Appendix B:
Soil Technical Report

Technical Report on the Soil Environment at Sylvia Lake

Final Report
Stantec Consulting Ltd.
October 2010

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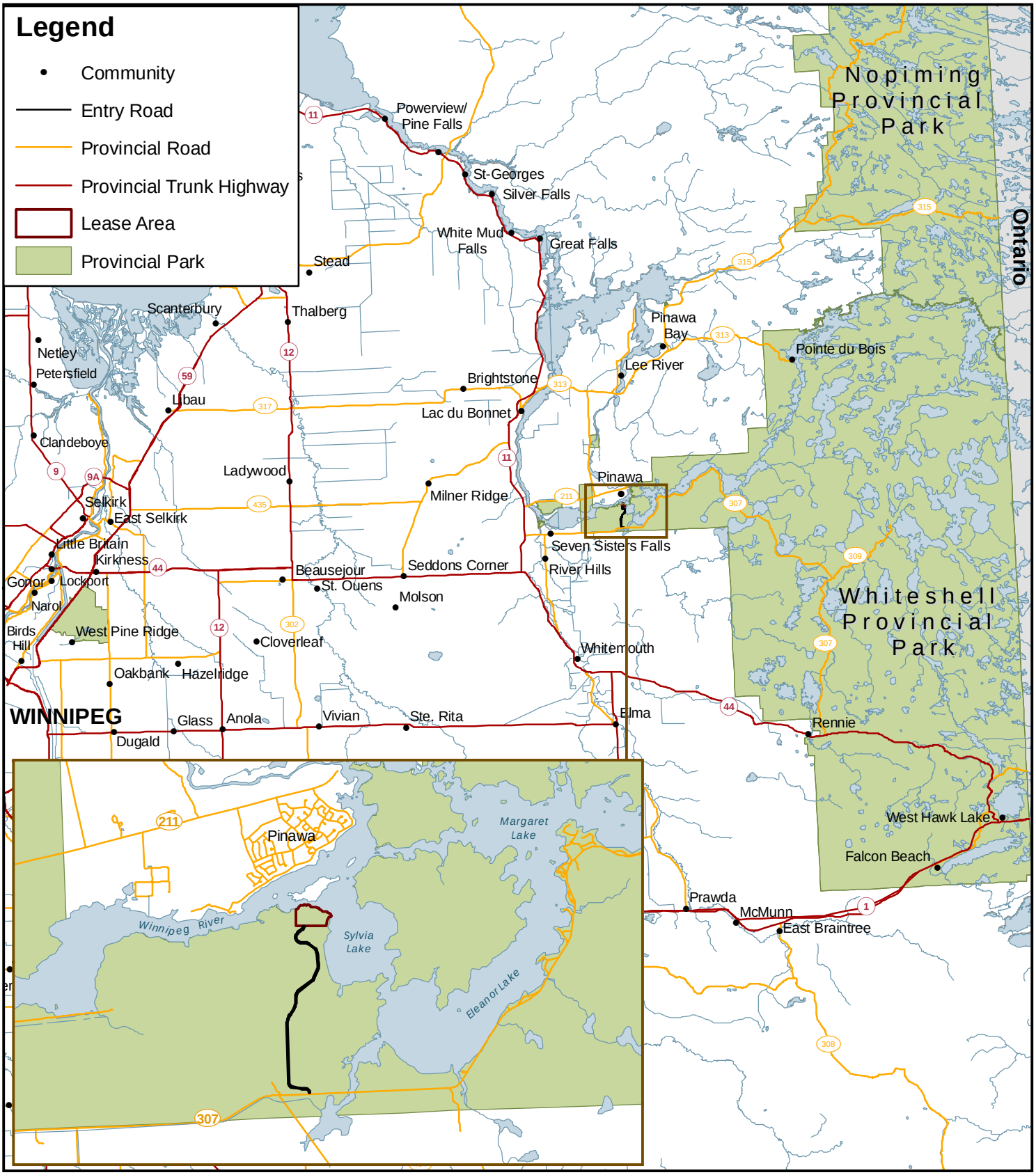
1.0 Introduction

Tim Horton Children's Foundation (THCF) is proposing to develop a youth leadership camp at Sylvia Lake (herein referred to as the "Project"), within the Whiteshell Provincial Park, across the Winnipeg River and due south (<1 km) of Pinawa, MB (Figure 1-1).The proposed camp will occur within a lease area of approximately 17.2 ha and consist of: a main lodge, bunkhouses, yurts, sports and recreational facilities, on-site services (e.g., septic treatment system and potable water treatment system), docks along the shoreline and an internal road network. Collateral developments proposed by Manitoba Conservation to service the site will include an entry road from Highway 307 (approximately 3.65 km in length), and a hydro servicing line within the entry road right of way and connecting to the existing distribution line located west of the Project area.

This technical report includes a description of the existing soil environment and is intended to provide baseline information to support the environmental assessment of the Project. Specifically, the objectives of this report are to provide a summary of existing soil resource information and as well as data collected specifically for the Project and collateral developments.



Location Plan

TIM HORTON CHILDREN'S FOUNDATION

Acknowledgements:
Data provided by ATLIS Geomatics (Imagery), Manitoba Culture Heritage and Tourism, Historic Resources Branch (Heritage Resource Sites) and THCF (project lease area and proposed road)
Projection: NAD83 Zone 14N

PREPARED BY
Stantec

MAP SCALE	DATA SCALE
1:3,500	NA

DATE	PROJECT	FIGURE NO.
October 1, 2010	1112 57005	1-1

DRAWN	CHECKED	APPROVED
KM	DS	DS

2.0 Methods

2.1 DESKTOP ASSESSMENT

A desktop review of existing soil resource information (SRI) was conducted to provide a summary of the best available information of the existing soil environment at the site. The review included the following sources of information:

- Soils of the Lac Du Bonnet Area, Report No. 15 (Smith *et al.* 1967).
- Soils and Terrain Information Bulletin 99-24 for the Rural Municipality of Whitemouth (Agriculture and Agri-Food Canada 1999).
- Agri-Maps online resource information map gallery (Manitoba Agriculture, Food and Rural Initiatives 2009).

Existing SRI and related interpretive ratings available in the existing data sources listed above are limited to survey intensity level 4 (SIL4), commonly referred to as Broad Reconnaissance survey. While this level of SRI provides an overview of the soil environment for the Project, it is typically limited in use to regional planning.

2.2 FIELD ASSESSMENT

Field visits were conducted by Stantec to provide more detailed soil resource information for the Project. Field assessments consisted of conducting detailed soil inspections (i.e., to depths >100 cm) and topsoil inspections (i.e., to a depth of 30 cm). At each inspection site, pertinent soil and site information was collected. Detailed soil inspections and classification were conducted in a manner consistent with the guidelines presented by the Expert Committee on Soil Survey (1982) and the Soil Classification Working Group (1998).

A summary of field visits conducted are as follows:

- November 5, 2009 – a site visit was conducted to groundtruth the proposed Project area, with the objective of collecting detailed soil information, including soil classifications and interpretations, with a specific focus in the area of the septic field component of the proposed on-site wastewater management system. A total of 6 detailed soil inspections (SL01-SL06, Figure 2-1) were conducted. Laboratory analysis was conducted for particle size analysis for one of the soil inspections (SL01), located at the proposed septic field location.

SL05
SLR04
SL04
SLR17
SLR05
SLR25
SLR26
SLR18
SLR27
SLR14
SLR24
SLR13
SLR12
SLR02
SLR15
SLR01
SLR19
SLR06
SL02
SLR16
SL01
SL06
SL03
SLR03
SLR07
SLR20
SLR08
SLR21
SLR09
SLR28
SLR22
SLR10
SLR23
SLR29
SLR11

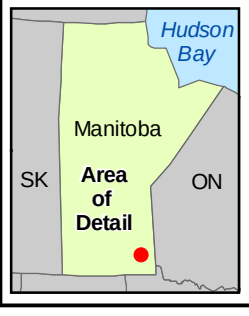
Legend

Soil Inspection Type

- Detailed
- Topsoil
- 260 Elevation Contours
- Entry Road
- Internal Roads
- Lease Area

TIM HORTON CHILDREN'S FOUNDATION
Where kids discover their best.

Soil Inspection Locations



NORTH

0 50 100 200 300

Metres

Acknowledgements:
Data provided by ATLIS Geomatics (Imagery), Stantec (Soil Inspections) and THCF (project lease area and proposed road)
Projection: NAD83 Zone 14N

PREPARED BY
Stantec

MAP SCALE	DATA SCALE
1:10,000	NA

DATE	PROJECT	FIGURE NO.
October 1, 2010	1112 57005	2-1

DRAWN	CHECKED	APPROVED
KM	DW	DW

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- September 23, 2010 – a site visit was conducted to groundtruth soils along the proposed internal roads for the Project, as well as for the proposed collateral road alignment. A total of 11 detailed soil inspections (SLR01-SLR11, Figure 2-1) and 18 topsoil inspections (SLR12-SLR29, Figure 2-1) were conducted.

An additional site visit was conducted on November 24, 2009, to sample a potential sand source for use as septic disposal bed pressure mound material. The source site, provided by Manitoba Conservation, Parks and Natural Areas Branch, is located at Dorothy Lake. Two samples were taken from the active sand pit and were submitted for grain size analysis to determine suitability for use as septic disposal bed pressure mound material.

3.0 Study Area Overview

3.1 GEOLOGY

The Project area is located within a geologic area called the Lac du Bonnet area which extends from the southeast shore of Lake Winnipeg in the west to the Ontario border in the east (Smith *et al.* 1967). Sylvia Lake falls within the eastern portion of the map area and is underlain by Precambrian crystalline rocks commonly referred to as the Precambrian Shield. The western portion of the map is underlain by limestone, dolomite, shales, sandstone and evaporate. Although these rocks are not found at the site, they did contribute surface materials to the Sylvia Lake area; materials that were transported by receding glaciers. Glaciers completely covered the province of Manitoba, including the Sylvia Lake area, during the last glaciation period of the Pleistocene epoch.

3.2 PHYSIOGRAPHY AND DRAINAGE

The Project area is located within the Precambrian Drift Plain Physiographic subdivision (Smith *et al.* 1967). This area was affected by glacial Lake Agassiz and is characterized by discontinuous clay deposits in localized depressions within the landscape. Also characteristic of the area are the outcroppings of granitic rocks from the Precambrian Shield.

While some surficial drainage along the bedrock outcroppings along the northern edge of the Project area, and in close proximity to the Winnipeg River channel, occurs to the north, surficial drainage within the Project area generally occurs in a southerly direction towards the lower-lying lands to the south of the proposed Project area (Figure 2-1). South of the Project area, surficial drainage occurs along a natural drainage contour in an easterly direction into a small depressional area adjacent to Sylvia Lake, and ultimately into Sylvia Lake proper. While surficial drainage would be considered rapid in areas of bedrock outcrops, drainage would be slower over mineral soils. Nearly level to very gently slopes dominate the Project area, with slope gradients generally ranging from 1 to 3%.

3.3 SOILS

Based on a review of the existing broad reconnaissance soil survey (Smith *et al.* 1967), the Project area and collateral developments are located within three soil units: 1) Indian Bay Complex, 2) Pine Valley, till substrate phase, and 3) Balmoral. The Indian Bay Complex is composed of approximately 60% granitoid rock outcrops, 20% well to moderately-well drained Luvisols and Brunisols, and 20% poorly to very poorly drained Humic Gleysols, Gleysols, Luvic Gleysols and shallow and deep peat. The soil series identified within the Indian Bay Complex are: Lettonia, Arborg, Thalberg, Peguis till substrate phase, Pine Valley till substrate phase, Fyala, Fyala till substrate phase and Telford. Topography in the Indian Bay Complex varies from irregular gently sloping to steeply sloping The Pine Valley till substrate unit is composed of

Gleyed Dark Grey Luvisols developed on moderately to strongly calcareous lacustrine clay deposits underlain within 75 cm by very strongly calcareous glacial till (the depth to the till substrate varies greatly over short distances however is typically less than 60 cm). These areas exhibit level to irregular very gently sloping topography. The Balmoral unit is composed of poorly drained peaty phase Rego Gleysols developed on extremely calcareous, moderately fine textured lake and alluvial sediments. Balmoral units exhibit smooth, level to depressional topography.

4.0 Results and Discussion

4.1 SOIL SUITABILITY FOR SEPTIC FIELD

A letter summarizing the baseline soil data and soil suitability for the proposed septic field installation within the Project area, and requesting confirmation of the Nutrient Management Zone rating, was submitted to Manitoba Water Stewardship on November 27, 2009 (Appendix A.1). This was conducted to satisfy the regulatory requirement for approvals for septic field installations under the *Nutrient Management Regulation* (62/2008) of the *Water Protection Act* (C.C.S.M. c. W65).

Based on the site-specific assessment conducted by Stantec, the soils at the proposed septic field location were found to be moderately well-drained Orthic Regosols and imperfectly drained Gleyed Regosols developed on thin, clayey lacustrine sediments overlying loamy glacial till. These soils were found to have a soil capability classification of 3D, resulting in a Nutrient Management Zone rating of N2. According to prohibition 14(1) in Part 4 of the *Regulation* this site would not be precluded from the installation of an onsite wastewater management system, as defined in the *Onsite Wastewater Management Systems Regulation* (83/2003).

In a letter dated December 11, 2009, Manitoba Water Stewardship confirmed that the proposed location of the septic field is not in Nutrient Management Zone N4 and as such is not precluded from the installation of an onsite wastewater management system according to the terms of the *Nutrient Management Regulation* (Appendix A.2).

4.1.1 Dorothy Lake Sand Source

The potential sand source for the septic disposal bed pressure mound is a sand pit actively used by Manitoba Conservation, Parks and Natural Areas Branch, and is located approximately 12 km from the Project area. Particle size analysis conducted on the two samples taken from within the sand pit indicate the material is dominantly sand (i.e., 97.8 to 99.5 % sand), with the sand fraction comprised dominantly of fine sand (i.e., 63.6 to 74.8 %) with a significant medium sand component (i.e., 22.0 to 35.1 %). The analytical report for the sand samples is found in Appendix B.

4.2 SOILS WITHIN THE PROPOSED PROJECT AREA

Based on the existing soil resource information (Smith *et al.* 1967), the Project area is located entirely within the Indian Bay Complex map unit. This map unit is primarily composed of three soil types (Manitoba Land Initiative 2010):

- Acidic Bedrock – granitic bedrock outcrops of granitic.
- Lettonia – well-drained Vertic and Solonetzic Gray Luvisols developed on moderately to strongly calcareous lacustrine clay sediments.

- Nora Lake – well-drained Eluviated Eutric Brunisols developed on thin glacial till deposits overlying granitic bedrock.

A total of nine detailed soil inspections (SL01-SL06, SLR01-SLR03) and six topsoil inspections (SLR12-16, SLR24) were conducted within and in close proximity to the Project area (Figure 2-1). Based on these site specific inspections, soils were found to be dominantly imperfectly to moderately well-drained, Gleyed and Orthic Regosols developed on fine-textured glacio-lacustrine sediments overlying moderately fine textured glacial tills (Table 4.1). Brunisolic, Luvisolic and Gleysolic soils were also found. Shallow water tables were found within the soil profile at 2 sites (SLR02 – 56 cm and SL05[1]). Bedrock outcrops were noted at 2 sites (SLR12 and SLR24), shallow bedrock was noted at SLR14 – 12 cm, and bedrock was noted below the soil profile at SL01 – 180 cm, SL03 – 150 cm and SL06 – 145 cm. Topsoil typically consisted of a thin organic (i.e., LFH) surface layer overlying the organic matter enriched mineral surface horizon, with depths ranging from 0 to 26 cm, with an average depth of 12 cm. The contrast between topsoil and subsoil was generally found to be good.

4.3 SOILS ALONG THE PROPOSED COLLATERAL DEVELOPMENT

Based on the existing soil resource information (Smith *et al.* 1967), the collateral development (i.e., entry road and hydro distribution line) is located within the Indian Bay Complex and Pine Valley till substrate map units, and is in close proximity to the Balmoral map unit. These map units are described as follows (Manitoba Land Initiative 2010):

- Indian Bay Complex:
    - Acidic Bedrock – granitic bedrock outcrops of granitic
    - Lettonia – well-drained Vertic and Solonetzic Gray Luvisols developed on moderately to strongly calcareous lacustrine clay sediments
    - Nora Lake – well-drained Eluviated Eutric Brunisols developed on thin glacial till deposits overlying granitic bedrock
- Pine Valley till substrate – imperfectly drained, Gleyed Dark Gray Luvisols developed on calcareous lacustrine clay sediments underlain within 75 cm by strongly calcareous glacial till deposits. These units exhibit level to irregularly and very gently sloping topography.
- Balmoral – the Balmoral unit is composed of poorly drained peaty phase Rego Gleysols developed on extremely calcareous, moderately fine textured lake and alluvial sediments. Balmoral units exhibit smooth, level to depressional topography.

A total of 8 detailed soil inspections (SLR04-SLR11) and 12 topsoil inspections (SLR17-SLR23; SLR25-SLR29) were conducted along the proposed collateral development (Figure 2-1). Based

[1] Site SL05 is located west of the Project lease area, in close proximity to a beaver flood area.

Table 4-1 Summary of Soil Inspections

Area	Site ID	UTM Coordinates[1] Easting	Northing	Inspection Type	Subgroup[4]	Topsoil Depth (cm)	Drainage	Parent Material[5]	Texture[6]	Depth to Water Table (cm)	Depth to Bedrock (cm)	Comment
Project	SL01	294315	5557706	Detailed	Gleyed Regosol	7	Imperfect	GLLC/TILL	F/MF	-	180	
Project	SL02	294365	5557725	Detailed	Orthic Regosol	5	Moderately Well	GLLC/TILL	F/MF	-	-	
Project	SL03	294286	5557676	Detailed	Gleyed Regosol	11	Imperfect	GLLC/TILL	F/MF	-	150	
Project	SL04	294254	5557525	Detailed	Gleyed Cumulic Regosol	11	Imperfect	GLLC/TILL	F/MF	-	-	
Project	SL05	293952	5557703	Detailed	Rego Gleysol	15	Poor	GLLC	F	0	-	Shallow water table
Project	SL06	294186	5557701	Detailed	Orthic Eutric Brunisol	15	Moderately Well	GLLC/TILL	F/MF		145	
Project	SLR01	294655	5557778	Detailed	Gleyed Dark Grey Luvisol	19	Imperfect	GLLC/TILL	F/MF	-	-	
Project	SLR02	294492	5557814	Detailed	Gleyed Grey Luvisol	18	Imperfect	TILL	MF	56	-	
Project	SLR03	294353	5557682	Detailed[2]	Gleyed Regosol	11	Imperfect	GLLC/TILL	F/MF	-	-	
Project	SLR12	294653	5557810	Topsoil[3]	-	0	-	RKIA	-	-	0	Bedrock outcrop
Project	SLR13	294583	5557845	Topsoil	-	26	-	TILL	MF	-	-	
Project	SLR14	294514	5557879	Topsoil	-	20	Poor	TILL/RKIA	MF	0	12	Shallow water table and shallow bedrock
Project	SLR15	294577	5557782	Topsoil	-	6	Imperfect	GLLC	F	-	-	
Project	SLR16	294387	5557716	Topsoil	-	16	Imperfect	GLLC	F	-	-	
Project	SLR24	294503	5557855	Topsoil	-	0	-	RKIA	-	-	0	Bedrock outcrop
Collateral development	SLR04	294283	5557587	Detailed	Gleyed Regosol	11	Imperfect	GLLC	F	-	-	
Collateral development	SLR05	294245	5557336	Detailed	Dark Grey Luvisol	8	Moderately Well	TILL	MF	-	-	
Collateral development	SLR06	294462	5556836	Detailed	Rego Gleysol	5	Poor	GLLC/TILL	F/MF	5	-	Shallow water table
Collateral development	SLR07	294405	5556722	Detailed	Rego Gleysol	4	Poor	GLLC	F	0	-	Shallow water table
Collateral development	SLR08	294119	5556515	Detailed	Gleyed Regosol	4	Imperfect	GLLC/TILL	F/MF	-	-	
Collateral development	SLR09	294030	5556252	Detailed	Rego Gleysol	10	Poor	GLLC	F	5	-	Shallow water table
Collateral development	SLR10	293864	5555725	Detailed	Gleyed Grey Luvisol	21	Imperfect	TILL	MF	-	-	
Collateral development	SLR11	294036	5554837	Detailed	Rego Gleysol	9	Poor	GLLC	F	5	-	Shallow water table
Collateral development	SLR17	294156	5557471	Topsoil	-	4	Well	TILL	MF	-	-	
Collateral development	SLR18	294437	5557235	Topsoil	-	10	Well	TILL	MF	-	-	
Collateral development	SLR19	294506	5557001	Topsoil	-	6	Imperfect	GLLC	F	-	-	
Collateral development	SLR20	294241	5556603	Topsoil	-	12	Poor	GLLC	F	2	-	Shallow water table
Collateral development	SLR21	294057	5556340	Topsoil	-	4	Well	TILL	MF	-	-	
Collateral development	SLR22	293884	5555917	Topsoil	-	9	Imperfect	GLLC/TILL	F/MF	-	-	
Collateral development	SLR23	293851	5555452	Topsoil	-	14	Moderately Well	TILL	MF	-	-	
Collateral development	SLR25	294327	5557321	Topsoil	-	0	-	RKIA	-	-	0	Bedrock outcrop
Collateral development	SLR26	294394	5557277	Topsoil	-	0	-	RKIA	-	-	0	Bedrock outcrop
Collateral development	SLR27	294492	5557195	Topsoil	-	0	-	RKIA	-	-	0	Bedrock outcrop
Collateral development	SLR28	293990	5556172	Topsoil	-	0	-	RKIA	-	-	0	Bedrock outcrop
Collateral development	SLR29	293843	5555189	Topsoil	-	0	-	RKIA	-	-	0	Bedrock outcrop

Notes:

1. Universal Transverse Mercator coordinate system: NAD83, Zone 15N
2. Detailed inspection were completed to a minimum depth of 100 cm.
3. Topsoil inspections were completed to a minimum depth of 30 cm.
4. Soil subgroup classification as per the Canadian System of Classification, 3rd edition
5. Parent Material types: GLLC - Glaciolacustrine, TILL - Glacial till, RKIA - Acidic igneous bedrock
6. Soil texture class: F - fine, MF - moderately fine, F/MF - fine over moderately fine

on these site-specific inspections, soils were found to be dominantly poorly to imperfectly drained, Rego Gleysols, Gleyed Regosols and Gleyed Grey Luvisols, developed on fine-textured glacio-lacustrine sediments overlying moderately fine textured glacial tills (Table 4.1). The thickness of the lacustrine overlays was highly variable from >100 cm to 0 cm (i.e., till to surface). Shallow water tables were found within the soil profile at five sites (SLR06 – 5 cm, SLR07 – 0 cm, SLR09 – 5 cm, SLR11 – 5 cm and SLR20 – 2 cm). Bedrock outcrops were noted at five sites (SLR25-SLR29). Topsoil typically consisted of a thin organic (i.e., LFH) surface layer overlying the organic matter enriched mineral surface horizon, with depths ranging from 0 to 21 cm, with an average depth of 7 cm. The contrast between topsoil and subsoil was generally found to be good.

5.0 Key Observations

A summary of key observations from the desktop and field assessments conducted for baseline soils information within the Project area and for the proposed collateral developments is as follows:

- The soils at the location of the septic fields included as part of the proposed septic treatment system are acceptable for septic fields under the *Nutrient Management Regulation* (62/2008).
- Soils within the Project area were found to be dominantly imperfectly to moderately well-drained Regosols developed on fine textured sediments over moderately fine-textured till deposits. Shallow depth to bedrock and bedrock outcrops occur throughout the Project area. Mineral soil drainage was found to be dominantly imperfect to moderately well. Topsoil depths ranged from 0 to 26 cm, with an average depth of 12 cm.
- Soils along the proposed collateral developments were found to be dominantly poorly to imperfectly drained and developed on fine-textured lacustrine sediments of variable depths overlying moderately fine textured till deposits. Bedrock outcrops were noted at multiple locations along the proposed development. Maintenance of surface and subsurface drainage will be an important consideration within this area. Topsoil depths ranged from 0 to 21 cm, with an average depth of 7 cm.

6.0 Closure

This report was prepared for the sole benefit of Tim Horton Children's Foundation. The report may not be relied upon by any other person or entity without the express written consent of Stantec Consulting Ltd. and Tim Horton Children's Foundation.

Any use which a third party makes of this report, or any reliance on decisions made based on it, is the responsibility of such third parties. Stantec Consulting Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The information, results and discussion contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted scientific practices current at the time the work was performed. The discussion presented represents the best judgment of Stantec Consulting Ltd. based on the data obtained from the work and on the site conditions encountered at the time the work was performed at the specific sampling, testing, and/or observation locations.

This report was prepared by Daniel Saurette, M.Sc., P.Ag., and was reviewed by David Whetter, M.Sc., P.Ag.

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7.0 References

Agriculture and Agri-Food Canada. 1999. Rural municipality of Whitemouth, Information Bulletin 99-24. Land Resource Unit, Agriculture and Agri-Food Canada, Department of Soil Science, University of Manitoba, and Manitoba Soil Resources Section, Manitoba Agriculture.

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Appendix A:
Correspondence on Proposed Septic Field Nutrient Management Zone

November 27, 2009
File: 1045466.02

Manitoba Water Stewardship
160 - 123 Main Street
Winnipeg MB
R3C 1A5

Attention: David Hay

Dear David Hay:

Reference: Soil suitability for Septic Field under *NMR 62/2008*; Sylvia Lake, MB

The purpose of this letter is to provide you with baseline soil data and Nutrient Management Zone (NMZ) ratings, for review by your Department in relation to *Nutrient Management Regulation* (62/2008) of the *Water Protection Act* (C.C.S.M. c. W65), based on soil inspections, including sampling and classification, conducted by Stantec. The review is required as a preliminary step in a recreational camp development to be proposed by The TDL Group at Sylvia Lake, in the Whiteshell Provincial Park, which would include a septic field as a component of an on-site wastewater management system. Specifically, the objective of this letter is to request confirmation of the NMZ rating and approval for the septic field installation, based on the soil information presented at the location proposed for the septic field.

The camp development to be proposed would include the installation of an on-site wastewater system, which would include subsurface disposal fields. This system capacity will be approximately 40,000 to 50,000 L of combined treated sewage and greywater flow per day. As this system will exceed the 10,000 L per day limit, it will not be governed under the *Onsite Wastewater Management Systems Regulation* (83/2003) of *The Environment Act* (C.C.S.M. c. E125), referenced in Part 4 of the *Nutrient Management Regulation* (62/2008) of the *Water Protection Act* (C.C.S.M. c. W65). However, it is understood that the guiding principles of this Regulation will be followed for the works to be proposed.

The specific area examined is located along the western boundary of Sylvia Lake at the convergence of the following legal locations: SE 3-14-12E1, SW 3-14-12E1, and NW 34-13-12E1 (Figure 1).

There is no existing detailed soil resource inventory report or data that covers this site. The 1:126,720 soil landscape information available on Agri-Maps[1] is of insufficient detail to support local-level land use decisions. Therefore, groundtruthing, including detailed soil inspections and sampling, was conducted in the area of the proposed septic field by Stantec on November 5, 2009. Soil inspections were conducted by Pedologists and Professional Agrologists in good standing with the Manitoba Institute of Agrologists.

Three soil inspections were completed within the boundary of the septic field location (SL01-SL03; Figure 2). The local slope gradient is approximately 1 % (slope class 2), with slopes facing towards an open meadow to the south. Bedrock was encountered at depths ranging from 1.80 metres to 1.15 metres at the sites

[1] Agri-Maps, Manitoba Agriculture, Food and Rural Initiatives (URL: http://geoapp2.gov.mb.ca, Accessed November 2009)

inspected. No groundwater features were found within the mineral soil profiles. The soils were found to be developed on a thin, clayey lacustrine sediments overlying loamy glacial till. Two of the three sites (i.e. SL01 and SL03) were classified as imperfectly-drained, Gleyed Regosols, while one site (i.e. SL02) was found to be a moderately well-drained, Orthic Regosol (Table 1).

The soil capability classifications (3D), based on our interpretation of the site-specific soil information discussed above, would result in the soils at the potential septic field location being considered Nutrient Management Zone N2, as defined in the Manitoba *Nutrient Management Regulation* (62/2008). According to prohibition 14(1) in Part 4 of the *Regulation*, this site would not be precluded from the installation of an onsite wastewater management system, as defined in *Onsite Wastewater Management Systems Regulation* (83/2003).

Please review this data and confirm our interpretation (i.e. Nutrient Management Zone) of the soils at the site in relation to the *Nutrient Management Regulation* (62/2008) and provide approval for septic field permitting, at your earliest convenience. Should you have any further questions on this assessment, please do not hesitate to call us at (204) 475-9966.

Sincerely,

Stantec

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Attachments: Figure 1 – Project Area Overview; Figure 2 – Soil Inspection Locations; Table 1 – Summary of Soil Properties and Ratings; Analytical Results

c. Garry Fraser (The TDL Group); Dave Wilhelm (MTE Consultants); Larry Teetaert (Regional Park Manager, Manitoba Conservation)

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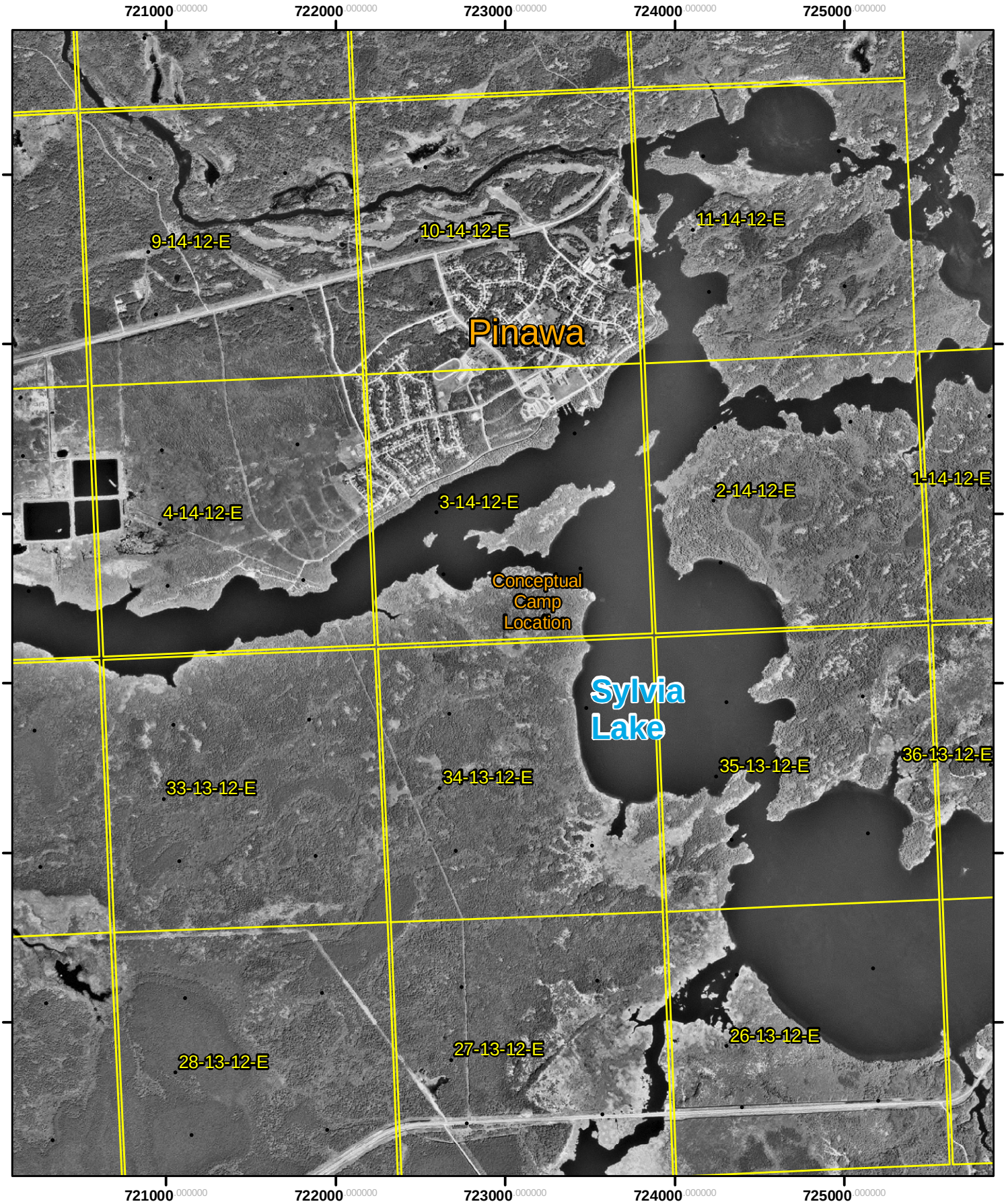
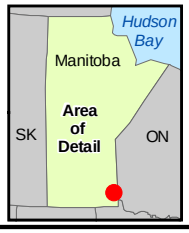


TDL GROUP - PROPOSED SYLVIA LAKE SITE

Project Area Overview



NORTH

0 165 330 660 990 Meters

Acknowledgements:
Original Drawing by Jacques Whitford Stantec AXYS Ltd.
Orthophoto Imagery provided by the Manitoba Land Initiative (MLI).

PREPARED BY Stantec

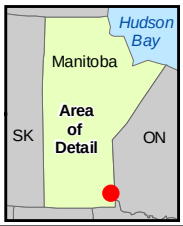
MAP SCALE	DATA SCALE
1:30,000	NA

DRAFT DATE	PROJECT	FIGURE NO.
November 26, 2009	1112 57005	1

DRAWN	CHECKED	APPROVED
DS	DW	DW

TDL GROUP - PROPOSED SYLVIA LAKE SITE

Soil Inspection Locations



NORTH

0 25 50 100 150 Meters

Acknowledgements:
Original Drawing by Jacques Whitford Stantec AXYS Ltd.
Orthophoto Imagery provided by the Manitoba Land Initiative (MLI).

PREPARED BY Stantec

MAP SCALE	DATA SCALE
1:5,000	NA

DRAFT DATE	PROJECT	FIGURE NO.
November 26, 2009	1112 57005	2

DRAWN	CHECKED	APPROVED
DS	DW	DW

Table 1 - Summary of Soil Properties and Ratings

Site ID	Soil Classification	Horizon	Depth (cm)		Texture*					Soil Ratings	
			Upper	Lower	Field	Laboratory	% sand	% silt	% clay	Agricultural Capability**	Nutrient Management Zone***
SL01	Gleyed Regosol	LFH	4	0	-	-	-	-	-	3D	N2
		Ah	0	7	CL	CL	29.0	38.0	33.0		
		C	7	36	SiC	C	15.0	30.0	54.0		
		Cgj	36	45	SiC	C	12.0	34.0	54.0		
		IICkgj1	45	90	CL	SiC	9.0	49.0	42.0		
		IICkgj2	90	180	CL	CL	22.0	45.0	33.0		
		R	180	-							
SL02	Orthic Regosol	LFH	6	0	-	-	-	-	-	3D	N2
		Ah	0	5	CL	-	-	-	-		
		C	5	58	SiC	-	-	-	-		
		Ckgj	58	92	SiC	-	-	-	-		
		IICkgj	92	115	CL	-	-	-	-		
		R	115	-							
SL03	Gleyed Regosol	LFH	5	0	-	-	-	-	-	3D	N2
		Ah	0	6	SiCL	-	-	-	-		
		C	6	45	C	-	-	-	-		
		IICkgj1	45	55	CL	-	-	-	-		
		IICkgj2	55	150	CL	-	-	-	-		
		R	150	-							

Notes

*CL - clay loam; SiCL - silty clay loam; C - clay; SiC - silty clay

**Agricultural Capability rating derived from Special Report 01-1, Technical Manual for Manitoba RM Soils and Terrain Information Bulletins, Agriculture and Agri-Food Canada, 2001.

***Nutrient Management Zone as defined in the Manitoba *Nutrient Management Regulation* (62/2008)

Certificate of Analysis

STANTEC (JACQUES WHITFORD)- WINNIPEG
ATTN: DANIEL SAURETTE
SUITE 103 - 611 CORYDON AVE
WINNIPEG MB R3L 0P3

Report Date: 27-NOV-09 10:19 (MT)
Version: FINAL

Lab Work Order #: L838015 **Date Received:** 06-NOV-09

Project P.O. #: 1045466
Job Reference: 1045466
Legal Site Desc:
CofC Numbers:

Other Information:

Comments:

M. Michalchuk

Michelle Michalchuk
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L838015-1	L838015-2	L838015-3	L838015-4	L838015-5
	Description	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampled Date	05-NOV-09	05-NOV-09	05-NOV-09	05-NOV-09	05-NOV-09
	Sampled Time					
	Client ID	TDL_SL01 AH	TDL_SL01 C	TDL_SL01 CGJ	TDL_SL01 IICKGJ1	TDL_SL01 IICKGJ2
Grouping	**Analyte**					
SOIL						
Particle Size	% Sand (2.0mm - 0.05mm) (%)	29.0	15.0	12.0	9.0	22.0
	% Silt (0.05mm - 2um) (%)	38.0	30.0	34.0	49.0	45.0
	% Clay (<2um) (%)	33.0	54.0	54.0	42.0	33.0
	Texture	Clay loam	Clay	Clay	Silty clay	Clay loam
Organic / Inorganic Carbon	CaCO3 Equivalent (%)	0.93				
	Inorganic Carbon (%)	<0.10				
	Total Carbon by Combustion (%)	14.9				
	Total Organic Carbon (%)	14.9				

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L838015-6	L838015-7	L838015-8		
	Description	SOIL	SOIL	SOIL		
	Sampled Date	05-NOV-09	05-NOV-09	05-NOV-09		
	Sampled Time					
	Client ID	TDL_SL06 BMK	TDL_SL06 CK	TDL_SL06 IICKGJ		
Grouping	**Analyte**					
SOIL						
Particle Size	% Sand (2.0mm - 0.05mm) (%)	24.0	21.0	24.0		
	% Silt (0.05mm - 2um) (%)	33.0	46.0	42.0		
	% Clay (<2um) (%)	43.0	32.0	34.0		
	Texture	Clay	Clay loam	Clay loam		
Organic / Inorganic Carbon	CaCO3 Equivalent (%)					
	Inorganic Carbon (%)					
	Total Carbon by Combustion (%)					
	Total Organic Carbon (%)					

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
C-INORG-ORG-SK	Soil	Inorganic and Organic Carbon	SSSA (1996) P455-456

When carbonates are decomposed with acid in an open system, carbon dioxide is released to the atmosphere. The decrease in sample weight resulting from CO2 loss is proportional to the carbonate content of the soil.

Reference:
Loeppert, R.H. and Suarez, D.L. 1996. Gravimetric Method for Loss of Carbon Dioxide. P. 455-456 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

C-TOT-LECO-SK	Soil	Total Carbon by combustion method	SSSA (1996) P. 973-974

The sample is introduced into a quartz tube where it undergoes combustion at 900 C in the presence of oxygen.
Combustion gases are first carried through a catalyst bed in the bottom of the combustion tube, where oxidation is completed and then carried through a reducing agent (copper), where the nitrogen oxides are reduced to elemental nitrogen.
This mixture of N2, CO2, and H2O is then passed through an absorber column containing magnesium perchlorate to remove water. N2 and CO2 gases are then separated in a gas chromatographic column and detected by thermal conductivity.

Reference:
Nelson, D.W. and Sommers, L.E. 1996. Total Carbon, organic carbon and organic matter. P. 973-974 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

PSA-1-SK	Soil	Particle Size Analysis: Hydrometer	CSSS (1993) P.508-509

The hydrometer method is based on Stokes' Law which relates the radius of soil particles to the velocity of their sedimentation.
Air-dried soil is wetted with a dispersing agent and then mixed with water in a sedimentation cylinder. The soil is allowed to settle and particle density readings(g/L) are taken after 40 seconds and 6 hours. These readings correspond to silt + clay and clay content respectively. Sand content is calculated by difference.

Reference:
Carter, M.R., 1993. Soil sampling and methods of analysis. Can. Soc. Soil Sci. Ottawa Ont. 508-509

Kalra, Y.P., Maynard, D.G. 1991. Methods manual for forest soil and plant analysis. Forestry Canada. p. 42-45.

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
SK	ALS LABORATORY GROUP - SASKATOON, SASKATCHEWAN, CANADA		

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

Manitoba
Water Stewardship
Water Quality Management, Water Science and Management Branch
160-123 Main Street, Winnipeg, Manitoba, Canada R3C 1A5
T 204-945-3991 F 204-945-2357
www.manitoba.ca

2009 December 11

David Whetter
Senior Associate, Environmental Management
Stantec
103 - 611 Corydon Avenue
Winnipeg, MB, R3L 0P3

Dear David,

I have reviewed the soil and landscape assessment report that you submitted for the proposed location of the septic field at Sylvia Lake at the convergence of SE 3-14-12E1, SW 3-14-12E1, and NW 34-13-12E1 (Stantec file number 1045466.02). Based on the information provided, I have confirmed that the proposed location of the septic field is not in Nutrient Management Zone N4 and as such this site is not precluded from the installation of an onsite wastewater management system according to the terms of the Nutrient Management Regulation.

Please note that while the requirements of the Nutrient Management Regulation have been met, the onsite wastewater management system at this site will need to go through the Environment Act licensing process as well.

Don't hesitate to contact me if you have any questions or concerns.

Sincerely,

Brian Wiebe, Ph.D., P.Ag.
Nutrient Management Program Coordinator

Appendix B:
Analytical Results for Dorothy Lake Sand Source

THE NATIONAL TESTING LABORATORIES LIMITED
Established in 1923

199 Henlow Bay
Winnipeg, MB R3Y 1G4
Phone (204) 488-6999
Fax (204) 488-6947
Email info@nationaltestlabs.com
www.nationaltestlabs.com

Stantec Consulting Ltd
103-611 Corydon Ave.
Winnipeg, MB
R3L 0P3

December 2, 2009

Project: Tim Hortons Septic Field

Attention: David Whetter

Soil samples were submitted to our laboratory on November 25, 2009. The samples were tested for particle size distribution in accordance with ASTM Standard Test Method D422 and the test results are provided in the table below.

Sample Identification	Gravel (%) 75 to 4.75 mm	Sand (%) <4.75 to 0.075mm	Silt (%) <0.075 to 0.005 mm	Clay (%) <0.005 mm
S1-4, Dorothy Lake	0.6	97.8	0.7	0.9
S5-6, Dorothy Lake	0	99.5	0.1	0.4

Notes
1. A high speed stirring device was used for 1 minute to disperse the test sample.
2. The soil samples were air-dried during sample preparation.

Based upon the Manitoba Conservation Soil Texture Classification Triangle and the particle size distribution for the soil samples, the soil samples are classified as **Sand**.

We appreciate the opportunity to assist you in this project. Please call if you have any questions regarding this report.

Don Flatt, M.Eng., P.Eng.
Senior Geotechnical Engineer

THE NATIONAL TESTING LABORATORIES LIMITED
Established in 1923

PARTICLE SIZE ANALYSIS
ASTM D422

Stantec Consulting
103-611 Corydon Avenue
Winnipeg, Manitoba
R3L 0P3

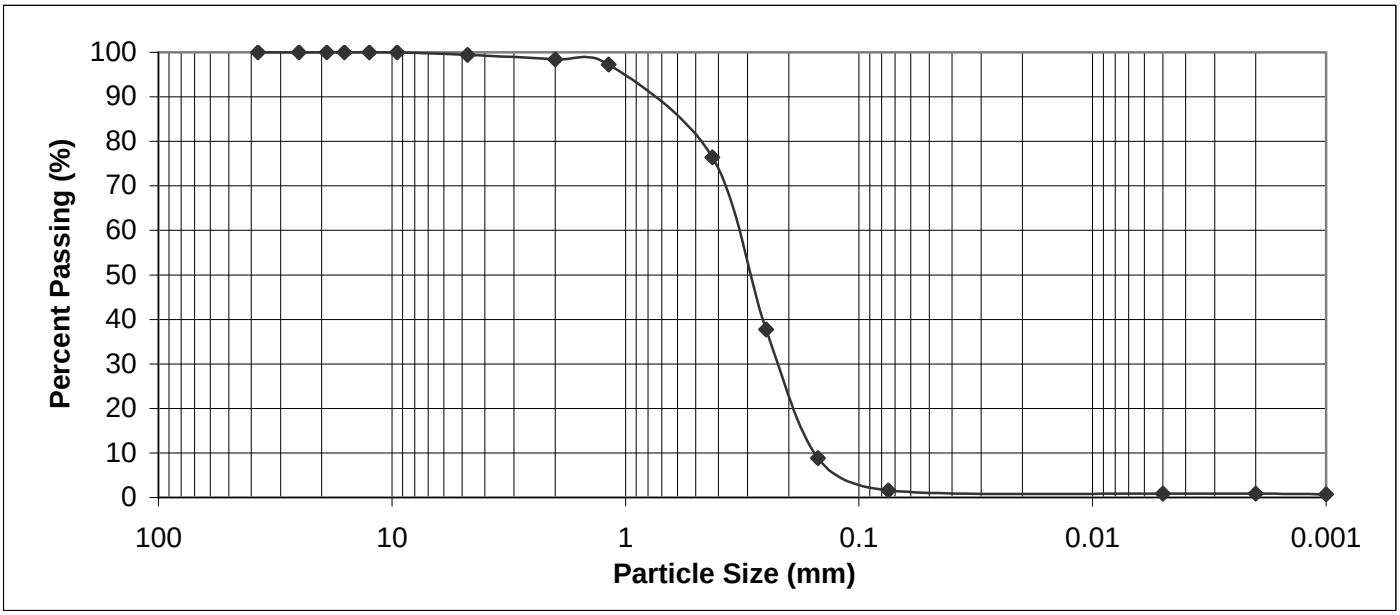
PROJECT: Tim Hortons Septic Field
Dorothy Lake

Attention: David Whetter

PROJECT NO.: STA- 954

SAMPLED BY: Client
SAMPLE ID: S1-4

DATE RECEIVED: November 25, 2009
TESTED BY: Larry Presado



PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0
25.00 mm	100.0
19.00 mm	100.0
16.00 mm	100.0
12.50 mm	100.0
9.50 mm	100.0
4.75 mm	99.4
2.00 mm	98.4

PARTICLE SIZE	PERCENT PASSING
1.18 mm	97.2
0.425 mm	76.4
0.250 mm	37.7
0.150 mm	8.8
0.075 mm	1.6
0.005 mm	0.9
0.002 mm	0.9
0.001 mm	0.7

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.005 mm	Clay, % <0.005 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.6	1.0	22.0	74.8	0.7	0.9	0.0

December 1, 2009

REVIEWED BY: Don Flatt, M. Eng., P. Eng.

THE NATIONAL TESTING LABORATORIES LIMITED
Established in 1923

PARTICLE SIZE ANALYSIS
ASTM D422

Stantec Consulting
103-611 Corydon Avenue
Winnipeg, Manitoba
R3L 0P3

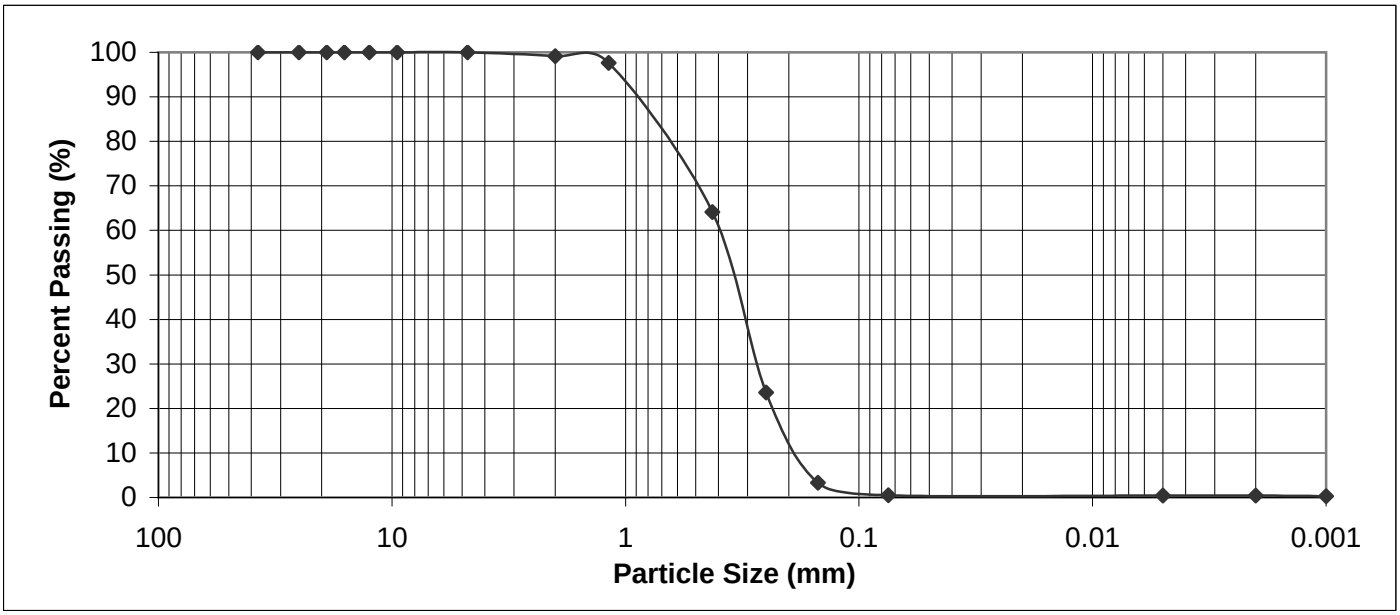
PROJECT: Tim Hortons Septic Field
Dorothy Lake

Attention: David Whetter

PROJECT NO.: STA- 954

SAMPLED BY: Client
SAMPLE ID: S5-6

DATE RECEIVED: November 25, 2009
TESTED BY: Larry Presado



PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0
25.00 mm	100.0
19.00 mm	100.0
16.00 mm	100.0
12.50 mm	100.0
9.50 mm	100.0
4.75 mm	100.0
2.00 mm	99.2

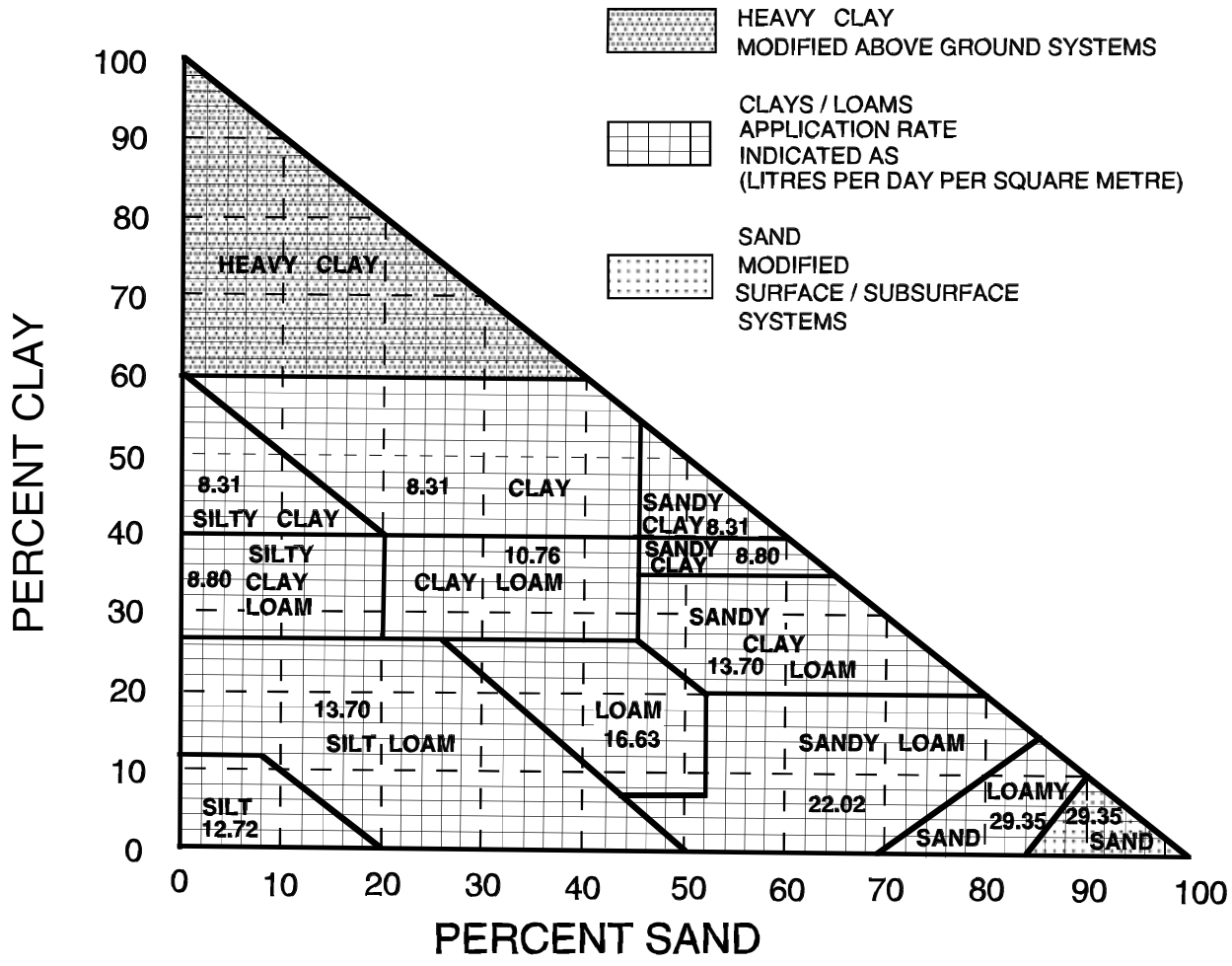
PARTICLE SIZE	PERCENT PASSING
1.18 mm	97.6
0.425 mm	64.1
0.250 mm	23.6
0.150 mm	3.3
0.075 mm	0.5
0.005 mm	0.4
0.002 mm	0.4
0.001 mm	0.3

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.005 mm	Clay, % <0.005 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.0	0.8	35.1	63.6	0.1	0.4	0.0

December 1, 2009

REVIEWED BY: Don Flatt, M. Eng., P. Eng.

SOIL TEXTURE CLASSIFICATION TRIANGLE



***APPLICATION RATE-LITRES PER DAY PER SQUARE METRE**

JULY 2005