RM OF GIMLI

ENVIRONMENT ACT PROPOSAL

WASTEWATER BIOSOLIDS STORAGE FACILITY

JUNE 2018

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WASTEWATER BIOSOLIDS STORAGE FACILITY

RM OF GIMLI

ENVIRONMENT ACT PROPOSAL REPORT

PROJECT NO.: 181-03988-00
DATE: JUNE 2018

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June 13, 2018

Manitoba Sustainable Development
Environmental Approvals
1007 Century Street
Winnipeg, MB R3H 0W4

Attention: Tracey Braun, M.Sc. – Director, Environmental Approvals

Dear Ms. Braun:

Subject: Environment Act Proposal – RM of Gimli
Wastewater Biosolids Storage Facility

The Rural Municipality of Gimli wastewater treatment plant generates biosolids that require storage during the time that it cannot be land applied. The existing Arnes Waste Disposal Ground site was selected as a desirable location to construct a biosolids storage facility for this purpose.

The RM has an existing Environment Act Licence No. 2473 R for the disposal of the sludge solids from the wastewater treatment plant, which operates under Environment Act Licence No. 2587.

The enclosed Environment Act Proposal report (2 copies, 1 CD) provides the details and information of the proposed development. It is accompanied by the signed application form and a cheque in the amount of $7,500.00. We request the opportunity to review the draft Environment Act Licence when it is issued. Please contact the undersigned if further information is required.

Yours sincerely,

Jason Bunn, P.Eng.
Engineer, Wastewater Infrastructure

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SIGNATURES

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Engineer, Wastewater Infrastructure

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2018-06-13
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REGISTERED PROFESSIONAL ENGINEER

REVIEWED BY

Ross Webster, P.Eng.
Senior Wastewater Specialist

ENGINEERS
GEOSCIENTISTS
MANITOBA
Certificate of Authorization
WSP Canada Inc.
No. 5750 Date: 2018-06-13

EXECUTIVE SUMMARY

The RM of Gimli operates a mechanical wastewater treatment plant within the Community of Gimli. The wastewater treatment plant services the Community, Diageo Gimli distillery and truck-hauled wastewater from the surrounding municipality as well as from the RM of Armstrong.

Wastewater biosolids is generated as a by-product of the operation of the plant. Currently this wastewater biosolids is stored within the compound at the wastewater treatment plant site. The RM is licensed to dispose of this wastewater biosolids by land application.

In order to provide suitable yet temporary storage for this material, the RM desires to construct a new biosolids storage facility adjacent to the Arnes Waste Disposal Ground site.

The proposed development involves the construction of two wastewater biosolids storage ponds that will provide annual storage for the wastewater biosolids generated within the 20-year design horizon.

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Rural Municipality of Gimli
Wastewater Biosolids Storage Facility

Name of development

Rural Municipality of Gimli

Legal name of the proponent of the development

Southwest Quarter of 10-21-3 EPM

Location of development

Contact Person for Proponent:

Mr. Dick Menon, P.Eng.
Project Manager
RM of Gimli
Box 1246 – 62 2nd Avenue
Gimli, MB R0C 1B0

Contact People for Environmental Assessment:

Mr. Jason Bunn, P.Eng. and Mr. Dana Bredin, P.Eng.
WSP
1600 Buffalo Place
Winnipeg, MB R3T 6B8

Table 1-1: Proposal Contents

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(ii)	Mineral rights	2.2
(iii)	Existing land use	2.3
(iv)	Land use designation	2.3
(v)	Previous studies	2.4
(vi)	Proposed development	5.0
(vii)	Storage of gasoline or associated products	5.3.1
(viii)	Potential impacts	5.0
(ix)	Proposed environmental management	6.0
SCHEDULE:		7.0
FUNDING:		7.0

1.1 CANADIAN ENVIRONMENTAL ASSESSMENT INFORMATION

Table 1-2: CEAA Proposal Contents

Screening Report Outline		Section Number in Report
1.	Assessment Responsibility - Funding	7.0
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7.	Follow-Up	6.0
8.	Contacts	1.0
9.	Personal Communication	Appendix D
10.	Attachments	Appendix A, B, C, D

2 DESCRIPTION OF DEVELOPMENT

2.1 LEGAL DESCRIPTION AND OWNERSHIP

The existing Arnes solid waste disposal ground is located in the southwest quarter of section 10-21-3 EPM. The Rural Municipality of Gimli is the registered owner of the existing site, as identified in Certificate of Title 533897 (Appendix A).

The new development is to be located within this same quarter section, as shown in Figure 2-1.

Figure 2-1: Location Map of the Existing Waste Disposal Ground and Proposed Development

2.2 MINERAL RIGHTS

The Crown Lands and Property Agency – Lands Branch was contacted to provide information on the mines & minerals and sand & gravel ownership of the applicable lands discussed in the previous section. It was confirmed that the RM of Gimli owns the sand and gravel whereas the mines and minerals remain with the Crown. Correspondence is included in Appendix D.

2.3 DESCRIPTION OF EXISTING LAND USE

The land proposed for the construction of a biosolids storage facility is currently a mixed wood area bordered on the west by Road 15E, on the south by Ridge Road and on the east by the waste disposal ground. The land is zone AG, “Agriculture General”.

2.4 PREVIOUS STUDIES

2018 "Geotechnical Site Review for the Proposed Sludge Storage Facility at the Arnes Waste Disposal Ground" prepared by WSP for the RM of Gimli

This letter report provides the details of the geotechnical investigation at the proposed sludge storage facility site. The investigation included testhole drilling, sample collection and laboratory analysis. The clay material identified at the site will meet the Provincial regulation for clay liners, but the clay material is limited in availability. Therefore, it is proposed to use the insitu till material, which also passed a consolidation test, as a liner on the bottom of the ponds and the suitable clay in the dykes above.

2016 "RM of Gimli Wastewater Treatment Plant: Notice of Alteration Request Environment Act Licence No. 2587" prepared by Birchtree Consulting

This alteration details request to add an additional centrifuge in the wastewater treatment plant and modify particular limits in the existing Environment Act Licence

1997 "Groundwater Analysis for Arnes Waste Site at SW 10-21-3 EPM" prepared by Cochrane Environmental Consultants for the RM of Gimli

This document satisfies the request of Manitoba Environment to provide laboratory analysis on the six monitoring wells on the property in question. The analysis concluded that the testing was consistent with the baseline sampling conducted in the previous year.

1997 "Rural Municipality of Gimli – Closure Plan and Groundwater Analysis – Arnes Waste Disposal Site" prepared by Cochrane Engineering

This document outlines the closure of the existing Arnes Waste Disposal Site which had operated for over twenty-five years and was nearing capacity. Both the Arnes Waste Disposal site and the Foley site were being replaced by a new regional waste disposal site located to the south of the Arnes existing site (current site location).

1994 "Geotechnical Investigation – Interlake Development Corporation – Rural Municipality of Gimli – Site 1 Arnes Waste Disposal Ground – SW 10-21-3EPM – Site 2 Foley Waste Disposal Ground – SW 26-18-3EPM" prepared by Poetker MacLaren Limited

This geotechnical investigation was conducted to satisfy the requirements for renewal of an expiring operating permit at the Arnes Waste Disposal Ground. The investigation included monitoring well installation, testhole drilling, sample collection and laboratory testing. As well, a vertical seepage analysis was conducted.

3 EXISTING WASTEWATER TREATMENT PLANT

3.1 DESCRIPTION

The existing wastewater treatment plant is located in the RM of Gimli Business Park in the west half of Section 18-19-4 EPM. The facility operates under Environment Act Licence No. 2587, originally issued January 20, 2003. The plant utilizes a sequencing batch reactor (SBR) treatment process and supplemental chemical phosphorus removal followed by ultraviolet disinfection. The wastewater treatment plant discharges treated effluent to Lake Winnipeg. A by-product of the plant operation is the generation of a wastewater biosolids. The biosolids are dewatered by centrifuges to approximately 19% solids, as reported by the RM. Therefore, further dewatering is not necessary prior to transport.

The RM wastewater biosolids generation for the 20-year design period is 11.7 cubic metres per day (m^3/d).

No changes are being proposed to the operation of the existing wastewater treatment plant as part of this proposal.

3.2 TRANSPORTATION ROUTE

The dewatered biosolids will be transported with a tandem truck and trailer (see Figure 3-1 below). The truck (18.1 m^3) and trailer (21.7 m^3) capacity totals 40 m^3, but the amount hauled will be limited by weight, typically 50-65% of a full load. On the basis of the design biosolids generation, transport to the biosolids storage facility will occur every 2 days.

Travelling via PTH 8, the round-trip route is approximately 49 kilometres. See Figure 3-2 on the following page.

Figure 3-1: RM of Gimli Truck and Trailer for Hauling Biosolids to the Proposed Storage Facility

Figure 3-2: Transportation Route from WWTP to Biosolids Storage Facility

4 PROPOSED DEVELOPMENT

The proposed development involves the construction of two new ponds to provide storage for the wastewater biosolids generated by the treatment process of the RM of Gimli wastewater treatment plant (WWTP). A third pond is also shown for possible future expansion. The existing WWTP is already designed with equipment and a truck bay to load the biosolids into a trailer for transport. A truck and trailer will deliver the biosolids to the new facility for storage until such time as it can be land applied according to EAL 2473 R.

The Arnes waste disposal ground site was selected as the location for the biosolids storage facility for the following reasons: (1) The area already supports a waste disposal ground (WDG) and therefore, the RM residents should have no objection to the proposal; (2) Proximity to Lake Winnipeg (9 km); (3) The RM of Gimli has ownership of this property; (4) Consolidation of the RM's waste storage facilities.

The detailed design phase of the project will include a runoff/leachate collection system for each of the ponds. The leachate will be collected in a tank that can be pumped out and hauled back to the WWTP.

The EAP design drawings are appended (Appendix C). The construction associated with this work will not affect the operation of either the WWTP or the WDG.

4.1 SITE CONDITIONS

On September 30, 2015, WSP conducted a site investigation at the proposed location for the biosolids storage facility at SW 10-21-3 EPM. A backhoe was used to excavate a total of four testpits (TP1 – TP4) at 3.0 m below grade. The testpit locations and detailed descriptions of the soil profiles are included in the Geotechnical Report in Appendix B.

This information is supplemented by a geotechnical investigation conducted in 1994 on an area adjacent to the site. On June 14, 1994, Cochrane Engineering conducted a site investigation at the RM of Gimli property within SW 10-21-3 EPM. The investigation consisted of augering six test holes, TH 101 to TH 108 over an 8.1-hectare area. The testholes were excavated using a truck-mounted drill rig with 125 mm diameter continuous flight, solid stem augers. Drilling depths were between 9.2 m and 12.0 m below grade. The testhole logs from the 1997 Groundwater Analysis report are included in the appended Geotechnical Report.

4.1.1 LOCAL TOPOGRAPHY

The site is located in the Interlake Till Plain landscape feature area. The topography varies from low ridge and swale to depressional. The land slopes gently towards Lake Winnipeg. The soil survey maps indicate that the surficial soils consist of Inwood-Meleb Complex (silt till), Leary Complex loamy sand, and Chatfield Complex peat deposits, developed over strongly calcareous till, sand and gravel outwash and beach deposits, and undifferentiated materials, respectively.

4.1.2 SOIL CONDITIONS

The four recent testpits excavated to a depth of 3.0 m revealed a general soil profile consisting of a layer of peat moss/topsoil underlain by a clay layer over a till with a silty-clay matrix which extended to the depth explored. The exception is at TP1 where a thin sand layer was encountered below the topsoil/peat moss layer. Based on the soil conditions from the available information, the till layer extends to a depth of between 36 m and 49 m, where the limestone bedrock aquifer is encountered.

Slight seepage was noted at 2.4 m in TP2 only after the completion of the excavation. It is understood that the static groundwater from the testhole logs came from the surface overburden and should not be considered as an aquifer.

4.1.3 GROUNDWATER

At present, there is a preliminary groundwater report prepared by the Planning Branch of the Water Resources Division on Eastern Interlake where the proposed site is located. Based on the report and groundwater availability maps, groundwater bearing formations or aquifers at the proposed site are formed by an extensive carbonate rock. This aquifer is almost continuous throughout the area. The depth to the aquifer ranges from less than 36 m to 49 m below grade. The potential yield around this area is approximately in the range of 1 to 100 litres per second. The water quality for the upper part of carbonate aquifer is of good quality.

A review of the Groundwater Pollution Hazard Map – Selkirk Area shows that the proposed site is not located inside a groundwater pollution hazard area.

The apparent groundwater flow is towards the east.

4.1.4 LABORATORY RESULTS

Select samples from the site investigations were submitted to a laboratory for moisture content, Atterberg limits and hydraulic conductivity analysis. As classified during our field investigation, the clay soil at TP1 (0.9-1.5 m) and TP2 (0.3-1.2 m) was classified as CH (high plasticity) material while the clay soil at TP3 (0.3-1.5m) was determined to be CL (low plasticity) with similar material at TP4. The hydraulic conductivity test result of the remoulded sample of sandy clay material (TP3@0.3 to 1.2m) is 2.54 x 10^{-8} cm/s.

Although the remoulded sample is acceptable according to the Provincial guideline for a clay liner, it is not suggested to use it as a soil liner due to the difficulty of compacting this material (sandy and silty in composition). The CH material could be used for a clay liner as this material is easy to remould and construct and will have a hydraulic conductivity range between $1x10^{-9}$ to $1x10^{-11}$ cm/sec. However, quantities are limited.

Therefore, the hydraulic conductivity of the dense till layer was calculated using a consolidation test from a block sample obtained in 2016 at TP3 at a depth of 1.5 m. The result of this test was a hydraulic conductivity of $2.99x10^{-8}$ cm/s.

4.1.5 GEOTECHNICAL RECOMMENDATIONS

Although the original intent was to excavate the ponds and utilize reworked clay to construct a 1.0 m liner, the Geotechnical Report notes a concern regarding the quantity of clay available. Subsequently, the plan was altered to investigate utilizing the in-situ dense till as the liner along the floor of the ponds and utilize the available clay for the dykes only. Knowing the density of the till, it was proposed that the till material be used for a liner foundation and a consolidation test on the till material was completed. Consolidation testing is considered to be the most accurate way to communicate the hydraulic conductivity of a dense till. This type of test has previously been used as a way of determining the suitability of an earthen liner. The laboratory analysis on the till material reported a hydraulic conductivity of $2.99x10^{-8}$ cm/s.

4.2 DESCRIPTION OF PROPOSED DEVELOPMENT

The following sections describe the construction and modifications proposed for the development. To be clear, no changes are proposed for the following:

- Existing wastewater treatment plant; and
- Existing Arnes solid waste disposal grounds.

4.2.1 PROPOSED NEW BIOSOLIDS STORAGE FACILITY

The new storage facility will be constructed as illustrated in the EAP design drawings (Appendix C) and will be located in the southwest quarter of section 10-21-3 EPM.

Each of the four pond areas will have a capacity of 2,290 m^3, thus the total biosolids capacity is 9,160 m^3 for a two year period. The anticipated biosolids generation over two years is 8,541 m^3.

A future third pond area is also shown on the drawings. The RM desires to gain approval for this future pond now and simply provide notification to Manitoba Sustainable Development when it is needed. This pond when constructed will add 4,580 m^3 of storage to the facility.

4.2.2 CONSTRUCTION DETAILS

The biosolids storage facility construction is based on the information and recommendations provided in the Geotechnical Report. According to the subsurface profiles in the Geotechnical Reports, the depth of topsoil in the proposed area is approximately 300 - 450 mm. Organic soil from the development area will be stripped, stockpiled and reapplied on the dykes and applicable disturbed areas as shown in the drawings.

For pond construction, the proposed bottom of the proposed ponds will be the in-situ dense till and the dykes will be constructed with a 1.1 m thick clay liner that ties into the till, creating a continuous liner. The proposed development location has limited clay present but in suitable quantities to be used for the dykes. Based on preliminary discussions with Manitoba Sustainable Development we anticipate that if any liner testing on the pond bottom floor is required, it will be done with a consolidation test.

The new facility will be constructed as detailed in the drawings. The interior side slopes of the constructed ponds will be 3:1 (horizontal:vertical) while the exterior slopes will be 4:1. The proposed ponds will have a 2.0 metre dyke height as measured from the interior finished pond bottom. The dykes will be constructed with in-situ material in 150 mm lifts compacted to 95% Standard Proctor density with a 1.1 m thick clay liner. The moisture content of the material should be minus two percent to plus 3 percent of optimum moisture as determined by the Standard Proctor test. Any unsuitable material such as coarse gravel and boulders should be removed. The top of the dykes will be 1.0 m wide.

The ponds will be designed with drainage laterals that collect leachate/runoff from the biosolids within the facility. The laterals will connect to a tank that can be pumped out and returned to the WWTP.

A perimeter drainage ditch will be constructed around the new ponds, if required. Other ditching will be located as shown on the drawings. For disturbed areas where sediment or erosion control is deemed necessary, the contractor will be required to employ appropriate measures.

5 ENVIRONMENTAL IMPACTS

5.1 ODOUR CONSIDERATIONS

Aerobically digested biosolids are a dark brown relatively inert waste. The primary functions of an aerobic digester are stabilization of organics and temporary storage of waste biosolids. This stabilization decomposes the solids, and reduces odours and destroys most of the bacteria in the material. Therefore, there is no expectation of any odour issues.

The closest residence to the proposed storage ponds is located approximately 1.5 kilometres away (to the north).

5.2 LAND IMPACT

The land proposed for the construction of a biosolids storage facility is currently a mixed wood area that will be cleared and grubbed. This land slated for construction is RM land that continues to be developed for the intent of a waste type facility.

Section 2.3 Description of Existing Land Use should be consulted for additional information.

5.3 SURFACE WATER

There is no discharge from the biosolids storage facility into ditching or surface watercourses. Any water collected within the facility will drain to a storage tank for pumping and return to the WWTP.

A perimeter drainage ditch (< 0.3 m in depth) will be constructed around the new ponds, if required.

The existing WWTP and Arnes waste disposal ground are in the Lower Interlake Area Watershed (No. 31).

The water licensing branch of Manitoba Water Stewardship was consulted to provide a list of water users within a 1-kilometre radius of the site. There are no licensed water users within this area (Appendix D).

5.3.1 FUEL STORAGE ON SITE

The proposed facility does not require the onsite storage of gasoline or diesel fuel. During construction and upgrading, the contractor will be required to ensure that all equipment is properly maintained to prevent leaks and spills of fuel and motor fluids. Refuelling of equipment will not be within 100 metres of a water body, stream or wetland.

5.4 GROUNDWATER

Refer to section 4.1.3 for information relating to groundwater.

5.5 SPECIES IMPACT

A file search with the Wildlife and Fisheries Branch of Manitoba Sustainable Development resulted in one occurrence in the nearby area of SE 9-21-3 EPM. The occurrence was:

- Bank Swallow (Riparia riparia), S5B, SARA: Threatened, COSEWIC: Threatened

The Bank Swallow areas have a restricted activity period between May 15-July 31. This project is anticipated to be constructed in October-November which is outside of this restricted period. Correspondence is included in Appendix D.

5.6 FISHERIES

Based on the fact that no discharge is occurring from the proposed facility to surface watercourses, fisheries will not be impacted.

5.7 FORESTRY

The Forestry and Peatlands Branch were contacting regarding forestry in the proposal area. The following information was supplied by the Regional Forester for the Central Region.

> *The Province of Manitoba is responsible for managing the forested crown lands within the proposal area. This includes the allocation of areas for timber harvesting and the subsequent renewal activities of those areas (i.e. treeplanting). The general trees species that are harvested include spruce, jack pine, balsam fir, poplar and white birch. The uses of wood products that are commercial harvested include both lumber and firewood. The closest sawmill is located north of Arborg and the firewood is distributed with in the region. There are also areas designated for obtaining personal use permits where the public harvest their own wood products. One of these areas is located in there Rembrandt Wildlife Management Area.*

5.8 HERITAGE RESOURCES

From an email dated June 4, 2018 from the Historic Resources Branch (Appendix D), it was stated that there are no concerns at this time. It is understood that if heritage resources or human remains are encountered during any phase of development, work is to stop and the Manitoba Historic Resources Branch is to be contacted immediately. In the case of human remains, the RCMP will be notified.

5.9 SOCIO-ECONOMIC IMPACTS

The biosolids facility construction will result in a short-term boost to the construction industry in the area.

5.10 PUBLIC INVOLVEMENT

Comments from concerned members of the public will be solicited as part of Manitoba Sustainable Development review prior to issuing a licence.

6 MANAGEMENT PRACTICE

The RM will be responsible for maintaining the storage facility during operation. The proposed management and operation of the facility is discussed in the following sections.

6.1 OPERATION

Operation of the biosolids storage facility must comply with the specifications, limits, terms and conditions of the existing Environment Act Licences.

The biosolids facility is designed to provide 2 years' worth of storage based on the future design biosolids generation. Within each individual pond are two storage areas (Pond 1a, 1b and Pond 2a, 2b). As such, each storage area (at design loading) will take 6 months to fill after which the biosolids will sit idle for a one-year period before being land applied.

Figure 6-1 details the fill and storage periods as well as the land applications windows for removal from the ponds.

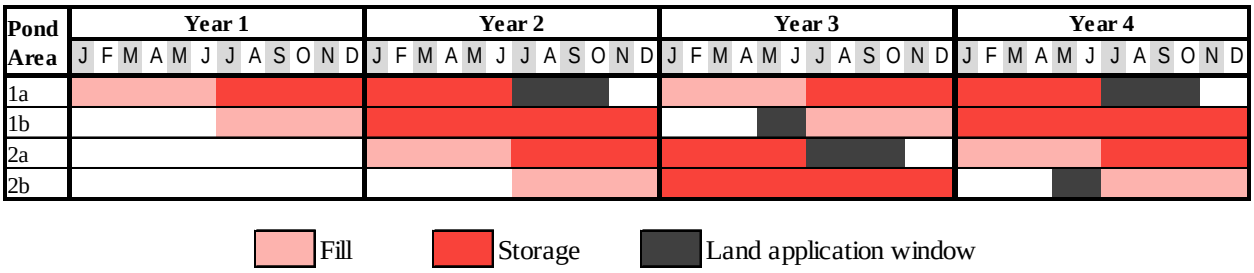


Figure 6-1: Storage Facility Stages: Fill, Storage and Land Application Periods

The design of the storage facility includes perforated laterals enclosed in a drainage stone trench that will serve to collect leachate and runoff from the biosolids. The laterals will connect to a tank which will be pumped out and returned to the WWTP. Pumping out the leachate will be done on an "as required" basis.

6.1.1 MAINTENANCE, RECORD KEEPING AND INSPECTION

The record keeping and inspection list will include but is not limited to:

1. Daily Records – Biosolids hauling records (dates and volumes) from the WWTP; Leachate hauling records (dates and volumes) from the collection manhole;
2. Weekly Records - The summer inspection would consist of noting and recording any changes to the pond dykes or floor. The summer maintenance should also include grass cutting on the dykes, extermination of burrowing animals, repair of the dykes and maintenance of the exit grid; and;
3. Periodic winter activities involve snow removal to maintain access to the facility.

7 SCHEDULE AND FUNDING

It is anticipated that the Environment Act Licence process will be finalized by the late summer/early fall of 2018 and tendering of the project will begin immediately upon receiving the draft licence (Figure 7-1). Construction is proposed for fall 2018.

The project will be funded partially funded from the Clean Water and Wastewater Fund (CWWF).

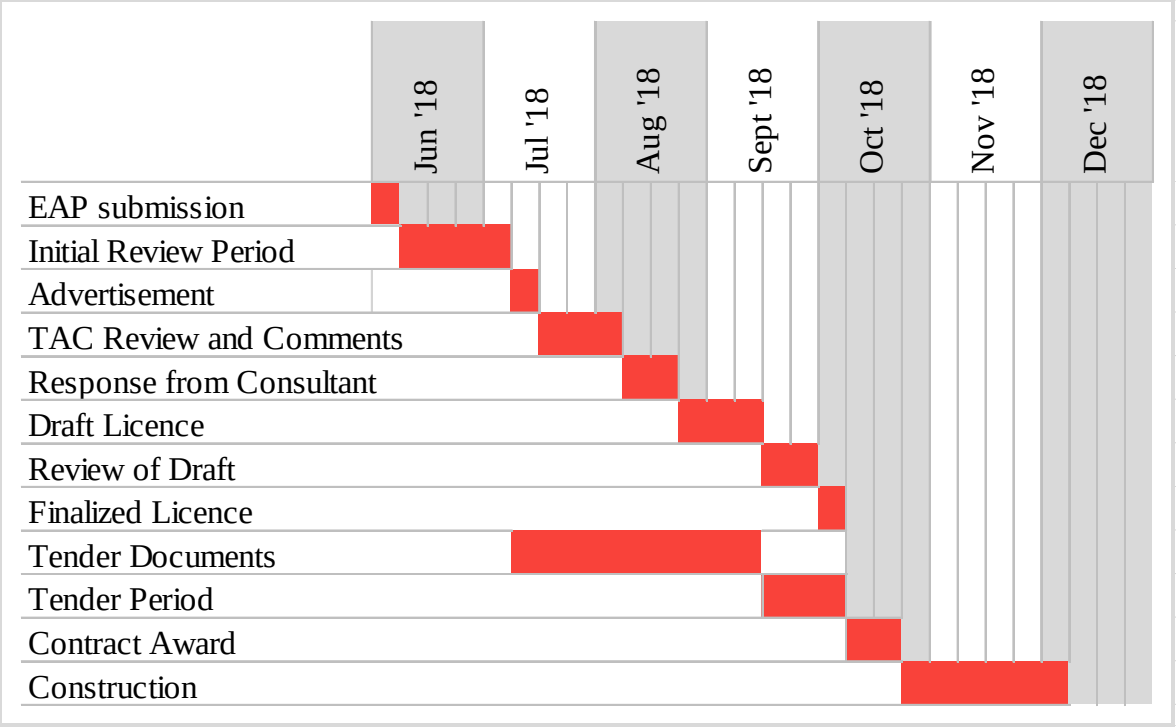


Figure 7-1: Schedule - EAP Submission to End of Construction

8 REFERENCES

None.

APPENDIX

A CERTIFICATE OF TITLE

Cert. No. 533897

MANITOBA

Certificate of Title

UNDER "THE REAL PROPERTY ACT."

THE RURAL MUNICIPALITY OF GIMLI,

IS *now seized of an estate in fee simple in possession subject to such encumbrances liens and interests as are notified by memorandum underwritten (or endorsed hereon) in all that piece or parcel of land known and described as follows* THE SOUTH-WEST QUARTER OF SECTION TEN IN THE TWENTY-FIRST TOWNSHIP AND THIRD RANGE EAST OF THE PRINCIPAL MERIDIAN IN MANITOBA, EXCEPTING THEREOUT THAT PORTION TAKEN FOR A PUBLIC ROAD AS SAME IS SHEWN ON A PLAN FILED IN THE WINNIPEG LAND TITLES OFFICE, AS NO. 3339, SUBJECT TO THE RESERVATIONS AND PROVISOES CONTAINED IN THE GRANT FROM THE CROWN.

No. 77243 TRANSFER OF E ½

TO H. M. The Queen, Man.

REG. May 5/75

VIDE CERT. C 87244 DEPT. DIST. REGISTRAR

IN WITNESS WHEREOF *I have hereunto signed my name and affixed my Seal of office this* TWENTY-SECOND *day of* DECEMBER *One thousand nine hundred and* THIRTY-NINE

Signed in the presence of

Deputy District Registrar for Winnipeg

The duplicate of this Certificate of Title having been lost, or destroyed a Provisional duplicate Certificate of Title was this day issued under The Real Property Act.

Dated May 7/75

Deputy District Registrar

Cert. No

MANITOBA

Certificate of Title

UNDER "THE REAL PROPERTY ACT."

THE RURAL MUNICIPALITY OF GIMLI,

IS *now seized of an estate in fee simple in possess* *such encumbrances liens and interests as are notified b* *dum underwritten (or endorsed hereon) in all that* AT *pie* *of land known and described as follows* THE SOUTH-WEST QU. TEN IN THE TWENTY-FIRST TOWNSHIP AND THIRD RANGE EAST OF THE PRINCIPAL MERIDIAN IN I THEREOUT THAT PORTION TAKEN FOR A PUBLIC ROAD AS SAME IS SHEWN ON A PLAN FILED IN T TITLES OFFICE, AS NO. 3339, SUBJECT TO THE RESERVATIONS AND PROVISOES CONTAINED IN CROWN.

No. 177213 T

TO H. M. The

REG. May 5/75

VIDE CERT. C 872

COLLECT

DEFERRED FEES $... 21.00

UNDER R.S.M. 1954, CAP. 87, SEC. 21.

DATE PAID	CERTS	AMOUNT
22/7/65	C	10 50
	R	10 50
		21 00

Paid

IN WITNESS WHEREOF *I have hereunto signed my name and affixed my Seal of office this* TWENTY-SECOND *day of* DECEMBER *One thousand nine hundred and* THIRTY-NINE

Signed in the presence of

W. V. Lund

Deputy District Registrar for Winnipeg

expressly declared, be deemed to be subject to:

(a) Any subsisting reservation contained in the original grant of the land from the Crown.
(b) Any municipal charge, rate or assessment existing at the date of the certificate, or subse imposed on the land.
(c) Any right-of-way or other easement, howsoever created, upon, over or in respect of the l
(d) Any subsisting lease or agreement for a lease for a period not exceeding three years, where there is actual occupation of the land thereunder.
(e) Any drainage levy or mechanics' lien affecting the land.
(f) Any order of attachment, judgment or order for the payment of money against the registered owner of the land, registered since the date of the certificate of title, and which has been maintained in force under the provisions of any Act of the province relating thereto.
(g) Any certificate of lis pendens issued out of a court in the province and registered since the date of the certificate of title.
(h) Any right of expropriation by statute.
(i) The title of a person adversely in actual occupation of and rightly entitled to the land at the time it was brought under the Act, and who continues in such occupation: See R.S.M. c. 171, s. 82.
(j) Caveats affecting the land registered since the date of the certificate, and
(k) Any town planning scheme or by-law authorized under "The Town Planning Act" or under the provisions of the charter of any city and any by-law passed by any municipal corporation under "The Municipal Act" or the charter of any city relating to residential areas or zoning.

Nature of Instrument	Day and Hour of its Production	Names of the Parties to it
	The *day of* *19* *at* *o'clock in* *the* *noon*	*Deputy District Registrar*
	The *day of* *19* *at* *o'clock in* *the* *noon*	*Deputy District Registrar*
	The *day of* *19* *at* *o'clock in* *the* *noon*	*Deputy District Registrar*
	The *day of* *19* *at* *o'clock in* *the* *noon*	*Deputy District Registrar*
	The *day of* *19* *at* *o'clock in* *the* *noon*	*Deputy District Registrar*
	The *day of* *19* *at* *o'clock in* *the* *noon*	*Deputy District Registrar*
	The *day of* *19* *at* *o'clock in* *the* *noon*	*Deputy District Registrar*

RE OF INSTRUMENT	DAY AND HOUR OF ITS PRODUCTION	NAMES OF THE PARTIES TO IT	REGISTRATION NUMBER
	The day of 19 at o'clock in the noon	Deputy District Registrar	
	The day of 19 at o'clock in the noon	Deputy District Registrar	
	The day of 19 at o'clock in the noon	Deputy District Registrar	
	The day of 19 at o'clock in the noon	Deputy District Registrar	
	The day of 19 at o'clock in the noon	Deputy District Registrar	
	The day of 19 at o'clock in the noon	Deputy District Registrar	
	The day of 19 at o'clock in the noon	Deputy District Registrar	

APPENDIX

B GEOTECHNICAL REPORT

GEOTECHNICAL LETTER REPORT

DATE: June 12, 2018

FILE: #181-03988-00

TO: **RM of GIMLI**
62-2nd Avenue
Box 1246
Gimli, Manitoba
R0C 1B0
ATTN: DICK MENON, P.ENG.

FROM: **SILVESTRE S. URBANO JR., P.ENG.**
Senior Geotechnical Engineer
WSP Canada Inc.
1600 Buffalo Place
Winnipeg, Manitoba R3T 6B8
Tel: (204) 477 6650

PHONE: 204-396-1000

RE: GEOTECHNICAL SITE REVIEW FOR THE PROPOSED SLUDGE STORAGE FACILITY AT THE ARNES WASTE DISPOSAL GROUND

A total of four testpits (TP1 to TP4) were excavated on September 30, 2015 for the proposed Sludge Storage Facility at the existing Arnes Waste Disposal Ground in the RM of Gimli. The intention is to build two pits, each having approximate dimensions of 114.0 m x 74.0 m x 2.0 m (deep). The dewatered sludge from the RM's wastewater treatment facility will be transferred and stored in these proposed pits. This letter report deals with the determination of the soil conditions of the proposed pits with respect to the 2003 Gimli Wastewater Treatment Plant licence, # 2587. Manitoba Sustainable Development requires that the inside and the bottom of any "pond" for sludge be provided with a layer consisting of at least one metre of soil having a permeability of $1x10^{-7}$ cm/s or equivalent.

The four testpits excavated to a depth of 3.0 m revealed a general soil profile consisting of a layer of peat moss/topsoil underlain by a clay layer over a till with a silty-clay matrix which extended to the depth explored. The exception is TP1 where a thin SAND layer was encountered below the topsoil/peatmoss layer. Also attached are the testhole logs drilled by Cochrane at the existing waste disposal ground in June 1994 and well logs near the proposed site. Based on the soil conditions from the additional logs and well logs, the till layer extends to a depth of 36 m to 49 m, where the limestone bedrock aquifer is encountered. These testhole logs also indicate occasional wet lenses within the till layer between 5.5 m and 6.4 m below grade.

Slight seepage was noted at a depth of 2.4 m in TP2 only after completion of the excavation. Seepage from surface overburden was also noted from the additional testhole logs (Cochrane). It is understood that the static groundwater from the testhole logs came from the surface overburden and should not be considered as an aquifer.

An additional sample from TP3, at a depth of 1.5 m, was obtained on October 14, 2016 to determine the in-situ hydraulic conductivity of the dense till material. Due to the density of the till layer (dense to very dense), a block sample was collected rather than a Shelby tube sample. A block sample of the dense till was acquired using a backhoe and was submitted to TREK Geotechnical to complete a consolidation test to determine the hydraulic conductivity of the in-situ till.

At present, there is a preliminary groundwater report prepared by the Planning Branch of the Water Resources Division for the Eastern Interlake where the proposed site is located. Based on the report and groundwater availability maps, groundwater bearing formations or aquifers at the proposed site are formed by an extensive carbonate rock. This aquifer is almost continuous throughout the area. The depth to the aquifer ranges from less than 36 m to 49 m below grade. The potential yield around this area is approximately in the range of 13-13000 gallons per minute (1 to 100 litres per second). The water quality for the upper part of carbonate aquifer is good.

Detailed descriptions of the subsurface conditions are attached including the testpit location plan. The additional testhole logs and a site plan from Poetker MacLaren Ltd., well logs near the site and a groundwater report are also attached. Note that these testhole logs and site plan were obtained from "COCHRANE GROUNDWATER ANALYSIS REPORT FOR ARNES WASTE SITE", dated November 1997.

LABORATORY TEST RESULTS

Select samples from the four testpits completed in 2015 were submitted for moisture content, Atterberg limits for classification and one hydraulic conductivity analysis of the remoulded sandy clay material and compacted to at least 97% STD proctor density (TP3 @ 0.3 to 1.2 m). As classified during our field investigation, the clay soil at TP1 (0.9 m - 1.5 m) and TP2 (0.3 m - 1.2 m) was classified as CH (high plasticity) material while the clay soil at TP3 (0.3m - 1.5m) was determined to be CL (low plasticity) with similar material at TP4. The hydraulic conductivity test result of the remoulded sample from TP3 was determined to be 2.54 x 10^{-8} cm/sec.

For the till layer the hydraulic conductivity of the block soil sample obtained in 2016 at TP3 at a depth of 1.5 m was determined to be approximately 2.99x10^{-8} cm/s. This hydraulic conductivity value was calculated based on a consolidation test, as permeability testing was not feasible for a block sample of the in-situ till material. The calculated hydraulic conductivity is below the sludge liner criteria of 1x10^{-7} cm/s.

The full laboratory test results are attached at the end of this letter, which includes the hydraulic conductivity test results of the remoulded clay and the consolidation test results of the block sample.

DESIGN CONSIDERATIONS

The two anticipated sludge pit dimensions are each approximately 114.0 m x 74.0 m x 2.0 m (deep) and both pits are approximately 1,500 m from the nearest residence. The sludge storage ponds should be designed such that the inside slopes are at minimum 3H:1V and where the hauling trucks enter and exit to dump and pick-up sludge, the slopes are at minimum 9H:1V.

For the sludge pond construction, Manitoba Sustainable Development's guidelines require that the inside and bottom of the ponds should be provided with a layer consisting of at least one metre of soil having a permeability of 1x10^{-7} cm/s or equivalent. Based on the testpit logs, the clay soil near TP1 (0.9 m - 1.5 m) and TP2 (0.3 m - 1.2 m) consists of CH material that has an approximate hydraulic

conductivity of $1x10^{-9}$ cm/s to $1x10^{-11}$ cm/s. This meets the current guideline of $1x10^{-7}$ cm/s, if remoulded and compacted to at least 95% standard proctor density and plus or minus 2% of optimum moisture content.

Unfortunately, the extent and thinness of this clay material will likely not be sufficient to line the entirety of both pits. There is most likely enough clay material to line the inside slopes of the cells above the till layer, but not for the dykes below the till layer. Thus, it is proposed that the in-situ till be used as a liner for the bottom of the ponds.

Note that the hydraulic conductivity of the till layer should be tested using a consolidation test. The dykes below the till layer, including the floor of the cells, will act as an in-situ liner. Since the density is too great to recover Shelby tubes samples, a block sample of the till material should be obtained.

ADDITIONAL CONSIDERATIONS (SITE DEVELOPMENT)

The surface drainage at the proposed site is very poor. *If extensive surface water is encountered, it is expected that significant site access problems (construction traffic) and surface groundwater problems may occur during the construction for the proposed pits.*

To minimize construction problems relative to the surface water and soft soil conditions, it is strongly recommended that prior to construction, a system of perimeter ditches leading to a lower spot (retention pond) be installed to drain surface water. These ditches should be provided with an adequate gradient to drain the water away from the site through a positive drainage outlet such as the drainage ditch to the northeast of the site.

The site development should also adopt measures such as providing a working platform for the construction on anticipated soft areas.

Finally, topsoil and grass seed should be placed on the exterior slopes (minimum slope of 4H:1V) to finish the pits.

CLOSURE

The findings and geotechnical recommendations provided in this report were prepared by WSP Canada Inc. (the Consultant) in accordance with generally accepted professional engineering principles and practices. The recommendations are based on the results of field and laboratory investigations and are reflective only of the actual testhole(s) and/or excavation(s) examined. Environmental Site Assessment (ESA) is not included in our scope of work. If conditions encountered during construction appear to be different than those shown by the testhole(s) and/or excavation(s) at this site, the Consultant should be notified immediately in order that the recommendations can be reviewed and modified as necessary to address actual site conditions.

This report is limited in scope to only those items that are specifically referenced in this report. There may be existing conditions that were not recorded in this report. Such conditions were not apparent to

the Consultant due to the limitations imposed by the scope of work. The Consultant, therefore, accepts no liability for any costs incurred by the Client for subsequent discovery, manifestation or rectification of such conditions.

This report is intended solely for the Client named as a general indication of the visible or reported physical condition of the items addressed in the report at the time of the geotechnical investigation. The material in this report reflects the Consultant's best judgment in light of the information available to it at the time of preparation.

This report and the information and data contained herein are to be treated as confidential and may be used only by the Client and its officers and employees in relation to the specific project that it was prepared for. Any use a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. The Consultant 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 report has been written to be read in its entirety, do not use any part of this report as a separate entity.

All files, notes, source data, test results and master files are retained by the Consultant and remain the property of the Consultant.

Silvestre S. Urbano Jr., P.Eng.
Senior Geotechnical Engineer

ENGINEERS
GEOSCIENTISTS
MANITOBA
Certificate of Authorization
WSP Canada Inc.
No. 5750 Date: 2018-06-12

wsp
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.WSPGROUP.COM

TITLE:

RM OF GIMLI – SLUDGE STORAGE PONDS
TESTPIT LOCATIONS

SCALE: 1:2000

DATE: 2018/06/12

PROJECT NO: 181-03988-00

REVISION:

DRAWING NO: GT-01

XREF

STAMP

Project No: 151-09378-00 **Client:** RM of Gimli **TP1**

Project: PROPOSED SLUDGE PONDS **Location:** Arnes WDG (Waste Disposal Ground)

WSP **Enclosure:**

Engineer: SSU

SUBSURFACE PROFILE				SAMPLE		
Depth (ft / m)	Symbol	Description	Depth/Elev., m	PP(kPa) 50 150 250 350	SPT, N	Water Content % Wp 10 30 50 70 90 Wl
0 / 0		Ground Surface	100			
1		***TOPSOIL*** 450mm thick; 150mm of ROOTLETS over 300mm of SANDY LOAM, black	99.5			
2		***SAND*** loose, fine to medium grained sand, fine to coarse gravel	99.1	200		
3 / 1		***CLAY*** stiff, brown, fractured	98.5	200		
5		***TILL*** soft, beige, SILTY, trace of fine gravel; DENSE below 1.8m, trace of clay; CLAYEY below 2.9m. EOTH AT 3M. TESTPIT IS DRY AFTER COMPLETION OF EXCAVATION.		400		
6 / 2						
9				300		
10 / 3			97			
		End of Testpit				
13 / 4						
16 / 5						
19 / 6						
20						

Drill Method: Backhoe

Drill Date: 09/30/15

Hole Size: 1.2m W x 3.6m L

WSP Canada Inc.
1600 Buffalo Place
Winnipeg, MB.
R3T 6B8

Elevation: 100.0m (Assumed)

Checked by: SSU

Sheet: 1 of 1

Project No: 151-09378-00

Client: RM of Gimli

TP2

Project: PROPOSED SLUDGE PONDS

Location: Arnes WDG (Waste Disposal Ground)

WSP

Enclosure:

Engineer: SSU

SUBSURFACE PROFILE				SAMPLE		
Depth (ft / m)	Symbol	Description	Depth/Elev., m	PP(kPa) 50 150 250 350	SPT, N	Water Content % Wp 10 30 50 70 90 Wl
0 / 0		Ground Surface	100			
1		***TOPSOIL*** 300mm thick; 150mm of ROOTLETS over 150mm of CLAY LOAM, black	99.7			
2 / 1		***CLAY*** firm to stiff, tan-brown, silty		150		
3 / 1			98.8			
4 / 5				400		
6 / 2		***TILL*** medium dense, beige, SILTY, trace of fine gravel; DENSE below 1.5m, trace of clay. EOTH AT 3M. SLIGHT SEEPAGE AT 2.4M AFTER COMPLETION OF EXCAVATION.		400		
9 / 10 / 3			97	400		
		End of Testpit				
11 / 12 / 13 / 4						
14 / 15 / 16 / 5						
17 / 18 / 19 / 6 / 20						

Drill Method: Backhoe

Drill Date: 09/30/15

Hole Size: 1.2m W x 3.6m L

WSP Canada Inc.
1600 Buffalo Place
Winnipeg, MB.
R3T 6B8

Elevation: 100.0m (Assumed)

Checked by: SSU

Sheet: 1 of 1

Project No: 151-09378-00

Client: RM of Gimli

TP3

Project: PROPOSED SLUDGE PONDS

Location: Arnes WDG (Waste Disposal Ground)

WSP

Enclosure:

Engineer: SSU

SUBSURFACE PROFILE				SAMPLE		
Depth (ft / m)	Symbol	Description	Depth/Elev., m	PP(kPa) 50 150 250 350	SPT, N	Water Content % Wp 0 Wl 10 30 50 70 90
0 / 0		Ground Surface	100			
		TOPSOIL 300mm thick; 150mm of ROOTLETS over 150mm of CLAY LOAM, black	99.7			
1 / 1		***CLAY*** firm, tan-brown, SILTY, trace of fine grained SAND	98.8	150		
2 / 2		***TILL*** medium dense, beige, SILTY, trace of fine gravel; DENSE below 1.5m, trace of clay. EOTH AT 3M. TESTPIT IS DRY AFTER COMPLETION OF EXCAVATION.	97	400 400 400		
10 / 3		End of Testpit				

Drill Method: Backhoe

Drill Date: 09/30/15

Hole Size: 1.2m W x 3.6m L

WSP Canada Inc.
1600 Buffalo Place
Winnipeg, MB.
R3T 6B8

Elevation: 100.0m (Assumed)

Checked by: SSU

Sheet: 1 of 1

Project No: 151-09378-00

Client: RM of Gimli

TP4

Project: PROPOSED SLUDGE PONDS

Location: Arnes WDG (Waste Disposal Ground)

WSP

Enclosure:

Engineer: SSU

SUBSURFACE PROFILE				SAMPLE		
Depth (ft / m)	Symbol	Description	Depth/Elev.,m	PP(kPa)	SPT, N	Water Content %
0 / 0		Ground Surface	100			
		TOPSOIL 300mm thick; 150mm of ROOTLETS WITH PEAT MOSS over 150mm of CLAY LOAM, black	99.7			
1 / 1		***CLAY*** firm, tan-brown, SILTY, trace of fine grained SAND	98.8	150		
2 / 2		***TILL*** medium dense, beige, SILTY, trace of fine gravel; DENSE below 1.5m, trace of clay. EOTH AT 3M. TESTPIT IS DRY AFTER COMPLETION OF EXCAVATION.	97	400 400 400		
3 / 4 / 5 / 6		End of Testpit				

PP(kPa) scale: 50, 150, 250, 350

Water Content % scale: 10, Wp, 30, 50, 70, Wl, 90

Drill Method: Backhoe

Drill Date: 09/30/15

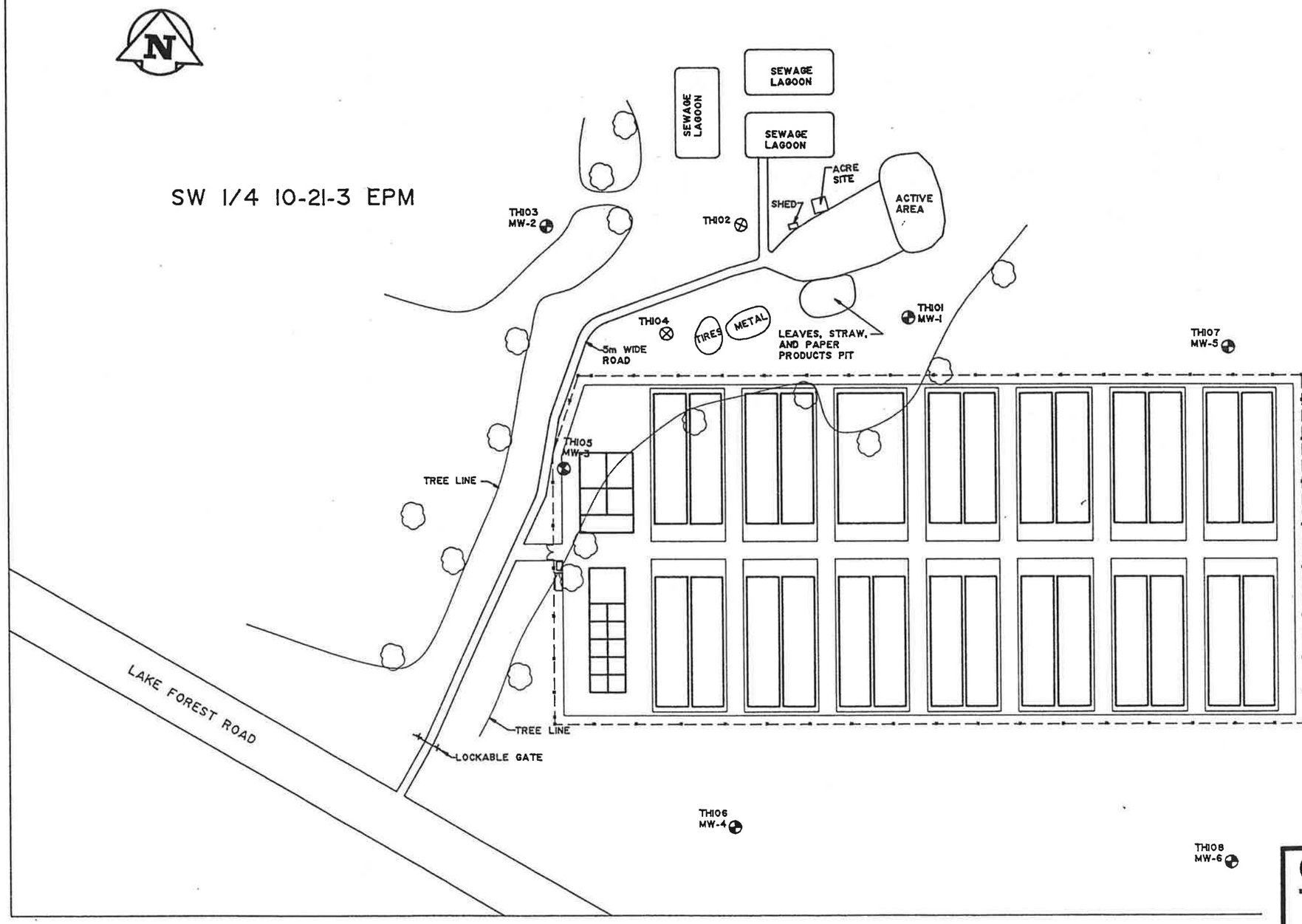
Hole Size: 1.2m W x 3.6m L

WSP Canada Inc.
1600 Buffalo Place
Winnipeg, MB.
R3T 6B8

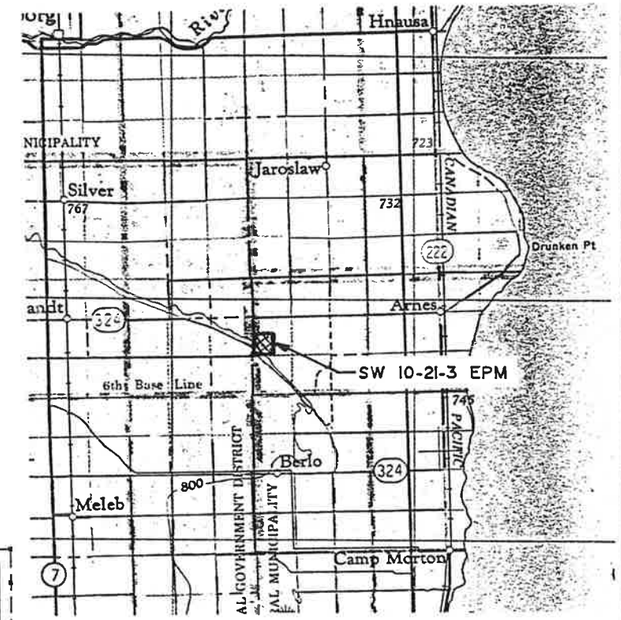
Elevation: 100.0m (Assumed)

Checked by: SSU

Sheet: 1 of 1



SITE 1



LOCATION PLAN

NOTES

1. TEST HOLES LOCATED IN AREAS WHERE ACCESSIBLE TO THE DRILL RIG AND ARE ASSUMED REPRESENTATIVE OF THE SOIL BELOW THE SITE.
2. TEST HOLES TH101 THRU TH105 EXCAVATED AND MONITORING WELLS MW1 THRU MW3 INSTALLED ON JUNE 14, 1994.
3. TEST HOLES TH106 THRU TH108 AND MONITORING WELLS MW4 THRU MW6 INSTALLED ON DECEMBER 18, 1996.

LEGEND

⊗ TEST HOLES

◓ MONITORING WELL

COCHRANE ENGINEERING

CONSULTING ENGINEERS • PROJECT MANAGERS

CALGARY, EDMONTON, REGINA, SASKATOON, WINNIPEG

PROJECT TITLE

R.M. OF GIMLI, ARNES WASTE DISPOSAL SITE, OPERATING PLAN

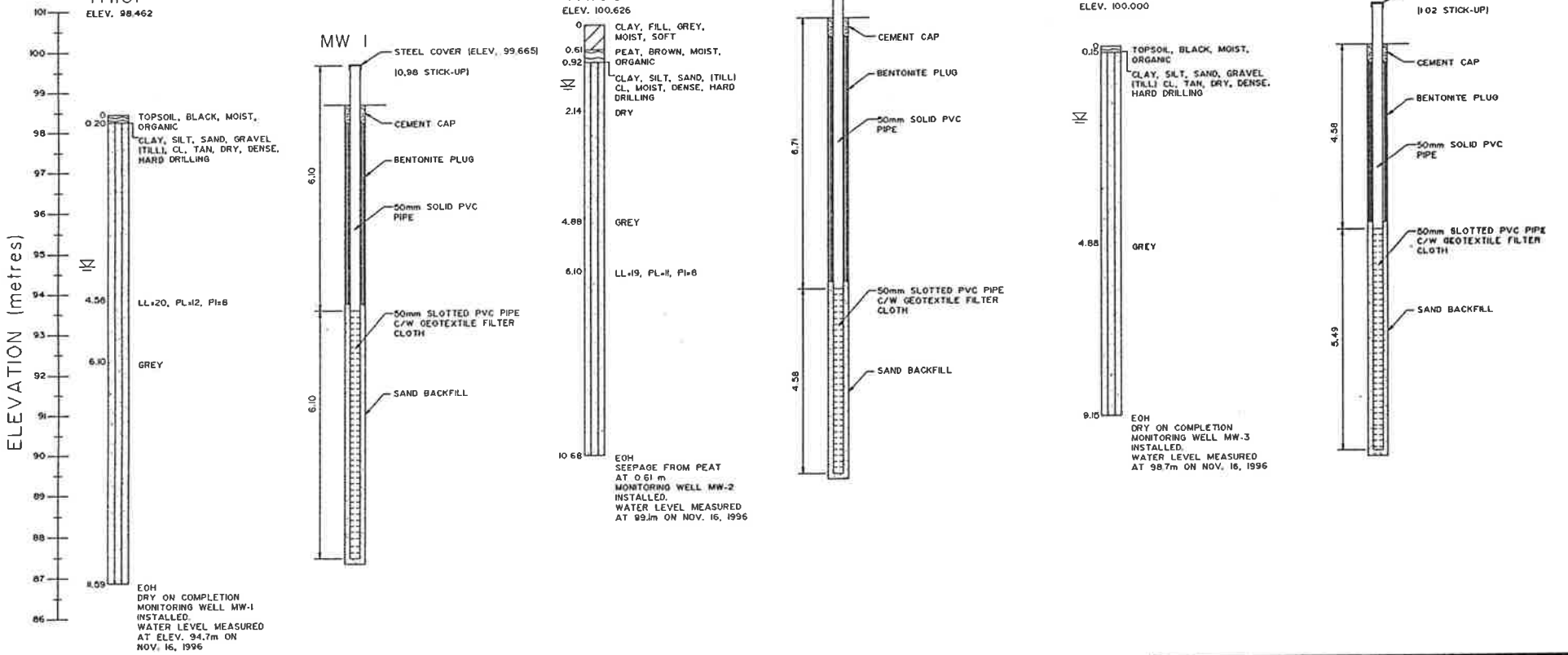
DRAWING TITLE

SW 1/4 10-21-3 EPM

LOCATION PLAN

DRAWING	SCALE	DATE	DRAWING No.	REVISION
G.R.A.	1 : 2500	01/06/97	FIGURE 1	

3680IFIA.2500



NOTES

1. TEST HOLE ELEVATIONS BASED ON LOCAL DATUM ESTABLISHED ON SITE.
2. TEST HOLES EXCAVATED ON JUNE 14, 1994 USING TRUCK-MOUNTED DRILL RIG WITH CONTINUOUS FLIGHT SOLID STEM AUGERS.
3. MONITORING WELLS INSTALLED ON JUNE 14, 1994. WATER LEVELS RECORDED BY COCHRANE ENGINEERING ON NOV. 16, 1996

COCHRANE ENGINEERING

CONSULTING ENGINEERS • PROJECT MANAGERS

CALGARY, EDMONTON, REGINA, SASKATOON, WINNIPEG

PROJECT TITLE

R.M. OF GIMLI, ARNES WASTE DISPOSAL SITE, GEOTECHNICAL INVESTIGATION

DRAWING TITLE

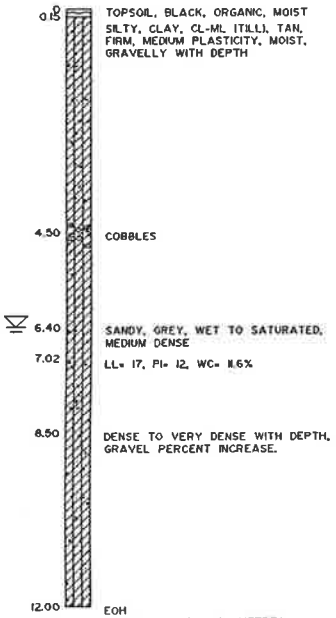
SW 1/4 10-21-3 EPM

SITE PLAN AND TEST HOLE LOCATIONS

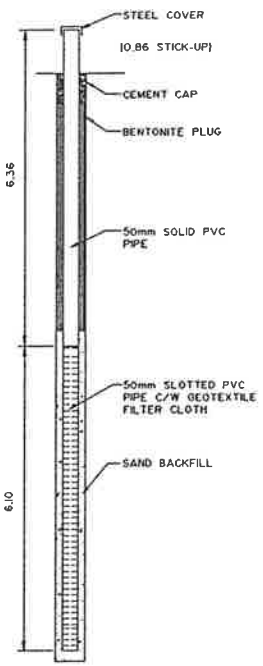
DRAWING	SCALE	DATE	DRAWING No.	REVISION
G.R.A.	1:100	07/21/97	FIGURE 2	0

3680IF3

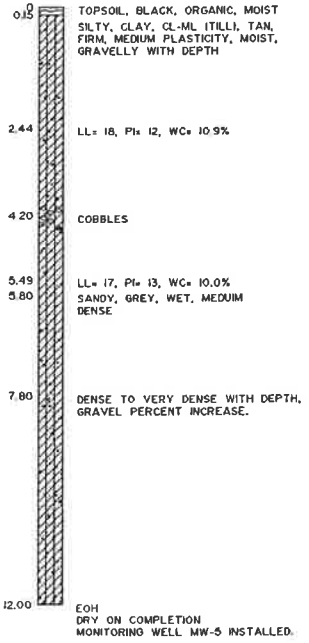
TH106
MW-4



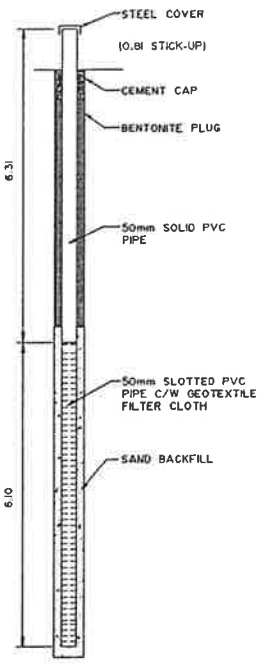
MW-4



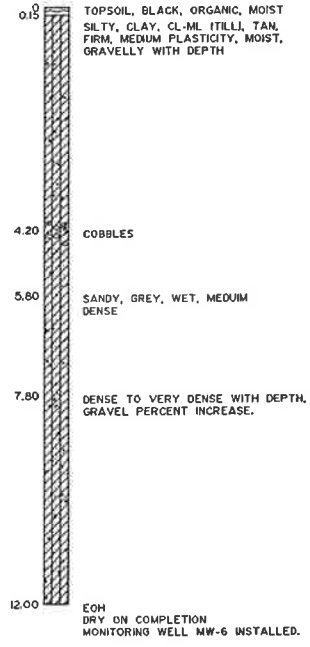
TH107
MW-5



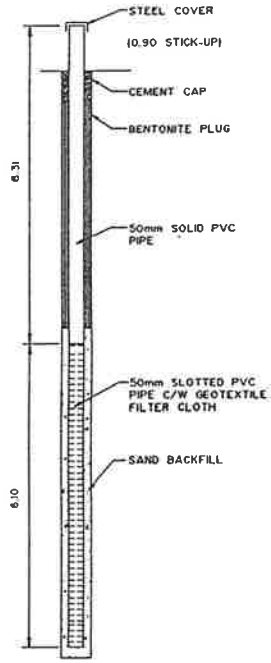
MW-5



TH108
MW-6



MW-6



NOTES

1. TEST HOLES LOCATED IN AREAS WHERE ACCESSIBLE TO THE DRILL RIG AND ARE ASSUMED REPRESENTATIVE OF THE SOIL BELOW THE SITE.
2. TEST HOLES TH101 THRU TH105 EXCAVATED AND MONITORING WELLS MW1 THRU MW3 INSTALLED ON JUNE 14, 1994.
3. TEST HOLES TH106 THRU TH108 AND MONITORING WELLS MW4 THRU MW6 INSTALLED ON DECEMBER 18, 1996.

COCHRANE ENGINEERING

CONSULTING ENGINEERS • PROJECT MANAGERS
CALGARY, EDMONTON, REGINA, SASKATOON, WINNIPEG

PROJECT TITLE
R.M. OF GIMLI, ARNES WASTE DISPOSAL SITE, GEOTECHNICAL INVESTIGATION

DRAWING TITLE
SW 1/4 10-21-3 EPM
SOIL LOGS & MONITORING WELLS

DRAWING	SCALE	DATE	DRAWING No.	REVISION
G.R.A.	1 : 100	12/20/96	FIGURE 3	

3680IF2.100

LOCATION: SW3-21-3E

Owner: A LESTER
Driller: AQUARIUS WELL DRILLING
Well Name:
Well Use: PRODUCTION
Water Use: Domestic,Livestock
Date Completed: 1976 May 26

WELL LOG

From (ft.)	To (ft.)	Log
0	4.0	CLAY
4.0	169.9	HARDPAN
169.9	174.9	LAYER OF LIMESTONE& HARDPAN
174.9	202.9	BROWN LIMESTONE

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type Material
0	184.9	casing	4.00			INSERT BLACK IRON
184.9	202.9	open hole	4.00			

Top of Casing: ft. below ground

PUMPING TEST

Date:
Pumping Rate: 20.0 Imp. gallons/minute
Water level before pumping: 94.9 ft. below ground
Pumping level at end of test: ?? ft. below ground
Test duration: 1 hours, minutes
Water temperature: ?? degrees F

LOCATION: NW9-21-3E

Owner: A J CHIBORAK
Driller: KARL STASIUK AND SON
Well Name:

Well Use: PRODUCTION
Water Use: Domestic
Date Completed: 1970 Jan 23

WELL LOG

From (ft.)	To (ft.)	Log
0	13.0	GRAVEL AND SAND
13.0	94.9	LIGHT GREY STONY TILL
94.9	143.9	LIGHT GREY STONY TILL AND PEBBLES
143.9	148.9	GRAVEL AND SAND
148.9	153.9	LIGHT BROWN LIMESTONE, WATER AT 154 FEET

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type Material
0	149.2	casing	4.00			
149.2	153.9	open hole				

Top of Casing: ft. below ground

PUMPING TEST

Date: 1970 Jan 23
Pumping Rate: 8.0 Imp. gallons/minute
Water level before pumping: 80.9 ft. below ground
Pumping level at end of test: 82.9 ft. below ground
Test duration: 4 hours, minutes
Water temperature: ?? degrees F

REMARKS

30 FT N OF PR #324 + 300 FT W OF 1/2 MI LINE, GROUND LEVEL ELEV EST
800 FT

LOCATION: NE11-21-3E

Owner: E MARKS/S PISBROWE
Driller: Ford Drilling Ltd.
Well Name:
Well Use: PRODUCTION
Water Use: Domestic,Livestock
Date Completed: 1997 Oct 14

WELL LOG

From (ft.)	To (ft.)	Log
0	12.0	CLAY
12.0	90.0	SILTY TILL WITH RUBBLE ZONES
90.0	125.0	SANDY TILL
125.0	130.0	BROKEN LIMESTONE
130.0	145.0	LIMESTONE

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type Material
0	132.0	CASING	5.30			T & C GALVANIZED
132.0	145.0	OPEN HOLE		4.50		
		CASING GROUT				

Top of Casing: 1.0 ft. above ground

PUMPING TEST

Date: 1997 Oct 14
Pumping Rate: 75.0 Imp. gallons/minute
Water level before pumping: 34.0 ft. below ground
Pumping level at end of test: ?? ft. below ground
Test duration: 1 hours, minutes
Water temperature: ?? degrees F

REMARKS

ARNES

LOCATION: NE12-21-3E

Owner: A CHAMBERS
Driller: Ford Drilling Ltd.
Well Name:
Well Use: PRODUCTION
Water Use: Domestic
Date Completed: 1982 Jul 08

WELL LOG

From (ft.)	To (ft.)	Log

0	119.9	TILL
119.9	136.9	LIMESTONE

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type Material
0	121.9	casing	4.00			INSERT GALVANIZED
121.9	136.9	open hole	3.90			

Top of Casing: 2.0 ft. below ground

PUMPING TEST

Date:	1982 Jul 08
Pumping Rate:	12.0 Imp. gallons/minute
Water level before pumping:	52.0 ft. below ground
Pumping level at end of test:	?? ft. below ground
Test duration:	1 hours, minutes
Water temperature:	?? degrees F

REMARKS

WATER FOUND AT 131 FT.

LOCATION: SW12-21-3E

Owner:	HENRY JONASSON & FRANK DOTTAVIO
Driller:	Ford Drilling Ltd.
Well Name:	
Well Use:	PRODUCTION
Water Use:	Livestock
Date Completed:	2003 Jul 31

WELL LOG

From (ft.)	To (ft.)	Log
0	5.0	TILL
5.0	12.0	CLAY
12.0	70.0	SILTY TILL
70.0	135.0	TILL WITH RUBBLE AND BOULDERS
135.0	148.0	BROKEN LIMESTONE
148.0	200.0	LIMESTONE

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type Material
0	150.0	CASING	5.25			GALVANIZED
150.0	200.0	OPEN HOLE		4.50		

Top of Casing: 2.0 ft. above ground

PUMPING TEST

Date:	2003 Jul 31
Pumping Rate:	20.0 Imp. gallons/minute
Water level before pumping:	?? ft. below ground
Pumping level at end of test:	40.0 ft. below ground
Test duration:	??? hours, ?? minutes
Water temperature:	?? degrees F

REMARKS

CASING GROUTED

LOCATION: 13-21-3E

Owner:	D BERGMAN
Driller:	AQUARIUS WELL DRILLING
Well Name:	
Well Use:	PRODUCTION
Water Use:	Domestic
Date Completed:	1977 Mar 31

WELL LOG

From (ft.)	To (ft.)	Log
0	148.9	TILL WITH SAND, GRAVEL& BOULDERS
148.9	158.9	BROKEN LIMESTONE
158.9	189.9	SOLID LIMESTONE

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type Material
0	161.9	casing	2.00			T & C GALVANIZED
161.9	189.9	open hole	2.00			

MANITOBA

DEPARTMENT OF NATURAL RESOURCES

WATER RESOURCES BRANCH

GROUNDWATER RESOURCES IN THE EASTERN INTERLAKE PLANNING DISTRICT

Prepared by:
M. Rutulis, P. Eng.
Groundwater Section
Water Investigations Service

February, 1981
Winnipeg, Manitoba

CONTENTS

SUMMARY

* Groundwater is readily available throughout the District. The total supply is adequate for present requirements and considerable new development.

* Well yield generally is adequate to abundant for domestic and farm requirements. In several areas groundwater conditions are favourable for very high capacity wells.

* In most of the District groundwater under natural conditions is of good quality.

* Groundwater pollution hazard exists in fairly extensive areas in the northern part of the District where the carbonate bedrock (limestone and dolostone) is at or near ground surface. Groundwater pollution also is possible in areas where sand and gravel deposits are at ground surface.

* Extensive flowing well areas exist in the area along the shore of Lake Winnipeg, Washow Bay area and along the Icelandic River. In the flowing well areas it would be advisable to construct wells so that discharge could be controlled.

I INTRODUCTION

The purpose of this report is to provide an assessment of groundwater resources in the Eastern Interlake Planning District.

The assessment is based on available information consisting of geological maps, soil reports and groundwater investigations carried out by this Branch and groundwater data in the files of this Branch.

This report is intended to provide general information on groundwater resources in the District and some guidance with respect to the development of water supplies for rural residential use. More specific information regarding groundwater conditions and development considerations can be obtained from the Water Resources Branch of the Department of Natural Resources.

The International System of Units (SI), commonly referred to as the metric system, and the following symbols of the SI units are used in this report:

metre	m
square metre	m^2
cubic metre	m^3
kilometre	km
square kilometre	km^2
litre	L
second	s
litres per second	L/s
cubic metres per year	m^3/a (annum)
milligrams per litre	mg/L

All dimensions and quantities are also shown in commonly used Imperial units in parentheses.

2 PHYSIOGRAPHY

The District can be divided into very flat lake plain areas that occupy the lower part of the Icelandic River Watershed and most of the southern part of the District and a slightly undulating till plain in the northwestern and northern parts of the District.

3 GEOLOGY

3.1. General Comments

Openings in rocks and in the unconsolidated deposits overlying them form the conduits through which groundwater flows and in which it is stored. Consequently the geology of an area has a significant bearing on groundwater resources in it. Hence, the main geological features of the District are described. The general geological setting of the District is schematically depicted in Figure 1.

3.2. Bedrock

The bedrock, that is the rock that underlies the surficial deposits, in the District consists of carbonate rock (limestone and dolostone) or carbonate rock interbedded with thin shale beds. In a few small and isolated areas the carbonate rock is overlain by shale and other rocks which appear to fill narrow valleys and sinkholes in the carbonate rock surface. Indications are that one of these valleys exists at Arborg.

The carbonate bedrock contains fractures and other openings that make it permeable and, therefore, capable of transmitting and storing water.

The carbonate rock is underlain by an interbedded shale and sandstone formation that, in turn, is underlain by granite and other hard rocks. The depth to the shale and sandstone formation ranges

from about 25 m (80 ft.) near the northeast corner to some 150 m (500 ft.) in the southwest corner of the District. The thickness of the shale and sandstone formation is around 30 m (100 ft.)

The sandstone beds are permeable and can transmit and store water. The granite and the other hard rocks are impermeable and for practical purposes the surface of these rocks is the base of groundwater movement in the area.

3.3. Depth to Bedrock

The bedrock surface topography in the District is considerably more uneven than the ground surface topography; valleys of various sizes and escarpments are common features of the bedrock surface. Hence, the depth to bedrock, which is an important factor in respect to well depth, varies considerably from place to place and it ranges from zero to more than 50 m (165 ft.). The depth to bedrock in the area is indicated on the map in Figure 2. Because the topography of the District is flat or only slightly undulating, the valleys and other features in the bedrock surface show up on the depth to bedrock map as variations in the depth to bedrock.

In most of the southern part of the District (R.M. of Gimli) the depth to bedrock is more than 30 m (100 ft.), although in a few areas the bedrock surface is less than 20 m (65 ft.) below ground level.

In several areas of the northwestern and northern parts of the District the bedrock is near ground surface. Consequently outcrops and areas covered with only a thin layer of rock rubble are common.

No doubt the bedrock surface is even more complex than indicated by the depth to bedrock map because there are fairly large areas where information is scarce and, therefore, it is very likely that not all such minor features as narrow valleys and depressions are indicated on the map.

3.4. Surficial Deposits

The bedrock is overlain by till, which is a mixture of clay, silt, sand, gravel and boulders deposited by glaciers during the Ice Age. The till is exposed or is near ground surface in most of the area.

In the lake plain areas along the Icelandic River and in the southern part of the District the till is overlain by extensive clay and silt lake deposits. The thickness of the lake deposits generally ranges from 3 m to 8 m (10 - 25 ft.). The lake deposits reach a maximum thickness of 15 m (50 ft.) in the vicinity of Arborg.

Surface sand and gravel deposits in the District occur mainly as long narrow ancient beach ridges that overlie the till. A few more extensive sand deposits overlie till or clay along the eastern edge of the till area northwest of Gimli, Figure 3. Buried sand and gravel deposits are not common and occur mainly in the form of isolated lenses within or at the base of the till.

The total thickness of the surficial deposits in the District ranges from zero to 50 m (165 ft.) and, as indicated on the depth to bedrock map, they are generally thicker in the southern part than in the rest of the District.

In general, the permeability of till is low and it retards groundwater movement. In some parts of the District, the till, however, is very gritty because of high crushed carbonate rock content and its permeability is high enough to allow significant percolation of precipitation to the bedrock.

The clay and silt deposits have very low permeability and for all practical purposes are impermeable.

The sand and gravel deposits are permeable and can transmit and store water in appreciable quantities.

4 GROUNDWATER

4.1. Aquifers

4.1.1. Definition and Classification:

In the discussion about the geology of the District it was pointed out that some of the rock formations and some of the surficial deposits can transmit groundwater at an appreciable rate. The rocks and surficial deposits that are saturated and can transmit groundwater in significant quantities for practical use are called aquifers.

Based on the materials forming them the aquifers in the District can be classified as follows:

1. Carbonate rock,
2. Sand and gravel,
3. Sandstone.

4.1.2. Carbonate Rock Aquifer

The carbonate rock that underlies the entire District (Figure 1) and, in fact, the entire Interlake Region constitutes an extensive aquifer. Sand and gravel beds deposited directly on the carbonate rock formation and hydraulically connected to it are considered as part of the carbonate aquifer.

The depth to the aquifer in most of the District is equal to the depth to the carbonate bedrock as indicated on the depth to bedrock map (Figure 2). However, in a few small areas in the northwestern part of the District, the water level is at a greater depth than the bedrock surface and wells must be drilled through dry rock before reaching water.

The main water bearing zone commonly is in the upper part of the carbonate rock, if the rock is saturated to its surface. In some areas, however, in addition to the upper water bearing zone, other significant water bearing zones exist deeper in the rock.

The water bearing properties of the carbonate rock can vary greatly within short distances. The yield of similar wells, i.e., wells of similar depth, dimensions of casing, and elevation, can range from 1 L/s to 100 L/s (13 - 1300 IGPM) within a distance of a few hundred metres (yards). Consequently, despite the fact that some very

be assumed that high pumping rates could be easily obtained at every location.

4.1.3. Sand and Gravel Aquifers

Some of the sand and gravel beach ridges and most of the sand and gravel deposits interbedded in or underlying the till or clay are likely water bearing. The sand and gravel aquifers, however, generally are not used for water supply because it is technically simpler and, in most cases, less expensive to drill a well into the carbonate aquifer. In areas where the bedrock is at more than 30 m (100 ft.) and shallow sand and gravel aquifers exist, it may be economically advantageous to develop the sand and gravel aquifers.

4.1.4. Sandstone Aquifers

The sandstone aquifers are formed by the sandstone beds of the shale and sandstone formation that underlies the carbonate rock. Because in most of the District the sandstone aquifers are at considerable depth and several water bearing zones exist in the carbonate rock, no attempts have been made to explore the sandstone aquifers.

4.2. Supply

4.2.1. Recharge

Ultimately the groundwater supply in the District would depend on the recharge of the groundwater flow system in the District. Hence an estimate of recharge would indicate the potential total supply.

The recharge area for the flow system in the District is about 500 km^2 (200 square miles) or 500 x 10^6 m^2. The recharge rate is assumed to be about 0.03 m (0.1 ft.) of water per year over the recharge area,

which is the usual observed recharge rate in Manitoba in areas of fairly good recharge conditions. The total recharge per year then is 15.0 x 10^6 m^3 (12,000 acre-feet), which is equal to a sustained pumping rate of 475 L/s (6300 I.G.P.M.).

4.2.2. Total Supply

Based on the estimated recharge the total groundwater supply in the District is about 15.0 x 10^6 m^3 a year (12,000 acre feet). The supply, for example, would be adequate for a city of 50,000 assuming a fairly high water consumption of 450 L (100 gallons) per person per day. This indicates that the groundwater resources in the District are abundant for present requirements and extensive new development.

Because groundwater supply in the District would be affected by groundwater consumption in adjacent areas, the total quantity of groundwater available for development in the District depends on groundwater development in adjacent planning districts or municipalities.

4.2.4. Well Yield

The potential yield of wells in the District ranges from 1.0 L/s (13 I.G.P.M.), which is adequate for domestic and farm requirements, to more than 100 L/s (1300 I.G.P.M.). It seems that a minimum of 1.0 L/s can be readily obtained at almost any location in the District. Well yield in the 10 L/s to 100 L/s (130 – 1300 I.G.P.M.) range likely can be obtained in most parts of the District but not necessarily at every point. Hence, in some areas several test holes may be required to find a site for a high capacity well.

4.3. Quality

In general, groundwater in the upper part of the carbonate aquifer and in the sand and gravel aquifers above it in most of the Dis-

trict is of good quality. (See Appendix "A" for explanation of quality descriptions).

Groundwater temperature in the upper part of the carbonate aquifer in the District under natural conditions usually is between 5.0 and 6.1°C (41 - 43° F).

4.4. Availability

Groundwater for domestic and farm requirements is readily available throughout the District.

In most of the District groundwater is also available for municipal, industrial and other requirements that require larger quantities of water. However, to find a suitable well site, i.e., aquifer conditions favourable for the required yield, some test drilling may be necessary, particularly if the required well capacity is very high.

In general, the groundwater supply in the District is abundant and large quantities are available for development.

5 POLLUTION

5.1. General Comments

Two basic kinds of groundwater pollution can be discerned - aquifer pollution and well pollution. Aquifer pollution occurs when pollutants affect water quality in a whole aquifer or a significant part of an aquifer. In the case of well pollution only water in the well and in the immediate vicinity of it is affected.

Aquifer pollution can be caused by pollutants that percolate to the aquifer from the ground surface through the overlying soil or that are introduced into the aquifer through artificial openings in a low permeability protective layer above an aquifer, e.g., quarries, pits, abandoned wells and test holes. Aquifer pollution also may be caused by improperly constructed production wells, if the quantity of pollutants that enters the wells is larger than the quantity of polluted water that is pumped out.

Well pollution usually is caused by poor well construction that allows pollutants such as debris, small animals, sewage effluents, barnyard runoff, etc. to enter the well. If the quantities of pollutants entering the well are small and the well is used, the pollution is not likely to spread throughout an aquifer. Pumping of the well draws unpolluted water towards the well and, consequently, the pollution remains confined to the well and a narrow zone around it. Well pollution is much more common than aquifer pollution. Well pollution can be prevented by proper well design.

5.2. Pollution Hazard Areas

Groundwater pollution hazard in the District exists in areas where the carbonate rock or sand and gravel deposits are at or near ground surface. In these areas seepage from septic drain fields, leachates from waste disposal grounds and spilled toxic substances could readily percolate to the water bearing zone and cause groundwater pollution. The groundwater pollution hazard areas are indicated on the

map in Figure 4.

The areas where sand and gravel deposits are at surface (Figure 4) are classified as groundwater pollution hazard areas because the deposits may contain aquifers. It is likely that some of the surface sand and gravel deposits or parts of them are dry and therefore no pollution hazard exists. The available information, however, is not adequate to differentiate sand and gravel that forms aquifers from dry deposits. Consequently, all surface sand and gravel areas have been classified as pollution hazard areas. Which surface sand and gravel deposits are dry and which form aquifers can be determined only by detailed field investigation.

In some areas the surface sand and gravel deposits may form shallow aquifers that are not used for water supply, because the carbonate rock aquifer is a better source. If these shallow aquifers are isolated from the carbonate aquifer by a sufficiently thick till or clay layer, pollution of the sand and gravel aquifers is not likely to pollute the carbonate rock aquifer.

5.3. Pollution Prevention

To prevent groundwater pollution the activities or facilities that cause serious groundwater pollution under normal operating conditions, or are likely to cause it by accident, should not be permitted in the groundwater pollution hazard areas.

The common facilities that are likely to cause groundwater pollution under normal operating conditions are waste disposal grounds, sewage lagoons, feed lots, and septic tank drain fields. It should be noted that a single residential septic tank drain field located on a fairly large property, e.g., a farm, is not likely to cause widespread aquifer pollution, but, on the other hand, if numerous septic tank drain fields are allowed in a densely populated area, e.g., a town, a village or a subdivision, located in a groundwater pollution hazard area, serious groundwater pollution is almost inevitable.

The most common facilities that are likely to cause groundwater pollution by accident or because of improper or careless handling of toxic

substances are bulk fuel stations, bulk liquid fertilizer distribution centres, and service stations. Fuel spills at bulk fuel storage tanks and leaky fuel tanks at service stations are not unknown, and the only fool-proof way to prevent aquifer pollution by accidental spills of liquid fuels and fertilizers is to prohibit bulk storage in groundwater pollution hazard areas. In general, industries or facilities handling potential pollutants that could under normal operating conditions or by accident cause groundwater pollution preferably should be located outside the groundwater pollution hazard areas. The best areas for storing or manufacturing toxic substances are groundwater discharge areas underlain by thick clay and till deposits.

It is not likely that it will be practically possible to eliminate all the potential pollutants from the groundwater pollution hazard areas; e.g., such sources of pollution as septic tank drain fields, manure piles, fertilizers and fuels found on farms would be difficult to prohibit. The prohibition of activities and facilities which are potential major sources of groundwater pollution from groundwater pollution hazard areas, however, seems to be feasible and should be implemented to prevent groundwater pollution in the District.

6 WELL CONSTRUCTION IN SHALLOW BEDROCK AREAS

In areas where the carbonate rock is near ground surface, it is common practice to install only enough casing to reach the rock surface and then drill an open hole (uncased hole) through the rock until a satisfactory water bearing zone is found. Where this kind of well construction is used polluted water that flows through the upper fractured zone of the rock can flow into the open hole and pollute water in the well and in the deeper water bearing zones that are used for water supply as illustrated in Figure 5.

To prevent the flow of polluted water into the deeper water bearing zones it is advisable to install grouted-in well casing through the low permeability zone as shown in Figure 5.

It should be noted that in an area where the conditions illustrated in Figure 5 exist and well density is high, such as in a town or settlement, all wells should be properly constructed to prevent aquifer pollution. Single wells located a fair distance from other wells, e.g., on farms, should be properly constructed mainly to prevent pollution of the well itself. Due to dilution effect, a single well is not likely to cause widespread pollution unless the pollutant is a very toxic substance or large quantities of pollutants are flowing into the well.

7 FLOWING AND HIGH WATER LEVEL WELLS

Flowing and high water level well areas are common in the District. The areas in which flowing wells occur are indicated on the map in Figure 6. The high water level wells occur in the vicinity of flowing wells and in low lying areas adjacent to flowing well areas. Improperly constructed flowing and high water level wells can cause a number of problems. The problems are discussed in Appendices "C" and "D" and the suggested basic well design to prevent the problems is depicted in Figure 6.

REFERENCES

Manitoba Mineral Resources Division, 1979. Geological Map of Manitoba, Map 79-2.

Pratt, L.E., W.A. Ehrlich, F.P. Leclaire and J.A. Barr. 1961. Detailed - Reconnaissance Soil Survey of Fisher and Teulon Map Sheet Areas. Manitoba Soil Survey, Soils Report No. 12.

APPENDIX A

GROUNDWATER QUALITY DESCRIPTION

To describe groundwater quality the terms excellent, good, fair, poor and combinations and modifications of them are used in this report. Unless other uses are specified these terms indicate how acceptable the water is for domestic use. The quality description is based on the total dissolved solids, the concentration of the common ions that affect quality, hardness, appearance, taste and odour of the water.

The meaning of the terms used for groundwater quality description is as follows:

1. Excellent: The water has no objectionable properties and treatment of it to improve quality is not necessary; the total dissolved solids concentration is less than 500 mg/L and hardness less than 250 mg/L.
2. Good: The water has higher mineral concentration than the excellent water and is rated less than excellent mainly because of higher hardness; the total dissolved solids concentration ranges from 500 to 1000 mg/L and hardness is from 250 to 500 mg/L. The hardness is likely to cause incrustration of kitchen utensils. The water can be used without treatment or, if desired, the hardness can be readily reduced.
3. Fair: The water has one or more objectionable properties and fairly commonly may require treatment to improve quality. The most common undesirable property is high hardness; it ranges from 500 to 1000 mg/L. The hardness can be reduced to accepable level with conventional water softeners. The water may have high enough sulphate, iron and chloride ion concentration to slightly impair the taste or, in the case of sulphates, have a laxative effect on persons not used to it. The total dissolved solids of the water is from 1000 to 2000 mg/L.
4. Poor: The water has one or more serious undesirable properties and it is difficult to impossible to improve the water quality by conventional water treatment. The water commonly is very hard (more than 1000 mg/L) and it may be difficult (also expensive) or impractical to reduce the hardness with conventional water softeners. The water may also have a very high sulphate

ion concentration (500 to 2500 mg/L). In some places the water may be rated as poor quality because of high sodium chloride (salt) concentration, which makes it taste salty. The water may be also less than desirable in appearance and may have an unpleasant odour.

5. Very Poor: The undesirable properties of the water are just below a tolerable maximum limit.

APPENDIX B
FLOWING WELLS

Numerous flowing well areas exist in Manitoba. Extensive flowing well areas are common in the Interlake region and in the southeastern part of the Province. In the flowing well areas the water level in most wells rises above ground level and in others it is near ground level. Some of the wells may flow when groundwater levels are high and stop flowing during periods of low levels.

Uncontrolled discharge from flowing wells may cause some of the following problems:

1. Icing up of drains, that, in turn, results in ice covered roads and flooding during spring runoff;
2. Damage to roads, bridges and drains;
3. Damp basements;
4. Damage to buildings due to excessive soil moisture or ice;
5. Wet and swampy yards and fields;
6. Flooding of septic tank drain fields.

In view that the above problems caused by uncontrolled flowing wells are likely to affect the well owner, his neighbours and public property in the vicinity, wells in flowing well areas should be constructed so that discharge can be controlled.

The discharge from flowing wells can be brought under control by proper well construction. A basic design for controlled flowing wells is shown in Figure 7.

APPENDIX C
HIGH WATER LEVEL WELLS

In high water level wells the water level is below ground level but above or near the basement floor level.

If high water level wells are not properly designed they may cause problems similar to some of those caused by flowing wells, such as:

1. Damp basements,
2. Flooding of septic tank drain fields,
3. Unnecessary pumping from sumps,
4. Damage to foundations and basement floors.

The problems are caused by water seeping or flowing up outside the well casing and then flowing through the backfill of water pipe excavations towards the building. If well pits are used to make connections between the well and the water pipe these problems may be caused by water flowing from the well into the pit and thence to the basement.

To prevent the above problems wells in high groundwater level areas should be constructed in the same manner as controlled flowing wells. The basic design for high water level wells is shown in Figure 7.

APPENDIX D
WELL POLLUTION

Well pollution is caused by pollutants entering the well directly via the well casing or the annulus outside the well casing. Well pollution is limited to the water in the well and in the aquifer within a metre or so (a few feet) of the well.

Well pollution usually is caused by faulty design and construction of wells, water systems, and sewage systems. In some areas well pollution has been caused by failure to adopt well design to special aquifer conditions, because well design that is good for one area may not be acceptable in another area where conditions are considerably different.

If well pollution continues over extended periods of time and the quantities and concentrations of the pollutants are high, the pollution is likely to spread and cause widespread pollution of the aquifer, particularly if a number of polluted wells are concentrated in a small area such as a settlement or a town.

If the inflow of pollutants to the well is slow, i.e., less than the quantity that is pumped out, most of the polluted water is likely to remain in the well and the immediate vicinity of it and the highest concentration of the pollutants is likely to be in the well. Because the pollutants enter the well directly, bacteria is not filtered out as is the case where pollutants enter aquifers by seepage through clay, silt or sand. Hence, well pollution presents a high health hazard.

Well pollution caused by faulty water supply and sewage disposal systems can happen in all areas where non-pumping or static water level is below ground level. Well pollution is not likely in flowing well areas unless pumping level falls below ground level and the flow from the wells is reversed.

To prevent well pollution wells and all connections to the wells should be designed and constructed so that surface water, effluent from septic tanks drain fields and other pollutants cannot enter the well. Because one of the most common causes of well pollution seems to be seepage of pollutants into well pits and from there into wells, pitless connections are preferable to well pits.

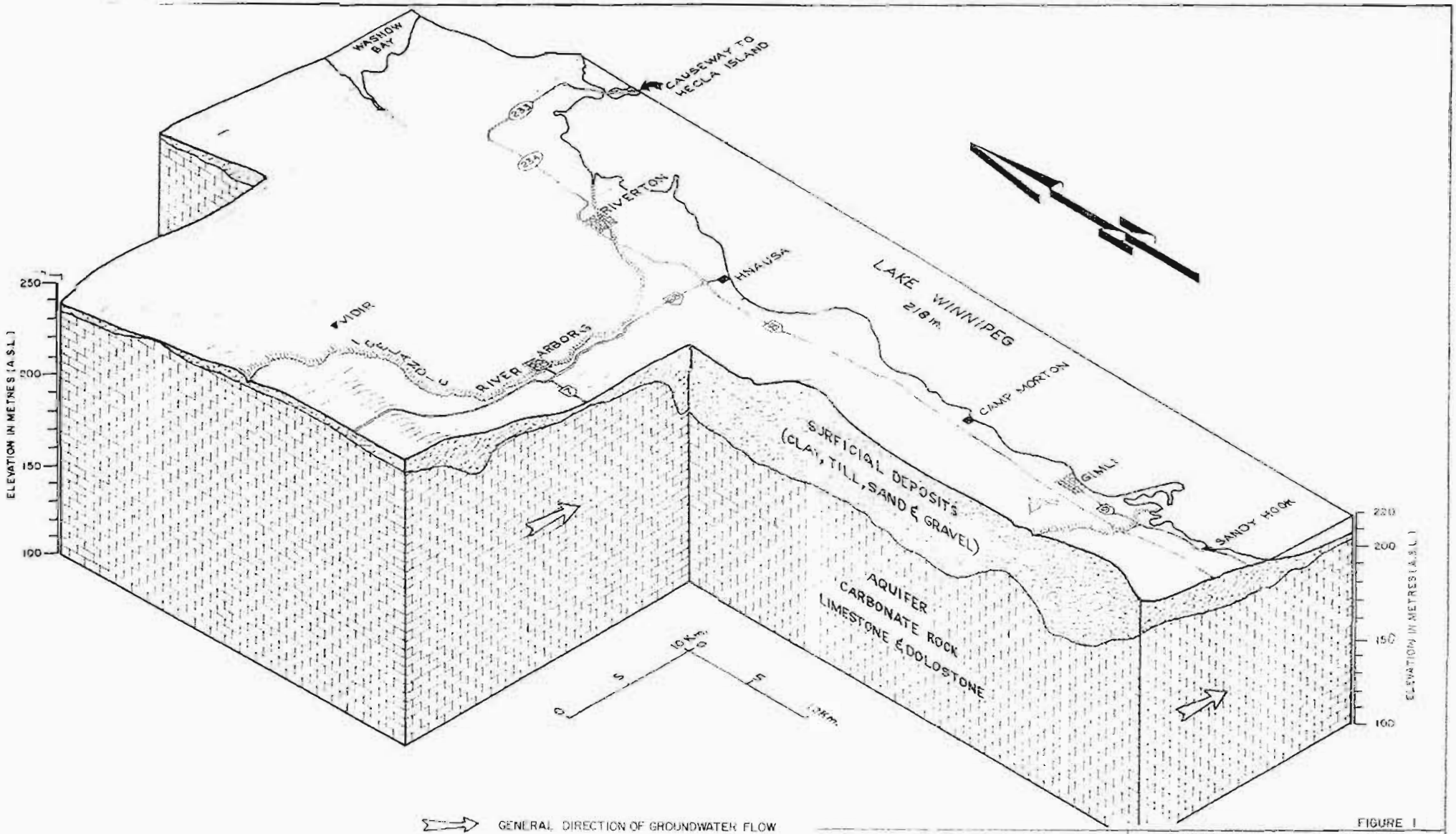


FIGURE 1

EASTERN INTERLAKE PLANNING DISTRICT

PROVINCE OF MANITOBA
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES BRANCH

TOPOGRAPHIC AND SUBSURFACE FEATURES

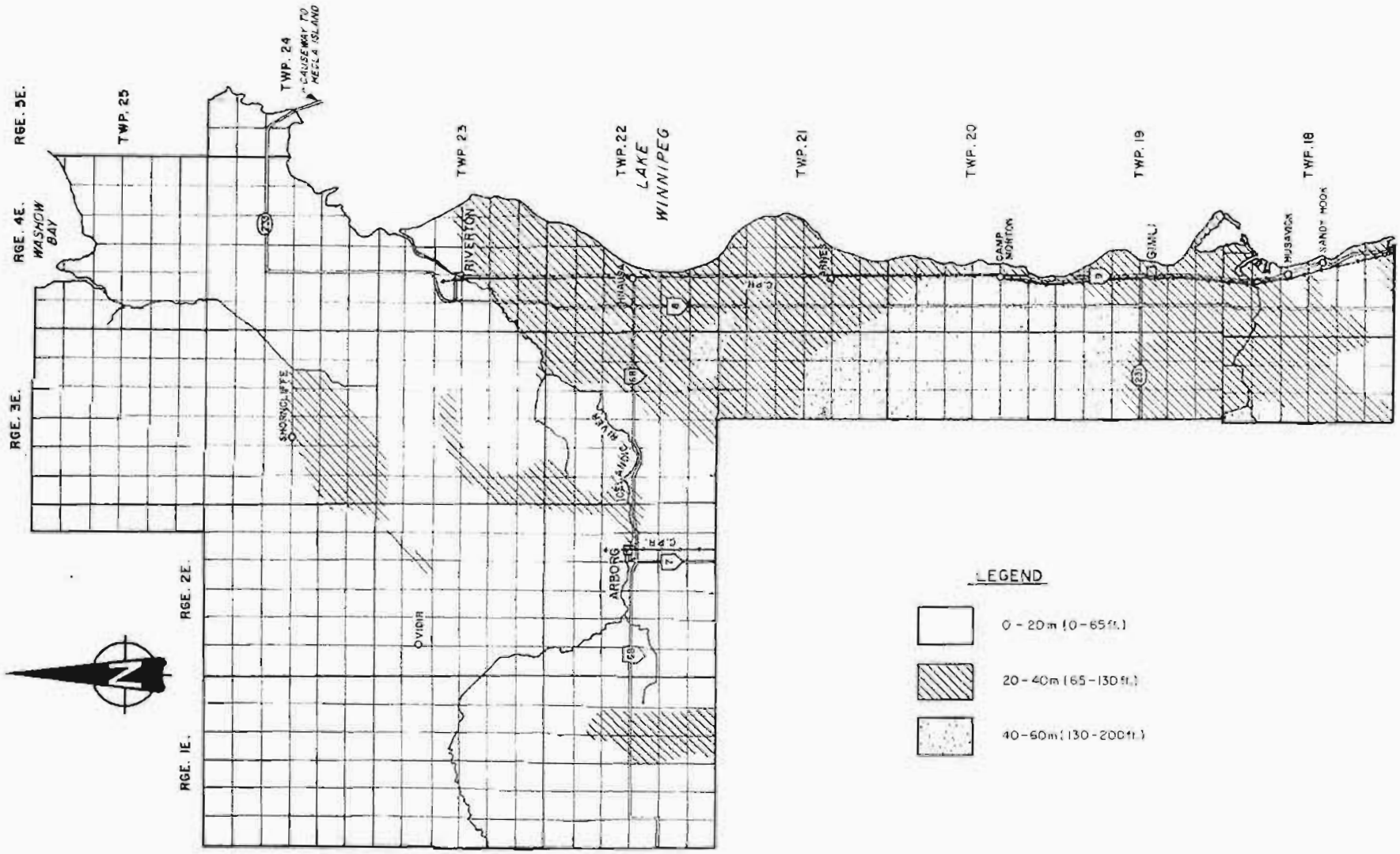


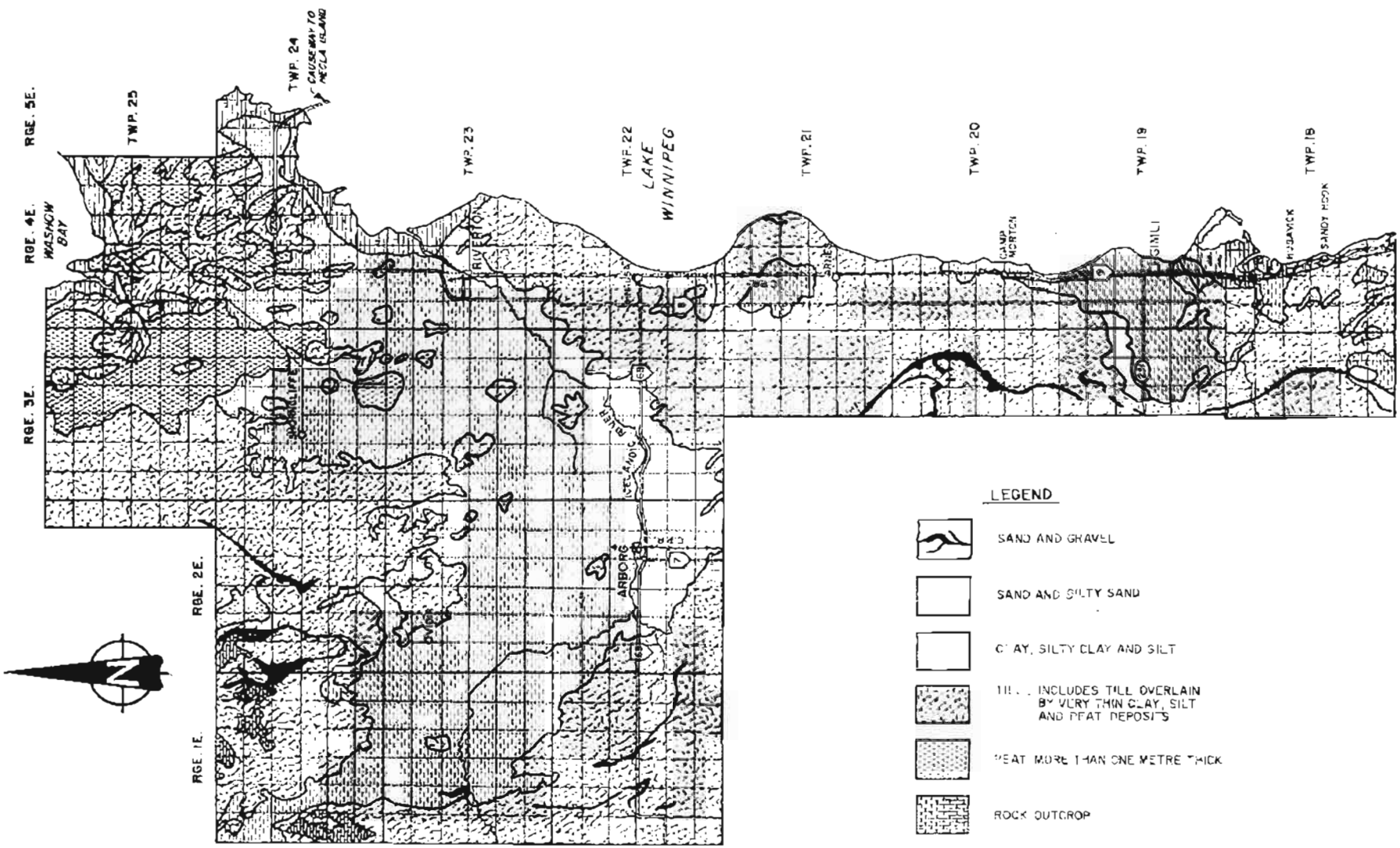
FIGURE 2

PROVINCE OF MANITOBA
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES BRANCH

EASTERN INTERLAKE PLANNING DISTRICT

DEPTH TO BEDROCK

PREPARED M. RUTULIS | DRAWN R.R.R. | CHECKED | SUBMITTED | APPROVED | SCALE AS SHOWN | DATE 81 02 13 | SHEET 2 OF 7 | FILE NO.



LEGEND

- SAND AND GRAVEL
- SAND AND SILTY SAND
- CLAY, SILTY CLAY AND SILT
- TILL - INCLUDES TILL OVERLAIN BY VERY THIN CLAY, SILT AND PEAT DEPOSITS
- PEAT MORE THAN ONE METRE THICK
- ROCK OUTCROP
- MARSH, USUALLY UNDERLAIN BY CLAY

SCALE IN MILES
0 1 2 3 4 5 10
0 5 10 15
SCALE IN KILOMETRES

Modified after Manitoba Soil Survey Soil Report No 12

FIGURE 3

PROVINCE OF MANITOBA
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES BRANCH

EASTERN INTERLAKE PLANNING DISTRICT

SURFACE DEPOSITS

PREPARED M. RUTULIS | DRAWN R.R.R. | CHECKED | SUBMITTED | APPROVED | DATE 81 02 13 | SHEET 4 OF 7 | FILE NO.

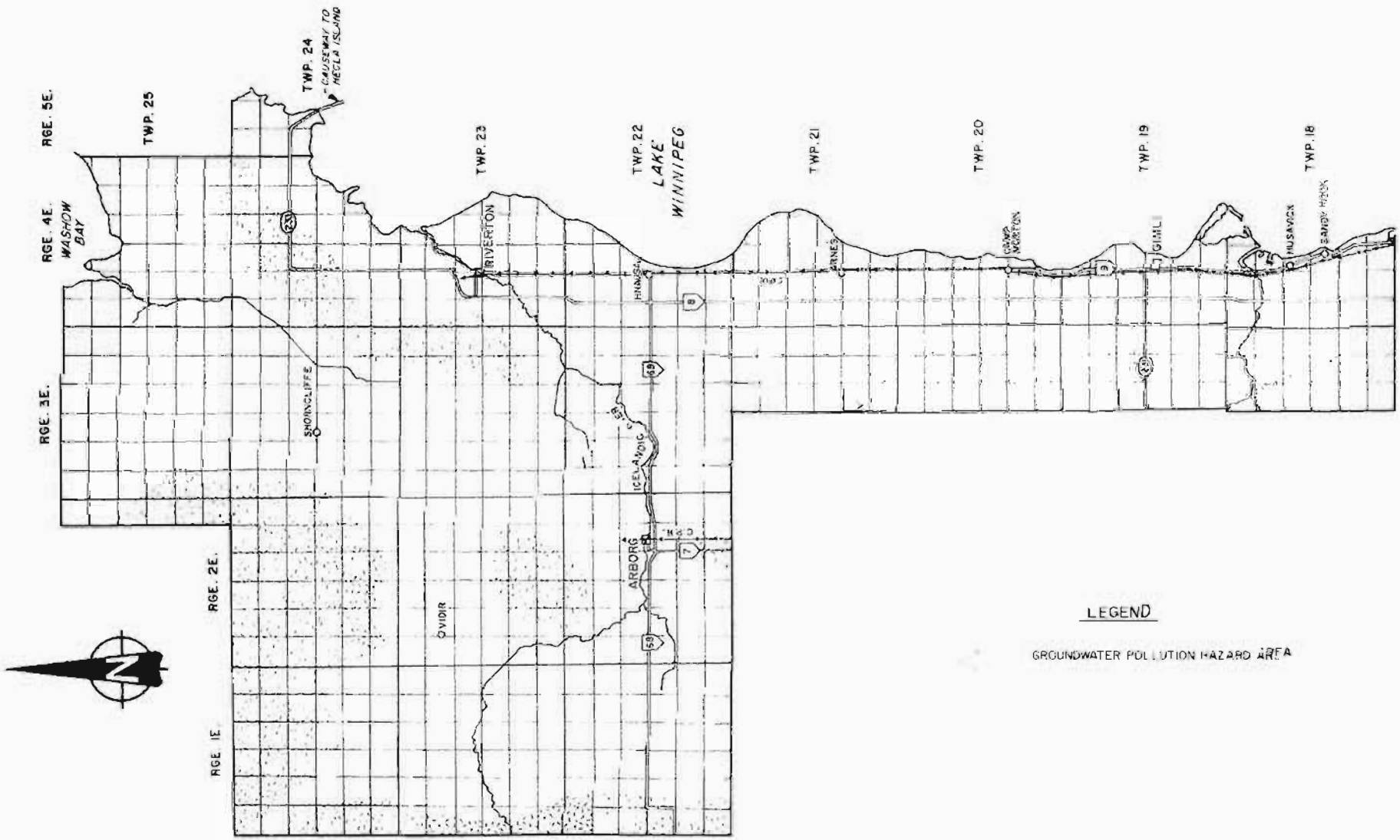


FIGURE 4

PROVINCE OF MANITOBA
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES BRANCH

EASTERN INTERLAKE PLANNING DISTRICT

GROUNDWATER POLLUTION HAZARD

DRAWN	SUBMITTED	APPROVED	SCALE	DATE	SHEET	FILE NO.
M. RUTULIS			AS SHOWN	81 02 13	1 of 1	

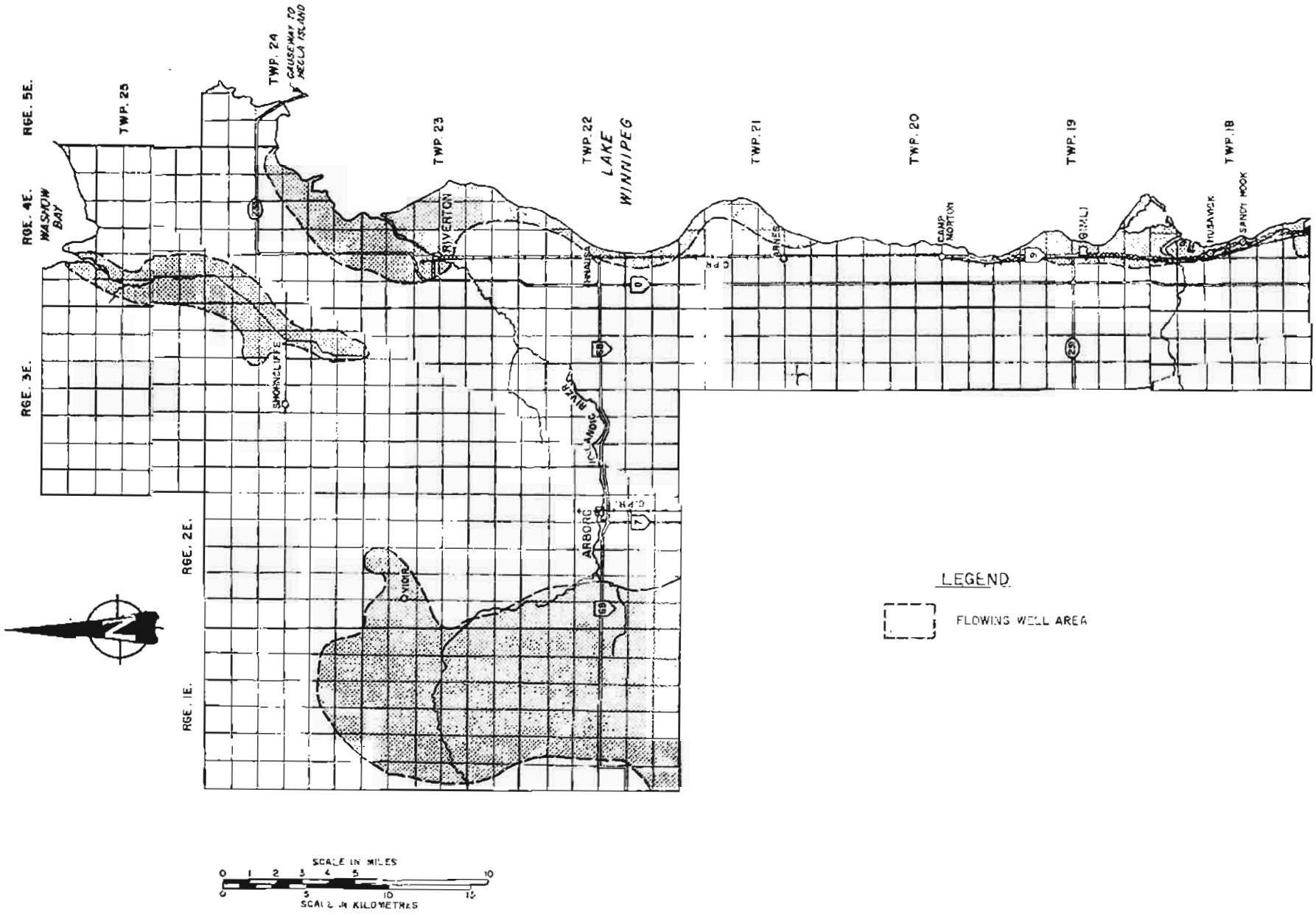


FIGURE 6

PROVINCE OF MANITOBA
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES BRANCH

EASTERN INTERLAKE PLANNING DISTRICT

FLOWING WELL AREAS

DRAWN	SUBMITTED	APPROVED	SCALE	DATE	SHEET	FILE NO
M. RUSNULIS						

TREK GEOTECHNICAL

Quality Engineering | Valued Relationships

January 13, 2016 Our File No. 1000 004 03

Silvestre Urbano
WSP Canada Inc.
1600 Buffalo Place
Winnipeg, Manitoba
R3T 6B8

RE Arnes Lab Results

Attached are the results of the lab tests requested. The remolded hydraulic conductivity test was conducted on material from TP3, 1'-4' which appeared to be the siltiest material compared to the other samples submitted. There was insuficent material to complete a full proctor, it was agreed to us an estimate proctor density of 1950 kg/m^3, and target to have a remolded sample about 97%.

If you have any questions or require additional information or clarifications please contact the undersigned at 204.975.9433.

Kind Regards,

TREK Geotechnical
Per:

Paul Bevel, B.Sc.
Lab and Field Services Manager

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1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Moisture Content Report
ASTM D2216-98

Project No. 1000 004 03
Client WSP Canada Inc.
Project Arnes

Sample Date 09-Oct-15
Test Date 13-Oct-15
Technician Junhui Wu

Test Pit	TP1	TP1	TP1	TP1	TP1	TP2
Depth (m)	0.8 - 0.8	0.9 - 1.5	1.5 - 1.8	2.3 - 2.3	3.0 - 3.0	0.3 - 0.9
Sample #						
Tare ID	N26	P12	F71	Z114	F3	P36
Mass of tare	8.4	8.5	8.6	8.3	8.5	8.6
Mass wet + tare	351.5	406.2	420.6	381.3	367.8	407.5
Mass dry + tare	333.0	321.8	376.7	353.5	289.8	352.1
Mass water	18.5	84.4	43.9	27.8	78.0	55.4
Mass dry soil	324.6	313.3	368.1	345.2	281.3	343.5
Moisture %	5.7%	26.9%	11.9%	8.1%	27.7%	16.1%

Test Pit	TP2	TP2	TP3	TP3	TP4	TP4
Depth (m)	0.3 - 1.2	2.3 - 2.3	0.3 - 1.2	1.2 - 3.0	0.3 - 1.2	1.2 - 3.0
Sample #						
Tare ID	N48	N99	D19	H12	K13	P03
Mass of tare	8.5	8.3	8.3	9.1	8.3	8.6
Mass wet + tare	425.2	511.5	419.6	454.2	430.4	439.6
Mass dry + tare	315.2	468.6	362.9	414.1	376.3	399.1
Mass water	110.0	42.9	56.7	40.1	54.1	40.5
Mass dry soil	306.7	460.3	354.6	405.0	368.0	390.5
Moisture %	35.9%	9.3%	16.0%	9.9%	14.7%	10.4%

Test Pit						
Depth (m)						
Sample #						
Tare ID						
Mass of tare						
Mass wet + tare						
Mass dry + tare						
Mass water						
Mass dry soil						
Moisture %						

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Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

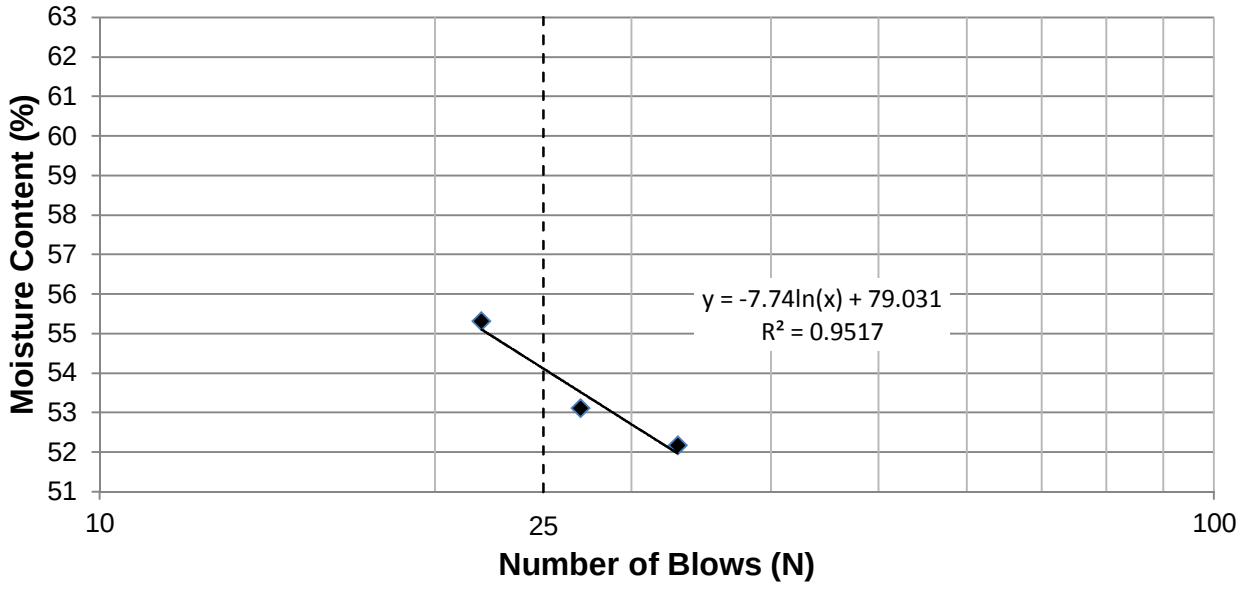
Atterberg Limits
ASTM D4318

Project No.	1000 004 03
Client	WSP Canada Inc.
Project	Arnes
Test Hole	TP1
Sample #	
Depth (m)	0.9 - 1.5
Sample Date	
Test Date	23-Oct-15
Technician	Daniel Wiebe

Liquid Limit	54
Plastic Limit	19
Plasticity Index	35

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	33	27	22		
Mass Wet Soil + Tare (g)	35.931	37.284	35.990		
Mass Dry Soil + Tare (g)	28.542	29.275	28.265		
Mass Tare (g)	14.380	14.196	14.298		
Mass Water (g)	7.389	8.009	7.725		
Mass Dry Soil (g)	14.162	15.079	13.967		
Moisture Content (%)	52.175	53.114	55.309		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.444	20.544			
Mass Dry Soil + Tare (g)	19.441	19.496			
Mass Tare (g)	14.157	14.080			
Mass Water (g)	1.003	1.048			
Mass Dry Soil (g)	5.284	5.416			
Moisture Content (%)	18.982	19.350			

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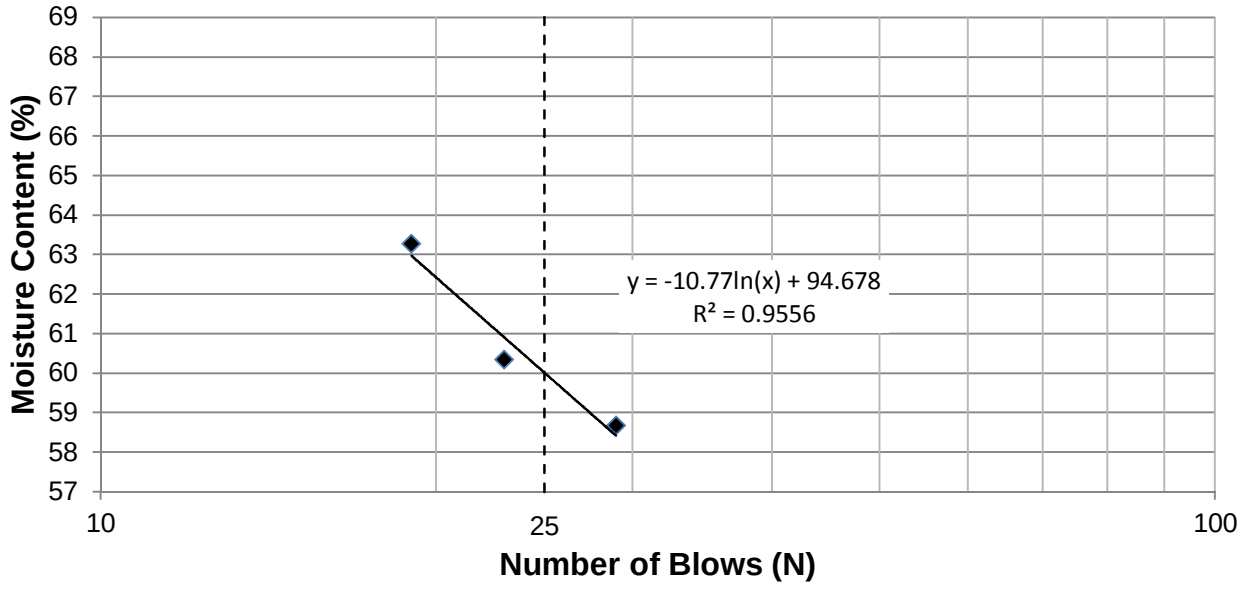
Atterberg Limits
ASTM D4318

Project No.	1000 004 03
Client	WSP Canada Inc.
Project	Arnes
Test Hole	TP2
Sample #	
Depth (m)	0.3 - 1.2
Sample Date	
Test Date	23-Oct-15
Technician	Daniel Wiebe

Liquid Limit	60
Plastic Limit	22
Plasticity Index	38

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	23	29	19		
Mass Wet Soil + Tare (g)	34.202	36.110	35.479		
Mass Dry Soil + Tare (g)	26.649	27.955	27.198		
Mass Tare (g)	14.133	14.056	14.112		
Mass Water (g)	7.553	8.155	8.281		
Mass Dry Soil (g)	12.516	13.899	13.086		
Moisture Content (%)	60.347	58.673	63.281		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.362	21.047			
Mass Dry Soil + Tare (g)	19.262	19.822			
Mass Tare (g)	14.154	14.150			
Mass Water (g)	1.100	1.225			
Mass Dry Soil (g)	5.108	5.672			
Moisture Content (%)	21.535	21.597			

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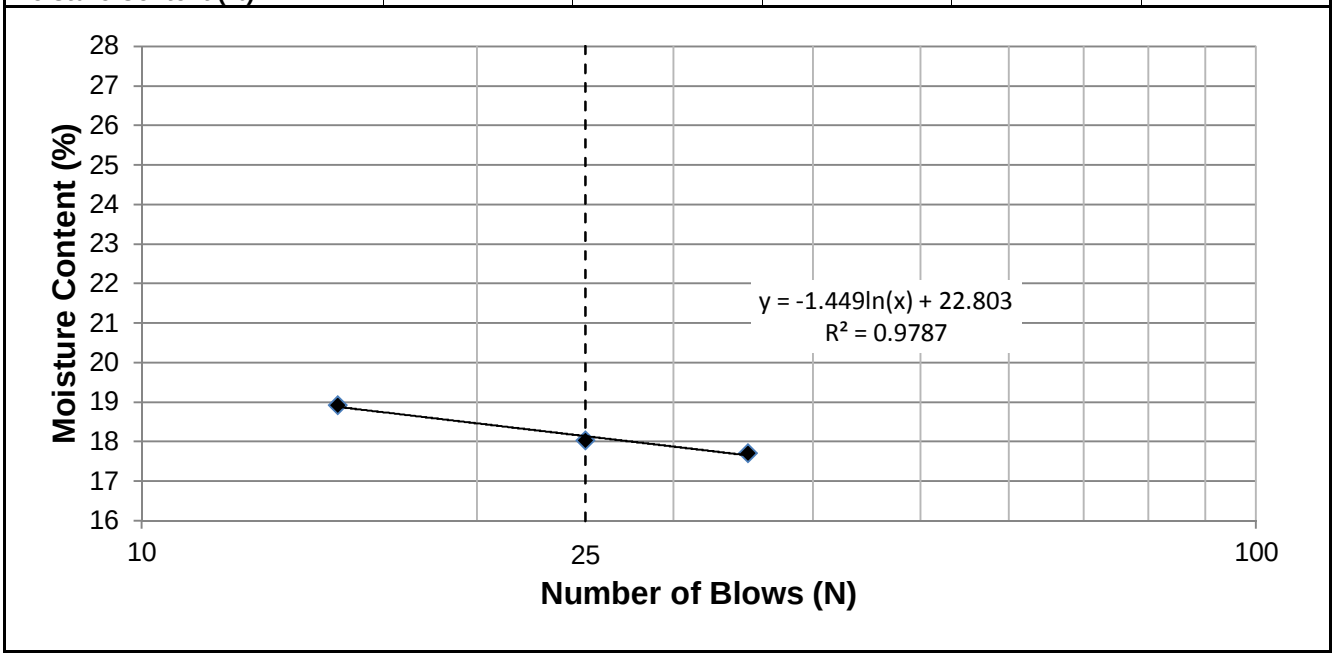
Atterberg Limits
ASTM D4318

Project No.	1000 004 03
Client	WSP Canada Inc.
Project	Arnes
Test Hole	TP3
Sample #	
Depth (m)	0.3 - 1.2
Sample Date	
Test Date	26-Oct-15
Technician	Junhui Wu

Liquid Limit	18
Plastic Limit	14
Plasticity Index	4

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	35	25	15		
Mass Wet Soil + Tare (g)	24.643	24.860	25.815		
Mass Dry Soil + Tare (g)	23.049	23.230	23.977		
Mass Tare (g)	14.051	14.192	14.263		
Mass Water (g)	1.594	1.630	1.838		
Mass Dry Soil (g)	8.998	9.038	9.714		
Moisture Content (%)	17.715	18.035	18.921		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	27.093	27.136			
Mass Dry Soil + Tare (g)	25.449	25.507			
Mass Tare (g)	13.861	14.022			
Mass Water (g)	1.644	1.629			
Mass Dry Soil (g)	11.588	11.485			
Moisture Content (%)	14.187	14.184			

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Hydraulic Conductivity Determination (Flexible Wall)

ASTM D5084-10

Project No.	1000-004-03	**Test Hole**	TP3
Client	WSP Canada Inc.	**Trek Sample #**	L265
Project	Arnes	**Depth (m)**	1-4'
		Sample Date	
		Test Date	Dec 16, 2015 to Jan 11, 2016
		Technician	Paul Bevel

Specimen Details

Visual Classification Silt and Clay, trace to some gravel, trace sand, light grey, Remolded sample

Comments The specific gravity of the soil was assumed to be 2.70.
Proctor density was estimated to be 1950, based on this, remolded density was about 98%

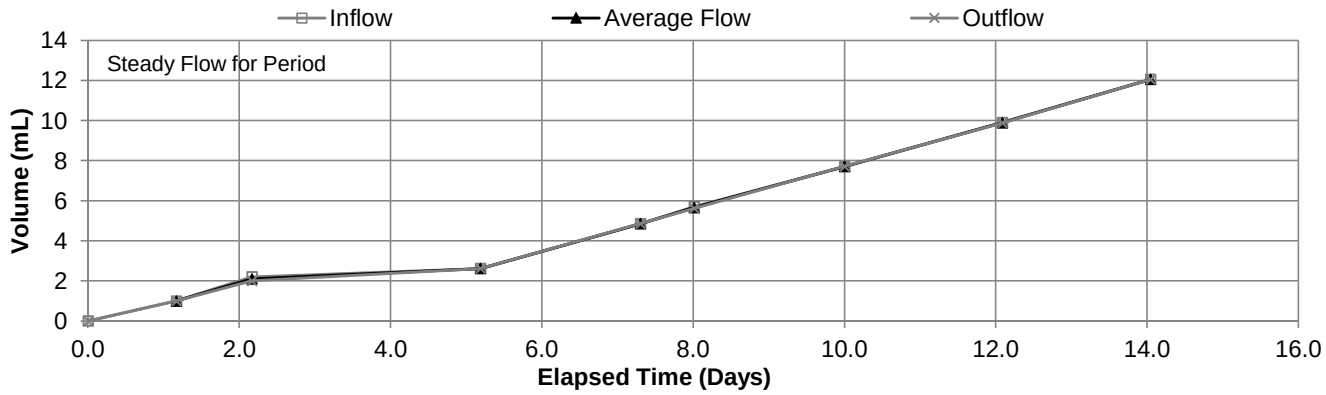
Atterberg Limits

Liquid Limit	18
Plastic Limit	14
Plasticity Index	4

Test Details

Permeant	Distilled, de-aired water
Method	Constant Head
Cell Pressure	100.7 kPa
Influent Pressure	60.0 kPa
Effluent Pressure	50.3 kPa
Gradient	11.24

Permeation Graph



Steady Flow Permeation Data

Time Increment (Days)	Elapsed Time (Days)	Flow (Q)		Inflow / Outflow Ratio	Average Flow (mL)	Temperature Correction	Corrected Hydraulic Conductivity, k_{20} (m/s)
		Influent (mL)	Effluent (mL)				
0.71	8.01	0.85	0.76	1.12	0.81	0.95	2.66E-10
1.99	10.00	2.00	2.10	0.95	2.05	0.95	2.41E-10
2.08	12.08	2.20	2.16	1.02	2.18	0.95	2.45E-10
1.96	14.04	2.15	2.17	0.99	2.16	0.98	2.64E-10

Average Temperature Corrected Hydraulic Conductivity, k_{20} (m/s) **2.54E-10** **(2.54×10^{-8} cm/s)**

Consolidation Data

	Average Height (m)	Average Diameter (m)	Moisture Content (%)	Dry Density (kN/m^3)	Degree of Saturation (%)	Cell Pressure	Back Pressure
Initial	0.091	0.073	14.7	18.8	97.3	100.0	50.0
Final	0.088	0.073	14.0	19.6	106.5	100.0	50.0

Consolidation Results

TREK GEOTECHNICAL
1712 St.James Street
Winnipeg, Manitoba R3H 0L3
tel 204. 975.9433 fax 204.975.9435

Client:	WSP	Hole No.	TP3 Bulk Sample
Project:	RM of Arnes, Gimli	Sample No.	L447
Job No:	1000-043-09	Depth:	N/A
Date :	09-May-17	Sample Description:	SILT TILL, clayey, trace sand, trace gravel, moist, low plastic

Sample Height : 21.58 mm
Ring Size: 63.52 mm Φ
Initial Dial Reading: 21.238

D_0	D_{100}	D_{50}	Load (lb)	P (kPa)	ΔP (kPa)	H_{50} (mm)	T_{50} (s)	c_v (mm^2/s)	e_{start}	e_{finish}	Δe	M_v	k (cm/s)	c_v (cm^2/s)
22.36	22.23	22.29	2	30.9		22.64	124.6	2.02E-01	1.06	1.05	-0.01			2.02E-03
22.21	21.96	22.09	3.5	54.2	23.2	22.43	502.0	4.91E-02	1.05	1.02	-0.03	5.37E-04	2.59E-08	4.91E-04
21.97	21.61	21.79	6	92.8	38.7	22.13	326.3	7.36E-02	1.02	0.99	-0.03	4.15E-04	2.99E-08	7.36E-04
21.60	21.27	21.44	12	185.7	92.8	21.78	621.4	3.74E-02	0.99	0.95	-0.04	1.99E-04	7.29E-09	3.74E-04
21.19	20.44	20.81	24	371.4	185.7	21.16	693.3	3.16E-02	0.95	0.88	-0.07	1.96E-04	6.08E-09	3.16E-04
20.39	19.38	19.89	48	742.7	371.4	20.23	1342.0	1.49E-02	0.88	0.78	-0.10	1.50E-04	2.20E-09	1.49E-04
19.22	18.48	18.85	96	1485.5	742.7	19.19	2193.8	8.22E-03	0.78	0.77	0.00	3.59E-06	2.90E-11	8.22E-05

Compression Index (Cc)
Re-compression Index (Cr)
Preconsolidation Presure (Casagrande's Method) kPa

APPENDIX

C PLANS AND DETAILS

NOTES:

1. LOCATION OF UNDERGROUND STRUCTURES AS SHOWN IS BASED ON THE BEST INFORMATION AVAILABLE, BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE CONSULTANT OF ANY ERROR OR OMISSION IN THE LOCATION OF ALL EXISTING UTILITIES SHOWN ON THE DRAWING.
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3. WHOLE NUMBERS INDICATE MILLIMETRES; DECIMALIZED NUMBERS INDICATE METRES.

EXISTING	LEGEND	PROPOSED
WMS	WATERMAIN	WMS
WWS	WASTEWATER	WWS
LPS	LOW PRESSURE SEWER	LPS
FM	FORCEMAIN	FM
⊗	GATE VALVE	⊗
○	MANHOLE	●
◇	HYDRANT	◆
●	UTILITY POLE	
⟵	GUY WIRE	
□	CATCH BASIN	■
△	CURB INLET	▲
⊠	HYDRO TOWER	
▼	SIGN	
⊠	MTS PEDESTAL	
⊕	SURVEY BAR	
◈	TEST HOLE/TEST PIT	
	CLEAN OUT	CO
	CULVERT	
	DITCH / SWALE	
	TREE OR SHRUB LINE	
	FENCE LINE	
	HYDRO	
	GAS MAIN	
	MTS	
	DIRECTION OF FLOW	
	WICK DRAIN	
	RIP RAP	
	GROUND ELEVATION	99.000
99.000	DITCH ELEVATION	99.000
99.000	ROAD/DYKE ELEVATION	99.000
	DYKE	

IS	RE	DATE	DESCRIPTION
1	0	2018-06-13	APPROVALS SUBMISSION

SEAL: PROVINCE OF MANITOBA — J.S. BUNN Member 100 — REGISTERED PROFESSIONAL ENGINEER — 2018-06-13

CLIENT: **PRELIMINARY** NOT FOR CONSTRUCTION

CLIENT REF. #: -

PROJECT: RM OF GIMLI BIOSOLIDS STORAGE FACILITY

PROJECT NO: 181-03988-00

DATE: 2018-06-13

wsp
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX: 204-474-2864
WWW.WSPGROUP.COM

ORIGINAL SCALE: 1:1000

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25mm

TITLE: EXISTING SITE PLAN

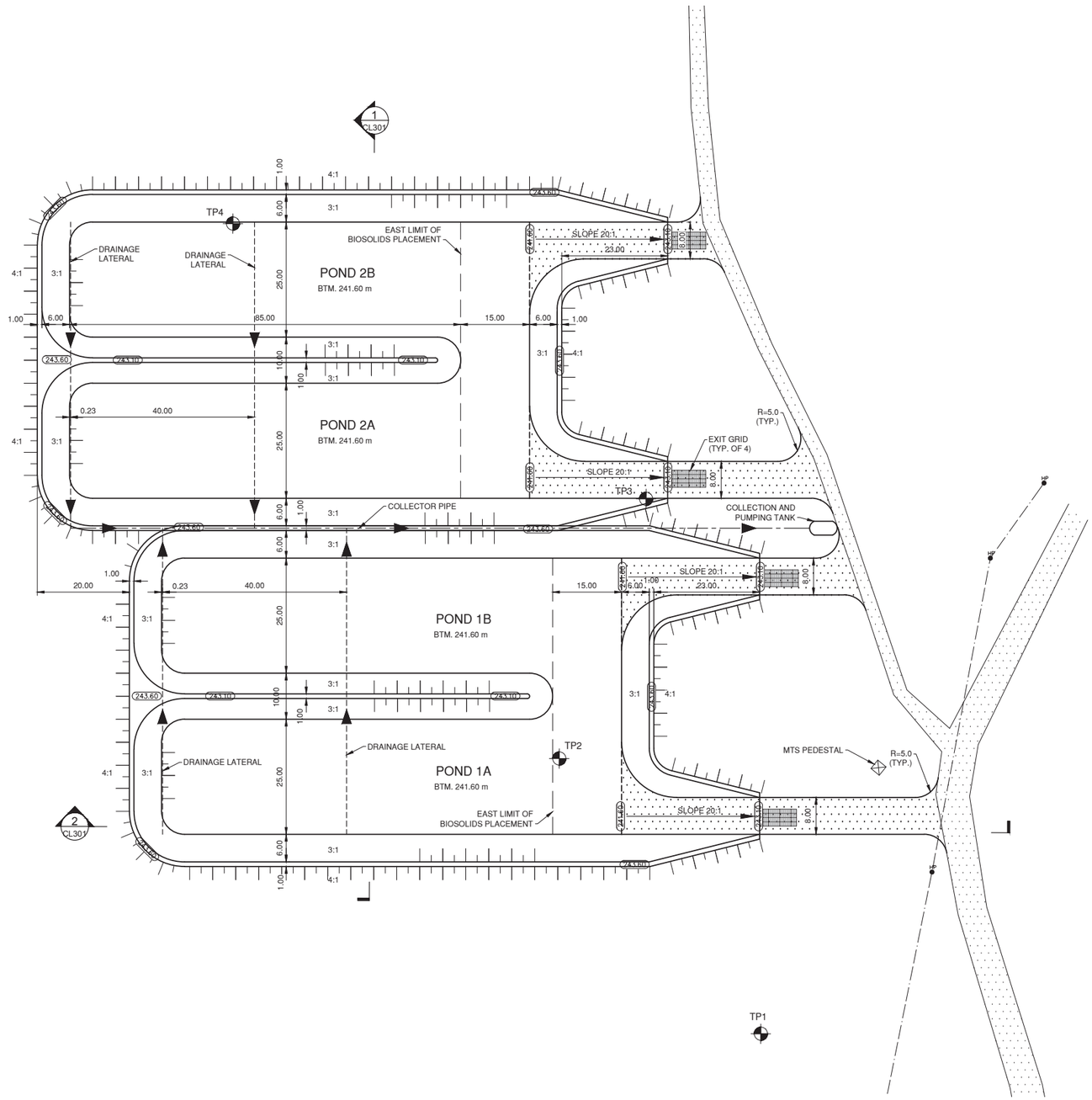
SHEET NUMBER: CL101

SHEET #: 1 OF 3

DESIGNED BY: J.S.B.
DRAWN BY: V.A.A.
CHECKED BY: J.S.B.
DISCIPLINE: CIVIL

ISSUE: APPROVALS SUBMISSION — REV #: 0

DATE OF: 2018-06-13



PROPOSED GRAVEL

EXISTING ROAD

NOTES:

1. LOCATION OF UNDERGROUND STRUCTURES AS SHOWN IS BASED ON THE BEST INFORMATION AVAILABLE, BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE CONSULTANT OF ANY ERROR OR OMISSION IN THE LOCATION OF ALL EXISTING UTILITIES SHOWN ON THE DRAWING.
2. DESCRIPTION OF PROPERTY LIMITS, AND EXISTING AND/OR PROPOSED FEATURES RELATIVE TO THESE LIMITS AS SHOWN ON THIS DRAWING DO NOT REPRESENT A LEGAL SURVEY. WSP MAKES NO REPRESENTATION OR GUARANTEE THAT THE PROPERTY LIMIT INFORMATION IS ACCURATE. WSP ACCEPTS NO RESPONSIBILITY FOR DAMAGES, IF ANY, SUFFERED BY ANY THIRD PARTY AS A RESULT OF DECISIONS OR ACTIONS BASED ON THIS DRAWING.
3. WHOLE NUMBERS INDICATE MILLIMETRES; DECIMALIZED NUMBERS INDICATE METRES.

EXISTING	LEGEND	PROPOSED
	WATERMAIN	
WWS	WASTEWATER	WWS
LPS	LOW PRESSURE SEWER	LPS
FM	FORCEMAIN	FM
⊗	GATE VALVE	
○	MANHOLE	
◇	HYDRANT	
•	UTILITY POLE	
⟵	GUY WIRE	
□	CATCH BASIN	■
△	CURB INLET	▲
⊠	HYDRO TOWER	
▼	SIGN	
⊠	MTS PEDESTAL	
⊕	SURVEY BAR	
◈	TEST HOLE/TEST PIT	
	CLEAN OUT	CO
	CULVERT	
	DITCH / SWALE	
	TREE OR SHRUB LINE	
	FENCE LINE	
	HYDRO	
	GAS MAIN	
	MTS	
	DIRECTION OF FLOW	
	WICK DRAIN	
	RIP RAP	
	GROUND ELEVATION	99.000
99.000	DITCH ELEVATION	99.000
99.000	ROAD/DYKE ELEVATION	99.000
	DYKE	

IS	RE	DATE	DESCRIPTION
0	0	2018-06-13	APPROVALS SUBMISSION

SEAL: PROVINCE OF MANITOBA 2018-06-13 J.S. BUNN Member 10 REGISTERED PROFESSIONAL ENGINEER

CLIENT: **PRELIMINARY** NOT FOR CONSTRUCTION

CLIENT REF. #: -

PROJECT: RM OF GIMLI BIOSOLIDS STORAGE FACILITY

PROJECT NO: 181-03988-00

DATE: 2018-06-13

wsp
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
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TITLE: PROPOSED SITE PLAN

SHEET NUMBER: CL102

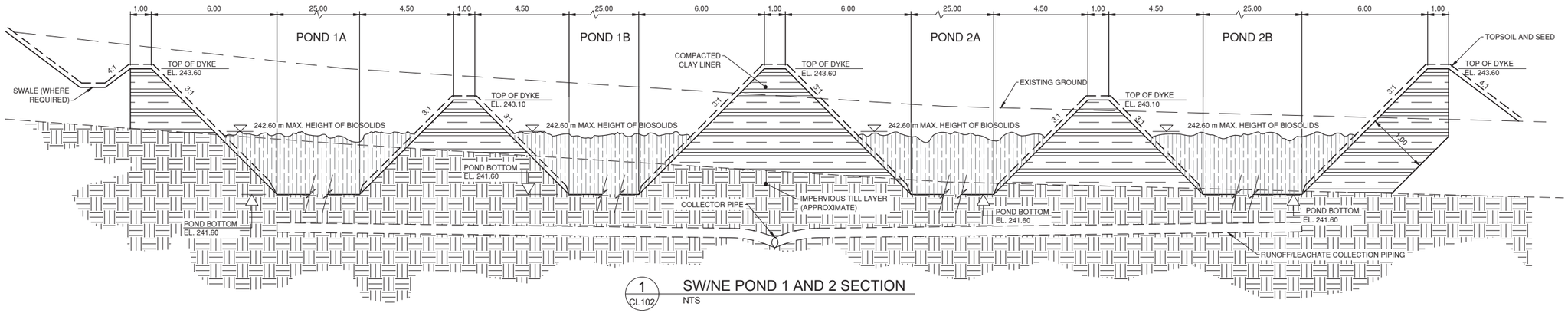
SHEET #: 2 OF 3

DESIGNED BY: J.S.B.
DRAWN BY: V.A.A.
CHECKED BY: J.S.B.
DISCIPLINE: CIVIL

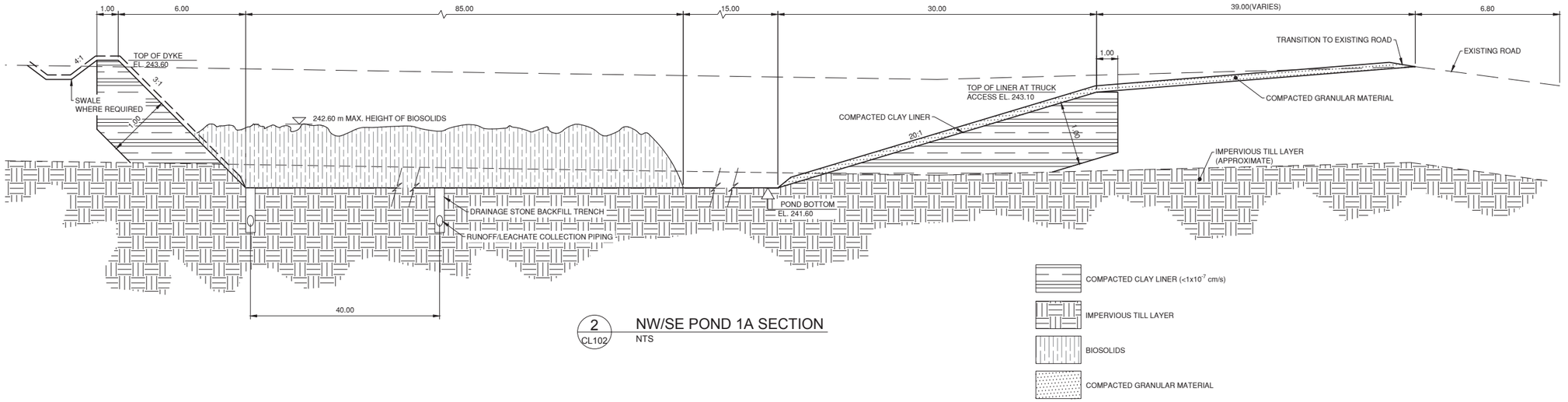
ISSUE: APPROVALS SUBMISSION

REV #: 0

DATE OF: 2018-06-13



1 CL102 SW/NE POND 1 AND 2 SECTION
NTS



2 CL102 NW/SE POND 1A SECTION
NTS

COMPACTED CLAY LINER (<1x10^{-7} cm/s)
IMPERVIOUS TILL LAYER
BIOSOLIDS
COMPACTED GRANULAR MATERIAL

IS	RE	DATE	DESCRIPTION
0	0	2018-06-13	APPROVALS SUBMISSION

SEAL: PROVINCE OF MANITOBA 2018-06-13 J.S. BUNN Member REGISTERED PROFESSIONAL ENGINEER

CLIENT: **PRELIMINARY** NOT FOR CONSTRUCTION
CLIENT REF. #: -

PROJECT: RM OF GIMLI BIOSOLIDS STORAGE FACILITY
PROJECT NO: 181-03988-00
DATE: 2018-06-13

wsp
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.WSPGROUP.COM

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25mm

TITLE: POND SECTIONS
SHEET NUMBER: CL301
SHEET #: 3 OF 3

DESIGNED BY: J.S.B.
DRAWN BY: V.A.A.
CHECKED BY: J.S.B.
DISCIPLINE: CIVIL
ISSUE: APPROVALS SUBMISSION
REV #: 0
DATE OF: 2018-06-13

APPENDIX

D GENERAL CORRESPONDENCE FOR REFERENCE

Hailstone, Amber

From: +WPG574 - HRB Archaeology (SCH) <HRB.archaeology@gov.mb.ca>
Sent: Monday, June 04, 2018 7:05 PM
To: Bunn, Jason
Cc: Nesbitt, Christina (SCH)
Subject: RE: Environment Act Proposal - RM of Gimli - Heritage Resources information request [WSP# 181-03988-00]
Attachments: Precious Resource for all Manitobans - Heritage Objects (English).pdf

Dear Jason,

The Historic Resources Branch has no concerns at this time. However, please be advised that in addition to a provision concerning the possibility of accidentially encountering heritage resources/archaeological sites, the EAP should contain an outline of the appropriate measures to mitigate those impacts upon such an encounter. Specifically, if heritage resources or human remains are encountered during any phase of development by the R.M. of Gimli, their employees or contractors, work is to stop and the Manitoba Historic Resources Branch is to be contacted immediately. In the case of human remains, notification must also be made to the RCMP.

If at any time heritage resources are encountered in association with these lands during develoment, the Historic Resources Branch may require that an acceptable heritage resource management strategy be implemented by the developer to mitigate the affects of development on the heritage resources.

If you have any questions or comments, please feel free to contact the Branch as below. I am attaching for yoru reference our booklet about heritage objects/resource recognition.

Sincerely,

Suyoko Anne Tsukamoto
Impact Assessment Archaeologist
Historic Resources Branch
Manitoba Sport, Culture, and Heritage

Main Floor, 213 Notre Dame Avenue
Winnipeg, MB
R3B 1N3
T: (204) 945-3893
F: (204) 945-2384
e: suyoko.tsukamoto@gov.mb.ca

From: Bunn, Jason [mailto:Jason.Bunn@wsp.com]
Sent: May-30-18 3:26 PM
To: +WPG574 - HRB Archaeology (SCH) <HRB.archaeology@gov.mb.ca>
Subject: Environment Act Proposal - RM of Gimli - Heritage Resources information request [WSP# 181-03988-00]

Hello,

We are working on an Environment Act Proposal for the RM of Gimli regarding the construction of biosolids storage ponds (from the Gimli WWTP) at a site adjacent to the Arnes waste disposal grounds (10-21-3 EPM). Please indicate if there are any concerns in regard to Heritage Resources. I would greatly appreciate your information before June 7, 2018.

Kind regards,

Jason Bunn, P.Eng.
Engineer, Wastewater Infrastructure

T+ 1 204-477-6650

D+ 1 204-259-1518

1600 Buffalo Place
Winnipeg, Manitoba,
R3T 6B8

wsp.com

-LAEmHhHzdJzBITWfa4Hgs7pbKI

Hailstone, Amber

From: Butterfield, Tamara (SD) <Tamara.Butterfield@gov.mb.ca>
Sent: Tuesday, June 05, 2018 11:00 AM
To: Bunn, Jason
Subject: RE: Environment Act Proposal - RM of Gimli - Licensed water users information request [WSP# 181-03988-00]

Hi Jason,
There are no licensed users within a one kilometre radius.

Please let me know if you need anything further.

Cheers,

Tamara

Ph. 204-945-7431
Cell 204-918-6273

From: Bunn, Jason [mailto:Jason.Bunn@wsp.com]
Sent: May-30-18 3:27 PM
To: Butterfield, Tamara (SD) <Tamara.Butterfield@gov.mb.ca>
Subject: Environment Act Proposal - RM of Gimli - Licensed water users information request [WSP# 181-03988-00]

Hi Tamara,

We are working on an Environment Act Proposal for the RM of Gimli regarding the construction of biosolids storage ponds (from the Gimli WWTP) at a site adjacent to the Arnes waste disposal grounds (SW 10-21-3 EPM). There will be no discharge from the facility to surface water courses. Please provide the licensed water users within a 1 kilometre radius from the site. I would greatly appreciate your information before June 7, 2018.

Kind regards,

Jason Bunn, P.Eng.
Engineer, Wastewater Infrastructure

T+ 1 204-477-6650

D+ 1 204-259-1518

1600 Buffalo Place
Winnipeg, Manitoba,
R3T 6B8

wsp.com

-LAEmHhHzdJzBlTWfa4Hgs7pbKI

Hailstone, Amber

From: McCartney, Erin (CLPA) <Erin.McCartney@gov.mb.ca>
Sent: Thursday, May 31, 2018 9:30 AM
To: Bunn, Jason
Subject: RE: Environment Act Proposal - RM of Gimli - Mineral rights information request [WSP# 181-03988-00]
Attachments: 1713730-1 for ESW 10-21-03 EPM.pdf

Good Morning, please be advised that according to our records as of this date SW 10-21-03 EPM (154.00 acres) was transferred by the Dominion of Canada in 1920 along with the Sand and Gravel. The Crown retained ownership of the mines and minerals.

Title 533897 dated December 22, 1939 is for WSW 10-21-03 EPM excluding Road Plan 3339 WLTO and is subject to the reservations and provisoes contained in the grant from the Crown. We can confirm that the sand and gravel continue to be owned by the surface's current landowner, The Rural Municipality of Gimli, and that the mines and minerals remain with the Crown.

Title 1713730/1, copy of which is attached, dated March 22, 2000 is for ESW 10-21-03 EPM and is subject to the reservations and provisoes contained in the grant from the Crown. We can confirm that the sand and gravel continue to be owned by the surface's current landowner, The Rural Municipality of Gimli, and that the mines and minerals remain with the Crown.

If I can be of further assistance to you may I please hear from you.

Erin McCartney
Acting Supervisor Crown Lands Registry

Crown Lands and Property Agency
308 - 25 Tupper Street North
Portage la Prairie MB R1N 3K1
P 204-239-3805 F 204-239-3560
Toll Free 1-866-210-9589
www.clp.gov.mb.ca

CLPA

An Agency of the Manitoba Government

From: Bunn, Jason [mailto:Jason.Bunn@wsp.com]
Sent: May-31-18 8:50 AM

To: McCartney, Erin (CLPA) <Erin.McCartney@gov.mb.ca>
Subject: RE: Environment Act Proposal - RM of Gimli - Mineral rights information request [WSP# 181-03988-00]

Hi Erin,

I'm interested in confirming ownership of the mines, minerals, sand and gravel. Attached is the Certificate of Title, which is all that we have.

Thanks!

Jason Bunn, P.Eng.
Engineer, Wastewater Infrastructure

From: McCartney, Erin (CLPA) [mailto:Erin.McCartney@gov.mb.ca]
Sent: May-31-18 8:47 AM
To: Bunn, Jason <Jason.Bunn@wsp.com>
Subject: RE: Environment Act Proposal - RM of Gimli - Mineral rights information request [WSP# 181-03988-00]

Hi Jason, are you inquiring as to who has ownership or are you wanting to acquire the mines, minerals, sand and gravel? Please confirm your request and provide a copy of the current status of title(s) so that I can proceed with your request.

Erin McCartney
Acting Supervisor, Crown Lands Registry

Crown Lands and Property Agency
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Portage la Prairie MB R1N 3K1
P 204-239-3805 F 204-239-3560
Toll Free 1-866-210-9589
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An Agency of the Manitoba Government

From: Bunn, Jason [mailto:Jason.Bunn@wsp.com]
Sent: May-30-18 3:25 PM
To: McCartney, Erin (CLPA) <Erin.McCartney@gov.mb.ca>
Subject: Environment Act Proposal - RM of Gimli - Mineral rights information request [WSP# 181-03988-00]

Hi Erin,

We are working on an Environment Act Proposal for the RM of Gimli and require the mineral rights (Mines and Minerals & Sand and Gravel) for SW10-21-3 EPM. I would greatly appreciate your information before June 7, 2018.

Kind regards,

Jason Bunn, P.Eng.
Engineer, Wastewater Infrastructure

T+ 1 204-477-6650

D+ 1 204-259-1518

1600 Buffalo Place
Winnipeg, Manitoba,
R3T 6B8

wsp.com

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Hailstone, Amber

From: Friesen, Chris (SD) <Chris.Friesen@gov.mb.ca>
Sent: Tuesday, June 05, 2018 1:15 PM
To: Bunn, Jason
Subject: RE: Environment Act Proposal - RM of Gimli - Species search information request [WSP# 181-03988-00]

Jason

Thank you for your information request. I completed a search of the MB Conservation Data Centre rare species database which resulted in the following occurrence:

SE 9-21-3E
Bank Swallow (Riparia riparia), S5B, SARA: Threatened, COSEWIC: Threatened

Further information on this ranking system can be found on our website at http://www.gov.mb.ca/conservation/cdc/consranks.html and these designations can be found at http://web2.gov.mb.ca/laws/statutes/ccsm/e111e.php, http://www.cosewic.gc.ca/ and http://www.sararegistry.gc.ca/default_e.cfm.

Manitoba's recommended setback distances can be found at http://www.gov.mb.ca/conservation/cdc/pubs.html

The information provided in this letter is based on existing data known to the Manitoba CDC of the Wildlife and Fisheries Branch at the time of the request. These data are dependent on the research and observations of our scientists and reflects our current state of knowledge. **An absence of data does not confirm the absence of any rare or endangered species.** Many areas of the province have never been thoroughly surveyed, however, and the absence of data in any particular geographic area does not necessarily mean that species or ecological communities of concern are not present. The information should, therefore, not be regarded as a final statement on the occurrence of any species of concern nor should it substitute for on-site surveys for species or environmental assessments. Also, because our Biotics database is continually updated and because information requests are evaluated by type of action, any given response is only appropriate for its respective request.

Please contact the Manitoba CDC for an update on this natural heritage information if more than six months passes before it is utilised.

Third party requests for products wholly or partially derived from the Biotics database must be approved by the Manitoba CDC before information is released. Once approved, the primary user will identify the Manitoba CDC as data contributors on any map or publication using data from our database, as the Manitoba Conservation Data Centre; Wildlife and Fisheries Branch, Manitoba Sustainable Development.

This letter is for information purposes only - it does not constitute consent or approval of the proposed project or activity, nor does it negate the need for any permits or approvals required by the Province of Manitoba.

We would be interested in receiving a copy of the results of any field surveys that you may undertake, to update our database with the most current knowledge of the area.

If you have any questions or require further information contact me directly at (204) 945-7747.

Chris Friesen
Coordinator

Manitoba Conservation Data Centre
204-945-7747
chris.friesen@gov.mb.ca
http://www.manitoba.ca/sd/cdc/

From: Bunn, Jason [mailto:Jason.Bunn@wsp.com]
Sent: May-30-18 3:26 PM
To: Friesen, Chris (SD) <Chris.Friesen@gov.mb.ca>
Subject: Environment Act Proposal - RM of Gimli - Species search information request [WSP# 181-03988-00]

Hi Chris,

We are working on an Environment Act Proposal for the RM of Gimli regarding the construction of biosolids storage ponds (from the Gimli WWTP) at a site adjacent to the Arnes waste disposal grounds (10-21-3 EPM). Please provide a listing of rare species for the identified area. I would greatly appreciate your information before June 7, 2018.

Kind regards,

Jason Bunn, P.Eng.
Engineer, Wastewater Infrastructure

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