name: T-CAR HOLDINGS LTD.		Drilling Company Approval No.: 119164
Mailing Address: 1542 66 STREET	City or Town: EDSON ALBERTA CANADA	Postal Code: T7E 1S4
WellOwner's Name: BUCKLE, STAN	Well Location Identifier:	
P.O. Box Number: 136	Mailing Address: EDSON	Postal Code: T0E 0P0
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
SW	25	053	17	5

Location in Quarter
0 M from Boundary
0 M from Boundary

Lot Block Plan

Well Elev: 899.16 M
How Obtain: Estimated

3. Drilling Information

Type of Work: New Well
Reclaimed Well
Date Reclaimed: Materials Used:
Method of Drilling: Rotary
Flowing Well: No
Gas Present: No
Rate: Liters
Oil Present: No
Proposed well use: Stock
Anticipated Water Requirements/day 0 Liters

4. Formation Log

Depth from ground level (meters)	Lithology Description
0.91	Sand
2.44	Clay
27.43	Silty Clay
28.96	Gravel
36.88	Silty Clay
41.15	Gravel

5. Well Completion

Date Started(yyyy/mm/dd): 1981/09/14	Date Completed (yyyy/mm/dd): 1981/09/14
Well Depth: 41.15 M	Borehole Diameter: 0 CM
Casing Type: Steel	Liner Type:
Size OD: 13.97 CM	Size OD: 0 CM
Wall Thickness: 0.48 CM	Wall Thickness: 0 CM
Bottom at: 37.8 M	Top: 0 M Bottom: 0 M

Perforations
from: 0 M to: 0 M
from: 0 M to: 0 M
from: 0 M to: 0 M
Perforations Size:
0 CM x 0 CM
0 CM x 0 CM
0 CM x 0 CM

Perforated by:

Seal: Driven
from: 0 M to: 0 M
Seal:
from: 0 M to: 0 M
Seal:
from: 0 M to: 0 M

Screen Type:
from: 0 M to: 0 M
Screen ID: 0 CM
Slot Size: 0 CM

Screen Type:
from: 0 M to: 0 M
Screen ID: 0 CM
Slot Size: 0 CM

Screen Installation Method:

Fittings
Top: Bottom:

Pack:
Grain Size: Amount:

Geophysical Log Taken:
Retained on Files:

Additional Test and/or Pump Data
Chemistries taken By Driller: Yes
Held: 1 Documents Held: 2

Pitless Adapter Type:
Drop Pipe Type:
Length: 25.91 M Diameter: 2.54 CM

Comments:
DRILLER REPORTS MEDIUM HARD WATER. CHEM
ORIGINALLY LOCATED @ LSD SW-25-53-17W5M

6. Well Yield

Test Date (yyyy/mm/dd): 1981/09/14	Start Time: 11:00 AM
Test Method: Pump	
Non pumping static level:	22.86 M
Rate of water removal:	90.92 Liters/Min
Depth of pump intake:	26.52 M
Water level at end of pumping:	M
Distance from top of casing to ground level:	CM

Depth To water level (meters)
Elapsed Time
Drawdown Minutes:Sec Recovery
Total Drawdown: 3.66 M

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 68.19 Liters/Min

Recommended pump intake: 27.74 M

Type Pump Installed
Pump Type: SUB
Pump Model: 4"
H.P.: 1/2
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: VA0144

This well was constructed in accordance with the Water Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.

Signature Yr Mo Day

Water Well Drilling Report

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

Well I.D.:	0477378
Map Verified:	Not Verified
Date Report Received:	1981/10/27
Measurements:	Metric

1. Contractor & Well Owner Information

Company Name: T-CAR HOLDINGS LTD.		Drilling Company Approval No.: 119164
Mailing Address: 1542 66 STREET	City or Town: EDSON ALBERTA CANADA	Postal Code: T7E 1S4
WellOwner's Name: GOMUWKA, TED	Well Location Identifier:	
P.O. Box Number: 354	Mailing Address: EDSON	Postal Code:
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
NW	24	053	17	5

Location in Quarter
0 M from Boundary
0 M from Boundary

Lot Block Plan

Well Elev: 899.16 M
How Obtain: Estimated

3. Drilling Information

Type of Work: New Well
Reclaimed Well
Date Reclaimed: Materials Used:
Method of Drilling: Rotary
Flowing Well: No
Gas Present: No
Rate: Liters
Oil Present: No
Proposed well use: Domestic
Anticipated Water Requirements/day 0 Liters

4. Formation Log

Depth from ground level (meters)	Lithology Description
0.61	Overburden
1.83	Clay
20.73	Silty Clay
22.86	Red Sand
38.4	Silty Clay & Boulders
39.32	Coal
42.67	Gravel

5. Well Completion

Date Started(yyyy/mm/dd): 1981/09/15	Date Completed (yyyy/mm/dd): 1981/09/16
Well Depth: 42.67 M	Borehole Diameter: 0 CM
Casing Type: Steel	Liner Type:
Size OD: 14.12 CM	Size OD: 0 CM
Wall Thickness: 0.62 CM	Wall Thickness: 0 CM
Bottom at: 40.84 M	Top: 0 M Bottom: 0 M

Perforations
from: 0 M to: 0 M
from: 0 M to: 0 M
from: 0 M to: 0 M
Perforations Size:
0 CM x 0 CM
0 CM x 0 CM
0 CM x 0 CM

Perforated by:
Seal: Driven
from: 39.62 M to: 40.84 M
Seal:
from: 0 M to: 0 M
Seal:
from: 0 M to: 0 M

Screen Type:
from: 0 M to: 0 M
Screen ID: 0 CM
Slot Size: 0 CM

Screen Type:
from: 0 M to: 0 M
Screen ID: 0 CM
Slot Size: 0 CM

Screen installation Method:
Fittings
Top: Bottom:
Pack:
Grain Size: Amount:
Geophysical Log Taken:
Retained on Files:
Additional Test and/or Pump Data
Chemistries taken By Driller: Yes
Held: 0 Documents Held: 1
Pitless Adapter Type:
Drop Pipe Type:
Length: M Diameter: CM
Comments:
DRILLER REPORTS WATER IS MEDIUM HARD

6. Well Yield

Test Date (yyyy/mm/dd): 1981/09/16	Start Time: 11:00 AM
Test Method: Air	
Non pumping static level:	27.43 M
Rate of water removal:	136.38 Liters/Min
Depth of pump intake:	32 M
Water level at end of pumping:	32 M
Distance from top of casing to ground level:	CM

Depth To water level (meters)
Elapsed Time
Drawdown Minutes:Sec Recovery
Total Drawdown: 4.57 M

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 0 Liters/Min
Recommended pump intake: 33.53 M
Type Pump Installed
Pump Type:
Pump Model:
H.P.:
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: VA0144
This well was constructed in accordance with the Water Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.
Signature Yr Mo Day

Water Well Drilling Report

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

Well I.D.:	0365387
Map Verified:	Map
Date Report Received:	1981/10/27
Measurements:	Metric

1. Contractor & Well Owner Information

Company Name: T-CAR HOLDINGS LTD.		Drilling Company Approval No.: 119164
Mailing Address: 1542 66 STREET	City or Town: EDSON ALBERTA CANADA	Postal Code: T7E 1S4
WellOwner's Name: BUCKLE, STAN	Well Location Identifier:	
P.O. Box Number: 136	Mailing Address: EDSON	Postal Code: T0E 0P0
City:	Province:	Country:

2. Well Location

1/4 or LSD	Sec	Twp	Rge	Westof M
SW	25	053	17	5

Location in Quarter
0 M from Boundary
0 M from Boundary

Lot | Block | Plan

Well Elev: 899.16 M
How Obtain: Estimated

3. Drilling Information

Type of Work: New Well
Reclaimed Well
Date Reclaimed:
Materials Used:
Method of Drilling: Rotary
Flowing Well: No
Gas Present: No
Rate: Liters
Oil Present: No
Proposed well use: Stock
Anticipated Water Requirements/day 0 Liters

4. Formation Log

Depth from ground level (meters)	Lithology Description
0.91	Sand
2.44	Clay
27.43	Silty Clay
28.96	Gravel
36.88	Silty Clay
41.15	Gravel

5. Well Completion

Date Started(yyyy/mm/dd): 1981/09/14	Date Completed (yyyy/mm/dd): 1981/09/14
Well Depth: 41.15 M	Borehole Diameter: 0 CM
Casing Type: Steel	Liner Type:
Size OD: 13.97 CM	Size OD: 0 CM
Wall Thickness: 0.48 CM	Wall Thickness: 0 CM
Bottom at: 37.8 M	Top: 0 M Bottom: 0 M
Perforations from: 0 M to: 0 M from: 0 M to: 0 M from: 0 M to: 0 M	Perforations Size: 0 CM x 0 CM 0 CM x 0 CM 0 CM x 0 CM
Perforated by:	
Seal: Driven from: 0 M	to: 0 M
Seal: from: 0 M	to: 0 M
Seal: from: 0 M	to: 0 M
Screen Type: from: 0 M to: 0 M	Screen ID: 0 CM Slot Size: 0 CM
Screen Type: from: 0 M to: 0 M	Screen ID: 0 CM Slot Size: 0 CM
Screen Installation Method:	
Fittings Top:	Bottom:
Pack: Grain Size:	Amount:
Geophysical Log Taken: Retained on Files:	
Additional Test and/or Pump Data Chemistries taken By Driller: Yes Held: 1	Documents Held: 2
Pitless Adapter Type: Drop Pipe Type: Length: 25.91 M	Diameter: 2.54 CM

Comments:
DRILLER REPORTS MEDIUM HARD WATER. CHEM
ORIGINALLY LOCATED @ LSD SW-25-53-17W5M

6. Well Yield

Test Date (yyyy/mm/dd): 1981/09/14	Start Time: 11:00 AM
Test Method: Pump	
Non pumping static level:	22.86 M
Rate of water removal:	90.92 Liters/Min
Depth of pump intake:	26.52 M
Water level at end of pumping:	M
Distance from top of casing to ground level:	CM

Depth To water level (meters)
Elapsed Time
Drawdown Minutes:Sec Recovery
Total Drawdown: 3.66 M

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 68.19 Liters/Min

Recommended pump intake: 27.74 M

Type Pump Installed
Pump Type: SUB
Pump Model: 4"
H.P.: 1/2
Any further pumptest information?

7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: VA0144
This well was constructed in accordance with the Water Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.
Signature Yr Mo Day

ALBERTA ENVIRONMENT
CHEMICAL ANALYSIS REPORT

WELL NAME: BUCKLE, S
LOCATION: LSD SW SEC 25 TWP 053 RG 17 M 5
WELL DEPTH: 135
AQUIFER:
SAMPLING DATE: TIME: 0

WELL ID No:0365387
SAMPLE No: 1336
WATER LEVEL: -9
LABORATORY: AA
PRINT DATE: 1/9/2009

FIELD:	MG/L	FIELD:	MG/L
BICARBONATE	-9	CARBONATE	-9
CHLORIDE	-9	CONDUCTIVITY	-9
DISSOLVED OXYGEN	-9	EH	-9
IRON	-9	MANGANESE	-9
PH	-9	SULPHATE	-9
S2	-9	TEMPERATURE°C	-9
TOTAL ALKALINITY	-9	TOTAL HARDNESS	-9
LABORATORY: Analysis Date: 7/11/1983			
COD	-9	CONDUCTIVITY	820
DIC	-9	FLUORIDE	0.25
ION BALANCE	-9	PH	8.5
SAR	-9	SIO2	-9
TOTAL ALKALINITY	430	TC	-9
TDS	488	TN	-9
DOC	-9		
AMMONIUM-N	-9	BICARBONATE	-9
CALCIUM	23.354	CARBONATE	-9
CHLORIDE	1.0011	MAGNESIUM	9.10784
NITRATE-N	0	NITRITE-N	0
PHOSPHATE	-9	POTASSIUM	-9
SODIUM	173.5005	SULPHATE	18.9888
$NO_2 + NO_3$	-9	TOTAL HARDNESS	96
ALUMINUM	-9	ARSENIC	-9
BARIUM	-9	BERYLIUM	-9
CADMIUM	-9	CHROMIUM	-9
COBALT	-9	COPPER	-9
IRON	*5.9*	*LEAD*	*-9*
MANGANESE	-9	MERCURY	-9
MOLYBDENUM	-9	NICKEL	-9
SELENIUM	-9	STRONTIUM	-9
VANADIUM	-9	ZINC	-9
HYDROCARBONS	-9	PESTICIDES	-9
PHENOLICS	-9	OTHER 3	0

Remarks: IGNITION LOSS 52
-9 indicates that no analysis was done for this parameter
*Indicates concentrations less than.
Temperature reported in Degree Centigrade. Conductivity reported in microsiemens/cm, pH in pH units. Alkalinity and Hardness expressed as Calcium Carbonate. FE, VA, PB, AL, AG expressed as extractable. FE in field measurements and all remaining metals expressed as total.

EH - Oxidation-Reduction Potential
DIC - Dissolved Inorganic Carbon
DOC - Dissolved Organic Carbon
TDS - Total Dissolved Solids
SAR - Sodium Adsorption Ratio
COD - Chemical Oxygen Demand
TN - Total Particulate Nitrogen
TC - Total Particulate Carbon

NOTE: This data may not be fully checked.
The Province disclaims all responsibility for its accuracy

ALBERTA ENVIRONMENT
CHEMICAL ANALYSIS REPORT

WELL NAME: NELSON, KEN
LOCATION: LSD NW SEC 25 TWP 053 RG 17 M 5
WELL DEPTH: 130
AQUIFER:
SAMPLING DATE: 10/12/1973 TIME: 0

WELL ID No:0481919
SAMPLE No: 9145
WATER LEVEL: 20
LABORATORY: AE
PRINT DATE: 1/9/2009

FIELD:	MG/L	FIELD:	MG/L
BICARBONATE	-9	CARBONATE	-9
CHLORIDE	-9	CONDUCTIVITY	-9
DISSOLVED OXYGEN	-9	EH	-9
IRON	-9	MANGANESE	-9
PH	-9	SULPHATE	-9
S2	-9	TEMPERATURE°C	-9
TOTAL ALKALINITY	-9	TOTAL HARDNESS	-9
LABORATORY: Analysis Date: 10/23/1973			
COD	-9	CONDUCTIVITY	800
DIC	-9	FLUORIDE	0.21
ION BALANCE	0.92	PH	7.3
SAR	-9	SIO2	-9
TOTAL ALKALINITY	410	TC	-9
TDS	409	TN	-9
DOC	-9		
AMMONIUM-N	-9	BICARBONATE	500.8344
CALCIUM	51.896	CARBONATE	-9
CHLORIDE	3.0033	MAGNESIUM	30.024256
NITRATE-N	0.0994	NITRITE-N	0.9996
PHOSPHATE	-9	POTASSIUM	2.3226
SODIUM	62.0011	SULPHATE	9.9936
$NO_2 + NO_3$	-9	TOTAL HARDNESS	251
ALUMINUM	-9	ARSENIC	-9
BARIUM	-9	BERYLIUM	-9
CADMIUM	-9	CHROMIUM	-9
COBALT	-9	COPPER	-9
IRON	0.2	LEAD	-9
MANGANESE	-9	MERCURY	-9
MOLYBDENUM	-9	NICKEL	-9
SELENIUM	-9	STRONTIUM	-9
VANADIUM	-9	ZINC	-9
HYDROCARBONS	-9	PESTICIDES	-9
PHENOLICS	-9	OTHER 3	0

Remarks:
-9 indicates that no analysis was done for this parameter
*Indicates concentrations less than.
Temperature reported in Degree Centigrade. Conductivity reported in microsiemens/cm, pH in pH units. Alkalinity and Hardness expressed as Calcium Carbonate. FE, VA, PB, AL, AG expressed as extractable. FE in field measurements and all remaining metals expressed as total.

EH - Oxidation-Reduction Potential
DIC - Dissolved Inorganic Carbon
DOC - Dissolved Organic Carbon
TDS - Total Dissolved Solids
SAR - Sodium Adsorption Ratio
COD - Chemical Oxygen Demand
TN - Total Particulate Nitrogen
TC - Total Particulate Carbon

NOTE: This data may not be fully checked.
The Province disclaims all responsibility for its accuracy

ALBERTA ENVIRONMENT
CHEMICAL ANALYSIS REPORT

WELL NAME: JEWEL, ROY
LOCATION: LSD NE SEC 25 TWP 053 RG 17 M 5
WELL DEPTH: 120
AQUIFER:
SAMPLING DATE: TIME: 0

WELL ID No:0481923
SAMPLE No: 2387
WATER LEVEL: -9
LABORATORY: PL
PRINT DATE: 1/9/2009

FIELD:	MG/L	FIELD:	MG/L
BICARBONATE	-9	CARBONATE	-9
CHLORIDE	-9	CONDUCTIVITY	-9
DISSOLVED OXYGEN	-9	EH	-9
IRON	-9	MANGANESE	-9
PH	-9	SULPHATE	-9
S2	-9	TEMPERATURE°C	-9
TOTAL ALKALINITY	-9	TOTAL HARDNESS	-9
LABORATORY: Analysis Date: 7/3/1986			
COD	-9	CONDUCTIVITY	750
DIC	-9	FLUORIDE	0.15
ION BALANCE	-9	PH	8.4
SAR	-9	SIO2	-9
TOTAL ALKALINITY	400	TC	-9
TDS	480	TN	-9
DOC	-9		
AMMONIUM-N	-9	BICARBONATE	-9
CALCIUM	9.88	CARBONATE	-9
CHLORIDE	1.1005	MAGNESIUM	5.304192
NITRATE-N	-9	NITRITE-N	-9
PHOSPHATE	-9	POTASSIUM	-9
SODIUM	177.0011	SULPHATE	44.8704
$NO_2 + NO_3$	-9	TOTAL HARDNESS	47
ALUMINUM	-9	ARSENIC	-9
BARIUM	-9	BERYLIUM	-9
CADMIUM	-9	CHROMIUM	-9
COBALT	-9	COPPER	-9
IRON	0.03	LEAD	-9
MANGANESE	-9	MERCURY	-9
MOLYBDENUM	-9	NICKEL	-9
SELENIUM	-9	STRONTIUM	-9
VANADIUM	-9	ZINC	-9
HYDROCARBONS	-9	PESTICIDES	-9
PHENOLICS	-9	OTHER 3	0

Remarks:
-9 indicates that no analysis was done for this parameter
*Indicates concentrations less than.
Temperature reported in Degree Centigrade. Conductivity reported in microsiemens/cm, pH in pH units. Alkalinity and Hardness expressed as Calcium Carbonate. FE, VA, PB, AL, AG expressed as extractable. FE in field measurements and all remaining metals expressed as total.

EH - Oxidation-Reduction Potential
DIC - Dissolved Inorganic Carbon
DOC - Dissolved Organic Carbon
TDS - Total Dissolved Solids
SAR - Sodium Adsorption Ratio
COD - Chemical Oxygen Demand
TN - Total Particulate Nitrogen
TC - Total Particulate Carbon

NOTE: This data may not be fully checked.
The Province disclaims all responsibility for its accuracy

ALBERTA ENVIRONMENT
CHEMICAL ANALYSIS REPORT

WELL NAME: SLUCHINSKI, W.
LOCATION: LSD SW SEC 36 TWP 053 RG 17 M 5
WELL DEPTH: 150
AQUIFER:
SAMPLING DATE: 8/3/1973 TIME: 0

WELL ID No:0481998
SAMPLE No: 7005
WATER LEVEL: 95
LABORATORY: AE
PRINT DATE: 1/9/2009

FIELD:	MG/L	FIELD:	MG/L
BICARBONATE	-9	CARBONATE	-9
CHLORIDE	-9	CONDUCTIVITY	-9
DISSOLVED OXYGEN	-9	EH	-9
IRON	-9	MANGANESE	-9
PH	-9	SULPHATE	-9
S2	-9	TEMPERATURE°C	-9
TOTAL ALKALINITY	-9	TOTAL HARDNESS	-9
LABORATORY: Analysis Date: 8/20/1973			
COD	-9	CONDUCTIVITY	720
DIC	-9	FLUORIDE	0.05
ION BALANCE	1	PH	7.3
SAR	-9	SIO2	-9
TOTAL ALKALINITY	294	TC	-9
TDS	318	TN	-9
DOC	-9		
AMMONIUM-N	-9	BICARBONATE	358.8813
CALCIUM	42.914	CARBONATE	-9
CHLORIDE	-9	MAGNESIUM	22.018112
NITRATE-N	0.0994	NITRITE-N	0.0994
PHOSPHATE	-9	POTASSIUM	2.4253
SODIUM	49.9997	SULPHATE	18.9888
$NO_2 + NO_3$	-9	TOTAL HARDNESS	200
ALUMINUM	-9	ARSENIC	-9
BARIUM	-9	BERYLIUM	-9
CADMIUM	-9	CHROMIUM	-9
COBALT	-9	COPPER	-9
IRON	0.1	LEAD	-9
MANGANESE	-9	MERCURY	-9
MOLYBDENUM	-9	NICKEL	-9
SELENIUM	-9	STRONTIUM	-9
VANADIUM	-9	ZINC	-9
HYDROCARBONS	-9	PESTICIDES	-9
PHENOLICS	-9	OTHER 3	0

Remarks:
-9 indicates that no analysis was done for this parameter
*Indicates concentrations less than.
Temperature reported in Degree Centigrade. Conductivity reported in microsiemens/cm, pH in pH units. Alkalinity and Hardness expressed as Calcium Carbonate. FE, VA, PB, AL, AG expressed as extractable. FE in field measurements and all remaining metals expressed as total.

EH - Oxidation-Reduction Potential
DIC - Dissolved Inorganic Carbon
DOC - Dissolved Organic Carbon
TDS - Total Dissolved Solids
SAR - Sodium Adsorption Ratio
COD - Chemical Oxygen Demand
TN - Total Particulate Nitrogen
TC - Total Particulate Carbon

ALBERTA ENVIRONMENT
CHEMICAL ANALYSIS REPORT

WELL NAME: KNETEMAN, LEONARD
LOCATION: LSD SW SEC 36 TWP 053 RG 17 M 5
WELL DEPTH: 0
AQUIFER:
SAMPLING DATE: 7/22/1986 TIME: 0

WELL ID No:0481999
SAMPLE No: 9257
WATER LEVEL: -9
LABORATORY: AE
PRINT DATE: 1/9/2009

FIELD:	MG/L	FIELD:	MG/L
BICARBONATE	-9	CARBONATE	-9
CHLORIDE	-9	CONDUCTIVITY	-9
DISSOLVED OXYGEN	-9	EH	-9
IRON	-9	MANGANESE	-9
PH	-9	SULPHATE	-9
S2	-9	TEMPERATURE°C	-9
TOTAL ALKALINITY	-9	TOTAL HARDNESS	-9
LABORATORY: Analysis Date: 8/1/1986			
COD	-9	CONDUCTIVITY	915
DIC	-9	FLUORIDE	0.22
ION BALANCE	1	PH	8.9
SAR	-9	SIO2	6.4
TOTAL ALKALINITY	436	TC	-9
TDS	530	TN	-9
DOC	-9		
AMMONIUM-N	-9	BICARBONATE	482.8394
CALCIUM	0.998	CARBONATE	24
CHLORIDE	1.0011	MAGNESIUM	1.000768
NITRATE-N	-9	NITRITE-N	0.0504
PHOSPHATE	-9	POTASSIUM	0.5056
SODIUM	219.9996	SULPHATE	44.9712
$NO_2 + NO_3$	0.0144	TOTAL HARDNESS	5
ALUMINUM	-9	ARSENIC	-9
BARIUM	-9	BERYLIUM	-9
CADMIUM	-9	CHROMIUM	-9
COBALT	-9	COPPER	-9
IRON	0.02	LEAD	-9
MANGANESE	-9	MERCURY	-9
MOLYBDENUM	-9	NICKEL	-9
SELENIUM	-9	STRONTIUM	-9
VANADIUM	-9	ZINC	-9
HYDROCARBONS	-9	PESTICIDES	-9
PHENOLICS	-9	OTHER 3	0

Remarks:
-9 indicates that no analysis was done for this parameter
*Indicates concentrations less than.
Temperature reported in Degree Centigrade. Conductivity reported in microsiemens/cm, pH in pH units. Alkalinity and Hardness expressed as Calcium Carbonate. FE, VA, PB, AL, AG expressed as extractable. FE in field measurements and all remaining metals expressed as total.

EH - Oxidation-Reduction Potential
DIC - Dissolved Inorganic Carbon
DOC - Dissolved Organic Carbon
TDS - Total Dissolved Solids
SAR - Sodium Adsorption Ratio
COD - Chemical Oxygen Demand
TN - Total Particulate Nitrogen
TC - Total Particulate Carbon

NOTE: This data may not be fully checked.
The Province disclaims all responsibility for its accuracy

APPENDIX B

THE GROUNDWATER CENTER QUERY RESULTS

Yellowhead County

NW 25-053-17 W5M

MOW-TECH LTD. gwQuery Results

View Regional Groundwater Assessment Report (PDF)

gwQuery Results - Metric (PDF) :: gwQuery Results - Imperial (PDF)

General Results Depth(s)	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
gwQuery Determined Minimum	29	169[2]	12	440	26	2	--
gwQuery Determined Maximum	47	169[2]	12	440	26	2	--

Detailed Results Geologic Unit Encountered	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
Lower Surficial Deposits	0	--	--	--	--	--	--
Bedrock Surface	12						
Dalehurst Member	12	169[2]	12	440	26	2	--
Upper Lacombe Member	170	190[2]	124	747	185	9	--
Lower Lacombe Member	277	286[2]	154	850	121	3	--
Haynes Member	338	31[2]	125	817	71	--	--
Upper Scollard Formation	390	--	140	467	--	19	Oil
Lower Scollard Formation	498	--	182	781	62	3	Oil
Battle Formation	558	--	--	--	--	--	--
Upper Horseshoe Canyon Formation	588	--	236	1273	269	--	Oil
Middle Horseshoe Canyon Formation	716	29[3]	--	--	--	--	Water

Parameter	metre
Base of Groundwater Protection (Depth)	389
Ground Elevation (AMSL)	913

Legend/Notes

'--' indicates information not available.
Base of Groundwater Protection (BGP; TDS > 4,000 mg/L).
* Yield based on the 'Fluid Encountered' being water.
[2] Results are based on a regional groundwater study by hydrogeological consultants ltd. (HCL)
[3] Results are based on a summary of Drill Stem Test (DST) results.

Contact at least three local licensed water well drillers to get estimates of drilling and water well completion costs in your area. Consult the 'Water wells that Last for Generations' booklet for advice on hiring a water well driller, and for a check list of items that you and the driller should discuss and agree to before starting the work.

The information calculated with the MOW-TECH LTD. gwQuery is meant only as a guide. Actual drilling conditions may vary. MOW-TECH LTD. is not liable for drilling or groundwater problems as a result of using this data.

YH089718 {02-227}

Yellowhead County

SE 25-053-17 W5M

MOW-TECH LTD. gwQuery Results

View Regional Groundwater Assessment Report (PDF)

gwQuery Results - Metric (PDF) :: gwQuery Results - Imperial (PDF)

General Results Depth(s)	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
gwQuery Determined Minimum	32	286[2]	20	523	44	1	--
gwQuery Determined Maximum	56	286[2]	20	523	44	1	--

Detailed Results Geologic Unit Encountered	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
Lower Surficial Deposits	0	--	11	482	13	--	--
Bedrock Surface	24						
Dalehurst Member	24	286[2]	20	523	44	1	--
Upper Lacombe Member	156	187[2]	110	740	180	10	--
Lower Lacombe Member	263	288[2]	139	852	122	3	--
Haynes Member	323	32[2]	111	820	70	--	--
Upper Scollard Formation	376	--	125	466	--	19	Oil
Lower Scollard Formation	484	--	167	778	62	3	Oil
Battle Formation	545	--	--	--	--	--	--
Upper Horseshoe Canyon Formation	575	--	221	1275	271	--	Oil
Middle Horseshoe Canyon Formation	703	29[3]	--	--	--	--	Water

Parameter	metre
Base of Groundwater Protection (Depth)	375
Ground Elevation (AMSL)	898

Legend/Notes

'--' indicates information not available.
Base of Groundwater Protection (BGP; TDS > 4,000 mg/L).
* Yield based on the 'Fluid Encountered' being water.
[2] Results are based on a regional groundwater study by hydrogeological consultants ltd. (HCL)
[3] Results are based on a summary of Drill Stem Test (DST) results.

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YH089721 {02-227}

Yellowhead County

NE 25-053-17 W5M

MOW-TECH LTD. gwQuery Results

View Regional Groundwater Assessment Report (PDF)

gwQuery Results - Metric (PDF) :: gwQuery Results - Imperial (PDF)

General Results Depth(s)	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
gwQuery Determined Minimum	32	241[2]	16	485	44	1	--
gwQuery Determined Maximum	57	241[2]	16	485	44	1	--

Detailed Results Geologic Unit Encountered	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
Lower Surficial Deposits	0	--	11	464	9	--	--
Bedrock Surface	20						
Dalehurst Member	20	241[2]	16	485	44	1	--
Upper Lacombe Member	155	188[2]	109	744	183	10	--
Lower Lacombe Member	262	286[2]	139	850	121	3	--
Haynes Member	322	33[2]	110	818	71	--	--
Upper Scollard Formation	375	--	125	467	--	19	Oil
Lower Scollard Formation	482	--	166	781	62	3	Oil
Battle Formation	542	--	--	--	--	--	--
Upper Horseshoe Canyon Formation	572	--	221	1273	269	--	Oil
Middle Horseshoe Canyon Formation	699	29[3]	--	--	--	--	Water

Parameter	metre
Base of Groundwater Protection (Depth)	373
Ground Elevation (AMSL)	898

Legend/Notes

'--' *indicates information not available.*

Base of Groundwater Protection (BGP; TDS > 4,000 mg/L).

* Yield based on the 'Fluid Encountered' being water.

[2] Results are based on a regional groundwater study by hydrogeological consultants ltd. (HCL)

[3] Results are based on a summary of Drill Stem Test (DST) results.

Contact at least three local licensed water well drillers to get estimates of drilling and water well completion costs in your area. Consult the 'Water wells that Last for Generations' booklet for advice on hiring a water well driller, and for a check list of items that you and the driller should discuss and agree to before starting the work.

The information calculated with the MOW-TECH LTD. gwQuery is meant only as a guide. Actual drilling conditions may vary. MOW-TECH LTD. is not liable for drilling or groundwater problems as a result of using this data.

YH089719 {02-227}

Yellowhead County

SW 25-053-17 W5M

MOW-TECH LTD. gwQuery Results

View Regional Groundwater Assessment Report (PDF)

gwQuery Results - Metric (PDF) :: gwQuery Results - Imperial (PDF)

General Results Depth(s)	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
gwQuery Determined Minimum	30	85[2]	19	476	30	1	--
gwQuery Determined Maximum	53	85[2]	19	476	30	1	--

Detailed Results Geologic Unit Encountered	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
Lower Surficial Deposits	0	--	--	--	--	--	--
Bedrock Surface	15						
Dalehurst Member	15	85[2]	19	476	30	1	--
Upper Lacombe Member	166	188[2]	120	743	182	10	--
Lower Lacombe Member	274	288[2]	150	852	122	3	--
Haynes Member	334	30[2]	121	819	70	--	--
Upper Scollard Formation	387	--	135	466	--	19	Oil
Lower Scollard Formation	495	--	178	778	62	3	Oil
Battle Formation	556	--	--	--	--	--	--
Upper Horseshoe Canyon Formation	586	--	232	1275	270	--	Oil
Middle Horseshoe Canyon Formation	715	29[3]	--	--	--	--	Water

Parameter	metre
Base of Groundwater Protection (Depth)	386
Ground Elevation (AMSL)	908

Legend/Notes

'--' indicates information not available.
Base of Groundwater Protection (BGP; TDS > 4,000 mg/L).
* Yield based on the 'Fluid Encountered' being water.
[2] Results are based on a regional groundwater study by hydrogeological consultants ltd. (HCL)
[3] Results are based on a summary of Drill Stem Test (DST) results.

Contact at least three local licensed water well drillers to get estimates of drilling and water well completion costs in your area. Consult the 'Water wells that Last for Generations' booklet for advice on hiring a water well driller, and for a check list of items that you and the driller should discuss and agree to before starting the work.

The information calculated with the MOW-TECH LTD. gwQuery is meant only as a guide. Actual drilling conditions may vary. MOW-TECH LTD. is not liable for drilling or groundwater problems as a result of using this data.

YH089720 {02-227}

Yellowhead County

SE 26-053-17 W5M

MOW-TECH LTD. gwQuery Results

View Regional Groundwater Assessment Report (PDF)

gwQuery Results - Metric (PDF) :: gwQuery Results - Imperial (PDF)

General Results Depth(s)	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
gwQuery Determined Minimum	25	103[2]	20	419	18	2	--
gwQuery Determined Maximum	43	103[2]	20	419	18	2	--

Detailed Results Geologic Unit Encountered	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
Lower Surficial Deposits	0	--	--	--	--	--	--
Bedrock Surface	10						
Dalehurst Member	10	103[2]	20	419	18	2	--
Upper Lacombe Member	183	190[2]	137	746	185	10	--
Lower Lacombe Member	291	287[2]	167	852	122	3	--
Haynes Member	352	28[2]	139	818	70	--	--
Upper Scollard Formation	405	--	153	466	--	19	Oil
Lower Scollard Formation	513	--	195	778	62	3	Oil
Battle Formation	574	--	--	--	--	--	--
Upper Horseshoe Canyon Formation	604	--	249	1275	270	--	Oil
Middle Horseshoe Canyon Formation	734	29[3]	--	--	--	--	Water

Parameter	metre
Base of Groundwater Protection (Depth)	404
Ground Elevation (AMSL)	926

Legend/Notes

'--' indicates information not available.
Base of Groundwater Protection (BGP; TDS > 4,000 mg/L).
* Yield based on the 'Fluid Encountered' being water.
[2] Results are based on a regional groundwater study by hydrogeological consultants ltd. (HCL)
[3] Results are based on a summary of Drill Stem Test (DST) results.

Contact at least three local licensed water well drillers to get estimates of drilling and water well completion costs in your area. Consult the 'Water wells that Last for Generations' booklet for advice on hiring a water well driller, and for a check list of items that you and the driller should discuss and agree to before starting the work.

The information calculated with the MOW-TECH LTD. gwQuery is meant only as a guide. Actual drilling conditions may vary. MOW-TECH LTD. is not liable for drilling or groundwater problems as a result of using this data.

YH089746 {02-227}

Yellowhead County

NE 26-053-17 W5M

MOW-TECH LTD. gwQuery Results

View Regional Groundwater Assessment Report (PDF)

gwQuery Results - Metric (PDF) :: gwQuery Results - Imperial (PDF)

General Results Depth(s)	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
gwQuery Determined Minimum	27	160[2]	13	419	17	3	--
gwQuery Determined Maximum	37	160[2]	13	419	17	3	--

Detailed Results Geologic Unit Encountered	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
Lower Surficial Deposits	0	--	--	--	--	--	--
Bedrock Surface	5						
Dalehurst Member	5	160[2]	13	419	17	3	--
Upper Lacombe Member	186	191[2]	138	750	188	9	--
Lower Lacombe Member	293	285[2]	169	850	122	3	--
Haynes Member	353	29[2]	141	816	71	--	--
Upper Scollard Formation	406	--	155	466	--	19	Oil
Lower Scollard Formation	513	--	197	781	62	3	Oil
Battle Formation	574	--	--	--	--	--	--
Upper Horseshoe Canyon Formation	604	--	252	1272	268	--	Oil
Middle Horseshoe Canyon Formation	734	30[3]	--	--	--	--	Water

Parameter	metre
Base of Groundwater Protection (Depth)	405
Ground Elevation (AMSL)	928

Legend/Notes

'--' indicates information not available.
Base of Groundwater Protection (BGP; TDS > 4,000 mg/L).
* Yield based on the 'Fluid Encountered' being water.
[2] Results are based on a regional groundwater study by hydrogeological consultants ltd. (HCL)
[3] Results are based on a summary of Drill Stem Test (DST) results.

Contact at least three local licensed water well drillers to get estimates of drilling and water well completion costs in your area. Consult the 'Water wells that Last for Generations' booklet for advice on hiring a water well driller, and for a check list of items that you and the driller should discuss and agree to before starting the work.

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YH089744 {02-227}

Yellowhead County

SE 35-053-17 W5M

MOW-TECH LTD. gwQuery Results

View Regional Groundwater Assessment Report (PDF)

gwQuery Results - Metric (PDF) :: gwQuery Results - Imperial (PDF)

General Results Depth(s)	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
gwQuery Determined Minimum	34	184[2]	8	442	24	3	--
gwQuery Determined Maximum	37	184[2]	8	442	24	3	--

Detailed Results Geologic Unit Encountered	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
Lower Surficial Deposits	0	--	--	--	--	--	--
Bedrock Surface	8						
Dalehurst Member	8	184[2]	8	442	24	3	--
Upper Lacombe Member	183	193[2]	135	754	191	9	--
Lower Lacombe Member	290	283[2]	166	849	121	3	--
Haynes Member	350	30[2]	138	814	71	--	--
Upper Scollard Formation	402	--	153	467	--	19	Oil
Lower Scollard Formation	509	--	194	783	63	3	Oil
Battle Formation	569	--	--	--	--	--	--
Upper Horseshoe Canyon Formation	599	--	249	1270	267	--	Oil
Middle Horseshoe Canyon Formation	728	30[3]	--	--	--	--	Water

Parameter	metre
Base of Groundwater Protection (Depth)	401
Ground Elevation (AMSL)	926

Legend/Notes

'--' indicates information not available.
Base of Groundwater Protection (BGP; TDS > 4,000 mg/L).
* Yield based on the 'Fluid Encountered' being water.
[2] Results are based on a regional groundwater study by hydrogeological consultants ltd. (HCL)
[3] Results are based on a summary of Drill Stem Test (DST) results.

Contact at least three local licensed water well drillers to get estimates of drilling and water well completion costs in your area. Consult the 'Water wells that Last for Generations' booklet for advice on hiring a water well driller, and for a check list of items that you and the driller should discuss and agree to before starting the work.

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YH089971 {02-227}

Yellowhead County

SW 36-053-17 W5M

MOW-TECH LTD. gwQuery Results

View Regional Groundwater Assessment Report (PDF)

gwQuery Results - Metric (PDF) :: gwQuery Results - Imperial (PDF)

General Results Depth(s)	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
gwQuery Determined Minimum	37	235[2]	4	428	30	2	--
gwQuery Determined Maximum	44	235[2]	4	428	30	2	--

Detailed Results Geologic Unit Encountered	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
Lower Surficial Deposits	0	--	--	--	--	--	--
Bedrock Surface	11						
Dalehurst Member	11	235[2]	4	428	30	2	--
Upper Lacombe Member	169	191[2]	122	751	189	9	--
Lower Lacombe Member	276	284[2]	153	849	121	3	--
Haynes Member	336	32[2]	124	815	71	--	--
Upper Scollard Formation	388	--	139	467	--	19	Oil
Lower Scollard Formation	495	--	180	783	63	3	Oil
Battle Formation	555	--	--	--	--	--	--
Upper Horseshoe Canyon Formation	585	--	235	1270	267	--	Oil
Middle Horseshoe Canyon Formation	712	30[3]	--	--	--	--	Water

Parameter	metre
Base of Groundwater Protection (Depth)	386
Ground Elevation (AMSL)	912

Legend/Notes

'--' indicates information not available.
Base of Groundwater Protection (BGP; TDS > 4,000 mg/L).
* Yield based on the 'Fluid Encountered' being water.
[2] Results are based on a regional groundwater study by hydrogeological consultants ltd. (HCL)
[3] Results are based on a summary of Drill Stem Test (DST) results.

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YH089995 {02-227}

Yellowhead County

SE 36-053-17 W5M

MOW-TECH LTD. gwQuery Results

View Regional Groundwater Assessment Report (PDF)

gwQuery Results - Metric (PDF) :: gwQuery Results - Imperial (PDF)

General Results Depth(s)	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
gwQuery Determined Minimum	34	497[2]	13	448	43	--	--
gwQuery Determined Maximum	49	497[2]	13	448	43	--	--

Detailed Results Geologic Unit Encountered	Top metre	Yield* m³/day	NPWL metre	TDS mg/L	Sulfate mg/L	Chloride mg/L	Fluid Expected
Lower Surficial Deposits	0	--	13	450	5	--	--
Bedrock Surface	21						
Dalehurst Member	21	497[2]	13	448	43	--	--
Upper Lacombe Member	156	189[2]	109	748	186	9	--
Lower Lacombe Member	263	285[2]	139	848	121	3	--
Haynes Member	322	34[2]	111	816	71	--	--
Upper Scollard Formation	374	--	126	468	--	19	Oil
Lower Scollard Formation	481	--	167	783	63	3	Oil
Battle Formation	541	--	--	--	--	--	--
Upper Horseshoe Canyon Formation	571	--	222	1271	267	--	Oil
Middle Horseshoe Canyon Formation	697	29[3]	--	--	--	--	Water

Parameter	metre
Base of Groundwater Protection (Depth)	373
Ground Elevation (AMSL)	899

Legend/Notes

'--' indicates information not available.
Base of Groundwater Protection (BGP; TDS > 4,000 mg/L).
* Yield based on the 'Fluid Encountered' being water.
[2] Results are based on a regional groundwater study by hydrogeological consultants ltd. (HCL)
[3] Results are based on a summary of Drill Stem Test (DST) results.

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YH089996 {02-227}

APPENDIX 3) Application Forms,
Existing Certificate of Title
& Deferred Reserve Caveat

Yellowhead County

Application No._____

Date Received _____

APPLICATION TO AMEND OR ADOPT AN AREA STRUCTURE PLAN

I/We hereby make application to amend/(adopt) the Edson North Estates Area Structure Plan as outlined in the supporting information submitted with this application this application form.

Registered Owner(s): Marc & Beata Chamberland Phone: 780-712-6110 780-712-9003

Address: Box 5231 Edson, AB T7E 1T8

Applicant *(if different than Owner)*: Gt Hoffman & Assoc. Phone: 780-460-0894

Address: 5 Portman Place St Albert T8N 5L5

I/We _____ hereby certify that

- ☐ I am/We are the registered owner(s) of
- ☐ I/We have been designated as the agent(s) of the registered owner of

Legal Description: Certificate of Tile # _____

Pt SW 1/4 Section 36 Township 53 Range 17 West of 5 Meridian

Lot(s) _____, Block _____, Reg. Plan No. _____

June 4/09 _____

DATE SIGNATURE OF APPLICANT(S)

_____ _____

DATE SIGNATURE OF REGISTERED OWNER(S)

Proposed Admendment (describe – *please attached sheet if additional space required*)

I/We enclose $200.00 being the application fee, payable to Yellowhead County.

This application form must identify the applicant, provide the legal description and municipal address of the lands to which the application relates, and describe the proposed amendment. The following supporting documentation is required:

- A Copy of the Certificate of Title.
- Map(s) illustrating the area affected by the proposed amendment.
- Purposes and reasons for amending the Area Structure Plan.
- Any other information, which explains or supports the proposed amendment.

The proposed amendment will be reviewed by the Planning Department who will make a recommendation to Council. Public Notice of the proposed amendment will be given in accordance with the provisions of the Municipal Government Act, Chapter M-26 R.S.A., 2000

This personal information is being collected under the authority of Municipal Government Act, Being Chapter M-26 R.S.A., 2000 and will be used to process area structure amendments. It is protected by the privacy provisions of the Freedom of Information and Protection of Privacy Act, Chapter F-18.5 R.S.A., 2000. If you have any questions about the collection of this personal information, please contact the Director of Planning, Yellowhead County, 2716-1 Ave., Edson AB T7E 1N9, (780) 723-4600.

YELLOWHEAD COUNTY

Application No._____

APPLICATION FOR AMENDMENT TO THE

YELLOWHEAD COUNTY
LAND USE BYLAW NO. 7.98

I/WE hereby make application to amend the Yellowhead County Land Use Bylaw No. 7.98.

Applicant: Name Greg Hofmann G.T. Hofmann & Assoc. Telephone 780-460-0894

Address ~~5 Portman Place, St. Albert, AB T8N5L5~~

Owner of Land: Name Marc & Beata Chamberland Telephone 780-712-6110 780-712-9003

Address ~~Box 5231, Edson, AB, T7E 1T8~~

Land Description: Certificate of Title 072 307 553

Pt SW 1/4 Section 36 Twp. 53 Range 17 West of 5 Meridian

Lot _____, Block _____, Reg. Plan No. _____

Area of above-described parcel of land to be redistricted 13.22 ha ±

Amendment Proposed

FROM ~~RD-Rural District~~ TO CR-Country Residential District

Reasons in support of Application for Amendment

See Conceptual Scheme & Supporting Documents

I/We enclose $200.00 being the application fee, payable to Yellowhead County.

May 21/2009 — SIGNATURE OF APPLICANT(S)

DATE

May 21/2009 — SIGNATURE OF LANDOWNER(S)

DATE

This personal information is being collected under the authority of Municipal Government Act, Being Chapter M-26 R.S.A., 2000 and will be used to process amendments to the Land Use Bylaw No. 7.98. It is protected by the privacy provisions of the Freedom of Information and Protection of Privacy Act, Chapter F-18.5 R.S.A., 2000. If you have any questions about the collection of this personal information, please contact the Director of Planning, Yellowhead County, 2716-1 Ave., Edson AB T7E 1N9, (780) 723-4800.

Yellowhead County

RETURN COMPLETED APPLICATION FORM TO:

Yellowhead County
2716 - 1st. Avenue, Edson, Alberta T7E 1N9
Ph. (780) 723-4800
Fax (780) 723-5066
Email info@yellowheadcounty.ab.ca

APPLICATION FOR SUBDIVISION APPROVAL (Check which applies) ___ By plan of subdivision ___ By other instrument	**For Office Use Only**	
	Date of receipt of Form A as complete	File No.
	Fees Submitted:	

THIS FORM IS TO BE COMPLETED IN FULL WHEREVER APPLICABLE BY THE REGISTERED OWNER OF THE LAND THAT IS THE SUBJECT OF THIS APPLICATION OR BY AN AUTHORIZED PERSON ACTING ON HIS/HER BEHALF

1. **Name(s) of registered owner(s) of land to be subdivided** Marc & Beata Chamberland
   Address and phone no. Box 5231, Edson, AB, T7E 1T8
   780-712-6110 780-712-9003

2. **Authorized person(s) acting on behalf of registered owner(s)** Greg Hofmann, ACP MCIP
   Address and phone no. 5 Portman Place, St. Albert, AB T8N 5L5
   780-460-0894

This personal information is being collected under the authority of Section 653 of the Municipal Government Act, Being Chapter M-26.1 R.S.A. 2000 and will be used to process the subdivision application. It is protected by the privacy provisions of the Freedom of Information and Protection of Privacy Act, Chapter F-15 R.S.A. 2000. If you have any questions about the collection of this personal information, please contact the Director of Planning, Yellowhead County, 2716-1 Ave., Edson AB T7E 1N9, (780) 723-4800.

3. **LEGAL DESCRIPTION AND AREA OF LAND TO BE SUBDIVIDED (ie: existing titled area)**

All/part of the SW 1/4 Section 36 twp. 53 range 17 west of 5 meridian

Being all/part of lot ____ block ____ Reg. Plan No. ____ Certificate of Title No. 072 307 553

Municipal Address (if applicable) ____

Area of above-described parcel of land to be subdivided (ie: existing titled area) 13.22 ha ±

4. **LOCATION OF LAND TO BE SUBDIVIDED**

a. Is the land situated immediately adjacent to the municipal boundary? Yes ____ No X
   If "Yes", the adjoining municipality is ____

b. Is the land situated within 0.5 miles of the right-of-way of a Highway? Yes ____ No X
   If "Yes", the Highway is No. ____, the Secondary Road is No. ____

c. Is the land situated within 0.5 miles of a river, watercourse, lake or other permanent body of water, or a canal or drainage ditch? Yes ____
   No X If "Yes", state its name ____

d. Is the proposed parcel within 1.5 km of a sour gas facility? Yes ____ No ____

5. **EXISTING AND PROPOSED USE OF LAND TO BE SUBDIVIDED**

a. Existing use of land Small holding Agricultural Parcel

b. Proposed use of land **PLEASE INDICATE THE SIZE AND EXACT USE(S) OF:**

   (a) The parcel(s) being created: Country Residential

   (b) The remainder (remnant) of the existing titled area: ____

c. The land use district ("zoning") applied to the existing titled area under the Land Use Bylaw Corresponding application to rezone to CR-1 District

6. PHYSICAL CHARACTERISTICS OF LAND TO BE SUBDIVIDED

a. Describe the nature of the topography of the land (e.g. flat, rolling, steep, mixed, etc.) reasonably flat, gentle slope

b. Describe the nature of the vegetation and water on the land (e.g. brush, tree stands, etc., sloughs, creeks, etc.) Mixed forest, partially cleared

c. Describe the kind of soil on the land (e.g. sandy, loam, clay, etc.) Clay, clay loam

7. EXISTING BUILDINGS ON THE LAND PROPOSED TO BE SUBDIVIDED

Describe any buildings, historical or otherwise, and any structures on the land and whether they are to be demolished or moved

Dwelling, garage

8. WATER SERVICES

a) Existing Source of Water: groundwater

b) If the application will result in six or more lots on the quarter section in total, according to Section 23(3)(a) and (b) of the Water Act (Provincial Statutes) an application for subdivision is considered incomplete until one of the following requirements regarding water supply for the proposed subdivision is submitted. Please check one (or more) of the following:

1. ___ Proposed water supply to new lots by a licensed (surface) water distribution system
2. X Proposed water supply to new lots by individual water wells, and
   - i. X Attached to the application is a report certified by a Professional Engineer, Hydrologist or Geophysicist which states that there is sufficient water to supply 1250 cubic metres of water per year to each proposed lot, and that the proposed diversion will not interfere with any existing household user, licensees, or traditional agricultural users who currently exist, or
   - ii. ___ The diversion of water by water wells for each proposed lot conforms with an applicable, approved water management plan.

9. SEWER SERVICES

a) Existing sewage disposal: on-site treatment

b) Proposed sewage disposal: on-site treatment (mounds)

10. REGISTERED OWNER OR PERSON ACTING ON HIS/ HER BEHALF

I(we) Greg Hofmann being the registered owner(s) ____, OR authorized to act on behalf of the registered owner(s) X, do hereby certify that the information given on this form is full and complete and is, to the best of my(our) knowledge, a true statement of the facts relating to this application for subdivision approval.

Signature(s) _____

Date May 21/2009

THE FOLLOWING INFORMATION MUST ALSO BE INCLUDED IN SUPPORT OF YOUR APPLICATION WHICH WILL NOT BE CONSIDERED COMPLETE AND PROCESSED UNTIL SUPPLIED:

a) A complete application form.

b) An accurate sketch of the proposed subdivision area to include:
   - i) An approximate location, dimensions, areas and boundaries of the proposed subdivision.
   - ii) North arrow.
   - iii) An approximate location of all existing buildings (temporary and permanent), driveways and road approaches on the property with their distances to existing and proposed property lines.
   - iv) An approximate location of existing wells, septic fields, fences, trees and any permanent bodies of water on the land.
   - v) The sketch is to be drawn with a straight edge as accurately as possible.

c) Application Fee.

d) A complete Authorization/ Right of Entry form.

Yellowhead County

2716 - 1st Avenue, Edson, Alberta, Canada T7E 1N9
Telephone 780-723-4800 or 1-800-665-6030, Facsimile 780-723-5066

PLANNING DEPARTMENT

Our File:_____

AUTHORIZATION FORM

I (We) Marc & Beata Chamberland.
{name(s) of registered owner(s)}

being the registered owner(s) of Pt SW 36-53-17-W5M
{legal description of land being subdivided}

do herby authorize Greg Hofmann, ACP MCIP
{individual or firm making application}
G.T. Hofmann & Associates

to make application to subdivide the above-described land on my(our) behalf.

X _____ X _____
{signature(s) of registered owner(s)}

RIGHT OF ENTRY

I(We) Marc & Beata Chamberland.
{name(s) of registered owner(s)}

being the registered owner(s) of Pt. SW 36-53-17-W.5M
{legal description of land being subdivided}

do hereby authorize representatives of Yellowhead County and other agencies designated in the Municipal Government Act, Being Chapter M-26.1, R.S.A. 2000 to enter upon my (our) land so that they may inspect same in connection with my(our) subdivision application.

X _____ X _____
{signature(s) of registered owner(s)}

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0027 656 157	5;17;53;36;SW	072 307 553

LEGAL DESCRIPTION

MERIDIAN 5 RANGE 17 TOWNSHIP 53
SECTION 36
THE SOUTH HALF OF THE SOUTH HALF OF THE SOUTH WEST QUARTER
CONTAINING 16.2 HECTARES (40.0 ACRES) MORE OR LESS
EXCEPTING THEREOUT:

		HECTARES	(ACRES) MORE OR LESS
A) PLAN 8520325	ROAD	0.101	0.25
B) PLAN 9825170	SUBDIVISION	2.88	7.12

EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

ESTATE: FEE SIMPLE

MUNICIPALITY: YELLOWHEAD COUNTY

REFERENCE NUMBER: 012 216 029

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
072 307 553	28/05/2007	TRANSFER OF LAND	$400,000	$400,000

OWNERS

BEATA E CHAMBERLAND

AND
MARC H CHAMBERLAND
BOTH OF:
1505 - 63 ST
EDSON
ALBERTA T7E 1S2
AS JOINT TENANTS

(CONTINUED)

REGISTRATION NUMBER | DATE (D/M/Y) | PARTICULARS

752 170 396 | 25/11/1975 | UTILITY RIGHT OF WAY
GRANTEE - YELLOWHEAD GAS CO-OP LTD.

982 313 864 | 13/10/1998 | CAVEAT
RE : DEFERRED RESERVE
CAVEATOR - YELLOWHEAD COUNTY.
2716-1ST AVENUE
EDSON
ALBERTA T7E1N9

072 307 554 | 28/05/2007 | MORTGAGE
MORTGAGEE - ALBERTA TREASURY BRANCHES.
C/O BOX 6418
EDSON
ALBERTA T7E1T8
ORIGINAL PRINCIPAL AMOUNT: $390,450

TOTAL INSTRUMENTS: 003

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 21 DAY OF MAY, 2009 AT 10:53 A.M.

ORDER NUMBER:13971097

CUSTOMER FILE NUMBER:

END OF CERTIFICATE

ALBERTA GOVERNMENT SERVICES
LAND TITLES OFFICE

IMAGE OF DOCUMENT REGISTERED AS:

982313864

YELLOWHEAD COUNTY

MUNICIPAL GOVERNMENT ACT

DEFERRED RESERVE CAVEAT

TO THE REGISTRAR OF THE NORTH ALBERTA LAND REGISTRATION DISTRICT:

TAKE NOTICE that Yellowhead County has an estate or interest in the nature of Municipal Reserve under Section 669 of the Municipal Government Act by virtue of a decision of the Council of Yellowhead County, acting as subdivision authority for Yellowhead County.

DATED this 5th day of October A.D. 1998 in 1.322 hectares (3.27 acres) of the lands described as follows:

MERIDIAN 5, RANGE 17, TOWNSHIP 53
SECTION 36
THE SOUTH HALF OF THE SOUTH HALF OF THE SOUTHWEST QUARTER CONTAINING 16.2 HECTARES (40.0 ACRES) MORE OR LESS

EXCEPTING THEREOUT:		HECTARES	ACRES MORE OR LESS
A. PLAN 852 0325	ROAD	0.101	0.25
B. PLAN 982 5170	SUBDIVISION	2.88	7.12

EXCEPTING THEREOUT ALL MINES AND MINERALS AND THE RIGHT TO WORK THE SAME

Being the lands currently described as Certificate of Title 852 182 359 standing in the register in the name of:

Werner Albert Sluchinski & Thelma Margaret Sluchinski

and the Caveator forbids the registration of any person as transferee or owner of, or any instrument affecting, the said estate or interest, unless the instrument or certificate of titles, as the case may be, is expressed to be subject to my claim.

I appoint The Offices of Yellowhead County
2716 – 1st Avenue
Edson, Alberta T7E 1N9

as the place which notices and proceedings relating hereto may be served.

DATED as Edson, in the Province of Alberta, this 5th day of October, 1998.

Marilyn Sanders
Witness

Greg Hofmann
Signing Authority
Yellowhead County

Canada)
Province of Alberta)
To Wilness)

AFFIDAVIT

I, Greg Hofmann, at the Town of Edson in the Province of Alberta MAKE OATH AND SAY:

1. That I am the agent for the above-named Caveator acting on behalf of Yellowhead County.
2. That I believe that the said Caveator has a good and valid claim upon the said lands, and I say that this caveat is not being filed for the purpose of delaying or embarrassing any person interested in or proposing to deal therewith.

SWORN BEFORE me at the Town of Edson,
In the Province of Alberta, this 5th day of
October, A.D , 1998.

Greg Hofmann
Signing Authority
Yellowhead County

Ann M. Dechambeau

A Commissioner of Oaths in and for the
PROVINCE OF ALBERTA
Ann Dechambeau
Yellowhead County

ANN M. DECHAMBEAU
A Commissioner for Oaths in
and for the Province of Alberta
My Commission Expires Sept. 4, 1999

982313964 REGISTERED 1998 10 13
CAVE - CAVEAT
DOC 2 OF 3 DRR#: 6305244 ADE [illegible]

APPENDIX 4) Sample FireSmart Restrictive Covenant

SAMPLE FIRESMART RESTRICTIVE COVENANT

RESTRICTIVE COVENANT

THIS RESTRICTIVE COVENANT IS DATED THE DAY OF _____

BETWEEN: [the "Grantor"]

AND [the "Grantee"]

RECITALS:

A. The Grantor is the owner of the parcels of land located in the (name of municipality) which are described in Schedule "A" (collectively called "the Servient Lands");

B. The Grantee is the owner of the parcels of land located in the (Yellowhead County) which are described in Schedule "B" (collectively called "the Dominant Lands");

C. It is beneficial to the Dominant Lands that all of the Servient Lands be continuously used for dwellings developed to specified minimum standards within a multi-parcel country residential subdivision;

D. To ensure that the Servient Lands will be continuously used for dwellings developed to specified minimum standards within a multi-parcel country residential subdivision, the Grantor has agreed to annex to the Servient Lands the following restrictive covenants.

THIS RESTRICTIVE COVENANT WITNESSES that, in consideration of the premises and in consideration of the sum of ONE ($1.00) DOLLAR and other good and valuable consideration passing from the Grantee to the Grantor (sufficiency and receipt of which is acknowledged by the Grantor), the Grantor, on its own behalf as owner of the Servient Lands and on behalf

of each of its successors in title to the Servient Lands, covenants with the Grantee, as owner of the Dominant Lands and with each of the Grantee's successors in title to the Dominant Lands, that the benefit of the following restrictive covenants shall be annexed to and run with the Dominant Lands and the burden of the following restrictive covenants shall be annexed to and be binding on the Servient Lands:

A. DEFINITIONS

Unless otherwise provided, for the purposes of this Restrictive Covenant the following definitions shall apply:

(1) **ACCESSORY BUILDING** - means a building separate and subordinate to the principal building, the use of which is incidental to that of the principal building and which is located on the same parcel of land;

(2) **ACT** - means the Alberta Municipal Government Act, as amended from time to time, together with any legislation which replaces such Act from time to time;

(3) **BUILDING** - includes any structure that is constructed or placed on or over land;

(4) **CARPORT** - means a roofed structure used for storing or parking of not more than two private vehicles which has not less than 40% of its total perimeter open and unobstructed;

(5) **CROWN COVER** - means the percentage of area covered by tree crowns if one were looking at the trees from above;

(6) **DECK** - means the paved, wooden or hardsurfaced area adjoining a dwelling that is more than 0.61 m (2.0 ft) above grade, used for outdoor living;

(7) **DWELLING** - means a dwelling intended for occupancy by one household which is constructed on site upon on a permanent foundation and/or basement;

(8) **FOUNDATION** - means the lower portion of a building, usually concrete or masonry, and includes the footings which transfer the weight of and loads on a building to the ground;

(9) **GARAGE** - means an accessory building or part of the principal building, designed and used primarily for the storage of motor vehicles;

(10) **GRADE, BUILDING** - means the ground elevation established for the purpose of regulating the number of storeys and the height of a building. The building grade shall be the level adjacent to the walls of the building if the finished grade is level. If the ground is not entirely level the grade shall be determined by averaging the elevation of the ground for each face of the building;

(11) **LAND USE BYLAW** - means the Land Use Bylaw of Yellowhead County and amendments thereto, and any subsequent replacement or complementary bylaw of Yellowhead County adopted pursuant to the Act, which is from time to time enacted for the purpose of regulating the use and development of land within Yellowhead County;

(12) **PATIO** - means the paved, wooden or hardsurfaced area adjoining a dwelling that is no more than 0.61 m (2.0 ft) above grade, used for outdoor living;

(13) **PRINCIPAL BUILDING** - means, in the case of the Servient Lands, a dwelling which:

(a) occupies the major or central portion of a parcel,

(b) is the main building among one or more buildings on a parcel, and

(c) constitutes by reason of its use the purpose for which a parcel is used;

(14) **STRUCTURE** - means anything constructed or erected on the ground or attached to something on the ground;

(15) **UNDERSTORY TREE** - means an immature tree growing under the canopy of a taller tree;

B. GENERAL COVENANTS AND COMPLIANCE

(1) The provisions of this restrictive covenant as they apply to the Servient Lands:

(a) do not absolve any owner of the Servient Lands from complying with an easement or other instrument affecting the Servient Lands;

(b) do not absolve any owner of the Servient Lands from complying with any federal or provincial legislation or regulation in force from time to time;

(c) do not absolve any owner of the Servient Lands from complying with the Land Use Bylaw or any other bylaw of Yellowhead County; and

(d) are not intended to conflict with but, rather, be further to those so prescribed for the Servient Lands under the Land Use Bylaw and any statutory plan of Yellowhead County, and any amendments thereto, affecting the Servient Lands.

(2) Further to Section B(l) above, no development shall be commenced or undertaken on the Servient Lands except as herein provided.

C. PRINCIPAL BUILDINGS

(1) A dwelling, including any addition or garage or carport attached thereto, as well as covered balcony, deck, porch or patio located or to be located on any parcel within the Servient Lands shall:

(a) not be constructed using roofing material other than fire-rated fibreglass composition shingles, metal roofing or other similarly fire-rated materials matching or complementary to the colour of the dwelling;

(c) not be constructed, where applicable, with a roof pitch less than 4:12;

(d) not be constructed, where applicable, without cement parging applied to the above-grade portion of the foundation; and,

(e) not be improperly or inadequately maintained and shall not be permitted to fall into a state of disrepair.

(2) The underside of any balcony, deck, porch or patio referred to in Section C(1), shall:

(a) not be constructed or allowed in any other way to become inaccessible for regular maintenance;

(b) not be enclosed with wood latticing; and,

(c) not be used to store firewood, kindling and other hazardous or combustible items including but not limited to tires, petroleum products, lawn mowers and gas barbecues.

(3) If a balcony, deck, porch or patio referred to in Section C(1) is not enclosed by solid walls, in which case Section C(1)(a) would apply, its railings shall:

(a) not be made of material other than metal (such as aluminum or iron) or painted spindles; and,

(b) not be improperly or inadequately maintained and shall not be permitted to fall into a state of disrepair.

D. ACCESSORY BUILDINGS/STRUCTURES

(1) A detached garage or carport, gazebo or storage building, associated with a dwelling on a parcel within the Servient Lands shall:

(a) not be constructed, where applicable, using roofing material other than fire-rated fibreglass composition shingles, metal roofing or other similarly fire-rated materials matching or complementary to the colour of the dwelling;

(c) not be constructed, where applicable, with a roof pitch less than 4:12;

(d) not be constructed, where applicable, without cement parging applied to the above-grade portion of the foundation; and,

(e) not be located within 10.0 m (33.0 ft) of the principal building; and,

(f) not be improperly or inadequately maintained and shall not be permitted to fall into a state of disrepair.

(2) Fencing shall:

(a) not be other than page wire or chain link; and,

(b) not be improperly or inadequately maintained and shall not be permitted to fall into a state of disrepair.

E. BUILDING HEIGHT

(1) A principal or accessory building/structure, as referred to in Sections A through D above, shall not exceed 10.0 m (33.0 ft) above grade.

F. LANDSCAPING

(1) On any parcel within the Servient Lands, all deadfall and downed trees shall be removed. Said lands are to be kept in this condition.

G. COMBUSTIBLE STORAGE

(1) On any parcel within the Servient Lands:

(a) firewood, kindling and other hazardous or combustible items including but not limited to tires, petroleum products, lawn mowers and gas barbecues shall not be stored within 10.0 m (33.0 ft) of the principal building.

(b) the storage areas referred to in Section G(2)(a) shall not be improperly or inadequately maintained and shall not be permitted to fall into a state of disrepair.

H. GENERAL PROVISIONS

(1) An owner, lessee or occupant shall not permit any activity or development on any parcel within the Servient Lands that would unduly interfere with the amenities of the neighbourhood or materially interfere with or affect the use, enjoyment or value of neighbouring properties.

(2) The restrictive covenants set out above are independent and severable from one another. The invalidation of one or more of them shall not invalidate any other restrictive covenant herein set out. The lack of enforcement of one or more of them shall in no way be construed as a waiver of any of the other restrictive covenants.

(3) Reference to "Dominant Lands" and "Servient Lands" shall be read as including and shall be deemed to include each parcel thereof and each portion of all parcels whenever necessary to give full effect to the provisions contained in this Restrictive Covenant.