

REPORT

East Floral Industrial Park Phase 2

Comprehensive Development Review RM of Corman Park



November 2017

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1 Development Summary

This Comprehensive Development Review (CDR) is being submitted to support the rezoning and subdivision of the East Floral Industrial Park (East Floral) Phase II situated on the W ½ of Section 35-35-4-W3M. This report is intended to provide an overview of how the planned industrial park expansion successfully integrates itself physically, socially, and financially with the existing land use in the immediate vicinity. In addition to addressing matters of land use integration, this CDR is intended to assess the capacity of the supportive municipal and provincial infrastructure as it relates to the demand created by the proposed development. Figure 1-1 below illustrates the conceptual lot layout for the planned expansion.

East Floral Phase II is located approximately 4.5 kilometers southeast of the City of Saskatoon along Highway No. 16. The project is in an area identified by the RM of Corman Park as being a suitable location to support additional rural industrial development. In addition to several industrial companies operating within the current phase of the industrial park, other existing industrial development in the area includes New Life Feeds, Double Diamond Industrial, and the Lafarge concrete plant. The continuation of industrial development in this area creates opportunities for businesses to locate in relative proximity to one another and share resources in the processing, manufacturing or transportation of goods and products.

Highway No. 16, commonly known as the Yellowhead Highway, is part of the national transportation network which connects Saskatoon with other major urban centers such as Edmonton and Winnipeg. The segment of Highway No. 16 adjacent to the development area has recently been twinned and its intersection with Floral Road realigned providing good access and high visibility along this highway corridor.

The gross development area, including Parcel A which represents land set aside to accommodate a potential future highway interchange encompasses 36.17 hectares (89.38 acres). The entire development site is intended to be rezoned from AG - Agricultural District to an M2 – Heavy Industrial District with a holding provision applied to all lands outside of the current active phase as defined by the most current Plan of Proposed Subdivision.

The MHI has indicated a willingness to consider temporary uses on Parcel A (i.e. outdoor storage) but no permanent structures will be allowed to be developed on this parcel. Any proposed temporary use on Parcel A is subject to the approval of the MHI.

The long-term intention for the site is to subdivide 20 new industrial lots ranging in size from 0.81 hectares (2.01 acres) to 1.90 hectares (4.69 acres) which complies with the minimum site area of 0.80 hectares (2.00 acres) defined for the M2 District. Anticipated land uses seeking to locate in the park may include construction yards, agricultural support services, manufacturing establishments, automotive repair shops, and warehousing operations. It is expected that the uses will be like the existing industrial developments in the area.

The proponent is intending to provide cash in lieu of land dedication to satisfy the municipal reserve requirement. Land within the plan area includes 6.57 hectares (16.25 acres) dedicated for the construction

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for a second stormwater retention facility (MU2) and a proposed new public utility parcel situated within lot 5B of East Floral Industrial Park Phase I. The public utility will accommodate a water distribution station that is to be developed and operated by a private cooperative established as a corporation under Federal statute. The company will provide water distribution services for East Floral Phases' I and II. This parcel is also intended to provide SaskWater access to their water valve which is located near the rear boundary of this lot.



Figure 1-1 Concept Plan

2 Phasing Plan

East Floral Phase II is anticipated to be developed in four phases to allow for the incremental subdivision and development of the area in a manner which reflects and aligns with the changing market conditions. Below is a brief description of each phase as illustrated on Figure 2-1, Phasing Plan. The phasing plan described herein is conceptual and the timing and composition of phases is subject to revision at the discretion of the landowner based upon market conditions.

2.1 PHASE 1

Phase 1 consists of three large lots which range in size from 1.86 hectares (4.60 acres) to 2.77 hectares (6.84 acres) with an average lot size of approximately 2.19 hectares (5.41 acres). Although these lots are larger than what is represented on the overall concept plan, their configuration corresponds with the over-all parcel boundaries represented by the concept plan; providing flexibility to be potentially re-subdivided in the future in the event the market demand warrants smaller properties.

Access to the initial three lots will be provided directly from Floral Road (Township Road 360) eliminating the need to construct any new internal roadways.

The initial phase also includes the dedication and construction of the new storm retention facility noted as MU2. Run-off generated within this initial phase of development is intended to be conveyed to the detention facility through a network of easements which correspond with the planned future internal road network. This is consistent with the broader drainage plan for the area eliminates the need for interim or temporary facilities.

2.2 PHASE 2

Phase 2 will necessitate the construction of Agar Road south to its intersection with South Floral siding. This phase will enable the subdivision of an additional four lots ranging in size from 0.81 hectares (2.01 acres) to 0.86 hectares (2.13 acres) with an average lot size of approximately 0.83 hectares (2.05 acres).

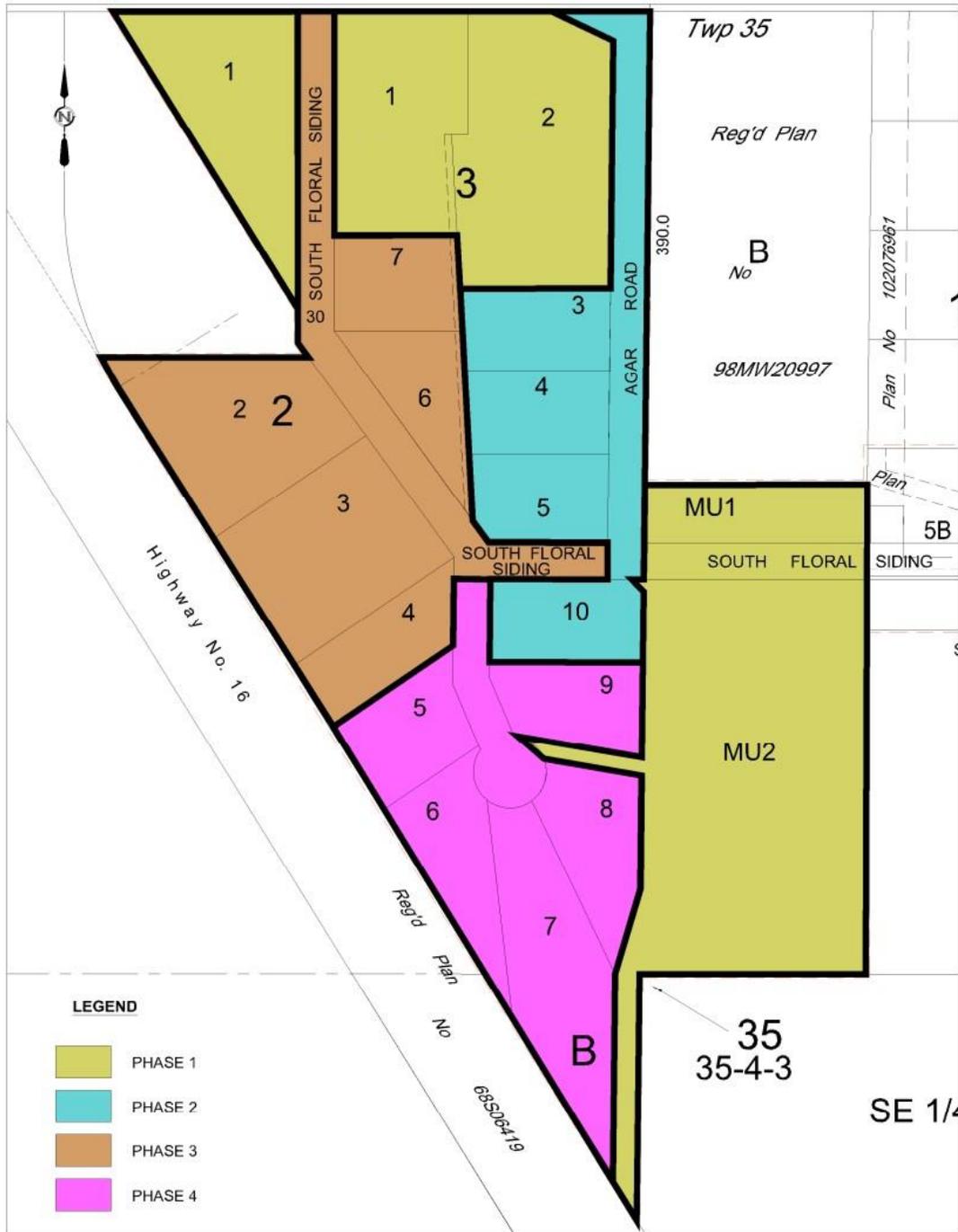
2.3 PHASE 3

Within Phase 3, South Floral Siding will be extended to the west and north to create a new internal road access along Floral Road. This additional roadway will enable the subdivision of an additional five lots ranging in size from 0.81 hectares (2.01 acres) to 1.90 hectares (4.69 acres) with an average lot size of approximately 1.40 hectares (3.46 acres).

2.4 PHASE 4

Phase 4 consists of the subdivision of five additional lots and the construction of the cul-de-sac. The five lots within this phase will range in size from 0.81 hectares (2.01 acres) to 1.73 hectares (4.27 acres) with an average lot size of approximately 1.04 hectares (2.57 acres).

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**Figure 2-1
Phasing Plan**

3 Municipal Impact Assessment

3.1 WATER RESOURCES

3.1.1 Potable Water Supply

SaskWater currently supplies potable water to the area via a waterline situated along Highway No. 16 extending to the Villages of Clavet and Bradwell, and the Town of Allan. SaskWater applied to the City of Saskatoon in December of 2014 for permission to expand its current water allocation to support the forecasted water demand for the entire development site. A copy of the SaskWater confirmation is attached as Appendix E –Consultation.

SaskWater has confirmed an allocation of 22 IGPM which provides approximately 968,000 gallons per month for East Floral. As referenced in the *Rural Water Pipeline Handbook for Saskatchewan*, it is important to ensure each lot is provided with a minimum flow of 0.5 IGPM (0.38 l/s) to accommodate the recharge of water supplies for each lot during peak demands. The minimum flow at 0.5 IGPM (0.38l/s) equates to 22,000 gallons per month per lot. This allocation is sufficient to support a total of 44 lots based upon the above noted minimum flow requirements but is incapable of providing a sufficient flow to support fire suppression.

Water distribution will continue to be managed by the current privately-operated water cooperative which has been given approval to access water from the main SaskWater supply line situated in the Highway 16 ROW. A centralized water metering station and chlorination facility is intended to be constructed on a privately-owned utility parcel to be subdivided from Lot 5, Block 1 of the current industrial park.

A new water main is intended to extend west along South Floral Siding into the development area. A curb stop connection will be provided along the frontage of each individual property. It will be the responsibility of each individual business owner to construct a connection to this line to service their development. A cistern and pressure system along with a water meter will be installed by each individual business owner to measure flows and to manage local water storage requirements including any specific fire suppression requirements as defined by the National Building Code. See Figure 3 – 1 for the proposed water servicing system.

The frequency of holding tank pump-outs will vary by property and will be relative to the rate of water consumption. It is anticipated that the absence of a centralized sewer system will discourage high water users from locating in the Park. East Floral anticipates $\pm 9,100$ litres (2,000 gallon) holding tanks at each lot. Based on the Saskatchewan Onsite Wastewater Disposal Guide a commercial/industrial building is expected to generate 50 litres per person per day. Based upon this per capita generation and a normal work week, a business with 10 employees is expected to generate 500 litres of domestic sewage per day which would require the evacuation of a 9,100 litre holding tank every 18.2 days. As rural industrial parks are not generally high-water users, holding tanks fulfill the need for wastewater disposal with minimal space needed to be dedicated to onsite wastewater disposal.

Envirotec Services Incorporated has been contacted (See Appendix E) to confirm their ability to service this development.

3.1.3 Stormwater Management

The subject property is currently zoned AG District and has historically been farmed. The property gently slopes east to south with several small catchment areas where ponding naturally occurs. The soils on the site are Class 3 according to the Canadian Land Inventory for Agriculture, which has moderate to severe limitations for agricultural productivity. The soil composition at the site is loam to sandy loam soils, which do not transport water well and would limit the agricultural productivity of the site. As the soils do not transport water well, the site drainage will be managed overland through road ditches, culverts and dedicated swales; conveying runoff into an engineer designed stormwater retention pond (MU2).

The existing drainage system within Phase I of East Floral consists of overland flow with the use of ditches and culverts. The runoff from Phase I is directed to a small stormwater retention pond located at the southwestern boundary. The drainage is stored and released at a controlled rate to an existing natural swale that conveys the runoff south along Highway No. 16.



Phase II of East Floral will use a similar drainage system via ditches, culverts, and swales. The conceptual design for Phase II includes a new larger stormwater retention pond which is intended to serve both phases. The proposed development site currently receives a large volume of runoff from areas north of the development. To meet the new regulations provided in *The Water Security Act*, the conceptual design of this pond needed to take into consideration the sites historical retention volume, any upstream flows, and mitigate the impacts which the community has been experiencing downstream.

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The conceptual design was completed following direction provided by the Water Security Agency (WSA). WSA indicated a preference to see 30,000 cubic metres of active storage (currently proposed 1:100 24hr storm pre to post development) with an additional 43,000 cubic metres of permanent storage (median annual inflows) to replicate the predevelopment natural storage that existed on this property. Based upon a total storage volume of 73,000 cubic metres, during severe runoff events, any excess water volume higher than the retention volume would simply be passed through the system via the spill over or one of the two emergency overflows. This replicates the historical stormwater volume on the proposed development site and the natural drainage pattern as discussed with WSA.

The conceptual design for the retention facility provides a total storage volume of 64,000 cubic metres. Recognizing the conceptual design was sized 9,000 cubic metres less than the preferred storage volume of 73,000 cubic metres, AE and WSA had a teleconference to discuss the design and its size. After the teleconference WSA provided an email which confirmed they agreed with the conceptual drainage plan as presented at a storage volume of 64,000 cubic metres (attached in Appendix – E Consultations).

The conceptual design of the pond has a bottom elevation of 514.80 metres, one spill over elevation of 516.15 metres at the ponds southwestern berm edge, two emergency overflows of 516.8 metres along the ponds southern and eastern berm edges, and a berm top of 517.0 metres. There are two inlets located along the ponds western berm edge with elevations of 516.2 metres, and one inlet along the ponds eastern berm edge with an elevation of 516.15 metres as represented in Appendix – A. An equalization culvert will be located through South Floral Siding road connecting MU1 with MU2 and allowing stormwater to fill and flow equally between the two parcels.

The pond has been designed to function as a fill and spill structure. Once the pond has reached its maximum volume capacity, excess water is intended to be released over into the repurposed drainage ditch which will then convey the stormwater downstream following its natural drainage path. The repurposed ditch will be constructed with riprap at the outlets and corners with an erosion blanket along the sides between the riprapped areas to prevent erosion from the movement of stormwater during and following higher runoff events. It is expected that during dryer years, the stormwater retention pond will go into an evaporation process and regenerate the stormwater storage volume. During wet cycles, the pond will fill to its maximum capacity and once full, release the excess stormwater downstream along its natural drainage path. In larger storm events such as a 1:100-year event, the inlet ditches will back up with stormwater and the emergency overflows will be triggered and release the excess water. Following the event, the pond will continue to release until the ditches are dry and the pond reaches its maximum capacity.

The conceptual drainage plan illustrates how the increased run-off generated from the proposed subdivision and development of the subject property is to be managed to prevent adverse impacts on the local hydrologic systems. There are no known environmentally sensitive areas near the development that would be impacted by or which would influence the proposed drainage concept. The conceptual drainage plan is attached to this report as Appendix A.

3.2 SHALLOW UTILITIES

SaskEnergy, SaskPower, and SaskTel all operate facilities in the immediate vicinity with sufficient capacity to service the proposed new industrial development. SaskPower will supply 3-phase power with overhead and some underground lines and a high capacity natural gas line extended into the development by SaskEnergy. A summary of the property servicing is attached as Appendix G – Servicing Worksheet.

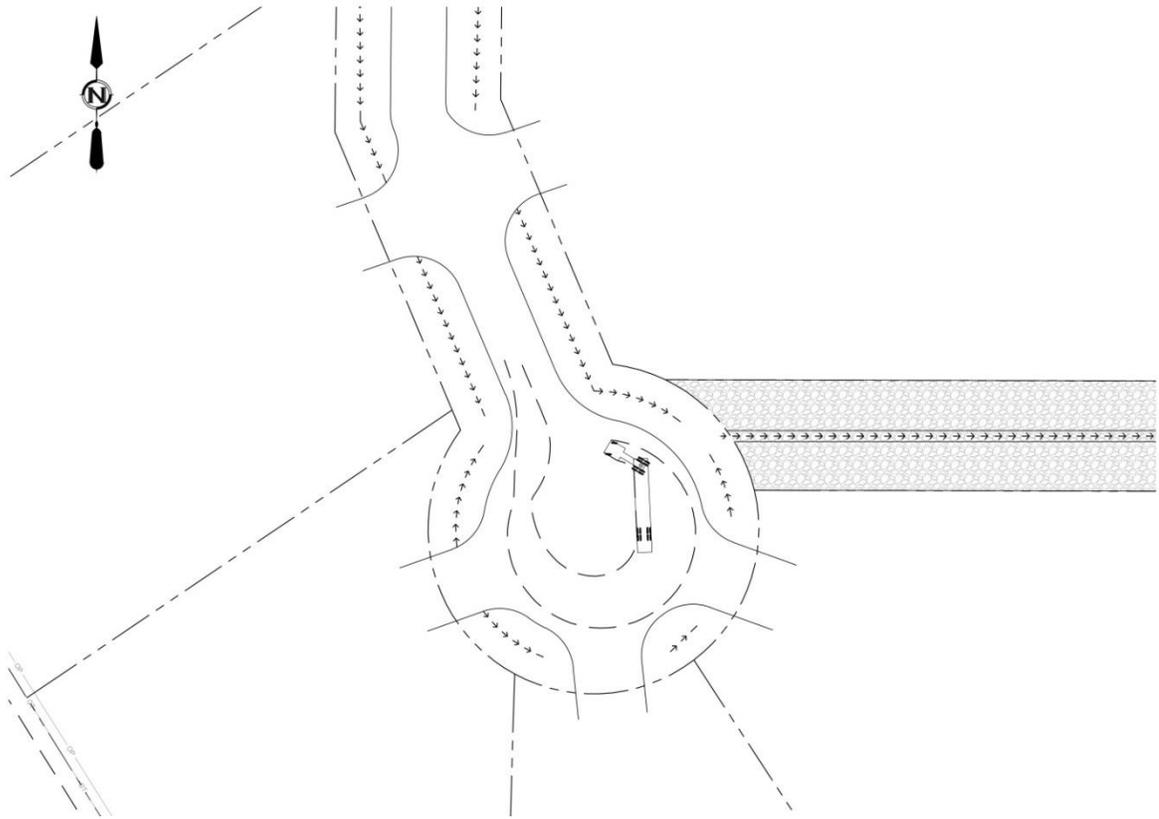
3.3 TRANSPORTATION

The property has access to Highway No. 16, which is a primary weight highway, via Floral Road from a new highway intersection which has recently been upgraded to include a northbound offramp. Access to the individual lots will be provided through the internal road system as illustrated on the appended concept plan. Individual business owners will be responsible for installing an engineered culvert and approach for access to their lot via RM standards.



Floral Road is a paved roadway structure originally constructed to accommodate heavy truck traffic generated from the Lafarge concrete plant in the adjacent ¼ section. It is our understanding the RM has planned improvements to Floral Road and that all new subdivisions along the roadway are required to contribute to this project. We anticipate that this requirement will be included by the RM in a servicing agreement.

Internal roads are intended to be constructed on a 30 metre ROW and will comply with the RM standards for gravel surfaced commercial/industrial roads as represented in Appendix I. To ensure the cul-de-sac was sized correctly to accommodate the types of traffic associated with industrial development, an AutoTurn program in AutoCAD was used to confirm the suitability of the turning radius (see Figure 3-2). This program confirmed that a semi-truck and trailer had sufficient space to complete a full turn at the end of this cul-de-sac. The size of truck was selected based on the anticipated types of vehicles that would be entering and egressing from the development.



**Figure 3-2
AutoTurn Illustration**

3.4 TERRESTRIAL AND AQUATIC RESOURCES

The RM of Corman Park has land conservation policies in place to preserve the natural character of the area and protect critical wildlife habitat and tracts of significant vegetative growth.

The Hunting, Angling, and Biodiversity Information (HABISask) online screening tool confirmed that the subject area lies within a general radius that has been flagged with the potential to have occurrences of northern-eyed-blue-grass which is a vascular plant with an S3 provincial ranking. The S3 rank is classified as vulnerable/rare to uncommon which means it is at moderate risk of extinction or extirpation due to a restricted range, relatively few populations, recent and widespread declines, threats, or other factors. However, the subject property has been cultivated and disturbed in the past and therefore the northern-eyed-blue-grass is expected to have little to no growth potential on the plan area as it requires wooded and moist meadow areas for growth.

3.5 HERITAGE RESOURCES

The RM of Corman Park is committed to the protection of historic, archaeological, and other cultural features and sites from incompatible development. The Heritage Conservation Branch of the Ministry of Parks, Culture, and Sport governs heritage resources in the province. The Heritage Conservation Branch provides an online searchable database which can be used by developers to determine whether a parcel of land potentially contains heritage resources. Where this potential is identified, a copy of the development concept for the property must be submitted for comment by their office to confirm the need for any additional investigation.

A query was performed of the online database and the results of the inquiry are attached as Appendix E. The query confirmed that the NW 35-35-4-W3M is of low heritage potential and that no further screening is required. The query indicated that the SW 35-35-4-W3M had not been previously screened and that additional consultation with the Heritage Conservation Branch was required. The Heritage Conservation Branch was contacted on June 1st, 2016 and confirmed on June 7th, 2016 the SW 35-35-4-W3M is not considered heritage sensitive – see Appendix E for SW 35-35-4-W3M clearance letter.

3.6 DOMESTIC WASTE MANAGEMENT

Solid waste generated by individual lot/business owners will be required to enter into an agreement with a disposal company to haul their solid waste off-site. There are companies in the Saskatoon area that provide solid waste removal for a fee. Loraas Disposal was contacted to ensure a licensed hauler had capacity to accommodate additional development in this area. A letter from Loraas Disposal Services Ltd. confirming their ability to provide domestic waste management services is attached as Appendix E – Consultations.

3.7 COMMUNITY SERVICES

3.7.1 Fire Protection and Policing

The City of Saskatoon Fire Department will provide the development with fire protective services, based upon the agreement between the RM of Corman Park and Saskatoon. The low-pressure water pipeline that will be supplying water to East Floral Phase II is not sufficient to provide onsite fire suppression. Individual business owners will be responsible for ensuring that adequate fire suppression support is provided within their individual developments.

The City of Saskatoon Fire Department provided the following response to our request for information pertaining to protective services;

“Our general response is 4 pieces of equipment with 12 staff. The number of staff is established for safety of the responders and the ability to meet most of the situations they will be faced with. Our water tankers carry 3000 gallons and the pumpers 500 and we as a fire service rely on the water sources that accompany the crews.”

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It is unknown whether developments within the Park will require sprinkler systems. Where sprinkler systems are required by the National Building Code, individual property/business owner(s) will be solely responsible to design for this necessity.

Police services will be provided by the Corman Park Police Service and the Saskatoon Detachment of the RCMP.

The City of Saskatoon Fire Department, the Corman Park Police Service, and the RCMP were contacted regarding the development and there were no concerns expressed with extending emergency services to the area. Correspondence from the City of Saskatoon Fire Department is attached as Appendix E.

4 Municipal Policy Compliance Summary

4.1 RM OF CORMAN PARK OFFICIAL COMMUNITY PLAN

<u>Municipal Policy</u>	<u>How it is addressed</u>
<p><u>6.1 The Industrial Objectives of the Plan shall be:</u></p>	
<p>6.1.1. To maximize the economic benefits of industrial development activities, while at the same time minimizing land use conflicts and environmental concerns associated with such development.</p> <p>6.1.3. To provide for high quality rural industrial development through appropriate subdivision design and location criteria.</p>	<p>The proposed industrial expansion takes full advantage of strategic access to the provincial transportation network at a recently upgraded intersection. The proposed development area represents the expansion of existing industrial development in the area.</p> <p>East Floral Phase II has been designed and located to take advantage of the existing infrastructure and minimize the potential disturbance to surrounding agricultural lands.</p>
<p><u>6.2 The General Industrial Policies of the Plan shall be:</u></p>	
<p>6.2.1. In order to evaluate industrial development proposals, a Comprehensive Development Review (CDR) shall be completed prior to consideration of an application to rezone or subdivide land for industrial use. The CDR shall address all matters of land use integration, environmental sustainability, public involvement and potential conflict mitigation, and the provision of services to the development as set out in the Zoning Bylaw.</p> <p>6.2.2. Rural Industrial Parks should be located on sites that:</p> <p>a) permit the economically-feasible provision of public services including but not limited to roadways, power, telecommunication, rail lines, police and fire protection;</p>	<p>This CDR report has been prepared to support the rezoning and phased subdivision of East Floral Phase II. The CDR addresses all matters as describe in this policy.</p> <p>All core services are available in the immediate vicinity.</p>

b) are in close proximity to, or adjacent

The subject land is located adjacent to Floral Road,

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engineered road way and/or rail access;	which is a paved heavy haul municipal roadway that provides access to Highway No. 16, a primary weight highway, at a permanent access point.
c) are not prime agricultural land;	Although the subject site is considered prime lands as defined within the RM of Corman Park Zoning Bylaw, the subject site is situated between an existing industrial park and a major provincial highway. The development site is situated in an area physically constrained by non-farm development to the east, a municipal roadway to the north and a provincial highway to the west, making it less capable of being productively farmed.
d) do not have high quality aggregate resources, unless the purpose of development is to extract the aggregate resources;	No high-quality aggregate resources are known to exist at this location.
e) are not prone to natural hazards and/or flooding;	The development is not located within an area that is flood prone, near a river system, or subject to geotechnical instability.
f) do not have unique historical or archaeological significance;	This area was screened for heritage sensitivity through the Heritage Conservation Branch developer's online screening tool and additional follow-up with the Heritage Branch via email which confirmed no further screening is required on this site.
g) do not have significant wildlife habitat;	The Hunting, Angling, and Biodiversity Information (HABISask) online screening tool confirmed that there is no significant wildlife habitat within the subject area.
h) are not high quality recreational land;	This site exhibits a very low potential for recreational development due to the area being previously cultivated and the surrounding land uses being predominantly industrial. There are no natural features within the area, such as a lake or river that lend themselves to high quality recreational usage.
i) will not pollute or otherwise adversely impact groundwater and/or surface water resources;	Groundwater quality and quantity will be protected through the employment of septic holding tanks and a communal water line. This will prevent infiltration and contamination of water resources. The hydrogeological report does not identify any concerns with the local

<p>j) have suitable drainage;</p> <p>k) do not lead to land use conflicts with adjacent lands.</p>	<p>ground water resources being at risk based upon the proposed development.</p> <p>An engineered drainage plan has been prepared for East Floral Industrial Park. This drainage plan has also received approval from the Water Security Agency (WSA).</p> <p>The proposed development is in an area of existing industrial development and near a major provincial highway, which eliminates any potential impacts on non-industrial properties in the area.</p> <p>The area where the development is proposed has been identified by the RM of Corman Park as being suitable for rural industrial growth due to its strategic location to the City of Saskatoon and a major transportation corridor in Highway No. 16.</p>
<p><u>6.2.5. Industrial development shall comply with the required separation distances as provided in Section 4.2.3, Table 1.</u></p>	

4.2.3. Intensive Livestock Operations shall observe the following separation distances from the uses listed in Table 1 and the uses listed in Table 1 shall maintain the following separation distances from Intensive Livestock Operations:

TABLE 1 Required Separation Distances

Other Uses	100 - 300 Animal Units	301 - 600 Animal Units	601 - 1000 Animal Units	Over 1000 Animal Units
Single family dwelling not owned by the Intensive Agricultural Operator	300 m (984 ft.)	400 m (0.25 mile)	0.8 km (0.5 mile)	1.2 km (0.75 mile)
Multi Parcel Country Residential Development: less than a quarter section in size OR having 15 or fewer developable lots	400 m (0.25 mile)	0.8 km (0.5 mile)	1.2 km (0.75 mile)	1.6 km (1 mile)
Multi Parcel Country Residential Development: quarter section or larger	0.8 km (0.5 mile)	1.2 km (0.75 mile)	1.6 km (1 mile)	2.4 km (1.5 miles)
Towns	1.2 km (0.75 mile)	1.6 km (1 mile)	2.4 km (1.5 miles)	3.2 km (2 miles)
Cities	1.6 km (1 mile)	2.4 km (1.5 miles)	3.2 km (2 miles)	3.2 km (2 miles)
Commercial Use	300 m (984 ft.)	400 m (0.25 mile)	0.8 km (0.5 mile)	1.6 km (1 mile)
Rural Industrial Park or Use	300 m (984 ft.)	400 m (0.25 mile)	0.8 km (0.5 mile)	1.6 km (1 mile)
Recreation Use	300 m (984 ft.)	400 m (0.25 mile)	0.8 km (0.5 mile)	1.6 km (1 mile)

There is an intensive livestock operation within the RM required separation distances near the proposed development.

4.2.7. When all landowners are in written agreement, the strict application of the Intensive Livestock Operation separation distance standards respecting isolated residences, multi-parcel country residential developments, commercial uses, rural industrial parks or uses, and recreation uses may be relaxed and shall be registered on the titles of the affected properties. (Bylaw 25/14, Approved March 20, 2015)

The proponent will be responsible for obtaining written agreement with the adjacent land owner operating the ILO to relax the above noted separation distance. It is expected that this will be a condition for municipal approval.

6.2.6. Industrial developments shall meet all municipal and provincial regulations respecting access to and from provincial highways, arterial roadways, and other public roads.

The proposed East Floral Phase II development was shared with the MHI to provide an opportunity for comments. At that time, the MHI confirmed they have no concerns with the development proceeding as laid

<p>6.2.7. All industrial developments must assess and avoid or mitigate potential impact on natural and heritage resources.</p> <p>6.2.8. Industrial developments shall be designed and constructed to ensure that alteration to drainage, landscape, or other natural conditions occurs in a way that avoids or mitigates on and off-site impacts and that respects any inter-municipal agreements on the extension of urban infrastructure to the area.</p> <p>6.2.10. Industrial developments shall, when deemed necessary by the Municipality, enter into servicing agreements, when subdivision is involved, including any considerations the Municipality deems necessary in accordance with <i>The Planning and Development Act, 2007</i>.</p>	<p>out in the concept plan.</p> <p>The plan area has been cleared in terms of heritage resources and natural resources.</p> <p>Drainage works within the development site have been designed in direct consultation with the Water Security Agency. The planned retention facility has been sized and designed to replicate historical functions in this regard. The subdivision layout and design capacity of the planned retention facility enables the continued receipt and temporary storage of upland flows. The design of the retention pond also provides a basis for managing the discharge of stormwater to assist in improving drainage conditions on downstream properties.</p> <p>It is expected that a servicing agreement will be prepared for each subdivision phase.</p>
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6.3. The Industrial Land Use Classifications of the Plan shall be:

<p>6.3.5. Heavy Industrial Classification is characterized as:</p> <p>a) developments which have a high potential for conflicts with adjacent land uses and are not dependent on exposure to high traffic areas;</p> <p>b) land uses and processes that may potentially create offsite impacts and/or land use conflicts; and</p> <p>c) permitting the outdoor storage of raw and processed materials subject to the provision of screening to the satisfaction of the Municipality.</p>	<p>The East Floral Phase II is in the immediate vicinity of existing industrial uses and will support complementary forms of development.</p> <p>The park expansion is situated between Highway No. 16 and an existing industrial park. The uses within the expansion area are anticipated to be complementary to the existing industrial uses in the area.</p> <p>Site specific yard requirements shall be regulated through the RM's development permitting process on a site by site basis.</p>
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6.4. The Rural Industrial Park Policies of the Plan shall be:

6.4.1. Rural Industrial Parks shall not be located within:

a) 1 km (0.6 mile) of multi-parcel country residential or recreational development measured from the property boundary of the closest developable parcel located within the multi parcel country residential development or recreational development to the property boundary of the closest developable parcel within the Rural Industrial Park;

6.4.2. The planning of industrial development within established or proposed industrial parks shall ensure that industries with a high potential for land use conflicts are located in a manner that provides for adequate buffering from non-industrial uses of land through the use of distance separation and/or landscaping, providing a visual buffer from potentially impacted properties.

There are no multi parcel country residential or intensive recreational developments within 1 km of the proposed industrial park expansion.

The additional lots anticipated by this CDR are situated to the west of the existing industrial park and east of Highway No. 16; maximizing the distance separation from non-industrial properties in the area.

11.1 The Servicing Objectives of the Plan shall be:

11.1.1. To provide an effective and efficient road network throughout the Municipality to facilitate traffic flow generated by the variety of land uses.

11.1.2. To minimize the financial burden on the residents of the Municipality, resulting from developments in the Municipality.

11.1.3. To minimize the financial burden on residents of the Municipality, resulting from the

All lots will have frontage onto an internal 30 m roadway that connects to Floral Road which provides direct access to Highway No. 16.

The site is conveniently located along Highway No. 16 and Floral Road which are considered suitable for supporting additional development and minimize the impact of industrial development on existing municipal roadways. The subdivision results in the construction of an additional 1.3 km of municipal roads.

School services are not impacted by the proposed

<p>school system in the Municipality.</p> <p>11.1.4. To ensure services are provided in an economic and efficient manner.</p>	<p>subdivision.</p> <p>All the necessary services are currently present in the area.</p>
<p>11.2 The Servicing Policies of the Plan shall be:</p>	
<p>11.2.1. All new development proposals in close proximity to any road in the Municipality shall allow for expansion of those roads to standards designated by Council.</p>	<p>Internal roads will be developed to the standards of the RM of Corman Park and Floral Road is already developed to RM standards to accommodate heavy haul industrial traffic.</p>
<p>11.2.2. Any person proposing a subdivision and/or development of land shall, as a condition of approval, construct at his or her own expense and to standards established by the Council such roads as may be required by the subdivision and/or development. (Bylaw No. 3/11, Approved April 2011)</p>	<p>The construction of any new roads will be completed to the RM standards.</p>
<p>11.2.3. All development proposals shall have regard to existing school and school bus capacity.</p>	<p>School services are not impacted by the proposed subdivision.</p>

4.2 RM OF CORMAN PARK ZONING BYLAW

Municipal Regulation	Compliance Notes
<p>Section 3 - General Regulations</p> <p>6.1. Where development is proposed in an area identified as containing critical wildlife habitat or heritage sensitive areas, the Development Officer may require the applicant provide additional information as required by The Wildlife Habitat Protection Act (WHPA) and The Heritage Property Act or any other relevant provincial regulations.</p> <p>13.2. No development or use of land which requires the disposal of solid waste, liquid waste, gaseous waste or clean fill shall be permitted unless it has received all required federal,</p>	<p>The plan area has been cleared in terms of heritage resources and natural resources.</p> <p>Each individual lot owner will be responsible to develop their lot in compliance with all federal, provincial, and municipal regulations and requirements and obtain any required permits and</p>

East Floral Industrial Park Phase 2

<p>provincial or municipal approvals.</p> <p>13.3. The storage of chemicals, fertilizers, and combustible materials are subject to the Requirements of both the Federal and Provincial Governments. All necessary requirements and permits must be met and obtained prior the storage of hazardous Substances.</p> <p>13.14. The Development Officer may require, as a condition of approval for a development permit, that an applicant submit a lot grading and drainage plan to the Municipality for approval.</p> <p>13.15. Where a proposed development alters site drainage potentially affecting adjacent or downstream properties, the applicant shall be required to submit an engineered design for the proposed drainage works incorporating sufficient capacity to accommodate surface water runoff for a 1:100-year storm event with no incremental increase in offsite flows in excess of what would have been generated from the Property prior to the new development.</p> <p>13.16. Drainage works shall be constructed at the owner's expense to provide for adequate surface water drainage that does not adversely affect adjacent properties, or the stability of the land.</p> <p>13.31. On site lighting shall be located, orientated, and shielded to avoid negatively affecting adjacent properties or producing unnecessary light pollution.</p> <p>13.32. All waste materials or unsightly elements shall be enclosed by buildings, or screened by landscape features, fences, or a combination</p>	<p>approvals. This is expected to be managed by the RM during the development permit process.</p> <p>A conceptual lot grading and drainage plan has been prepared by Associated Engineering for the development. A detailed grading and drainage plan will be prepared following the receipt of approval for the rezoning and subdivision and prior to development of the sites within the Park.</p> <p>Drainage works within the development site have been designed in direct consultation with the Water Security Agency. The planned retention facility has been sized and designed to replicate historical functions in this regard. The subdivision layout and design capacity of the planned retention facility enables the continued receipt and temporary storage of upland flows. The design of the retention pond also provides a basis for managing the discharge of stormwater to assist in improving drainage conditions on downstream properties. This plan is attached to this report as Appendix A.</p> <p>The developer is not anticipating the installation of any street lights within the subdivision. Individual lot owners will be responsible for submitting a landscaping plan to the RM for approval prior to initiating construction on the site. This landscaping plan is expected to include details concerning the design and erection of lighting, the provision of loading and outdoor storage facilities.</p>
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thereof to the satisfaction of the Development Officer.

13.39. All outdoor lighting for any development shall be located and arranged so that no direct rays of light are directed at any adjoining properties; interfere with the use and enjoyment of neighboring lands; or interfere with the effectiveness of any traffic control devices or the vision or safety of motorists.

13.40. Appropriate lighting of commercial and industrial development shall be undertaken to provide security and to add visual interest. Lighting standards and fixtures shall be of consistent design and complimentary to the overall architecture.

13.41. Public access areas shall be lit in keeping with the principles of crime prevention.

16.1. Development adjacent to a provincial highway shall meet all provincial regulations respecting access to and the location of structures on the site.

16.2. All dead-end roads shall have a cul-de-sac or a hammerhead-T designed at the closed end of at least 15 m (49.21 ft) in diameter, measured at the outside of the traveled way.

16.12. No development or use of land shall be permitted where the proposal will adversely affect domestic or municipal water supplies, or where a suitable, potable water supply cannot be furnished to the requirements of the Saskatoon District Health Region and or SaskWater.

Schedule K – M2 – Heavy Industrial District

The subdivision has been reviewed by the Ministry and no concerns were identified. The Ministry recently partnered with the developer and the RM to complete improvements to the existing Floral Road/Highway No. 16 intersection to construct a northbound acceleration ramp.

There is only one cul-de-sac in the development and it has a property diameter of 60 m. To ensure the cul-de-sac was sized correctly to accommodate the types of traffic associated with industrial development, an AutoTurn program in AutoCAD was used to confirm the suitability of the turning radius (see Figure 3-2).

Potable water will be provided from an existing SaskWater line servicing the existing industrial subdivision.

3. THE SITE REGULATIONS IN THE M2 DISTRICT SHALL BE:

In addition to the general provisions contained in this Bylaw the following regulations shall apply to every development in this district:

3.1 THE AREA REQUIREMENTS FOR PERMITTED AND DISCRETIONARY USES SHALL BE:

a) The minimum site area shall be 0.8 ha (2 acres).

Each site is a minimum of 0.8 ha (2 acres)

c) The minimum site frontage shall be 30 meters (98.4 ft).

Each site meets the minimum site frontage of 30 meters.

4. ADDITIONAL REQUIREMENTS IN ASSOCIATION WITH ALL PERMITTED AND DISCRETIONARY USES SHALL BE:

4.1 SETBACKS:

a) Front yards:

All buildings shall be set back a minimum of 45 metres (147.6 ft) from the centerline of a municipal road allowance or provincial highway or such greater distance as required by the Saskatchewan Ministry of Highways and Infrastructure, excepting sites which front on an internal subdivision road which shall be setback a minimum of 20 metres (65.6 ft) from the front site line.

All lots are of sufficient size to allow for the building setback requirements to be met. This is expected to be managed by the RM during the development permit process.

b) Side yards:

All buildings shall be set back a minimum of 8 metres (26.2 ft) from the side property line. Where a side yard abuts a municipal road allowance or provincial highway, the front yard requirements shall apply.

All lots are of sufficient size to allow for the building setback requirements to be met. This is expected to be managed by the RM during the development permit process.

c) Rear yards:

All buildings shall be set back a minimum of 8 metres (26.2 ft) from the rear property line, excepting properties where the rear site line is adjacent to a municipal road in which case all buildings shall be setback a minimum of 45

All lots are of sufficient size to allow for the building setback requirements to be met. This is expected to be managed by the RM during the development permit process.

4 - Municipal Policy Compliance Summary

metres (147.6 ft) from the center line of the road allowance.	
---	--

5 Public and Regulatory Agency Consultations

5.1 PUBLIC CONSULTATION

In May 2013, written notice of the developer’s intent to rezone and subdivide the subject property, including a brief description of the proposed development was circulated to all landowners within a 1.6-kilometre radius of the proposed development site. One response was received from New Life Feeds, which was in favour of the development and requested further information on the type of business the developer hopes to attract to the development. A copy of the correspondence that was sent out and the response is attached as Appendix F.

5.2 REGULATORY AGENCY CONSULTATION

Ministry of Highways and Infrastructure	<p>The MHI have provided an established spatial area which accommodates the footprint of the future interchange. As mentioned above, this impacts the northwest corner of East Floral Phase II and its future development potential. The lands impacted by this spatial footprint will be limited to temporary uses of moveable objects and material. No permanent structures will be able to be constructed within this area.</p>
Heritage Conservation Branch, Ministry of Parks, Culture and Sport	<p>The Developers’ Online Screening Tool and consultations with the Heritage Conservation Branch indicates that the proposed development site does not require any further heritage screening.</p>
Water Security Agency (WSA)	<p>A confirmation email was provided by WSA on April 7th, 2016 that stated, “The redesign has included a permanent retention pond of 64,000 cubic metres. WSA is prepared to approve the drainage project and will accept the retention as mitigation to limit the downstream impacts of this project.” This demonstrates that WSA has been contacted and is satisfied with the conceptual drainage plan appended to this CDR.</p>

REPORT

Closure

The services provided by Associated Engineering (Sask.) Ltd. in the preparation of this report were conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No other warranty expressed or implied is made.

Respectfully submitted,
Associated Engineering (Sask.) Ltd.

Prepared by:



Mike Pawluski, RPP
Project Planner

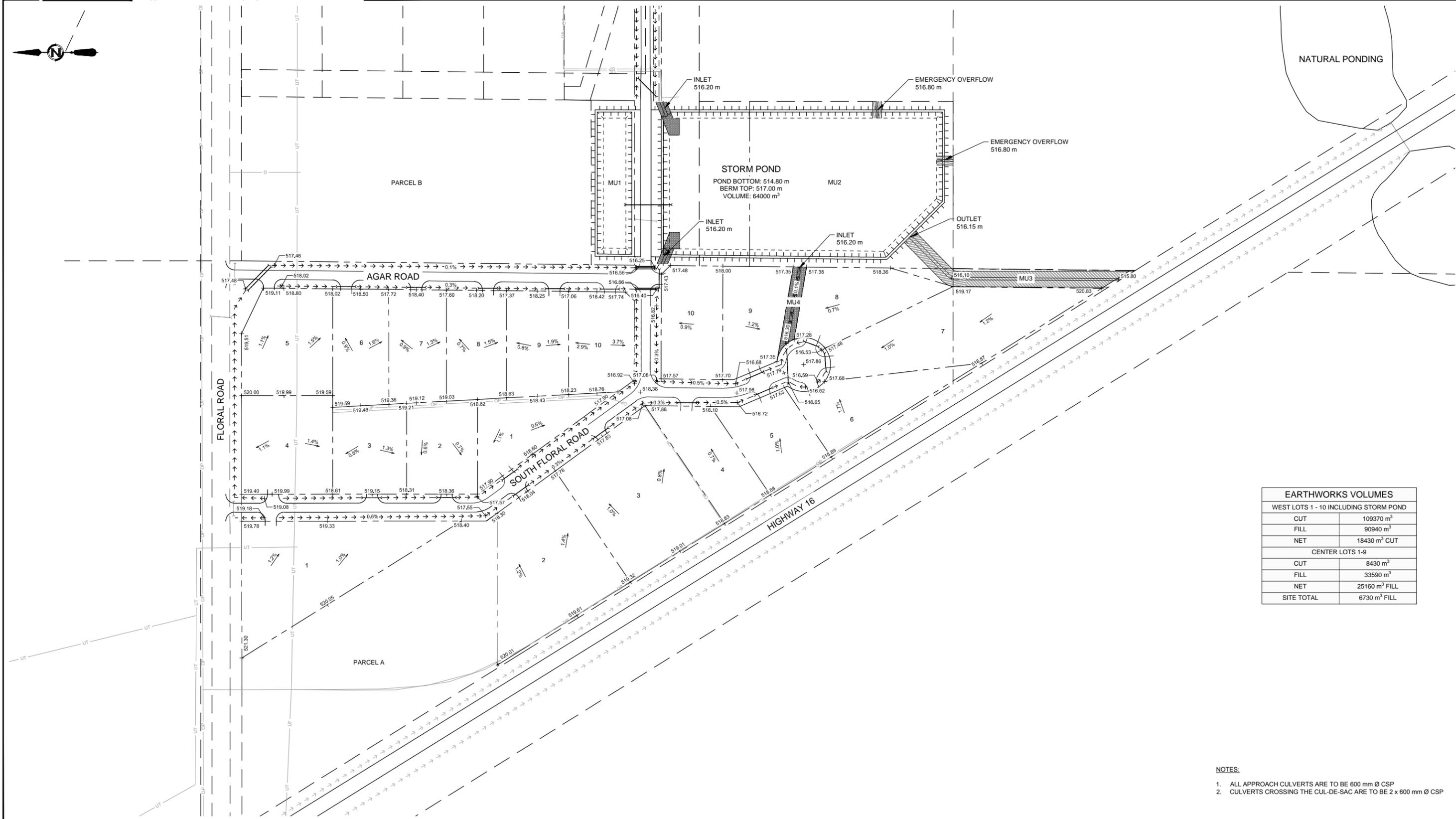
Reviewed by:



Bill Delainey, RPP
Group Manager, Urban Planning

REPORT

Appendix A – Conceptual Drainage Plan



EARTHWORKS VOLUMES	
WEST LOTS 1 - 10 INCLUDING STORM POND	
CUT	109370 m³
FILL	90940 m³
NET	18430 m³ CUT
CENTER LOTS 1-9	
CUT	8430 m³
FILL	33590 m³
NET	25160 m³ FILL
SITE TOTAL	6730 m³ FILL

- NOTES:
- ALL APPROACH CULVERTS ARE TO BE 600 mm Ø CSP
 - CULVERTS CROSSING THE CUL-DE-SAC ARE TO BE 2 x 600 mm Ø CSP

P:\2012\4157\00_E_Floral_Phase_III\Working_Drags\100_Civil\4157-00-C-710.dwg
DATE: 2016-06-27, Reid Syrnko



AE PROJECT No. 20124157-00
SCALE 1:4000
APPROVED D. RINAS
DATE 2016JUN21
REV A
DESCRIPTION ISSUED FOR CONSTRUCTION

FIGURE No. 1
EAST FLORAL INDUSTRIAL PARK
CIVIL DRAINAGE PLAN
SITE GRADING AND STORM POND PLAN
DWG No. 4157-00-C-710

REPORT

Appendix B – Hydrogeological Investigation



PROJECT: **HYDROGEOLOGIC INVESTIGATION
AND ONSITE WASTEWATER DISPOSAL
SYSTEM ASSESSMENT
Portions of NW and SW 1/4-35-35-04-W3
R.M. OF CORMAN PARK, SK**

PREPARED FOR: Colliers International, c/o Graham Cowles





PINTER
& ASSOCIATES LTD

26 October 2012

File Number: 12-1431-2-00J

Colliers International
c/o Graham Cowles
728 Spadina Crescent East
Saskatoon, SK S7K 4H7

Dear Mr. Cowles:

Re: Hydrogeologic Investigation and Onsite Wastewater Disposal System Assessment on a portions of NW and SW 1/4-35-35-04-W3

Please find attached a report of our findings developed from our hydrogeological investigation. We are pleased to have been selected for this project and trust that this report meets your requirements at this time. We look forward to a continued working relationship with you in the successful completion of your residential development.

If you have any questions, concerns or further direction please feel free to contact the undersigned at 244-1710.

Yours Sincerely,
PINTER & Associates Ltd.

Matthew Fleming, E.I.T.
Engineer-in-Training

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**HYDROGEOLOGIC
INVESTIGATION
AND ONSITE WASTEWATER
DISPOSAL SYSTEM
ASSESSMENT
Proposed East Floral Industrial Park
-R.M. of Corman Park, SK**

**Prepared For:
COLLIERS INTERNATIONAL &
EAST FLORAL INDUSTRIAL PARK**

**Prepared By:
PINTER & Associates Ltd.**

**26 October 2012
File: 12-1431-2-00J**

Distribution:
Client. 2 copies
PINTER & Associates Ltd.: 1 copy
PINTER & Associates Ltd.: Original



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EXECUTIVE SUMMARY

This report provides an onsite wastewater disposal system review for a proposed development located primarily on a portion of the northwest quarter of 35-35-04-W3 in the RM of Corman Park, SK. The proposed lot plan for the development shows 13 lots. Of these, eight (8) lots range from 0.87 Ha (2.15 Acres) to 1.14 Ha (2.82 Acres), three (3) lots are approximately 1.7 Ha (4.2 Acres), and the remaining lot is 8.59 Ha (21.23 Acres). The remainder of the property is occupied by two roadways, an ecological reserve of approximately 2.0 Ha (4.96 Acres) and assorted municipal buffers.

Potable water at the development will be provided by SaskWater. Wastewater disposal will be provided for by private onsite wastewater disposal systems. The proponent has indicated their intention to restrict land owners to holding tank systems.

A review of the Saskatchewan Watershed Authority's Water Well Database indicated six (6) existing groundwater wells within 1 km of the proposed development. Four (4) out of the six (6) wells are completed in the range of thirty-two (32) to thirty-seven (37) metres below ground surface. Of the remaining wells, one was completed in the range of 65 m and the other was shallow and over sixty (60) years old.

PINTER & Associates Ltd. carried out a field investigation to identify onsite soil and groundwater characteristics. Soils were primarily clay and clay till, largely unsuitable for onsite wastewater disposal. Groundwater was identified between 1.0 m and 2.5 m below ground surface.

The interpreted direction of groundwater flow is east and south. The hydraulic conductivities identified suggest that wastewater plumes have the potential to migrate a few centimetres per year.

The results of a preliminary nitrate impact assessment indicate that groundwater nitrate concentrations will likely approach or exceed 10 mg/L if the site is fully developed with conventional onsite wastewater disposal systems. However, some onsite wastewater disposal may be feasible on the development at certain lots where surface soil types allow.

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1.0 INTRODUCTION

1.1. BACKGROUND

Mr. Graham Cowles, on behalf of Colliers International (the Client) retained PINTER & Associates Ltd. (PINTER) to carry out a hydrogeological investigation and prepare a report for a proposed industrial subdivision known as the East Floral Industrial Park (the proponent, the Site). The Site consists of a portion of the northwest quarter of 35-35-04-W3 and a small portion of the southwest quarter of 35-35-04-W3 in the R.M. of Corman Park, SK. The parcels are described as Surface Parcel Number 146792964, Parcel A, Plan 101610009 Ext 142 and Surface Parcel Number 146792986, Parcel B, Plan 101640009 Ext 144.

The nearest boundary of the site is located approximately 4.5 km southeast of the City of Saskatoon. The site location is indicated on Figure 1, Appendix A. A more detailed image of the site is included in Figure 2, Appendix A. A proposed plan of subdivision is provided in Figure 3, Appendix A.

Based upon initial information, the site would be categorized as a Medium Density development at an Adequate Location. As such, a Basic Assessment is required by the Saskatoon Health Region. This investigation and report are required by the Community Planning Branch of the Ministry of Municipal Affairs to assess the suitability of proposed subdivisions for onsite wastewater disposal systems. The investigation and report have been prepared in accordance with the guidance document provided by the Saskatoon Health Region (Appendix B), and the Saskatchewan Onsite Wastewater Disposal Guide (2009).

1.2. SCOPE OF WORK

The scope of work proposed by PINTER is provided in Appendix C. A portion of the fieldwork and data collected and provided in this report was shared with an environmental investigation carried out concurrently at the Site by PINTER. The environmental investigation is documented under separate cover, dated 25 October 2012, PINTER file number 1431-1.

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The scope of work was fully completed for this project with the exceptions of well completion depths and water sample collection. Wells were occasionally completed to differing depths in order to determine groundwater characteristics from the identified soil layers. One routine water sample could not be collected due to insufficient availability of groundwater.

1.3. REPORT FORMAT

This report begins with a detailed description of the proposed development. This is followed by a review of available soil and groundwater information and the methods, results and interpretation from a field investigation. The results of the information review and field investigation are combined to develop a conceptual hydrogeologic model for the site. This model is then used as the basis of a preliminary nitrate impact assessment. The results of the desktop investigation, fieldwork and preliminary nitrate impact assessment are used to classify the subdivision as to its suitability for onsite wastewater disposal systems.

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2.0 PROPOSED DEVELOPMENT

2.1. SITE AND VICINITY

The Site is located approximately 4.5 km southeast of the City of Saskatoon along Highway 16. The site is bounded to the west by Highway 16. Figure 1, Appendix A illustrates the site location with respect to the City of Saskatoon. The topography is gently sloping to the east and south. The current land use at the site is farming. Three small distributed areas of near surface groundwater are suggested by a change in vegetation (cattails and reeds). Similar vegetation follows the east boundary of the property. At this location the vegetation begins near a slough containing surface water on the adjoining property and becomes more sparse moving to the north. Interview information with the former land owners indicates that from time to time a stream runs through the property along the east property line.

Adjacent land uses consist of agricultural (farm) land to the north, south and west. Existing and proposed commercial/industrial development is located to the east of the Site. Existing commercial/industrial uses consist of a former fiberglass manufacturer immediately adjacent to the property. Other properties remain to be developed. A commercial/industrial development is underway to the east of the former fiberglass manufacturer which will be connected with the proposed develop presented in this report. A general site plan is included in Figure 2, Appendix A.

2.2. PROPOSED DEVELOPMENT AND SITE PLAN

A copy of the most recent proposed plan of subdivision is included in Figure 3, Appendix A prepared by Webb Surveys. The proposed lot plan for the development shows 13 lots. Eight (8) lots range from 0.87 Ha (2.15 Acres) to 1.14 Ha (2.82 Acres), three (3) lots are approximately 1.7 Ha (4.2 Acres). The remaining lot is 8.59 Ha (21.23 Acres). The remainder of the property is occupied by two roadways and an ecological reserve of approximately 2.0 Ha (4.96 Acres).

It is not currently known what businesses or industries will occupy these lots. The developer has expressed a desire to avoid intensive water users.

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2.3. LOCAL DEVELOPMENT DENSITY CONSIDERATIONS

The site is located in an area currently experiencing low levels of development. Consequently there is limited potential for cumulative impact concerns. Anticipated lot densities are anticipated to be sufficient to allow for appropriate and properly managed onsite wastewater disposal systems, however this is largely dependent upon the type of businesses and number of employees.

2.4. PROPOSED ONSITE SYSTEMS

2.4.1. Potable Water

All potable water will be provided by a SaskWater Pipeline. No groundwater wells are planned or proposed within the development.

2.4.2. Wastewater

Wastewater generated at the development will be stored in onsite holding tanks on each lot. The Proponent anticipates $\pm 9,100$ litres (2,000 gallon) holding tanks at each lot. The tanks will be pumped and the sewage removed for offsite disposal. The proponent has indicated a desire to restrict intensive water users and/or atypical wastewater generators from the development. However, since the future needs of land owners cannot be fully anticipated, an onsite wastewater disposal system review was carried out for this development.

Sewage concentrations are anticipated to be similar to residential sewage at the site. Where industrial or commercial establishments will generate sewage with atypical characteristics, those systems will require specific investigations and specialized design and/or disposal methods.

For the purposes of this report, low population and high population conditions are considered for the development. This approach was taken to determine the anticipated impacts from a variety of potential development scenarios. Estimated populations are discussed in Section 5.1 and resulting wastewater flows are and provided in Table 5. Cumulative impacts are assessed based upon average daily flows.

Based upon the Saskatchewan Onsite Wastewater Disposal Guide a typical commercial/industrial building is expected to generate 50 litres per person per day. It is assumed that these facilities will operate five (5) days per week, fifty-two (52) weeks per year.

CONFIDENTIAL**2.5. SOIL SURVEY REPORTS****2.5.1. Soil Series**

The Saskatchewan Soil Survey (Canada Department of Agriculture, 1974) identifies surface soils at the site as the Bradwell soil series, BR3. These are primarily orthic and partially eluviated dark brown soils of fine loam to very fine sandy loam.

The terrain is described as shallow lacustrine plain with knoll and depression patterns. Topography is very gently sloping to gently undulating.

2.5.2. Permeability and Drainage

The Saskatchewan Soil Survey Report does not provide direct comment on the permeability and drainage conditions of the soil units; however, significant inferences can be made from the available information.

According to the soil survey reports, Bradwell soils cover the entire proposed subdivision area. These loam to sandy loam soils would be expected to have moderate to low hydraulic conductivities (permeability) permitting limited movement of groundwater throughout and across the site.

2.5.3. Suitability for Onsite Systems Based Upon Soil Survey Reports

The Saskatchewan Soil Survey report indicates that soils at the site should be acceptable for onsite wastewater disposal.

2.6. WATER WELL SEARCH

A search of the Saskatchewan Watershed Authority's (SWA) Water Well Database identified six (6) residential groundwater wells within 1 km of the proposed development. These wells are identified in Table 1 below. Search reports are included in Appendix D.

TABLE 1: SWA Water Well Database Search

Land Description	Year Completed	Use	Bottom m (ft)	Water Level m (ft)
Domestic				
NE 34 35 04 W3	1981	Withdrawal	32.0 (105)	NR
NE 35 35 04 W3	1964	Withdrawal	37.2 (122)	5.5 (18)
SE 35 35 04 W3	1935	Withdrawal	35.4 (116)	3.0 (10)
SE 35 35 04 W3	1997	Withdrawal	35.1 (115)	4.6 (15)
SW 02 36 04 W3	1950	Withdrawal	6.7 (22)	6.1 (20)
SW 02 36 04 W3	1988	Withdrawal	67.7 (222)	5.8 (19)

NR – Not Recorded

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Four (4) of the wells are completed between 32.0 m and 37.2 m below ground surface. One well is completed 6.7 m below ground surface. It is noted that this well was installed in 1950. The remaining well is completed 67.7 m below ground surface.

SaskWater operates a rural water pipeline in this area. It is not known how many residents have discontinued the use of their wells in favour of SaskWater supplied water. The Proponent has indicated that all occupants/land use at the proposed development will be required to connect to a SaskWater supplied distribution line. Consequently, no groundwater wells will be installed at the Site.

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3.0 FIELD INVESTIGATION

PINTER carried out a physical site investigation to confirm soil and groundwater conditions at the site. The investigation consisted of six (6) test holes and five (5) groundwater monitoring wells. Advantage Probe and Injection Corporation (APIC) provided the necessary personnel, equipment and materials required for the advancement of the test holes. PINTER provided personnel for data collection and subsequent interpretation.

3.1. METHODS

3.1.1. Underground Utility Locates

Underground utility locates were requested from all utility companies via Sask First Call or direct communication where appropriate. In addition to Sask First Call cooperating companies, locates were requested from SaskWater. Locates were completed prior to PINTER's arrival on site.

3.1.2. Equipment

Advantage Probe & Injection Corp. provided a truck-mounted direct push rig equipped with a Macro-Core® barrel sampler. The Macro-Core® system uses a direct push hammer to advance the barrel in 1.5 m (5 foot) increments. As the barrel is advanced, the open end permits soil to enter, where it is captured and withdrawn from the hole for sampling and visual identification.

3.1.3. Laboratory Analysis

Relatively undisturbed soil samples were recovered from cores from each test hole at 0.75 m metre intervals below ground surface. Selected soil samples were submitted for laboratory analysis. Water content and particle size analyses were performed on selected soil samples. Test hole logs were developed and are provided in Appendix E. These logs contain laboratory analysis results at corresponding sample depths.

Groundwater samples were collected and preserved as required for laboratory analysis. The samples were stored on ice in the field and refrigerated until they could be delivered to the lab. Samples were collected according to the procedures for routine, selected

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nutrient and bacteriological analysis. Field readings of pH, electrical conductivity, and dissolved oxygen were taken at the time of sampling.

ALS Laboratory Group, Saskatoon SK, provided laboratory analysis for the particle size, moisture content and water quality analyses. Documentation of the investigation and interpretation of data in this report were provided by PINTER.

3.1.4. Completion of Test Holes

Where monitoring wells were installed, the test hole was bored out to 82.5 mm (3.25 inches). A sand pack of 10/20 frac sand was provided from the bottom of the screen to 0.3 m above the top of the screen. The remaining depth was backfilled to surface with bentonite.

Test holes were backfilled to surface with bentonite where monitoring wells were not installed.

3.1.5. Site Survey

An engineering site survey was carried out 27 September 2012. The survey was carried out using a Sokkia GRS2700 ISX GPS system in RTK mode. The location of the base station was determined using the GPS system.

The site survey was carried out to record the monitoring well elevations and pertinent site information to prepare site drawings. This was not a legal survey.

A topographic survey was carried out by others and provided by the client. A copy of the topographic contours generated from this survey is provided in drawing 4457-SK102 in Appendix A.

3.2. RESULTS AND DISCUSSION

3.2.1. Site Survey

Topographic contours provided by the client are shown on drawing 4457-SK102. This information indicates approximately a 5 m change in elevation from the high point to the low point. The ground surface slopes gently from the high point near the northwest corner of the property to the low point near the southeast corner of the property. The steepest slopes at the property are approximately 2.5%.

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3.2.2. Test Holes

For the purposes of the hydrogeologic investigation, six (6) test holes were cored and sampled and four (4) monitoring wells were installed to varying depths across the site.

Test holes were completed as follows:

- Two (2) test holes were cored to 3 m,
- Two (2) test holes were cored to 6 m, and
- Two (2) test holes were cored to 9 m.

Monitoring wells were installed as follows:

- Two (2) monitoring wells were completed to 3 m,
- One (1) monitoring well was completed to 4.5 m,
- One (1) monitoring well was completed to 9 m.

The test hole program was carried out on 27 September 2012. Test hole and monitoring well locations are shown in, Figure 4, Appendix A. Test holes were distributed across the site to the extent possible while supporting the combined preliminary geotechnical/hydrogeological and environmental field scope of work.

3.2.3. Laboratory Analysis Results

For the purposes of the onsite wastewater review, particle size analysis was performed on soil samples retrieved from two (2) depths from each of four (4) the test holes on site. Water content analyses were carried out on each sample. The results of laboratory testing are included on the test hole logs provided in Appendix E. Additional laboratory testing was carried out for geotechnical purposes and is included in the borehole logs and laboratory reports. Laboratory data are summarized in Table 2. A copy of the laboratory analysis report is included in Appendix F. The results indicated primarily clay and silty clay soils. Silt and clay contents varied from approximately 45% to 90%.

One (1) exception was noted in test hole 12-7. Loam soil was identified at this location. The loam soil was also identified by visual logging near the surface in test holes 12-6 and 12-8.

CONFIDENTIAL**TABLE 2: Laboratory Results - Soil**

Test Hole	Depth	Sand	Silt	Clay	Texture	Water Content
	(m)	(%)	(%)	(%)		(g/g)
12-6	1.5	6.2	2.9	90.9	Clay	24.7
12-6	2.25	7.0	2.9	90.1	Clay	26.9
12-7	0.75	35.5	43.9	20.6	Loam	18.3
12-7	1.5	9.1	2.0	88.9	Clay	26.1
12-8	0.75	13.6	42.6	44.1	Silty Clay	20.9
12-8	1.5	0	55.0	44.0	Silty Clay	23.8
12-8	2.25	11.9	40.5	47.6	Silty Clay	26.3
12-9	0.75	12.2	45.4	42.4	Silty Clay	19.1
12-9	1.5	7.0	41.0	52.0	Silty Clay	21.6

3.2.4. Stratigraphy

Site stratigraphy at higher topographic locations consisted of 0.0 m to 0.4 m of clay topsoil over 0.5 m to 1.0 m of loam soils. Below the loam soils was high plasticity clay identified throughout the site. In areas of low topography, this clay soil formed the topsoil and/or uppermost layer. The observed clay layer ranged from just under 1 m to just over 5 m in thickness. Below the high plasticity clay was high plasticity clay till. The two deep test holes at the site indicated medium plasticity sandy clay till soil below the high plasticity clay till. Detailed test hole logs are provided in Appendix E. Two schematic cross sections are also included in Appendix E for further illustration. Clay and Silty Clay soils are considered not suitable for a disposal field. However, in some cases, sufficient loam soils may be present for the development of onsite wastewater disposal leach fields.

Gravimetric water content in the predominantly clayey soils of the top 3 m ranged from 18.3 % to 26.9 % on a dry weight basis. These water contents indicate moist soil conditions for this type of soil.

CONFIDENTIAL**3.2.5. Groundwater Monitoring**

Groundwater monitoring was carried out 11 October 2012. The depth to groundwater was determined and water samples were collected using a bailer. Water samples were collected from test holes 12-3, 12-6, 12-7, and 12-8.

Information regarding the ground water table at the site is provided in Table 3. Groundwater elevation contours were developed and are presented in Figure 5, Appendix A. Pertinent water quality parameters are included in Table 4. Additional water quality information can be found in the laboratory reports included in Appendix F.

Table 3 includes data gathered from monitoring well 12-1 which was part of the environmental investigation.

TABLE 3: Groundwater Elevation Results – 11 October 2012

Well	Ground Elevation	Depth of Water Below Ground Surface	Elevation of Water Table
	(m WGS84*)	(m)	(m WGS84*)
12-1	494.31	1.09	493.23
12-3	494.35	1.78	492.57
12-6	497.97	2.44	495.53
12-7	496.16	1.90	494.26
12-8	493.48	1.79	491.69

The water table information suggests a near surface water table ranging from about 1.0 m to more than 2.4 m below ground surface.

Groundwater samples were analyzed for routine parameters including ammonia-nitrogen, nitrate-nitrogen and bacteriological parameters. The full suite of analyses was carried out on water samples from 12-3 and 12-6. The full suite could not be completed on water samples from 12-8 due to the limited availability of water during sampling. Full laboratory analysis reports are included in Appendix F.

Of particular interest to this investigation, dissolved oxygen readings indicated aerobic conditions across the site. Minimal ammonia and nitrate-nitrogen were identified in all water samples. Bacteriological analyses indicate a very active system of heterotrophs

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and coliforms. Two (2) samples, were found to contain E.Coli above detection limits. It is likely that this e-coli results from natural processes and/or the application of fertilizer.

The Groundwater Quality parameters suggest that near surface groundwater is of moderate suitability for human consumption, having relatively high sulphate concentrations. It is noted that groundwater will not be used to provide potable water for the development.

TABLE 4: Groundwater Quality Results

Parameter	Units	12-3	12-6	12-8
Field Readings				
Dissolved Oxygen	mg/L	6.75	18.2	11.6
Conductivity	mS/cm	3.78	6.82	1.69
Ferrous Iron	mg/L	0.5	0.0	0.0
Laboratory Results				
TDS	mg/L	4,240	6,670	--
Hardness (as CaCO₃)	mg/L	2,580	4,500	--
Ammonia-N	mg/L	0.25	0.78	0.20
Chloride	mg/L	872	2,350	--
Nitrate-N	mg/L	<0.50	1.70	<0.50
Sulphate	mg/L	1,810	2,010	--
E. Coli	CFU/ 100 mL	1	<1	6
Total Coliforms	CFU/ 100 mL	Overgrown	106	Over- grown
Heterotrophic Plate Count	CFU/mL	>3,000	>3,000	>3,000

CFU = colony forming units

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3.2.6. Hydraulic Conductivity Testing

Groundwater monitoring included follow up readings to develop hydraulic conductivity estimates for the site. Hydraulic conductivities were determined using the bail method and Hvorslev analyses. Hydraulic conductivity test reports are included in Appendix G.

Interpreted hydraulic conductivities were 1.0×10^{-7} m/s, 5.3×10^{-7} m/s, and 1.9×10^{-7} m/s at 12-6, 12-7 and 12-8 respectively. Test hole 12-6 was completed in the hard clay till. Test hole 12-7 was completed part in hard till and part in the firm clay. Test hole 12-8 was completed entirely in the firm clay.

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4.0 CONCEPTUAL HYDROGEOLOGIC MODEL

4.1. SITE INFORMATION

The Site is located approximately 4.5 km southeast of Saskatoon, SK adjoining Highway 16. Topography is gently sloping from the northwest to the southeast of the property as illustrated on drawing 4457-SK102.

The top of the observed groundwater surface was used to generate potentiometric contours at the site. Groundwater elevation contours are presented in Figure 5, Appendix A. The contours indicate that surficial groundwater flows to the southeast, toward the slough on adjoining property. Groundwater observed in the monitoring wells was generally aerobic.

Hydraulic conductivity testing indicates similar hydraulic conductivities in the clay and clay till soils. Consequently, near surface groundwater would be expected to migrate as if in relatively homogeneous soil.

4.2. CONCEPTUAL HYDROGEOLOGIC MODEL

The conceptual hydrogeologic model applied to this site consists of a relatively thin layer of loam soils overlying clay and silty clay (till) soils. The ground surface and groundwater table slope gently to the east and slightly south.

The depth to the water table ranges from 1.0 m to 2.5 m below ground surface. The saturated hydraulic conductivity of the clay and clay till soils is assumed to be 2.0×10^{-7} m/s. The vertical hydraulic gradient was not determined at the site. The horizontal gradient is calculated to be 6.6×10^{-3} m/m as indicated on the groundwater surface contours.

4.3. ESTIMATED PLUME MIGRATION

Based upon this model, the migration of waste water plumes is anticipated to be primarily downward, with some variable component of horizontal migration to the east and slightly south.

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Wastewater plumes that reach the groundwater table would be expected to migrate horizontally at approximately 0.04 m/yr. This suggests that the bulk of infiltrating groundwater migrates vertically to deeper aquifers.

At these velocities, offsite migration of the contaminant plumes is not anticipated.

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5.0 PRELIMINARY NITRATE IMPACT ASSESSMENT

5.1. PRELIMINARY NITRATE IMPACT ASSESSMENT METHOD

A comprehensive simple mass balance model is used in this assessment to predict the long-term impact to groundwater from the proposed onsite wastewater disposal system. It is a general mass balance approach, which builds on the principle of conservation of mass, i.e. in steady state equilibrium the mass of nitrate entering the groundwater system equals the mass of nitrate leaving the groundwater system.

Although many factors may contribute to the violation of this assumption, the model provides a conservative estimate of nitrate impact based on that assumption. The Wehrmann Nitrate Model provided by the Wyoming Department of Environmental Protection (2003) is used as the mass balance tool. The model considers all sources of nitrates and water entering and exiting the groundwater system, such as infiltrating rainwater, onsite wastewater disposal, background groundwater, soil, bedrock, storm water runoff, groundwater flow and water well withdrawal. Other assumptions include:

- All nitrogen leaving the onsite wastewater disposal system is completely converted to nitrates before the plume reaches groundwater,
- Dilution primarily accounts for the reduction in nitrate concentration, without the consideration of dispersion, diffusion or adsorption, and de-nitrification,
- Dilution occurs as a direct result of rainwater infiltrating across the entire development area considered,
- Uniform and complete mixing of the wastewater with infiltrating rainwater and up-gradient groundwater where appropriate,
- Complete mixing between wastewater and recharge water occurs within the near surface ground water table.

The model was used to provide an approximation of the general impact rather than provide an accurate estimate at a particular location down-gradient of the wastewater disposal systems. This is a useful approach for estimating long term impacts under steady-state conditions. The utility of the model increases with the area of the study site.

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Two design scenarios were considered to assess the impact of onsite wastewater disposal systems. The design scenarios were based upon the proposed plan of subdivision and three conditions of assumed occupancy. Assumed occupancies were 10, 25 and 40 employees per lot. Two scenarios were considered to assess overall impacts from the subdivision. The low occupancy scenario is based upon half of the lots containing 10 employees per lot and the remainder at 25 employees per lot. The high occupancy scenario is based upon half of the lots containing 25 employees per lot and the other half containing 40 employees per lot.

Disposal systems are assessed on the basis of each lot size and the entire subdivision. Wastewater flows are determined based upon 50 litres per employee per day as given in the Saskatchewan Onsite Wastewater Disposal Guide. Table 5 illustrates the anticipated number of employees and anticipated wastewater flows for each of the scenarios analyzed.

TABLE 5: Wastewater Flow Scenarios

Wastewater Design Flow	Number of Employees (wastewater flow volumes)		
	Design Case (Area / acres)	Low Occupancy (litres per day)	Intermediate Occupancy (litres per day)
Small Lot (2.2 ac)	10 (355)	25 (890)	40 (1,425)
Medium Lot (4.2 ac)	10 (355)	25 (890)	40 (1,425)
Large Lot (21.2 ac)	10 (355)	25 (890)	40 (1,425)
Subdivision (73 ac)	½ 10 per lot; ½ 25 per lot (16,205)	--	½ 25 per lot; ½ 40 per lot (30,095)

5.2. MODEL DESCRIPTION

A preliminary nitrate impact assessment was carried out for the site using the Wehrmann Nitrate Model provided by the Wyoming Department of Environmental Protection (2003). The Wehrmann model is a mass balance model that considers the potential sources and volumes of water and the sources and mass of nitrate entering the near surface groundwater (Taylor, 2003). Mass balance models are not intended to predict local impacts associated with a particular system at a particular point in time, but instead provide an average approximation of long term, steady state conditions. The accuracy

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and applicability of this model is much greater for large scale considerations (ie. the development) as opposed to an individual lot. (Taylor, 2003). The model is given by the following equation:

$$C_o = \frac{V_i C_i + V_s C_s + V_b C_b + V_p C_p}{(V_i + V_s + V_b + V_p)}$$

Where:

- Co = nitrate concentration of groundwater after onsite system construction
- Vi = volume of infiltrating water
- Ci = nitrate concentration of infiltrating groundwater
- Vs = volume of sewage generated
- Cs = nitrate concentration of sewage
- Vb = volume of ambient subdivision water
- Cb = nitrate concentration of ambient subdivision water
- Vp = volume of water pumped from receiving aquifer
- Cp = nitrate concentration of water pumped from receiving aquifer.

The Wehrmann Nitrate Model estimates an average groundwater nitrate concentration based upon the volume and nitrate concentration of infiltrating precipitation and infiltrating wastewater. Lateral groundwater flow was not considered in the model in accordance with the Saskatchewan Onsite Wastewater Disposal Guide. Lateral groundwater flow is minimal in most Canadian Prairie settings (van der Kamp and Hayashi, 1998). Attenuation or denitrification were not considered in the model as these influences are often minimal and are difficult to quantify. There is potential for denitrification due to the low oxygen content of some groundwater identified at the Site. Neglecting these influences is considered conservative.

Other input parameters were as follows:

- Vi = 60 mm/year. This value is based upon studies of regional aquifers on the prairies carried out by van der Kamp and Hayashi (1998) and Fang et al. (2007) which suggest infiltration rates to deep groundwater of 5 to 45 mm/year and approximately 60 mm/year respectively. 60 mm was selected because the topography and geology closely match the conditions identified in Fang et al.
- Ci = 0 mg/L assumed for rainwater and snowmelt.

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V_s = as given in Table 5.

C_s = 40 mg/L as given by the Saskatchewan Onsite Wastewater Disposal Guide or 20 mg/L as a design alternative if package treatment plants are used.

V_b = 0 L/day. Little or no horizontal groundwater movement is anticipated at this location due to soil conditions and topography.

C_b = 0 mg/L, as per V_b .

V_p = 0 L/day. No groundwater wells were identified whose radius of influence would be affected by the proposed subdivision.

C_p = 0 mg/L, as per V_p above.

For example, considering the entire development at the anticipated flow rate of 16,205 litres/day, the model calculation is as follows:

$$10.0 = \frac{(48,620)(0) + (16,205)(40) + (0)(0) + (0)(0)}{(48,620 + 16,205 + 0 + 0)}$$

5.3. RESULTS

The results of nitrate impact modelling are included in Table 6 below. The results are based on office environment situations. A criterion of 10 mg/L was selected for groundwater nitrate-N concentrations in accordance with the Canadian Drinking Water Quality Guidelines.

TABLE 6: Preliminary Nitrate Model Results

Wastewater Design Flow	Anticipated Groundwater Nitrate-Nitrogen (mg/L)		
	Low Occupancy	Intermediate Occupancy	High Occupancy
Design Case (Area acres)			
Small Lot (2.2 ac)	7.9	15.1	19.7
Medium Lot (4.2 ac)	4.6	9.7	13.5
Large Lot (21.2 ac)	1.0	2.4	3.7
Subdivision (73 ac)	10.0	--	15.3

Based upon the Wehrmann model and assumed occupancy at the development, groundwater below the subdivision would be expected to approach 10.0 mg/L nitrate-N under an assumed low occupancy model to 15.3 mg/L nitrate-N over the long term if wastewater concentrations are 40 mg/L. However, consideration on a lot by lot basis is

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significant at this development because it consists of widely variable lot sizes and relatively unpredictable future occupancy.

Nitrate modelling suggests that the relatively small lots at the development (in the range of 2.2 acres) could support onsite septic systems up to approximately twelve (12) occupants. Similarly, the medium-sized lots (approximately 4.2 acres) support onsite septic systems up to twenty-five (25) occupants. These concentrations could be reduced if package treatment plants are installed at the Site.

5.4. DISCUSSION AND CONCLUSIONS

Anticipated groundwater nitrate-nitrogen concentrations could be expected to approach and likely exceed the regulatory limit of 10 mg/L if the Site is fully developed at a reasonable low occupancy using conventional onsite wastewater disposal systems. Some development using onsite wastewater systems could be allowed, provided that not every lot is developed with onsite disposal.

The proponent intends to restrict future land owners to holding tank systems. Holding tanks can be installed to suit any capacity or density requirements as indicated in the Saskatchewan Onsite Wastewater Disposal Guide.

There are no direct regulations regarding setback distances between holding tanks and groundwater. However, high groundwater may limit site selection for the installation of holding tanks, particularly in the vicinity of test hole 12-1.

5.5. SITE SUITABILITY CLASSIFICATION

Based upon the results of the PINTER investigation and modelling, the site is considered to be of limited suitability for onsite wastewater disposal systems. Small sized lots could support onsite wastewater disposal if the site occupancy is less than 12, medium sized lots to occupancy less than 25. However, as indicated above, holding tanks are the preferred option of the proponent and can be installed at any required density.

If onsite wastewater disposal is considered for any of the lots, a detailed site investigation will be required to determine the depth to any limiting clay layer. Where limiting clay or silty clays are encountered, a percolation test will be required as per the Saskatchewan Onsite Wastewater Disposal Guide. Suitable systems should be limited to Type II Mounds to achieve adequate infiltration.

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If any subsequent investigation reveals site specific information that disqualifies a system identified as allowable for that lot, the system should be disqualified.

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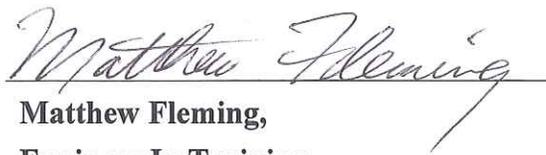
LIMITATIONS

The findings and recommendations provided in this report were prepared in accordance with generally accepted professional engineering principles and practices. No warranty, expressed or implied, is given concerning specific onsite wastewater disposal systems designed and installed at the Subject Property. The results and findings of this report are based on a review of existing information, the results of field observations and laboratory analysis. Interpolation of soil and groundwater conditions has been made between test hole locations. Conditions may differ from those detailed by the test holes drilled onsite and described in this report.

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PINTER & Associates Ltd.



**Matthew Fleming,
Engineer In Training
Junior Engineer**

Date: 26 October 2012



**Lawrence Pinter, P.Eng.
Senior Engineer**

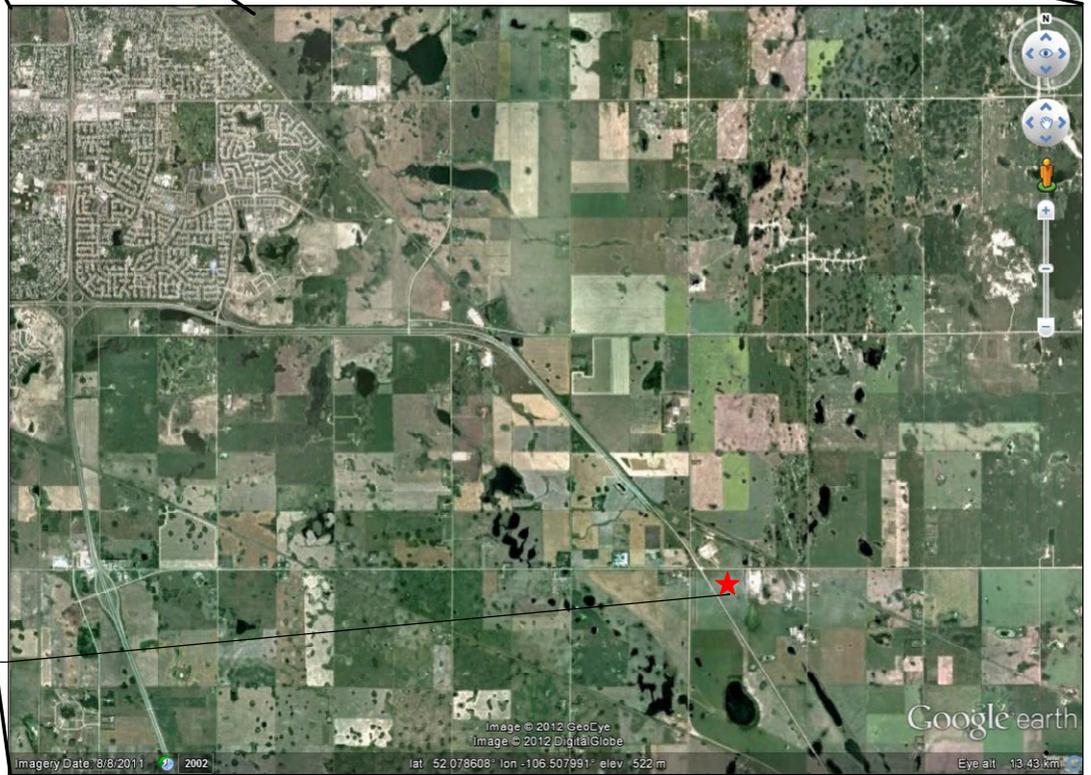
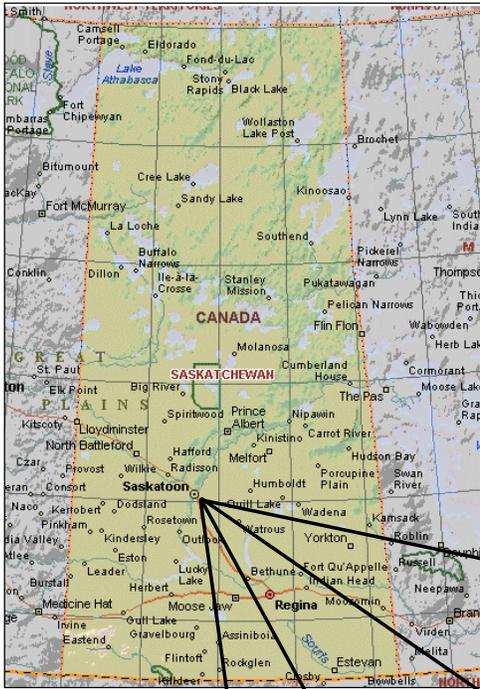


Association of Professional Engineers & Geoscientists of Saskatchewan		
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Discipline	Sk. Reg. No.	Signature
Environmental	6565	
Geotechnical	6565	

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APPENDIX A

FIGURES



SUBJECT PROPERTY

*Reference: Map details from "Google Maps 2011"



710A-48TH STREET EAST
SASKATOON SK S7K 5B4
306.244.1710
pintermain@pinter.ca

LEGEND

Subject Property ★



DRAWING TITLE

**FIGURE 1
SITE LOCATION**

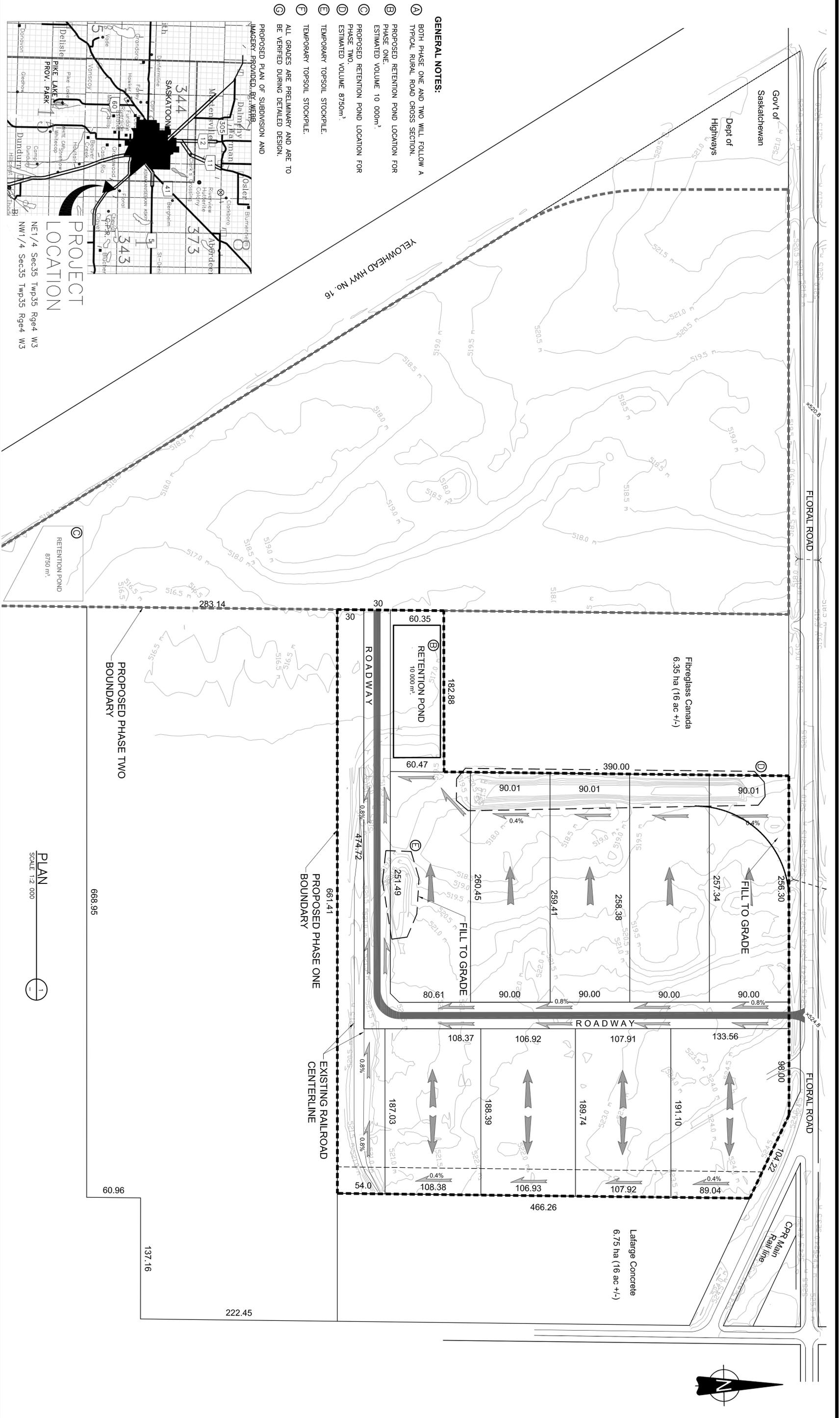
DATE: 16 OCTOBER 2012
FILENAME: 12-1431-2 RM CORMAN PARK, SK

DRAWN BY: M. FLEMING, E.I.T.

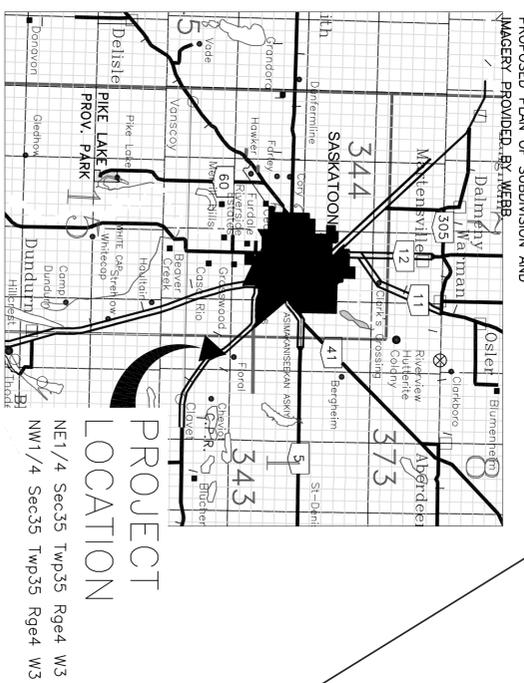
CHECKED BY: L. PINTER, P.ENG.

SCALE: N/A

FILE: H:\PROJECTS\1431 EAST FLORAL PHS I ESA
1431-2 EAST FLORAL GEOTECH\1431-2 DRAWINGS



- GENERAL NOTES:**
- A BOTH PHASE ONE AND TWO WILL FOLLOW A TYPICAL RURAL ROAD CROSS SECTION.
 - B PROPOSED RETENTION POND LOCATION FOR PHASE ONE. ESTIMATED VOLUME 10 000m³.
 - C PROPOSED RETENTION POND LOCATION FOR PHASE TWO. ESTIMATED VOLUME 8750m³.
 - D TEMPORARY TOPSOIL STOCKPILE.
 - E TEMPORARY TOPSOIL STOCKPILE.
 - F ALL GRADES ARE PRELIMINARY AND ARE TO BE VERIFIED DURING DETAILED DESIGN.
 - G



VERIFY SCALES
 BAR IS 20mm ON ORIGINAL DRAWING
 IF NOT 20mm ON THIS SHEET, USE SCALES ACCORDINGLY

PRELIMINARY
 NOT FOR CONSTRUCTION

PROJECT No.	20084457
SCALE	1:2000
DRAWN	T. ISTEAD
DESIGNED	T. ISTEAD
CHECKED	D. THOMSON
APPROVED	D. RIVAS
DATE	FEBRUARY 2009

EAST FLORAL INDUSTRIAL PARK LTD.
 CIVIL
 OVERALL CONTOUR PLAN
 DRAINAGE CONCEPT

EAST FLORAL INDUSTRIAL PARK COMMERCIAL DEVELOPMENT
 DRAWING NUMBER
 4457-SK102

NO.	DATE	ENG.	BY	SUBJECT
A	2009/02/09	DR.	T.F.L.	ISSUED FOR PRECISION REPORT

REVISIONS

NOT FOR CONSTRUCTION



PROJECT No.	20084457
SCALE	1:2000
DRAWN	T. ISTEAD
DESIGNED	T. ISTEAD
CHECKED	D. THOMSON
APPROVED	D. RIVAS
DATE	FEBRUARY 2009

EAST FLORAL INDUSTRIAL PARK LTD.
 CIVIL
 OVERALL CONTOUR PLAN
 DRAINAGE CONCEPT

EAST FLORAL INDUSTRIAL PARK COMMERCIAL DEVELOPMENT
 DRAWING NUMBER
 4457-SK102

REV. NO.	A	SHEET	2
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710A 48TH ST. E.
SASKATOON SK S7K 5B4
306.244.1710
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NOTES:

1. THIS DRAWING IS PREPARED FOR ILLUSTRATIVE PURPOSES ONLY.
2. THIS IS NOT A LEGAL SURVEY.
3. ALL MEASUREMENTS ARE IN METRES.
4. SURVEY INFORMATION COLLECTED BY RTK GPS. BASE STATION LOCATION DETERMINED BY GPS SYSTEM USING WGS '84 GEOID IN UTM COORDINATES.

LEGEND

TEST HOLE		GAS		SEWER	
MONITORING WELL		POWER		STORM SEWER	
CATTAILS		PHONE		POWER POLE	
IRON PIN		WATER		PROPERTY LINE (APPROX.)	



SCALE 1: 6500 (APPROXIMATE)

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FIGURE 2
PROPOSED DEVELOPMENT

16 OCTOBER 2012
12-1431-2 RM CORMAN PARK

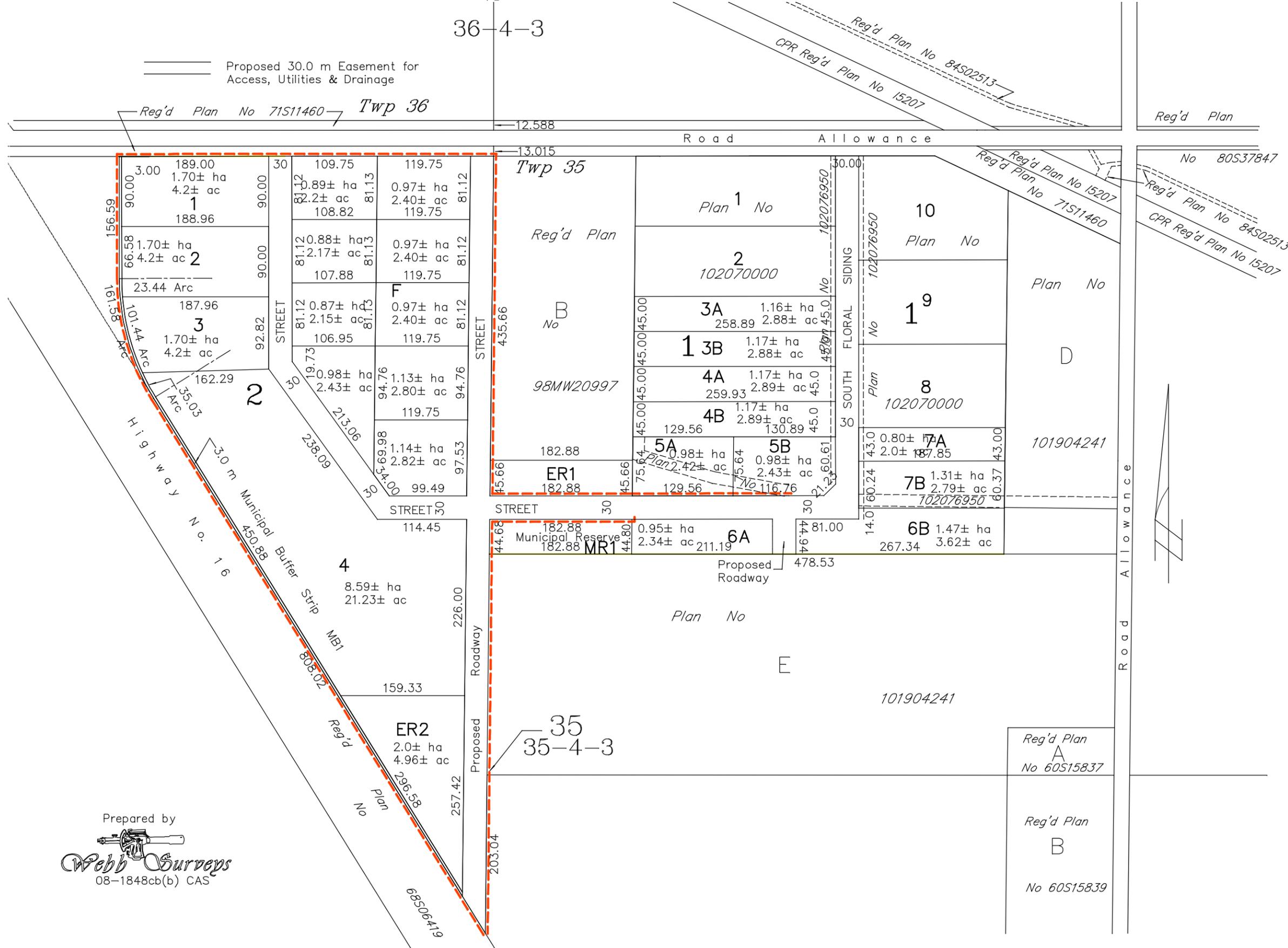
DRAWN BY: M. FLEMING, E.I.T.

CHECKED BY: L. PINTER, P.ENG.

Proposed 30.0 m Easement for Access, Utilities & Drainage

Reg'd Plan No 71S11460 Twp 36

36-4-3



Prepared by

Webb Surveys
 08-1848cb(b) CAS



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LEGEND

TEST HOLE		GAS		SEWER	
MONITORING WELL		POWER		STORM SEWER	
CATTAILS		PHONE		POWER POLE	
IRON PIN		WATER		PROPERTY LINE (APPROX.)	



SCALE 1: 6500 (APPROXIMATE)

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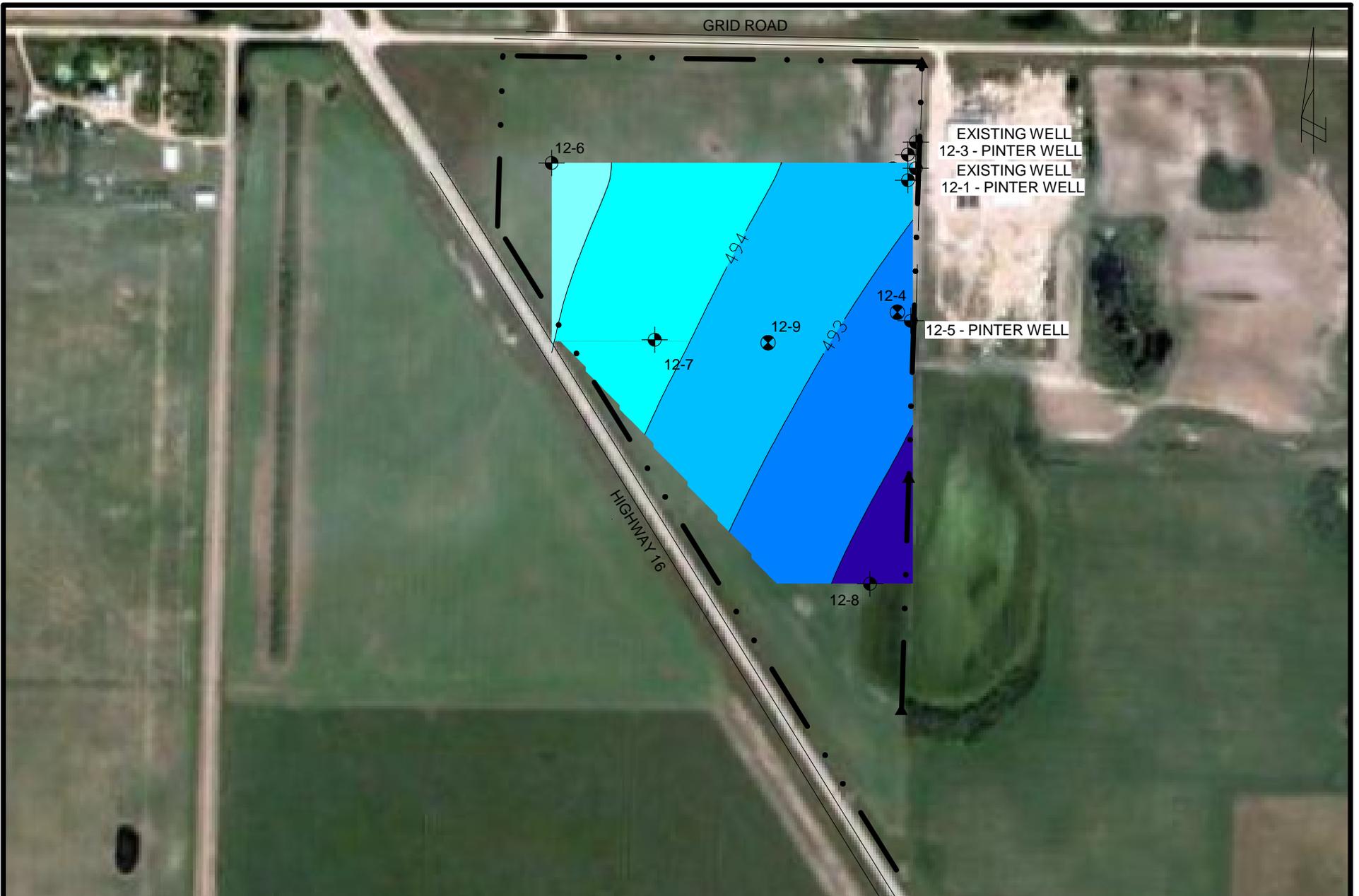
FIGURE 4

TEST HOLE LOCATIONS

16 OCTOBER 2012
12-1431-2 RM CORMAN PARK

DRAWN BY: M. FLEMING, E.I.T.

CHECKED BY: L. PINTER, P.ENG.



EXISTING WELL
12-3 - PINTER WELL
EXISTING WELL
12-1 - PINTER WELL

12-5 - PINTER WELL

NOTES:

1. THIS DRAWING IS PREPARED FOR ILLUSTRATIVE PURPOSES ONLY.
2. THIS IS NOT A LEGAL SURVEY.
3. ALL MEASUREMENTS ARE IN METRES.
4. SURVEY INFORMATION COLLECTED BY RTK GPS. BASE STATION LOCATION DETERMINED BY GPS SYSTEM USING WGS '84 GEOID IN UTM COORDINATES.

LEGEND

TEST HOLE		GAS		SEWER	
MONITORING WELL		POWER		STORM SEWER	
CATTAILS		PHONE		POWER POLE	
IRON PIN		WATER		PROPERTY LINE (APPROX.)	



SCALE 1: 6500 (APPROXIMATE)

FILE: H:\PROJECTS\1431-2\DRAWINGS

FIGURE 5
WATER TABLE ELEVATION
16 OCTOBER 2012
12-1431-2 RM CORMAN PARK
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APPENDIX B

GUIDANCE DOCUMENT

Appendix B – Subdivision Study Summary Requirements

These requirements are to be used until such time as the process as defined in On-Site Wastewater Treatment Systems in Subdivisions” (Froese et al, 2009) is adopted.

Basic Assessment

The program should include:

- An inventory of water supply wells within 1.0 kms of the proposed development. This should also include all springs and dugouts that access shallow ground water. The results should also determine the number of down gradient wells within 1.0 kms that could be potentially impacted by the proposed development.
- An investigation to determine surficial geological and hydrogeologic conditions using test pits and shallow boreholes. A representative number (minimum of three) of test pits to a minimum of three meters of depth are necessary for each development. Where this amount of test pits will not result in a representative determination of site geological and hydrogeological conditions, additional test pits are required. Justification for the number of test pits selected must be included in the final report. Proponents and contractors should ensure that all Occupational Health and Safety requirements for excavations are met.
- A field survey using monitoring wells should also be conducted, where appropriate, to determine the gradient of the water table.
- A number (minimum of three) of representative grab soil samples should be analyzed in the laboratory to determine the grain size distribution. The report should justify the number of samples as sufficient to determine representative conditions.
- Where a water table is present, selected standpipes should be fully developed prior to sampling. A number of representative groundwater samples should be collected for analysis of samples for major ions, health & toxicity analysis including nitrate, total coliforms, E.Coli. and plate count, dissolved oxygen, and reduced iron. The consultant/proponent should be prepared to support the number of samples taken and location of standpipes as representative.

The following information as well as related interpretations, conclusions and recommendations must be included in the assessment. In general, these conclusions and recommendations should be related to the suitability of each proposed lot and the overall subdivision for onsite wastewater treatment and disposal. Specifically, conclusions and recommendations with respect to site restrictions, alternative design criteria, treatment potential, impact of treated effluent, mounding concerns, and other technical issues/topics related to onsite wastewater treatment and disposal should be made. It is expected that these conclusions be based on current scientific knowledge and properly referenced in the report.

(1) Site drawing(s) of the proposed subdivision

The following information should be included:

- The subdivision area showing lot boundaries

- Location of springs, dugouts or wells accessing shallow groundwater providing water for domestic purposes within 1 km of the proposed subdivision
- Location of the proposed systems and, if proposed, any reserve areas
- Soil series included in the subdivision as identified by available soils data
- Location of test pits and bore holes and percolation test holes
- Topography contour lines at 1.5 meter intervals based on site survey results
- Existing or planned drainage courses
- Measurements to pertinent features that require separation distances (For example: property lines, wells or proposed wells, surface water, existing or proposed buildings, right of ways and other encumbrances that affect system siting)

(2) Density

The proponent should identify the number of parcels on the quarter section and surrounding quarters.

The proponent should comment on the potential for cumulative impact concerns. Detailed calculations are not required.

(3) Set-out type of onsite system(s) proposed

The following information should be in the report:

- Describe the proposed land use and type of development expected
- Estimate the anticipated or typical sewage volumes used in assessment considerations
- Propose the type of on-site systems
- Estimate the dimensions of land area required for the on-site systems at the anticipated volume

(4) Consider information available in soil survey reports

The following information should be in the report:

- Determine the predominant soil series or mapping unit of the subdivision area as well as any significant minor soil series shown on soil maps in the area
- List soil profile description (texture, structure and parent material) of expected soil series on the site
- Describe any permeability or drainage classifications/characterizations
- Provide a reference to soil water or soil characteristics that indicate the existence of soil moisture conditions that will adversely affect suitability for onsite systems

(5) Evaluation of soils in the subdivision

The following information should be in the report:

- Document the soil conditions and characteristics and document in a soil profile log

(6) Evaluation of soil moisture and near surface groundwater conditions

The following information should be in the report:

- Determination of soil moisture condition by an examination of the soil pit and bore holes
- Include in the soil log features that indicate soil moisture conditions that affect soil suitability, system design, and location of the system

(7) Assess topography, surface drainage, and vegetation

The following information should be in the report:

- Identify cuts, banks, or slopes and consider stability concerns created by a proposed on-site system
- Determine surface drainage characteristics present or planned that may affect the system(s)
- Identify vegetation indicative of soil moisture conditions

(8) Conduct a Preliminary Nitrate Impact Assessment.

Available information and on-site tests should be utilized to estimate the potential recharge to the site via infiltration of precipitation and, where appropriate, lateral flow. Recharge rates should be scientifically determined, based on the nature of the soils beneath the soil treatment system and down gradient areas determined during the test pit program. The results should be used in conjunction with the average daily sewage flow, to estimate available dilution, where appropriate and ultimately the potential nitrate levels at the down gradient property boundary. The results of research on plume development should also be incorporated. Emphasis should be given to predicting where nitrate and other contaminants should travel in the long-term and their ultimate impact on aquifers, wetlands, stream and lakes. Arguments for other attenuating mechanisms can also be incorporated if adequately supported by scientific research or field monitoring data. All assumptions used in the preliminary nitrate impact assessment should be stated and substantiated.

The assessment should clearly define those portions of the subsurface which should be affected by the effluent. Detailed predictions of the shape of individual contaminant plumes and a description of specific contaminant concentrations over space and time are not required.

(9) Classify subdivision suitability for onsite systems

The following information should be in the report:

- Consider information from complete evaluation and classify subdivision as:
 - Unsuitable except for holding tank
 - Severe limitations
 - Moderate limitations
 - Well suited
- Illustrate the optimum location and orientation of the proposed onsite wastewater treatment and disposal system considering onsite wastewater treatment and disposal design theory and water supply issues.
- Determine the proposed number of lots.
 - Where it has been demonstrated that the sewage effluent will not enter ground water resources, the lot density of the proposed development may be dictated by factors such as onsite wastewater treatment and disposal replacement areas (if proposed) and by the minimum set-back distances for individual on-site beds (and their contingency areas).
 - In other cases, determinants would include but are not limited to:

- Site suitability
- Nitrate and other nutrient impacts.

Advanced Assessment

In addition to the information contained within the Basic assessment, proponents required to submit an Advanced Assessment should also include the following.

The field program should include:

- A door to door inventory of:
 - water supply wells within 1.0 kms of the proposed development. The survey should be conducted to determine the condition and details of local wells, including the method of construction, water level, pump intake and well depths, water use, general water quality and suitability of the well for future monitoring, if required. This should also include all springs and dugouts that access shallow ground water. The results of this survey should also determine the number of down gradient wells within 1.0 kms that could be potentially impacted by the proposed development and the extent to which these wells are used.
 - Any municipal/communal wells within 1.5 kms down gradient should be located.
 - onsite wastewater systems (excepting holding tanks) within 1.0 kms of the proposed development.

(1) Site drawing(s) of the proposed subdivision

In addition to the Basic Assessment, the following information should be included:

- Any stormwater management plan features
- A minimum of two geological cross-sections

(2) Density

The proponent should identify nearby of onsite wastewater treatment and disposal systems and their type should also be identified.

(3) Set-out type of onsite system(s) proposed

The proponent should:

- Determine characteristics of the proposed water supply that may affect sewage system long term performance

(4) Evaluation of soil moisture and near surface groundwater conditions

The following information should be in the report:

- Identify the existence (if any) of an unconfined aquifer. Link to the field survey results.

(5) Evaluation of surface water impacts

The complete section is new for the advanced assessment and the following information should be in the report:

- Identify the existence of any surface water body that may be impacted by the subdivision

(6) Preliminary Nitrate Impact Assessment.

This section is NOT required in the advanced assessment.

(7) Cumulative Assessment

The proponent shall:

- develop, identify, and describe the cumulative impact of the effluent from the private sewage systems to the environment and to the entire subdivision; and
- identify and assess any on and off-site receptors that may be affected from the development of private sewage systems.

The groundwater impact assessment will address the ability of the lands and treatment systems identified by and restricted to the subdivision proposal to treat sewage effluent to meet acceptable limits. Regulatory authorities will generally only consider support for subdivision applications involving private sewage systems, where the proponent and/or the consultant has:

- a. Successfully defended the ability of the site to support private sewage systems;
- b. Determined the representative existing background and vertical stratification of nitrate-nitrogen levels in the receiving groundwater and the long-term impact to the subdivision and the environment; and,
- c. Demonstrate that the area is not obviously hydrogeologically sensitive (for example, areas of fractured bedrock exposed at surface, areas of thin soil cover, or areas of highly permeable soils).

APPENDIX C

SCOPE OF WORK

WORK SCOPE:

Desktop Study

PINTER will carry out the appropriate database searches and compile relevant materials to meet the informational requirements as identified in the attached document Appendix B – Subdivision Study Summary Requirements. The desktop study will also include calculations and interpretations necessary to meet the scientific requirements of Appendix B.

Field Work

PINTER proposes to use a Geoprobe direct-push rig equipped with a MacroCore® (MC) sampler to visually log the site geology and collect soil samples. The MacroCore® system is equipped with an 83 mm (3.25”) diameter sampling barrel that recovers intact core samples for visual inspection.

To meet investigation and field sampling requirements for both investigations **PINTER** will provide equipment, materials and labour to carry out the following tasks.

- Advance a total of six (6) MacroCore® test holes to various depths to collect soil samples for laboratory analysis. Test holes are provided at various depths to provide adequate and appropriate site information for various purposes. Deep test holes are required for deep foundation design, whereas shallow test holes are required for parking lot and onsite waste water design. The six (6) test holes will be advanced as follows:
 - Two (2) test holes to 9 m
 - Two (2) test holes to 6 m
 - Two (2) test holes to 3 m.
- Install four (4) environmental monitoring wells to determine groundwater conditions at the site. The four (4) wells will be installed as follows:
 - One (1) well to 9 m
 - One (1) well to 6 m
 - Two (2) wells to 3 m
- Visually log all soils encountered using field visual and textural methods.
- Collect soil samples every 1 m, 2 m, 4.5 m and at changes in geology for potential laboratory analysis.
- Carry out a return visit to monitor groundwater monitoring wells and collect groundwater samples for laboratory analysis.
- Carry out a topographic survey of the site. This is not a legal survey. This survey is carried out for engineering purposes to determine ground surface contours and monitoring well elevations.

APPENDIX D

WELL SEARCH REPORTS



Land Location **304 035 34NE00**
WWDR# **066537**

AGAR, JAMES

Completion **04/23/1981**

RM
Major Basin **06**
SubBasin **30**
NTS Map **73B00**

Well Location

LSD	Quarter	Section	Township	Range	Meridian	Reserve	Riverlot	Location of Well (in Quarter)		
00	NE	34	035	04	3			200.00	ft from N/S Boundary	N
Zone	Easting	Northing	Source	Accuracy				400.00	ft from E/W Boundary	E

Well Information

Driller #	Water Use	Hole #	Well Use	Installation Method	Depth	Water Level	Bit	Flowing Head	Well Casings	Length (ft)	Btm (ft)	Dia (in)	Description
ELSTOW WELL DRILLING	Domestic	001	Withdrawal	Drilled	105.00	0.00	6.20	0.00					Plastic
									Screens				
									Length (ft)	Btm (ft)	Dia (in)	Slot (in)	Description
									5.00	105.00	5.00	15.00	Stainless Steel
									0.00	0.00	0.00	0.00	
									0.00	0.00	0.00	0.00	

Pump Test

Draw Down	15.00 ft	Rec. Pumping Rate	10.00
Duration	6.00 hrs	Intake	80.00
Pumping Rate	40.00 igpm	Aquifer	
Temp	42.00 deg. F	E-Log	No
Elevation	1,715.00 ft	Phys	E03

Lithology List

Depth (ft)	Material	Colour	Description
40.00	Clay	Yellow	Unknown
100.00	Clay	Blue	Unknown
105.00	Sand	Unknown	Unknown



Land Location **304 035 35SE00**
WWDR# **031749**

SCHMIDT, PAUL

Completion **07/01/1935**

RM
Major Basin **06**
SubBasin **30**
NTS Map **73B00**

Well Location

LSD	Quarter	Section	Township	Range	Meridian	Reserve	Riverlot
00	SE	35	035	04	3		
Zone	Easting	Northing	Source	Accuracy			

Location of Well (in Quarter)
0.00 ft from N/S Boundary
0.00 ft from E/W Boundary

Well Information

Driller #	UNKNOWN	Well Casings				
Water Use	Domestic	Length (ft)	Btm (ft)	Dia (in)	Description	
Hole #		0.00	0.00	0.00	Corrugated Metal	
Well Use	Withdrawal	0.00	0.00	0.00	Concrete	
Installation Method	Unknown	0.00	0.00	0.00		
Depth	116.00	Screens				
Water Level	10.00	Length (ft)	Btm (ft)	Dia (in)	Slot (in)	Description
Bit	36.00	0.00	0.00	0.00	0.00	
Flowing Head	0.00	0.00	0.00	0.00	0.00	
		0.00	0.00	0.00	0.00	
		0.00	0.00	0.00	0.00	
<u>Pump Test</u>						
Draw Down	0.00 ft	Rec. Pumping Rate	0.00			
Duration	0.00 hrs	Intake	0.00			
Pumping Rate	0.00 igpm	Aquifer	Glac			
Temp	0.00 deg. F	E-Log	No			
Elevation	1,700.00 ft	Phys	E03			

Lithology List

Depth (ft)	Material	Colour	Description
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Land Location **304 035 35SE00**
WWDR# **108665**

SCHMIT FARMS LTD

Completion **07/30/1997**

RM **344**
Major Basin **06**
SubBasin **30**
NTS Map **73B01**

Well Location

LSD	Quarter	Section	Township	Range	Meridian	Reserve	Riverlot
00	SE	35	035	04	3		
Zone	Easting	Northing	Source	Accuracy			

Location of Well (in Quarter)
800.00 ft from N/S Boundary **N**
200.00 ft from E/W Boundary **E**

Well Information

Driller #	Water Use	Hole #	Well Use	Installation Method	Depth	Water Level	Bit	Flowing Head	Well Casings	Length (ft)	Btm (ft)	Dia (in)	Description
MITCHELL DRILLING (197	Domestic	001	Withdrawal	Drilled	120.00	15.00	5.10	0.00		103.00	100.00	5.00	P.V.C.
										0.00	0.00	0.00	
										0.00	0.00	0.00	
										0.00	0.00	0.00	
										0.00	0.00	0.00	
										0.00	0.00	0.00	

Pump Test

Draw Down	90.00 ft	Rec. Pumping Rate	1.00
Duration	10.00 hrs	Intake	115.00
Pumping Rate	1.00 igpm	Aquifer	
Temp	44.00 deg. F	E-Log	SCANNED
Elevation	1,706.00 ft	Phys	E03

Lithology List

Depth (ft)	Material	Colour	Description
23.00	Clay	Brown	Oxidized
33.00	Clay	Grey	Hard
98.00	Till	Grey	Hard
115.00	Sand	Unknown	Fine
120.00	Till	Grey	Hard



**Saskatchewan
Watershed
Authority**

One Well Per Page

Page 2 of 2
10/3/2012
(OneWellPerPage)
(c) Saskatchewan Watershed Authority



Land Location **304 036 02SW00**
WWDR# **031769**

FLORAL SCHOOL UNIT

Completion **08/19/1950**

RM
Major Basin **06**
SubBasin **30**
NTS Map **73B00**

Well Location

LSD	Quarter	Section	Township	Range	Meridian	Reserve	Riverlot
00	SW	02	036	04	3		
Zone	Easting	Northing	Source	Accuracy			

Location of Well (in Quarter)
0.00 ft from N/S Boundary
0.00 ft from E/W Boundary

Well Information

Driller #	Water Use	Hole #	Well Use	Installation Method	Depth	Water Level	Bit	Flowing Head	Well Casings	Length (ft)	Btm (ft)	Dia (in)	Description
UNKNOWN	Domestic		Withdrawal	Unknown	22.00	20.00	48.00	0.00					Wood
										0.00	0.00	0.00	
										0.00	0.00	0.00	
										0.00	0.00	0.00	
										0.00	0.00	0.00	
										0.00	0.00	0.00	

Pump Test

Draw Down	0.00 ft	Rec. Pumping Rate	0.00
Duration	0.00 hrs	Intake	0.00
Pumping Rate	0.00 igpm	Aquifer	Glac
Temp	0.00 deg. F	E-Log	No
Elevation	1,700.00 ft	Phys	E03

Lithology List

Depth (ft)	Material	Colour	Description
22.00	Sand	Unknown	Unknown



184.00 Clay	Grey	Unknown
190.00 Clay	Grey	Stoney
206.00 Clay	Grey	Unknown
218.00 Gravel	Grey	Unknown
222.00 Clay	Grey	Stoney

APPENDIX E

TEST HOLE LOGS



12-1431-2 - East Floral Industrial Park
RM of Corman Park, SK
Geotechnical and Hydrogeological Investigation

Investigative Method : Macro-Core MC5
Date Finished : 27 September 2012

Water Elev. Recorded : 11 October 2012
Groundwater :

Logged By : MF
Checked By : LP

Depth-Meters (m)	Surf. Elev. 494.35	GRAPHIC	Legend WC = Water Content (%) PI = Plastic Index (%) LL = Liquid Limit (%) USCS = Unified Soil Classification System CSSC = Canadian Soil Survey Committee	Sample	Pocket Pen. (kg/sq.cm)	Lab Results	SIEVE ANALYSIS				
							% Sand	% Silt	% Clay		
			DESCRIPTION								
0			CLAY, trace silt, medium to high plasticity, pale brown, oxidized, dry to damp, firm to stiff, frequent fractures and slickensides noted Increased silt content below 0.5 m Increased sand content at 1.5 m								
494					1.5	WC: 21.7					
1					1.0	WC: 18.5					
493					1.0	WC: 27.4					
2					1.5	WC: 25.2					
492					1.5	WC: 22.7					
3					1.5	WC: 27.1					
491					CLAY, (Till), little silt, trace sand, high plasticity, grey, unoxidized, damp to dry, soft						
4						1.5	WC: 24.5				
490						2.0	WC: 24.2				
5											
489											
6			End of Hole at 6.0 m								
488											
7											
487											
8											
486											
9											
485											
10											



12-1431-2 - East Floral Industrial Park
RM of Corman Park, SK
Geotechnical and Hydrogeological Investigation

Investigative Method : Macro-Core MC5
Date Finished : 27 September 2012

Water Elev. Recorded :
Groundwater :

Logged By : MF
Checked By : LP

Depth-Meters (m)	Surf. Elev. 494.32	GRAPHIC	Legend WC = Water Content (%) PI = Plastic Index (%) LL = Liquid Limit (%) USCS = Unified Soil Classification System CSSC = Canadian Soil Survey Committee	Sample	Pocket Pen. (kg/sq.cm)	Lab Results	SIEVE ANALYSIS						
							% Sand	% Silt	% Clay				
			DESCRIPTION										
0			CLAY, little silt, little sand, medium to high plasticity, pale brown to grey, oxidized, moist, soft to very soft, frequent fractures and slickensides noted		1.0	WC: 24.5							
494													
1							Decreasing sand content below 1.5 m		1.0	WC: 25.0			
493													
2													
492								Mottled, dry below 3.8 m		1.5	WC: 25.5		
3													
491													
4					2.0	WC: 27.0							
490													
5													
489			CLAY, (Till), little silt, little sand, high plasticity, dark grey, unoxidized, damp, soft to firm,		2.5	WC: 25.8							
6													
			End of Hole at 6.0 m										
488													
7													
487													
8													
486													
9													
485													
10													



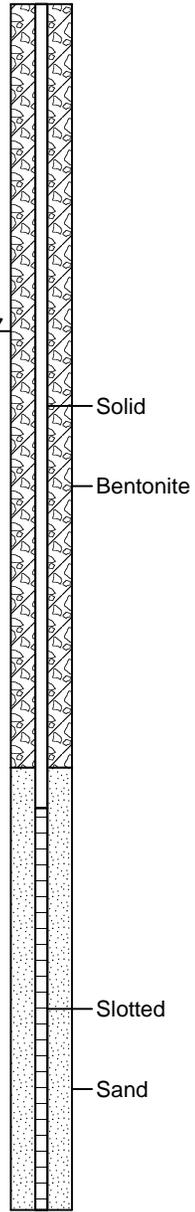
12-1431-2 - East Floral Industrial Park
RM of Corman Park, SK
Geotechnical and Hydrogeological Investigation

Investigative Method : Macro-Core MC5
Date Finished : 27 September 2012

Water Elev. Recorded : 11 October 2012
Groundwater :

Logged By : MF
Checked By : LP

Depth-Meters (m)	Surf. Elev. 497.97	GRAPHIC	DESCRIPTION	Sample	Pocket Pen. (kg/sq.cm)	Lab Results	SIEVE ANALYSIS		
							% Sand	% Silt	% Clay
0			TOPSOIL, clay, some silt, low to no plasticity, dark brown to black, oxidized, dry, loose, increasing water content with depth						
1	497		SAND, fine, little silt, little clay, pale brown, oxidized, moist, compact to dense, increasing sand content with depth		1.0	WC: 16.1			
2	496		CLAY, trace silt, trace sand, medium to high plasticity, pale brown, oxidized, moist, firm to stiff, frequent fractures and slickensides noted		0.5	WC: 24.7 CSSC: Clay	6.2	2.9	90.9
			Increased water content at 1.7 m.		0.5	WC: 26.9 CSSC: Clay	7.0	2.9	90.1
3	495		Increasing plasticity below 2.0 m, variable stiffness, soft to stiff.		1.0	WC: 26.0 LL: 62 PI: 32 USCS: CH - High Plasticity Clay			
			Becomes stiff to hard.		0.5	WC: 23.5			
4	494		Variably soft to stiff		0.5	WC: 26.1			
			Becomes grey with occasional brown mottles, occasional ochre staining, medium to high plasticity		0.5	WC: 26.1			
5	493		Variable occasional sand below 3.6 m		0	WC: 25.5			
			Very soft at 4.7 m		0	WC: 25.5			
6	492		CLAY, (Till), some silt, little sand, medium to high plasticity, grey, unoxidized, moist, occasional fractures		2.0	WC: 26.2 LL: 77 PI: 45 USCS: CH - High Plasticity Clay			
			Becomes firm to stiff, increased water content 6.0 m.		0.5	WC: 14.9			
7	491		CLAY, (Till), some silt, some sand, occasional gravel, medium plasticity, grey, unoxidized, damp, stiff to hard		2.0	WC: 12.0	43	38	19
			1 to 2 mm thick sand seam at 7.2 m		1.5	WC: 13.7			
8	490				2.0	WC: 12.7			
9	489		End of Hole at 9.0 m						
10	488								



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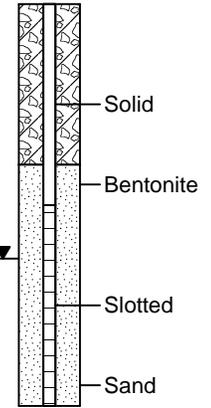
12-1431-2 - East Floral Industrial Park
RM of Corman Park, SK
Geotechnical and Hydrogeological Investigation

Investigative Method : Macro-Core MC5
Date Finished : 27 September 2012

Water Elev. Recorded : 11 October 2012
Groundwater :

Logged By : MF
Checked By : LP

Depth-Meters (m)	Surf. Elev. 496.15	GRAPHIC	Legend WC = Water Content (%) PI = Plastic Index (%) LL = Liquid Limit (%) USCS = Unified Soil Classification System CSSC = Canadian Soil Survey Committee	Sample	Pocket Pen. (kg/sq.cm)	Lab Results	SIEVE ANALYSIS		
							% Sand	% Silt	% Clay
DESCRIPTION									
0	496		TOPSOIL, clay, some silt, low to no plasticity, dark brown to black, oxidized, dry, loose, increasing water content with depth						
1	495		SAND, fine, some silt, little clay, pale brown, oxidized, moist, compact to dense, increasing sand content with depth	0.5	0.5	WC: 18.3 CSSC: Loam	35.5	43.9	20.6
2	494		CLAY, trace silt, trace sand, medium to high plasticity, pale brown, oxidized, moist, firm to stiff, frequent fractures and slickensides noted, occasional sand seams	1.0	1.0	WC: 26.1 CSSC: Clay	9.1	2.0	88.9
3	493		CLAY, (Till), little silt, trace sand, medium to high plasticity, grey, unoxidized, moist, occasional fractures	1.0	1.0	WC: 27.0 LL: 58 PI: 28 USCS: CH - High Plasticity Clay			
			End of Hole at 3.0 m	1.0	1.0	WC: 26.7			
4	492								
5	491								
6	490								
7	489								
8	488								
9	487								
10									





12-1431-2 - East Floral Industrial Park
RM of Corman Park, SK
Geotechnical and Hydrogeological Investigation

Investigative Method : Macro-Core MC5
Date Finished : 27 September 2012

Water Elev. Recorded : 11 October 2012
Groundwater :

Logged By : MF
Checked By : LP

Depth-Meters (m)	Surf. Elev. 493.48	GRAPHIC	DESCRIPTION	Sample	Pocket Pen. (kg/sq.cm)	Lab Results	SIEVE ANALYSIS		
							% Sand	% Silt	% Clay
0			CLAY, some silt, medium to high plasticity, black, oxidized, moist, firm						
0.3			Becomes pale brown at 0.3 m	0.5	WC: 20.9 CSSC: Silty Clay	13.6	42.6	44.1	
1.0			Becomes mottled grey and brown, low to medium plasticity, firm to stiff below 1.3 m	1.0	WC: 23.8 LL: 66 PI: 36 USCS: CH - High Plasticity Clay CSSC: Silty Clay	0	55	44	
1.5			Soft and wet from 2.6 to 2.9 m	1.5	WC: 26.3 CSSC: Silty Clay	11.9	40.5	47.6	
1.5				1.5	WC: 29.6				
3.0			CLAY, (Till), some silt, little sand, medium to high plasticity, grey, unoxidized, moist, stiff to hard, occasional fractures	1.0	WC: 26.8				
2.0				2.0	WC: 21.6 CSSC: Silty Clay Loam	19	48	33	
3.0			Becomes firm to stiff, increased water content and medium to high plasticity below 5.4 m.	0.0	WC: 28.5				
2.0			CLAY, (Till), some silt, some sand, occasional gravel, medium plasticity, grey, unoxidized, damp, stiff to hard	2.0	WC: 24.3				
2.5				2.5	WC: 18.6				
2.5				2.5	WC: 18.9				
2.5				2.5	WC: 15.5 LL: 31 PI: 16 USCS: CI - Intermediate Plasticity Clay				
9.0			End of Hole at 9.0 m						

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12-1431-2 - East Floral Industrial Park
RM of Corman Park, SK
Geotechnical and Hydrogeological Investigation

Investigative Method : Macro-Core MC5
Date Finished : 27 September 2012

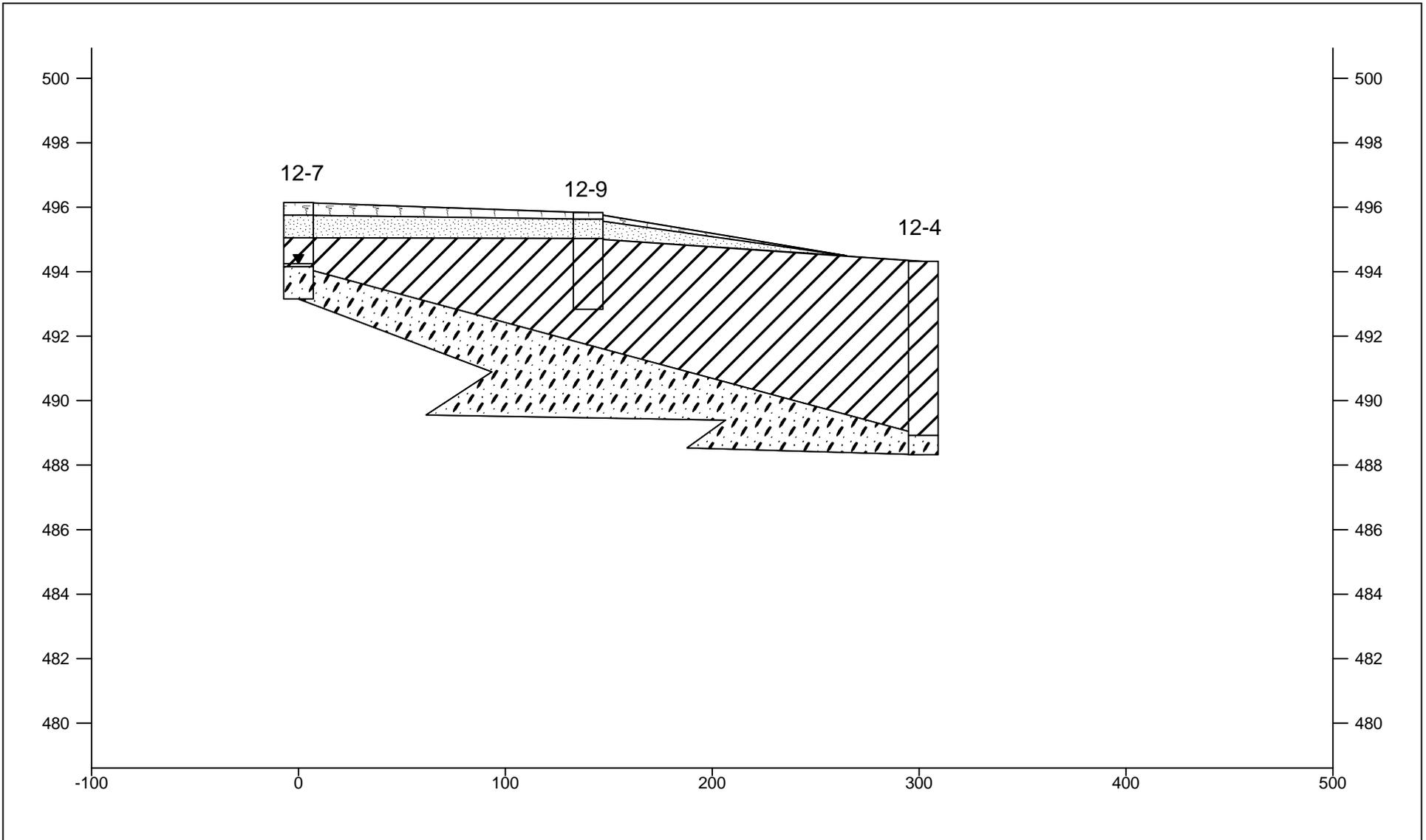
Water Elev. Recorded :
Groundwater :

Logged By : MF
Checked By : LP

Depth-Meters (m)	Surf. Elev. 495.83	GRAPHIC	Legend WC = Water Content (%) PI = Plastic Index (%) LL = Liquid Limit (%) USCS = Unified Soil Classification System CSSC = Canadian Soil Survey Committee	Sample	Pocket Pen. (kg/sq.cm)	Lab Results	SIEVE ANALYSIS		
							% Sand	% Silt	% Clay

0			TOPSOIL, clay, some silt, low to no plasticity, dark brown to black, oxidized, dry, loose, increasing water content with depth						
1	495		SAND, fine, some silt, little clay, pale brown, oxidized, moist, compact to dense, increasing sand content with depth	1.0	1.0	WC: 19.1 CSSC: Silty Clay	12.2	45.4	42.4
2	494		CLAY, trace silt, medium to high plasticity, pale brown, oxidized, moist, soft to firm, frequent fractures and slickensides noted, expansive	0.5	0.5	WC: 21.6 CSSC: Silty Clay	7.0	41.0	52.0
3	493		-becomes saturated, dark brown, increased to some silt content.	0.5	0.5	WC: 28.9			
				1.0	1.0	WC: 27.0			

End of Hole at 3.0 m

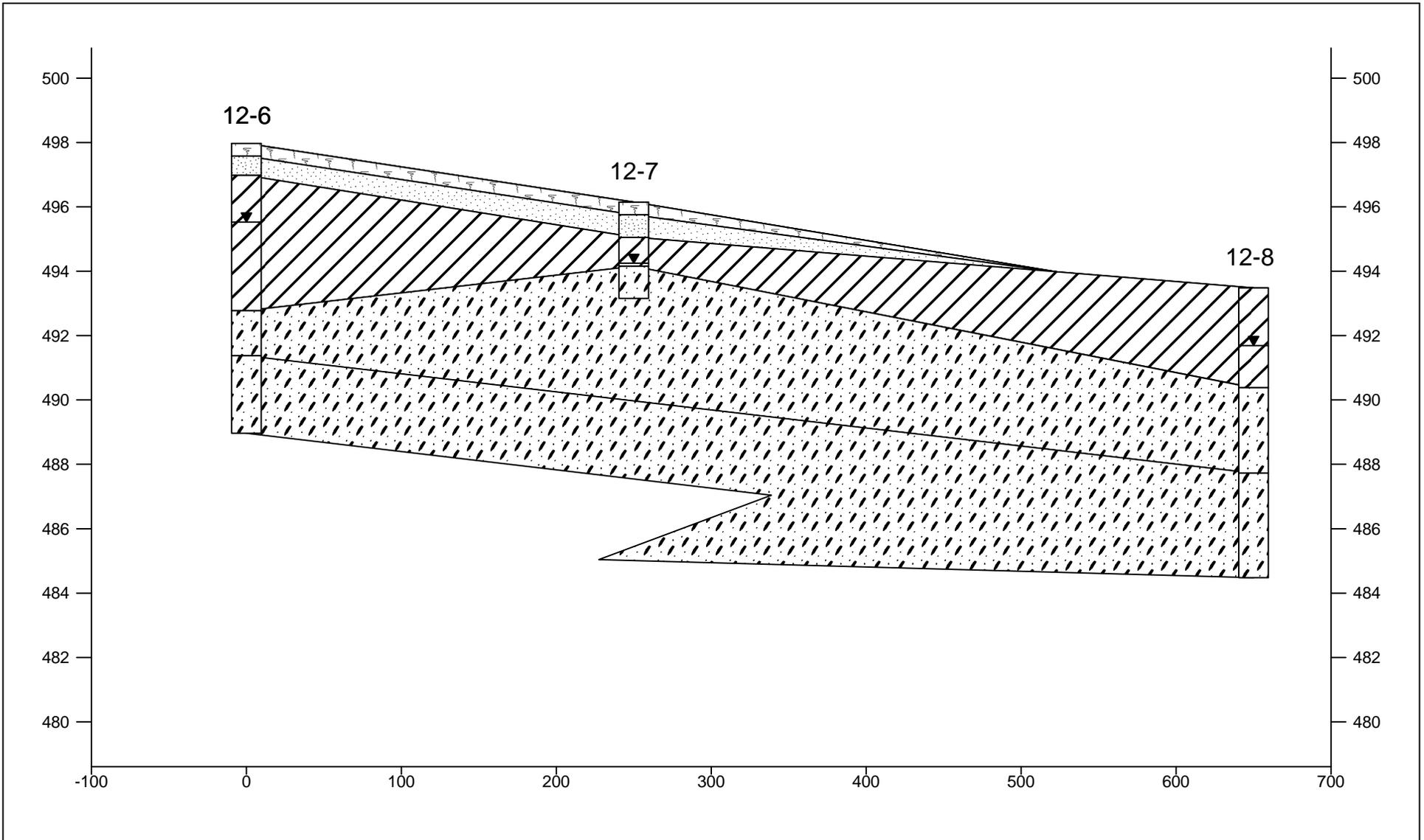


12-1431-2 - East Floral Industrial Park
 RM of Corman Park, SK
 Geotechnical and Hydrogeological Investigation

East - West Cross Section



PINTER
 & ASSOCIATES LTD



12-1431-2 - East Floral Industrial Park
 RM of Corman Park, SK
 Geotechnical and Hydrogeological Investigation

North-South Cross Section



APPENDIX F

LABORATORY ANALYSIS RESULTS



PINTER AND ASSOCIATES LTD.
ATTN: MATTHEW FLEMING
710A 48th Street East
Saskatoon SK S7K 5B4

Date Received: 01-OCT-12
Report Date: 09-OCT-12 15:30 (MT)
Version: FINAL

Client Phone: 306-244-1710

Certificate of Analysis

Lab Work Order #: L1217302
Project P.O. #: PO# 1431-2
Job Reference: 1431-2 FLORAL INDUSTRIAL GEOTECH
C of C Numbers:
Legal Site Desc:

Brian Morgan
Account Manager

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ADDRESS: #819-58th St E., Saskatoon, SK S7K 6X5 Canada | Phone: +1 306 668 8370 | Fax: +1 306 668 8383
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1217302-1 12-3 0-0.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	21.7		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-2 12-3 0.75-1.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	18.5		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-3 12-3 1.5-2.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	27.4		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-4 12-3 2.25-3.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	25.2		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-5 12-3 3.0-3.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	22.7		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-6 12-3 3.75-4.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	27.1		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-7 12-3 4.5-5.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	24.5		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-8 12-3 5.25-6.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	24.2		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-9 12-4 0.75-1.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	25.0		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-10 12-4 1.5-2.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	24.6		0.10	%	04-OCT-12	04-OCT-12	R2449104

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1217302-11 12-4 2.25-3.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	25.5		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-12 12-4 3.0-3.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	24.5		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-13 12-4 3.75-4.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	27.0		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-15 12-4 5.25-6.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	25.8		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-16 12-6 @ 0.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	16.1		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-17 12-6 @ 1.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture Particle Size - Pipette Method % Sand (2.0mm - 0.05mm) % Silt (0.05mm - 2um) % Clay (<2um) Texture	24.7 6.16 2.91 90.9 Clay		0.10 0.10 0.10 0.10	% % % %	04-OCT-12 02-OCT-12 02-OCT-12 02-OCT-12 02-OCT-12	04-OCT-12 03-OCT-12 03-OCT-12 03-OCT-12 03-OCT-12	R2449104 R2448738 R2448738 R2448738 R2448738
L1217302-18 12-6 @ 2.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture Particle Size - Pipette Method % Sand (2.0mm - 0.05mm) % Silt (0.05mm - 2um) % Clay (<2um) Texture	26.9 6.96 2.90 90.1 Clay		0.10 0.10 0.10 0.10	% % % %	04-OCT-12 02-OCT-12 02-OCT-12 02-OCT-12 02-OCT-12	04-OCT-12 03-OCT-12 03-OCT-12 03-OCT-12 03-OCT-12	R2449104 R2448738 R2448738 R2448738 R2448738
L1217302-19 12-6 @ 3.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture Atterberg limits Liquid Limit (LL)	26.0 62		0.10 1	% %	04-OCT-12 05-OCT-12	04-OCT-12 05-OCT-12	R2449104 R2450435

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1217302-19 12-6 @ 3.0 Sampled By: MATTHEW Matrix: SOIL Atterberg limits Plasticity Index (PI)	32		1	%	05-OCT-12	05-OCT-12	R2450435
L1217302-20 12-6 @ 3.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	23.5		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-21 12-6 @ 4.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	26.1		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-22 12-6 @ 5.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	25.5		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-23 12-6 @ 6.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture Atterberg limits Liquid Limit (LL) Plasticity Index (PI)	26.2 77 45		0.10 1 1	% % %	04-OCT-12 05-OCT-12 05-OCT-12	04-OCT-12 05-OCT-12 05-OCT-12	R2448989 R2450435 R2450435
L1217302-24 12-6 @ 6.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	14.9		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-25 12-6 @ 7.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters Grain Size Curve % Moisture	SEE ATTACHED 12.0		0.10	%	03-OCT-12 04-OCT-12	04-OCT-12 04-OCT-12	R2451691 R2448989
L1217302-26 12-6 @ 8.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	13.7		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-27 12-6 @ 9.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	12.7		0.10	%	04-OCT-12	04-OCT-12	R2448989

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1217302-28 12-7 @ 0.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	18.3		0.10	%	04-OCT-12	04-OCT-12	R2448989
Particle Size - Pipette Method % Sand (2.0mm - 0.05mm)	35.5		0.10	%	02-OCT-12	03-OCT-12	R2448738
% Silt (0.05mm - 2um)	43.9		0.10	%	02-OCT-12	03-OCT-12	R2448738
% Clay (<2um)	20.6		0.10	%	02-OCT-12	03-OCT-12	R2448738
Texture	Loam				02-OCT-12	03-OCT-12	R2448738
L1217302-29 12-7 @ 1.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	26.1		0.10	%	04-OCT-12	04-OCT-12	R2448989
Particle Size - Pipette Method % Sand (2.0mm - 0.05mm)	9.11		0.10	%	02-OCT-12	03-OCT-12	R2448738
% Silt (0.05mm - 2um)	2.04		0.10	%	02-OCT-12	03-OCT-12	R2448738
% Clay (<2um)	88.9		0.10	%	02-OCT-12	03-OCT-12	R2448738
Texture	Clay				02-OCT-12	03-OCT-12	R2448738
L1217302-30 12-7 @ 2.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	27.0		0.10	%	04-OCT-12	04-OCT-12	R2448989
Atterberg limits Liquid Limit (LL)	58		1	%	05-OCT-12	05-OCT-12	R2450435
Plasticity Index (PI)	28		1	%	05-OCT-12	05-OCT-12	R2450435
L1217302-31 12-7 @ 3.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	26.7		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-32 12-8 @ 0.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	20.9		0.10	%	04-OCT-12	04-OCT-12	R2448989
Particle Size - Pipette Method % Sand (2.0mm - 0.05mm)	13.6		0.10	%	02-OCT-12	03-OCT-12	R2448738
% Silt (0.05mm - 2um)	42.3		0.10	%	02-OCT-12	03-OCT-12	R2448738
% Clay (<2um)	44.1		0.10	%	02-OCT-12	03-OCT-12	R2448738
Texture	Silty clay				02-OCT-12	03-OCT-12	R2448738
L1217302-33 12-8 @ 1.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters Grain Size Curve	SEE ATTACHED				03-OCT-12	04-OCT-12	R2451691
% Moisture	23.8		0.10	%	04-OCT-12	04-OCT-12	R2448989
Atterberg limits Liquid Limit (LL)	66		1	%	05-OCT-12	05-OCT-12	R2450435
Plasticity Index (PI)	36		1	%	05-OCT-12	05-OCT-12	R2450435

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1217302-34 12-8 @ 2.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	26.3		0.10	%	04-OCT-12	04-OCT-12	R2448989
Particle Size - Pipette Method % Sand (2.0mm - 0.05mm)	11.9		0.10	%	02-OCT-12	03-OCT-12	R2448738
% Silt (0.05mm - 2um)	40.5		0.10	%	02-OCT-12	03-OCT-12	R2448738
% Clay (<2um)	47.6		0.10	%	02-OCT-12	03-OCT-12	R2448738
Texture	Silty clay				02-OCT-12	03-OCT-12	R2448738
L1217302-35 12-8 @ 3.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	29.6		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-36 12-8 @ 3.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	26.8		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-37 12-8 @ 4.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters Grain Size Curve	SEE ATTACHED				03-OCT-12	04-OCT-12	R2451691
% Moisture	21.6		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-38 12-8 @ 5.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	28.5		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-39 12-8 @ 6.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	24.3		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-40 12-8 @ 6.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	18.6		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-41 12-8 @ 7.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	18.9		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-42 12-8 @ 8.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	15.5		0.10	%	04-OCT-12	04-OCT-12	R2449244

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1217302-43 12-8 @ 9.0 Sampled By: MATTHEW Matrix: SOIL Atterberg limits Liquid Limit (LL) Plasticity Index (PI)	31 16		1 1	% %	05-OCT-12 05-OCT-12	05-OCT-12 05-OCT-12	R2450435 R2450435
L1217302-44 12-9 @ 0.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture Particle Size - Pipette Method % Sand (2.0mm - 0.05mm) % Silt (0.05mm - 2um) % Clay (<2um) Texture	19.1 12.2 45.4 42.4 Silty clay		0.10 0.10 0.10 0.10	% % % %	04-OCT-12 02-OCT-12 02-OCT-12 02-OCT-12 02-OCT-12	04-OCT-12 03-OCT-12 03-OCT-12 03-OCT-12 03-OCT-12	R2449244 R2448738 R2448738 R2448738 R2448738
L1217302-45 12-9 @ 1.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture Particle Size - Pipette Method % Sand (2.0mm - 0.05mm) % Silt (0.05mm - 2um) % Clay (<2um) Texture	21.6 6.95 41.0 52.0 Silty clay		0.10 0.10 0.10 0.10	% % % %	04-OCT-12 02-OCT-12 02-OCT-12 02-OCT-12 02-OCT-12	04-OCT-12 03-OCT-12 03-OCT-12 03-OCT-12 03-OCT-12	R2449244 R2448738 R2448738 R2448738 R2448738
L1217302-46 12-9 @ 2.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	28.9		0.10	%	04-OCT-12	04-OCT-12	R2449244
L1217302-47 12-9 @ 3.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	27.0		0.10	%	04-OCT-12	04-OCT-12	R2449244
L1217302-48 12-4 0-0.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	24.5		0.10	%	04-OCT-12	04-OCT-12	R2449244
L1217302-49 12-4 @ 8.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	26.3		0.10	%	04-OCT-12	04-OCT-12	R2449244

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Qualifiers for Individual Samples Listed:

Sample Number	Client ID	Qualifier	Description
L1217302-14	12-4 4.5-5.25	NR:NR	No Result: Sample Not Received At Laboratory

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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ATTERBERG-SK	Soil	Atterberg limits	CARTER CSSS 58
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The liquid limit (or upper plastic limit) is the point at which the soil becomes semifluid, like softened butter. In operational terms, the liquid limit is defined as the water content at which a trapezoidal groove cut in moist soil is closed after 25 taps on a hard rubber plate (ASTM D-18, 1958).

The plastic limit (or lower plastic limit) is defined as the water content at which soil begins to crumble on being rolled into a thread 1/8 inch (or 3 mm) in diameter. It represents the lowest water content at which soil can be deformed readily without cracking.

The plastic index (which is the difference between the liquid and plastic limits) gives an indication of the "clayeyness" or plasticity of a clay and is employed in engineering classification systems for soils.

References: McKeague, J.A. 1978. Atterberg Limits pp 50 - 55 In: Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci. p. 50 - 55

GRAIN SIZE-SK	Soil	Grain Size Analysis	SSIR-51 METHOD 3.2.1
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Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

MOIST-SK	Soil	Moisture Content	ASTM D2216-80
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The weighed portion of soil is placed in a 105°C oven overnight. The dried soil is allowed to cooled to room temperature, weighed and the % moisture is calculated.

Reference: ASTM D2216-80

PSA-2-SK	Soil	Particle Size - Pipette Method	Forestry Canada (1991) p. 47-53
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Dry, < 2 mm soil is treated with sodium hexametaphosphate to ensure complete dispersion of primary soil particles. The homogenized suspension is allowed to settle in accordance with Stoke's Law so that only clay particles remain in suspension. To determine the clay fraction, an aliquot of the clay suspension is removed, then dried and weighed. The sand fraction is determined by wet sieving the remaining suspension, then drying and weighing the sand retained on the sieve. The silt fraction is determined by calculation where % Silt = 100 - (%Sand+%Clay)

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

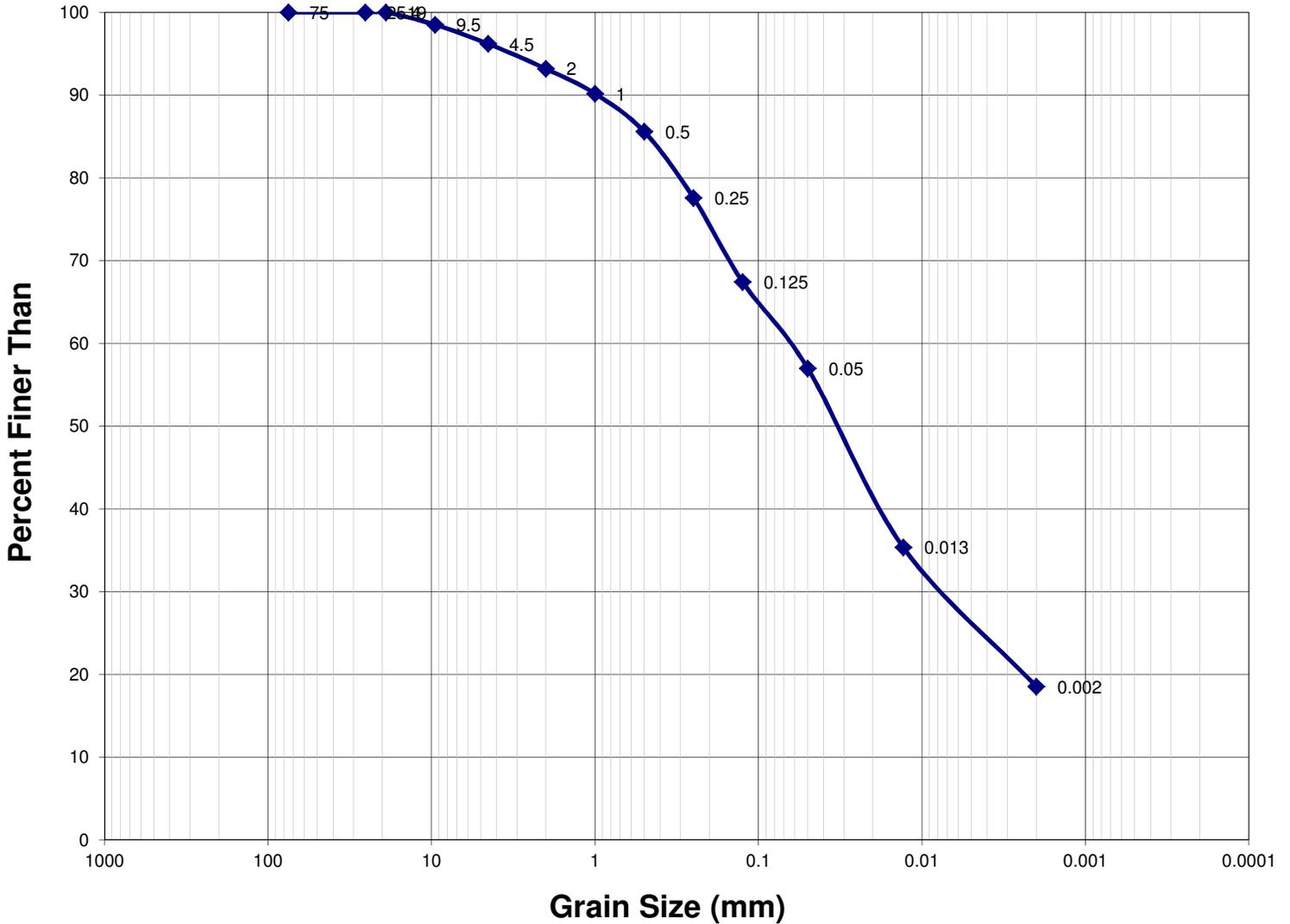
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Particle Size Distribution Curve



Summary of Results

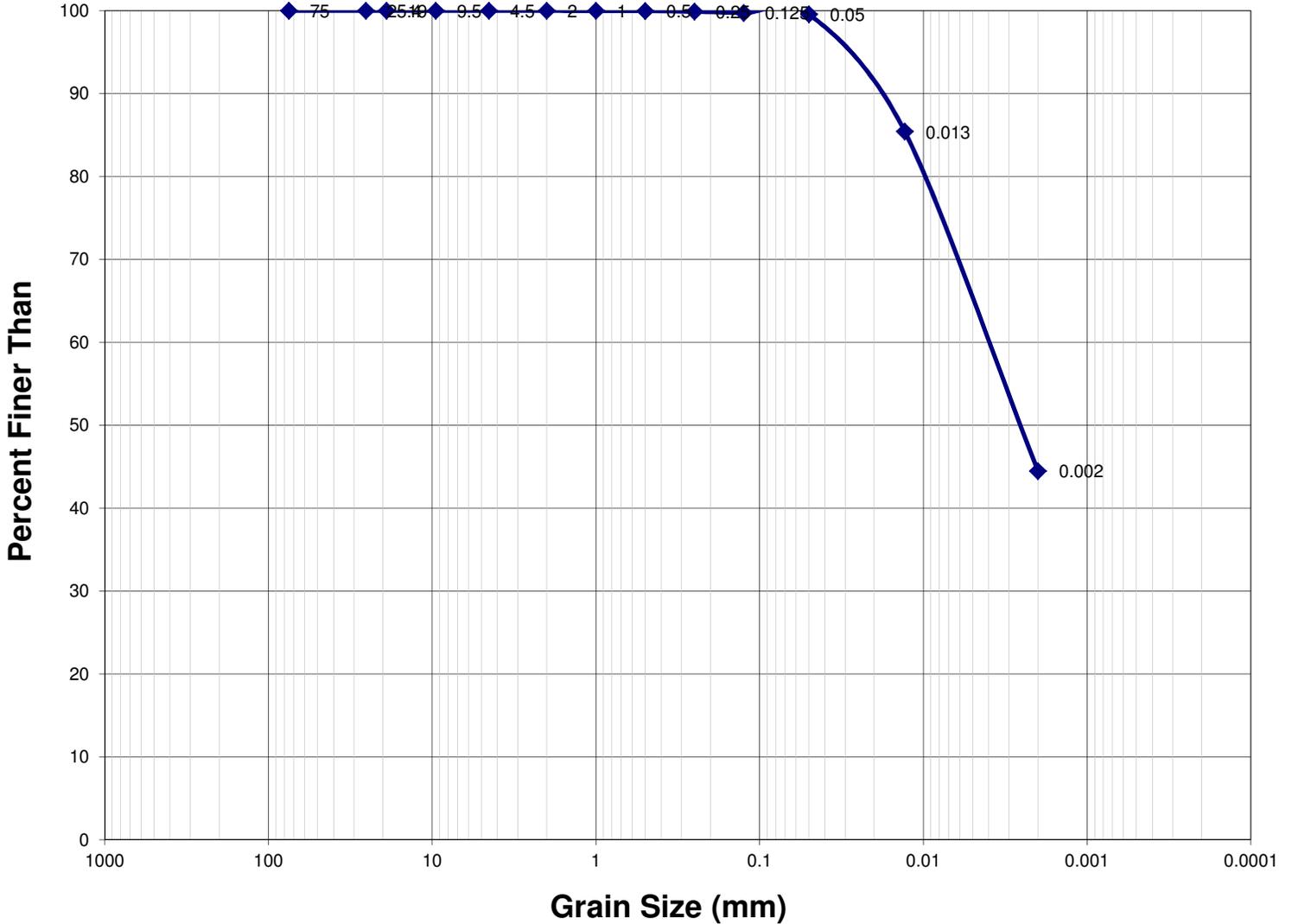
Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	4
Coarse Sand	2.0mm - 4.75mm	3
Medium Sand	0.425mm - 2.0mm	10
Fine Sand	0.075mm - 0.425mm	23
Fines	< 0.075mm	60

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	7
Sand	0.05mm - 2mm	36
Silt	0.002mm - 0.05mm	38
Clay	< 0.002mm	19

Particle Size Distribution Curve



Summary of Results

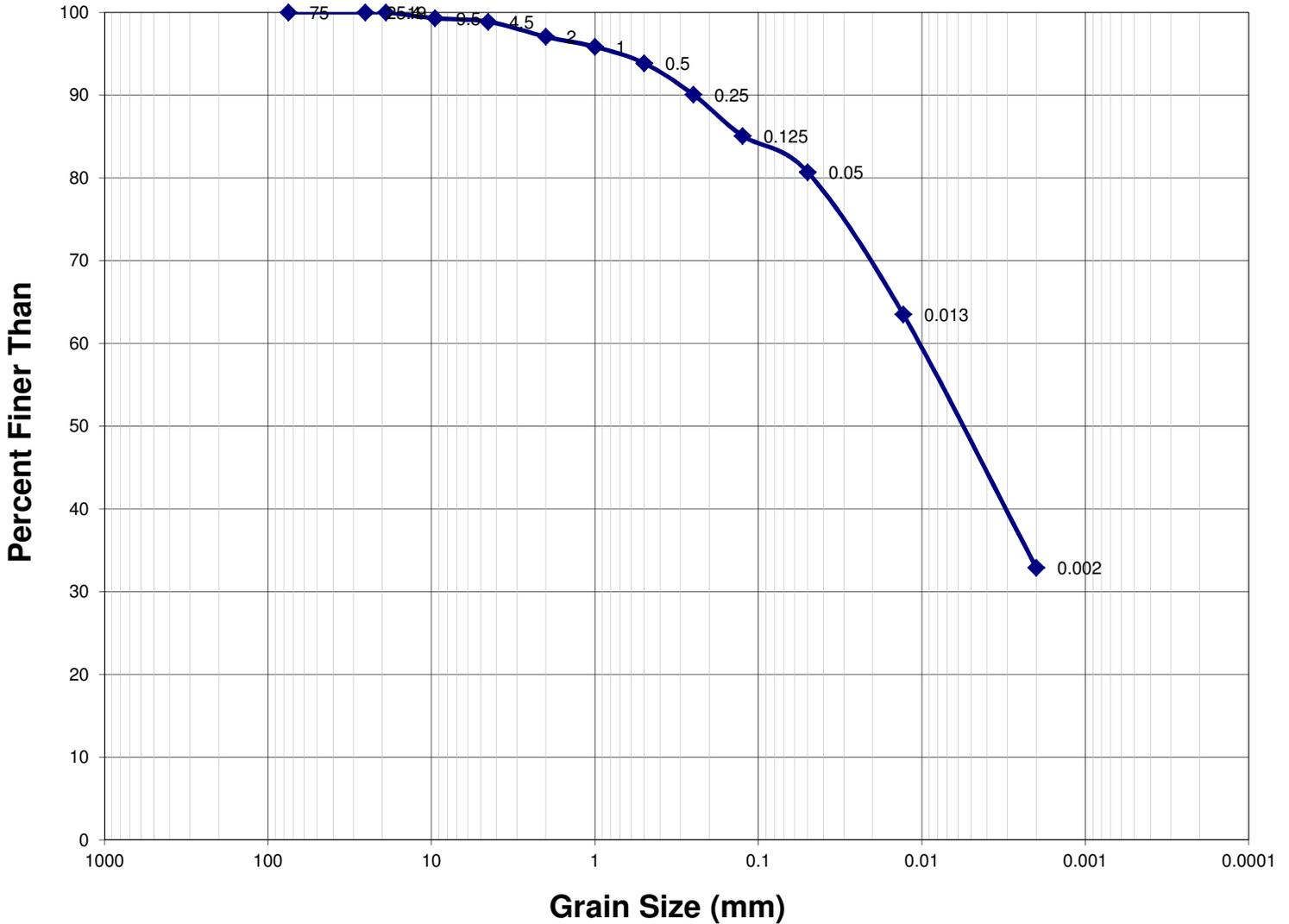
Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	0
Coarse Sand	2.0mm - 4.75mm	0
Medium Sand	0.425mm - 2.0mm	0
Fine Sand	0.075mm - 0.425mm	0
Fines	< 0.075mm	100

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	0
Sand	0.05mm - 2mm	0
Silt	0.002mm - 0.05mm	55
Clay	< 0.002mm	44

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	1
Coarse Sand	2.0mm - 4.75mm	2
Medium Sand	0.425mm - 2.0mm	4
Fine Sand	0.075mm - 0.425mm	11
Fines	< 0.075mm	82

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	3
Sand	0.05mm - 2mm	16
Silt	0.002mm - 0.05mm	48
Clay	< 0.002mm	33



L1217302-COFC

COC # _____

Page 1 of 4

Report To			Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)																																																																																																																																																																					
Company: PINTER & Associates Limited			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other				<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)																																																																																																																																																																					
Contact: Matthew Fleming			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax				<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT																																																																																																																																																																					
Address: 710A - 48th Street E. Saskatoon, SK, S7K 5B4			Email 1: matthew.fleming@pinter.ca				<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT																																																																																																																																																																					
Phone: 244-1710 Fax: 933-4986			Email 2: lawrence.pinter@pinter.ca				<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT																																																																																																																																																																					
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PINTER AND ASSOCIATES LTD.
ATTN: Matthew Fleming
710A 48th Street East
Saskatoon SK S7K 5B4

Date Received: 12-OCT-12
Report Date: 18-OCT-12 10:08 (MT)
Version: FINAL

Client Phone: 306-244-1710

Certificate of Analysis

Lab Work Order #: L1222991
Project P.O. #: PO# 1431-2
Job Reference: 1431-2 FLORAL INDUSTRIAL PARK
C of C Numbers: L1222991
Legal Site Desc:

Brian Morgan
Account Manager

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ADDRESS: #819-58th St E., Saskatoon, SK S7K 6X5 Canada | Phone: +1 306 668 8370 | Fax: +1 306 668 8383
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1222991-1 12-1 EAST FLORAL INDUST. PRK Sampled By: MATTHEW on 11-OCT-12 @ 15:00 Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	0.246		0.050	mg/L	13-OCT-12	13-OCT-12	R2454795
Routine Water Analysis							
Alkalinity, Total							
Alkalinity, Total (as CaCO3)	430		5.0	mg/L	13-OCT-12	13-OCT-12	R2454998
Bicarbonate (HCO3)	525		5.0	mg/L	13-OCT-12	13-OCT-12	R2454998
Hydroxide (OH)	<5.0		5.0	mg/L	13-OCT-12	13-OCT-12	R2454998
Carbonate (CO3)	<5.0		5.0	mg/L	13-OCT-12	13-OCT-12	R2454998
Chloride (Cl)							
Chloride (Cl)	872	DLA	10	mg/L	15-OCT-12	15-OCT-12	R2455594
ICP Cations							
Calcium (Ca)	596	DLA	5.0	mg/L	15-OCT-12	15-OCT-12	R2455508
Potassium (K)	16.6	DLA	5.0	mg/L	15-OCT-12	15-OCT-12	R2455508
Magnesium (Mg)	264	DLA	5.0	mg/L	15-OCT-12	15-OCT-12	R2455508
Sodium (Na)	425	DLA	10	mg/L	15-OCT-12	15-OCT-12	R2455508
Sulfur (as SO4)	1810	DLA	15	mg/L	15-OCT-12	15-OCT-12	R2455508
Ion Balance Calculation							
Cation - Anion Balance	-0.3			%		15-OCT-12	
TDS (Calculated)	4240			mg/L		15-OCT-12	
Hardness (as CaCO3)	2580			mg/L		15-OCT-12	
Nitrate, Nitrite and Nitrate+Nitrite-N							
Nitrate-N	<0.50		0.50	mg/L	12-OCT-12	12-OCT-12	R2454632
Nitrite-N	<0.050		0.050	mg/L	12-OCT-12	12-OCT-12	R2454632
Nitrate+Nitrite-N	<0.50		0.50	mg/L	12-OCT-12	12-OCT-12	R2454632
pH and Conductivity							
pH	7.27	EHT	0.10	pH	12-OCT-12	12-OCT-12	R2454985
Conductivity (EC)	5780		10	uS/cm	12-OCT-12	12-OCT-12	R2454985
Total Coliform, EColi Mcoli Blue & HPC							
Escherichia Coli mcoli blue MF							
E. Coli	1		1	CFU/100mL	13-OCT-12	14-OCT-12	R2454988
Heterotrophic Plate Count							
Heterotrophic Plate Count	>3000		10	CFU/mL	13-OCT-12	15-OCT-12	R2455371
Total Coliform mcoli blue MF							
Total Coliforms	OVERGROWN		1	CFU/100mL	13-OCT-12	14-OCT-12	R2454988
L1222991-2 12-6 EAST FLORAL INDUST. PRK Sampled By: MATTHEW on 11-OCT-12 @ 14:30 Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	0.782		0.050	mg/L	13-OCT-12	13-OCT-12	R2454795
Routine Water Analysis							
Alkalinity, Total							
Alkalinity, Total (as CaCO3)	261		5.0	mg/L	13-OCT-12	13-OCT-12	R2454998
Bicarbonate (HCO3)	318		5.0	mg/L	13-OCT-12	13-OCT-12	R2454998
Hydroxide (OH)	<5.0		5.0	mg/L	13-OCT-12	13-OCT-12	R2454998
Carbonate (CO3)	<5.0		5.0	mg/L	13-OCT-12	13-OCT-12	R2454998
Chloride (Cl)							
Chloride (Cl)	2350	DLA	20	mg/L	15-OCT-12	15-OCT-12	R2455594
ICP Cations							
Calcium (Ca)	958	DLA	10	mg/L	15-OCT-12	15-OCT-12	R2455508
Potassium (K)	29	DLA	10	mg/L	15-OCT-12	15-OCT-12	R2455508
Magnesium (Mg)	513	DLA	10	mg/L	15-OCT-12	15-OCT-12	R2455508
Sodium (Na)	642	DLA	20	mg/L	15-OCT-12	15-OCT-12	R2455508

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1222991-2 12-6 EAST FLORAL INDUST. PRK Sampled By: MATTHEW on 11-OCT-12 @ 14:30 Matrix: WATER							
ICP Cations							
Sulfur (as SO4)	2010	DLA	30	mg/L	15-OCT-12	15-OCT-12	R2455508
Ion Balance Calculation							
Cation - Anion Balance	2.3			%		15-OCT-12	
TDS (Calculated)	6670			mg/L		15-OCT-12	
Hardness (as CaCO3)	4500			mg/L		15-OCT-12	
Nitrate, Nitrite and Nitrate+Nitrite-N							
Nitrate-N	1.70		0.50	mg/L	12-OCT-12	12-OCT-12	R2454632
Nitrite-N	0.065		0.050	mg/L	12-OCT-12	12-OCT-12	R2454632
Nitrate+Nitrite-N	1.76		0.50	mg/L	12-OCT-12	12-OCT-12	R2454632
pH and Conductivity							
pH	7.05	EHT	0.10	pH	12-OCT-12	12-OCT-12	R2454985
Conductivity (EC)	10100		10	uS/cm	12-OCT-12	12-OCT-12	R2454985
Total Coliform, EColi Mcoli Blue & HPC							
Escherichia Coli mcoli blue MF							
E. Coli	<1		1	CFU/100mL	13-OCT-12	14-OCT-12	R2454988
Heterotrophic Plate Count							
Heterotrophic Plate Count	>3000		10	CFU/mL	13-OCT-12	15-OCT-12	R2455371
Total Coliform mcoli blue MF							
Total Coliforms	106		1	CFU/100mL	13-OCT-12	14-OCT-12	R2454988
L1222991-3 12-8 EAST FLORAL INDUST. PRK Sampled By: MATTHEW on 11-OCT-12 @ 15:30 Matrix: WATER							
Miscellaneous Parameters							
Ammonia, Total (as N)	0.200		0.050	mg/L	13-OCT-12	13-OCT-12	R2454795
Nitrate, Nitrite and Nitrate+Nitrite-N							
Nitrate-N	<0.50		0.50	mg/L	12-OCT-12	12-OCT-12	R2454632
Nitrite-N	<0.050		0.050	mg/L	12-OCT-12	12-OCT-12	R2454632
Nitrate+Nitrite-N	<0.50		0.50	mg/L	12-OCT-12	12-OCT-12	R2454632
Total Coliform, EColi Mcoli Blue & HPC							
Escherichia Coli mcoli blue MF							
E. Coli	6		1	CFU/100mL	13-OCT-12	14-OCT-12	R2454988
Heterotrophic Plate Count							
Heterotrophic Plate Count	>3000		10	CFU/mL	13-OCT-12	15-OCT-12	R2455371
Total Coliform mcoli blue MF							
Total Coliforms	OVERGROWN		1	CFU/100mL	13-OCT-12	14-OCT-12	R2454988

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Qualifiers for Individual Samples Listed:

Sample Number	Client ID	Qualifier	Description
L1222991-3	12-8 EAST FLORAL INDUST	SPL	NH4 PRESERVED IN-HOUSE - Sample was Preserved at the laboratory

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
EHT	Exceeded Recommended Holding Time Prior To Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TOT-SK	Water	Alkalinity, Total	APHA 2320 B-Auto-Pot. Titration
Alkalinity is determined by a titration of an aliquot with standardized acid solution to a pH of 4.5. Total alkalinity, bicarbonate, carbonate(if present) and hydroxide(if present) also reported.			
Reference Greenberg, Arnold E., Cleseri, Lenore S., Eaton, Andrew D., Standard Methods For The Examination of Water and Wastewater, 18th Edition, 1992, Method 2320B.			
CL-SK	Water	Chloride (Cl)	APHA 4500-CL E
Chloride in aqueous matrices is determined colorimetrically by auto-analyzer.			
EC-MCOLIMF-WP	Water	Escherichia Coli mcoli blue MF	APHA 9222B AND HACH 10029
This procedure is applicable to E. coli analysis for water samples. It is also used for Total Coliform analysis when only one 100 mL samples is submitted for both Total Coliforms and E. coli. If two sample bottles are submitted for these analyses, E. coli analysis is performed by this procedure, and Total Coliform analysis can be performed by A151.			
A suitable sample volume is poured through a membrane filter and placed in a petri dish prepared with m-Coli Blue 24 broth. The inverted plates are incubated at 35C +/- 0.5C for 24hrs. Coliforms that are not E. coli turn red because they reduce TTC (2,3,5 triphenyltetrazolium chloride) in the medium. E. coli turn blue due to the reaction between the enzyme beta glucuronidase and BCIG (5-bromo-4 chloro-3 indolyl-beta-D-glucuronide) in the medium.			
ETL-ROUTINE-ICP-SK	Water	ICP Cations	APHA 3120 B-ICP-OES-ROU
These ions are determined directly y ICP-OES.			
Reference Greenberg, Arnold E., Cleseri, Lenore S., Eaton, Andrew D., Standard Methods For The Examination of Water and Wastewater, 18th Edition, 1992, Method 3120B.			
HPC-PP-WP	Water	Heterotrophic Plate Count	APHA 9215B, 2005
This is a procedure for estimating the number of live heterotrophic bacteria in water and measuring changes during water treatment and distribution or in swimming pools. In the pour plate method, samples are diluted and plated on to media. After incubation, the colonies are counted and reported as CFU/mL.			
IONBALANCE-OP03-SK	Water	Ion Balance Calculation	APHA 1030-E
N2/N3-SK	Water	Nitrate, Nitrite and Nitrate+Nitrite-N	APHA 4500 NO3F
Nitrate is quantitatively reduced to nitrite by passage of the sample through a copperized cadmium column. The nitrite (reduced nitrate plus original nitrite) is then determined by diazotizing with sulfanilamide followed by coupling with N-(1-naphthyl)ethylenediamine dihydrochloride. The resulting water-soluble dye has a magenta color, which is measured at 520nm. Original nitrite can also be determined by removing the cadmium column and following the same procedure. Nitrate-N, Nitrite-N and NO3+NO2-N are reported.			
Reference Greenberg, Arnold E., Cleseri, Lenore S., Eaton, Andrew D., Standard Methods For The Examination of Water and Wastewater, 18th Edition, 1992, Method 4500NO3-F.			
NH4-SK	Water	Ammonia-N	COMM SOIL SCI 19(6)
Ammonium in the extract is mixed with hypochlorite and salicylate to form indophenol blue, which is determined colorimetrically by auto analysis at 660 nm.			
PH/EC-SK	Water	pH and Conductivity	APHA 4500-H, 2510
TC-MCOLIMF-WP	Water	Total Coliform mcoli blue MF	APHA 9222B and HACH 10029

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
---------------	--------	------------------	--------------------

This procedure is applicable to E. coli analysis for water samples. It is also used for Total Coliform analysis when only one 100 mL samples is submitted for both Total Coliforms and E. coli. If two sample bottles are submitted for these analyses, E. coli analysis is performed by this procedure, and Total Coliform analysis is performed by A151.

A suitable sample volume is poured through a membrane filter and placed in a petri dish prepared with m-Coli Blue 24 broth. The inverted plates are incubated at 35C +/- 0.5C for 24hrs. Coliforms that are not E. coli turn red because they reduce TTC (2,3,5 triphenyltetrazolium chloride) in the medium. E. coli turn blue due to the reaction between the enzyme beta glucuronidase and BCIG (5-bromo-4 chloro-3 indolyl-beta-D-glucuronide) in the medium.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

L1222991

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

APPENDIX G

**HYDRAULIC CONDUCTIVITY TEST
REPORTS**

REPORT

Appendix C – Ministry of Highways and Infrastructure



Government
— of —
Saskatchewan

Ministry of Highways and Infrastructure
Design & Innovation - Central
18, 3603 Millar Avenue
Saskatoon, Canada S7P 0B2

February 6, 2015

Our File: C.S. 16-20 Sub
Municipal File: R651-14S

Shawn Dukart
Ministry of Government Relations
Room 978, 122 - 3rd Avenue North
Saskatoon, SK
S7K 2H6

**Re: Proposed Subdivision
R.M. of Corman Park No. 344,
N & S 1/4 35-35-04-W3M
Intended Use: Industrial/Commercial**

The Ministry of Highways and Infrastructure has reviewed the above mentioned subdivision proposal. Our Ministry has concerns over a portion of this development, we will grant partial approval provided all the conditions are met:

1. The Ministry of Highways and Infrastructure uses control circles to manage development that may be affected by future highway improvements. These traffic circles are put in place to protect the area for future interchanges. At this location, the Ministry **will not permit any permanent development inside Section 2, Lots 1, 2 and 3** due to a circle with a radius of 427 metres from the intersection of the median centreline of Highway No. 16 and the centreline of the proposed interchange. Non-permanent developments are reviewed case by case to determine if they will impact the future interchange. An example of something that **may** be allowed within a control circle as temporary would be a vehicle storage. **Please note that the control circle greatly impacts this development.** This area was protected from development because of plans for a future interchange at this location under the Highways Act, 1997.

The Ministry is currently in the process of undertaking the *Perimeter Highway South East General Location Study*. This study will determine where the future Perimeter Highway will be located. Upon completion of this general location study, the necessity of this particular control circle will be reviewed.

2. Any permanent development within 90 metres of the highway right-of-way requires a permit from this Ministry. Minimum setback from the existing roadway centreline is 60 metres for homes and 55 metres for trees, shrubs, granaries, commercial development etc. **Please note that the setbacks will impact this development.**

3. No new access to Highway 16 will be permitted. Access to the proposed subdivision shall be via the existing municipal grid road access. The existing access to Highway 16 will be removed when improvements are made to the Highway, at that time access shall be obtained via a service road or municipal grid road.
4. If the site drainage plan is to utilize the highway ditches or culverts, a capacity analysis of the existing infrastructure is required for our review. The capacity analysis should demonstrate that no negative impacts to government property or downstream landowners will occur as a result of the increased flows.

Please quote our file number on return correspondence.



Jennifer Fertuck, P. Eng.
Acting Director, Regional Asset Management
Central Region

cc: Doug Daniels, Land Manager, Saskatoon

Ministry Contact: Calla Kusch, Phone (306) 933-5657, Fax (306) 933-5805



PROPOSED SUBDIVISION

HWY 16
N & S 1/4 35-35-04-W3M
km 52.75

DRAWN BY	C. KUSCH	DATE	14/11/25	CS	16-20	TAB NO	A4-SUBDIV
DESIGNED BY		DATE		CONTRACT	CHKLST	SHEET	1 OF 1

ACAD DWG: 14/11/25
AST REV DATE:

HWY 16
C/L

NW 2-36-4-3

SE 3-36-4-3

FLORAL
ROAD

235.4

361.3

205.9

308.0

A

B

2

NE 34-35-4-3

NW 35-35-4-3

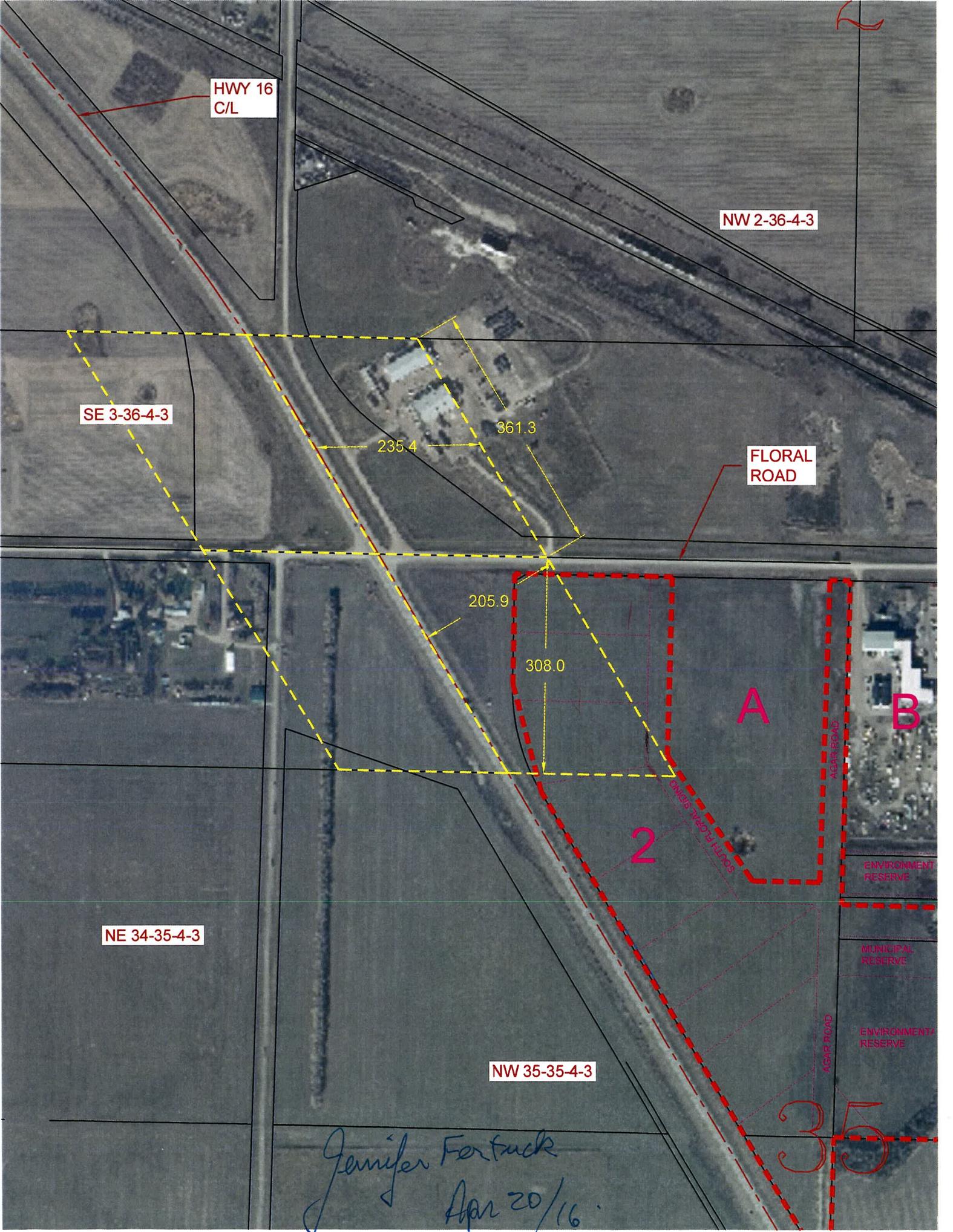
ENVIRONMENT
RESERVE

MUNICIPAL
RESERVE

ENVIRONMENT
RESERVE

*Jennifer Fortuck
Apr 20/16*

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REPORT

Appendix D – Preliminary Geotechnical Investigation



PROJECT: **PRELIMINARY GEOTECHNICAL
INVESTIGATION for
EAST FLORAL INDUSTRIAL PARK
R.M. OF CORMAN PARK, SK**

PREPARED FOR: Colliers International c/o Graham Cowles





26 October 2012

File Number: 12-1431-2-00J

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Colliers International
c/o Mr. Graham Cowles
728 Spadina Crescent East
Saskatoon, SK S7K 4H7

Re: Preliminary Geotechnical Report – Proposed East Floral Industrial Park

Attached are two (2) copies of our Preliminary Geotechnical Report for your proposed development. We look forward to a continued working relationship with you as your project progresses.

If you have any questions, concerns or further direction please call the undersigned at 244-1710.

Yours Sincerely,
PINTER & Associates Ltd.

A handwritten signature in blue ink that reads "Matthew Fleming".

Matthew Fleming, E.I.T.
Junior Engineer

file: h:\projects\1431 east floral phs i esa, colliers\1431-2 east floral geotechnical\1431-2 report - geotech\drafts\rrpt-1431-2-floralindustrial-24oct 12-mflptw.doc

**PRELIMINARY GEOTECHNICAL
INVESTIGATION @
Proposed East Floral Industrial Park
–R.M. of Corman Park, SK**

**Prepared For:
COLLIERS INTERNATIONAL &
EAST FLORAL INDUSTRIAL PARK**

**Prepared By:
PINTER & Associates Ltd.**

**26 October 2012
File: 12-1431-2-00J**

Distribution:
Client: 2 copies
PINTER & Associates Ltd.: 1 copy
PINTER & Associates Ltd.: Original



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1.0 INTRODUCTION

1.1. OVERVIEW OF PROPOSED DEVELOPMENT

Mr. Graham Cowles, on behalf of Colliers International (the Client) retained PINTER & Associates Ltd. (PINTER) to carry out a preliminary geotechnical investigation and prepare a report for a proposed industrial subdivision known as the East Floral Industrial Park (the proponent, the Site). The Site consists of a portion of the northwest quarter of 35-35-04-W3 and a small portion of the southwest quarter of 35-35-04-W3 in the R.M. of Corman Park, SK. The parcels are described as Surface Parcel Number 146792964, Parcel A, Plan 101610009 Ext 142 and Surface Parcel Number 146792986, Parcel B, Plan 101640009 Ext 144.

The nearest boundary of the site is located approximately 4.5 km southeast of the City of Saskatoon. The site location is indicated on Figure 1, Appendix A. The extent of the proposed development is indicated on Figure 2, Appendix A.

A preliminary geotechnical investigation is required to secure approval of the plan of subdivision from the R.M. of Corman Park. The Client directed the scope of work quoted from the 08 June 2012 proposal/agreement found in Appendix D.

1.2. INVESTIGATION OBJECTIVES

This investigation was carried out to determine soil and groundwater conditions at the site and provide comment on the conditions as related to the proposed commercial development. Soil and groundwater conditions are relevant to a number of development considerations, which may be broadly summarized as:

- Surface Water and Flood Control,
- Near Surface Groundwater,
- Suitability for Onsite Wastewater Disposal Systems,
- Slope Stability Considerations, and
- Foundation Design.

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2.0 METHODS

2.1. DESKTOP INVESTIGATION

The desktop investigation for this project consisted of a review of published geologic maps of the region and a search of the Saskatchewan Watershed Authority (SWA) Water Well Database.

2.2. FIELD INVESTIGATIONS

The field investigation was carried out 27 September 2012. Follow up groundwater monitoring was carried out 11 October 2012. Advantage Probe and Injection Corporation (APIC) provided the personnel, equipment and materials required for the advancement of the test holes.

PINTER provided personnel for data collection during the drilling program. Visual logging and Pocket Penetrometer tests, on disturbed soil samples, were carried out on core samples in the field to identify soil types and the approximate undrained shear strength of clay soils.

2.3. UNDERGROUND UTILITY LOCATES

Underground utility locates were requested from all utility companies via Sask First Call or direct communication where appropriate. In addition to Sask First Call cooperating companies, locates were requested from SaskWater. Utility locates were completed prior to PINTER's arrival on site.

2.4. EQUIPMENT

APIC of Saskatoon provided a truck-mounted GeoProbe direct push rig equipped with a Macro-Core® barrel sampler. The Macro-Core® system uses the direct push hammer to advance the sampler in 1.5 m (5') increments. As the barrel is advanced the open end permits soil to enter. The soil is captured in a plastic sleeve which can then be removed from the sampler for visual identification and sample collection.

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2.5. LABORATORY ANALYSES

Soil samples were collected for laboratory analysis at selected depths from cores recovered onsite. Samples were collected in soil bags provided by the laboratory.

Water content, Atterberg Limits (plasticity) and particle size analyses were performed on selected soil samples. Test hole logs including laboratory analysis results are provided in Appendix B. Copies of the laboratory analysis reports are included in Appendix C. A brief description of each test and its purpose is provided here.

Particle Size

Particle size analysis was performed on soil samples retrieved from various depths onsite. This lab analysis is used to confirm soil classification.

Atterberg Limits (Plasticity)

Atterberg Limits were performed on soil samples retrieved from various depths onsite. Atterberg limits are used to determine soil swelling potential near building foundations and approximate shear strength values of clays.

Water Content

Water content analysis was performed at several depths within the cores collected onsite. This lab analysis is used primarily to confirm the water content of the soils.

ALS Laboratory Group of Saskatoon, SK provided laboratory analysis for the particle size, plasticity and moisture content analyses. Interpretation of data and documentation of the investigation in this report were provided by PINTER.

2.6. COMPLETION OF TEST HOLES

Where monitoring wells were installed, the test hole was bored out to 82.5 mm (3.25 inches). A sand pack of 10/20 frac sand was provided from the bottom of the screen to 0.3 m above the top of the screen. The remaining depth was backfilled to surface with bentonite.

Test holes were backfilled to surface with bentonite where monitoring wells were not installed.

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2.7. SITE SURVEY

The site survey was carried out to record the monitoring well elevations and pertinent site information to prepare site drawings. This was not a legal survey. The survey was carried out using a Sokkia GRS2700 ISX GPS system in RTK mode. The location of the base station was determined using the GPS system.

A topographic survey was carried out by others and provided by the client. A copy of the topographic contours generated from this survey is provided in drawing 4457-SK102 in Appendix A. A copy of the proposed plan of subdivision is included in Figure 3, Appendix A.

CONFIDENTIAL**3.0 RESULTS****3.1. DESKTOP INVESTIGATION**

The desktop investigation indicated that site is located on a glacio-lacustrine plain. Aerial and satellite imagery indicate several large sloughs in the vicinity of the site, however, these are located at minimum 500 m from the boundary of the Site. Underlying the lake plain is approximately 350 m of Saskatoon and Sutherland Group till soils. These till soils consist of approximately 30 m of Battleford till overlying 200 m of the Floral formation. The Floral formation overlies 120 m of the Dundurn formation. Bedrock consists of the silt and clay Cretaceous Bearpaw formation.

A review of the Saskatchewan Watershed Authority database identified six (6) groundwater wells within 1 km of the proposed development. The well locations are presented in Table 1. Only one (1) well is potentially down-gradient of the proposed development. This is a withdrawal well installed by Canada Cement for domestic purposes in 1964 on NE35-35-04-W3. This cement facility continues operation, however it is not known if the well is still in service. Copies of the water well search records are included in Appendix E.

TABLE 1: SWA Water Well Database Search

Land Description	Year Completed	Use	Bottom m (ft)*	Water Level m (ft)*
Domestic				
NE 34 35 04 W3	1981	Withdrawal	32.0 (105)	NR
NE 35 35 04 W3	1964	Withdrawal	37.2 (122)	5.5 (18)
SE 35 35 04 W3	1935	Withdrawal	35.4 (116)	3.0 (10)
SE 35 35 04 W3	1997	Withdrawal	35.1 (115)	4.6 (15)
SW 02 36 04 W3	1950	Withdrawal	6.7 (22)	6.1 (20)
SW 02 36 04 W3	1988	Withdrawal	67.7 (222)	5.8 (19)

NR – Not Recorded

* - distance below ground surface

3.2. FIELD OBSERVATIONS

The site consists primarily of farmed agricultural land. The terrain is gently sloping from a high point in the northwest to a low area that follows the eastern bound of the property. Several site photographs are included in Appendix G

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Topographic information for the site was provided by the Client. This is included on drawing 4457-SK102, Appendix A. Test hole locations are indicated on the site plan in Figure 4, Appendix A.

Surface water impounding was not identified during fieldwork, although two areas of marsh vegetation (cattails and reeds) were noted at the site. These are shown on Figure 2, Appendix A. A third area of marsh vegetation was noted at the southeast corner of the property. This area is part of a much larger marsh and slough area on adjoining property.

3.3. LABORATORY ANALYSIS RESULTS

The results of laboratory analyses are presented on the test hole logs included in Appendix B. A summary of physical properties and soil classification information is provided in Table 2 below. Laboratory analysis reports are provided in Appendix C.

Gravimetric water content in the predominantly clayey soils of the top 3 m ranged from 19.1 % to 26.9 % on a dry weight basis. These water contents indicate moist soil conditions for this type of soil.

A review of the laboratory indicates primarily high plasticity clay soils at the site. Clay soils are characterized by high water content and cohesive properties. Clay soils at the observed plasticity present the likelihood for differential movements due to settlement and/or heave during changes in moisture conditions if not controlled during design.

3.4. STRATIGRAPHY

Site stratigraphy at higher topographic locations consisted of 0.0 m to 0.4 m of clay topsoil over 0.5 m to 1.0 m of loam soils. Below the loam soils was a high plasticity clay identified throughout the site. In areas of low topography, this clay soil formed the topsoil and/or uppermost layer. The observed clay layer ranged from just under 1 m to just over 5 m in thickness. Below the high plasticity clay was high plasticity clay till. The two deep test holes at the site indicated medium plasticity sandy clay till soil below the high plasticity clay till. Detailed test hole logs are provided in Appendix B.

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Disturbed Pocket Penetrometer tests were carried out on disturbed soil samples collected throughout the length of the test holes. The results suggest soil cohesion of 50 kPa to 100 kPa in the clay soil layer. The cohesive strength of the clay till soils at the site ranged from 100 kPa to 250 kPa

Cobbles and boulders were not encountered during drilling. However, random cobbles and boulders are common in glacial soils and should be expected to some degree during excavations in the glacial tills identified at this site.

CONFIDENTIAL**TABLE 2: Laboratory Results - Soil**

Test Hole / Depth	Water Content	CSSC Particle Sizes			Atterberg Limits			Classification	
		Sand	Silt	Clay	Liquid Limit	Plastic Limit	Plasticity Index	CSSC	USCS
	(%)	(%)	(%)	(%)					
12-6/1.5	24.7	6.2	2.9	91				Clay	
12-6/2.25	26.9	7.0	2.9	90				Clay	
12-6/3.0	26.0				62	30	32		CH
12-6/6.0	26.2				77	32	45		CH
12-6/7.5	12.0	43	38	19				Loam	
12-7/0.75	18.3	36	44	20				Loam	
12-7/1.5	26.1	9.1	2.0	89				Clay	
12-7/2.25	27.0				58	30	28		CH
12-8/0.75	20.9	13	43	44				Silty Clay	
12-8/1.5	23.8	0	55	44	66	30	36	Silty Clay	CH
12-8/2.25	26.3	12	40	48				Silty Clay	
12-8/4.5	21.6	19	48	33				Silty Clay Loam	
12-8/8.25	15.5				31	15	16		CI
12-9	19.1	12	45	43				Silty Clay	
12-9	21.6	7.0	41	52				Silty Clay	

Notes:

CSSC: Canadian Soil Survey Committee

USCS: Unified Soil Classification System

CH: High Plasticity Clay

CI: Intermediate Plasticity Clay

CL: Low Plasticity Clay

3.5. SITE SURVEY

A cursory site survey was carried out 27 September 2012 by PINTER to determine the test hole location and elevations and assist in developing site drawings. This is not a legal survey.

PINTER was provided with a topographical map produced by Associated Engineering. This topographical indicates a low lying area along the east property line. This corroborates interview information with the former property owner which indicates that from time to time a stream flow through the property on the east side

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into a marsh/slough/bush located at or near the southeast corner of the site. It was further indicated that this wetland drains southwest across Highway 16 into a natural drainage channel.

3.6. SLOUGHING AND GROUNDWATER

Significant sloughing conditions were not encountered during drilling. However, soft spots are anticipated at the surface in the vicinity of the marsh vegetation. Occasional sloughing may be encountered, particularly in areas of low elevation.

Depth to groundwater was determined in the standpipe piezometers on 11 October 2012. The results are presented in Table 3 below. Groundwater was identified at depths ranging from 1.09 m to 2.44 m below ground surface. Depth to groundwater is also presented on the test hole logs in Appendix B.

TABLE 3: Observed Groundwater Levels– 11 October 2012

Well	Ground Elevation	Depth of Water Below Ground Surface	Elevation of Water Table
	(m WGS84)	(m)	(m WGS84)
12-1	494.31	1.09	493.23
12-3	494.35	1.78	492.57
12-6	497.97	2.44	495.53
12-7	496.16	1.90	494.26
12-8	493.48	1.79	491.69

Groundwater monitoring included follow up readings to develop hydraulic conductivity estimates for the site. Hydraulic conductivities were determined using the bail method and Hvorslev analyses. Hydraulic conductivity test reports are included in Appendix F. Interpreted hydraulic conductivities were 1.0×10^{-7} m/s, 5.3×10^{-7} m/s, and 1.9×10^{-7} m/s at 12-6, 12-7 and 12-8 respectively. Test hole 12-6 was completed in the clay till. Test hole 12-7 was completed part in the till and partly in the high plasticity clay. Test hole 12-8 was completed entirely in the high plasticity clay.

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4.0 DISCUSSION AND RECOMMENDATIONS

4.1. INTRODUCTION

Each of the key development considerations are addressed in this section in light of the results presented in Chapter 3.0. Specific recommendations related to each topic are presented in each subsection.

4.2. NEAR SURFACE GROUNDWATER

Groundwater less than 3.0 m below ground surface was identified in all five (5) piezometers. Groundwater less than 1.5 m below ground surface was identified at one (1) out of five (5) standpipe piezometer locations. This suggests that near surface groundwater should be anticipated to some degree across the development. It should be anticipated that most locations will not accommodate full-depth basements.

Near surface groundwater can present challenges to development in terms of excavations, foundation design, wet basements and limitations to siting of onsite wastewater disposal systems. Groundwater conditions and their impacts can be summarized in three general ranges as follows;

- < 1.5 m below ground surface,
- 1.5 m to 3.0 m below ground surface, and
- > 3.0 m below ground surface.

Groundwater less than 1.5 m below ground surface creates the greatest challenges to development. At these levels, installation of basements is not recommended without some remedial effort and installation of onsite wastewater disposal systems may be significantly restricted. Dewatering will likely be required for excavations for underground infrastructure.

Where groundwater is in the range of 1.5 m to 3.0 m, basements are not recommended and should only be constructed following a site specific investigation. If basements are constructed dewatering sumps and appropriate discharge will be required. Most infrastructure excavations will not be impacted by groundwater at this

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depth; however some deeper utilities, such as water and sewer installations, may be affected.

This investigation was intended as a preliminary investigation for the purposes of obtaining approvals and to provide information on the general geological setting of the site. For design purposes detailed geotechnical investigations will be required at each development site.

Due to the clayey nature of most soils identified at the site, a test pit will not be sufficient to determine groundwater elevations. A geotechnical investigation with test holes and piezometers, including follow up groundwater monitoring, is recommended where depth to groundwater is required for design purposes.

4.3. SURFACE WATER AND FLOOD CONTROL

No surface water was identified at the site. However, areas of marsh vegetation suggest near surface groundwater. It is possible that during wet cycles or periods of intense runoff, semi-permanent surface water will accumulate in these areas if the grade is not raised. It is known from historical information that from time to time a stream runs through the property along the east property line. The water originates from the north, crosses under the roadway and travels south along the east edge of the property. This feature should be accommodated during design and included in a proper drainage plan.

Large scale flooding is not considered a concern at this site due to the distance between the site and large water bodies if natural drainage is allowed to occur.

4.4. ONSITE WASTEWATER DISPOSAL SYSTEMS

The proponent has indicated intentions to restrict onsite wastewater systems to holding tanks. This is supported by the clayey nature of the soils at the site, which will likely inhibit and/or restrict suitable systems for onsite wastewater disposal.

Onsite wastewater disposal is discussed in significant detail in a separate report prepared by PINTER & Associates Ltd. under separate cover, dated 25 October 2012, PINTER file number 1431-2.

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4.5. SLOPE STABILITY CONSIDERATIONS

Topography at the site is gently sloping. Topographic information provided by the Client indicates no extensive slopes greater than 2.5%. As such, general slope stability is not a concern at this development.

4.6. FOUNDATION CONSIDERATIONS

The random nature of clay till soils and observed variability of the stratigraphy across the proposed development preclude general foundation recommendations for this development. Site specific investigations at each development location should be carried out prior to design and construction. Site specific investigations are required to determine both soil type and groundwater conditions.

The clay soils identified at this site are sensitive and should be expected to undergo settlement and/or heaving in response to construction and associated changes related to changes in soil moisture.

For structures supported on strip footings, the bottom elevation of basement excavations should be at minimum 0.5 m above the observed groundwater table. Installation of basements below the groundwater table is not recommended. Given the nature of the clay soils at the site footing weeping tile should be provided for all structures supported on strip footings. Sub-slab drainage and sump pumps are also recommended. It is recommended that weeping tile receive at minimum 150 mm of free draining aggregate cover. The aggregate should be wrapped in suitable, free draining, non-woven geotextile.

Where grade supported slabs are used for construction, structural, reinforced slabs are recommended to minimize cracking associated with heave and differential settlement. However, structural slabs may not be required depending upon the level of serviceability required by the future owner. Appropriate construction methods should be determined for intended structures based upon a site specific investigation.

Slab construction, of any type, should be to industry best practices, including excavation of soft or deleterious materials, provision of aggregate base and poly barrier between the aggregate and poured concrete. Some degree of heaving and cracking should be expected for slabs constructed on clayey soils unless engineered designs are prepared to prevent it.

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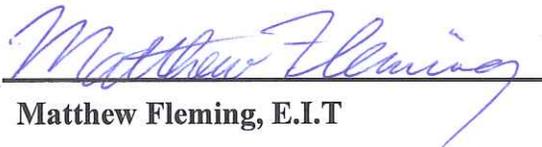
LIMITATIONS

No warranty, expressed or implied, is given concerning foundations design at the Subject Property. Where additional development is proposed at the Subject Property, additional geotechnical investigation should be undertaken. The findings and recommendations provided in this report were prepared in accordance with generally accepted professional engineering principles and practices.

The results, findings and recommendations of this report are based on the results of field observations and laboratory analysis. Interpolation of soil and groundwater conditions has been made between test hole locations. If conditions are encountered that differ from those detailed by the test holes drilled onsite and described in this report, or if the assumptions stated in this report are not in keeping with the design, PINTER should be notified in order to review and adjust the recommendations, if necessary.

This report has been prepared for the exclusive use of *Colliers International* and *East Floral Industrial Park*. Any use that 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. PINTER & Associates Ltd. accepts no responsibility for damages, if any suffered by any third party, as a result of decisions made or actions based on this report.

PINTER & Associates Ltd.



Matthew Fleming, E.I.T
Junior Engineer



Lawrence G. Pinter, P.Eng.
Project Manager

Date: 26 October 2012

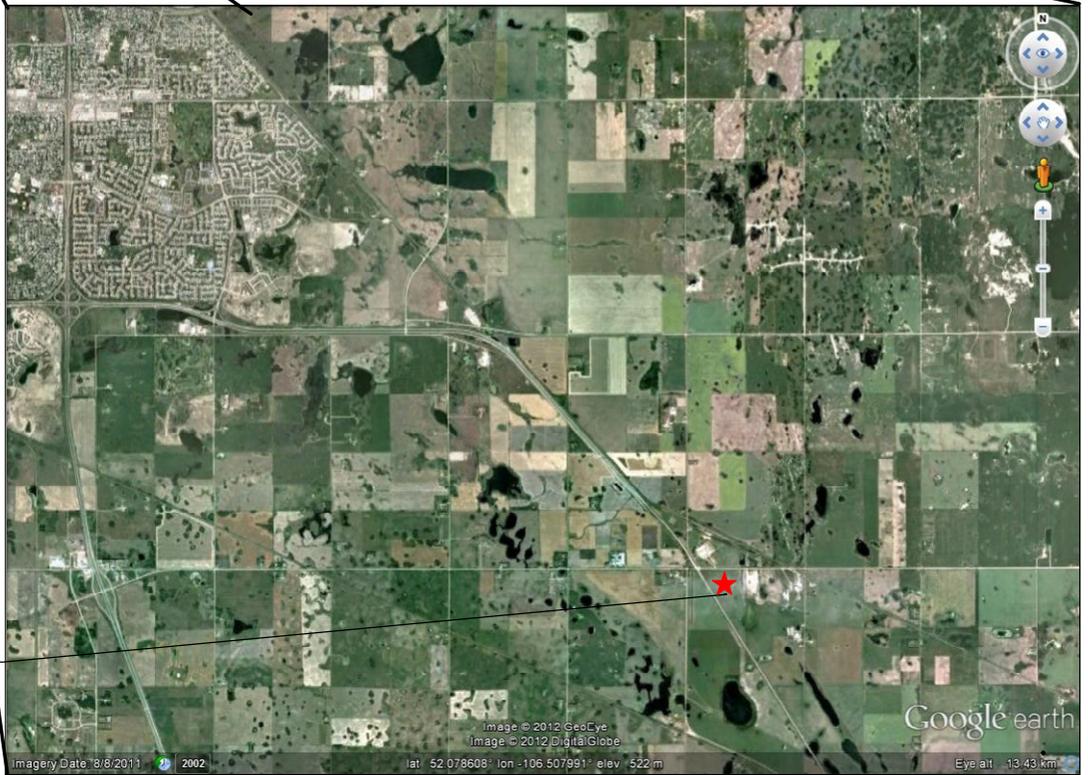
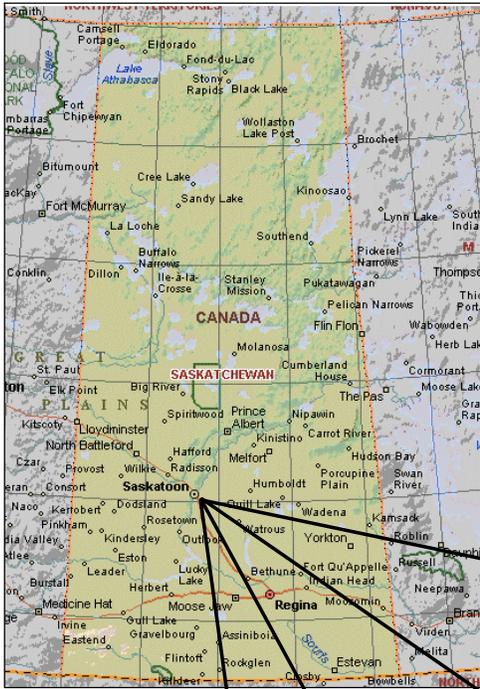
Association of Professional Engineers & Geoscientists of Saskatchewan		
CERTIFICATE OF AUTHORIZATION		
Pinter & Associates Ltd.		
Number C1232		
Permission to Consult held by:		
Discipline	Sk. Reg. No.	Signature
Environmental	6565	
Geotechnical	6565	



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APPENDIX A

DRAWINGS



SUBJECT PROPERTY

*Reference: Map details from "Google Maps 2011"



710A-48TH STREET EAST
SASKATOON SK S7K 5B4
306.244.1710
pintermain@pinter.ca

LEGEND

Subject Property ★



DRAWING TITLE

FIGURE 1
SITE LOCATION

DATE: 16 OCTOBER 2012
FILENAME: 12-1431-2 RM CORMAN PARK, SK

DRAWN BY: M. FLEMING, E.I.T.

CHECKED BY: L. PINTER, P.ENG.

SCALE: N/A

FILE: H:\PROJECTS\1431 EAST FLORAL PHS I ESA
1431-2 EAST FLORAL GEOTECH\1431-2 DRAWINGS



710A 48TH ST. E.
SASKATOON SK S7K 5B4
306.244.1710
pintermain@pinter.ca

NOTES:

1. THIS DRAWING IS PREPARED FOR ILLUSTRATIVE PURPOSES ONLY.
2. THIS IS NOT A LEGAL SURVEY.
3. ALL MEASUREMENTS ARE IN METRES.
4. SURVEY INFORMATION COLLECTED BY RTK GPS. BASE STATION LOCATION DETERMINED BY GPS SYSTEM USING WGS '84 GEOID IN UTM COORDINATES.

LEGEND

TEST HOLE		GAS		SEWER	
MONITORING WELL		POWER		STORM SEWER	
CATTAILS		PHONE		POWER POLE	
IRON PIN		WATER		PROPERTY LINE (APPROX.)	



SCALE 1: 6500 (APPROXIMATE)

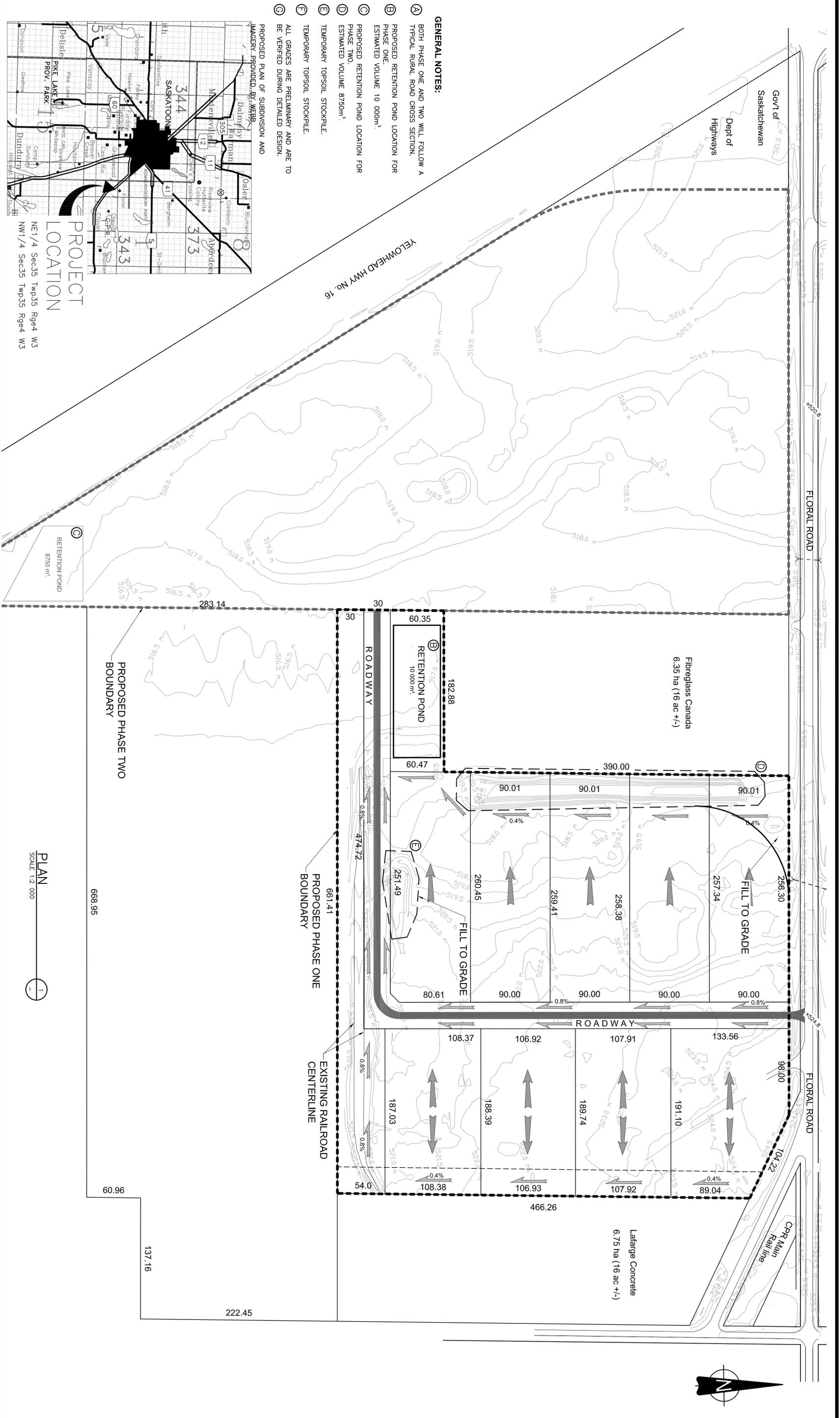
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FIGURE 2
PROPOSED DEVELOPMENT

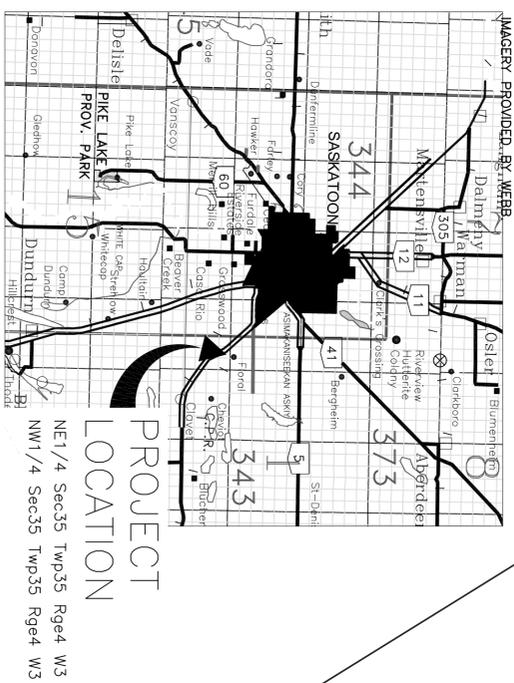
16 OCTOBER 2012
12-1431-2 RM CORMAN PARK

DRAWN BY: M. FLEMING, E.I.T.

CHECKED BY: L. PINTER, P.ENG.



- GENERAL NOTES:**
- A BOTH PHASE ONE AND TWO WILL FOLLOW A TYPICAL RURAL ROAD CROSS SECTION.
 - B PROPOSED RETENTION POND LOCATION FOR PHASE ONE. ESTIMATED VOLUME 10 000m³.
 - C PROPOSED RETENTION POND LOCATION FOR PHASE TWO. ESTIMATED VOLUME 8750m³.
 - D TEMPORARY TOPSOIL STOCKPILE.
 - E TEMPORARY TOPSOIL STOCKPILE.
 - F ALL GRADES ARE PRELIMINARY AND ARE TO BE VERIFIED DURING DETAILED DESIGN.
- PROPOSED PLAN OF SUBDIVISION AND IMAGERY PROVIDED BY MERRB



VERIFY SCALES

BAR IS 20mm ON ORIGINAL DRAWING
 0 20mm
 IF NOT 20mm ON THIS SHEET USE SCALES ACCORDINGLY

PRELIMINARY
 NOT FOR CONSTRUCTION



PROJECT No.	20084457
SCALE	1:2000
DRAWN	T. ISTEAD
DESIGNED	T. ISTEAD
CHECKED	D. THOMPSON
APPROVED	D. RIVAS
DATE	FEBRUARY 2009
INITIAL	

PLAN
 SCALE 1:2 000



EAST FLORAL INDUSTRIAL PARK LTD.
 CIVIL
 OVERALL CONTOUR PLAN
 DRAINAGE CONCEPT

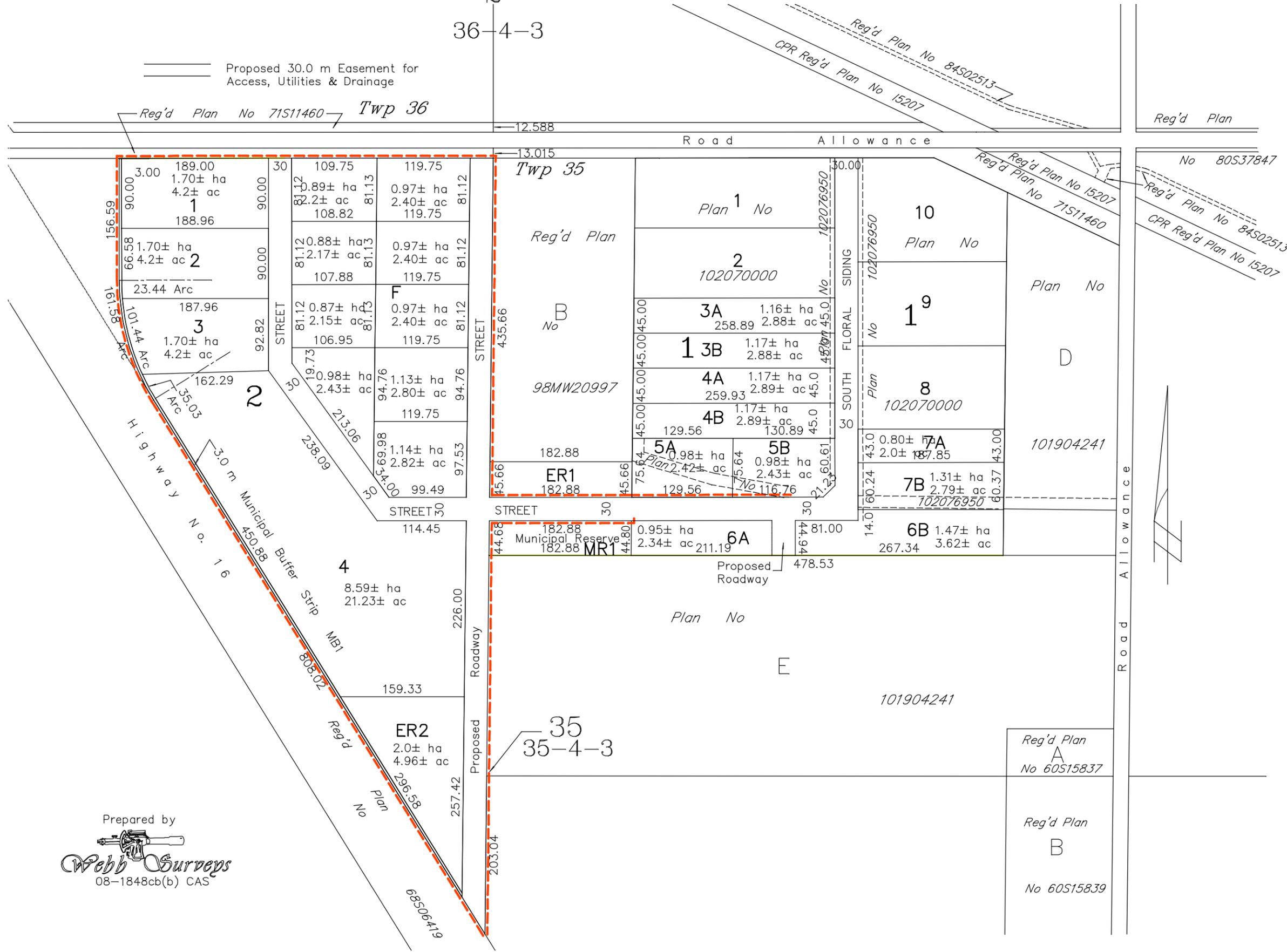
EAST FLORAL INDUSTRIAL PARK
 COMMERCIAL DEVELOPMENT
 DRAWING NUMBER
 4457-SK102

REV. NO.	A
SHEET	2

Proposed 30.0 m Easement for Access, Utilities & Drainage

Reg'd Plan No 71S11460 Twp 36

36-4-3



Prepared by

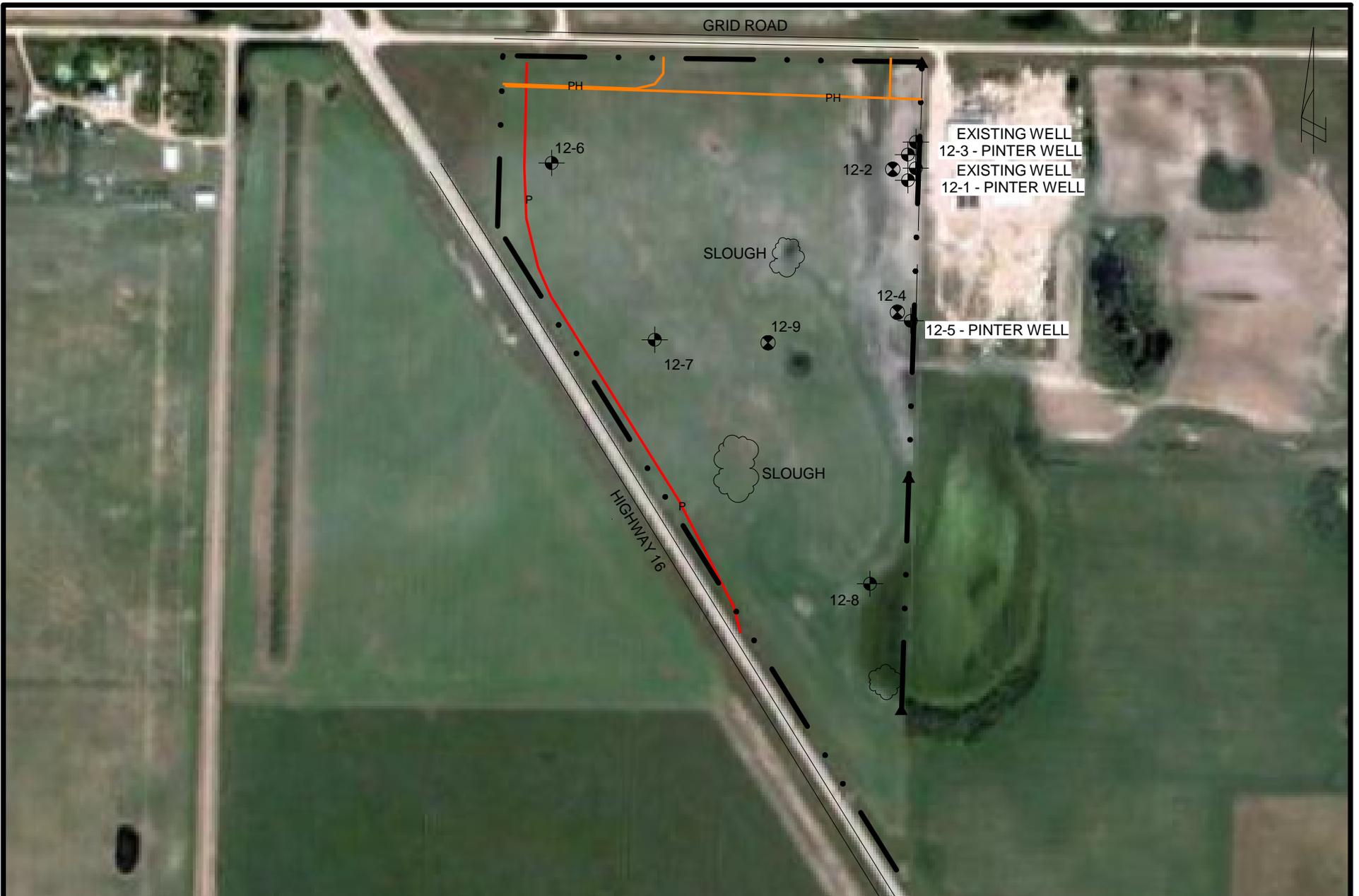
Webb Surveys
 08-1848cb(b) CAS

Reg'd Plan
 A
 No 60S15837

Reg'd Plan
 B
 No 60S15839

No 80S37847
 Reg'd Plan No 84S02513
 Reg'd Plan No 71S11460
 CPR Reg'd Plan No 15207





710A 48TH ST. E.
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3. ALL MEASUREMENTS ARE IN METRES.
4. SURVEY INFORMATION COLLECTED BY RTK GPS. BASE STATION LOCATION DETERMINED BY GPS SYSTEM USING WGS '84 GEOID IN UTM COORDINATES.

LEGEND

TEST HOLE		GAS		SEWER	
MONITORING WELL		POWER		STORM SEWER	
CATTAILS		PHONE		POWER POLE	
IRON PIN		WATER		PROPERTY LINE (APPROX.)	



SCALE 1: 6500 (APPROXIMATE)

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FIGURE 4
TEST HOLE LOCATIONS
16 OCTOBER 2012
12-1431-2 RM CORMAN PARK
DRAWN BY: M. FLEMING, E.I.T.
CHECKED BY: L. PINTER, P.ENG.

APPENDIX B

TEST HOLE LOGS



12-1431-2 - East Floral Industrial Park
RM of Corman Park, SK
Geotechnical and Hydrogeological Investigation

Investigative Method : Macro-Core MC5
Date Finished : 27 September 2012

Water Elev. Recorded : 11 October 2012
Groundwater :

Logged By : MF
Checked By : LP

Depth-Meters (m)	Surf. Elev. 494.35	GRAPHIC	Legend WC = Water Content (%) PI = Plastic Index (%) LL = Liquid Limit (%) USCS = Unified Soil Classification System CSSC = Canadian Soil Survey Committee	Sample	Pocket Pen. (kg/sq.cm)	Lab Results	SIEVE ANALYSIS				
							% Sand	% Silt	% Clay		
			DESCRIPTION								
0			CLAY, trace silt, medium to high plasticity, pale brown, oxidized, dry to damp, firm to stiff, frequent fractures and slickensides noted Increased silt content below 0.5 m Increased sand content at 1.5 m								
494					1.5	WC: 21.7					
1					1.0	WC: 18.5					
493					1.0	WC: 27.4					
2					1.5	WC: 25.2					
492					1.5	WC: 22.7					
3					1.5	WC: 27.1					
491					CLAY, (Till), little silt, trace sand, high plasticity, grey, unoxidized, damp to dry, soft	2.5	WC: 24.5				
4						2.0	WC: 24.2				
490											
5											
489											
6			End of Hole at 6.0 m								
488											
7											
487											
8											
486											
9											
485											
10											



12-1431-2 - East Floral Industrial Park
RM of Corman Park, SK
Geotechnical and Hydrogeological Investigation

Investigative Method : Macro-Core MC5
Date Finished : 27 September 2012

Water Elev. Recorded :
Groundwater :

Logged By : MF
Checked By : LP

Depth-Meters (m)	Surf. Elev. 494.32	GRAPHIC	Legend WC = Water Content (%) PI = Plastic Index (%) LL = Liquid Limit (%) USCS = Unified Soil Classification System CSSC = Canadian Soil Survey Committee	Sample	Pocket Pen. (kg/sq.cm)	Lab Results	SIEVE ANALYSIS							
							% Sand	% Silt	% Clay					
			DESCRIPTION											
0			CLAY, little silt, little sand, medium to high plasticity, pale brown to grey, oxidized, moist, soft to very soft, frequent fractures and slickensides noted		1.0	WC: 24.5								
494														
1							Decreasing sand content below 1.5 m		1.0	WC: 25.0				
493														
2														
492								Mottled, dry below 3.8 m		1.5	WC: 25.5			
3														
491														
4					2.0	WC: 27.0								
490														
5														
489			CLAY, (Till), little silt, little sand, high plasticity, dark grey, unoxidized, damp, soft to firm,		2.5	WC: 25.8								
6														
			End of Hole at 6.0 m											
488														
7														
487														
8														
486														
9														
485														
10														

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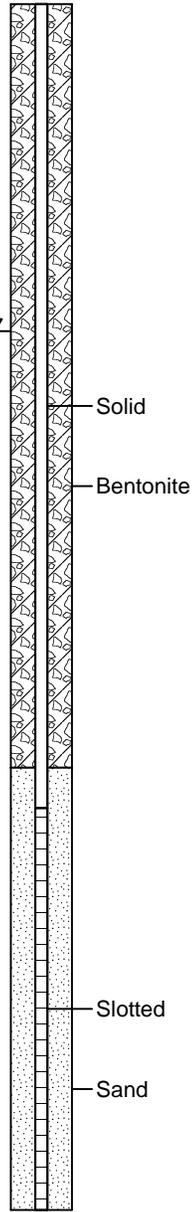
12-1431-2 - East Floral Industrial Park
RM of Corman Park, SK
Geotechnical and Hydrogeological Investigation

Investigative Method : Macro-Core MC5
Date Finished : 27 September 2012

Water Elev. Recorded : 11 October 2012
Groundwater :

Logged By : MF
Checked By : LP

Depth-Meters (m)	Surf. Elev. 497.97	GRAPHIC	DESCRIPTION	Sample	Pocket Pen. (kg/sq.cm)	Lab Results	SIEVE ANALYSIS		
							% Sand	% Silt	% Clay
0			TOPSOIL, clay, some silt, low to no plasticity, dark brown to black, oxidized, dry, loose, increasing water content with depth						
1	497		SAND, fine, little silt, little clay, pale brown, oxidized, moist, compact to dense, increasing sand content with depth		1.0	WC: 16.1			
2	496		CLAY, trace silt, trace sand, medium to high plasticity, pale brown, oxidized, moist, firm to stiff, frequent fractures and slickensides noted		0.5	WC: 24.7 CSSC: Clay	6.2	2.9	90.9
			Increased water content at 1.7 m.		0.5	WC: 26.9 CSSC: Clay	7.0	2.9	90.1
3	495		Increasing plasticity below 2.0 m, variable stiffness, soft to stiff.		1.0	WC: 26.0 LL: 62 PI: 32 USCS: CH - High Plasticity Clay			
			Becomes stiff to hard.		0.5	WC: 23.5			
4	494		Variably soft to stiff		0.5	WC: 26.1			
			Becomes grey with occasional brown mottles, occasional ochre staining, medium to high plasticity		0.5	WC: 26.1			
5	493		Variable occasional sand below 3.6 m		0	WC: 25.5			
			Very soft at 4.7 m		2.0	WC: 26.2 LL: 77 PI: 45 USCS: CH - High Plasticity Clay			
6	492		CLAY, (Till), some silt, little sand, medium to high plasticity, grey, unoxidized, moist, occasional fractures		2.0	WC: 26.2 LL: 77 PI: 45 USCS: CH - High Plasticity Clay			
			Becomes firm to stiff, increased water content 6.0 m.		0.5	WC: 14.9			
7	491		CLAY, (Till), some silt, some sand, occasional gravel, medium plasticity, grey, unoxidized, damp, stiff to hard		2.0	WC: 12.0	43	38	19
			1 to 2 mm thick sand seam at 7.2 m		1.5	WC: 13.7			
8	490				2.0	WC: 12.7			
9	489		End of Hole at 9.0 m						
10	488								



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12-1431-2 - East Floral Industrial Park
RM of Corman Park, SK
Geotechnical and Hydrogeological Investigation

Investigative Method : Macro-Core MC5
Date Finished : 27 September 2012

Water Elev. Recorded : 11 October 2012
Groundwater :

Logged By : MF
Checked By : LP

Depth-Meters (m)	Surf. Elev. 496.15	GRAPHIC	Legend WC = Water Content (%) PI = Plastic Index (%) LL = Liquid Limit (%) USCS = Unified Soil Classification System CSSC = Canadian Soil Survey Committee	Sample	Pocket Pen. (kg/sq.cm)	Lab Results	SIEVE ANALYSIS		
							% Sand	% Silt	% Clay
			DESCRIPTION						
0	496		TOPSOIL, clay, some silt, low to no plasticity, dark brown to black, oxidized, dry, loose, increasing water content with depth	0.5	WC: 18.3 CSSC: Loam	35.5	43.9	20.6	
1	495		SAND, fine, some silt, little clay, pale brown, oxidized, moist, compact to dense, increasing sand content with depth	1.0	WC: 26.1 CSSC: Clay	9.1	2.0	88.9	
2	494		CLAY, trace silt, trace sand, medium to high plasticity, pale brown, oxidized, moist, firm to stiff, frequent fractures and slickensides noted, occasional sand seams	1.0	WC: 27.0 LL: 58 PI: 28 USCS: CH - High Plasticity Clay				
3	493		CLAY, (Till), little silt, trace sand, medium to high plasticity, grey, unoxidized, moist, occasional fractures	1.0	WC: 26.7				
			End of Hole at 3.0 m						
4	492								
5	491								
6	490								
7	489								
8	488								
9	487								
10									



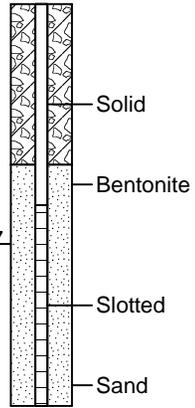
12-1431-2 - East Floral Industrial Park
RM of Corman Park, SK
Geotechnical and Hydrogeological Investigation

Investigative Method : Macro-Core MC5
Date Finished : 27 September 2012

Water Elev. Recorded : 11 October 2012
Groundwater :

Logged By : MF
Checked By : LP

Depth-Meters (m)	Surf. Elev. 493.48	GRAPHIC	DESCRIPTION	Sample	Pocket Pen. (kg/sq.cm)	Lab Results	SIEVE ANALYSIS		
							% Sand	% Silt	% Clay
0			CLAY, some silt, medium to high plasticity, black, oxidized, moist, firm						
0.3			Becomes pale brown at 0.3 m	0.5	WC: 20.9 CSSC: Silty Clay	13.6	42.6	44.1	
1.0			Becomes mottled grey and brown, low to medium plasticity, firm to stiff below 1.3 m	1.0	WC: 23.8 LL: 66 PI: 36 USCS: CH - High Plasticity Clay CSSC: Silty Clay	0	55	44	
1.5			Soft and wet from 2.6 to 2.9 m	1.5	WC: 26.3 CSSC: Silty Clay	11.9	40.5	47.6	
1.5				1.5	WC: 29.6				
3.0			CLAY, (Till), some silt, little sand, medium to high plasticity, grey, unoxidized, moist, stiff to hard, occasional fractures	1.0	WC: 26.8				
2.0				2.0	WC: 21.6 CSSC: Silty Clay Loam	19	48	33	
4.0			Becomes firm to stiff, increased water content and medium to high plasticity below 5.4 m.	0.0	WC: 28.5				
5.0			CLAY, (Till), some silt, some sand, occasional gravel, medium plasticity, grey, unoxidized, damp, stiff to hard	2.0	WC: 24.3				
6.0				2.5	WC: 18.6				
7.0				2.5	WC: 18.9				
8.0				2.5	WC: 15.5 LL: 31 PI: 16 USCS: CI - Intermediate Plasticity Clay				
9.0			End of Hole at 9.0 m						
9.0									
10.0									



10-26-2012 H:\Projects\1431 East Floral Phs | ESA, Colliers\1431-2 East Floral Geotechnical\1431-2 BH Logs\1431-2 - 12-8-BHLog-Geotech-02Oct12.bo



12-1431-2 - East Floral Industrial Park
RM of Corman Park, SK
Geotechnical and Hydrogeological Investigation

Investigative Method : Macro-Core MC5
Date Finished : 27 September 2012

Water Elev. Recorded :
Groundwater :

Logged By : MF
Checked By : LP

Depth-Meters (m)	Surf. Elev. 495.83	GRAPHIC	Legend WC = Water Content (%) PI = Plastic Index (%) LL = Liquid Limit (%) USCS = Unified Soil Classification System CSSC = Canadian Soil Survey Committee	Sample	Pocket Pen. (kg/sq.cm)	Lab Results	SIEVE ANALYSIS		
							% Sand	% Silt	% Clay

0			TOPSOIL, clay, some silt, low to no plasticity, dark brown to black, oxidized, dry, loose, increasing water content with depth						
1	495		SAND, fine, some silt, little clay, pale brown, oxidized, moist, compact to dense, increasing sand content with depth	1.0	1.0	WC: 19.1 CSSC: Silty Clay	12.2	45.4	42.4
2	494		CLAY, trace silt, medium to high plasticity, pale brown, oxidized, moist, soft to firm, frequent fractures and slickensides noted, expansive	0.5	0.5	WC: 21.6 CSSC: Silty Clay	7.0	41.0	52.0
3	493		-becomes saturated, dark brown, increased to some silt content.	0.5	0.5	WC: 28.9			
				1.0	1.0	WC: 27.0			

End of Hole at 3.0 m

APPENDIX C

LABORATORY ANALYSIS REPORTS



PINTER AND ASSOCIATES LTD.
ATTN: MATTHEW FLEMING
710A 48th Street East
Saskatoon SK S7K 5B4

Date Received: 01-OCT-12
Report Date: 09-OCT-12 15:30 (MT)
Version: FINAL

Client Phone: 306-244-1710

Certificate of Analysis

Lab Work Order #: L1217302
Project P.O. #: PO# 1431-2
Job Reference: 1431-2 FLORAL INDUSTRIAL GEOTECH
C of C Numbers:
Legal Site Desc:

Brian Morgan
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: #819-58th St E., Saskatoon, SK S7K 6X5 Canada | Phone: +1 306 668 8370 | Fax: +1 306 668 8383
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1217302-1 12-3 0-0.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	21.7		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-2 12-3 0.75-1.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	18.5		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-3 12-3 1.5-2.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	27.4		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-4 12-3 2.25-3.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	25.2		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-5 12-3 3.0-3.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	22.7		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-6 12-3 3.75-4.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	27.1		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-7 12-3 4.5-5.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	24.5		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-8 12-3 5.25-6.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	24.2		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-9 12-4 0.75-1.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	25.0		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-10 12-4 1.5-2.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	24.6		0.10	%	04-OCT-12	04-OCT-12	R2449104

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1217302-11 12-4 2.25-3.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	25.5		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-12 12-4 3.0-3.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	24.5		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-13 12-4 3.75-4.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	27.0		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-15 12-4 5.25-6.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	25.8		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-16 12-6 @ 0.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	16.1		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-17 12-6 @ 1.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture Particle Size - Pipette Method % Sand (2.0mm - 0.05mm) % Silt (0.05mm - 2um) % Clay (<2um) Texture	24.7 6.16 2.91 90.9 Clay		0.10 0.10 0.10 0.10	% % % %	04-OCT-12 02-OCT-12 02-OCT-12 02-OCT-12 02-OCT-12	04-OCT-12 03-OCT-12 03-OCT-12 03-OCT-12 03-OCT-12	R2449104 R2448738 R2448738 R2448738 R2448738
L1217302-18 12-6 @ 2.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture Particle Size - Pipette Method % Sand (2.0mm - 0.05mm) % Silt (0.05mm - 2um) % Clay (<2um) Texture	26.9 6.96 2.90 90.1 Clay		0.10 0.10 0.10 0.10	% % % %	04-OCT-12 02-OCT-12 02-OCT-12 02-OCT-12 02-OCT-12	04-OCT-12 03-OCT-12 03-OCT-12 03-OCT-12 03-OCT-12	R2449104 R2448738 R2448738 R2448738 R2448738
L1217302-19 12-6 @ 3.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture Atterberg limits Liquid Limit (LL)	26.0 62		0.10 1	% %	04-OCT-12 05-OCT-12	04-OCT-12 05-OCT-12	R2449104 R2450435

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1217302-19 12-6 @ 3.0 Sampled By: MATTHEW Matrix: SOIL Atterberg limits Plasticity Index (PI)	32		1	%	05-OCT-12	05-OCT-12	R2450435
L1217302-20 12-6 @ 3.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	23.5		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-21 12-6 @ 4.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	26.1		0.10	%	04-OCT-12	04-OCT-12	R2449104
L1217302-22 12-6 @ 5.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	25.5		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-23 12-6 @ 6.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture Atterberg limits Liquid Limit (LL) Plasticity Index (PI)	26.2 77 45		0.10 1 1	% % %	04-OCT-12 05-OCT-12 05-OCT-12	04-OCT-12 05-OCT-12 05-OCT-12	R2448989 R2450435 R2450435
L1217302-24 12-6 @ 6.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	14.9		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-25 12-6 @ 7.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters Grain Size Curve % Moisture	SEE ATTACHED 12.0		0.10	%	03-OCT-12 04-OCT-12	04-OCT-12 04-OCT-12	R2451691 R2448989
L1217302-26 12-6 @ 8.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	13.7		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-27 12-6 @ 9.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	12.7		0.10	%	04-OCT-12	04-OCT-12	R2448989

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1217302-28 12-7 @ 0.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	18.3		0.10	%	04-OCT-12	04-OCT-12	R2448989
Particle Size - Pipette Method % Sand (2.0mm - 0.05mm)	35.5		0.10	%	02-OCT-12	03-OCT-12	R2448738
% Silt (0.05mm - 2um)	43.9		0.10	%	02-OCT-12	03-OCT-12	R2448738
% Clay (<2um)	20.6		0.10	%	02-OCT-12	03-OCT-12	R2448738
Texture	Loam				02-OCT-12	03-OCT-12	R2448738
L1217302-29 12-7 @ 1.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	26.1		0.10	%	04-OCT-12	04-OCT-12	R2448989
Particle Size - Pipette Method % Sand (2.0mm - 0.05mm)	9.11		0.10	%	02-OCT-12	03-OCT-12	R2448738
% Silt (0.05mm - 2um)	2.04		0.10	%	02-OCT-12	03-OCT-12	R2448738
% Clay (<2um)	88.9		0.10	%	02-OCT-12	03-OCT-12	R2448738
Texture	Clay				02-OCT-12	03-OCT-12	R2448738
L1217302-30 12-7 @ 2.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	27.0		0.10	%	04-OCT-12	04-OCT-12	R2448989
Atterberg limits Liquid Limit (LL)	58		1	%	05-OCT-12	05-OCT-12	R2450435
Plasticity Index (PI)	28		1	%	05-OCT-12	05-OCT-12	R2450435
L1217302-31 12-7 @ 3.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	26.7		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-32 12-8 @ 0.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	20.9		0.10	%	04-OCT-12	04-OCT-12	R2448989
Particle Size - Pipette Method % Sand (2.0mm - 0.05mm)	13.6		0.10	%	02-OCT-12	03-OCT-12	R2448738
% Silt (0.05mm - 2um)	42.3		0.10	%	02-OCT-12	03-OCT-12	R2448738
% Clay (<2um)	44.1		0.10	%	02-OCT-12	03-OCT-12	R2448738
Texture	Silty clay				02-OCT-12	03-OCT-12	R2448738
L1217302-33 12-8 @ 1.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters Grain Size Curve	SEE ATTACHED				03-OCT-12	04-OCT-12	R2451691
% Moisture	23.8		0.10	%	04-OCT-12	04-OCT-12	R2448989
Atterberg limits Liquid Limit (LL)	66		1	%	05-OCT-12	05-OCT-12	R2450435
Plasticity Index (PI)	36		1	%	05-OCT-12	05-OCT-12	R2450435

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1217302-34 12-8 @ 2.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	26.3		0.10	%	04-OCT-12	04-OCT-12	R2448989
Particle Size - Pipette Method % Sand (2.0mm - 0.05mm)	11.9		0.10	%	02-OCT-12	03-OCT-12	R2448738
% Silt (0.05mm - 2um)	40.5		0.10	%	02-OCT-12	03-OCT-12	R2448738
% Clay (<2um)	47.6		0.10	%	02-OCT-12	03-OCT-12	R2448738
Texture	Silty clay				02-OCT-12	03-OCT-12	R2448738
L1217302-35 12-8 @ 3.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	29.6		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-36 12-8 @ 3.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	26.8		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-37 12-8 @ 4.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters Grain Size Curve	SEE ATTACHED				03-OCT-12	04-OCT-12	R2451691
% Moisture	21.6		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-38 12-8 @ 5.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	28.5		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-39 12-8 @ 6.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	24.3		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-40 12-8 @ 6.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	18.6		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-41 12-8 @ 7.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	18.9		0.10	%	04-OCT-12	04-OCT-12	R2448989
L1217302-42 12-8 @ 8.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	15.5		0.10	%	04-OCT-12	04-OCT-12	R2449244

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1217302-43 12-8 @ 9.0 Sampled By: MATTHEW Matrix: SOIL Atterberg limits Liquid Limit (LL) Plasticity Index (PI)	 31 16		 1 1	 % %	 05-OCT-12 05-OCT-12	 05-OCT-12 05-OCT-12	 R2450435 R2450435
L1217302-44 12-9 @ 0.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture Particle Size - Pipette Method % Sand (2.0mm - 0.05mm) % Silt (0.05mm - 2um) % Clay (<2um) Texture	 19.1 12.2 45.4 42.4 Silty clay		 0.10 0.10 0.10 0.10	 % % % %	 04-OCT-12 02-OCT-12 02-OCT-12 02-OCT-12 02-OCT-12	 04-OCT-12 03-OCT-12 03-OCT-12 03-OCT-12 03-OCT-12	 R2449244 R2448738 R2448738 R2448738 R2448738
L1217302-45 12-9 @ 1.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture Particle Size - Pipette Method % Sand (2.0mm - 0.05mm) % Silt (0.05mm - 2um) % Clay (<2um) Texture	 21.6 6.95 41.0 52.0 Silty clay		 0.10 0.10 0.10 0.10	 % % % %	 04-OCT-12 02-OCT-12 02-OCT-12 02-OCT-12 02-OCT-12	 04-OCT-12 03-OCT-12 03-OCT-12 03-OCT-12 03-OCT-12	 R2449244 R2448738 R2448738 R2448738 R2448738
L1217302-46 12-9 @ 2.25 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	 28.9		 0.10	 %	 04-OCT-12	 04-OCT-12	 R2449244
L1217302-47 12-9 @ 3.0 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	 27.0		 0.10	 %	 04-OCT-12	 04-OCT-12	 R2449244
L1217302-48 12-4 0-0.75 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	 24.5		 0.10	 %	 04-OCT-12	 04-OCT-12	 R2449244
L1217302-49 12-4 @ 8.5 Sampled By: MATTHEW Matrix: SOIL Miscellaneous Parameters % Moisture	 26.3		 0.10	 %	 04-OCT-12	 04-OCT-12	 R2449244

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Qualifiers for Individual Samples Listed:

Sample Number	Client ID	Qualifier	Description
L1217302-14	12-4 4.5-5.25	NR:NR	No Result: Sample Not Received At Laboratory

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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ATTERBERG-SK	Soil	Atterberg limits	CARTER CSSS 58
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The liquid limit (or upper plastic limit) is the point at which the soil becomes semifluid, like softened butter. In operational terms, the liquid limit is defined as the water content at which a trapezoidal groove cut in moist soil is closed after 25 taps on a hard rubber plate (ASTM D-18, 1958).

The plastic limit (or lower plastic limit) is defined as the water content at which soil begins to crumble on being rolled into a thread 1/8 inch (or 3 mm) in diameter. It represents the lowest water content at which soil can be deformed readily without cracking.

The plastic index (which is the difference between the liquid and plastic limits) gives an indication of the "clayeyness" or plasticity of a clay and is employed in engineering classification systems for soils.

References: McKeague, J.A. 1978. Atterberg Limits pp 50 - 55 In: Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci. p. 50 - 55

GRAIN SIZE-SK	Soil	Grain Size Analysis	SSIR-51 METHOD 3.2.1
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Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

MOIST-SK	Soil	Moisture Content	ASTM D2216-80
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The weighed portion of soil is placed in a 105°C oven overnight. The dried soil is allowed to cooled to room temperature, weighed and the % moisture is calculated.

Reference: ASTM D2216-80

PSA-2-SK	Soil	Particle Size - Pipette Method	Forestry Canada (1991) p. 47-53
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Dry, < 2 mm soil is treated with sodium hexametaphosphate to ensure complete dispersion of primary soil particles. The homogenized suspension is allowed to settle in accordance with Stoke's Law so that only clay particles remain in suspension. To determine the clay fraction, an aliquot of the clay suspension is removed, then dried and weighed. The sand fraction is determined by wet sieving the remaining suspension, then drying and weighing the sand retained on the sieve. The silt fraction is determined by calculation where % Silt = 100 - (%Sand+%Clay)

Reference:

Burt, R. (2009). Soil Survey Field and Laboratory Methods Manual. Soil Survey Investigations Report No. 5. Method 3.2.1.2.2. United States Department of Agriculture Natural Resources Conservation Service.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

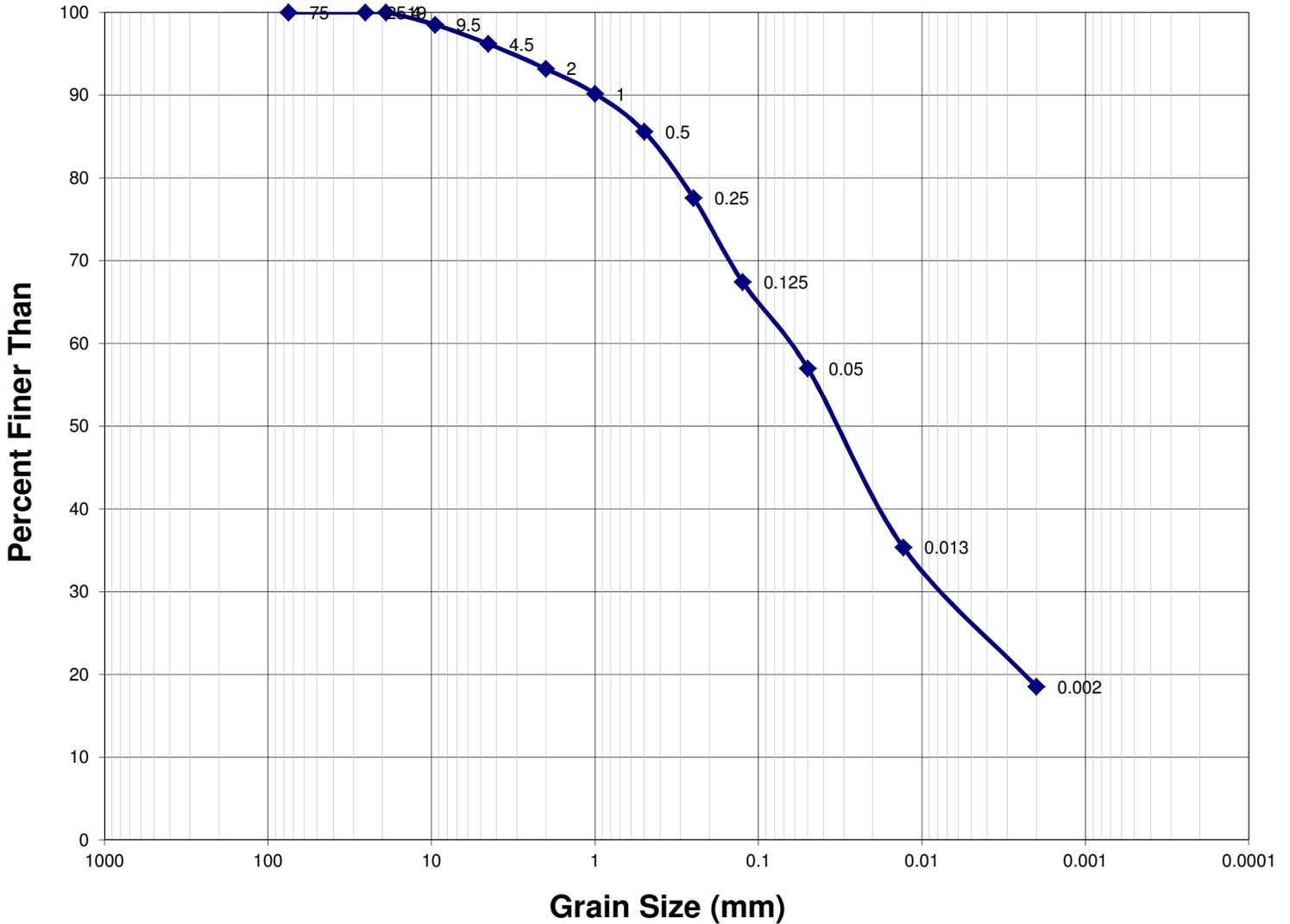
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Particle Size Distribution Curve



Summary of Results

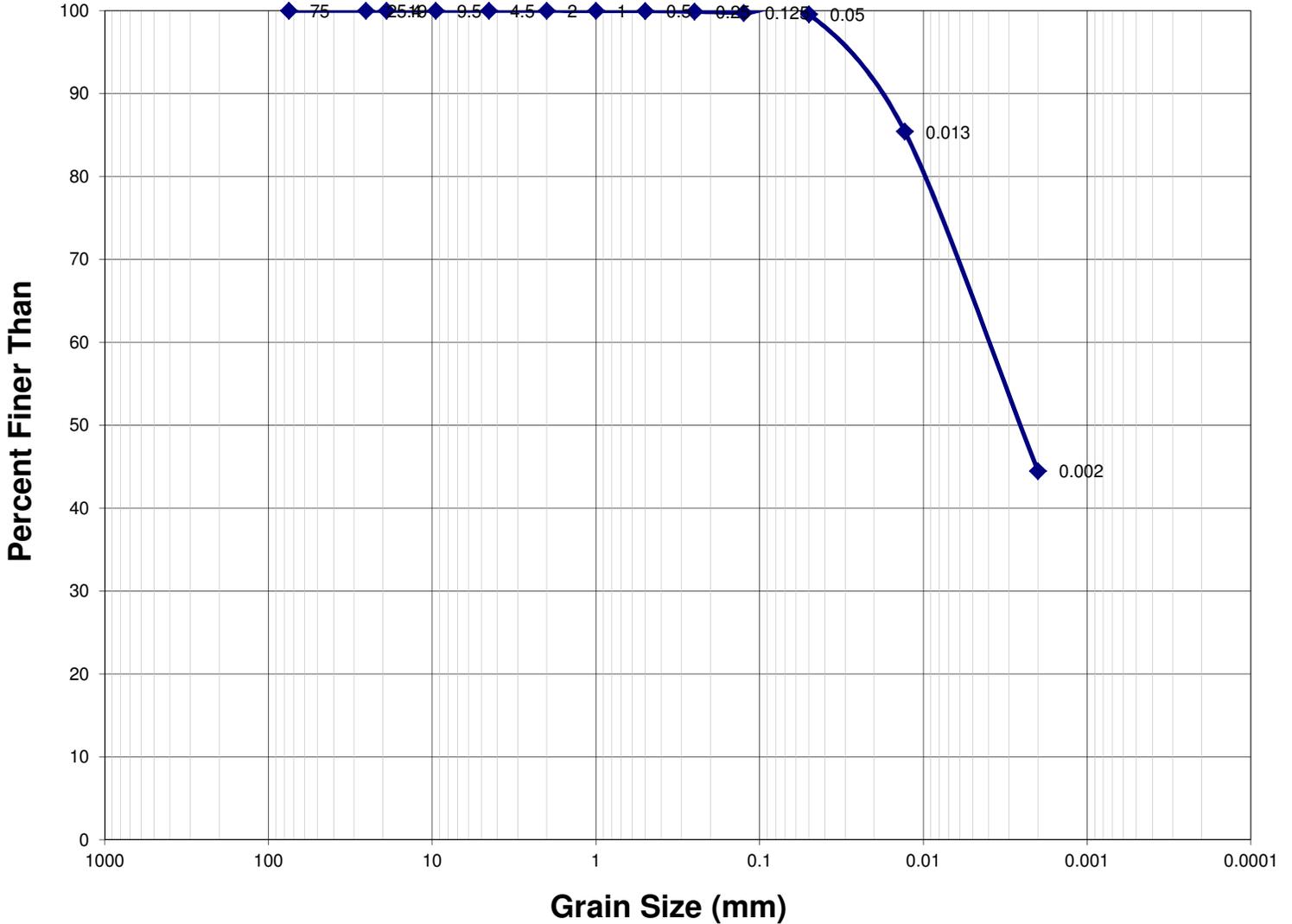
Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	4
Coarse Sand	2.0mm - 4.75mm	3
Medium Sand	0.425mm - 2.0mm	10
Fine Sand	0.075mm - 0.425mm	23
Fines	< 0.075mm	60

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	7
Sand	0.05mm - 2mm	36
Silt	0.002mm - 0.05mm	38
Clay	< 0.002mm	19

Particle Size Distribution Curve



Summary of Results

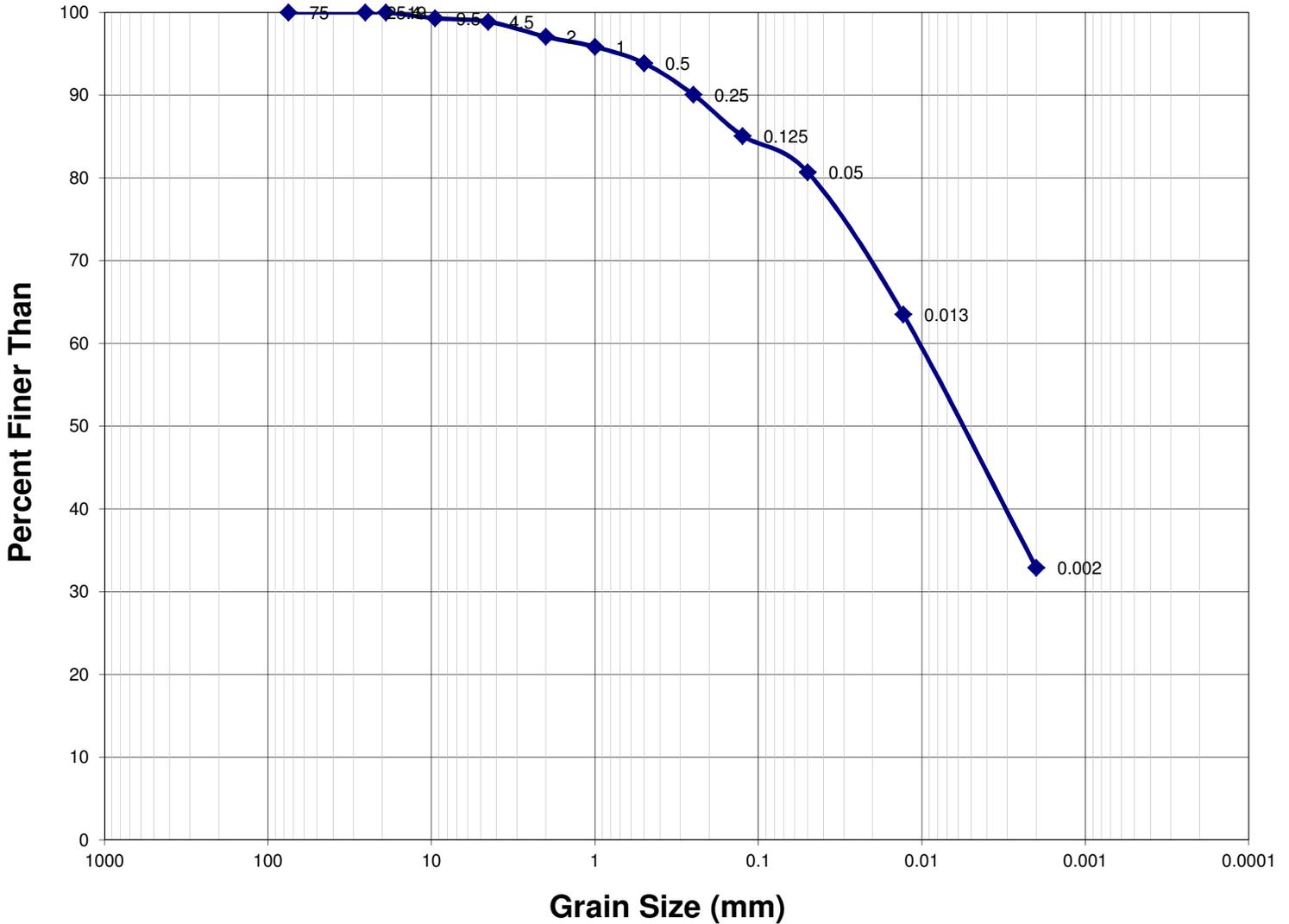
Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	0
Coarse Sand	2.0mm - 4.75mm	0
Medium Sand	0.425mm - 2.0mm	0
Fine Sand	0.075mm - 0.425mm	0
Fines	< 0.075mm	100

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	0
Sand	0.05mm - 2mm	0
Silt	0.002mm - 0.05mm	55
Clay	< 0.002mm	44

Particle Size Distribution Curve



Summary of Results

Unified Soil Classification System (USCS)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	4.75mm - 3"	1
Coarse Sand	2.0mm - 4.75mm	2
Medium Sand	0.425mm - 2.0mm	4
Fine Sand	0.075mm - 0.425mm	11
Fines	< 0.075mm	82

Canadian Soil Survey Committee (CSSC)

Size Class	Size Range	Wt. (%)
Cobbles	> 3"	0
Gravel	2mm - 3"	3
Sand	0.05mm - 2mm	16
Silt	0.002mm - 0.05mm	48
Clay	< 0.002mm	33



L1217302-COFC

COC # _____

Page 1 of 4

Report To			Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)											
Company: PINTER & Associates Limited			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other				<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)											
Contact: Matthew Fleming			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax				<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT											
Address: 710A - 48th Street E. Saskatoon, SK, S7K 5B4			Email 1: matthew.fleming@pinter.ca				<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT											
Phone: 244-1710 Fax: 933-4986			Email 2: lawrence.pinter@pinter.ca				<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT											
Invoice To Same as Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			Client / Project Information				Please indicate below Filtered, Preserved or both (F, P, F/P)											
Hardcopy of Invoice with Report? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			Job #: 1431-2 Floral Industrial Geotech															
Company:			PO / AFE: 1431-2				Moisture - SK	PSA-2	Grainsize-SK	Atterberg	Routine	Nitrate + Nitrite	Ammonia	Dissolved Iron	E Coli	Total coliforms	Heterotrophic Plate count	Number of Containers
Contact:			LSD:															
Address:			Quote #:				Moisture - SK	PSA-2	Grainsize-SK	Atterberg	Routine	Nitrate + Nitrite	Ammonia	Dissolved Iron	E Coli	Total coliforms	Heterotrophic Plate count	Number of Containers
Phone: Fax:			ALS Contact: Brian Sampler: Matthew															
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12-3-0 to 0-75					soil	X											1	
12-3-0-75 to 1-5					soil	X											1	
12-3-1-5 to 2-25					soil	X											1	
12-3-2-25 to 3-0					soil	X											1	
12-3-3-0 to 3-75					soil	X											1	
12-3-3-75 to 4-5					soil	X											1	
12-3-4-5 to 5-25					soil	X											1	
12-3-5-25 to 6-0					soil	X											1	
12-4-0-75 to 1-5					soil	X											1	
12-4-1-5 to 2-25					soil	X											1	
12-4-2-25 to 3-0					soil	X											1	
12-4-3-0 to 3-75					soil	X											1	
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details																		
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Phone: 244-1710 Fax: 933-4986			Email 2: lawrence.pinter@pinter.ca				<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT																						
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Sample #			Sample Identification (This description will appear on the report)		Date (dd-mmm-yy)	Time (hh:mm)													Sample Type										
12-4 3.75 to 4.5																			soil	X									1
12-4 4.5 to 5.25																			soil	X									1
12-4 5.25 to 6.0																			soil	X									1
12-6 @ 0.75							soil	X									1												
12-6 @ 1.5							soil	X	X								1												
12-6 @ 2.25							soil	X	X								1												
12-6 @ 3.0							soil	X		X							1												
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APPENDIX D

PROPOSAL/AGREEMENT/SCOPE OF WORK

WORK SCOPE:

Desktop Study

PINTER will carry out the appropriate database searches and compile relevant materials to meet the informational requirements as identified in the attached document Appendix B – Subdivision Study Summary Requirements. The desktop study will also include calculations and interpretations necessary to meet the scientific requirements of Appendix B.

Field Work

PINTER proposes to use a Geoprobe direct-push rig equipped with a MacroCore® (MC) sampler to visually log the site geology and collect soil samples. The MacroCore® system is equipped with an 83 mm (3.25”) diameter sampling barrel that recovers intact core samples for visual inspection.

To meet investigation and field sampling requirements for both investigations **PINTER** will provide equipment, materials and labour to carry out the following tasks.

- Advance a total of six (6) MacroCore® test holes to various depths to collect soil samples for laboratory analysis. Test holes are provided at various depths to provide adequate and appropriate site information for various purposes. Deep test holes are required for deep foundation design, whereas shallow test holes are required for parking lot and onsite waste water design. The six (6) test holes will be advanced as follows:
 - Two (2) test holes to 9 m
 - Two (2) test holes to 6 m
 - Two (2) test holes to 3 m.
- Install four (4) environmental monitoring wells to determine groundwater conditions at the site. The four (4) wells will be installed as follows:
 - One (1) well to 9 m
 - One (1) well to 6 m
 - Two (2) wells to 3 m
- Visually log all soils encountered using field visual and textural methods.
- Collect soil samples every 1 m, 2 m, 4.5 m and at changes in geology for potential laboratory analysis.
- Carry out a return visit to monitor groundwater monitoring wells and collect groundwater samples for laboratory analysis.
- Carry out a topographic survey of the site. This is not a legal survey. This survey is carried out for engineering purposes to determine ground surface contours and monitoring well elevations.

APPENDIX E

WATER WELL SEARCH RECORDS



Land Location **304 035 34NE00**
WWDR# **066537**

AGAR, JAMES

Completion **04/23/1981**

RM
Major Basin **06**
SubBasin **30**
NTS Map **73B00**

Well Location

LSD	Quarter	Section	Township	Range	Meridian	Reserve	Riverlot	Location of Well (in Quarter)		
00	NE	34	035	04	3			200.00	ft from N/S Boundary	N
Zone	Easting	Northing	Source	Accuracy				400.00	ft from E/W Boundary	E

Well Information

Driller #	Water Use	Hole #	Well Use	Installation Method	Depth	Water Level	Bit	Flowing Head	Well Casings	Length (ft)	Btm (ft)	Dia (in)	Description
ELSTOW WELL DRILLING	Domestic	001	Withdrawal	Drilled	105.00	0.00	6.20	0.00					
									Screens				
									Length (ft)	Btm (ft)	Dia (in)	Slot (in)	Description
									5.00	105.00	5.00	15.00	Stainless Steel
									0.00	0.00	0.00	0.00	
									0.00	0.00	0.00	0.00	

Pump Test

Draw Down	15.00 ft	Rec. Pumping Rate	10.00
Duration	6.00 hrs	Intake	80.00
Pumping Rate	40.00 igpm	Aquifer	
Temp	42.00 deg. F	E-Log	No
Elevation	1,715.00 ft	Phys	E03

Lithology List

Depth (ft)	Material	Colour	Description
40.00	Clay	Yellow	Unknown
100.00	Clay	Blue	Unknown
105.00	Sand	Unknown	Unknown



Land Location **304 035 35SE00**
WWDR# **031749**

SCHMIDT, PAUL

Completion **07/01/1935**

RM
Major Basin **06**
SubBasin **30**
NTS Map **73B00**

Well Location

LSD	Quarter	Section	Township	Range	Meridian	Reserve	Riverlot
00	SE	35	035	04	3		
Zone	Easting	Northing	Source	Accuracy			

Location of Well (in Quarter)
0.00 ft from N/S Boundary
0.00 ft from E/W Boundary

Well Information

Driller #	UNKNOWN	Well Casings				
Water Use	Domestic	Length (ft)	Btm (ft)	Dia (in)	Description	
Hole #		0.00	0.00	0.00	Corrugated Metal	
Well Use	Withdrawal	0.00	0.00	0.00	Concrete	
Installation Method	Unknown	0.00	0.00	0.00		
Depth	116.00	Screens				
Water Level	10.00	Length (ft)	Btm (ft)	Dia (in)	Slot (in)	Description
Bit	36.00	0.00	0.00	0.00	0.00	
Flowing Head	0.00	0.00	0.00	0.00	0.00	
		0.00	0.00	0.00	0.00	
		0.00	0.00	0.00	0.00	
<u>Pump Test</u>						
Draw Down	0.00 ft	Rec. Pumping Rate	0.00			
Duration	0.00 hrs	Intake	0.00			
Pumping Rate	0.00 igpm	Aquifer	Glac			
Temp	0.00 deg. F	E-Log	No			
Elevation	1,700.00 ft	Phys	E03			

Lithology List

Depth (ft)	Material	Colour	Description
------------	----------	--------	-------------



Land Location **304 035 35SE00**
WWDR# **108665**

SCHMIT FARMS LTD

Completion **07/30/1997**

RM **344**
Major Basin **06**
SubBasin **30**
NTS Map **73B01**

Well Location

LSD	Quarter	Section	Township	Range	Meridian	Reserve	Riverlot
00	SE	35	035	04	3		
Zone	Easting	Northing	Source	Accuracy			

Location of Well (in Quarter)
800.00 ft from N/S Boundary **N**
200.00 ft from E/W Boundary **E**

Well Information

Driller #	Water Use	Hole #	Well Use	Installation Method	Depth	Water Level	Bit	Flowing Head	Well Casings	Length (ft)	Btm (ft)	Dia (in)	Description
MITCHELL DRILLING (197	Domestic	001	Withdrawal	Drilled	120.00	15.00	5.10	0.00					
										103.00	100.00	5.00	P.V.C.
										0.00	0.00	0.00	
										0.00	0.00	0.00	
										15.00	115.00	5.00	P.v.c.
										0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00

Pump Test

Draw Down	90.00 ft	Rec. Pumping Rate	1.00
Duration	10.00 hrs	Intake	115.00
Pumping Rate	1.00 igpm	Aquifer	
Temp	44.00 deg. F	E-Log	SCANNED
Elevation	1,706.00 ft	Phys	E03

Lithology List

Depth (ft)	Material	Colour	Description
23.00	Clay	Brown	Oxidized
33.00	Clay	Grey	Hard
98.00	Till	Grey	Hard
115.00	Sand	Unknown	Fine
120.00	Till	Grey	Hard



**Saskatchewan
Watershed
Authority**

One Well Per Page

Page 2 of 2
10/3/2012
(OneWellPerPage)
(c) Saskatchewan Watershed Authority



Land Location **304 036 02SW00**
WWDR# **031769**

FLORAL SCHOOL UNIT

Completion **08/19/1950**

RM
Major Basin **06**
SubBasin **30**
NTS Map **73B00**

Well Location

LSD	Quarter	Section	Township	Range	Meridian	Reserve	Riverlot
00	SW	02	036	04	3		
Zone	Easting	Northing	Source	Accuracy			

Location of Well (in Quarter)
0.00 ft from N/S Boundary
0.00 ft from E/W Boundary

Well Information

Driller #	Water Use	Hole #	Well Use	Installation Method	Depth	Water Level	Bit	Flowing Head	Well Casings	Length (ft)	Btm (ft)	Dia (in)	Description
UNKNOWN	Domestic		Withdrawal	Unknown	22.00	20.00	48.00	0.00					Wood
										0.00	0.00	0.00	
										0.00	0.00	0.00	
										0.00	0.00	0.00	
										0.00	0.00	0.00	
										0.00	0.00	0.00	

Pump Test

Draw Down	0.00 ft	Rec. Pumping Rate	0.00
Duration	0.00 hrs	Intake	0.00
Pumping Rate	0.00 igpm	Aquifer	Glac
Temp	0.00 deg. F	E-Log	No
Elevation	1,700.00 ft	Phys	E03

Lithology List

Depth (ft)	Material	Colour	Description
22.00	Sand	Unknown	Unknown



184.00 Clay	Grey	Unknown
190.00 Clay	Grey	Stoney
206.00 Clay	Grey	Unknown
218.00 Gravel	Grey	Unknown
222.00 Clay	Grey	Stoney

APPENDIX F

HYDRAULIC CONDUCTIVITY TESTS

APPENDIX G

PHOTOPAGES



Photograph #1 – The view looking west cross the northern edge of the property.



Photograph #2 – The view looking south along the eastern edge of the property. This is the low area of the site.



Photograph #3 – The view looking north across the site.



Photograph #4 – A typical soil sample showing black topsoil grading into pale brown clay.

Appendix E – Record of Consultation

Mike Pawluski

From: Colin Dutton [REDACTED]
Sent: Tuesday, November 18, 2014 12:34 PM
To: Mike Pawluski
Cc: Colin Dutton
Subject: RE: Service Capacity / Capability

Mike, thanks for the information.

This message is to confirm that Envirotec Services Inc. is capable to provide Septic service to the businesses that would be located in both areas. We can work on an on-call or scheduled Septic Service, but prefer and strongly suggest to operate on a scheduled service. We have daily capacity to provide service to both locations.

Provided that these are true septic (waste waters) with no hydrocarbon content; we would dispose of at the Saskatoon Wastewater Treatment Plant located on Whiteswan Drive. This is the same location we currently take all of our Septic business.

If you have any questions at all about our Septic service or capabilities, please let me know. We can also provide Sump services (i.e. wash-bay mud sumps) as well as any haz waste / petroleum collections if required. Again let me know if you need anything else or if you'd like to discuss further.

Regards,

Colin Dutton | Assistant Manager, Vacuum Truck and Industrial Services

Envirotec Services Incorporated

P.O. Box 25055, **Saskatoon**, Saskatchewan S7K 8B7
100 Cory Road, East Cory Industrial Park, RM of Corman Park, Saskatchewan
Tel. (306) 244-9500

P.O. Box 27063, **Regina**, Saskatchewan S4R 0J0
2B Industrial Drive, Great Plains Industrial Park, Emerald Park, Saskatchewan
Tel. (306) 721-9500

Toll-Free (24 Hours) 1-877-244-9500 www.envirotec.ca

From: Mike Pawluski [[mailto:\[REDACTED\]](mailto:[REDACTED])]
Sent: November-18-14 11:09 AM
To: Colin Dutton
Subject: Service Capacity / Capability

Hi Colin,

Attached are two subdivision plans for the developments we have previously discussed. These developments are expected to install holding tanks as their wastewater management system.

The legal land descriptions are:

- SE¼ 25-37-6-W3M – 4416-00-c-701-PHASES
- W½ 35-35-4-W3M – R651-14S_plan1

The expected types of business uses for the area are:

- Agricultural support service - including such facilities as farm implement dealerships, and bulk fertilizer or fuel distributors;
- Automotive, equipment and vehicle service – limited to the sale and servicing of heavy equipment.
- Construction yards – equipment storage and office/maintenance facilities;
- Manufacturing facilities – fabricating, food manufacturing, mobile home or RTM manufacturing, concrete product manufacturing, and hardware manufacturing; and
- Warehousing – the storage of goods, materials, and merchandise which would provide for businesses such as trucking terminals, storage facilities, or moving companies.

Could you please provide us with an email confirming Envirotec Services Incorporated capacity / capability to provide services to our development. Also can you please provide information pertaining on where the effluent will be hauled to for treatment / disposal.

If you have any further questions please contact us.

Thanks Colin.

Regards,

Mike Pawluski
Project Planner



Associated
Engineering

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LOCAL FOCUS.

1 - 2225 Northridge Drive
Saskatoon, SK, Canada S7L 6X6

Tel: 306.653.4969
Fax: 306.242.4904

www.ae.ca



From: Colin Dutton [<mailto:> ██████████]

Sent: Tuesday, November 18, 2014 10:35 AM

To: Mike Pawluski

Subject: TEST

Nice speaking with you Mike. Please let me know what detail you have for the proposed sites in terms of locations, # of lots or tenants, etc. Then I should be able to send you that requested email we discussed.

Thanks Mike.

Regards,

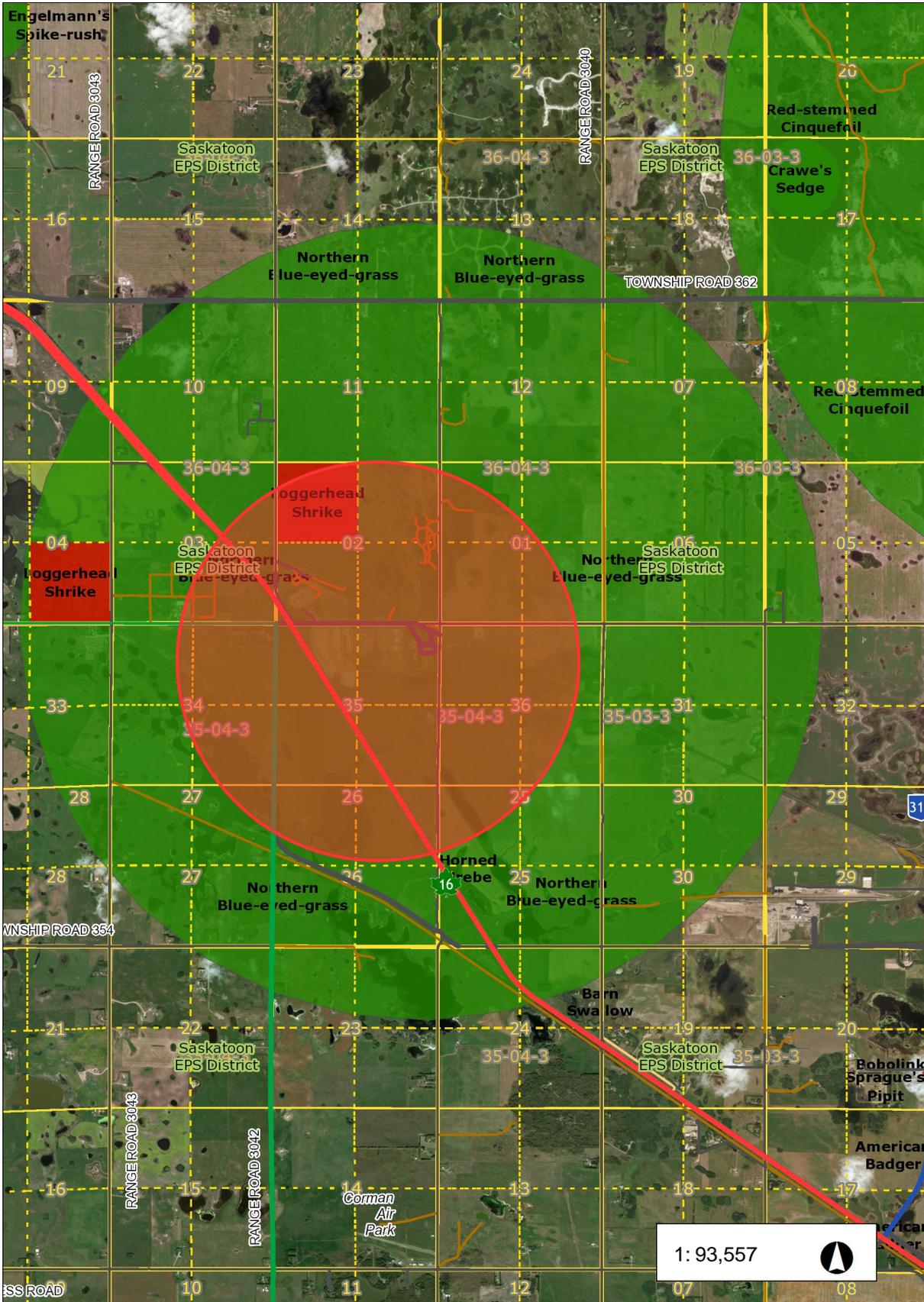
Colin Dutton | Assistant Manager, Vacuum Truck and Industrial Services

Envirotec Services Incorporated

P.O. Box 25055, **Saskatoon**, Saskatchewan S7K 8B7
100 Cory Road, East Cory Industrial Park, RM of Corman Park, Saskatchewan
Tel. (306) 244-9500

P.O. Box 27063, **Regina**, Saskatchewan S4R 0J0
2B Industrial Drive, Great Plains Industrial Park, Emerald Park, Saskatchewan
Tel. (306) 721-9500

Toll-Free (24 Hours) 1-877-244-9500 www.envirotec.ca



Legend

- Provincial Boundary
- Ecological Protection Specialis
- Primary Highways**
 - Paved
 - Unpaved
- Secondary Highways**
 - Paved
 - Unpaved
 - Winter
- Municipal Highways**
 - Paved
 - Unpaved
 - Winter
- Collector Roads**
 - Paved
 - Unpaved
 - Winter
- Ramps**
 - Primary, Paved
 - Primary, Unpaved
 - Secondary, Paved
 - Secondary, Unpaved
 - Municipal, Paved
 - Municipal, Unpaved
 - Collector, Paved
 - Collector, Unpaved
- Resource/Recreation Roads**
 - Paved
 - Unpaved
 - Winter
 - Local Street

Notes

1: 93,557



4.8 0 2.38 4.8 Kilometers

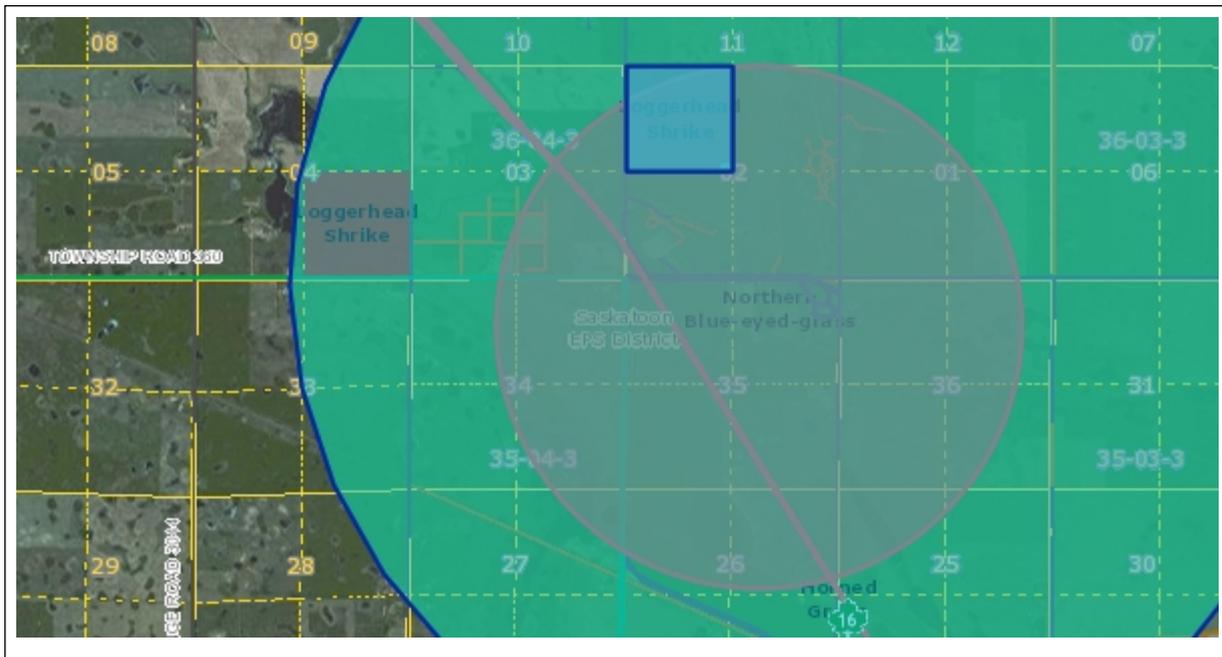
Rare and Endangered Species Report

Report Generated: 11/8/2017 8:34:25 AM

The absence of information provided by the Saskatchewan Conservation Data Centre (SKCDC) does not categorically mean the absence of sensitive species or features. The quantity and quality for data collected by the SKCDC are dependent on the research and observations of many individuals and organizations. SKCDC reports summarize the existing natural heritage information, known to the SKCDC, at the time of the request.

SKCDC data should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. The user therefore acknowledges that the absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources.

Rare and Endangered Species Area of Interest



Rare and Endangered Species Report

Scientific Name: *Sisyrinchium septentrionale*
Common Name: Northern Blue-eyed-grass
Provincial Rank: S3 **Global Rank:** G3G4
Observation: First: 1958-08-15 **Last:** 1958-08-15

Occurrence ID: 16762
Occurrence Class: Vascular Plant
Occurrence Type:
Occurrence Rank: H - Historical

Provincial Legal Status:
Species at Risk Act Status:
COSEWIC Status:
General Description:

Occurrence Data:
1958 - species observed in 1 site

Directions:
Floral

Scientific Name: *Lanius ludovicianus excubitorides*
Common Name: Loggerhead Shrike
Provincial Rank: S2B,S2M **Global Rank:** G4T4
Observation: First: 2005 **Last:** 2005

Occurrence ID: 999923985
Occurrence Class: Vertebrate Animal
Occurrence Type:
Occurrence Rank:

Provincial Legal Status:
Species at Risk Act Status: Threatened
COSEWIC Status: Threatened
General Description:
5 - LOSH , SFS 2005 data

Occurrence Data:

Directions:
NW-02-36-04-3



Associated Engineering
1-2225 Northridge Dr
Saskatoon, SK S7L6X6

November 19/2014

Attn: Mike Pawluski

Please accept this letter of confirmation in providing Waste Removal Services in future for the East Floral Industrial Park located in the RM of Corman Park. Land Location 35 35 4 W3.

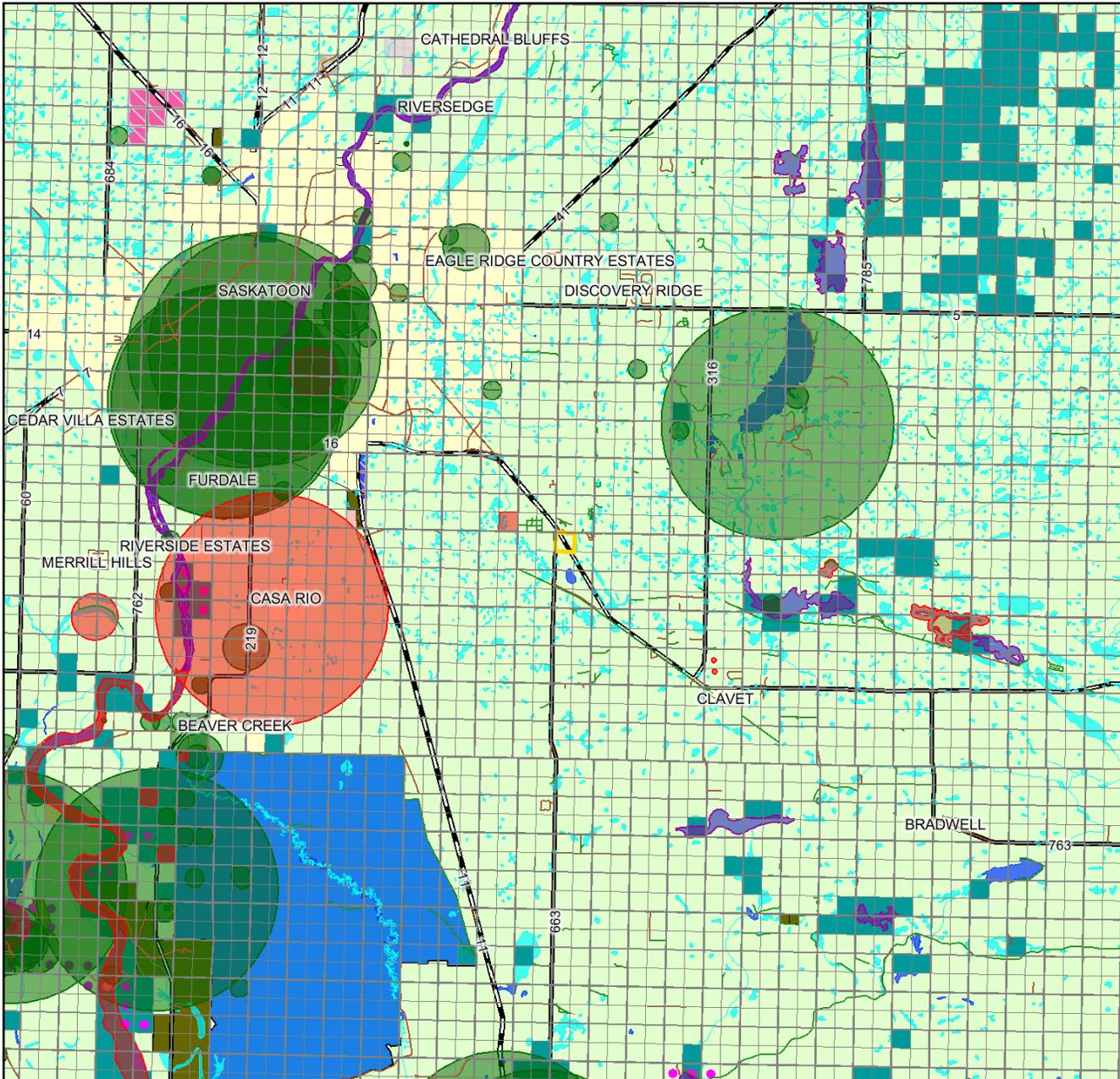
Any further questions please feel free in contacting us.

Thank you,

Jan Magnuson | Customer Care | Loraas Disposal

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E. Floral Phase 2



Legend

- Sask Mask
- Northern Administrative District Line
- Sections
- Quarter Sections
- Spruce Budworm
- Provincial Forest
- GSH Landuse Planning Area
- Landuse Planning Areas
- Forest Management License Agreements
- Indian Reserves
- Land Claim
- Provincial Community Pastures
- PFRA Community Pastures
- National Parks
- Provincial Parks
- Historic Park
- Wilderness Park
- Recreation Park
- Natural Environment Park
- Air Weapons Range
- Sask Updated Road Network Roads
- Resource / Recreation
- Collector
- Rare and Endangered
- ANIMAL
- COMMUNITY
- INVERTEBRATE
- OTHER
- PLANT
- SE Administered Land
- SAF Administered Land
- Wildlife Habitat Protection
- Fish/Wildlife Dev Fund
- Rivers 50k
- Urban Municipalities
- Sask Updated Road Network Highways

Scale: 1:273,150

Datum: NAD83 CSRS98
Projection: Universal Transverse Mercator

Copyright: Government of Saskatchewan

Comments/Questions - Contact:
Geomatics Services
Saskatchewan Ministry of Environment
Phone: (306) 787-3482
Email: geomatics.services@gov.sk.ca

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Product of: Geomatics Services - TLE Landclaims
Date Created: Mar 14, 2013

Mike Pawluski

From: Darrell Rinas
Sent: Monday, March 28, 2016 1:32 PM
To: Mike Pawluski
Subject: FW: East Floral Water Supply

FYI

From: Dawn Dierker [mailto: [REDACTED]]
Sent: Monday, March 28, 2016 12:31 PM
To: Dukart, Shawn MA
Cc: Darrell Rinas; Randy Avery; Darlene Guy
Subject: RE: East Floral Water Supply

Good Afternoon, Shawn. As per our agreement with the City of Saskatoon any development that falls within the designated P4G Planning District requires SaskWater to apply to the City of Saskatoon for permission to supply water. We applied in December of 2014 for permission to supply water for the East Floral subdivision and received permission from the City of Saskatoon shortly after.

We do have the capacity on this system to supply the proposed subdivision and have been working directly with Associated Engineering and the owner to accommodate the request.

If you have any questions regarding this project please feel free to contact me directly.

Best regards,

Dawn Dierker, B.Sc.
Account Manager
103-2103 Airport Drive
Saskatoon SK S7L 6W6
Phone: 306-933-5209
Fax: 306-933-1129

[REDACTED]
www.saskwater.com



SaskWater provides safe, reliable and sustainable water and wastewater services for Saskatchewan.

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Please consider the environment before printing this email

From: Dukart, Shawn MA [mailto: [REDACTED]]
Sent: March-28-16 11:55 AM
To: Dawn Dierker
Subject: FW: East Floral Water Supply

Hi Dawn,

I work with the Community Planning Branch of Government Relations. We are working with the developer and the consultant, Associated Engineering, on the East Floral subdivision in the RM of Corman Park. It is my understanding that the developer is setting up his own water utility to supply water to the development. From the correspondence below it looks like the City is able to provide the water but I just wanted to confirm that SaskWater has no capacity concerns or issues with the developer connecting onto your line or the utility itself.

Thanks!

Regards,

Shawn Dukart
Government of Saskatchewan
Planning Consultant
Community Planning Branch, Ministry of Government Relations
Room 978, 122 - 3rd Avenue North
Saskatoon, Saskatchewan S7K 2H6
Bus: (306) 933-7883
Fax: (306) 933-7720

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From: Mike Pawluski [mailto: [REDACTED]]
Sent: Monday, March 28, 2016 10:46 AM
To: Dukart, Shawn MA
Subject: East Floral Water Supply

Hi Shawn,

Below is confirmation that East Floral will have a sufficient water supply via the City of Saskatoon and SaskWater.

If you require any additional information let us know.

Regards,

Mike Pawluski
Project Planner
Associated Engineering (Sask.) Ltd.
1 - 2225 Northridge Drive, Saskatoon, SK S7L 6X6
Tel: 306.653.4969



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LOCAL FOCUS.



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From: Darrell Rinas
Sent: Thursday, May 07, 2015 6:37 PM
To: Mike Pawluski; Bill Delainey
Subject: Fwd: Message from "RNP0026735F55A9"

FYI

Sent from my iPhone

Begin forwarded message:

From: Dawn Dierker <[REDACTED]>
Date: May 7, 2015 at 4:10:43 PM CST
To: Darrell Rinas <[REDACTED]>
Subject: RE: Message from "RNP0026735F55A9"

Great! Thanks for this, Darrell. I will discuss it with Dennis Frey tomorrow. Just a quick update - City Council has accepted the recommendation to provide water to East Floral - so, it's a go.

Talk to you soon.

Dawn

-----Original Message-----

From: Darrell Rinas [[mailto:\[REDACTED\]](mailto:[REDACTED])]
Sent: May-07-15 4:09 PM
To: Dawn Dierker; Mike Pawluski
Cc: Ryan Karsgaard
Subject: RE: Message from "RNP0026735F55A9"

Hi Dawn,

Please see the attached drawings for review. We think that this alignment represents what we had discussed at our previous meetings, and we should be able to achieve everything that SaskWater is looking for with this arrangement. A few points are noted below.

- We should be able to have the SaskWater point of delivery prior to the building, the meter can be in the building if SaskWater chooses for ease of operation.
- We will not be encroaching on lot 11 as this area will be a municipal utility parcel, and has sufficient space for all of the operations required.
- Everything we have seen so far indicates that the water line is in this location, and we are

moving the mainline to the road allowance so it is not in lot 11 where the current easement for the SRED service exists. Further to this point, if the service for SRED does come in from the south, we can change the service location for SRED with minimal effort.

- We would not have shown the building in ER1 as ER1 is a stormwater retention pond, and is generally full of water.

If you would like to have a meeting to discuss further , we are more than happy to stop by and meet again.

Thanks,
Darrell

-----Original Message-----

From: Dawn Dierker [<mailto:> 
Sent: Wednesday, April 29, 2015 8:57 AM
To: Darrell Rinas; Mike Pawluski
Subject: FW: Message from "RNP0026735F55A9"
Importance: High

Hi Darrel/Mike:

We are still waiting for word from the City of Saskatoon regarding the letter for special consideration that we sent for the East Floral Industrial Development, however I have started the process to "fast-track" it when we do get approval. I have written an Executive Decision Item to amend the existing agreement and a memo to our in-house lawyer to amend the current agreement.

While I was doing that I had Dennis Frey, our Operations Manager for Saskatoon, look at the drawings that we have and he noticed a couple of things about them that he felt needed changing. Here is what he said:

" Where they have the proposed building drawn is east of where the existing valve is for the SRED point of delivery. I believe Parcel B is the existing SRED lot. Our connection point to the new pipeline needs to be upstream of the new pump house. With their proposed location we need to encroach on lot 11 and ER1 to accomplish that. I believe that the existing water line shown on their drawing is in the wrong location. It enters Parcel B from the south not the east as drawn. I saw a version of this drawing where the pump house was located in ER1. That would simplify things from our perspective. We would need an easement across which ever parcels they chose to run the new supply to SRED. "

I had Dennis mark up the attached drawing so that you can see what he is talking about.

I am not sure if this is something that we can clear up via email or if we should arrange for a short meeting to go over the drawing. Let me know what your preference is.

Thanks,

Dawn

-----Original Message-----

From: 

Sent: April-29-15 7:42 AM
To: Dawn Dierker
Subject: Message from "RNP0026735F55A9"

This E-mail was sent from "RNP0026735F55A9" (Aficio MP C4502).

Scan Date: 04.29.2015 08:41:43 (-0500)
Queries to: [REDACTED]

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Mike Pawluski

From: Al Keller <[REDACTED]>
Sent: Thursday, April 07, 2016 8:56 AM
To: Darrell Rinas; Dukart, Shawn MA
Cc: Dwayne Rowlett; Clinton Molde; Doug Johnson; Mike Pawluski
Subject: RE: Floral East Industrial Park-N ½ of 35-35-4 W3

Darrell

Further to our conference call last week, Water Security Agency (WSA) has reviewed the proposed redesign of the Floral East Industrial subdivision. The redesign has included a permanent retention pond of 64,000 cubic metres. WSA is prepared to approve the drainage project and will accept the retention as mitigation to limit the downstream impacts of this project.

WSA will issue an Approval once an Application for Approval to Construct and Operate Drainage Works and an Application Fee of \$100.00 has been submitted. The application form and instruction were forwarded earlier this week.

We appreciate the cooperation and work that you have put into redesigning this project to move it forward.

If you have any questions let me know.

Al

Al Keller - C.Tech.

Supervisor, Regional Services
402 Royal Bank Tower 1101 - 101st Street
North Battleford, SK S9A 0Z5
Ph: 306.446.7458 | Cell: 306.441.1726 | Fax: 306.446.7461
wsask.ca | al.keller@wsask.ca

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From: Darrell Rinas [mailto:[REDACTED]]
Sent: March-24-16 3:19 PM
To: Al Keller

Cc: Mike Pawluski
Subject: RE: Floral East Industrial Park-N ½ of 35-35-4 W3

OK, sounds great.
Likely myself and Mike Pawluski from AE.
We look forward to the conversation. I've attached the design concept for your review prior to the meeting.
Regards,
Darrell

From: Al Keller [mailto: [REDACTED]]
Sent: Thursday, March 24, 2016 1:07 PM
To: Darrell Rinas
Subject: RE: Floral East Industrial Park-N ½ of 35-35-4 W3

Let's do 1:30pm on Wednesday. I am thinking it will be Spencer McNie and myself from WSA for now.

Al

From: Darrell Rinas [mailto: [REDACTED]]
Sent: March-24-16 11:55 AM
To: Al Keller
Subject: RE: Floral East Industrial Park-N ½ of 35-35-4 W3

Thanks Al,

Wednesday afternoon and all of Thursday are open for me right now.
Do you want to set up a time to meet and invite all who you think should be in attendance? I can forward you our design concept and notes for review prior to the meeting.
I'd like to talk to you very briefly before a conference call as we haven't been able to get to the full design capacity you were looking for, but there are some limiting factors that we are dealing with and I want to get that out on the table prior to a full discussion.

Thanks,
Darrell

From: Al Keller [mailto: [REDACTED]]
Sent: Thursday, March 24, 2016 11:42 AM
To: Darrell Rinas
Subject: RE: Floral East Industrial Park-N ½ of 35-35-4 W3

Darrell

I am available Wednesday or Thursday next week. By conference call works the best unless you feel it's easier to get together. Let me know.

Al

From: Darrell Rinas [mailto: [REDACTED]]
Sent: March-24-16 11:31 AM
To: Al Keller
Subject: RE: Floral East Industrial Park-N ½ of 35-35-4 W3

Hi Al,
Have you had a chance to see if there is a time that will work for you in regards to this?
Thanks,
Darrell

From: Darrell Rinas
Sent: Wednesday, March 16, 2016 9:49 AM
To: 'Al Keller'
Cc: Mike Pawluski; Chad Watson; Doug Johnson; Spencer McNie; Dukart, Shawn MA; Bill Delainey; Clinton Molde; Abul Kashem
Subject: RE: Floral East Industrial Park-N ½ of 35-35-4 W3

Hello Al,
We have been working away at this design now for a while, trying to find a good balance between land use and the storm pond size you have asked for. Would you be interested in meeting with us again to go over some things with us. Either a phone call or we could meet in person again in North Battleford as well.
Whatever is easiest for you.
Thanks,
Darrell

From: Al Keller [<mailto:> 
Sent: Thursday, December 17, 2015 4:51 PM
To: Darrell Rinas
Cc: Mike Pawluski; Chad Watson; Doug Johnson; Spencer McNie; Dukart, Shawn MA; Bill Delainey; Clinton Molde; Abul Kashem
Subject: RE: Floral East Industrial Park-N ½ of 35-35-4 W3

Darrell

Sorry the delay. We have had a chance to review all the information and complete some additional hydrology on this area.

The ditch requires Approval under the Water Security Agency Act to remain in place. The developer is required to submit an Application for Approval to Construct and Operate Drainage Works, Application Fee of \$100.00 and plans of the ditch and details of the retained storage.

In lieu of land control to address downstream impacts a recovery of storage will be considered. WSA would consider the 30,000 cubic metres of storage (currently proposed 1:100 24hr storm pre to post development) with an additional 43,000 cubic metres of storage (median annual inflows) to offset the natural storage that existed on this property. Total storage required retained storage would be 73,000 cubic metres. This total volume would be similar to the 1:10 inflow volumes. On higher runoff events any excess water volume higher than the retention volume would simply be passed through the system.

The design should include provisions to ensure that in larger events surcharging will not impact permanent structures. On the plans AE prepared there are elevations of the culvert where it crosses highway 16. Two questions- Size of the culvert ? and do you have a highway centerline elevation at the culvert ? Further evaluation may be completed to determine if there is a flood risk based the 1:500 elevation based on this information.

If you have any questions don't hesitate to contact me.

Al

Al Keller - C.Tech.

Supervisor, Regional Services

402 Royal Bank Tower 1101 - 101st Street

North Battleford, SK S9A 0Z5

Ph: 306.446.7458 | Cell: 306.441.1726 | Fax: 306.446.7461

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From: Bart Oegema
Sent: December-10-15 3:11 PM
To: Al Keller
Cc: Abul Kashem
Subject: RE: Floral East Industrial Park-N 1/2 35-35-4W3

Al,

Attached is a map with my interpretation of the gross and effective area to the ditch in question. The effective area is 2.7 km² and the gross is 5.3 km². This aligns fairly closely with the 1950's estimate of 2.5 sq.mi. (6.5 km²). My interpretation is that the western portion of the watershed has fewer wetlands and is all effective, while the eastern (non-effective in a median runoff year) has many more wetlands including larger wetland in just north of the Floral East site. My assumption was that culverts were in place to allow these sloughs just north of the site would flow south across both the grid road and the railway tracks to the site rather than diverting their outflow to the east or southeast. Because of these larger wetlands low in the non-effective area and the other wetlands further up, I judged that flow from the non-effective area would not begin until about a 1:10 runoff event.

Inflow volume was estimated based on recorded flow volumes of Brightwater Creek near Kenaston (05HG002), with results tabulated below.

Return Period	1:2	1:5	1:10	1:25	1:50	1:100
Site Inflow Volume (dam ³)	43.4	58.9	70	110	130	160

The 1950's era estimated median volume of 38 ac-ft (46.9 dam³) is again fairly close to my estimated median volume though my unit yield is likely near double the 1950s while my effective area is about ½ of the 1950's interpreted area. The above inflow volume estimates seem reasonable relative to the FSL volume of about 89 dam³ (72 ac-ft) or more. In normal years, a median to 1:5 inflow likely would not spill from the natural outlet, maybe not even in 1:10, depending on how much carry-over storage was in the wetland from the previous year.

I trust this meets your needs to move this file forward.

Bart Oegema - M.A.Sc., P.Eng.

Manager, Hydrology Services
400-111 Fairford Street East
Moose Jaw, SK S6H 7X9
Ph: 306.694.3957 | Fax: 306.694.3944
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From: Al Keller
Sent: December-09-15 11:54 AM
To: Bart Oegema
Cc: Abul Kashem
Subject: FW: Floral East Industrial Park-N 1/2 35-35-4W3

Bart

We are dealing with Phase 2 of an industrial subdivision and restoration of an 1950's drainage project on the N ½ of 35-35-4 W3 (East of Saskatoon Adjacent to Highway 16).

Some rough hydrology was completed in 1953, Drainage area 2.5 sq. miles and the median annual inflow was calculated to be 38 ac-feet. Plans of the project show the capacity of 72 acre feet @ elev. 97.8ft (FSL). It is unclear whether that is the natural spill elevation. The profile shows that the spill could be 2.2 feet higher than that which would mean that natural capacity could be significantly higher than that.

In order to approve the drainage project we are going to require the developer to create some volume of permanent storage. Total restoration is not likely an option as the subdivision would not allow. The developer has completed some hydrology to take into account the pre to post drainage and is proposing 30,000 Cubic Metres storage. I have attached a scan of the Memo from Associated Engineering in this regards.

Could you complete a hydrological analysis including a drainage area and a range of inflow volumes from 1:2 to 1:100. Timing is an issue as we have made a commitment to the developer to get back to them next week so they can proceed. Would you be able to look at this right away?

Let me know.

Thanks

Al

From: Darrell Rinas [<mailto:> 
Sent: December-04-15 10:55 AM
To: Al Keller
Cc: Mike Pawluski; Chad Watson; Doug Johnson; Spencer McNie; Dukart, Shawn MA; Bill Delainey
Subject: Re: Floral East Industrial Park

Hi Al,

That should work for us.

Thanks,
Darrell

Sent from my iPhone

On Dec 4, 2015, at 10:45 AM, Al Keller <Al.Keller@wsask.ca> wrote:

Darrell

Would 11:00am Monday December 7, 2015 work for you?

Al

From: Darrell Rinas [<mailto:> 
Sent: December-02-15 4:44 PM
To: Al Keller
Cc: Mike Pawluski; 'Chad Watson'; Doug Johnson; Spencer McNie; Dukart, Shawn MA; Bill Delainey
Subject: RE: Floral East Industrial Park

Thanks Al,
I think we should set something up for Monday December 7th.
I am available most of the day, is there a time that works for you and your team?
Thanks,
Darrell

From: Al Keller [<mailto:> 
Sent: Wednesday, December 02, 2015 4:32 PM
To: Darrell Rinas
Cc: Mike Pawluski; 'Chad Watson'; Doug Johnson; Spencer McNie; Dukart, Shawn MA
Subject: RE: Floral East Industrial Park

Darryl

I wasn't able to get in touch with Doug but we did have a quick conversation yesterday and about a path forward.

The developer will have to do more work to modify the storage design and give us the maximum storage that is possible on site without major renovations to the subdivision. We will use these storage numbers to determine downstream impacts and determine whether approval is required. Both the original storage under natural conditions and the difference between pre to post development should be considered.

WSA needs assurance that downstream impacts have been mitigated to the point of being insignificant. Your studies indicated that the difference between pre and post 30,000 cubic meters and the 1950 hydrology indicates that median annual inflow to this slough was 65,000. How much storage can be created?

If you would like to discuss further we can try to set up something up for Monday December 7.

Al

From: Dukart, Shawn MA [REDACTED]
Sent: November-30-15 2:06 PM
To: Doug Johnson; Spencer McNie; Al Keller
Cc: 'Mike Pawluski'; [REDACTED]; 'Chad Watson'
Subject: RE: Floral East Industrial Park

Hey guys,

Just looking for an update. Perhaps discussion has already begun but I have not heard back yet. Please advise. I will follow-up at the end of the week.

Regards,

Shawn Dukart
Government of Saskatchewan
Planning Consultant
Community Planning Branch, Ministry of Government Relations
Room 978, 122 - 3rd Avenue North
Saskatoon, Saskatchewan S7K 2H6
Bus: (306) 933-7883
Fax: (306) 933-7720

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From: Dukart, Shawn MA
Sent: Tuesday, November 24, 2015 9:44 AM
To: 'Doug Johnson'; 'Spencer McNie'; 'Al Keller'
Cc: Mike Pawluski; [REDACTED]; 'Chad Watson'
Subject: RE: Floral East Industrial Park

Good morning Doug,

As an update to this file we had a meeting with the applicant on Friday and he has agreed to look into the following option, that is:

Enhance the currently proposed storage, by excavation and increasing surface area, install a ditch block at an elevation tolerable to the rest of development. This may require use of Lot 9. The goal would be to try enhance the retained storage to closely match the natural storage the slough had before the ditch with some time type of fill and spill structure. The 1950 hydrology suggests that the median annual inflow into this slough 65 cubic decametres.

This is great news and will go along way to moving this file forward to approval. To make this work the applicant has requested a couple of things from WSA:

1) More detail regarding the option noted.

2) Assurance that if the new design meets the criteria provided that WSA would support it.

I realize this may put some pressure on you as you can't be 100% certain that it will work until the plan is completed. Having said that, this will be the third iteration of design so I do believe that there should be some reassurance provided.

I have cced AE so ideally some discussion regarding this proposal can begin. Perhaps I will follow-up at the beginning of next week to see how things are progressing.

Regards,

Shawn Dukart
Government of Saskatchewan
Planning Consultant
Community Planning Branch, Ministry of Government Relations
Room 978, 122 - 3rd Avenue North
Saskatoon, Saskatchewan S7K 2H6
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From: Dukart, Shawn MA
Sent: Monday, November 16, 2015 3:44 PM
To: 'Doug Johnson'
Subject: RE: Floral East Industrial Park

Hi Doug,

The plan of action right now is to have the developer come in to discuss some options. As I mentioned, I don't believe he opposed entirely to the idea of a regional pond. Having said that, I would expect him to request assistance from the RM and possibly WSA.

Ignorant question, but do you have experience working with municipalities on developing regional drainage systems? The reason I ask is that I don't have the first clue on how to initiate that process. The RM needs to be the largest player in this whole thing and they will need to be advised appropriately.

Regards,

Shawn Dukart
Government of Saskatchewan
Planning Consultant
Community Planning Branch, Ministry of Government Relations
Room 978, 122 - 3rd Avenue North
Saskatoon, Saskatchewan S7K 2H6
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From: Doug Johnson [mailto:████████████████████]
Sent: Friday, November 13, 2015 7:22 AM
To: Dukart, Shawn MA; Kowalko, Len MA; Leibel, Ralph MA
Cc: Spencer McNie; Abul Kashem; Al Keller; Clinton Molde
Subject: RE: Floral East Industrial Park

Shawn,

You are right, that this is a regional problem. The municipality should be responsible for developing a regional plan, for development of stormwater management drainage systems. The plan should be a requirement of the municipality and should be able to be expanded to with increased development. Right now there is no legislative or regulatory requirement for the RM to have a stormwater management system for its ratepayers. Without that, this subdivision is either in a flood prone area, or through its development causing flooding for other individuals. We cannot allow this to happen and we cannot bend the rules, because it has happened in the past.

The Statement of Provincial Interest Regulations were developed to protect the individuals and the province from inappropriate development. The province has spent millions of dollars in the RM of Corman Park to develop flood protection for landowners (Emergency Flood Damage Reduction Program) or for disaster assistance (Provincial Disaster Assistance Program) for places which could have been protected with an engineered stormwater management system. Knowing what we know now, most of the development in Corman Park should have developed with a regional protection system, and this should have been a requirement in the subdivision approval system. There is a gap in the process, but approving this application will only add to the issue.

Is Municipal Government willing to redevelop and pay for the flood protection for the downstream landowners who now have flood control projects that were mostly paid for through EFDRP?

<image001.png>

From: Al Keller
Sent: November-12-15 4:24 PM
To: Dukart, Shawn MA
Cc: Spencer McNie; Doug Johnson; Abul Kashem
Subject: RE: Floral East Industrial Park

Shawn

You are right this is an issue that we will run into and will be more or less complicated depending on its location.

I am not sure that this is completely a regional issue. The developer does have to address a couple of issues. Firstly, the old ditch on this property needs to be restored or approved. Restoration would be recreating the natural storage volume that existed before the ditch. Connected to this issue is the requirement for the developer to allow natural water coming from the north to flow as it would under natural conditions. Under natural conditions the slough that used to be on this property would fill to a

point and then spill south. The second issue would be the requirement of the developer to store the difference in runoff from pre to post development.

It does become a regional problem if the more development occurs in the area and more loss of storage occurs as a result. Lots of areas in the RM of Corman Park are sensitive due to the lack of adequate outlets.

We would definitely be willing to attend a meeting to discuss the change in regulations and how to move forward with this issue. If you have any questions don't hesitate to contact me.

AI

Al Keller - C. Tech.

Acting Supervisor

402 Royal Bank Tower 1101 - 101st Street

North Battleford, SK S9A 0Z5

Ph: 306.446.7458 | Cell: 306.441.1726 | Fax: 306.446.7461

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From: Dukart, Shawn MA [<mailto:> 
Sent: November-12-15 11:37 AM
To: Al Keller
Cc: Spencer McNie; Doug Johnson; Abul Kashem
Subject: RE: Floral East Industrial Park

Hi Al,

I wanted to follow-up on this as I had not received a response quite yet. I am wondering what your thoughts are? Specifically, is this not a regional issue, not the issue of a single development?

The developer is going to be required to accommodate not only the excess water he generates but the water generated north of this parcel. This has been exacerbated by the fact that the drainage ditch is now closed. Technically, the developer could suggest that those north of him are causing problems for him. Those north of him could suggest the same and so on. Rather than address each site one by one right back to the initial source, the best solution would be some type of regional storm pond. In this case, perhaps a regional storm pond makes sense at this location. I believe the developer would agree to such an option but it comes down to who will pay for it. I see this as a joint initiative shared by the developer, WSA and the RM. I feel that there is some obligation not only on the part of the developer (no one asked him to develop) but administration as well as the solution is trying to address a more systemic concern. It is easy for me to say, right?

As much as I dislike meetings it may be a good idea to have WSA, the RM and developer come together to discuss.

In this instance it appears that I am siding with the developer but in fact I am concerned that we are going to run into this again and again. I will await your response.

Regards,

Shawn Dukart
Government of Saskatchewan
Planning Consultant
Community Planning Branch, Ministry of Government Relations
Room 978, 122 - 3rd Avenue North
Saskatoon, Saskatchewan S7K 2H6
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From: Dukart, Shawn MA
Sent: Monday, October 19, 2015 11:11 AM
To: 'Al Keller'
Cc: Spencer McNie; Doug Johnson; Abul Kashem; Kowalko, Len MA; [REDACTED]
Subject: RE: Floral East Industrial Park

Hi Al,

We have had a chance to discuss the options and really appreciate the work you have done to come up with some solutions.

Of all the options, Option 1 appears to be the most workable. Correct me if I am wrong but as the ditch essentially needs to be closed, the runoff generated north of this site is no longer able to pass through as it has since 1953. As such, this additional runoff has no direct outlet and the best option is to capture it. The proposed development provides the opportunity to create this capture point. Is this correct? If so, I don't believe that it is realistic to have the landowner be solely responsible for providing both the land and construction of this pond. The developer has already designed a pond large enough to handle the pre and post runoff volumes had the ditch remained open. For administration to close the ditch and have one landowner accommodate the additional water is hard to rationalize.

To me, this may be more of a regional matter as the ditch has been utilized as part of the areas drainage for quite some time and closing it affects all the landowners up stream of this site as well. This is easy for me to say but perhaps there is some opportunity to share in the costs of construction of the pond in more regional situations like this. Given that the revisions to the WSA act are recent we are likely to run into other situations so this a good opportunity to discuss.

Let me know your thoughts.

Regards,

Shawn Dukart
Government of Saskatchewan
Planning Consultant
Community Planning Branch, Ministry of Government Relations
Room 978, 122 - 3rd Avenue North
Saskatoon, Saskatchewan S7K 2H6
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From: Al Keller [mailto: [REDACTED]]
Sent: Thursday, October 08, 2015 11:54 AM
To: [REDACTED] Dukart, Shawn MA
Cc: Spencer McNie; Doug Johnson; Abul Kashem
Subject: Floral East Industrial Park

Darrell

Thanks for the discussion two weeks ago regarding the East Floral Road Industrial Phase 2.

As we discussed the recent change in regulations losses a pre 1981 exemption for old drainage projects. This land had a backflood/ drainage project constructed in 1953 and has been operating since. This ditch as it exists now requires approval under the WSA act or it needs to be rendered inoperable. Based on the development that has occurred it will be near impossible to restore the natural storage that existed pre-drainage. After completing an inspection of the area last week I think there are a couple of options that could be investigated:

- 1 Enhance storage- Enhance the currently proposed storage, by excavation and increasing surface area, install a ditch block at an elevation tolerable to the rest of development. This may require use of Lot 9. The goal would be to try enhance the retained storage to closely match the natural storage the slough had before the ditch with some type of fill and spill structure. The 1950 hydrology suggests that the median annual inflow into this slough is 65 cubic decametres.
- 2 Enhance storage (South of Hwy 16) U of S property- investigate the possibility of constructing a structure on the outlet of the slough on the U of S lands to make up the loss of storage. This option would require permission from the land owner, the U of S.
- 3 A third option would be to pursue land control around the terminal basin south of the railway tracks.

If you would like to discuss these options / requirements in more detail don't hesitate to contact me.

AL

Al Keller - C. Tech.

Acting Supervisor

402 Royal Bank Tower 1101 - 101st Street

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From: Spencer McNie

Sent: July-13-15 11:13 AM

To: 'Darrell Rinas'

Cc: Brent Eberle; 'Dukart, Shawn MA'

Subject: RE: R651-15S W 1/2 of NE 35-35-04-3 RM of Corman Park No. 344

Darrell,

The Water Security Agency (WSA) has reviewed your below email. The drainage works in question pre date 1981 and are therefore considered unauthorized but not illegal. The works are owned by whoever currently owns the property and they are ultimately responsible for them.

You are correct that a drainage approval with the current design could be granted with control of the impacted lands downstream, control would be in the form of easements. As we discussed obtaining land control for the ditch would likely be very difficult. The more feasible option would be to undertake a design that increases the size of the retention pond by 25% (1:100 year event + 25%) to mitigate downstream impacts.

The WSA would not be able to approve the ditch without land control; however, we could approve the subdivision application based on the fact that significant mitigation works are going to be put in place. As you indicated in low flow years it is likely that the downstream landowners will see very little or even no water leaving the retention pond. During high flow years the pond would act as a buffer to temper flows. Please provide us with the revised storm water design/plans.

As development in the area continues to increase it may become necessary to design an outlet/mitigation strategy for the surrounding area. This would be a large undertaking and would likely best be handled by having the Rural Municipality be the proponent. If in the future you should encounter some existing drainage works involving your projects please do not hesitate to contact the WSA for input/information. Hopefully we will be able to prevent situations like this from occurring in the future.

There are no projects owned or operated by the WSA that would be affected by the proposed subdivision. As it stands right now we have no further concerns; we would like to review the revised plans before giving final comments.

Regards,

S

Spencer McNie

Technologist, Regional Services
402 Royal Bank Tower 1101 - 101st Street
North Battleford, SK S9A 0Z5
Ph: 306.446.7454 | Fax: 306.446.7461
wsask.ca | spencer.mcnie@wsask.ca

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From: Darrell Rinas [mailto:████████████████████]
Sent: June-19-15 11:06 AM
To: Spencer McNie
Cc: Mike Pawluski; Bill Delainey
Subject: RE: R651-15S W 1/2 of NE 35-35-04-3 RM of Corman Park No. 344

Hi Spencer,
Have you had a chance to review and respond to my email from June 8th?
Thanks,
Darrell

From: Darrell Rinas
Sent: Monday, June 08, 2015 3:32 PM
To: [REDACTED]
Cc: 'Dukart, Shawn MA'; Mike Pawluski; Bill Delaine; [REDACTED]
Subject: RE: R651-15S W 1/2 of NE 35-35-04-3 RM of Corman Park No. 344

Hi Spencer,

We would like to thank Brent Eberle and yourself for meeting with us today to discuss the drainage plan for East Floral Industrial Park Phase 2 in regards to the following comments received through Shawn Dukart at the Community Planning Branch.

You had identified that there is an existing irrigation plan that predates 1983 which consisted of an old 12" concrete culvert that has since been taken out of service. At the time the irrigation system was taken out of service (~1960's?) a drainage channel was constructed to drain the low lying area and this ditch was completed without permit by the landowners. This ditch has been used in the drainage plan for the initial phases of the East Floral Industrial Park and is proposed to be used in the next phases as well. It is our understanding that there is a perception that this ditch has created downstream impacts to the lands southwest of the proposed development on the west side of Highway No. 16 and that further development of the area will add to the problems the downstream users are experiencing.

The plan we have provided is expected to improve the conditions downstream as the retention pond is designed to catch and retain the water from upstream of the development and allow it to flow through the system in periods of high flows. However, in periods of lower flows the system will contain water in the retention pond and result in less water downstream, which should be viewed as a benefit for the affected landowners.

Following this discussion, you provided us with next steps to proceed with the consideration of approval for the East Floral Industrial Park Phase 2 drainage plan. These options consist of:

1. Drainage approval with the current design could be granted with control of the impacted lands downstream.
2. Increase the pond size by 25% over the 1:100 year storm event we are currently proposing to allow for an increased storage volume and further benefit to affected landowners.

Either one of these options would require that the existing drainage ditch be approved by the WSA for further use, our intention is to provide a design which includes 25% additional storage volume and continued use of the existing drainage ditch.

Can you please provide a brief email to confirm these next steps and inform us if there are any further considerations we should make.

Regards,

Darrell Rinas, P.Eng.
Division Manager, Infrastructure
Associated Engineering (Sask.) Ltd.



<image004.gif><image005.gif> <image007.gif>
You may [unsubscribe from Associated Engineering electronic communications](#) at any time.

From: Dukart, Shawn MA [<mailto:> [REDACTED]]
Sent: Tuesday, May 26, 2015 2:08 PM
To: Mike Pawluski; Bill Delainey; Darrell Rinas
Cc: 'Chad Watson'; Tom R. Webb
Subject: FW: R651-15S W 1/2 of NE 35-35-04-3 RM of Corman Park No. 344

Hi all,

WSA has responded regarding the East Floral subdivision. I spoke with Spencer regarding WSA's comments and apparently the way things are draining now there are issues downstream. Obviously, the existing East Floral subdivision is not the only source of water but their concern is that if they allow for added drainage through the proposed route it will cause additional flood risk. As he indicates below we can work on approving the outlet ditch (drainage approval with land control) or an alternative storm water management plan could be designed. This is a bit of setback but my hope is that we can figure something out something that will work for all parties. Please let me know what option is best suited for you.

Regards,

Shawn Dukart
Government of Saskatchewan
Planning Consultant
Community Planning Branch, Ministry of Government Relations
Room 978, 122 - 3rd Avenue North
Saskatoon, Saskatchewan S7K 2H6
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From: Spencer McNie [<mailto:> [REDACTED]]
Sent: Monday, May 25, 2015 2:37 PM
To: Dukart, Shawn MA
Subject: R651-15S W 1/2 of NE 35-35-04-3 RM of Corman Park No. 344

Shawn,

As we discussed the Water Security Agency (WSA) has concerns regarding the discharge of storm water through an unauthorized drainage ditch into the Highway 16 ditch owned by the Ministry of Highways and Infrastructure. The unauthorized ditch has been a point of contention for several complaints

through the years. The water drained through the ditch eventually ends up in a dead end slough on section 26-35-04-3. There are several yard sites with flooding issues in the area already; the sloughs affecting these yards does not have an outlet and any additional water only increases the flood risk to the land owners. The WSA cannot approve this file until the outlet ditch is approved (drainage approval with land control) or an alternative storm water management plan is created.

Regards,

S

Spencer McNie

Technologist, Regional Services
402 Royal Bank Tower 1101 - 101st Street
North Battleford, SK S9A 0Z5
Ph: 306.446.7454 | Fax: 306.446.7461
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Kendra Raymond

From: Paulsen, Dan (Fire) [REDACTED]
Sent: Wednesday, May 29, 2013 4:23 PM
To: Kendra Raymond
Cc: Coffin, Bill (Fire); Rumpel, Dave (Fire)
Subject: RE: Fire Response in RM Corman Park

Good afternoon Kendra:

The present service agreement with the Rural Municipality of Corman Park does not specify the number or types of apparatus that we respond with. Also the response is governed by if there is sufficient resources available and we will respond with an anticipated arrival of 30 minutes from time of call. Our general response is 4 pieces of equipment with 12 staff. The number of staff is established for safety of the responders and the ability to meet most of the situations they will be faced with. Our water tankers carry 3000 gallons and the pumpers 500 and we as a fire service rely on the water sources that accompany the crews.

I trust this addresses your questions

Regards

Dan Paulsen
Fire Chief

From: Kendra Raymond [[mailto:\[REDACTED\]](mailto:[REDACTED])]
Sent: May 15, 2013 10:31
To: Rodger, Wayne (Fire)
Subject: Fire Response in RM Corman Park

Hi Wayne,

We are working on an industrial development expansion of 7 lots adjacent to East Floral Industrial Park just off Highway No. 16 in the W 1/2 Section 35-35-4-W3M.

I am wondering if you can answer the following questions for me regarding fire response so that we can include them in our Comprehensive Development Review submission to the RM of Corman Park:

1. What type of trucks do you take out to respond to a fire?
2. Do they have enough water?
3. Expected response time
4. What does the developer need within the development to enable you to provide fire services to satisfy your agreement with the RM?

Please contact me if you require further information or have any questions.

Sincerely,

Kendra Raymond
Project Planner

Associated Engineering
1 – 2225 Northridge Drive
Saskatoon, SK S7L 6X6

Tel: 306.653.2137 ext 484
Fax: 306.242.4904

Email: raymondk@ae.ca
Web: www.ae.ca



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Inquiry was made on March 14, 2013 at 1:26 PM

You are inquiring about the heritage sensitivity of the following land location:

Quarter-section: NW

Section: 35

Township: 35

Range: 4

Meridian: 3

This quarter-section is NOT heritage sensitive.

It is not necessary to submit the project to the Heritage Conservation Branch for screening. These results can be printed for submission to other regulatory bodies (e.g. Saskatchewan Environment, Saskatchewan Industry and Resources). Please email arms@gov.sk.ca if you have any questions.



**Ministry of Parks,
Culture and Sport**

Heritage Conservation Branch
2nd Floor, 3211 Albert Street
Regina, Saskatchewan
S4S 5W6

(306) 787-2848
jennifer.thompson@gov.sk.ca

June 7, 2016

Our File: 16-1412

Mr. Mike Pawluski
Associated Engineering (Sask.) Ltd.
1 – 2225 Northridge Drive
SASKATOON SK S7L 6X6

Dear Mr. Pawluski:

**RE: East Floral Industrial Park Subdivision:
SW 35-35-4-W3M;
HERITAGE RESOURCE REVIEW**

Thank you for referring this project to our office for review.

In determining the need for, and scope of, heritage resource impact assessment (HRIA) pursuant to S. 63 of *The Heritage Property Act*, the following factors were considered: the presence of previously recorded heritage sites, the area's overall heritage resource potential, the extent of previous land disturbance, and the scope of new proposed land development.

There are no recorded heritage sites located in conflict with the proposed project. As well, the project area has been previously disturbed by development and cultivation. As such, the potential for heritage sites to be adversely affected by this project is low. Our office has no concerns with the development proceeding as planned.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Dr. Jennifer A. Thompson
Archaeologist/GIS Specialist
Archaeological Resource Management

REPORT

Appendix F – Public Consultation



Associated
Engineering

GLOBAL PERSPECTIVE.
LOCAL FOCUS.

Associated Engineering (Sask.) Ltd.
1 - 2225 Northridge Drive
Saskatoon, SK, Canada, S7L 6X6

TEL: 306.653.4969
FAX: 306.242.4904
www.ae.ca

May 24, 2013
File: 2012-4157

Dear Sir or Madam:

**Re: EAST FLORAL INDUSTRIAL PARK PHASE 2
W ½ Section 35-35-4-W3M in the RM of Corman Park No. 344**

Please find enclosed a copy of the Plan of Proposed Subdivision for the second phase of the East Floral Industrial Park located at Highway No. 16 and Floral Road in the W ½ -Section 35-35-4-W3M in the RM of Corman Park No. 344.

The purpose is to develop a 7 lot light industrial park next to the existing East Floral Industrial Park, Phase 1 on 19.40 hectares (47.95 acres) of land. This development will create an industrial park that provides convenient access from the City of Saskatoon, has excellent access roads via a major transportation corridor, and features a range of lot sizes that are able to accommodate a wide variety of light industrial uses.

We are sending this letter out to landowners within a 1.6 kilometre radius of the development for their comments on the proposal. Your comments will be included in our report to the RM of Corman Park. Please send your comments by **June 21, 2013** by mail or e-mail to:

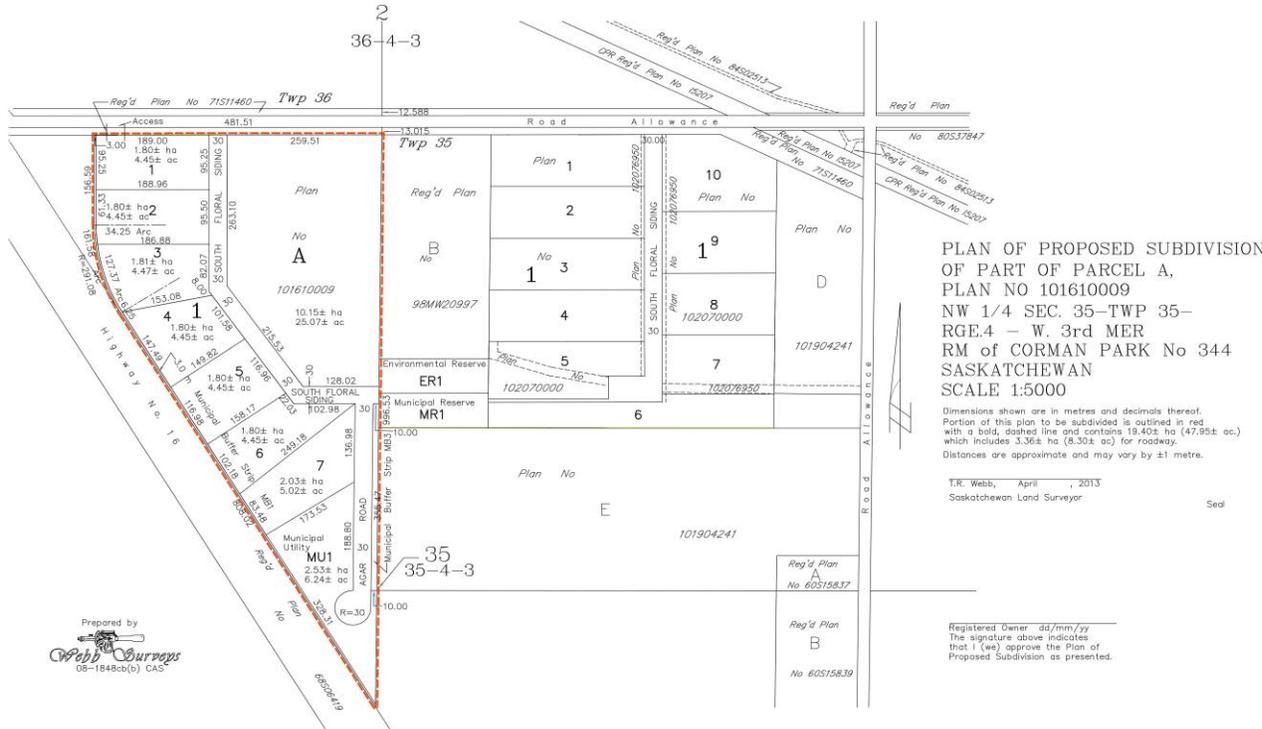
Kendra Raymond, Project Planner
Associated Engineering
1 – 2225 Northridge Drive
SASKATOON SK S7L 6X6
E-mail: raymondk@ae.ca

Yours truly,

A handwritten signature in black ink, appearing to read 'Kendra Raymond'.

Kendra Raymond
Project Planner

East Floral Industrial Park Phase 2



Owner Name: _____

Comments: _____

Date: _____

Signature: _____

Kendra Raymond

From: Tim Armstrong <[REDACTED]>
Sent: Monday, June 17, 2013 1:07 PM
To: Kendra Raymond
Subject: File 2012-4157

Kendra,

I received your letter regarding the East Floral Industrial Park Phase 2, dated May 24, 2013.

We are in the process of constructing a Feed Mill East of this location. I have no issue with your project but I am interested in the type of business that you are hoping to attract to this location.

Regards,

Tim Armstrong

[REDACTED]
(306) 244-5192 [REDACTED]
(306) 665-2021 (fax)
[REDACTED]

**new-life mills**
Feeding Your Future

A Division of Parrish and Heimbecker, Ltd.

REPORT

Appendix G – Servicing Worksheet

Summary of Property Servicing



Development Name: INDUSTRIAL/COMMERCIAL SUBDIVISION

Developer Name: East Floral Phase 2

Legal Land Location: _____

The purpose of these worksheets is twofold. Firstly, the worksheets are intended to provide the Municipality with a summary of the various services which are being constructed included any technical specifications. The second reason for these worksheets is to aid the developer in itemizing the various costs of servicing the development for the purpose of calculating the amount of financial security to be provided to the Municipality.

Summary of Property Servicing Worksheet 1: Roadways

To be submitted by an applicant for the purposes of summarizing the design standards for a development and calculation of financial security. **Complete a separate worksheet for each type of roadway being constructed or upgraded for the development.**

1. Type of roadway:

- Residential internal subdivision road
- Municipal road – main farm access
- Primary haul road
- Industrial/Commercial internal subdivision road

2. Specifications:

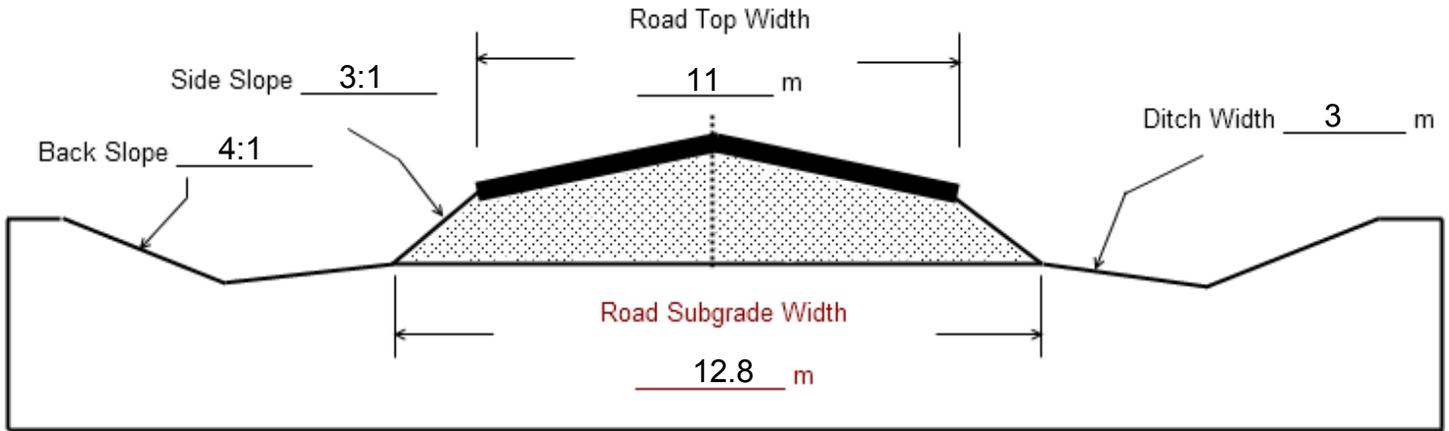
- a. length of road to be constructed or upgraded: 1833 metres
- b. right of way width 30 metres
- c. road sub-grade width: 12.8 metres
- d. road top width: 11 metres
- e. back slope : 4:1
- f. side slope: 3:1
- g. ditch width: 3.0 metres
- h. method of erosion control: Grass seed in ditches and retention pond
- i. anticipated design speed 50 km/hr
- j. estimated road lifespan: 50 years
- k. culvert locations (attach site plan) and sizes:
 - number: 1 type: CSP size: 400 mm
 - number: 11 type: CSP size: 600 mm
 - number: 9 type: CSP size: 800 mm
 - number: type: size: mm
 - number: type: size: mm

Comments: _____

l. road surfacing:

- Gravel Chip seal Asphalt Other

surface thickness: 476.7 m³/km



3. **Cost estimates:** Provide cost estimate for each component of construction attaching quotes and contracts where necessary to verify estimates.

a. land acquisition	\$ <u> N/A </u>
b. Design and engineering	<u> 12,000 </u>
c. preliminary earthwork & sub grade construction	<u> 600,000 </u>
d. road construction	<u> 230,000 </u>
e. surfacing	<u> 45,000 </u>
f. culverts	<u> 24,000 </u>
g. signage	<u> 1800 </u>
h. line painting, curbing etc...	<u> N/A </u>
i. re-vegetation and erosion controls	<u> --- </u>
 TOTAL ESTIMATED COST	 <u> \$ 923,000 </u>

For Office Use Only:

Date of receipt of preliminary construction plans: _____ / _____ / _____ (d/m/y)
Date of approval of preliminary construction plans: _____ / _____ / _____ (d/m/y)
Date of receipt of as-built drawings: _____ / _____ / _____ (d/m/y)
Date of final inspection: _____ / _____ / _____ (d/m/y)

Summary of Property Servicing Worksheet 2: Water Supply Lines

To be submitted by an applicant for the purposes of summarizing the design standards for a development and calculation of financial security. **Complete a separate worksheet for each type of waterline being constructed or upgraded for the development.**

4. Type of waterline:

- Potable
 Non potable
 Fire suppression

5. Specifications:

- | | | |
|---|------|--------|
| a. length of water supply line constructed: | 1400 | metres |
| b. water supply line diameter: | 100 | mm |
| c. depth of line: | 2.8 | metres |
| d. water supply line material : | HDPE | |
| e. # fire hydrants: | N/A | |
| f. # curb stops: | 17 | metres |
| g. minimum water supply line depth: | 2.8 | metres |

6. Cost estimates: Provide cost estimate for each component of construction attaching quotes and contracts where necessary to verify estimates.

- | | |
|---------------------------------------|--------------------------|
| a. land acquisition and /or easements | \$ N/A |
| b. Design and engineering | 12,000 |
| c. materials & labour | 46,000 |
| d. trenching and or drilling | 42,000 |
| e. installation | included in mat. & lab |
| f. backfill and re-vegetation | included in mat. & labor |
| g. hydrants and pump stations | N/A |
| TOTAL ESTIMATED COST | \$ 100,000 |

For Office Use Only:

Date of receipt of preliminary construction plans:	_____ / _____ / _____	(d/m/y)
Date of approval of preliminary construction plans:	_____ / _____ / _____	(d/m/y)
Date of receipt of as-built drawings:	_____ / _____ / _____	(d/m/y)
Date of final inspection:	_____ / _____ / _____	(d/m/y)

Summary of Property Servicing Worksheet 4: Drainage Works

To be submitted by an applicant for the purposes of summarizing the design standards for a development and calculation of financial security.

10. Drainage Works: Provide a cost estimate for the construction of drainage works for the development attaching quotes and contracts where necessary to verify estimates.

a. Design and Engineering		\$ <u>12,000</u>
b. Site grading and excavation		<u>328,400</u>
c. Culverts and drainage channels/swales		<u>120,000</u>
d. Re-vegetation		<u>---</u>
e. Pump		<u>---</u>
f. Other control structures		
i. _____		_____
ii. _____		_____
iii. _____		_____
TOTAL ESTIMATED COST DRAINAGE WORKS		\$ <u><u>460,400</u></u>

11. Storm Pond Design Specifications:

- a. Pond Type: Wet pond Dry Pond
- b. Pond depth: _____ m
- c. Water holding capacity _____ m³

Summary of Estimated Costs

Roadways:	\$	<u>922,800</u>
Waterlines:		<u>100,000</u>
Shallow Utilities:		<u>132,000</u>
Drainage Works/Lot Preparation:		<u>460,400</u>
Other:		<u>40,000</u>
Total Estimated Costs:		<u><u>1,655,200</u></u>

REPORT

Appendix H – RM of Corman Park Road Standards





Internal Commercial Industrial Road Program	Required Construction Standards
	Subject: Internal Commercial Industrial Road

SUMMARY OF BASIC STANDARDS

Right-of-way width = 46 meters (purchased). With municipal approval = 30 meters (purchased).

Full width of right-of-way to be cleared.

The standard basic finished top width for heavy haul roads is 10.0 meters for gravel surface and 9.0 meters for asphalt.

Sideslopes = 4:1

- fills 0 – 3 meters = 4:1
- fills 3 meters to 4 meters - toe of slope to be 12.0 meters from shoulder.
- fills over 4 meters = 3:1

Backslopes

- 5:1, with maximum of 3:1
- 5:1 backslope is to be maintained until top of backslope reaches the edge of right-of-way. The backslope will remain at the edge of the right-of-way to a maximum of 3:1.

Snowclearance – When shoulder grade elevation is 0.3 meters or less above natural surface at 15.0 meters from center line then the backslope must be flattened using a variable slope of 5:1 to a maximum of 3:1.

Maximum gradient – 5%. In unusual circumstances – 6%.

Stopping sight distance – 140 meters minimum (for 80 km/h design).

Clear vision at road intersection – minimum of 85 meters from the point of intersection on municipal roads and grid intersections and to a maximum of 140 meters on primary grid roads using 80 km/h design speed and 200 meters for a highway on another heavy haul road using 100 km/hr design spread.



Internal Commercial Industrial Road Program	
Required Construction Standards	Subject: Internal Commercial Industrial Road

Shall include the installation of all necessary drainage structures and construction of drainage ditches. Culverts should be designed for at least a Q¹⁵ flow, with a minimum culvert size of 500 mm diameter. Riprap only where necessary to avoid undue erosion. All culverts will be constructed of metal unless approved by the Municipality prior to construction.

Construction shall include all road connections and approaches. See attached plan – Standard Approach.

The average shoulder elevation of the road surface to be approximately 0.6 meters above the adjacent ground surface, except in cuts.

Objectionable organic material shall be subcut where the fill is less than 0.6 meters in depth.

The subgrade surface shall not be less than 1.5 meters above high water level on the ground water table. (ie: level to which free water would rise in a hole sunk in the ground).

Road surface, sideslopes, ditches and backslopes shall be bladed smooth to conform to the typical cross-section.

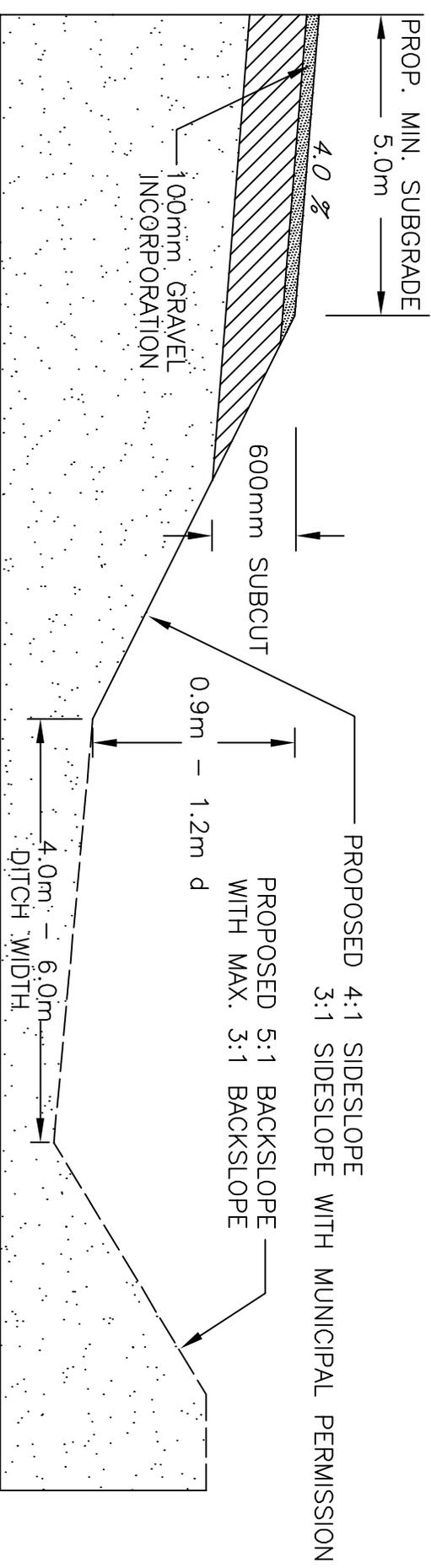
Where necessary to provide a smooth, stable driving surface, the road shall be capped with a layer of clay material. The depth of clay cap shall be a minimum of 0.3 meters. If the subgrade is to be surfaced clay material should be avoided if possible and a granular subgrade constructed. Gravel shall be incorporated in the top 100 mm of the subgrade prior to traffic gravel being applied. Gravel incorporation shall be done according to the Municipal Specification attached. The gravel specification for incorporation is Type 103 or 104.

Gravel surfacing for the subgrade required at the rate of 250 m³/km for the first application, 250 m³/km for the year following construction and additional applications as required. The required gravel specification for traffic gravel is Type 106 or Type 108.

Alignment – curves must be constructed with the proper super-elevation as per the Ministry of Highways & Transportation Standards.

Asphalt surface for Internal Commercial Industrial Roads – Soil testing is required to determine surface design. Along with the soil testing, traffic volume and vehicle configurations must be considered when selecting the surface structure.

23.0m
 15.0m WITH MUNICIPAL PERMISSION



NOTE: SUBGRADE WIDTH FOR INTERNAL COMMERCIAL-SURFACED ROADS
 TO BE DETERMINED AFTER COMPLETION OF SURFACING DESIGN.



PUBLIC WORKS
INTERNAL COMMERCIAL INDUSTRIAL ROADS
TYPICAL CROSS SECTION
SUBGRADE

DATE: 2011

SCALE: NTS

DRAWN BY: AMECE & E