Overpass Farms Inc & Nienhuis Contracting Ltd.

Western Business Park

Comprehensive Development Review

Associated Engineering | 75 YEARS

SEPTEMBER 2023

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Executive Summary

Legal Land Location:	NE 05-38-05-W3M and SE 08-38-5-W3M
Registered Owner:	Overpass Farms Inc & Nienhuis Contracting Ltd.
Gross Land Area:	76.70 ha
Existing Zoning:	**(DC2) D - Arterial Commercial 2 District**
	(DAG1) D- Agricultural 1 District
Proposed Zoning:	**(DC2) D - Arterial Commercial 2 District**
Ownership:	Fee Simple Subdivision
Lot Estimate:	Rural - 42 lots
	Urban - 83 lots
Jurisdiction:	RM of Corman Park No. 344
Potable Water:	Intervalley Water Inc.
Wastewater:	Septic Holding Tanks

Western Business Park is a proposed multi-lot commercial subdivision situated approximately halfway between Martensville and Saskatoon along the west side of Highway 12. The development is intended to support a mix of interim and permanent commercial uses on rural serviced lots that have been planned to be potentially subdivided further in the future as the area transitions towards incorporation into an urban neighbourhood.

In the initial rural phase of development, businesses within the park will be geared towards supporting the commercial needs of the traveling public. As the surrounding area is developed for urban residential development, this development will become part of a suburban commercial corridor transitioning to uses that serve both local and regional populations.

The plan for development acknowledges the need to protect key utility and transportation corridors associated with the transition from a highway focused rural development to a suburban commercial corridor. Given the long-term timeline for urban services and the lack of confirmed connections to guide infrastructure design, this plan does not provide an urban servicing design but rather identifies and seeks to dedicate the right-of-ways needed to extend future underground infrastructure.

1 Introduction

1.1 Purpose

This Comprehensive Development Review (CDR) has been prepared to support an application to rezone 76.52 ha (189.53 ac) located within NE 05-38-05-W3M and a portion of the SE 08-38-05-W3M from D-Agricultural 1 District to a D-Arterial Commercial 2 District (DC2) to support a proposed multi-lot subdivision herein described as the Western Business Park.

The Saskatoon North Partnership for Growth District Official Community Plan (DOCP) defines the long-term intent of the plan area as urban commercial/industrial. The North Concept Plan further refines the proposed land use designation as future urban commercial. This document demonstrates how the proposed development will successfully transition from rural development in the RM of Corman Park to an urban form of development. 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.

Given the size of the plan area, this development will be phased with the composition and timing for each phase depending upon market conditions and the logical extension of services to and within the subject property. Although subdivision and development within the Western Business Park is intended to be phased, this submission is intended to provide enough detail to support rezoning of the entire subject property with a holding provision applied to the lands located outside of the active phases of subdivision. It is our understanding that Council will consider the removal of this holding provision upon receipt of subsequent subdivision applications accompanied by updated servicing cost estimates to be used to inform the preparation of servicing agreements for each successive phase. It is acknowledged that these subsequent subdivision plans will be required to align with the direction presented in this report and any significant deviation may require an amendment to this report.

2 Plan Context

2.1 Current Land ownership

Table 2.1 illustrates the current distribution of ownership within the ¼ section.

Parcel Number	Registered Owner	Area (ha)
161612344	Overpass Farms Inc.	18.52 ha (45.78 acres)
161612355	Overpass Farms Inc.	1.11 ha (2.74 acres)
117386770	Friesen, Fred, Nienhuis, Anthony	57.06 ha (141.01 acres)

Table 2.1 Land Ownership

2.2 Plan Location

The subject property is located along Highway 12, approximately halfway between the cities of Saskatoon and Martensville. The situation of the park along Highway 12 offers businesses with visibility and access along a major national transportation route; supporting the efficient movement of goods and people with little impact on municipal roads. The location of the plan area is illustrated in Figure 2.1.

2.3 Physical Conditions

The land is relatively flat within elevations ranging between 510 m and 512 m above sea level. The property naturally slopes to the east and southeast towards the Highway 12 corridor. Historical imagery suggests that Parcel No. 161612344 was previously excavated for sand and gravel and never fully reclaimed contributing to the undulating terrain within this portion of the plan area. The flat topography of the balance of the site supports building construction and lot development, but the lack of grade also presents some minor challenges for lot grading and stormwater management.

The land cover is mostly grassland with several low-lying marshes. There are also pockets of trees and shrubs within the northern portions of the plan area. In April 2020, the Sustainability Division of the City of Saskatoon published the Green Network Refinement Stage 1: Natural Areas Screening (Desktop) report to identify the spatial distribution of wetlands, environmentally significant and managed lands, land cover, agricultural soil capability, heritage sites, and species of concern within the lands encompassed by the North Concept Plan. This natural area screening is intended to be used to enable the boundary of the Green Network to be confirmed or refined.

The above-noted report identified Class III and IV wetlands within the plan area. Class III wetlands are identified as seasonal ponds and lakes that are usually dry by midsummer whereas Class IV wetlands are semi-permanent ponds and lakes that frequently maintain water throughout the growing season from May to September.

A desktop biophysical screening was completed for the plan area using the HABISask on-line GIS database and reviewing the North/Northwest Natural Area Screening Study prepared by Stantec Consulting Ltd. in 2012. The HABISask query is attached in Appendix A and no rare or endangered vegetation or wildlife species were identified. However, the Natural Area Screening Study identified the potential presence of meadow pussy-toes (Antennaria Corymbosa) in the southwest corner of Parcel 117386770 at its common boundary with NW 5-38-5-W3M. The meadow pussy-toes are a rare plant species with an S1 ranking, which has the highest risk of extirpation or extinction due to extreme rarity, very steep declines, high threat level, or other factors. The Natural Area Screening Study recommends mitigation measures should be considered for the plant species such as transplantation and/or seed collection.

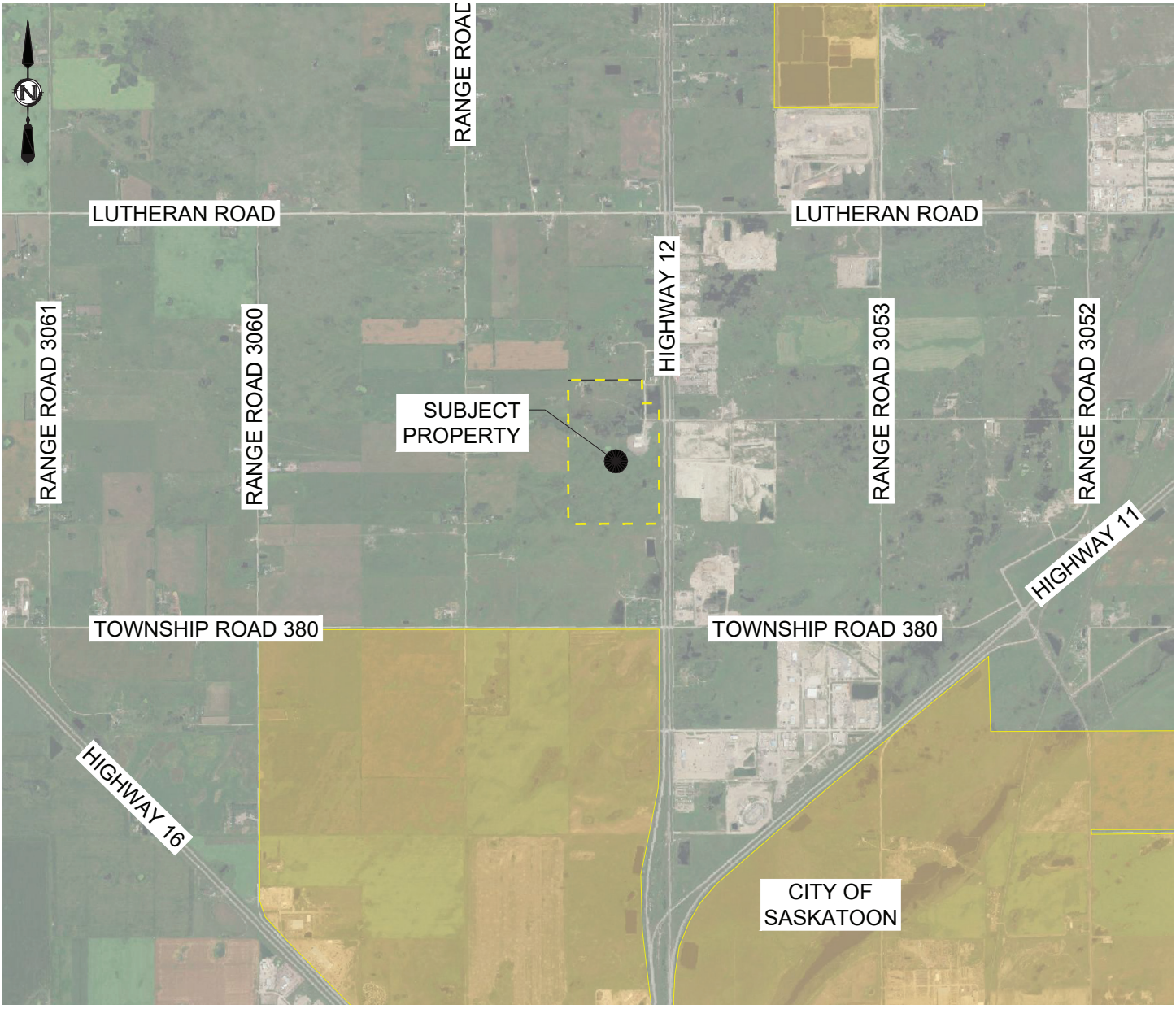


Figure 2.1 Location Plan

The impacted area is anticipated to be one of the last areas to be developed. Associated Engineering recommends that a field survey is completed within the plan area to confirm the occurrence of this rare plant species, identify the impact of development and an appropriate mitigation strategy before any further grading or excavation occurs within this area of the property.

There are no existing tree stands on the project area that are considered valuable and need to be conserved.

Local soils are considered Class 4 according to the Canada Land Inventory Soil Classification Index. Class 4 soils are considered marginal soils exhibiting moderate to severe limitations for agricultural activity. Preliminary geotechnical investigations were performed by P. Machibroda to determine the suitability of the site for development based upon local soil conditions and groundwater elevations. A total of 15 test holes were drilled within the plan area to depths ranging between 3.0 m and 12.4 m. The general soil profile at the locations investigated consisted of a surface layer of fill or silt that extended to depths of about 0.4 m to 1.6 m, followed by an extensive deposit of glacial till that extended to the maximum depth investigated. Except for BH 22-6 which revealed a ground water elevation of 3.4 m below existing ground surface, the five other monitoring wells were dry when tested. The report suggests that higher water levels may be encountered, particularly during and/or following spring snow melt and/or periods of precipitation.

Based on the preliminary geotechnical investigation reports, the site is considered suitable for development. Site-specific

geotechnical investigations will be required for the design and construction of any proposed structures within the future development area. Copies of the two geotechnical reports are attached as Appendix B.

2.4 Cultural and Heritage Resources

A desktop heritage screening was completed using the Developer's On-line Screening Tool confirming that lands within the plan area are not considered heritage sensitive and no further consultation or approvals are required. A copy of this query is attached in Appendix A.

2.5 Legal Encumbrances and Built Conditions

There is currently an operating contracting and construction business located in Parcel 117386770 which includes two buildings and a small operations yard. A small stormwater management facility has been constructed directly north of the buildings and a gravel surfaced driveway has been constructed to connect the business to Township Road 381.

The lands situated east of the northbound leg of Township Road 381 and west of Highway 12 has been previously graded and fenced in anticipation of the construction of an agricultural cold storage building. The balance of the lands within the plan area are undeveloped.

Based upon a review of property title information provided by Information Services Corporation (ISC), there are two easements registered within the plan area as illustrated in Figure 2.2.

An 15 m TransGas easement extends along the southern boundary of the NE 05-38-05-W3M. This easement contains a high-pressure gas line. The following development restrictions are placed on this easement:

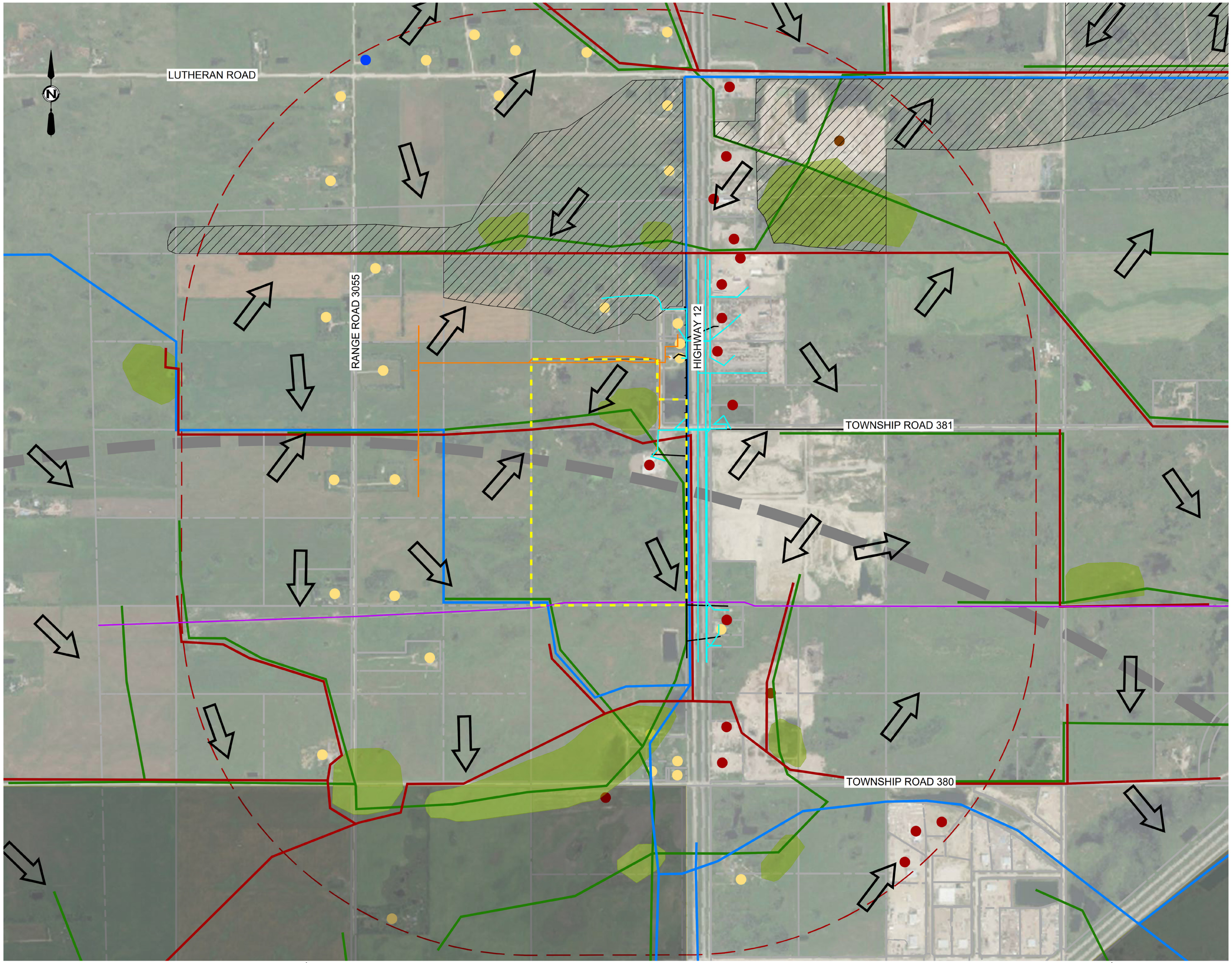
- No ground disturbance, pits, wells, foundations, pavement or buildings, or other structures are permitted on, over, under, or through the right-of-way without the approval of TransGas.
- To reduce the risk of unintentional excavation contact or crushing damage, TransGas recommends that the developer install and maintain a snow fence along the right of way boundaries when work is occurring within 30 m of the right of way.
- As a condition of its consent to working within or crossing the easement, TransGas will require that the developer install and maintain a snow fence along both sides of the TransGas right of way for the entire duration of the development, to protect against inadvertent vehicular or equipment access and pipeline damage.
- No roads are to be constructed over the pipeline(s) without TransGas conducting an assessment and approving the work. If the assessment indicates modifications to the pipeline(s) are required, the costs for the modifications will generally be borne by the applicant.
- Upgrades or relocation of TransGas pipelines may require several months' notice and planning, and costs are generally the responsibility of the applicant.
- TransGas suggests that a proposed plan of development be submitted to TransGas for assessment. This will help identify potential concerns ranging from loading concerns (weight of equipment) to potential setback issues.

The above-noted restrictions were accounted for in establishing a layout for the site.

A 48.3 mm SaskEnergy distribution gas main extends within a 10 m easement along the north boundary of Parcel B in the SE 08-38-05-W3M. According to the terms of the agreement, the easement and gas line can be crossed in conjunction with the use of properties and some grading is permitted assuming the minimum depths of cover are maintained; however, no permanent buildings or coverings may be located over the gas main. The lot layout will consider and minimize the implications of the gas line easement by locating it in the rear yards of the properties outside of the developable area on the lots.

Development within the immediate vicinity of the property is summarized in Figure 2.2 and includes the following:

- There are 30 acreage/farmsteads within 1.6 km of the site with 28 of these residences located on the west side of Highway 12. The closest residences are located along the northern extension of Township 381. We note that this roadway terminates approximately 1.2 km north of the current Highway 12 intersection and a total of four acreages would share the existing highway intersection with the proposed development.
- There are 17 existing commercial/industrial businesses within 1.6 km of the site with most of those businesses being focused along the Highway 12 corridor. Two of the businesses are located on the west side of the highway including



LEGEND

- PROJECT AREA
- 1,600 m ADJACENT USE BOUNDARY
- EXISTING COMMERCIAL/ INDUSTRIAL USES
- EXISTING RESIDENTIAL USES
- EXISTING AGGREGATE OPERATION
- INTERVALLEY WATER PUMP HOUSE No. 2
- NCP OVERLAND DRAINAGE DIRECTION
- TRANSGAS TRANSMISSION LINE
- NCP PROPOSED WATER MAIN
- NCP PROPOSED SANITARY TRUNK
- NCP PROPOSED STORM TRUNK
- SASKENERGY DISTRIBUTION LINE
- SASKPOWER OVERHEAD POWER LINE
- SASKTEL INFRASTRUCTURE
- NCP 8 km AIRPORT WILDLIFE BUFFER
- NCP PROPOSED WETPOND
- NCP GREEN NETWORK STUDY AREA
- CITY OF SASKATOON LEGAL LIMITS

FIGURE 2.2 DEVELOPMENT INFLUENCES

OVERPASS FARMS INC.
MARTENSVILLE LUMBER

WESTERN BUSINESS PARK

AE PROJECT No.	20204508-00
SCALE	NTS
APPROVED	B. DELAINEY
DATE	2021NOV10
REV	0
DESCRIPTION	ISSUED FOR REPORT

PLOT DATE: 11/10/2021 1:04:51 PM
SAVE DATE: 11/10/2021 12:59:30 PM SAVED BY: PAWLUSKIM
DWG PATH: \\ae.ca\data\working\sas\2020-4508-00\plan\concept_figures\west_biz_context.dwg

Impact Asphalt and Concrete Crushing and Western Wall Systems.

- There appear to be two sand and gravel processing/storage operations within 1.6 km of the subject property and both these operations are on the east side of Highway 12

The remaining lands surrounding the subject property are currently undeveloped farmland.

The closest residence is approximately 90 m to the northeast of the project area. The DOCP does not include minimum separation distances between commercial and residential development. Commercial development typically provides for less intensive uses and a higher quality property landscaping relative to other forms of development. The P4G Zoning regulations restricts outdoor storage of unfinished goods and provides for the establishment of screening along adjacent municipal roadways and public lands by a solid fence, landscape materials, berm, vegetative plantings or any combination of the above at least 2.0 m in height. The combination of landscaping and restrictions to outdoor storage and activity reduces the potential impact of development on the use and enjoyment of nearby properties.

The closest residence to the proposed development area has an established perimeter shelter belt providing a physical and visual buffer between the dwelling and the subject property.

2.6 Utility Servicing Conditions

Intervalley Water Inc. (IWI) operates an existing 3 inch water main line on the west side of Highway 12 which will service the development. This main line is a low-pressure line that will require individual properties to install a cistern and a pump to supply full pressure water service within the buildings. As it is a low-pressure line, there will not be sufficient pressure to accommodate fire flows and therefore, an alternate method of fire protection should be considered in building design. IWI has confirmed they have enough water allocation available from SaskWater. A copy of this correspondence is included in Appendix C.

As a rural development area, there is no existing centralized sanitary sewer collection system available to tie into. It is anticipated that businesses within the park will exclusively utilize septic holding tanks to manage wastewater collection and disposal. The use of holding tanks will require a licensed hauler to evacuate tanks and haul the wastewater to an approved facility capable of disposing the waste. The size of and location of the tanks will be determined by lot owners and will influence the frequency of evacuation. GFL Environmental was contacted and confirmed they can provide service for evacuating tanks at this site and disposing the wastewater at the Saskatoon Wastewater Treatment Facility located at 470 Whiteswan Drive, Saskatoon, SK. This correspondence is attached to this report in Appendix C.

There are presently no constructed drainage works within the subject property with exception of an existing stormwater pond adjacent to Western Wall Systems which was constructed in conjunction with the establishment of this business.

Access to the site is provided from an intersection along Township Road 381. Highway 12 is an Access Management Level 1 Highway, so permanent access points are spaced at a minimum of 3.2 km apart. This intersection is considered temporary, with the closest permanent highway access point being Township Road 382 (Lutheran Road) to the north. If this access is removed, the Ministry of Highways would provide alternate access. Typically, the removal of temporary approaches happens when interchanges are built, or a safety concern is identified by the Ministry. With the future construction of the Saskatoon Freeway, the current access from Highway 12 at Township Road 381 will be closed and established to the north at Township Road 382 (Lutheran Road). The anticipated construction of the Saskatoon Freeway is still 10 – 15 years away as per comments from the Ministry of Highways.

Despite the temporary classification of this intersection, it has been previously improved to include intersection lighting and a northbound left turn lane to improve its function and safety. Additional planned improvements include:

- A northbound right turn lane; and
- A southbound left turn lane.

These improvements are identified in the Ministry of Highways Safety Improvement Program Database. Construction of these improvements will happen when funding is available.

A Traffic Impact Assessment (TIA) was prepared to determine the traffic impacts of the proposed Western Business Park. The report included in Appendix D included the following recommendations:

Development related recommendations:

1. Construct a southbound right turn lane at the intersection of Highway 12 and Township Road 381 before full build-out.

This is warranted based on development traffic volumes.

Planned improvements by MoH:

1. Construct a northbound right turn lane at the intersection of Highway 12 and Township Road 381. This is warranted based on background traffic volumes and registered in the Safety Improvement Program. Installing a northbound right turn lane at Victor Road before 2037. This improvement is warranted based on background traffic volumes.
2. Construct a southbound left turn lane at the intersection of Highway 12 and Township Road 381. This is warranted based on background traffic volumes and registered in the Safety Improvement Program.
3. Consider additional safety measures to address the existing pattern of far side right-angle collisions at the intersection of Highway 12 and Township Road 381.

Township Road 381 is a graveled surface roadway constructed in a 30-m right-of-way. This municipal road is anticipated to act as a highway service road and will be extended to the south within the proposed development. It is expected that the segments of this roadway directly associated with the development of the business park will be improved to a rural profile paved roadway.

SaskPower operates a three-phase overhead power line along the eastern boundary of the plan area adjacent to Highway 12. As previously referenced, a SaskEnergy gas line extends along the northern boundary of the SE 08-38-05-W3M and south to service the NE 05-38-05-W3M.

SaskTel service lines are in the centre of the Highway 12 right-of-way and extend west along Township Road 381 to Range Road 3054 providing a service connection to Western Wall Systems in NE 05-38-05-W3M.

2.7 Policy and Regulatory Framework

Development of land within the subject property is subject to the DOCP, the North Concept Plan, and the P4G District Zoning Bylaw. Any application to subdivide or develop land, including rezoning, is required to consider the policies and regulations within these documents.

2.7.1 P4G District Official Community Plan

The DOCP contains policies intended to guide land use, development and infrastructure services in this area of the RM. The following sections of the DOCP are anticipated to have the greatest influence on the form, intensity and configuration of development within the plan area. A complete list of the applicable policies is provided in Appendix E.

The DOCP identifies the intention for the subject property to be developed for future rural commercial or industrial purposes within the RM of Corman Park. This designation accommodates general commercial and industrial uses, including lightly serviced industrial, storage, and commercial areas that require a large land base.

Section 3 of the DOCP includes the following objectives for development:

- Support and encourage regional economic prosperity and entrepreneurship.
- Support initiatives to strengthen and diversify the regional economic base.
- Support efforts by the P4G municipalities, First Nations and Métis communities and economic development organizations in increasing economic opportunities in the region and enhancing regional competitiveness.

Section 6 of the DOCP aims to identify and protect significant natural and heritage resources within the region and to provide value-added spaces for the community. This section aims to:

- Conserve and enhance natural systems and biodiversity.
- Encourage the protection and conservation of heritage properties, including sensitive buildings, structures, and lands.
- Promote awareness of the natural and heritage resources and visual amenities to both residents and visitors.

Section 14 of the DOCP provides specific policies concerning rural industrial development and offers support to the development of the subject property for business, light and heavy industrial uses requiring rural servicing.

The DOCP establishes the following location criteria for industrial park development:

- The carrying capacity of the lands proposed for development and the surrounding area based on site conditions,

environmental considerations, potential impacts, and other factors that may warrant consideration in the design of the proposal are addressed;

- Impacts on regional drainage patterns and other regional ecological systems are minimized;
- The suitability and availability of municipal and other services and infrastructure necessary to support the proposal are considered;
- The design is compatible with that of the surrounding area;
- Existing roads and infrastructure are sufficient to support the development while impacts to existing roadways and additional costs of maintenance are minimized;
- Nodal development is planned where key intersections of provincial highways, municipal roadways, and the Saskatoon Freeway can support access;
- Lands are not prone to natural hazards;
- Lands do not have unique historical or archaeological features;
- Lands do not have significant wildlife habitat;
- Lands do not have high quality recreational resources;
- Surface and groundwater resources will not be impacted; and
- Any other costs to Corman Park associated with the development are minimized.

Section 17 of the DOCP addresses regional stormwater issues. The area accommodates compatible agriculture, outdoor recreation, and sensitively integrated stormwater management infrastructure. Section 17.3.7 specifically addresses that the Green Network Study Area should be integrated with regional stormwater management systems whenever feasible and should consider ecological functions within the area and address the suitability of any sustainability measures.

Section 27 of the DOCP speaks to transportation with specific objectives in coordinating local infrastructure improvements with municipal partners:

- Support accessibility, connectivity, and mobility in the regional transportation system;
- Integrate transportation planning with land use planning and development policies to provide more effective responses to future development and mobility needs;
- Support efforts by the P4G municipalities to improve local circulation and build fiscally sustainable transportation infrastructure;
- Coordinate regional transportation planning with the Province to support efficient, integrated solutions to mobility requirements.

2.8.2 North Concept Plan

The DOCP provides for the preparation of concept plans to provide more focused policy direction to guide development, land use and services in specific areas of the region building on the general direction presented in the DOCP. The regional municipalities have endeavoured to prepare a concept plan for the area including and surrounding the subject property. Map 5 of the North Concept Plan (NCP) verifies the intention for the subject land to be developed as part of a broader urban commercial corridor. The NCP states the commercial corridor is intended to accommodate a broad range of commercial activities including office and retail, institutional, and recreation uses. The NCP also identifies the trend towards incorporating multi-unit and mixed-use residential development within commercial areas to take advantage of the proximity of services and amenities. Developments in this area would initially utilize rural servicing standards considering the potential further subdivision and transition towards an urban form of development and servicing. Due to the long-term nature of this transition, this CDR is only able to speak to the general standard of urban servicing and to seek to protect and dedicate the lands needed to facilitate the transition in servicing.

The NCP establishes key utility corridors designed to accommodate the extension of large scale regional water, sanitary sewer, and drainage infrastructure as well as arterial roads. The NCP states the general specification and land requirements for this new infrastructure and recommends that the land required should be reserved at the time of subdivision to ensure that development does not prevent its construction in the future. Given the long term nature of transition to urban servicing and the lack of detail available concerning the exact routing and tie-in points and elevations, it is not possible to prepare a design

for the future urban services. These constraints limit our consideration to defining and protecting the utility corridors within the subject property to accommodate future design and construction once additional information regarding adjacent land uses, routing, elevations and tie-in points are confirmed.

2.8.3 P4G Zoning Bylaw

The P4G Zoning Bylaw is the primary tool used by the municipality to implement the policy direction provided by the DOCP and NCP. The Zoning Bylaw contains regulations that inform the physical development requirements within the subject property including but not limited to establishing minimum lot size requirements, maximum building heights and setback distances between certain types of land uses. The proposed development has been planned to align with the D – Arterial Commercial District (DC2) with the intent to accommodate a variety of commercial activities geared initially to serving the traveling public while also meeting the future commercial needs of a local residential population once the surrounding area is built out.

The key regulatory provisions of the Zoning Bylaw that influence development in the subject property include:

Drainage - Where development may alter site drainage potentially affecting adjacent, upstream or downstream properties, or the stability of the land, the applicant shall be required to construct engineered drainage works incorporating sufficient capacity to accommodate the surficial water runoff for a 24-hour 1:100 year storm event with no incremental increase in off-site flows in excess of what would have been generated from the property prior to the grading and leveling.

Public Roadways – Roadways required to support development within the subject property will need to be constructed to the RM's current engineering standards and at the sole expense of the proponent.

Utility Services – Development will be adequately serviced to the satisfaction of the municipality and in cases where upgrades are required, the applicant will be solely responsible for the costs and scheduling of such upgrades.

Wastewater Treatment Systems – The development shall not be issued a development permit until all appropriate permits have been obtained for the wastewater treatment system from appropriate provincial regulatory agencies. It is anticipated that each individual lot will utilize holding tanks as a means of wastewater collection.

Water Supply – All new multi-parcel commercial, industrial, community service and country residential development shall be serviced by a centralized potable waterline to the satisfaction of the municipality. The developer will contact the local water utility and will be solely responsible for the costs and scheduling of such upgrades. It is anticipated that curb stops will be provided to each lot as subdivision occurs.

3 Development Concept

The development concepts illustrated in Figures 3.1 and 3.2 depict the general plan for the initial subdivision of the subject property to support rural serviced commercial development and a potential plan for the further subdivision of the lots into smaller urban commercial lots.

Land Use	# Lots	Area (ha)	%GDA
Gross Development Area (GDA)		**76.69**	**100**
D-Arterial Commercial District	42 Rural 83 Urban	52.32	68.3
MU - Municipal Utility		9.18	11.9
Roadways		15.19	19.8
Design Population (160 p/ha)		8,371	

Table 3.1 Land Use Statistics

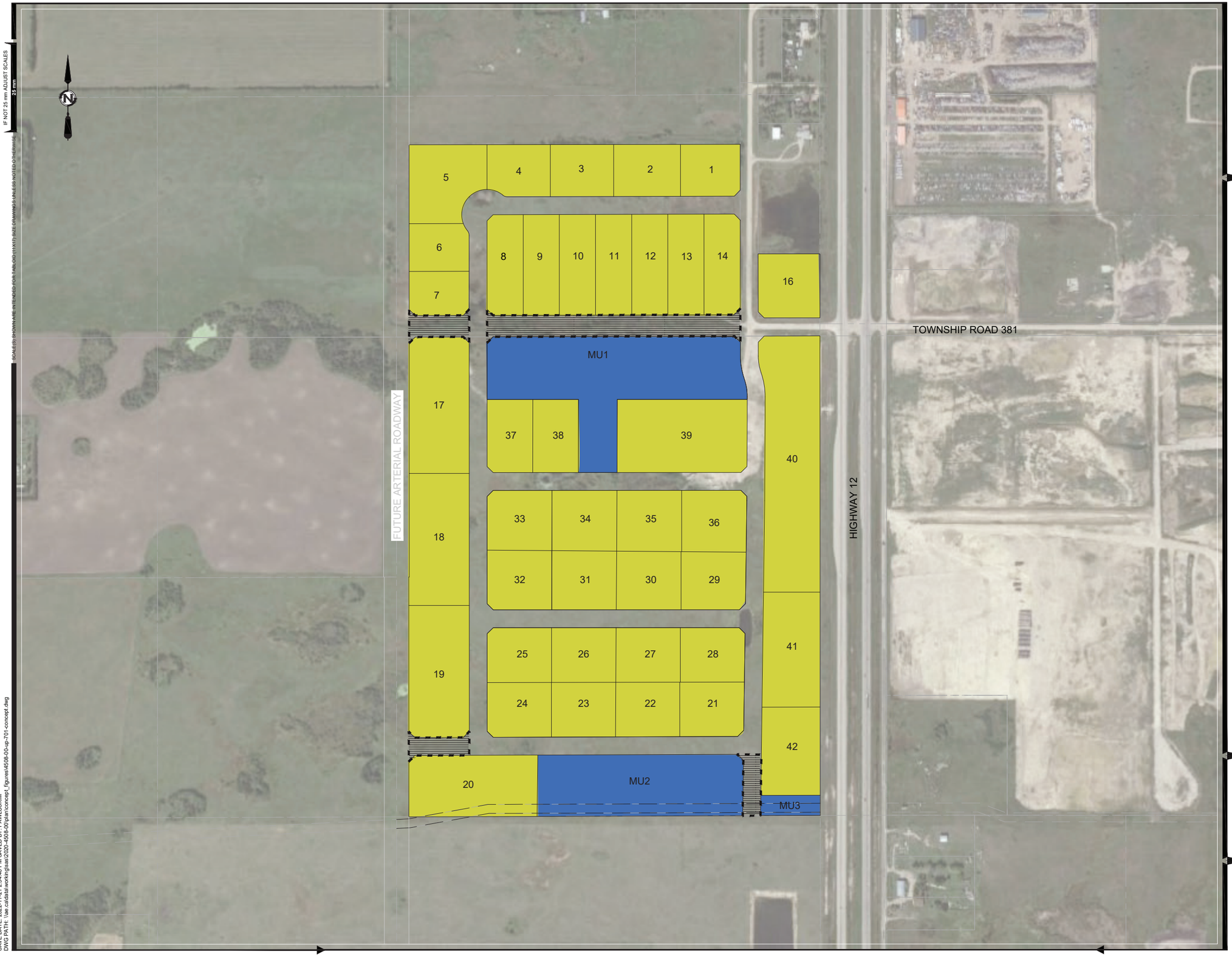
Development within the Western Business Park will align with the uses defined within the D- Arterial Commercial 2 District and will include a variety of businesses intended to provide goods and services to the travelling public and for local residents as the surrounding suburban residential area to the west is developed in the future. In the absence of any significant residential population in the immediate vicinity, businesses in the park will initially focus on serving the travelling public. As a vehicle-dependent development, a grid road network is proposed to distribute traffic evenly within the area.

The subject property is situated within a planned commercial corridor which is anticipated to be primarily developed for commercial use but presents an option for mixed use. The lands west of the subject property have been identified by the NCP as future urban residential. The western boundary of the subject property abuts a future arterial roadway which provides a logical transition to mixed use and residential development to the west.

Commercial uses are predominantly indoor focused. Outdoor areas may be used to display or store finished goods and services for sale. Commercial developments are anticipated to have a higher standard of site design relative to industrial uses. The application of a 45 m front yard setback will push buildings back from the street, contributing to the use of the front yard for parking or the display of finished goods, and reinforcing the focus on vehicles. Yard landscaping will be designed to complement the specific use of the site, offering a visual screening where needed but not obstructing the display of finished goods for sale. Landscaped boulevards will be provided along all front and flanking yards as required by the P4G Zoning Bylaw.

Where a lot is to be potentially resubdivided in the future, buildings should be situated to account for this further subdivision and the potential separation of buildings onto separate sites. This can be accommodated by providing a 6 m separation between buildings to account for a future 3 m side yard as defined in the City of Saskatoon Zoning Bylaw for arterial commercial uses.

All internal roads are designed to a rural paved road standard constructed within a 30 m right-of-way. The first north/south internal road closest to Highway 12 will act as a highway service road providing internal road access to all properties along the highway corridor while enabling these properties to take advantage of the visibility provided by the highway. The internal road network also includes a future internal road connection to connect the subject property to development lands to the south to supplement the planned arterial road network.



Associated Engineering

BEST MANAGED COMPANIES
Platinum member

RURAL ARTERIAL COMMERCIAL LOTS

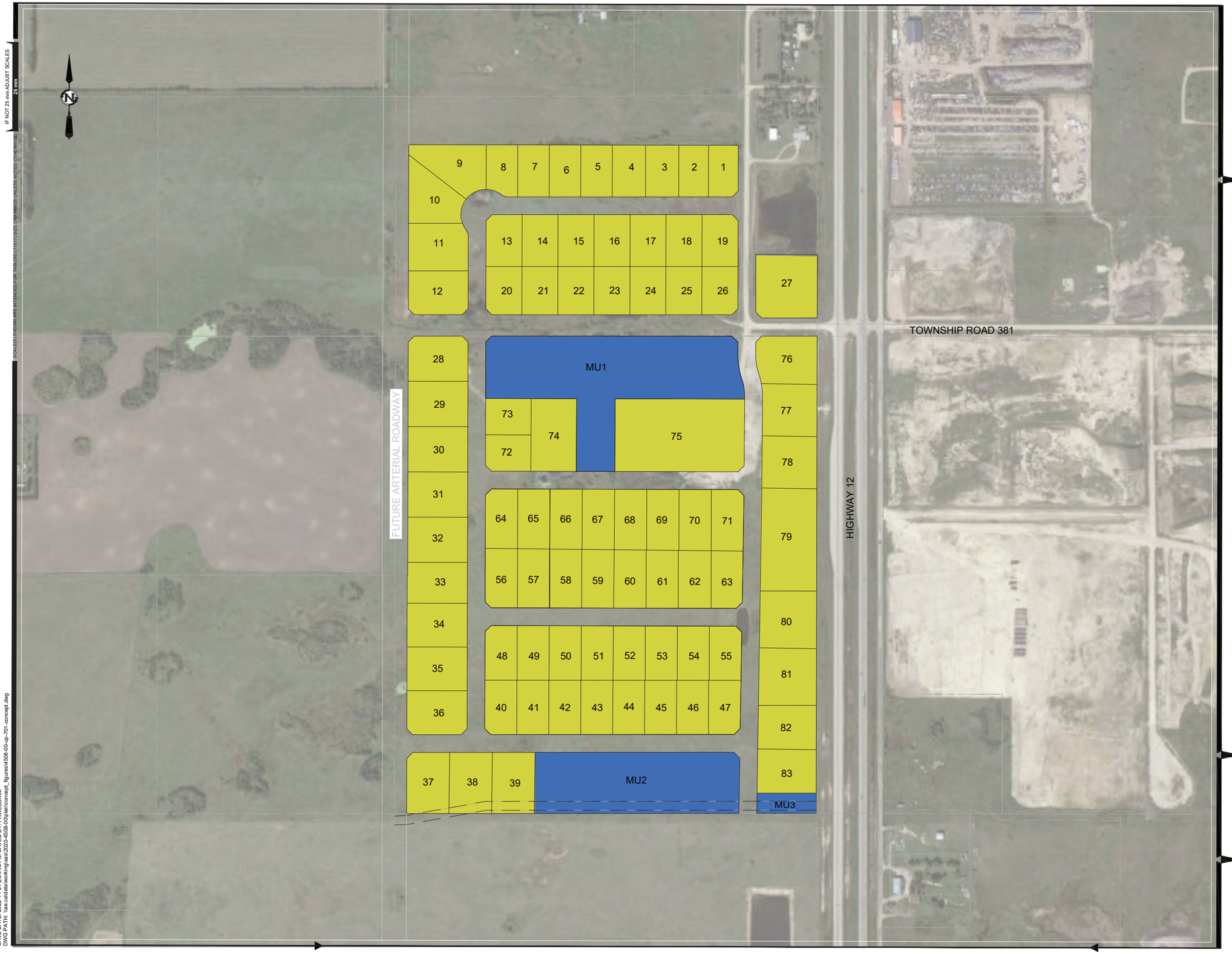
STORMWATER MANAGEMENT

UNDEVELOPED ROADS

FIGURE 3.1 - RURAL DEVELOPMENT CONCEPT

CORMAN PARK NORTH BUSINESS CDR
WESTERN BUSINESS PARK

AE PROJECT No.	20204508-00
SCALE	NTS
APPROVED	B. DELAINEY
DATE	2022NOV21
REV	0
DESCRIPTION	ISSUED FOR REPORT



Associated Engineering

CANADA'S BEST MANAGED COMPANIES
Platinum member

URBAN ARTERIAL COMMERCIAL LOTS

STORMWATER MANAGEMENT

FIGURE 3.2 - URBAN DEVELOPMENT CONCEPT

CORMAN PARK NORTH BUSINESS CDR
WESTERN BUSINESS PARK

AE PROJECT No.	20204508-00
SCALE	NTS
APPROVED	B. DELAINEY
DATE	2022NOV21
REV	0
DESCRIPTION	ISSUED FOR REPORT

Property approaches along the internal road network will be confirmed and constructed in conjunction with the submission of development and building permits to ensure that the location of the property accesses coincides with the plan for development on each lot.

Initially, the primary means of access to the subject property will be provided from an existing highway intersection along Township Road 381. A TIA was prepared to assess the capacity of the highway intersection to accommodate the proposed development and to provide recommendations for improvements. The only improvement recommended by the TIA as a result of the proposed development was the construction of a southbound right-hand turning lane.

The NCP anticipates the eventual closure of this intersection and relocation of highway access to Township Road 382 to the north. The construction of the Saskatoon Freeway to the south of the subject property will restrict direct highway access and force the consolidation of multiple highway access points into a single highway intersection to the north at Township Road 382. Changes along the highway corridor will eventually shift traffic toward future internal arterial roadways situated west of the subject property.

The NCP identifies the intention to construct a major arterial roadway along the western boundary of the plan area which will eventually serve as the primary access to commercial development within the plan area. The development concept acknowledges this intention and includes the dedication of two future right-of-ways connecting the development with this future arterial road. It is expected that the proposed arterial road design will include a multi-use pathway that will extend along the arterial and connect to the internal sidewalk network within the park.

As the arterial road network is planned for the future, there is no intention to construct either internal road connection until the area transitions to urban development. It is expected that this future internal road will be developed as a collector requiring between 21 and 41 m of right-of-way. Dedication of a 30 m right-of-way is sufficient to enable the construction of a standard urban collector cross-section including two driving lanes, on-street parking and sidewalks on each side of the road.

The development concept acknowledges the need to dedicate land to support the eventual construction of the future arterial road lying along the western property boundary by dedicating 21.5 m of land representing half of the dedication required to construct the roadway. As this future roadway will serve a broader purpose for the area, it is expected that the owner will be compensated for this dedication to reflect their proportionate contribution to this future infrastructure.

3.1 Green Network Study Area

A portion of the SE 8-38-5-W3M is designated as Green Network Study Area due to the low-lying marshlands resulting from previous gravel extractions that occurred in this area in the past. The plan for development respects the existing wetland area by limiting development and situating planned storm management facilities in this location. The Green Network Pilot Project Report indicates that the extents of the designated area may be reduced by constructing defined channels that have been designed for the capacity of the total flow seen through the respective segment of the Green Network. The DOCP also provides support for the refinement of the Green Network subject to considering:

- Wetlands;
- Drainage areas;
- Conveyance areas, such as streams, rivers, and swales;
- Habitat corridors for wildlife movement
- Important view sheds, such as the view shed of Wanuskewin Heritage Park; and
- Important ecological areas.

The plan for development includes the intention to construct two stormwater management facilities (SWMF) to capture and temporarily store the incremental increase in run-off resulting from hard surface development and to replace the lost permanent storage resulting from site grading. The SWMFs have been designed to enable upstream flows to continue to pass through the site and the controlled release of on-site run-off at a predevelopment rate and along the predevelopment route.

A desktop environmental screening using the HABISask on-line GIS database indicated that there were no species at risk within the subject property. The North/Northwest Natural Area Screening Study, 2012 identified the potential occurrence of meadow pussy-toes (Antennaria corymbosa) in the southwest corner of Parcel 117386770 at its common boundary with NW 5-38-5-W3M. The location of this potential occurrence lies outside of the area designated as Green Network.

Two natural area screening reports have been conducted for this area including the North/Northwest Natural Area Screening Study, 2012 and the Green Network Refinement Stage 1 Natural Areas Screening (Desktop). The 2012 screening included a functional assessment of the wetland area within the subject property. This study concluded that "*… the habitat quality of the natural areas (wetlands and tree stands) within the study area is generally poor. The natural areas are highly disturbed from past and current agricultural activity (or adjacent agricultural activity) which has allowed exotic/invasive species too invade, thereby decreasing biodiversity. The disturbed nature of the natural areas limits the recreation and education potential at present period additionally with the exception of the north Swale there are no linkages between natural areas having significant value to wildlife.*" This study classified the wetlands located in the Green Network as predominantly Class II temporary wetlands.

This assessment differs from the results of the 2020 NAS report which identified the same wetlands as Class III and IV wetlands. Despite the difference in assessment, the 2020 NAS report recommends that Class III or higher wetlands "be protected for flood mitigation, water filtration, reducing the effects of drought, and biodiversity."

Given that the 2012 NAS study states that the ecological value of wetlands outside of the North Swale is low, combined with the fact that the plan for development within the subject property intends to utilize a large portion of the Green Network for stormwater management, the refinement of the designated area is considered appropriate.

3.2 Public Amenities and Municipal Reserve

Initially, development within the subject property is to be supported by rural services including rural profile roads. In the absence of a substantive residential population in the immediate vicinity, commercial development will focus on serving the travelling public which increases the reliance on vehicle accommodation and lessens the demand for non-vehicular forms of transportation. The proposed rural development will not include any public open space or recreational amenities. As the area transitions to an urban development, it is expected that the transition from a rural to an urban profile road will include the installation of a public sidewalk network to support pedestrian traffic.

The Planning and Development Act requires the dedication of 5% of the land area proposed for commercial subdivision as municipal reserve. Where land dedication is not desirable a cash-in-lieu payment can be provided equal to 5% of the value of the land that remains when the land required to be provided as environmental reserve has been subtracted from the subdivision. The DOCP states that the RM of Corman Park will consult with the adjacent municipality to confirm the dedication and/or cash-in-lieu requirements considering the potential for and suitability of significant public amenities, including open space recreational opportunities, integrated trail systems, and continuous pedestrian linkages and the costs to Corman Park and the adjacent urban municipality. The plan for development anticipates that the dedication requirement will be satisfied through a cash-in-lieu payment.

3.3 Rural Land Use Compatibility

Although the plan area has been designated to host future commercial development, the initial subdivision and development of the site needs to appropriately consider the use of surrounding lands outside of the project boundaries and incorporate design considerations aimed at preserving the use and enjoyment of these adjacent and nearby properties.

A public notice was prepared and circulated to all landowners within 1.6 km of the subject property informing them of the intentions for subdivision and development of the lands and providing a link to view this report. Two landowners responded to the notice. The first respondent inquired about the planned improvements to the highway intersection to ensure that an acceptable level of service is maintained. The same respondent also indicated that their property has been flooded in the past and wanted some assurance that the proposed development will not generate more run-off that could affect the use and enjoyment of their residential property. The second respondent owns land to the northeast and on the east side of Highway 16. The landowner expressed concern that run-off from the development would negatively impact his property which has been challenged with drainage issues in the recent past. The properties in question both lie at a higher elevation than the subject property and are upland from the point of planned discharge.

A copy of the record of conversation is attached as Appendix C.

3.4 Development Regulation and Land Use Transition

Initial rural development within the plan area will be required to comply with the site and use regulations represented by the D-Arterial Commercial 2 District (DC2). As the plan area changes jurisdiction, land use is expected to comply with the site and land use regulations represented in Saskatoon's B4A - Special Suburban Centre and Arterial Commercial District or similar commercial zoning in place at the time of transition. The list of permitted and discretionary uses provided in the DC2 are compatible with the uses permitted within the B4A District, so no land-use conflicts are anticipated to be created by the change in jurisdiction.

Site development within the DC2 District will consider the following minimum yard requirements:

Site Area	Frontage	Front Yard	Side Yard	Rear Yard	Flanking Yard
0.2 ha	30 m	45 m	8 m	8 m	45 m

As these properties transition into the B4A or similar district, the following new minimum site regulations would apply:

Site Area	Frontage	Front Yard	Side Yard	Rear Yard	Flanking Yard
Varies 450 - 900 m^2	Varies 15-30 m	9 m	3 m	7.5 m	1.5 m

The rural site regulations are more stringent than their urban counterpart. The reduction of the side and front yard setback within the B4A or similar district offers sufficient flexibility to accommodate future resubdivision of the sites without having to alter the road network. The transition to an urban development also provides an opportunity for new buildings to be constructed closer to the road, creating a stronger relationship with the road and is associated sidewalk and encouraging non-vehicular modes of transportation.

Saskatchewan has adopted the National Building Code as the minimum standard for the construction and renovation of buildings throughout the province. The National Fire Code is adopted as the minimum standard for the fire safe operation of buildings and facilities. Any future subdivision that creates a legal separation between existing buildings will need to consider the provision of adequate fire separations to ensure continued compliance with the codes.

Figure 3.6 illustrates the potential placement of buildings within the rural phase of development and how the buildings can be placed to accommodate the eventual resubdivision of the property as it transitions to an urban development.

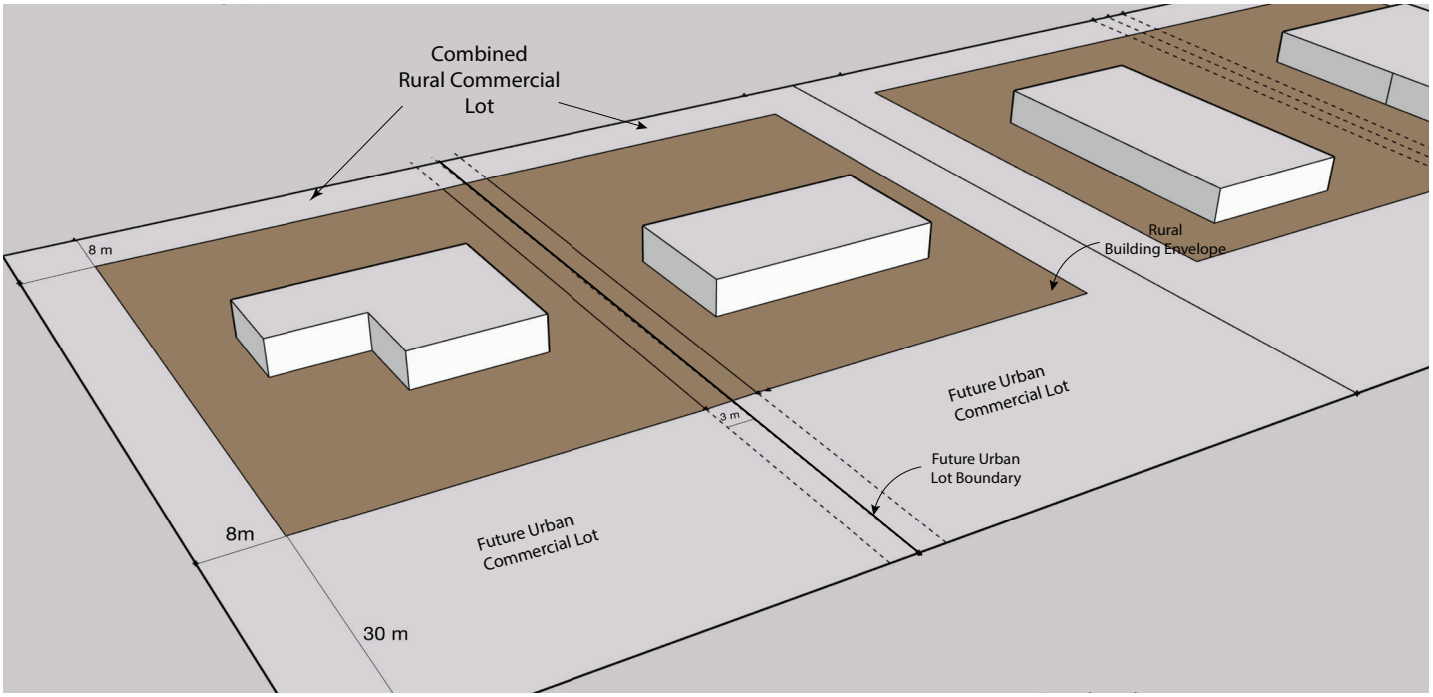


Figure 3.6 Development Transition

4 Conceptual Servicing

4.1 Potable Water

A 100 mm low-pressure service line will be extended from the existing Intervalley distribution line. This system will not be capable of providing fire flows to the parcels. The developers of each site will be responsible for constructing private reservoirs and pressure systems if desired or required for their operations. This low-pressure line is proposed to be installed along the edge of the internal road right-of-way to facilitate easy access to the line for future service connections without having to excavate within the paved roadway.

The proposed future urban redevelopment will include the installation of a full-pressure water distribution system. The proposed water mains will follow the same routes as the rural water lines, within the road right-of-way and installed in conjunction with the reconstruction of the roadway to an urban cross-section.

The conceptual design criteria and assumptions for the water distribution system proposed for the future urban redevelopment are listed in Table 4.1. The design population, operating pressures, fire flow requirements, estimated water consumption, maximum daily, and peak hourly flow rates will all need to be developed in consultation with the urban service provider at the time for urban redevelopment. Using the current Saskatoon standards and assuming the redevelopment is predominantly classified as a Arterial Commercial use, the water main sizing is expected to be a minimum of 300 mm or 250 mm, if looped, to meet demands and provide the minimum 220 L/s fire flow within acceptable pipe velocities. All interconnections to the City's primary water main and any other external looping connections are expected to be 300 mm in size.

Item	Value
Development Area	52.32 ha
Equivalent Population	160 p/ha
Design Population	8371
Estimated Water Consumption	290 L/p/d
Average Day Demand	28.1 L/**s**
Maximum Daily Demand	56.2 L/s
Peak Hourly Demand	84.3 L/s
Fire Flow	220 L/s (140 kPa min pressure)
Max Fire Hydrant Spacing	90 m

Table 4.1 Water System Design Criteria

In addition to accounting for the internal water distribution system, the NCP identifies the need to access land within the plan area to install a 900 – 1500 mm primary water main along Highway 12. According to the NCP, the installation of this future water main requires a 10 metre right-of-way. The plan for development accounts for this installation within the first internal road as illustrated in Figure 4.5.

Due to the long term nature of urban servicing, it is anticipated the urban standards may change over time before the transition from rural to urban infrastructure occurs. Therefore,

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200 mm water line

300 mm water line

FIGURE 4.1 - RURAL WATER SERVICING

CORMAN PARK NORTH BUSINESS CDR
WESTERN BUSINESS PARK

AE PROJECT No.	20204508-00
SCALE	NTS
APPROVED	B. DELAINEY
DATE	2022NOV21
REV	0
DESCRIPTION	ISSUED FOR REPORT

IF NOT 25 mm ADJUST SCALES
25 mm
SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE

PLOT DATE: 2022-11-21 3:56:09 PM
SAVE DATE: 2022-11-21 2:54:46 PM SAVED BY: PAWLUSKIM
DWG PATH: \\ae.ca\data\working\sas\2020-4508-00\plan\concept_figures\4508-00-up-701-concept.dwg

the design of any water services included in the future urban redevelopment will need to be updated to reflect the future design and development requirements.

4.2 Wastewater Management

The initial rural development of the industrial park will require the individual property owners to install septic holding tanks to manage all wastewater flows generated within each property. Each property owner will be individually responsible for contracting the services of a licensed septic hauler to evacuate the holding tank and dispose of the waste to an approved disposal facility. As required to support a subdivision utilizing private on-site wastewater disposal, a copy of a letter from a licensed septic hauler is attached in Appendix C confirming their ability to service the properties.

In conjunction with the other services and road reconstruction, a gravity wastewater collection system is proposed to be installed during the urban redevelopment of the industrial park. The sanitary sewer mains will be installed within the road rights-of-way and following the surface grading, direct wastewater flows to a planned lift station or the planned sanitary sewer main running parallel with Highway 12. The conceptual design criteria and assumptions for the wastewater collection system proposed for the future urban redevelopment is listed in Table 4.2.

Item	Value
Development Area	52.32 ha
Equivalent Population	160 p/ha
Design Population	8371
Estimated Wastewater Generation	290 L/p/d
Infiltration Allowance	0.17 L/s/ha
Average Dry Weather Flow	28.1 L/s
Peaking Factor (Harmon Formula)	3.03
Inflow and Infiltration	8.89 L/s
Peak Design Flow	94.03 L/s

Table 4.2 Sanitary Sewer Design Criteria

The NCP anticipates the extension of new regional sanitary sewer infrastructure along Highway 12 and to the west along the southern boundary of SE 8-38-5-W3M. The NCP states that a 20 m right-of-way is required to install this future infrastructure. The plan for development proposes to situate this future infrastructure within the 30 m road right-of-way as illustrated in Figure 4.2. Where additional land beyond the dedicated right-of-way is required, a temporary construction easement is expected to be provided.

Due to the long term nature of urban servicing, it is anticipated the urban standards may change over time before the transition from rural to urban infrastructure occurs. Therefore, the design of any sanitary sewer services included in the future urban redevelopment will need to be updated to reflect the future design and development requirements.

4.3 Grading and Drainage Management

The site drains from the west, through the development to the east towards Highway 12 ditch where it eventually enter the Opimahaw Creek drainage system. A conceptual drainage plan has been prepared to confirm the location and sizing for new stormwater management facilities (SWMF). The plan proposes to construct two separate facilities considering the differentiation of the broader contributing areas.

The SWMFs are planned to be constructed to a rural standard and sized to detain a 1:100 year 24-hour return design event to reflecting the inability to connect the facilities to an established underground storm sewer. The primary outcome of the conceptual design process is to verify that the land allocated for the SWMFs is adequate to meet current and future

200 mm sanitary line

525 - 600 mm sanitary line

FIGURE 4-2 - URBAN SANITARY SERVICING

CORMAN PARK NORTH BUSINESS CDR
WESTERN BUSINESS PARK

AE PROJECT No.	20204508-00
SCALE	NTS
APPROVED	B. DELAINEY
DATE	2022NOV21
REV	0
DESCRIPTION	ISSUED FOR REPORT

requirements and that the land is capable of being drained to one of the two ponds. This plan acknowledges that certain alterations will be needed to make the SWMFs align with the COS design standards and function within a future urban storm system.

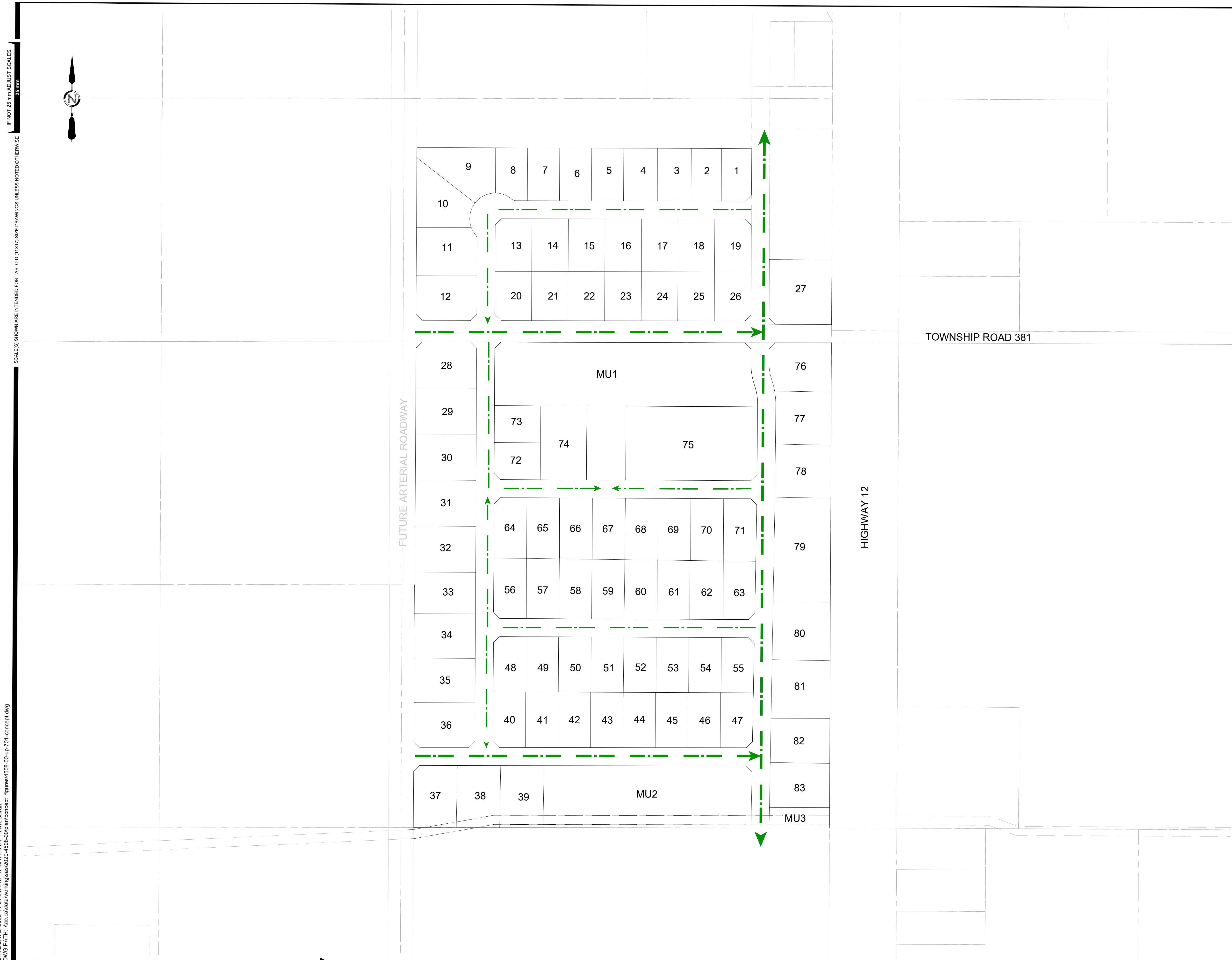
Two separate calculations were performed using the Rational Method to determine the appropriate size of the SWMFs based upon a typical rural facility with the second calculation reflecting the COS design standards as summarized in Table 4.3. For the rural design scenario, Associated used a predevelopment run-off coefficient of 0.30 and a weighted post development run-off coefficient of 0.9 to reflect the predominantly agricultural state of the current land holdings and the typical extent of impervious and semi-impervious surfaces associated with these forms of development in Corman Park. Using a post-development weighted coefficient of 0.9 decreases the likelihood of individual property owners having to construct supplemental storage on their lots to make up for any deviation between the run-off allocated from a lot to the SWMF and the calculated coefficient once a detailed site plan is submitted to support construction on the lots.

Calculating the pond volumes using the COS design standards which utilize a predevelopment coefficient of 0.05 and a post-development coefficient of 0.6 results in a similar volume of storage required relative to the rural design scenario confirming that a sufficient land area has been set aside within the subdivision to accommodate the facilities regardless of the intended design. A copy of the calculations are provided in Appendix G.

The NCP anticipates the eventual construction of a 750 mm storm truck within the adjacent road ROW to the east of the ponds at a depth of 8 m as development transitions into an urban context. Given the absence of underground infrastructure, the SWMFs will rely on ground surface discharge and must be designed within this in mind while seeking to mirror the COS geometric design standards as much as possible to minimize alterations in the future. Reliance on matching surrounding surface grades to empty the ponds requires a larger surface area which results in a larger land area requirement relative to an urban SWMF which is able to be deeper and potentially smaller in surface area as it is able to discharge to storm sewer infrastructure situated 8 m below ground surface.

Item	North Pond	South Pond
Overall Catchment Area	121.1 ha	25.4 ha
Design Storm Event	1-in-100 year, 24-hour, design event	
Predevelopment Run-off Coefficient	0.05	
Post Development Run-off Coefficient (C - 1:2 year)	0.30	0.58
Post Development Run-off Coefficient (C + 25% - 1:100 year)	0.38	0.73
Post Development Time of Concentration (FAA Airport Method)	373 min	194 min
Initial Active Volume (Modified Rational Method)	59,300 m^3	29,400 m^3
Initial Active Volume (COS Estimate Method)	41,700 m^3	19,050 m^3

Table 4.3 Stormwater Design Criteria



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600 mm storm sewer line

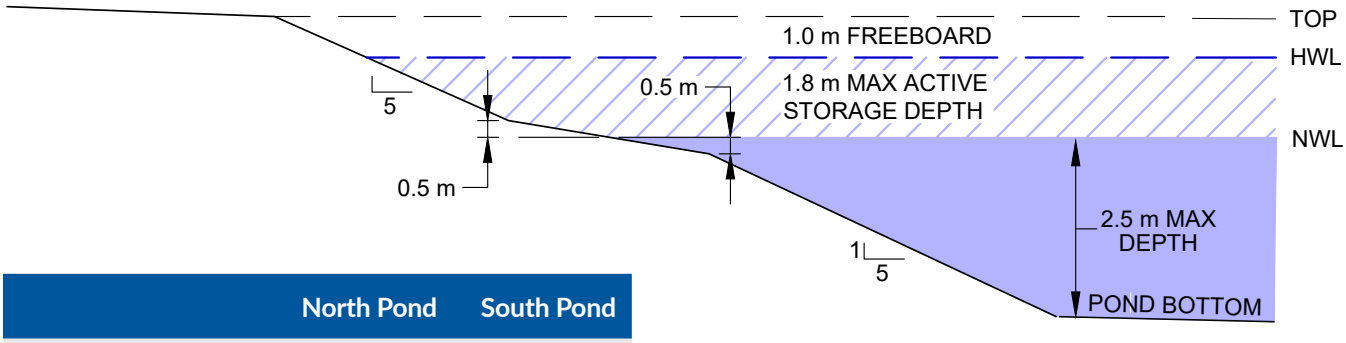
750 mm storm sewer line

FIGURE 4-3 - URBAN STORM SERVICING

CORMAN PARK NORTH BUSINESS CDR
WESTERN BUSINESS PARK

AE PROJECT No.	20204508-00
SCALE	NTS
APPROVED	B. DELAINEY
DATE	2022NOV21
REV	0
DESCRIPTION	ISSUED FOR REPORT

A typical cross-section of the proposed SWMFs based upon the COS geometric design standards are illustrated in Figure 4.3.



	North Pond	South Pond
Top Elevation	512 m	511.4 m
High Water Level	511 m	508.8 m
Normal Water Level	509.6 m	508.8 m

Figure 4.3 SWMF Typical Cross Section

4.3.1 Major System (Urban)

The transition from rural to urban development will require some adjustments to the surface grades along the roadways to provide a minimum 0.50% slope along the curb and gutters. The creation of "low points" and a minor stormwater collection system will be required to provide an increase to the road surface slopes while maintaining the overall major system. Figure 4.4 illustrates how this transition will occur.

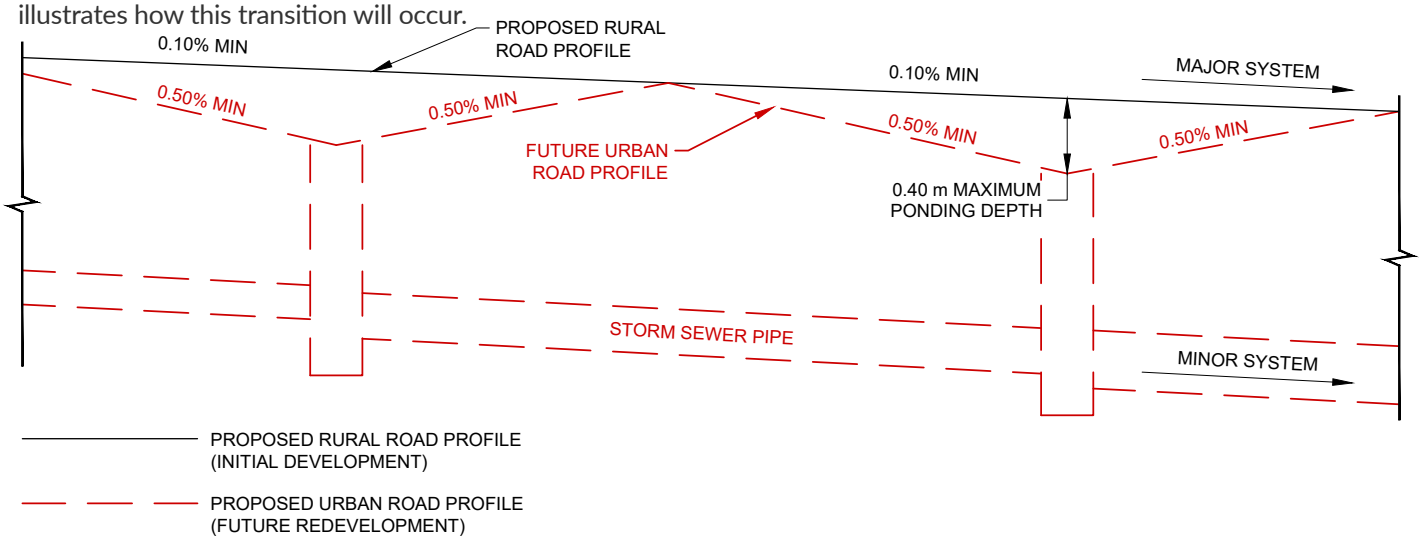


Figure 4.3 Major Storm System Transition

In addition to alteration of the road surface grades, the following alterations will be required to support the transition of the SWMFs to an urban standard:

- Surface inlets will be replaced as an urban minor storm network is constructed, providing an underground connection to the SWMFs.
- The surface outlet will be replaced through the installation of an underground pipe connecting to the future urban storm trunk

4.3.2 Minor System (Urban)

It is anticipated a minor stormwater collection system will be installed in conjunction with the other servicing and road reconstruction with the road rights-of-way as the development transitions from rural to urban. As per COS standards, the minor system is proposed to accommodate a 1:2-year event and include services into the lots so they can provide on-site stormwater management. For each site with 1500 sq.m or greater paved area, an oil/grit separator will be required to be installed at the interface of the connection to the future urban storm network.

The conceptual drainage system presented for the future urban redevelopment is based on the current COS standards. Similar to the redevelopment of the roadways and other underground services, it is anticipated the COS standards will evolve by the time this transition from rural to urban infrastructure occurs. Therefore, the design of any storm services included in the future urban redevelopment will need to be updated to reflect the future design and development requirements.

A copy of the conceptual stormwater management technical memorandum and supportive correspondence from the Water Security Agency is attached to this report as Appendix G.

4.4 Transportation

Access to the plan area is intended to be provided from Township Road 381 and its existing intersection at Highway 12. Township Road 381 is a two-lane gravel surfaced rural profile road constructed within a 30 m right-of-way. It is expected that segments of this road related to the proposed development will be upgraded to a paved rural standard.

The plan for development provides for a 30 m right-of-way to continue within the internal road network. It is expected that these roads will be constructed to the RM's Industrial Paved Road Standard attached as Appendix F.

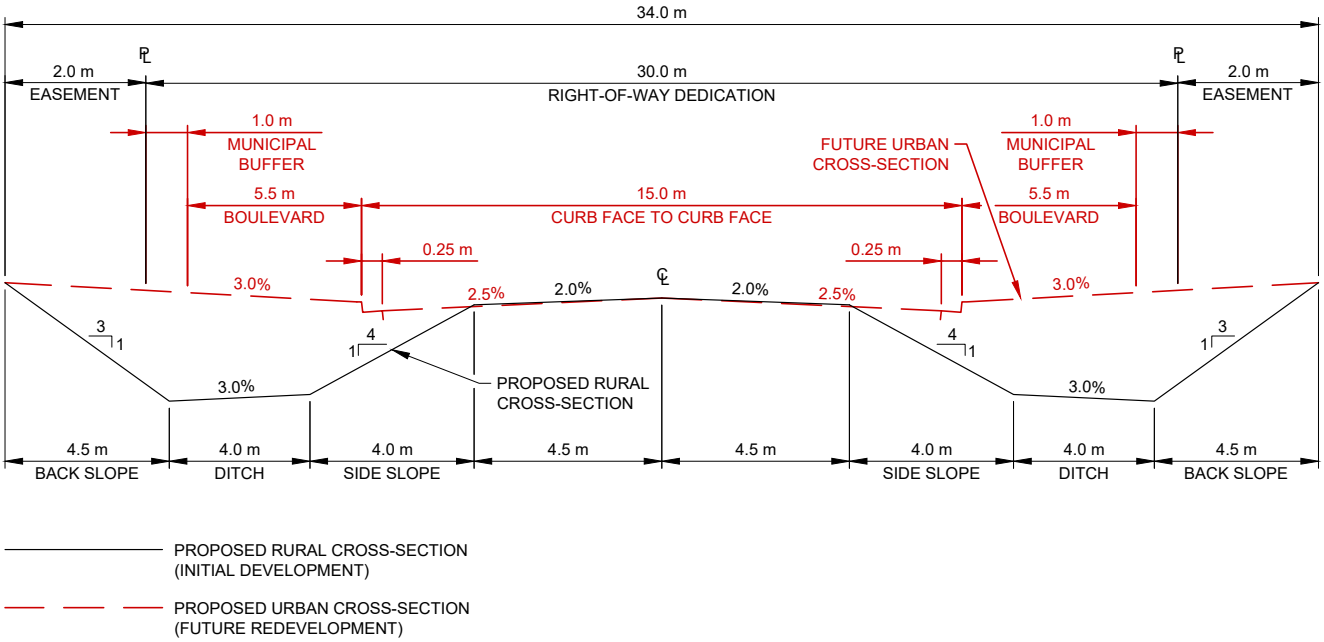


Figure 4.4 Combined Road Cross Section

The plan provides for three future road connections to surrounding lands to create a functional connection with future development and to provide for the eventual connection to a planned internal arterial road connection which will act as the primary transportation route following transition to an urban development.

The future transition of development within the plan area from rural to urban will trigger the full reconstruction of the internal roadways to an urban standard enabling the installation of water, wastewater, and stormwater services as generally illustrated in Figure 4.5.

As per the NCP, in the absence of a regional urban servicing standard, the standards of the closest urban municipality should be used. The cities of Martensville and Saskatoon are equidistant from the subject property and either municipal standard could be applied to the transition. At the time of this report, Martensville had not yet published development standards so for the purpose of this section, we are referencing the published Saskatoon Design and Development Standards Manual.

According to these published standards, local commercial roads require between 15 and 22 m of right-of-way and include on street parking lanes and sidewalks on both sides of the street. The minimum intersection spacing for local commercial roads is 60 m.

To support the future installation of underground services as the area transitions into an urban municipality, an additional 2 m construction easement is planned on either side of the roads to be released following the installations, temporarily bringing the total right-of-way to 34 m. Given that the right-of-way requirement for a local commercial road is 22 m, any additional excess right-of-way remaining after the roads have transitioned can be used to support the installation of a multi-purpose pathway, separated sidewalk or relinquished to the adjacent property owner to be credited towards the front landscaping requirement.

Figure 4.5 illustrates the intention to locate future regional underground infrastructure within the 30 m right-of-way. It is our understanding that these services will be constructed in conjunction with the construction of new urban roadways as the area transitions into a larger urban neighbourhood.

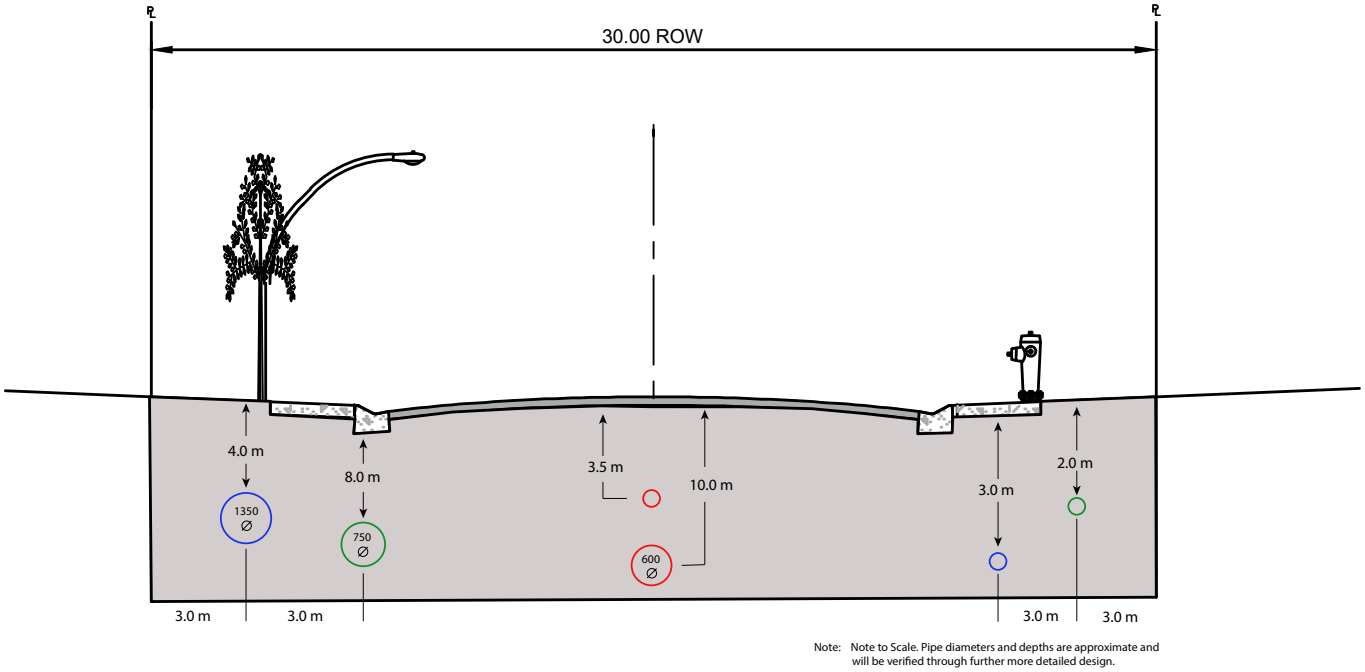


Figure 4.5 Future Regional Infrastructure Detail

4.5 Other Services

The City of Martensville Fire Department will provide the development with fire protective services, based upon an existing agreement with the RM. As the development transitions into an urban neighbourhood, full fire protection infrastructure will be constructed as is found in other urban industrial areas with the host urban community providing service the area.

Police services will be provided by the Corman Park Police Service and the Saskatoon Detachment of the RCMP, transitioning into the jurisdiction of the host urban centre in the future.

Domestic solid waste disposal in the RM of Corman Park is provided at the Loraas Landfill. Each property owner will be required to contract one of several licensed haulers to collect and dispose of solid waste at one of several landfills in the region. These same contracted services will remain as the development is incorporated into the host urban municipality.

The Developer has been in contact with SaskPower, SaskEnergy, and SaskTel. It is anticipated that this development can be easily serviced by power, gas, and telecommunication utilities. SaskPower, SaskEnergy, and SaskTel have confirmed their ability to provide utility service.

4.7 Development Phasing

The subdivision and development of the lands is expected to occur over multiple phases. The size and timing for each phase will be determined based upon market demand and the logical extension of new services to the property. The information presented in this report is conceptual in nature and subject to change over time at the discretion of the developer. It is assumed that a servicing agreement will be executed with each Plan of Proposed Subdivision submitted to confirm the responsibilities for property servicing. The developer acknowledges that any subdivision plans submitted that are not consistent with this report shall be accompanied by additional information to support the deviation.

Although subdivision and development within the subject property is intended to be phased, this submission anticipates that the RM Council will consent to rezoning the entire subject property in conjunction with the initial phase of subdivision with a holding provision applied the lands located outside of the initial phase. Our understanding is that Council will consider the removal of this holding provision upon receipt of subsequent subdivision applications accompanied by updated servicing cost estimates for each additional phase.

5 Closure

This report was prepared for Overpass Farms Inc. and Nienhuis Contracting Ltd. to support the rezoning and future subdivision of lands within NE 05-38-05-W3M and a portion of the SE 08-38-05-W3M.

The services provided by Associated Engineering (Sask.) Ltd. in the preparation of this report was 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.

Bill Delainey, RPP

Project Manager

Appendix A - Desktop Environmental and Heritage Screening

Saskatchewan

Developers' Online Screening Tool

Inquiry was made on January 21, 2021 at 1:52 PM
You are inquiring about the heritage sensitivity of the following land location:

Quarter-section:	SE
Section:	8
Township:	38
Range:	5
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 Energy and Resources). Please email arms@gov.sk.ca if you have any questions.

Refine Search | New Search | Log Out

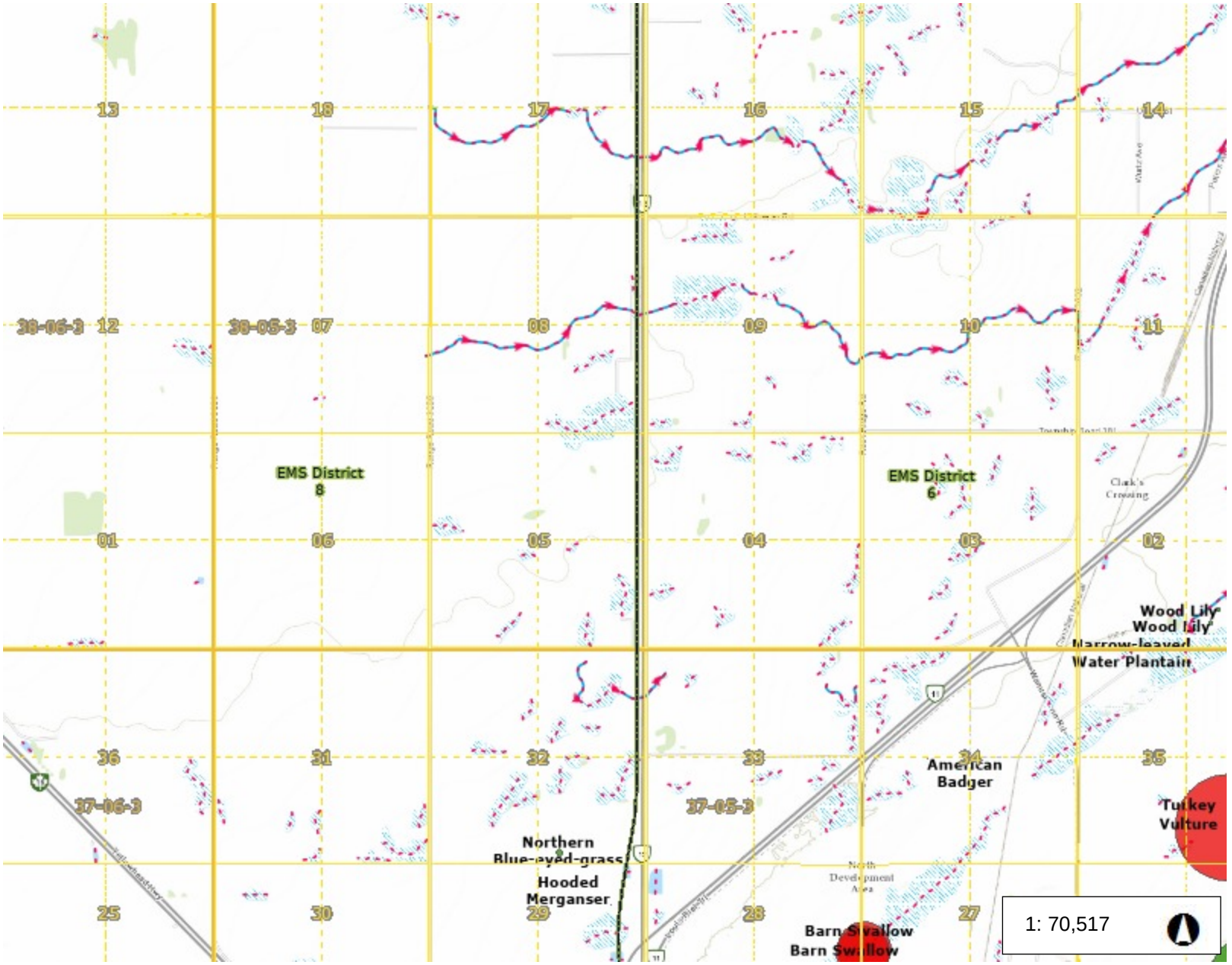
6.7K

Contact Us

Privacy

Saskatchewan

HABISask Desktop Review
Rare and Endangered Species



Legend

- Provincial Boundary
- Ecological Management Speci
- Township
- Section
- Quarter Section
- Rare and Endangered Species
  - Vertebrate Animal
  - Invertebrate Animal
  - Animal Assemblage
  - Vascular Plant
  - Nonvascular Plant
  - Other (Botanical)
  - Fungus
- Water Security Agency
- Game Preserve
- National Wildlife Area
- Migratory Bird Sanctuary
- Conservation Easements
- Crown Land Subdivisions
- Ecological Reserves
- Fish and Wildlife Development
- Former Federal Pastures
- Ramsar Wetland
- Reservior Development Areas
- Representative Areas
- Provincial Pastures

1: 70,517

Notes

3.6 0 1.79 3.6 Kilometers

WGS_1984_Web_Mercator_Auxiliary_Sphere

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.
THIS MAP IS NOT TO BE USED FOR NAVIGATION

Saskatchewan

Developers' Online Screening Tool

Inquiry was made on January 21, 2021 at 1:54 PM
You are inquiring about the heritage sensitivity of the following land location:

Quarter-section:	NE
Section:	5
Township:	38
Range:	5
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 Energy and Resources). Please email arms@gov.sk.ca if you have any questions.

Refine Search | New Search | Log Out

6.7K

Contact Us

Privacy

Saskatchewan

Appendix B - Preliminary Geotechnical Reports

PRELIMINARY GEOTECHNICAL INVESTIGATION

PROPOSED INDUSTRIAL SUBDIVISION
LOT 45.8, SE 8-38-5 W3M
NEAR MARTENSVILLE, SASKATCHEWAN
PMEL FILE NO. 18906
FEBRUARY 18, 2022

PREPARED FOR:
Overpass Farms Inc.

ATTENTION: Laurie Bradley

P.MACHIBRODA ENGINEERING LTD.
DOWN TO EARTH SOLUTIONS

P.MACHIBRODA ENGINEERING LTD.

PROJECT: Preliminary Geotechnical Investigation
Proposed Industrial Subdivision
Lot 45.8, SE 8-38-5 W3M
Near Martensville, Saskatchewan
PMEL File No. 18906
February 18, 2022

PREPARED FOR: Overpass Farms Inc.
Camp 17, Site 414 RR4
Saskatoon, Saskatchewan
S7K 3J7

ATTENTION: Laurie Bradley

DISTRIBUTION: Overpass Farms Inc. – Digital Copy
P. Machibroda Engineering Ltd. – One Copy

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www.machibroda.com

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1 INTRODUCTION

1.1 GENERAL

The following report has been prepared to provide preliminary geotechnical information for the proposed industrial subdivision to be developed within Lot 45.8 of SE 8-38-5 W3M near Martensville, Saskatchewan.

The terms of reference for this investigation were presented in P. Machibroda Engineering Ltd. (PMEL) Proposal No. 18906, dated January 18, 2022. Written authorization to proceed with this investigation was provided in the signed Consulting Agreement between Overpass Farms Inc. and PMEL, dated February 1, 2022.

1.2 SITE LOCATION AND DESCRIPTION

The proposed industrial subdivision is located just west of Highway 12, approximately 3.5 km south of Martensville, Saskatchewan. The site is bordered by industrial properties on the east side of Highway 12 and light residential development to the west, north and south. Examination of the topographical survey completed for the site revealed numerous mounds and depressions which were likely associated with the previous sand/gravel extraction activities that occurred on-site. A Site Plan showing the location of the study area and boreholes has been shown on Drawing No. 18906-1.

2 FIELD INVESTIGATION

The field test drilling, soil sampling and monitoring well installation was conducted on January 31, 2022. Groundwater monitoring was conducted on February 17, 2022.

The ground surface elevation at the borehole locations was inferred from topographical information provided by GeoVerra.

Four boreholes, located as shown on the Site Plan, Drawing No. 18906-1, were dry drilled using our truck-mounted, continuous flight auger drilling rig. The boreholes were 150 mm in diameter and extended to depths of 3 to 12.4 m below the existing ground surface. Borehole logs, as shown on the attached Drawing Nos. 18906-2 to 5, inclusive, were compiled during test drilling to record the soil stratification, the groundwater conditions, the position of unstable sloughing soils and the depths at which cobblestones and/or boulders were encountered.

Disturbed samples of auger cuttings, collected during test drilling, were sealed in plastic bags to minimize moisture loss. The soil samples were taken to our laboratory for analysis.

Standard penetration tests (SPT) were performed during test drilling.

Standpipe monitoring wells (slotted, 50 mm PVC pipe) were installed in BH's 22-2 and 22-4 to monitor the existing groundwater conditions.

3 SOIL AND GROUNDWATER CONDITIONS

3.1 SOIL PROFILE

The general soil profile at the locations investigated consisted of a surface layer of fill or silt that extended to depths of about 0.4 to 1.6 m, followed by an extensive deposit of glacial till that extended to the maximum depth investigated with our boreholes at this site (to a depth of at least 12.4 m below existing ground surface). Inter-till sand layers were encountered in BH's 22-3 and 22-4 between depths of 6.6 and 7.4 m, and 1.6 and 2.6 m below existing grade, respectively.

The fill consisted of variable deposits of highly plastic clay, well graded sand and low to medium plastic silt/glacial till. The fill deposits were frozen at the time of the investigation. The underlying glacial till was low to medium plastic and very stiff to hard in consistency.

3.2 GROUNDWATER CONDITIONS, SLOUGHING

Groundwater seepage and/or sloughing conditions were encountered in the sand layers during test drilling. The depths at which groundwater seepage and sloughing conditions were encountered have been shown on the borehole logs.

A summary of the groundwater levels recorded in the monitoring wells installed during this investigation has been presented in Table I.

TABLE I RECORDED GROUNDWATER LEVELS

Borehole No.	Monitoring Well Rim Elevation (m)	Ground Surface Elevation (m)	Monitoring Well Tip Elevation (m)	Groundwater Depth (m)	Groundwater Elevation (m)
				February 17, 2022	February 17, 2022
22-2	512.6	511.6	509.1	Dry	Dry
22-4	512.2	511.2	508.9	Dry	Dry

Examination of Table I revealed that the groundwater table was below the installed depth of the monitoring wells (elevation of approximately 509 m) on February 17, 2022. Higher water levels may be encountered, particularly during and/or following spring snowmelt and/or periods of precipitation.

3.3 COBBLESTONES AND BOULDERS

Cobblestones and/or boulders were encountered within the depth of exploration at this site. The depths at which cobbles/boulders were encountered have been shown on the borehole logs, Drawing Nos. 18906-2 to 5, inclusive.

Glacial till consists of a heterogeneous mixture of gravel, sand, silt and clay-sized particles. Glacial till inherently contains sorted deposits of the above particle sizes as well as a random distribution of larger particle sizes in the cobblestone range (60 to 200 mm) and boulder-sized range (larger than 200 mm).

Inter/intra till deposits of cobblestones, boulders, boulder pavements and isolated deposits of saturated sand or gravel should be anticipated.

It should be recognized that the statistical probability of encountering cobbles/boulders in the four small diameter boreholes drilled at this site was low. The frequency of encountering such deposits will increase proportionately with the volume of soil excavated/number and depth of piles installed.

4 LABORATORY ANALYSIS

The soil classification and index tests performed during this investigation consisted of a visual classification of the soil, moisture contents, Atterberg limits, unit weights and grain size distribution analysis.

The results of the soil classification and index tests conducted on representative samples of soil have been plotted on the borehole logs alongside the corresponding depths at which the samples were recovered, as shown on Drawing Nos. 18906-2 to 5, inclusive.

The results of the grain size distribution analysis have been presented on Drawing No. 18906-6.

5 DESIGN CONSIDERATIONS

The purpose of this investigation was to evaluate the existing subsurface soil and groundwater conditions for potential site development. Additional investigation(s) will be required once the exact location and extent of the proposed development has been finalized.

The subsurface soil conditions consisted of variable deposits of fill (clay, sand and glacial till), silt and sand within the upper 2.5 m of the soil profile followed by glacial to the full depth explored (i.e., 12.4 m). Groundwater seepage and sloughing conditions were encountered in inter-till sand layers during test drilling. The groundwater table was situated below the installation depths of the monitoring wells on February 17, 2022 (below approximately Elev. 509 m).

Preparation of the site for development should consist of the removal of all vegetation, topsoil and organic material from the construction areas. It is anticipated that conventional site preparation (scarifying, moisture conditioning and re-compacting the soils) will suffice over the majority of the site. The use of geosynthetics and additional fill thicknesses may be required in low lying areas.

Within building footprints and traffic areas, the subgrade should be uniformly compacted to a specified density. Soils which are unstable during site preparation and fail to achieve the required compaction will require additional treatment, which may include: over-excavation and replacement and/or geosynthetic stabilization. Locally available soils which are similar to underlying soils should be suitable for use as subgrade fill; creating mixed soil conditions during site grading is not recommended.

Conventional open-cut excavations above the groundwater table should be feasible at this site. Below the groundwater table, dewatering will be required to maintain excavation stability, particularly where sand or silt soils exist.

The subgrade soils are considered frost susceptible and the potential depth of frost penetration could range from approximately 1.5 to 2.5 m, depending on soil type (i.e., glacial till vs sand), surface cover, severity of winter and heat loss affects beneath/adjacent buildings; the depth of frost penetration will be greater where granular fills are utilized.

Potential deep foundation alternatives for structures at this site include drilled, cast-in-place concrete piles (straight shaft and belled) or continuous flight auger (CFA) piles. Drilled piles may not be feasible at some locations of the site if large thicknesses of saturated sands are encountered. Temporary casing will be required to complete the installation of drilled piles. Construction difficulties associated with cobbles/boulders could also be encountered during the installation of pile foundations. Coring and/or larger diameter augers may be required to assist in achieving the design pile depths. Driven piles (open-end pipe and timber) may not be practical due to the hard ground conditions encountered at relatively shallow depths and potential for shallow termination.

Footings and/or thickened edge raft (shallow) foundations bearing on undisturbed naturally occurring glacial till and/or sand soils could be a suitable foundation alternative at this site. Shallow foundations bearing on uncontrolled fill soils are not recommended. Utilization of structural granular fill beneath shallow foundations could be viable provided the subgrade consists of undisturbed, naturally occurring soils. Setting the foundation below the depth of frost penetration or protecting from frost action using rigid polystyrene insulation will be required to mitigate frost induced foundation movements.

The most practical/economical foundation alternative will depend on the structure being supported.

It is anticipated that site grading activities will be required to provide a level site for development and large fill depths (i.e., in excess of 3 m) may be required in some areas of the site. Construction of grade supported building floor slabs bearing on newly placed fill will be subject to potential excessive differential movements as the fill consolidates under its own weight. To minimize long term settlements, cut and fill activities should be undertaken such that the fill is placed and compacted in thin lifts (i.e., 150 to 300 mm) to optimum density/moisture content prior to placing additional lifts. The subgrade fill should be approved by the Geotechnical Consultant; in general, granular fill or non-expansive fine-grained soils are preferred over highly plastic clay. Quality assurance/control testing is recommended to confirm the fill has been placed to a dense condition. It is also recommended to delay construction of building floor slabs as long as practical after the site has been graded to allow for settlements to develop (minimum of a construction season/calendar year). Where potential floor movements/cracking cannot be tolerated, the slabs should be structurally supported by piles.

If basements are constructed, they should be based an adequate depth above the groundwater table and permanent drainage systems should be constructed to control and discharge any water that may accumulate adjacent to or below the structure.

Traffic structures constructed in accordance with typical City of Saskatoon construction practices/standards should perform satisfactorily at this site.

Based on the consistency of the subgrade soils encountered at this site and Table 4.1.8.4A of the 2015 National Building Code, the site classification for seismic site response falls within Class D.

6 LIMITATIONS

The presentation of the summary of the borehole logs and preliminary design recommendations has been completed as authorized. Four, 150 mm diameter boreholes were dry drilled using continuous flight, solid stem auger drilling equipment. Borehole logs were compiled during test drilling which, we believe, were representative of the subsurface conditions at the borehole locations at the time of test drilling.

Variations in the subsurface conditions from that shown on the borehole logs at locations other than the exact test locations should be anticipated. If conditions should differ from those reported here, then we should be notified immediately in order that we may examine the conditions in the field and reassess our recommendations in the light of any new findings.

The Terms of Reference for this geotechnical investigation did not include any environmental assessment of the site. No detectable evidence of environmentally sensitive materials such as hydrocarbon odour was detected during the actual time of the field test drilling program. If, on the basis of any knowledge, other than that formally communicated to us, there is reason to suspect that environmentally sensitive materials may exist, then additional boreholes should be drilled and samples recovered for chemical analysis.

The subsurface investigation necessitated the drilling of deep boreholes. The boreholes were backfilled at the completion of test drilling. Please be advised that some settlement of the backfill materials will occur which may leave a depression or an open hole. It is the responsibility of the client to inspect the site and backfill, as required, to ensure that the ground surface at each borehole location is maintained level with the existing grade.

It is recommended to decommission the monitoring wells once they are no longer needed. PMEL will not accept any future liability associated with inadequate decommissioning. Costs for decommissioning the monitoring wells can be provided by PMEL upon request.

This report has been prepared for the exclusive use of Overpass Farms Inc. and their agents for specific application to the proposed industrial subdivision to be developed within Lot 45.8 of the SE 8-38-5 W3M, near Martensville, Saskatchewan. It has been prepared in accordance with generally accepted geotechnical engineering practices and no other warranty, express or implied, is made.

Any use which a Third Party makes of this report, or any reliance on decisions to be made based on it, is the responsibility of such Third Party. Governing Agencies such as municipal, provincial, or federal agencies having jurisdictions with respect to this development and/or construction of the facilities described herein have full jurisdiction with respect to the described development. Any other unspecified subsequent development would be considered Third Party and would, therefore, require prior review by PMEL. PMEL accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.

The design considerations presented in this report are for preliminary purposes only. Detailed, specific geotechnical investigation(s) are recommended once the building/structure details and locations have been finalized. PMEL will not accept responsibility on this project for any unsatisfactory performance if the design considerations presented in this report are utilized for the final building design in lieu of conducting a detailed, specific geotechnical investigation.

If this report has been transmitted electronically, it has been digitally signed and secured with personal passwords to lock the document. Due to the possibility of digital modification, only originally signed reports and those reports sent directly by PMEL can be relied upon without fault.

We trust that this report fulfills your requirements for this project. Should you require additional information, please contact us.

P. MACHIBRODA ENGINEERING LTD.

PROFESSIONAL ENGINEER
K.V. PARDOSKI
MEMBER 10461
2022-02-18
YR. MN. DAY
SASKATCHEWAN

Kelly Pardoski, P. Eng.

Association of Professional Engineers & Geoscientists of Saskatchewan
CERTIFICATE OF AUTHORIZATION
P. MACHIBRODA ENGINEERING LTD.
Number 172
Permission to Consult held by:

Discipline	Sk. Reg. No.	Signature
Geotechnical	10461	

2022-02-18

Cory Zubrowski, P. Eng.

KP/CZ:tbs

DRAWINGS

P.MACHIBRODA ENGINEERING LTD.

KEY PLAN
NOT TO SCALE

NOTE:
1. THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.
2. THIS DRAWING WAS COMPILED FROM GOOGLE EARTH PRO ©2021, IMAGE ©2021 DIGITALGLOBE, (IMAGERY DATE: 04/27/17).
3.THIS DRAWING WAS COMPILED USING HANDHELD GPS EQUIPMENT (TRIMBLE, MODEL No. Geo7X).

LEGEND — PMEL BOREHOLE — PMEL BOREHOLE (MONITORING WELL INSTALLED)

CONSULTING
GEOENVIRONMENTAL
GEOTECHNICAL
ENGINEERS

P. MACHIBRODA ENGINEERING LTD.

806 – 48th STREET EAST
SASKATOON, SK
S7K 3Y4

DRAWING TITLE:
SITE PLAN - BOREHOLE LOCATIONS

PROJECT:
PROPOSED INDUSTRIAL SUBDIVISION
LOT 45.8, SE-8-38-5-W3M, NEAR MARTENSVILLE, SK

APPROVED BY:	DRAWN BY:	DRAWING NUMBER:
CZ	TP	18906-1
DATE: FEBRUARY, 2022	SCALE: AS SHOWN	

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-1

DRAWING NUMBER: 18906-2

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: LOT 45.8, SE-8-38-5-W3M, NEAR MARTENSVILLE, SK

NORTHING (m): 5789930 **EASTING (m):** 385690 **ELEVATION (m):** 510.0 **DATE DRILLED:** JAN 31/22

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)	DEPTH (m)
0		FILL, clay, some silt, trace sand, stiff, highly plastic, moist, brown, frozen.			16.6						0
					16.4	52	15				
1		trace rootlets below 0.9 m.									1
		GLACIAL TILL, silt, sandy, some clay, trace gravel, very stiff, low plastic, moist, brown, oxide stained.			8.5						
2		cobbles and boulders at 2.4 m.									2
3		GLACIAL TILL, clay, some silt, some sand, trace gravel, hard, medium plastic, moist, brown, oxide stained. very stiff to hard below 3.8 m. grey below 4.0 m.	☒	38	11.7			21.7			3
4					11.4					2.75	4
5											5
6			☒	25	10.8			22.6		2.75	6
7					11.5					3.0	7
8											8
9			☒	25	11.2			22.3		3.0	9
10					11.7					3.0	10
11											11
12					11.8					3.0	12

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-1

DRAWING NUMBER: 18906-2A

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: LOT 45.8, SE-8-38-5-W3M, NEAR MARTENSVILLE, SK

NORTHING (m): 5789930 **EASTING (m):** 385690 **ELEVATION (m):** **DATE DRILLED:** JAN 31/22

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)	DEPTH (m)
12		GLACIAL TILL, clay, some silt, some sand, trace gravel, hard, medium plastic, moist, grey.	☒	30	14.1			22.3			12
13											13
14											14
15											15
16											16
17											17
18											18
19											19
20											20
21											21
22											22
23											23
24											24

NOTES:
1. Borehole open and dry Immediately After Drilling.

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-2

DRAWING NUMBER: 18906-3

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: LOT 45.8, SE-8-38-5-W3M, NEAR MARTENSVILLE, SK

NORTHING (m): 5789960 **EASTING (m):** 385270 **ELEVATION (m):** 511.6 **DATE DRILLED:** JAN 31/22

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		GLACIAL TILL, clay, some silt, some sand, trace gravel, very stiff to hard, low plastic, moist, brown, oxide stained, gypsum crystals.			14.1					
1					13.6	27	15			
2		frozen to 1.8 m.		37	12.8			21.7		
3					11.9					

MONITORING WELL: BH22-2
ELEV.: 512.6 m

BENTONITE SEAL
50 mm diam. SCH 40, PVC RISER PIPE
SANDPACKED ANNULUS
50 mm diam. MACHINE SLOTTED SCH 40 PVC WELL SCREEN
SLOUGH

DEPTH (m)

NOTES:
1. Borehole sloughed to 2.5 m and dry Immediately After Drilling.
2. Monitoring Well dry on February 17, 2022.

SHEET 1 OF 1

02-18-2022 Z:\2022 Projcts- Geotechnical\18906-NEAR MARTENSVILLE, SK\DWG\BH2-18906.bor

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-3

DRAWING NUMBER: 18906-4

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: LOT 45.8, SE-8-38-5-W3M, NEAR MARTENSVILLE, SK

NORTHING (m): 5789736 **EASTING (m):** 385206 **ELEVATION (m):** 510.0 **DATE DRILLED:** JAN 31/22

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)	DEPTH (m)
0		SILT, trace sand, trace clay, very stiff, low plastic, moist, brown, frozen.			9.4						0
0.5					11.6						0.5
1		GLACIAL TILL, silt, some clay, some sand, trace gravel, very stiff to hard, low plastic, moist, brown, oxide stained. frozen to 1.0 m.									1
1.5			☒	33	11.0			22.2		3.0	1.5
2											2
2.5					11.1					2.75	2.5
3											3
3.5											3.5
4		GLACIAL TILL, clay, some silt, some sand, trace gravel, very stiff to hard, medium plastic, moist, grey.									4
4.5			☒	26	10.8			22.6		2.75	4.5
5											5
5.5					10.5					3.0	5.5
6											6
6.5		sand layer, wet, seepage, sloughing 6.6 to 7.4 m.									6.5
7											7
7.5			☒	32	10.5			22.4			7.5
8											8
8.5					12.7					2.25	8.5
9											9
9.5											9.5
10					13.4					2.25	10
10.5											10.5
11											11
11.5											11.5
12					14.5					2.0	12

▽ (water level at 8.5 m)

NOTES:
1. Borehole sloughed to 8.5 m Immediately After Drilling.

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-4

DRAWING NUMBER: 18906-5

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: LOT 45.8, SE-8-38-5-W3M, NEAR MARTENSVILLE, SK

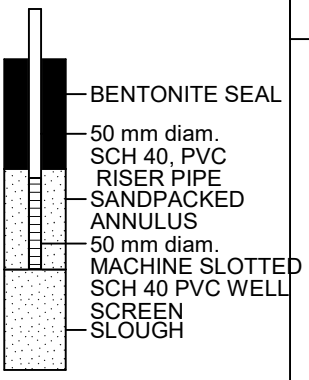
NORTHING (m): 5789725 **EASTING (m):** 385685 **ELEVATION (m):** 511.2 **DATE DRILLED:** JAN 31/22

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		FILL, sand, some silt, trace gravel, well graded, fine to coarse grained, moist, brown, frozen, rootlets, wood pieces.			8.0					
					8.7	28	15			
1		FILL, glacial till, clay,some silt, some sand, trace gravel, very stiff, low plastic, moist, brown.			11.1					2.0
		frozen to 1.0 m.			8.9					
2		SAND, silty, gravelly, compact to dense, well graded, fine to coarse grained, moist, brown, sloughing.								
3		GLACIAL TILL, clay, some silt, some sand, trace gravel, very stiff, medium plastic, moist, brown, oxide stained.	☒	19	11.2			22.6		2.25
4										
5										
6										
7										
8										
9										
10										
11										
12										

MONITORING WELL: BH22-4
ELEV.: 512.2 m



NOTES:
1. Borehole sloughed to 2.3 m and dry Immediately After Drilling.
2. Monitoring Well is dry on February 17, 2022.

P.MACHIBRODA ENGINEERING LTD.

ASTM C136: GRAIN SIZE ANALYSIS

Project: Proposed Industrial Subdivision

Location: Lot 45.8, SE 8-38-5 W3M, Near Martensville, SK

Project No.: 18906

Date Tested: February 11, 2022

Borehole No: 22-4

Sample No.: 18

Depth (m): 2.0

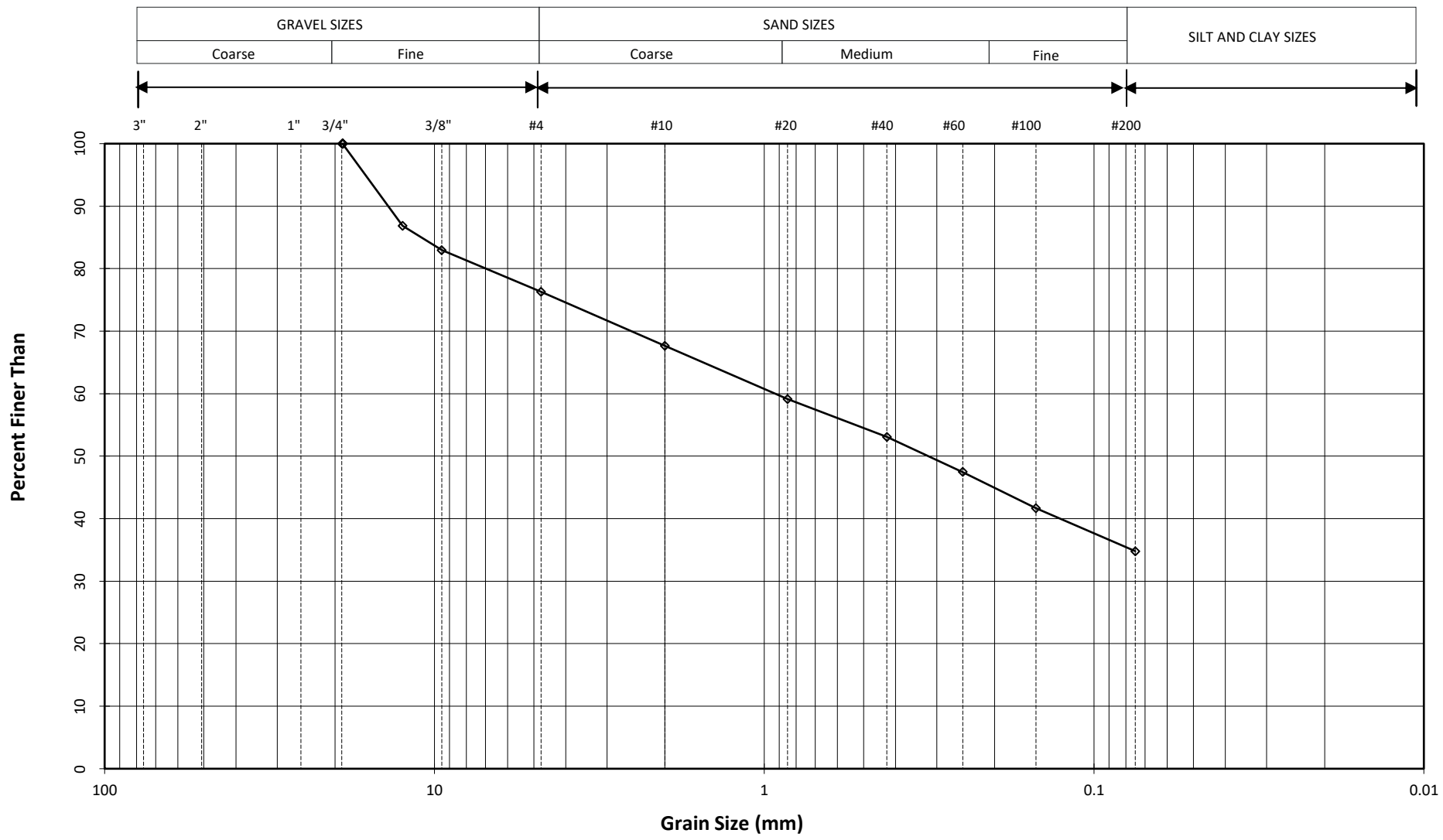
Sieve Analysis:

Sieve	Diameter mm	% Finer
	76.200	100
	63.500	100
	50.000	100
	37.500	100
	25.000	100
	19.000	100
	12.500	87
	9.500	83
	4.750	76
	2.000	68
	0.850	59
	0.425	53
	0.250	47
	0.150	42
	0.075	35

Material Description:

% Gravel Sizes	% Sand Sizes	% Silt and Clay Sizes
24	41	35

Remarks:



CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

DRAWING NUMBER

18906-6

WE CERTIFY TESTING PROCEDURES ARE IN ACCORDANCE WITH ASTM C136 AND C117 CSTANDARDS
P. MACHIBRODA ENGINEERING LTD.

PER Preston Schergevitch

APPENDIX A

Explanation of Terms on
Borehole Logs

CLASSIFICATION OF SOILS

Coarse-Grained Soils: Soils containing particles that are visible to the naked eye. They include gravels and sands and are generally referred to as cohesionless or non-cohesive soils. Coarse-grained soils are soils having more than 50 percent of the dry weight larger than particle size 0.080 mm.

Fine-Grained Soils: Soils containing particles that are not visible to the naked eye. They include silts and clays. Fine-grained soils are soils having more than 50 percent of the dry weight smaller than particle size 0.080 mm.

Organic Soils: Soils containing a high natural organic content.

Soil Classification By Particle Size

Soil Type	Particles of Size
Clay	< 0.002 mm
Silt	0.002 – 0.060 mm
Sand	0.06 – 2.0 mm
Gravel	2.0 – 60 mm
Cobbles	60 – 200 mm
Boulders	>200 mm

TERMS DESCRIBING CONSISTENCY OR CONDITION

Coarse-grained soils: Described in terms of compactness condition and are often interpreted from the results of a Standard Penetration Test (SPT). The standard penetration test is described as the number of blows, N, required to drive a 51 mm outside diameter (O.D.) split barrel sampler into the soil a distance of 0.3 m (from 0.15 m to 0.45 m) with a 63.5 kg weight having a free fall of 0.76 m.

Compactness Condition	SPT N-Index (blows per 0.3 m)
Very loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	Over 50

Fine-Grained Soils: Classified in relation to undrained shear strength.

Consistency	Undrained Shear Strength (kPa)	N Value (Approximate)	Field Identification
Very Soft	<12	0-2	Easily penetrated several centimetres by the fist.
Soft	12-25	2-4	Easily penetrated several centimetres by the thumb.
Firm	25-50	4-8	Can be penetrated several centimetres by the thumb with moderate effort.
Stiff	50-100	8-15	Readily indented by the thumb, but penetrated only with great effort.
Very Stiff	100-200	15-30	Readily indented by the thumb nail.
Hard	>200	>30	Indented with difficulty by the thumbnail.

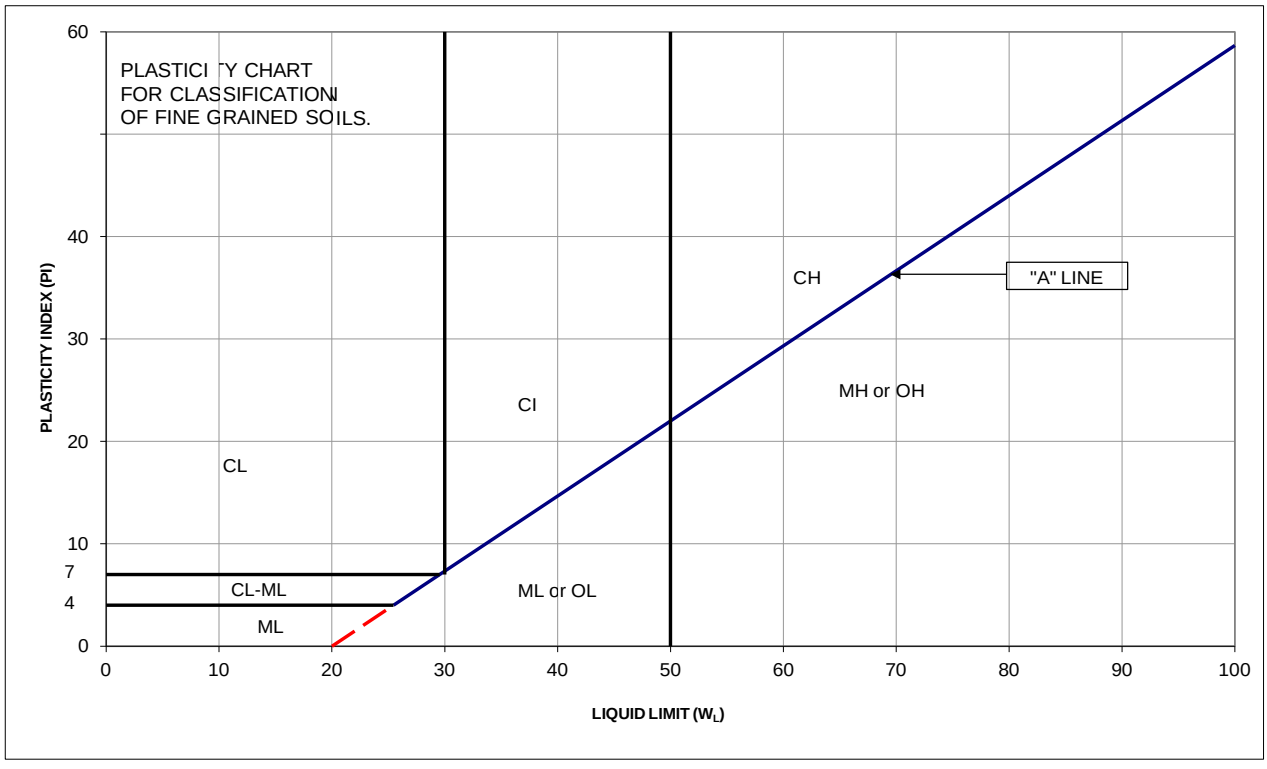
Organic Soils: Readily identified by colour, odour, spongy feel and frequently by fibrous texture.

DESCRIPTIVE TERMS COMMONLY USED TO CHARACTERIZE SOILS

Poorly Graded	- predominance of particles of one grain size.
Well Graded	- having no excess of particles in any size range with no intermediate sizes lacking.
Mottled	- marked with different coloured spots.
Nuggety	- structure consisting of small prismatic cubes.
Laminated	- structure consisting of thin layers of varying colour and texture.
Slickensided	- having inclined planes of weakness that are slick and glossy in appearance.
Fissured	- containing shrinkage cracks.
Fractured	- broken by randomly oriented interconnecting cracks in all 3 dimensions

SOIL CLASSIFICATION SYSTEM (MODIFIED U.S.C.)

MAJOR DIVISION			GROUP SYMBOL	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS	STRONG COLOUR OR ODOUR AND OFTEN FIBROUS TEXTURE
COARSE-GRAINED SOILS(MORE THAN HALF BY WEIGHT LARGER THAN NO. 200 SIEVE SIZE)	GRAVELS More than half coarse fraction larger than No. 4 sieve size	CLEAN GRAVELS	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES <5% FINES	$C_u = \frac{D_{60}}{D_{10}} > 4 \quad C_c = \frac{(D_{30})^2}{D_{60} \times D_{10}} = 1 \text{ to } 3$
			GP	POORLY-GRADED GRAVELS AND GRAVEL-SAND MIXTURES <5% FINES	NOT MEETING ALL ABOVE REQUIREMENTS FOR GW
		DIRTY GRAVELS	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES >12% FINES	ATTERBERG LIMITS BELOW "A" LINE OR PI < 4
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES >12% FINES	ATTERBERG LIMITS ABOVE "A" LINE WITH PI > 7
	SANDS More than half coarse fraction smaller than No. 4 sieve size	CLEAN SANDS	SW	WELL-GRADED SANDS, GRAVELLY SANDS MIXTURES <5% FINES	$C_u = \frac{D_{60}}{D_{10}} > 6 \quad C_c = \frac{(D_{30})^2}{D_{60} \times D_{10}} = 1 \text{ to } 3$
			SP	POORLY-GRADED SANDS OR GRAVELLY SANDS <5% FINES	NOT MEETING ALL GRADATION REQUIREMENTS FOR SW
		DIRTY SANDS	SM	SILTY SANDS, SAND-SILT MIXTURES >12% FINES	ATTERBERG LIMITS BELOW "A" LINE OR PI < 4
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES >12% FINES	ATTERBERG LIMITS ABOVE "A" LINE WITH PI >7
FINE-GRAINED SOILS (MORE THAN HALF BY WEIGHT PASSING NO. 200 SIEVE SIZE)	SILTS Below "A" line on plasticity chart; negligible organic content		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY SANDS OF SLIGHT PLASTICITY	$W_L < 50$
			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS	$W_L > 50$
	CLAYS Above 'A" line on plasticity chart; negligible organic content		CL	INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY, OR SILTY CLAYS, LEAN CLAYS	$W_L < 30$
			CI	INORGANIC CLAYS OF MEDIUM PLASTICITY, SILTY CLAYS	$W_L > 30 < 50$
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	$W_L > 50$
	ORGANIC SILTS & ORGANIC CLAYS Below "A" line on plasticity chart		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	$W_L < 50$
			OH	ORGANIC CLAYS OF HIGH PLASTICITY	$W_L > 50$



P.MACHIBRODA ENGINEERING LTD.

PRELIMINARY GEOTECHNICAL INVESTIGATION

PROPOSED INDUSTRIAL SUBDIVISION
NE 5-38-5 W3M
NEAR MARTENSVILLE, SASKATCHEWAN
PMEL FILE NO. 18907
FEBRUARY 28, 2022

PREPARED FOR:
Nienhuis Contracting Ltd.

ATTENTION: Anthony Nienhuis

P.MACHIBRODA ENGINEERING LTD.
DOWN TO EARTH SOLUTIONS

P.MACHIBRODA ENGINEERING LTD.

PROJECT: Preliminary Geotechnical Investigation
Proposed Industrial Subdivision
NE 5-38-5 W3M
Near Martensville, Saskatchewan
PMEL File No. 18907
February 28, 2022

PREPARED FOR: Nienhuis Contracting Ltd.
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ATTENTION: Anthony Nienhuis

DISTRIBUTION: Nienhuis Contracting Ltd. – Digital Copy
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1 INTRODUCTION

1.1 GENERAL

The following report has been prepared to provide preliminary geotechnical information for the proposed industrial subdivision to be developed within the NE 5-38-5 W3M near Martensville, Saskatchewan.

The terms of reference for this investigation were presented in P. Machibroda Engineering Ltd. (PMEL) Proposal No. 18907, dated January 14, 2022. Written authorization to proceed with this investigation was provided in the signed Consulting Agreement between Nienhuis Contracting Ltd. and PMEL, dated January 14, 2022.

PMEL conducted a geotechnical investigation in 2012 for Nienhuis Contracting within the north-east portion of the site (area of the existing buildings). The test hole locations and logs have been presented on the Site Plan, Drawing No. 18907-1 and in Appendix B, respectively.

1.2 SITE LOCATION AND DESCRIPTION

The proposed industrial subdivision is located just west of Highway 12, approximately 3½ km south of Martensville, Saskatchewan. The site is bordered by industrial properties on the east side of Highway 12 and light residential development to the west, north and south. With the exception of the existing buildings located at the northeast corner of the quarter section, the subject site is primarily undeveloped and grass covered (with light brush cover in areas). It is understood that hydrovac washout materials and uncontrolled fill have been placed in some areas at the north end of the site. A Site Plan showing the location of the study area and boreholes has been shown on Drawing No. 18907-1.

2 FIELD INVESTIGATION

The field test drilling, soil sampling and monitoring well installation was conducted on February 7, 2022. Groundwater monitoring was conducted on February 17, 2022.

The plan location and surface elevation of each borehole was surveyed using handheld Global Positioning Equipment (Trimble, Model No. GeoXH 6000). The vertical accuracy of the handheld GPS was ±1 m.

Eleven boreholes, located as shown on the Site Plan, Drawing No. 18907-1, were dry drilled using our truck-mounted, continuous flight auger drilling rig. The boreholes were 150 mm in diameter and extended to depths of 3 to 12.4 m below the existing ground surface. Borehole logs, as shown on the attached Drawing Nos. 18907-2 to 12, inclusive, were compiled during test drilling to record the soil stratification, the groundwater conditions, the position of unstable sloughing soils and the depths at which cobblestones and/or boulders were encountered.

Disturbed samples of auger cuttings, collected during test drilling, were sealed in plastic bags to minimize moisture loss. The soil samples were taken to our laboratory for analysis.

Standard penetration tests (SPT) were performed during test drilling.

Standpipe monitoring wells (slotted, 50 mm PVC pipe) were installed in BH's 22-4, 22-6, 22-7 and 22-11 to monitor the existing groundwater conditions.

3 SOIL AND GROUNDWATER CONDITIONS

3.1 SOIL PROFILE

The general soil profile at the locations investigated consisted of a surface layer of topsoil (100 to 150 mm) followed by variable layers of silt or sand/gravel that extended to depths of about 0.5 to 1.5 m, followed by an extensive deposit of glacial till that extended to the maximum depth investigated with our boreholes at this site (to a depth of at least 12.4 m below existing ground surface). The exception to this was encountered at the location of BH 22-6 where approximately 2.8 m of fill was encountered at ground surface (i.e., uncontrolled fill/hydro vac washout area) and at the location of BH's 22-8 and 22-9 where the glacial till stratum was encountered directly beneath the topsoil layer. Inter-till sand layers/lenses and cobbles/boulders were encountered at random depths during test drilling.

The strength of the surface layers of silt (fill and naturally occurring) and gravel/sand were difficult to evaluate due to them being frozen at the time of the investigation. The silts were generally low plastic whereas the gravel/sand was fine to coarse grained, well graded and contained cobbles/boulders. The underlying glacial till was low plastic and predominantly very stiff to hard in consistency.

3.2 GROUNDWATER CONDITIONS, SLOUGHING

Groundwater seepage and sloughing conditions were encountered in the sand layers/lenses during test drilling. The depths at which groundwater seepage and sloughing conditions were encountered have been shown on the borehole logs.

A summary of the groundwater levels recorded in the monitoring wells installed during this investigation has been presented in Table I.

TABLE I RECORDED GROUNDWATER LEVELS

Borehole No.	[1]Monitoring Well Rim Elevation (m)	[1]Ground Surface Elevation (m)	[1]Monitoring Well Tip Elevation (m)	Groundwater Depth (m)	[1]Groundwater Elevation (m)
				February 17, 2022	February 17, 2022
22-4	512.1	511.0	508.3	Dry	Dry
22-6	513.8	512.7	508.5	3.4	509.3
22-7	513.1	512.1	509.1	Dry	Dry
22-11	513.2	512.1	509.5	Dry	Dry

Notes:
1. GPS accuracy ± 1 m.

Examination of Table I revealed that the groundwater table was measured at a depth of 3.4 m below existing ground surface at the location of BH 22-6 on February 17, 2022. Higher water levels may be encountered, particularly during and/or following spring snowmelt and/or periods of precipitation.

3.3 COBBLESTONES AND BOULDERS

Cobblestones and/or boulders were encountered within the depth of exploration at this site. The depths at which cobbles/boulders were encountered have been shown on the borehole logs, Drawing Nos. 18907-2 to 12, inclusive.

Glacial till consists of a heterogeneous mixture of gravel, sand, silt and clay-sized particles. Glacial till inherently contains sorted deposits of the above particle sizes as well as a random distribution of larger particle sizes in the cobblestone range (60 to 200 mm) and boulder-sized range (larger than 200 mm). Inter/intra till deposits of cobblestones, boulders, boulder pavements and isolated deposits of saturated sand or gravel should be anticipated.

It should be recognized that the statistical probability of encountering cobbles/boulders in the small diameter boreholes drilled at this site was low. The frequency of encountering such deposits will increase proportionately with the number and depth of piles installed and/or volume of soil excavated.

4 LABORATORY ANALYSIS

The soil classification and index tests performed during this investigation consisted of a visual classification of the soil, moisture contents, Atterberg limits, unit weights and grain size distribution analysis.

The results of the soil classification and index tests conducted on representative samples of soil have been plotted on the borehole logs alongside the corresponding depths at which the samples were recovered, as shown on Drawing Nos. 18907-2 to 12, inclusive. The results of the grain size distribution analyses have been presented in Appendix C.

5 DESIGN CONSIDERATIONS

The purpose of this investigation was to evaluate the existing subsurface soil and groundwater conditions for potential site development. Site specific investigation(s) will be required once the proposed development has been finalized.

The subsurface soil conditions consisted of variable deposits of silt (fill and naturally occurring) and gravel/sand within the upper approximately 0.5 to 2.5 m of the soil profile followed by glacial till to the full depth explored (i.e., 12.4 m). Cobbles/boulders were encountered in the glacial till stratum. Groundwater seepage and sloughing conditions were encountered in inter-till sand layers/lenses during test drilling. The groundwater level measured in BH 22-6 was recorded at a depth of approximately 3.4 m below existing ground surface on February 17, 2022.

Preparation of the site for development should consist of the removal of all vegetation, topsoil, loose fill, hydrovac washout material, and organic material from the construction areas. It is anticipated that conventional site preparation (scarifying, moisture conditioning and re-compacting the soils) will suffice over the majority of the site. The use of geosynthetics and additional fill thicknesses may be required in low lying areas.

Within building footprints and traffic areas, the subgrade should be uniformly compacted to a specified density. Soils which are unstable during site preparation and fail to achieve the required compaction will require additional treatment, which may include: over-excavation and replacement and/or geosynthetic stabilization. Locally available soils which are similar to underlying soils should be suitable for use as subgrade fill; creating mixed soil conditions during site grading is not recommended.

Conventional open-cut excavations above the groundwater table should be feasible at this site. Below the groundwater table, dewatering will be required to maintain excavation stability, particularly where sand or silt soils exist.

The subgrade soils are considered frost susceptible and the potential depth of frost penetration could range from approximately 1.5 to 2.5 m, depending on soil type (i.e., glacial till vs sand), surface cover, severity of winter and heat loss affects beneath/adjacent buildings; the depth of frost penetration will be greater where granular fills are utilized.

Potential deep foundation alternatives for structures at this site include drilled, cast-in-place concrete piles (straight shaft and belled) or continuous flight auger (CFA) piles. Drilled piles may not be feasible at some locations of the site if large thicknesses of saturated sands are encountered. Temporary casing will be required to complete the installation of drilled piles. Construction difficulties associated with cobbles/boulders could also be encountered during the installation of pile foundations. Coring and/or larger diameter augers may be required to assist in achieving the design pile depths. Driven piles (open-end pipe and timber) may not be practical due to the hard ground conditions encountered at relatively shallow depths and potential for shallow termination.

Footings and/or thickened edge raft (shallow) foundations bearing on undisturbed naturally occurring glacial till and/or sand soils could be a suitable foundation alternative at this site. Shallow foundations bearing on uncontrolled fill soils are not recommended. Utilization of structural granular fill beneath shallow foundations could be viable provided the underlying subgrade consists of undisturbed, naturally occurring soils. Setting the foundation below the depth of frost penetration or protecting from frost action using rigid polystyrene insulation will be required to mitigate frost induced foundation movements.

The most practical/economical foundation alternative will depend on the structure being supported.

Provided a typical level of floor performance is considered acceptable (i.e., potential for some floor movements and cracking), the existing subgrade soils should provide stable support for grade-supported floor slabs.

Where site grades are low and large fill depths (i.e., in excess of 2 to 3 m) are needed to bring the site up to grade, construction of grade supported building floor slabs bearing on newly placed fill will be subject to potential excessive differential movements as the fill consolidates under its own weight. To minimize long term settlements, cut and fill activities should be undertaken such that the fill is placed and compacted in thin lifts (i.e., 150 to 300 mm) to optimum density/moisture content prior to placing additional lifts.

The subgrade fill should be approved by the Geotechnical Consultant; in general, granular fill or non-expansive fine grained soils are preferred over highly plastic clay. Quality assurance/control testing is recommended to confirm the fill has been placed to a dense condition. It is also recommended to delay construction of building floor slabs as long as practical after the site has been graded to allow for settlements to develop (minimum of a construction season/calendar year after placing). Where potential floor movements/cracking cannot be tolerated, the slabs should be structurally supported by piles.

If basements are constructed, they should be based an adequate depth above the groundwater table and permanent drainage systems should be constructed to control and discharge any water that may accumulate adjacent to or below the structure.

Traffic structures constructed in accordance with typical City of Saskatoon construction practices/standards should perform satisfactorily at this site.

Based on the consistency of the subgrade soils encountered at this site and Table 4.1.8.4A of the 2015 National Building Code, the site classification for seismic site response falls within Class D.

6 LIMITATIONS

The presentation of the summary of the borehole logs and preliminary design recommendations has been completed as authorized. Eleven, 150 mm diameter boreholes were dry drilled using continuous flight, solid stem auger drilling equipment. Borehole logs were compiled during test drilling which, we believe, were representative of the subsurface conditions at the borehole locations at the time of test drilling.

Variations in the subsurface conditions from that shown on the borehole logs at locations other than the exact test locations should be anticipated. If conditions should differ from those reported here, then we should be notified immediately in order that we may examine the conditions in the field and reassess our recommendations in the light of any new findings.

The Terms of Reference for this geotechnical investigation did not include any environmental assessment of the site. No detectable evidence of environmentally sensitive materials such as hydrocarbon odour was detected during the actual time of the field test drilling program. If, on the basis of any knowledge, other than that formally communicated to us, there is reason to suspect that environmentally sensitive materials may exist, then additional boreholes should be drilled and samples recovered for chemical analysis.

The subsurface investigation necessitated the drilling of deep boreholes. The boreholes were backfilled at the completion of test drilling. Please be advised that some settlement of the backfill materials will occur which may leave a depression or an open hole. It is the responsibility of the client to inspect the site and backfill, as required, to ensure that the ground surface at each borehole location is maintained level with the existing grade.

It is recommended to decommission the monitoring wells once they are no longer needed. PMEL will not accept any future liability associated with inadequate decommissioning. Costs for decommissioning the monitoring wells can be provided by PMEL upon request.

This report has been prepared for the exclusive use of Nienhuis Contracting Ltd. and their agents for specific application to the proposed industrial subdivision to be developed within the NE 5-38-5 W3M near Martensville, Saskatchewan. It has been prepared in accordance with generally accepted geotechnical engineering practices and no other warranty, express or implied, is made.

Any use which a Third Party makes of this report, or any reliance on decisions to be made based on it, is the responsibility of such Third Party. Governing Agencies such as municipal, provincial, or federal agencies having jurisdictions with respect to this development and/or construction of the facilities described herein have full jurisdiction with respect to the described development. Any other unspecified subsequent development would be considered Third Party and would, therefore, require prior review by PMEL. PMEL accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.

The design considerations presented in this report are for preliminary purposes only. Detailed, specific geotechnical investigation(s) are recommended once the building/structure details and locations have been finalized. PMEL will not accept responsibility on this project for any unsatisfactory performance if the design considerations presented in this report are utilized for the final building design in lieu of conducting a detailed, specific geotechnical investigation.

If this report has been transmitted electronically, it has been digitally signed and secured with personal passwords to lock the document. Due to the possibility of digital modification, only originally signed reports and those reports sent directly by PMEL can be relied upon without fault.

We trust that this report fulfills your requirements for this project. Should you require additional information, please contact us.

P. MACHIBRODA ENGINEERING LTD.

PROFESSIONAL ENGINEER
K.V. PARDOSKI
MEMBER 10461
K. Pardoski
2022-03-01
YR. MN. DAY
SASKATCHEWAN

Kelly Pardoski, P. Eng.

Association of Professional Engineers & Geoscientists of Saskatchewan
CERTIFICATE OF AUTHORIZATION
P. MACHIBRODA ENGINEERING LTD.
Number 172
Permission to Consult held by:

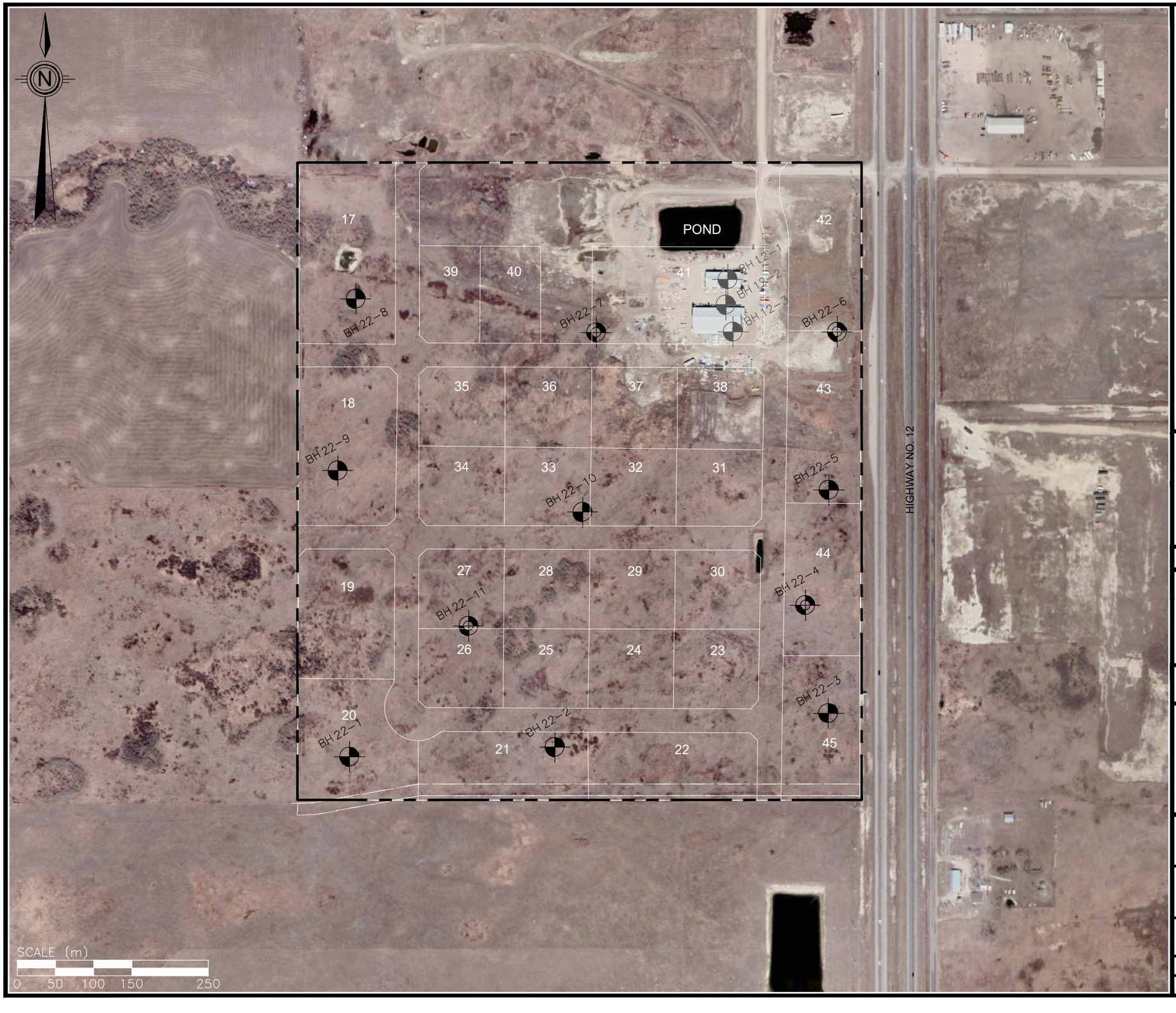
Discipline	Sk. Reg. No.	Signature
Geotechnical	10461	K. Pardoski

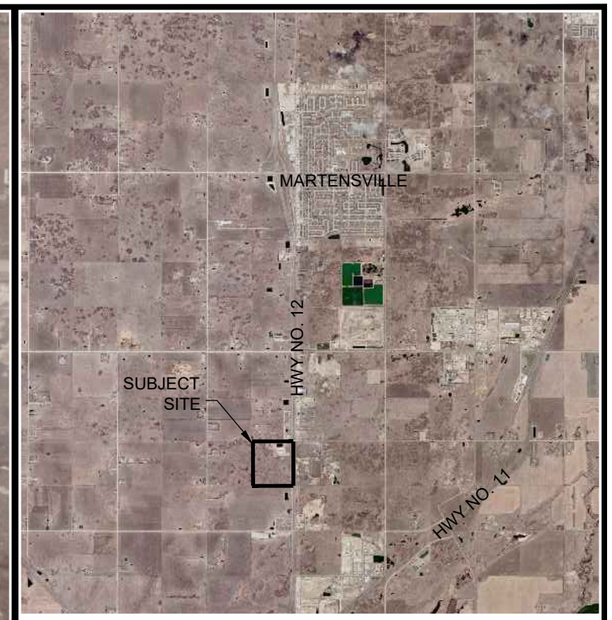
2022-03-01

Cory Zubrowski, P. Eng.
KP/CZ:tbs

DRAWINGS

P.MACHIBRODA ENGINEERING LTD.





KEY PLAN
NOT TO SCALE

NOTE:
1. THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.
2. THIS DRAWING WAS COMPILED FROM GOOGLE EARTH PRO ©2021, IMAGE ©2021 DIGITALGLOBE, (IMAGERY DATE: 04/27/21).
3. THIS DRAWING WAS COMPILED USING HANDHELD GPS EQUIPMENT (TRIMBLE, MODEL No. Geo7X).
4. THIS DRAWING WAS COMPILED FROM A PRELIMINARY DRAWING PROVIDED BY ASSOCIATED ENGINEERING. PROJECT NO. 20204508-00

LEGEND

- –PMEL BOREHOLE
- –FORMER PMEL BOREHOLE (S12–8322)
- –PMEL BOREHOLE (MONITORING WELL INSTALLED)

P. MACHIBRODA ENGINEERING LTD.

CONSULTING
GEOENVIRONMENTAL
GEOTECHNICAL
ENGINEERS

806 – 48th STREET EAST
SASKATOON, SK
S7K 3Y4

DRAWING TITLE:

SITE PLAN - BOREHOLE LOCATIONS

PROJECT:

PROPOSED INDUSTRIAL SUBDIVISION
NE-5-38-5-W3M, NEAR MARTENSVILLE, SK

APPROVED BY:	DRAWN BY:
CZ/NT	TP
DATE: FEBRUARY, 2022	DRAWING NUMBER: 18907-1
SCALE: AS SHOWN	

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-1

DRAWING NUMBER: 18907-2

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: NE-05-38-05-W3M, NEAR MARTENSVILLE, SK

NORTHING (m): 5788961 **EASTING (m):** 385201 **ELEVATION (m):** 510.8 +/- 1.0 **DATE DRILLED:** FEB 7/22

SAMPLE TYPE: CUTTINGS SPLIT SPOON SHELBY TUBE

WATER LEVELS
After Drilling
During Drilling

DEPTH (m)	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0	TOPSOIL, silt and clay, black to dark brown, rootlets, frozen.			13.2					
	SILT, some clay, trace sand, stiff to very stiff, low to medium plastic, brown, oxide stained, frozen.			13.5					
1				17.5					1.5
	GLACIAL TILL, clay, silty, some sand, trace gravel, very stiff, low plastic, moist, brown, oxide stianed, gypsum crystals.								
2									
3			24	11.0	29	11			
	hard below 3.5 m.								
4				11.1					4.5
5									
	cobbles and boulders below 5.9 m.								
6	grey below 6.3 m.		32	10.6			22.7		
7				10.8					4.5
8									
	SAND, trace silt, compact, poorly graded, medium to coarse grained, wet, grey, seepage, sloughing.			16.8					
9	GLACIAL TILL, clay, silty, some sand, trace gravel, very stiff to hard, medium plastic, moist, grey, gypsum crystals.		19	12.5					
10				13.3					3.5
11									
12									

CONTINUED ON NEXT PAGE

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-1

DRAWING NUMBER: 18907-2A

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: NE-05-38-05-W3M, NEAR MARTENSVILLE, SK

NORTHING (m): 5788961 **EASTING (m):** 385201 **ELEVATION (m):** **DATE DRILLED:** FEB 7/22

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)	DEPTH (m)
12		GLACIAL TILL, clay, silty, some sand, trace gravel, hard, medium plastic, moist, grey, gypsum crystals.	☒	28	12.6			22.4			12
13											13
14											14
15											15
16											16
17											17
18											18
19											19
20											20
21											21
22											22
23											23
24											24

NOTES:
1. Borehole sloughed to 11.7 m Immediately After Drilling.

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-2

DRAWING NUMBER: 18907-3

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: NE-05-38-05-W3M, NEAR MARTENSVILLE, SK

NORTHING (m): 5788968 **EASTING (m):** 385466 **ELEVATION (m):** 509.9 +/- 1.0 **DATE DRILLED:** FEB 7/22

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)	DEPTH (m)
0		TOPSOIL, silt and clay, black to dark brown, trace rootlets, frozen.			1.8						0
					4.2						
1		GRAVEL AND SAND, some silt, well graded, fine to coarse grained, damp, brown, oxide stained, frozen.									1
		GLACIAL TILL, clay, silty, some sand, trace gravel, stiff to very stiff, low plastic, moist, brown, oxide stained, gypsum crystals.	☒	20	14.1						
2		firm below 1.2 m.									2
		very stiff to hard below 1.9 m.			11.7						
3											3
4											4
			☒	29	10.9			22.5			
5		grey below 5.0 m									5
6					10.7						6
7											7
		sand lense, wet, trace seepage at 7.8 m.	☒	23	10.9			22.4			
8											8
9					10.9					4.5	9
10											10
			☒	28	10.9			22.5			
11											11
12					11.3					4.5	12

1. Borehole was open and dry Immediately After Drilling.

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-3

DRAWING NUMBER: 18907-4

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: NE-05-38-05-W3M, NEAR MARTENSVILLE, SK

NORTHING (m): 5789003 **EASTING (m):** 385821 **ELEVATION (m):** 509.6 +/- 1.0 **DATE DRILLED:** FEB 7/22

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)	DEPTH (m)
0		TOPSOIL, silt and clay, black to dark brown, rootlets, frozen.			2.0						0
		GRAVEL AND SAND, some silt, well graded, fine to coarse grained, damp, brown, oxide stained, sloughing, frozen.			3.1						
1		GLACIAL TILL, clay, silty, some sand, trace gravel, firm, low plastic, moist, brown, oxide stained, gypsum crystals.			15.3					0.5	1
2		very stiff to hard below 1.6 m.									2
3					11.9					3.0	3
4					10.8						4
5											5
6		grey below 6.2 m.		25	11.3			22.5			6
7					11.3					3.0	7
8											8
9				22	11.1			22.3			9
10					11.6					3.5	10
11											11
12											12

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P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-3

DRAWING NUMBER: 18907-4A

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: NE-05-38-05-W3M, NEAR MARTENSVILLE, SK

NORTHING (m): 5789003 **EASTING (m):** 385821 **ELEVATION (m):** **DATE DRILLED:** FEB 7/22

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)	DEPTH (m)
12		GLACIAL TILL, clay, silty, some sand, trace gravel, very stiff to hard, low plastic, moist, grey, gypsum crystals.	☒	21	11.8			22.4			12
13											13
14											14
15											15
16											16
17											17
18											18
19											19
20											20
21											21
22											22
23											23
24											24

NOTES:
1. Borehole open and dry Immediately After Drilling.

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-4

DRAWING NUMBER: 18907-5

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: NE-05-38-05-W3M, NEAR MARTENSVILLE, SK

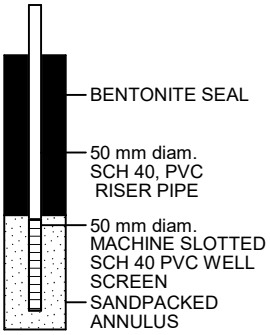
NORTHING (m): 5789145 **EASTING (m):** 385791 **ELEVATION (m):** 511.0 +/- 1.0 **DATE DRILLED:** FEB 7/22

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		TOPSOIL, silt and clay, black to dark brown, trace rootlets, frozen.			5.2					
1		SAND AND GRAVEL, silty, well graded, fine to coarse grained, damp, brown, oxide stained, frozen.			15.6					1.25
2		GLACIAL TILL, clay, silty, some sand, trace gravel, stiff, medium plastic, moist, brown, oxide stained, gypsum crystals.		11	14.6			21.4		
3					14.3					2.0

MONITORING WELL: BH22-4
ELEV.: 512.1 m



NOTES:
1. Borehole sloughed to 2.7 m Immediately After Drilling.
2. Monitoring Well dry on February 17, 2022.

SHEET 1 OF 1

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P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-5

DRAWING NUMBER: 18907-6

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: NE-05-38-05-W3M, NEAR MARTENSVILLE, SK

NORTHING (m): 5789291 **EASTING (m):** 385828 **ELEVATION (m):** 510.4 +/- 1.0 **DATE DRILLED:** FEB 7/22

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)	DEPTH (m)
0		TOPSOIL, silt and clay, black to dark brown, trace rootlets, frozen.			6.0						0
					14.5						
1		SILT, sandy to some sand, some to trace gravel, firm, low plastic, brown, oxide stained, frozen.									1
		GLACIAL TILL, clay, silty, some sand, trace gravel, firm to stiff, low plastic, moist, brown, oxide stained, gypsum crystals.			12.6					1.0	
2		cobbles/boulders at 0.7 m.									2
3		very stiff below 3.0 m	☒	22	13.5						3
4					11.2					2.5	4
5											5
6			☒	15	9.7			22.7			6
7		grey below 7.3 m.			11.4					3.5	7
		hard below 7.8 m.									
8											8
9			☒	30	10.3			22.7			9
10					10.0					4.5	10
11											11
12											12

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P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-5

DRAWING NUMBER: 18907-6A

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: NE-05-38-05-W3M, NEAR MARTENSVILLE, SK

NORTHING (m): 5789291 **EASTING (m):** 385828 **ELEVATION (m):** **DATE DRILLED:** FEB 7/22

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)	DEPTH (m)
12		GLACIAL TILL, clay, silty, some sand, trace gravel, hard, low plastic, moist, grey, gypsum crystals.	☒	30	10.9			22.6			12
13											13
14											14
15											15
16											16
17											17
18											18
19											19
20											20
21											21
22											22
23											23
24											24

NOTES:
1. Borehole open and dry Immediately After Drilling.

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-6

DRAWING NUMBER: 18907-7

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

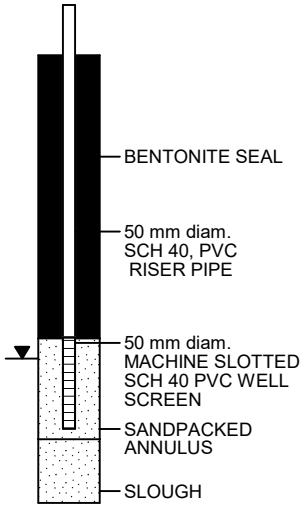
LOCATION: NE-05-38-05-W3M, NEAR MARTENSVILLE, SK

NORTHING (m): 5789493 **EASTING (m):** 385842 **ELEVATION (m):** 512.7 +/- 1.0 **DATE DRILLED:** FEB 8/22

SAMPLE TYPE: CUTTINGS SPLIT SPOON SHELBY TUBE

WATER LEVELS
After Drilling
During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		FILL, silt and sand, some gravel, some clay, well graded, stiff, low to medium plastic, damp, brown.			6.9					
1					6.6					
		frozen to 1.5 m.		32	8.1	35	17			
2										
3		clayey, stiff below 2.8 m.			13.9					
		sand seam, wet, seepage, sloughing 2.8 to 3.0 m.								
4		GLACIAL TILL, clay, silty, some sand, trace gravel, very stiff, low plastic, moist, brown, oxide stained, gypsum crystals.		18	11.4					
5										
6										
7										
8										
9										
10										
11										
12										



NOTES:
1. Borehole sloughed to 4.2 m Immediately After Drilling.
2. Monitoring Well water level at 3.4 m below existing grade on February 17, 2022.

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-7

DRAWING NUMBER: 18907-8

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: NE-05-38-05-W3M, NEAR MARTENSVILLE, SK

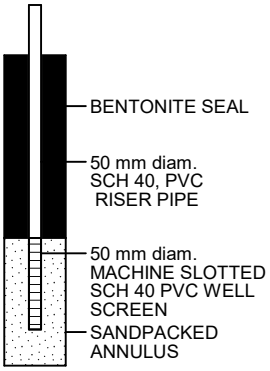
NORTHING (m): 5789500 **EASTING (m):** 385529 **ELEVATION (m):** 512.1 +/- 1.0 **DATE DRILLED:** FEB 8/22

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
- ▼ After Drilling
- ▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		TOPSOIL, silt and clay, black to dark brown, trace rootlets, frozen.			16.6					
					14.3					
1		SILT, sandy, some clay, trace gravel, firm, low to medium plastic, moist, brown, oxide stained, frozen.			13.0					
2		GLACIAL TILL, clay, silty, some sand, trace gravel, stiff, low plastic, moist, brown, oxide stained, gypsum crystals.								
3			☒	10	12.7			22.0		
4										
5										
6										
7										
8										
9										
10										
11										
12										

MONITORING WELL: BH22-7
ELEV.: 513.1 m



NOTES:
1. Borehole open and dry Immediately After Drilling.
2. Monitoring Well dry on February 17, 2022.

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-8

DRAWING NUMBER: 18907-9

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: NE-05-38-05-W3M, NEAR MARTENSVILLE, SK

NORTHING (m): 5789550 **EASTING (m):** 385223 **ELEVATION (m):** 511.8 +/- 1.0 **DATE DRILLED:** FEB 8/22

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)	DEPTH (m)
0		TOPSOIL, silt and clay, black to dark brown, trace rootlets, frozen.			9.2						0
0.5					7.9	25	12				0.5
1		GLACIAL TILL, clay, silty, some sand, trace gravel, stiff, low plastic, moist, brown, oxide stained, gypsum crystals. frozen to 1.0 m.									1
1.5			☒	9	11.1						1.5
2		hard below 2.0 m.									2
2.5					10.9					4.5	2.5
3											3
3.5											3.5
4											4
4.5			☒	33	11.3			22.6			4.5
5											5
5.5					11.1					4.5	5.5
6		grey below 6.2 m.									6
6.5											6.5
7											7
7.5		cobbles and boulders below 7.5 m	☒	31	10.8						7.5
8											8
8.5					11.0					4.5	8.5
9											9
9.5											9.5
10											10
10.5			☒	30	11.4			22.6			10.5
11											11
11.5		sand lense, wet, trace seepage at 11.9 m.			11.5					4.5	11.5
12											12

1. Borehole was open and dry Immediately After Drilling.

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-9

DRAWING NUMBER: 18907-10

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: NE-05-38-05-W3M, NEAR MARTENSVILLE, SK

NORTHING (m): 5789330 **EASTING (m):** 385195 **ELEVATION (m):** 510.8 +/- 1.0 **DATE DRILLED:** FEB 8/22

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0	TOPSOIL, silt and clay, black to dark brown, trace rootlets, frozen.			11.0					
				12.2					
1	GLACIAL TILL, clay, silty, some sand, trace gravel, stiff, low plastic, brown, oxide stained, gypsum crystals. frozen to 1.0 m.			11.4					1.5
	very stiff below 1.5 m.								
2	hard below 2.0 m.								
	cobbles and boulders below 2.7 m.								
3		☒	38	11.6			22.4		
4				10.9					3.0
5									
6		☒	41	11.2					
7				11.4					3.0
	grey below 7.7 m.								
8									
9	very stiff to hard below 9.0 m.	☒	23	11.9			22.4		
10				13.5					▽
	GRAVEL, sandy, trace silt, trace clay, dense, well graded, fine to coarse grained, wet, grey, seepage, sloughing.								
11	GLACIAL TILL, clay, silty, some sand, trace gravel, very stiff to hard, low plastic, moist, grey.								
12									

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P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-9

DRAWING NUMBER: 18907-10A

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: NE-05-38-05-W3M, NEAR MARTENSVILLE, SK

NORTHING (m): 5789330 **EASTING (m):** 385195 **ELEVATION (m):** **DATE DRILLED:** FEB 8/22

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)	DEPTH (m)
12		GLACIAL TILL, clay, silty, some sand, trace gravel, very stiff to hard, low plastic, moist, grey.	☒	24	12.3						12
13											13
14											14
15											15
16											16
17											17
18											18
19											19
20											20
21											21
22											22
23											23
24											24

NOTES:
1. Borehole sloughed to 11.0 m Immediately After Drilling.

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-10

DRAWING NUMBER: 18907-11

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: NE-05-38-05-W3M, NEAR MARTENSVILLE, SK

NORTHING (m): 5789269 **EASTING (m):** 385508 **ELEVATION (m):** 510.6 +/- 1.0 **DATE DRILLED:** FEB 8/22

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)	DEPTH (m)
0		TOPSOIL, silt and clay, black to dark brown, trace rootlets, frozen.			14.8						0
					14.3						
1		GRAVEL, some sand, some silt, trace clay, cobbles/boulders, well graded, fine to coarse grained, moist, brown, oxide stained, sloughing, frozen.			11.0					1.5	1
2		GLACIAL TILL, clay, silty, some sand, trace gravel, stiff, medium plastic, moist, brown, oxide stained, gypsum crystals.									2
3		very stiff below 3.0 m.	☒	24	11.3			22.1			3
4					11.0					3.0	4
5											5
6			☒	23	11.1						6
7					11.2					3.5	7
8											8
9											9
10											10
11											11
12											12

1. Borehole sloughed to 0.5 m Immediately After Drilling.
2. Auger refusal on cobbles/boulders from gravel layer on first drill attempt.

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 22-11

DRAWING NUMBER: 18907-12

PROJECT: PROPOSED INDUSTRIAL SUBDIVISION

LOCATION: NE-05-38-05-W3M, NEAR MARTENSVILLE, SK

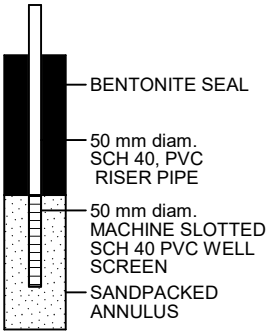
NORTHING (m): 5789125 **EASTING (m):** 385356 **ELEVATION (m):** 512.1 +/- 1.0 **DATE DRILLED:** FEB 8/22

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		TOPSOIL, silt and clay, trace gravel, black to dark brown, trace rootlets, frozen.			5.8					
1		SILT, some sand, trace gravel, trace clay, low plastic, damp, brown, oxide stained, frozen.			2.1					
2		GLACIAL TILL, silt, some clay, some sand, trace gravel, stiff, low plastic, moist, brown, oxide stained, gypsum crystals.		8	12.5			21.8		
3		very stiff below 2.0 m.			12.0					3.0

MONITORING WELL: BH22-11
ELEV.: 513.2 m



NOTES:
1. Borehole sloughed to 2.6 m Immediately After Drilling.
2. Monitoring Well dry on February 17, 2022.

APPENDIX A

Explanation of Terms on
Borehole Logs

CLASSIFICATION OF SOILS

Coarse-Grained Soils: Soils containing particles that are visible to the naked eye. They include gravels and sands and are generally referred to as cohesionless or non-cohesive soils. Coarse-grained soils are soils having more than 50 percent of the dry weight larger than particle size 0.080 mm.

Fine-Grained Soils: Soils containing particles that are not visible to the naked eye. They include silts and clays. Fine-grained soils are soils having more than 50 percent of the dry weight smaller than particle size 0.080 mm.

Organic Soils: Soils containing a high natural organic content.

Soil Classification By Particle Size

Soil Type	Particles of Size
Clay	< 0.002 mm
Silt	0.002 – 0.060 mm
Sand	0.06 – 2.0 mm
Gravel	2.0 – 60 mm
Cobbles	60 – 200 mm
Boulders	>200 mm

TERMS DESCRIBING CONSISTENCY OR CONDITION

Coarse-grained soils: Described in terms of compactness condition and are often interpreted from the results of a Standard Penetration Test (SPT). The standard penetration test is described as the number of blows, N, required to drive a 51 mm outside diameter (O.D.) split barrel sampler into the soil a distance of 0.3 m (from 0.15 m to 0.45 m) with a 63.5 kg weight having a free fall of 0.76 m.

Compactness Condition	SPT N-Index (blows per 0.3 m)
Very loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	Over 50

Fine-Grained Soils: Classified in relation to undrained shear strength.

Consistency	Undrained Shear Strength (kPa)	N Value (Approximate)	Field Identification
Very Soft	<12	0-2	Easily penetrated several centimetres by the fist.
Soft	12-25	2-4	Easily penetrated several centimetres by the thumb.
Firm	25-50	4-8	Can be penetrated several centimetres by the thumb with moderate effort.
Stiff	50-100	8-15	Readily indented by the thumb, but penetrated only with great effort.
Very Stiff	100-200	15-30	Readily indented by the thumb nail.
Hard	>200	>30	Indented with difficulty by the thumbnail.

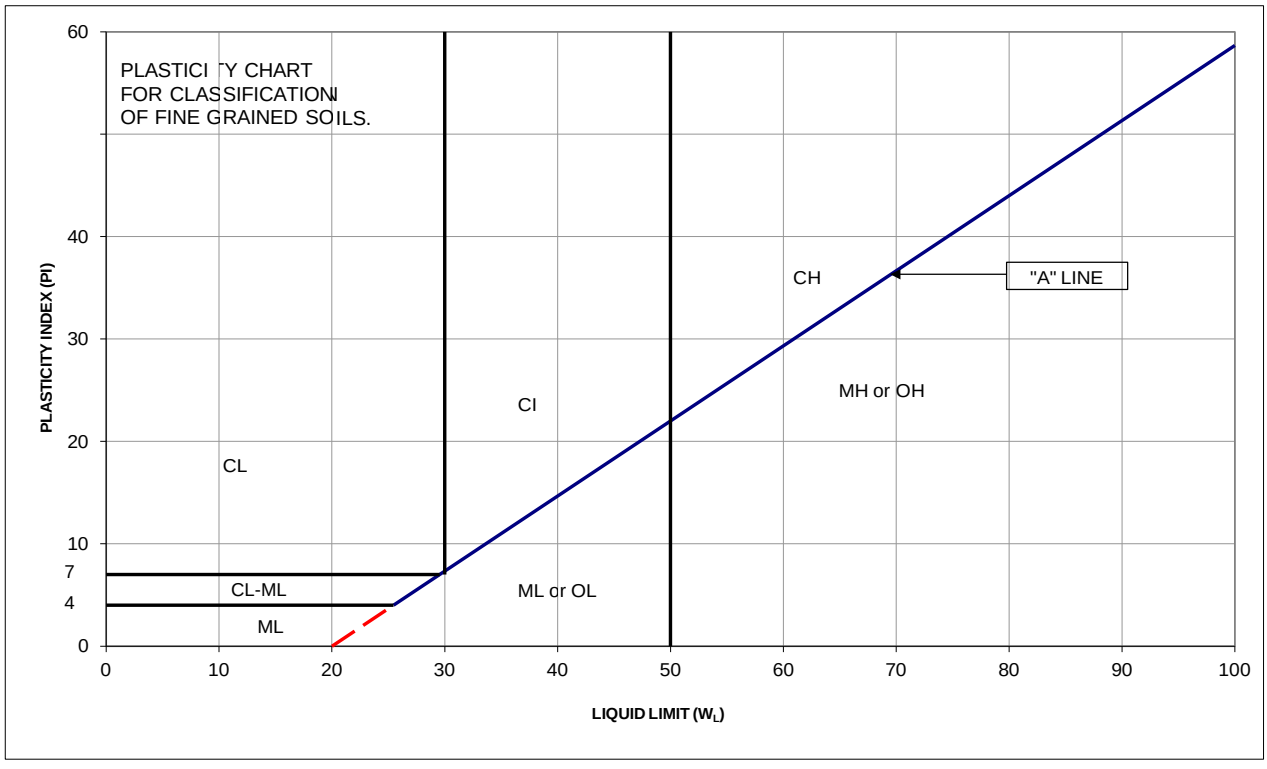
Organic Soils: Readily identified by colour, odour, spongy feel and frequently by fibrous texture.

DESCRIPTIVE TERMS COMMONLY USED TO CHARACTERIZE SOILS

Poorly Graded	- predominance of particles of one grain size.
Well Graded	- having no excess of particles in any size range with no intermediate sizes lacking.
Mottled	- marked with different coloured spots.
Nuggety	- structure consisting of small prismatic cubes.
Laminated	- structure consisting of thin layers of varying colour and texture.
Slickensided	- having inclined planes of weakness that are slick and glossy in appearance.
Fissured	- containing shrinkage cracks.
Fractured	- broken by randomly oriented interconnecting cracks in all 3 dimensions

SOIL CLASSIFICATION SYSTEM (MODIFIED U.S.C.)

MAJOR DIVISION			GROUP SYMBOL	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS	STRONG COLOUR OR ODOUR AND OFTEN FIBROUS TEXTURE
COARSE-GRAINED SOILS(MORE THAN HALF BY WEIGHT LARGER THAN NO. 200 SIEVE SIZE)	GRAVELS More than half coarse fraction larger than No. 4 sieve size	CLEAN GRAVELS	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES <5% FINES	$C_u = \frac{D_{60}}{D_{10}} > 4 \quad C_c = \frac{(D_{30})^2}{D_{60} \times D_{10}} = 1 \text{ to } 3$
			GP	POORLY-GRADED GRAVELS AND GRAVEL-SAND MIXTURES <5% FINES	NOT MEETING ALL ABOVE REQUIREMENTS FOR GW
		DIRTY GRAVELS	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES >12% FINES	ATTERBERG LIMITS BELOW "A" LINE OR PI < 4
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES >12% FINES	ATTERBERG LIMITS ABOVE "A" LINE WITH PI > 7
	SANDS More than half coarse fraction smaller than No. 4 sieve size	CLEAN SANDS	SW	WELL-GRADED SANDS, GRAVELLY SANDS MIXTURES <5% FINES	$C_u = \frac{D_{60}}{D_{10}} > 6 \quad C_c = \frac{(D_{30})^2}{D_{60} \times D_{10}} = 1 \text{ to } 3$
			SP	POORLY-GRADED SANDS OR GRAVELLY SANDS <5% FINES	NOT MEETING ALL GRADATION REQUIREMENTS FOR SW
		DIRTY SANDS	SM	SILTY SANDS, SAND-SILT MIXTURES >12% FINES	ATTERBERG LIMITS BELOW "A" LINE OR PI < 4
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES >12% FINES	ATTERBERG LIMITS ABOVE "A" LINE WITH PI >7
FINE-GRAINED SOILS (MORE THAN HALF BY WEIGHT PASSING NO. 200 SIEVE SIZE)	SILTS Below "A" line on plasticity chart; negligible organic content		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY SANDS OF SLIGHT PLASTICITY	$W_L < 50$
			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS	$W_L > 50$
	CLAYS Above 'A" line on plasticity chart; negligible organic content		CL	INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY, OR SILTY CLAYS, LEAN CLAYS	$W_L < 30$
			CI	INORGANIC CLAYS OF MEDIUM PLASTICITY, SILTY CLAYS	$W_L > 30 < 50$
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	$W_L > 50$
	ORGANIC SILTS & ORGANIC CLAYS Below "A" line on plasticity chart		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	$W_L < 50$
			OH	ORGANIC CLAYS OF HIGH PLASTICITY	$W_L > 50$

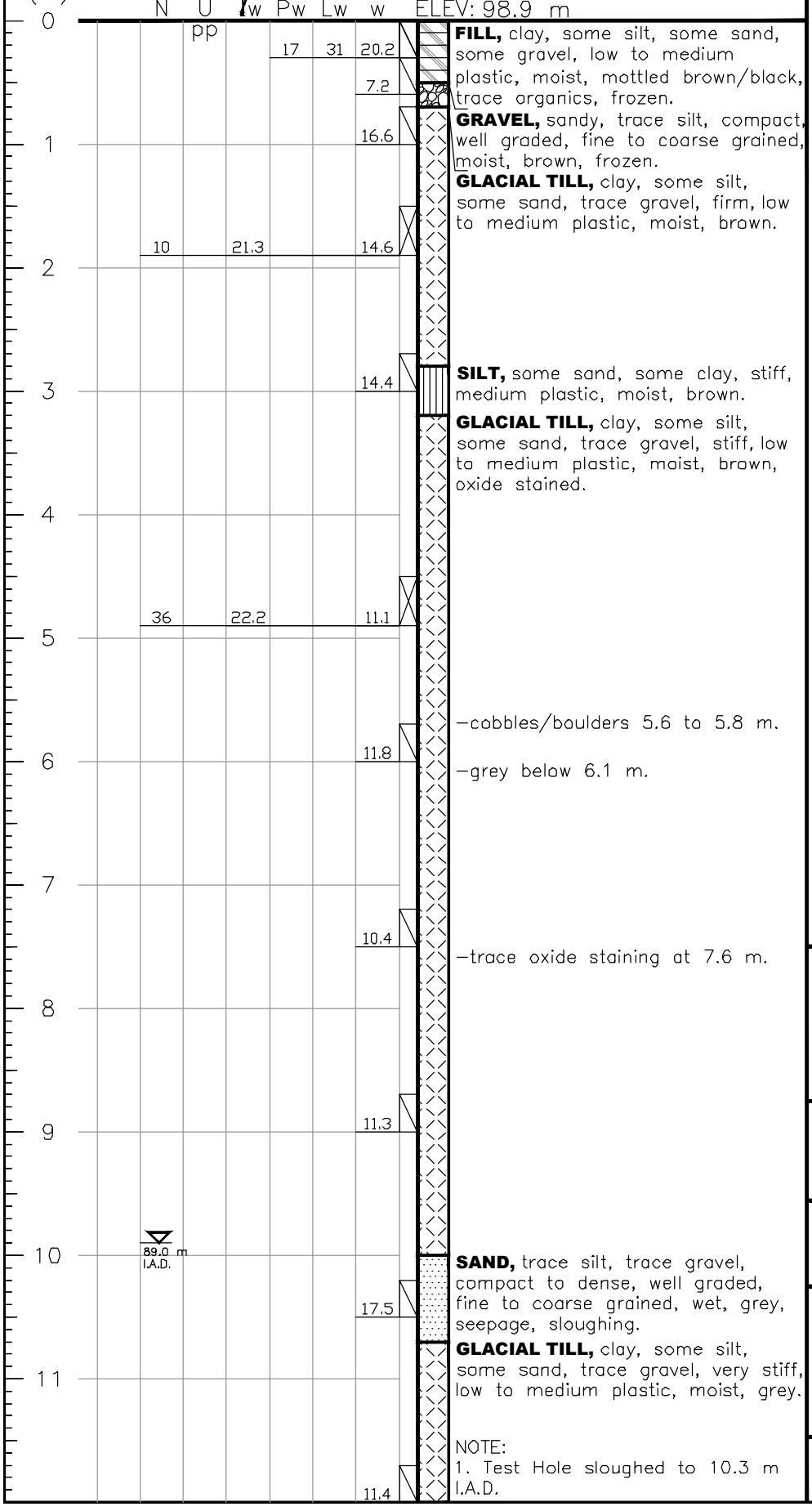


P.MACHIBRODA ENGINEERING LTD.

APPENDIX B

Test Hole Logs from
PMEL Report No. S12-8322

TEST HOLE 12-1



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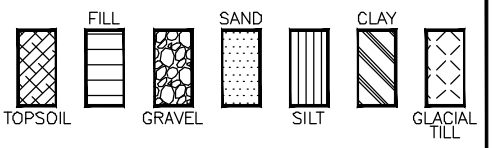


w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw...LIQUID LIMIT

Pw...PLASTIC LIMIT

γ_w...WET UNIT WEIGHT (kN/m^3)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

pp...POCKET PENETROMETER (kg/cm^2)

N.....STANDARD PENETRATION TEST (ROPE–CATHEAD & DONUT HAMMER) (50/125 = BLOWS/SAMPLER PENETRATION [mm])

SO_4 .....SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)

P200...% PASSING No. 200 SIEVE

I.A.D.....IMMEDIATELY AFTER DRILLING

▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)

▼...RECORDED WATER LEVEL (PIEZO)

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:

PROPOSED BUILDING

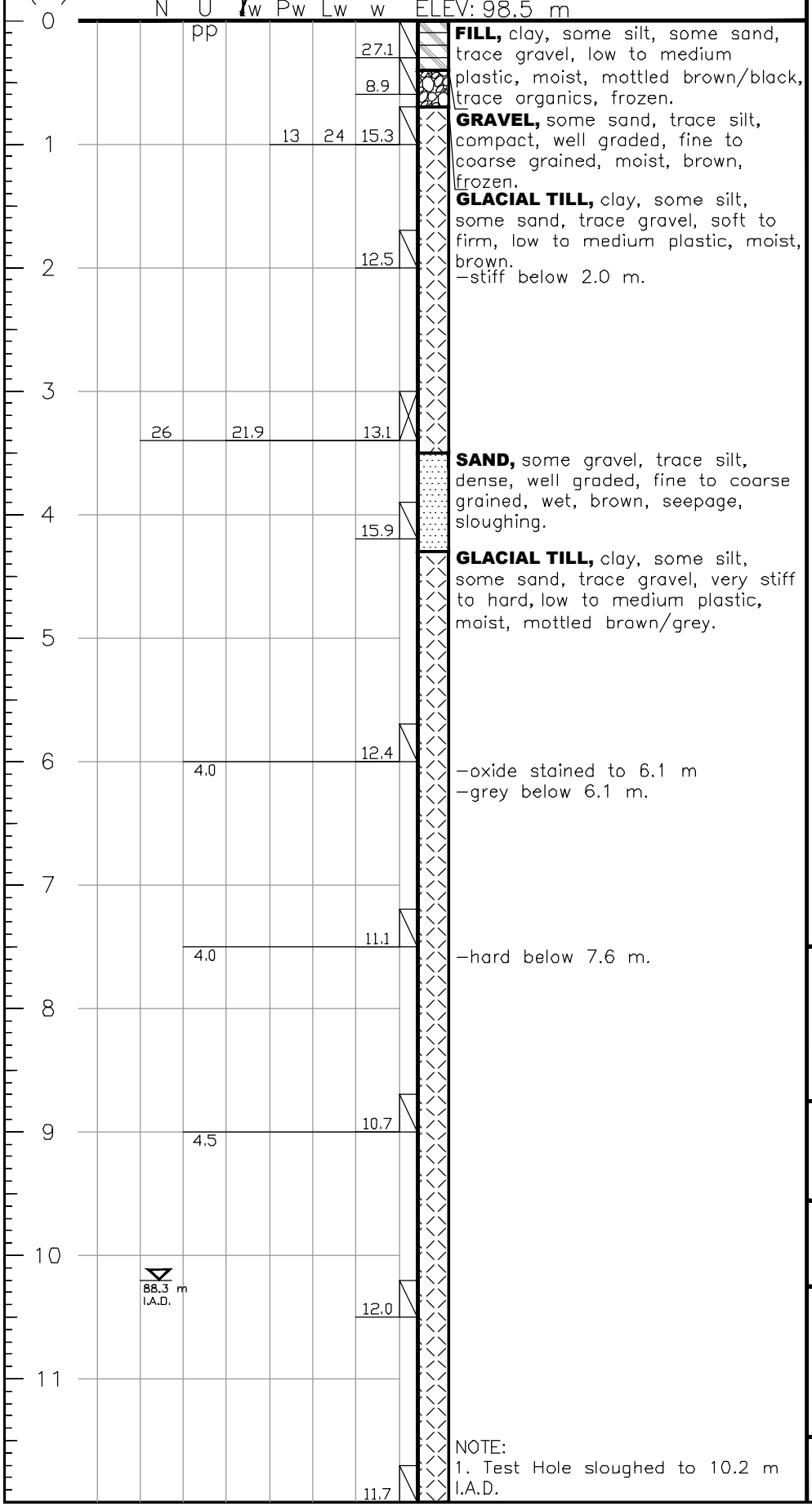
LOCATION:

NE1/4-5-38-5-W3M
NEAR SASKATOON, SK

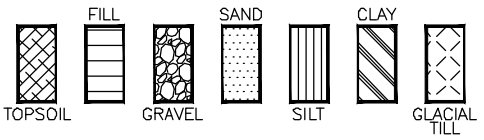
NORTHING: 5789555 **EASTING:** 385700

DATE DRILLED:	DRAWING NUMBER:
DEC 11/12	S12-8322-2

TEST HOLE 12-2



LEGEND:



w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw...LIQUID LIMIT

Pw...PLASTIC LIMIT

γ_w...WET UNIT WEIGHT (kN/m^3)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

pp...POCKET PENETROMETER (kg/cm^2)

N.....STANDARD PENETRATION TEST (ROPE–CATHEAD & DONUT HAMMER) (50/125 = BLOWS/SAMPLER PENETRATION [mm])

SO_4 .....SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)

P200...% PASSING No. 200 SIEVE

I.A.D.....IMMEDIATELY AFTER DRILLING

▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)

▼...RECORDED WATER LEVEL (PIEZO)

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:

PROPOSED BUILDING

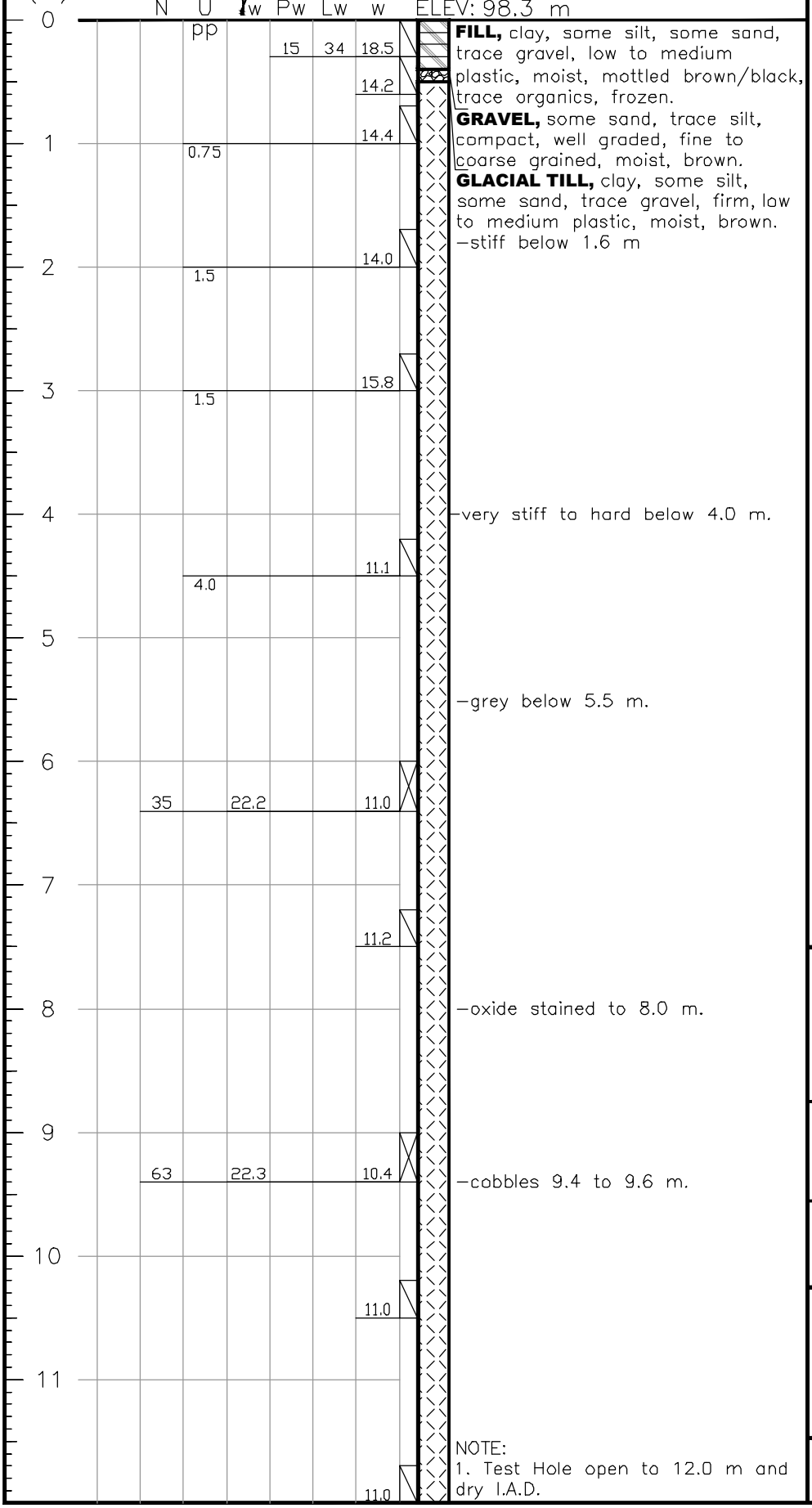
LOCATION:

NE1/4-5-38-5-W3M
NEAR SASKATOON, SK

NORTHING: 5789527 **EASTING:** 385698

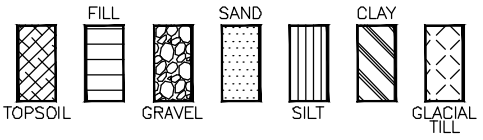
DATE DRILLED:	DRAWING NUMBER:
DEC 12/12	S12-8322-3

TEST HOLE 12-3



NOTE:
1. Test Hole open to 12.0 m and dry I.A.D.

LEGEND:



w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw...LIQUID LIMIT

Pw...PLASTIC LIMIT

γ_w...WET UNIT WEIGHT (kN/m^3)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

pp...POCKET PENETROMETER (kg/cm^2)

N.....STANDARD PENETRATION TEST (ROPE–CATHEAD & DONUT HAMMER) (50/125 = BLOWS/SAMPLER PENETRATION [mm])

SO_4 .....SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)

P200...% PASSING No. 200 SIEVE

I.A.D.....IMMEDIATELY AFTER DRILLING

▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)

▼...RECORDED WATER LEVEL (PIEZO)

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:

PROPOSED BUILDING

LOCATION:

NE1/4-5-38-5-W3M
NEAR SASKATOON, SK

NORTHING: 5789499 **EASTING:** 385707

DATE DRILLED:	DRAWING NUMBER:
DEC 11/12	S12-8322-4

APPENDIX C

Grain Size Distribution
Test Results

P.MACHIBRODA ENGINEERING LTD.

ASTM C136: GRAIN SIZE ANALYSIS

Project: Proposed Industrial Subdivision

Location: NE 5-38-5 W3M, Near Martensville, SK

Project No.: 18907

Date Tested: February 11, 2022

Borehole No: 22-3

Sample No.: 23

Depth (m): 0.8

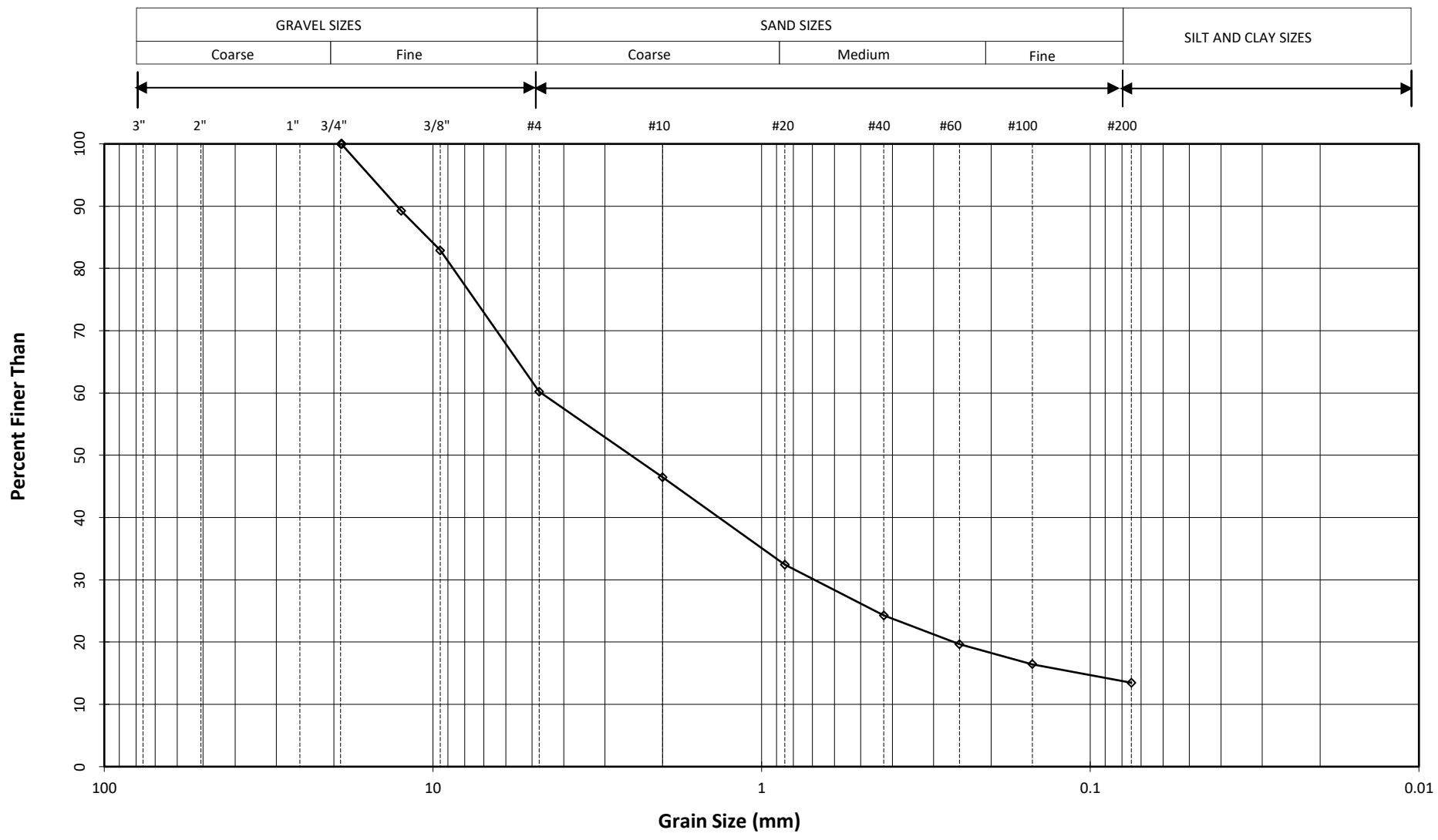
Sieve Analysis:

Sieve	Diameter mm	% Finer
	76.200	100
	63.500	100
	50.000	100
	37.500	100
	25.000	100
	19.000	100
	12.500	89
	9.500	83
	4.750	60
	2.000	46
	0.850	32
	0.425	24
	0.250	20
	0.150	16
	0.075	13

Material Description:

% Gravel Sizes	% Sand Sizes	% Silt and Clay Sizes
40	46	14

Remarks:



CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

DRAWING NUMBER

Appendix C-1

WE CERTIFY TESTING PROCEDURES ARE IN ACCORDANCE WITH ASTM C136 AND C117 CSTANDARDS
P. MACHIBRODA ENGINEERING LTD.

PER Preston Schergevitch

P.MACHIBRODA ENGINEERING LTD.

AASHTO T 88: PARTICLE SIZE ANALYSIS OF SOILS

Project: Proposed Industrial Subdivision

Location: NE 5-38-5 W3M Near Martensville, SK

Project No.: 18907

Date Tested: February 18, 2022

Test Hole No.: 22-6

Sample No.: 48

Depth (m): 1.5-1.9

Sieve Analysis:

Sieve	Diameter mm	% Finer
1.5"	38.1	100
1"	25.4	94
3/4"	19.1	80
1/2"	12.7	76
3/8"	9.5	72
# 4	4.75	67
# 10	2	60
# 20	0.85	46
# 40	0.425	38.3
#60	0.25	31.4
# 100	0.15	25.1
# 200	0.075	20.6

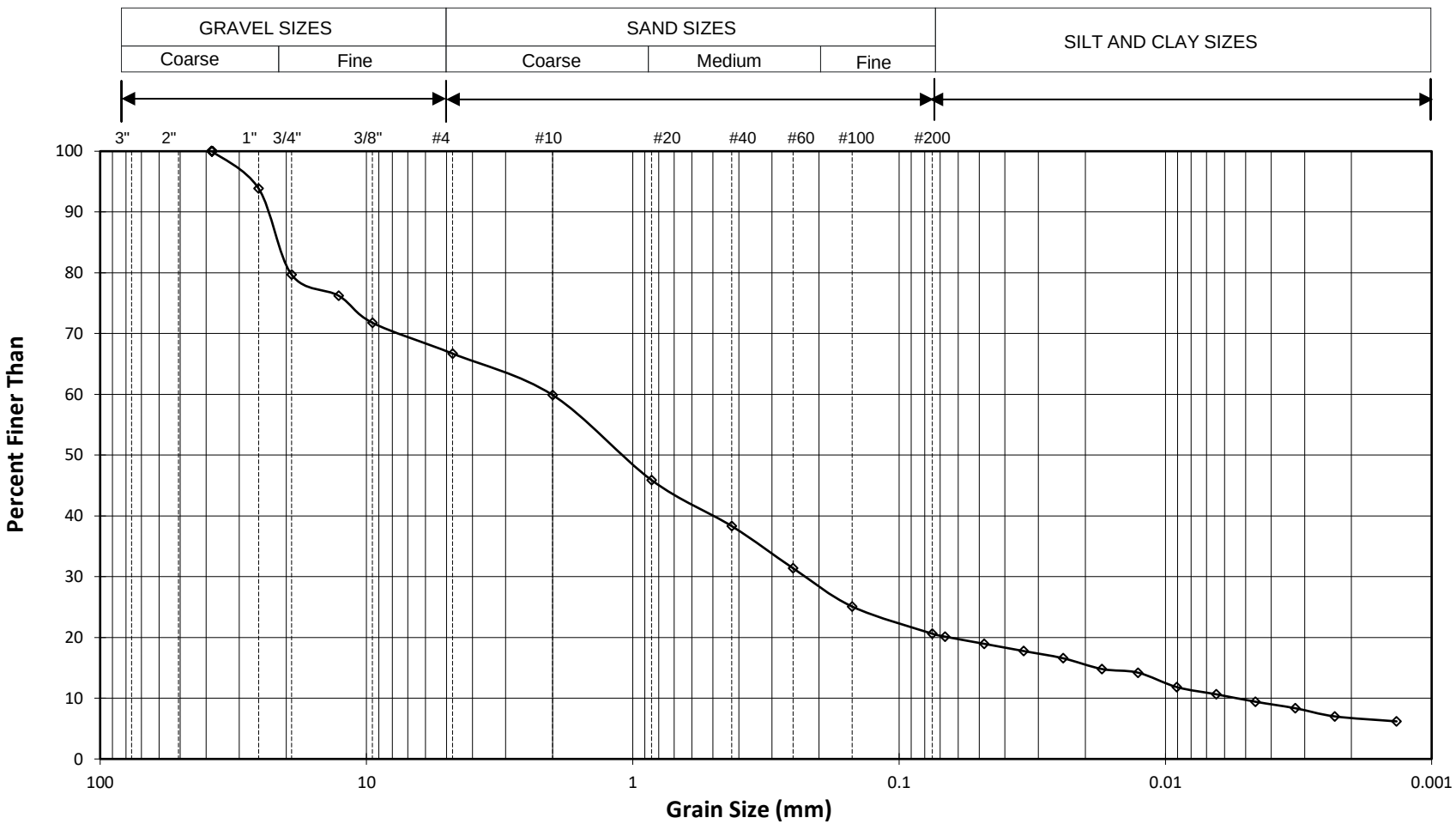
Hydrometer Analysis:

	Diameter mm	% Finer
Dispersing Agent:	0.0672	20.1
Sodium Hexametaphosphate	0.0478	18.9
	0.0340	17.8
	0.0242	16.6
	0.0173	14.8
	0.0127	14.2
	0.0091	11.8
	0.0064	10.6
	0.0046	9.4
	0.0033	8.3
	0.0023	7.0
	0.0014	6.2

Material Description:

% Gravel Sizes	% Sand Sizes	% Silt Sizes	% Clay Sizes
33	46	14	7

Remarks:



CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Drawing No.

Appendix C-2

WE CERTIFY TESTING PROCEDURES ARE IN ACCORDANCE WITH AASHTO T 88 STANDARD

P. MACHIBRODA ENGINEERING LTD.

PER Preston Schergevitch

P.MACHIBRODA ENGINEERING LTD.

ASTM C136: GRAIN SIZE ANALYSIS

Project: Proposed Industrial Subdivision

Location: NE 5-38-5 W3M, Near Martensville, SK

Project No.: 18907

Date Tested: February 11, 2022

Borehole No: 22-10

Sample No.: 75

Depth (m): 0.3

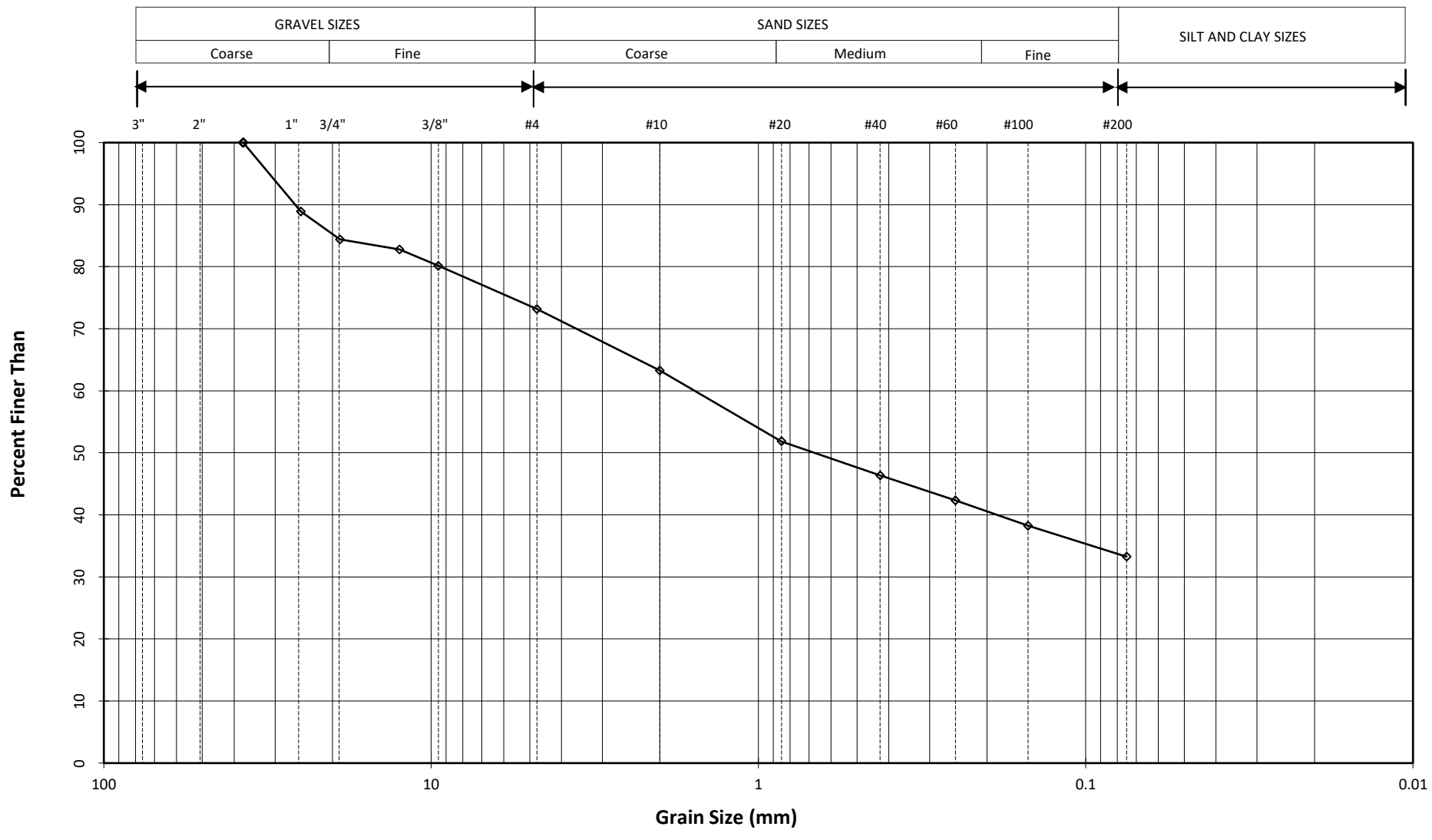
Sieve Analysis:

Sieve	Diameter mm	% Finer
	76.200	100
	63.500	100
	50.000	100
	37.500	100
	25.000	89
	19.000	84
	12.500	83
	9.500	80
	4.750	73
	2.000	63
	0.850	52
	0.425	46
	0.250	42
	0.150	38
	0.075	33

Material Description:

% Gravel Sizes	% Sand Sizes	% Silt and Clay Sizes
27	40	33

Remarks:



CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

DRAWING NUMBER

Appendix C-3

WE CERTIFY TESTING PROCEDURES ARE IN ACCORDANCE WITH ASTM C136 AND C117 CSTANDARDS
P. MACHIBRODA ENGINEERING LTD.

PER Preston Schergevitch

Appendix C - General Correspondence

PO Box 160
Bay # 8 - 301 Centennial Drive N
Martensville, SK
S0K 2T0

2023-08-27

Associated Engineering
Bill Delaney

Re: **Potable Water Supply to** Western Business Park

IWI has the resources to provide potable water for:

1. PCL B SE 8-38-5-W3: 207,000 gal/month
2. NE 5-38-5-W3: 358,000 gal / month
3. The connection will connect to the existing potable water line running past the front of the properties.

An application to Sask Water for approval has been made. Additional allocation is **not** required. Associated Engineering has included this demand in the recent water model validations and flow rates are within allowances.

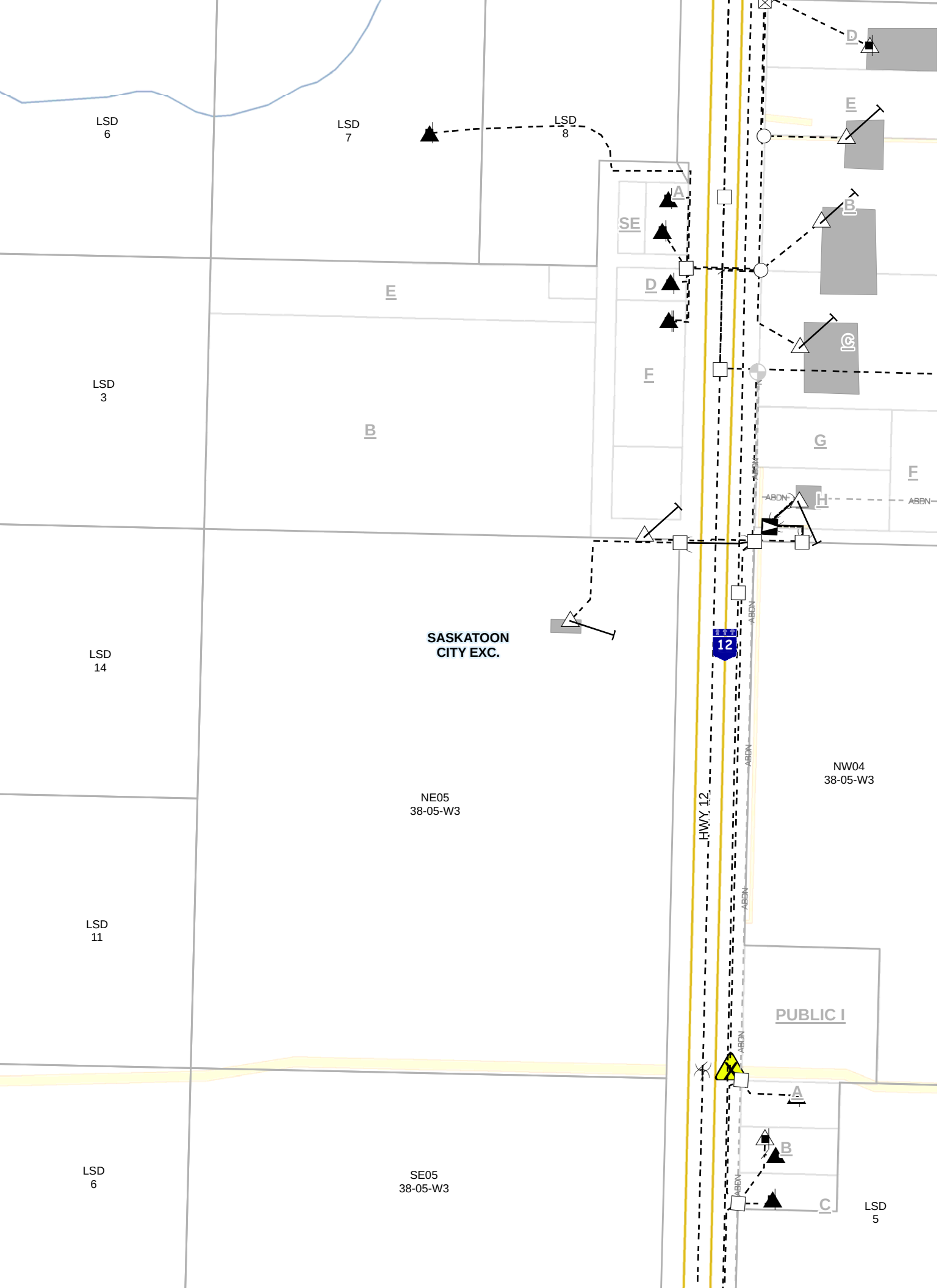
A main supply connection will be provided to each area. The water supplied will be a low-pressure line requiring on site storage for each individual end-user connection as a reservoir. Initial flow restrictors per individual connection are 1 US Gal /minute and are changed depending on the maximum water requested.

Fire fighting needs are NOT allowed.

Sincerely,

Geoffrey Booth
Administrator

(306) 227-9658


LSD
6
LSD
7
LSD
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SE
A
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C
ABDN
LSD
3
LSD
14
LSD
11
LSD
6
LSD
5
SASKATOON
CITY EXC.
12
HWY 12
NE05
38-05-W3
NW04
38-05-W3
SE05
38-05-W3
PUBLIC I

Ministry of Highways
Operation & Maintenance – Central
18, 3603 Millar Avenue
Saskatoon, Canada S7P 0B2

August 22, 2022

Our File: C.S. 12-01 Sub
Municipal File: R1016-21S

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

Re: Proposed Subdivision
R.M. of Corman Park No. 344,
NE 1/4 05-38-05-W3M
Intended Use: Agricultural

The Ministry of Highways has reviewed the above mentioned subdivision proposal. Our Ministry has no objections providing the following conditions are met:

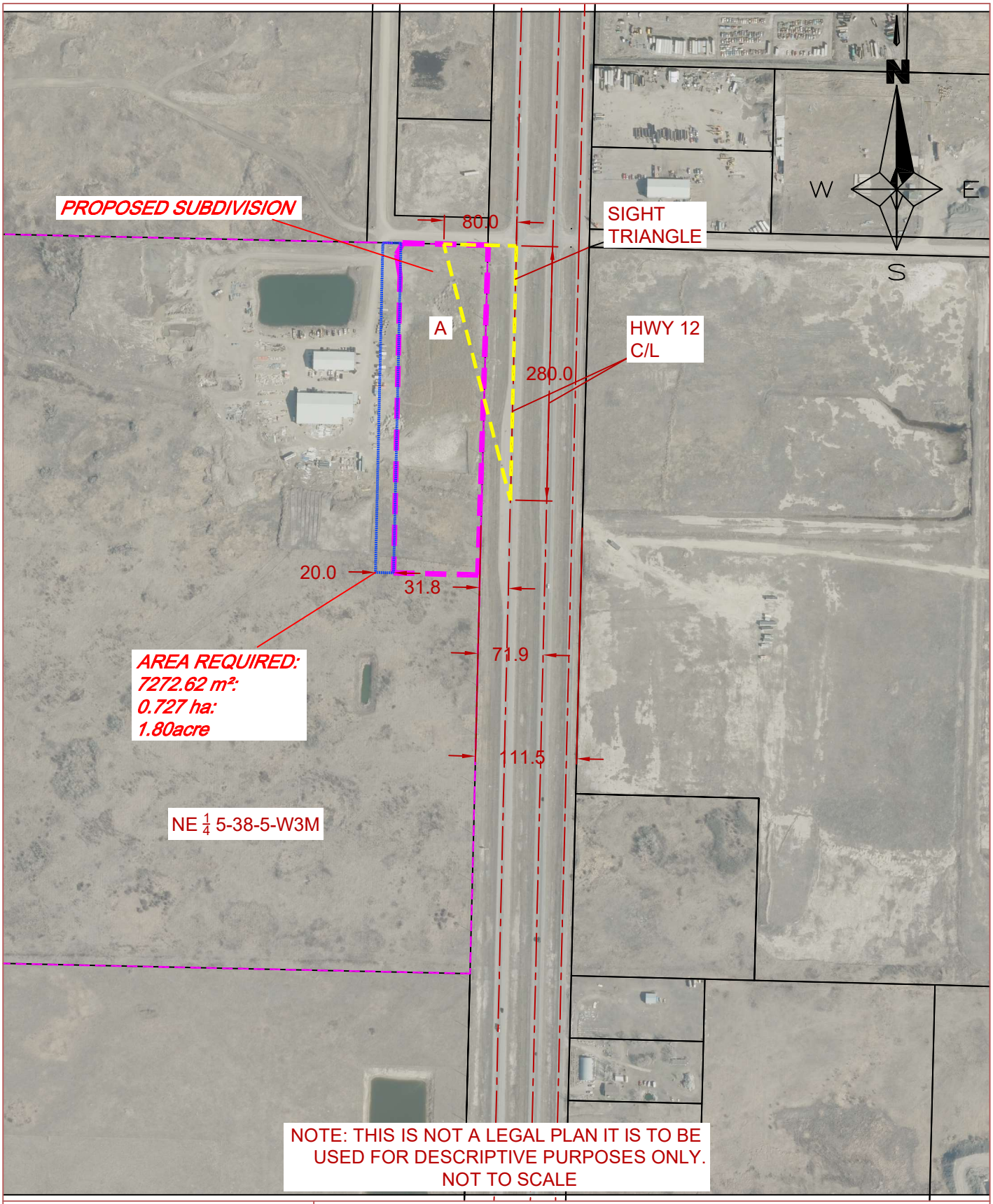
1. Any permanent development within 90 metres of the highway right-of-way requires a permit from this Ministry. Minimum setback from the existing roadway centreline is 60 metres for homes and 55 metres for trees, shrubs, granaries, commercial development, etc.
2. No new access to Highway 12 will be permitted. Access to the proposed subdivision shall be via the existing municipal road or the new service road. The existing access to Highway 12 will be removed when improvements are made to the Highway, at that time access shall be provided.
3. No development within a triangle formed by measuring the following distances from the intersection of the roadway centrelines and joining the points so obtained:

   290metres (951 feet) along the highway centreline;
   80 metres (263 feet) along the centreline of the intersecting grid road.
4. Section 184 of The Planning and Development Act, 2007, provides that where a proposed subdivision abuts a provincial highway which is designed for future widening the design shall make provision for dedicating title for such land as required by the approving authority for highway widening.

Please quote both file numbers on return correspondence.

Jennifer Fertuck, P. Eng.
Director, Traffic Engineering and Development
Central Region

Ministry Contact: Jackie Diener



Saskatchewan

PROPOSED SUBDIVISION

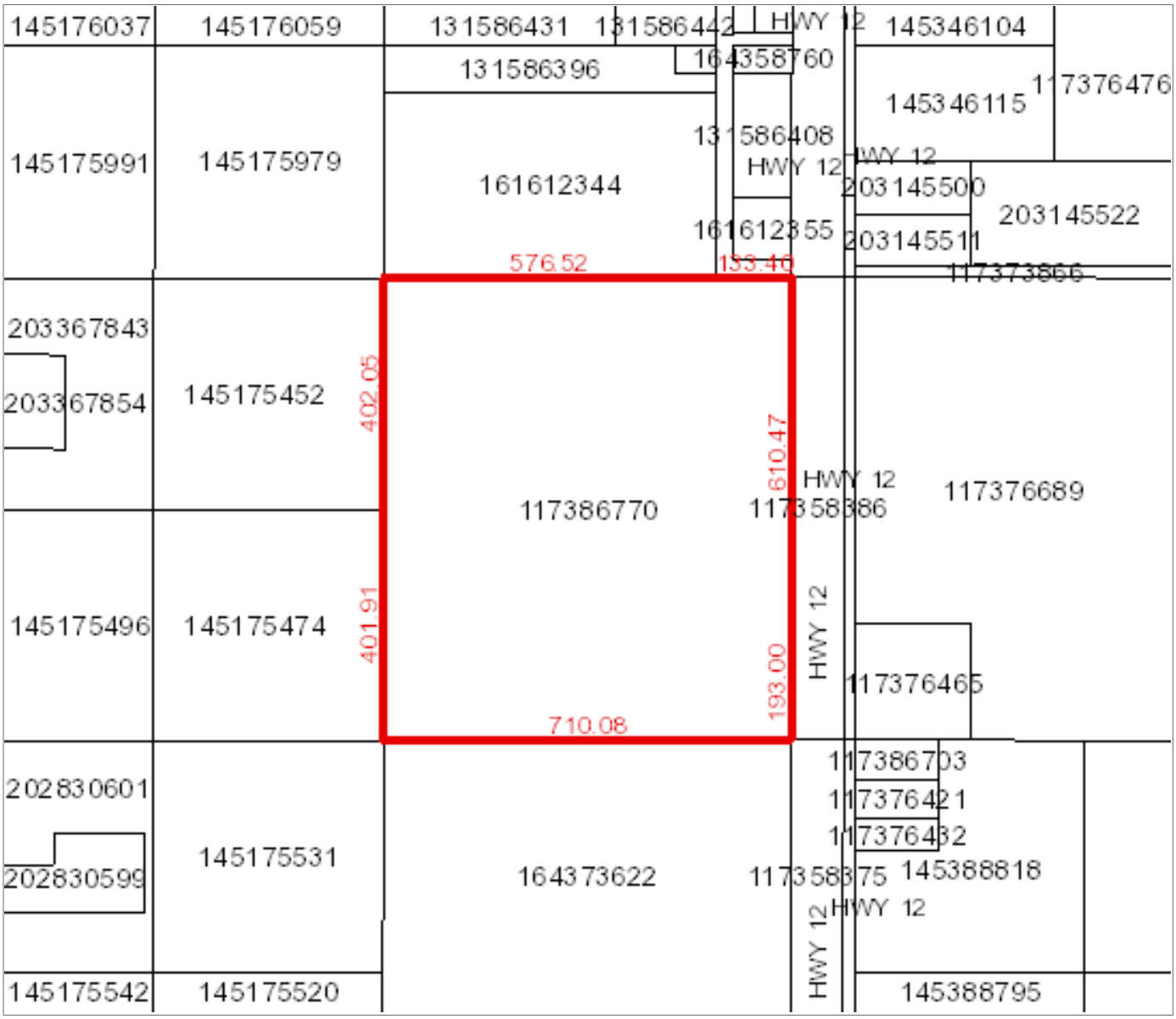
HWY #12
NE 1/4 05-38-05-W3M

DRAWN BY	J.DIENER	DATE	2022/08/22	CS	12-01	TAB NO	A4-SUBDIV
DESIGNED BY		DATE		CONTRACT		SHEET	1 OF 1

ACAD DWG:
LAST REV DATE: YY/MM/DD

Surface Parcel Number: 117386770

REQUEST DATE: Tue Jul 26 13:31:43 GMT-06:00 2022



Owner Name(s) : Friesen, Fred, Nienhuis, Anthony

Municipality : RM OF CORMAN PARK NO. 344

Area : 57.063 hectares (141.01 acres)

Title Number(s) : 147692199

Converted Title Number : 89S19016

Parcel Class : Parcel (Generic)

Ownership Share : 1:1

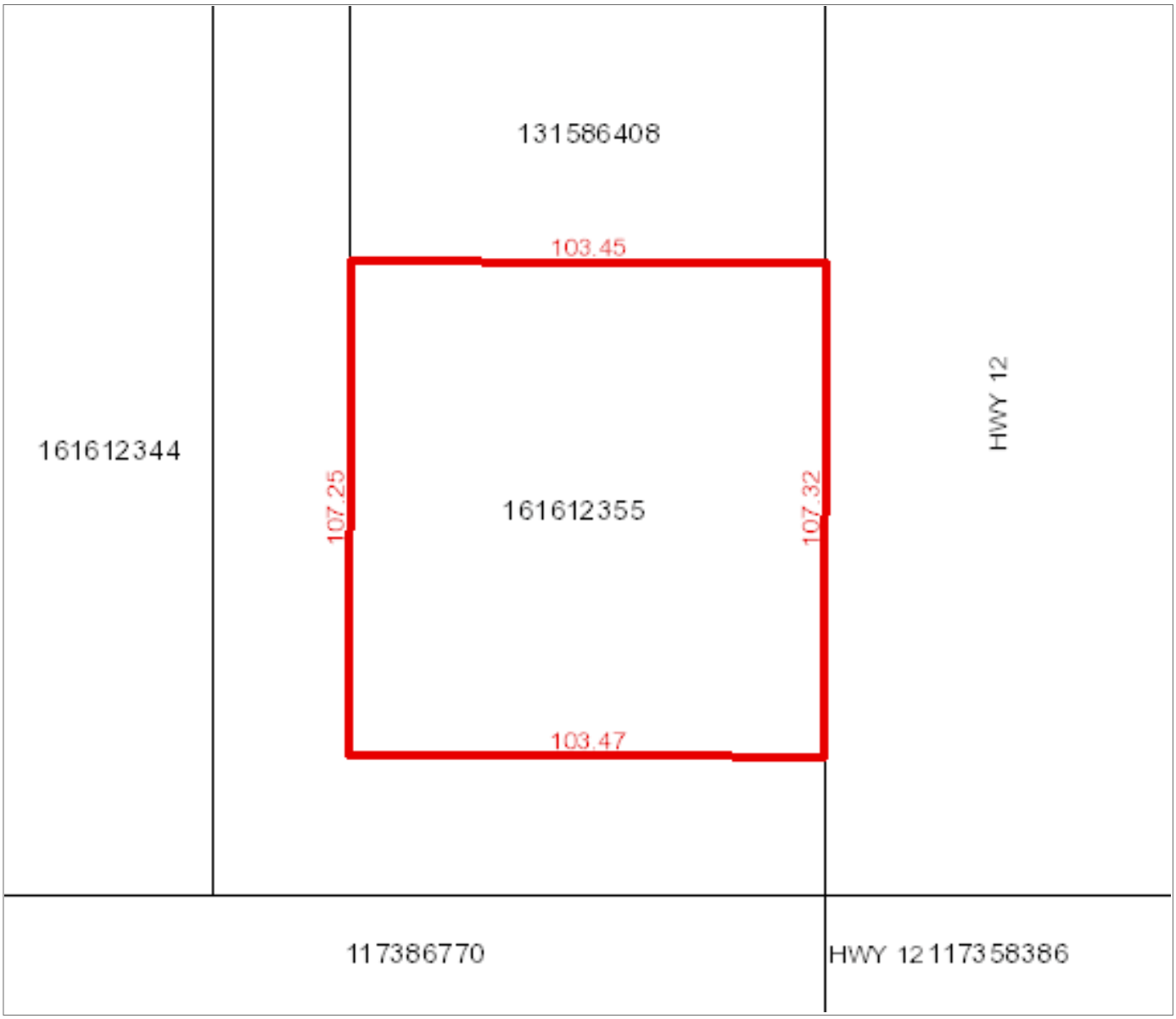
Land Description : NE 05-38-05-3 Ext 0

Source Quarter Section : NE-05-38-05-3

Commodity/Unit : Not Applicable

Surface Parcel Number: 161612355

REQUEST DATE: Tue Jul 26 13:31:00 GMT-06:00 2022



Owner Name(s) : OVERPASS FARMS INC.

Municipality : RM OF CORMAN PARK NO. 344

Area : 1.11 hectares (2.74 acres)

Title Number(s) : 154826758

Converted Title Number : 91S07829

Parcel Class : Parcel (Generic)

Ownership Share : 1:1

Land Description : Blk/Par B-Plan 62S03803 Ext 2

Source Quarter Section : SE-08-38-05-3

Commodity/Unit : Not Applicable

Ministry of Government Relations

MINISTRY OF GOVERNMENT RELATIONS
DEC 09 2021
Received by Community Planning

Application to Subdivide Land

R1016-21S R-S.

1. Location of Land to be Subdivided:

RM of Corman Park #344
Municipality (City, Town, Village, RM)

NE 1/4 Sec. 5 Twp. 38 Rge. 5 Mer. 3

Lot(s) _____ Block(s) _____ Plan/Parcel No. 117386770

2. The Proposed Subdivision involves:

- ◉ Plan of Proposed Subdivision
- ○ Parcel Tie Removal (describe and include parcel pictures)
- ○ Other Subdividing Instrument (lease, easement)

3. Legal and Physical Access to the Subdivision is via: ○ Paved ◉ Gravel ○ Unimproved

- ☒ Grid Road
- ☐ Highway
- ☐ Resource Road
- ☐ Northern Crown Land
- ☐ Main Farm Access
- ☐ Urban Street
- ☐ Road Allowance
- ☐ Trail

4. Physical Nature of the Land to be Subdivided:

a) What is the physical nature of the proposed lot(s) or parcel(s)?

☐ Wooded/Treed ☐ Cultivated ☐ Pasture ☐ Hilly ☒ Level/Flat ☐ Low/Swampy ☐ Adjacent to a Lake, River, or Creek

Describe the physical nature in more detail: Previous mined gravel pit, filled and graded.

b) Drainage:
How will the proposed lot(s) or parcel(s) be drained?

☐ Natural ☒ Ditches ☐ Curb and Gutter ☐ Storm Sewer

Do you propose to discharge surface water into a highway ditch or waterway? ☐ Yes ☒ No

Show drainage courses on the Plan of Proposed Subdivision.

5. Land Use:

a) What is the land presently used for?

☒ Agriculture ☐ Residential ☐ Seasonal Recreation (Cottage) ☐ Commercial ☐ Industrial ☐ Other

Describe the present land use in more detail: Ag Commercial - discretionary use

b) What is the **intended** use of the proposed lot(s) or parcel(s)?

☐ Agriculture ☐ Residential ☐ Seasonal Recreation (Cottage) ☒ Commercial ☐ Industrial ☐ Other

Describe the intended use in more detail: Light Commercial - warehouse space

c) Are there any buildings on the land being subdivided? ☐ Yes ☒ No

Indicate the location, distance from the property boundary and use of all buildings and utility lines on the Plan of Proposed Subdivision/ Parcel Picture.

6. **Services:**

a) Water Supply is: ☒ Existing ☐ Proposed ☐ Not Required

☒ Communal System ☐ Cistern ☐ Lake / Waterbody

☐ Municipal Well ☐ Private Well ☐ Other

Describe / specify proposed water source: Intervalley Water

b) Sewage Disposal is: ☐ Existing ☒ Proposed ☐ Not Required

☐ Municipal ☐ Private-On-site (please specify below)

☐ Mound ☐ Chamber ☒ Holding Tank

☐ Jet Type ☐ Absorption Field ☐ Other

Describe / specify proposed sewage disposal system: Holding tank

Please show all set back distances from the property boundary, house, well and water course(s) on the plan of proposed subdivision.

7. **Utility Services:**

Electrical Power is:	☐ Existing	☒ Proposed	☐ Not Required	☐ Not Available
Telephone service is:	☐ Existing	☒ Proposed	☐ Not Required	☐ Not Available
Natural Gas is:	☐ Existing	☒ Proposed	☐ Not Required	☐ Not Available

8. **Surrounding Land Uses:**

If the proposed subdivision is in a Rural Municipality, are any of the following within 5 km; or
If in an Urban Municipality, are any of the following within 500 m? Check all that apply.

	If checked, please state distance
☐ Airport	
☐ Intensive Livestock Operation	
☐ Sewage Treatment Facility or Sewage Lagoon	
☑ Landfill for disposal of garbage or refuse	4 km
☑ High Voltage Power Transmission Line	2 km
☑ High Pressure Gas Transmission Line, Oil Line (specify)	1 km
☑ Industrial Commercial Operation (specify) local businesses	.3 km
☐ National, Provincial, or Regional Park	
☐ Residential Lot(s)	
☐ Water Body or Course	
☐ Cemetery	
☐ School Bus Route	
☐ Urban Municipality	
☐ Water Treatment Plant or Reservoir	
☐ Other (specify)	

9. **Additional Comments:**

10. **Other Requirements:**

1. Applications must include a copy of the title to the land being subdivided and the Basic Fees. Also include any relevant permits or approvals obtained from other agencies or a municipality.
2. Basic Fees are $300 per proposed lot (non-refundable) plus $150 for a issuance of a Certificate of Approval. The fees are exempt from GST & PST. Make a cheque or money order payable to the Minister of Finance.
3. Applicants may be asked for additional fees and information if found to be needed during the review of an application.
4. Until the review of an application is done and a decision is issued, no binding contracts for the land should be made and no construction or site preparation work should be started.
5. Personal information given on this form is collected pursuant to The Freedom of Information and Protection of Privacy Act and will be shared with other agencies involved in reviewing subdivision applications. If you do not want your personal information to be shared, contact the Community Planning Branch to discuss your concerns before submitting a completed form.

11. **Applicant(s):** *(persons making the application and to whom correspondence should be addressed)*

a) Name of registered owner of land to be subdivided:

Name: Anthony Nienhuis and Fred Friesen

Address: Box 111 RR 4

City/Town/Village: Saskatoon

Prov.: Saskatchewan Postal Code: S7K 3J7

Email: nienhuis@sasktel.net Tel.: 306-221-1598

b) Land Surveyor / Planner / Lawyer /Agent (specify):

Name: Brad J. Luey Company Name: Webb Surveys

Address: 222 Jessop Avenue

City/Town/Village: Saskatoon

Prov.: Saskatchewan Postal Code: S7N 1Y4

Email: BLuey@midwestsurveys.com Tel.: 306-955-5330

TParker@midwestsurveys.com

c) Declaration by registered owner:

I, Anthony Nienhuis Fred Friesen hereby certify that I
(Full name in block capitals)

✓ am the registered owner of the land proposed for subdivision.

___ am authorized, in writing, to act as the registered owner per Sections 2(b.2) and 5(3) of The Subdivision Regulations.

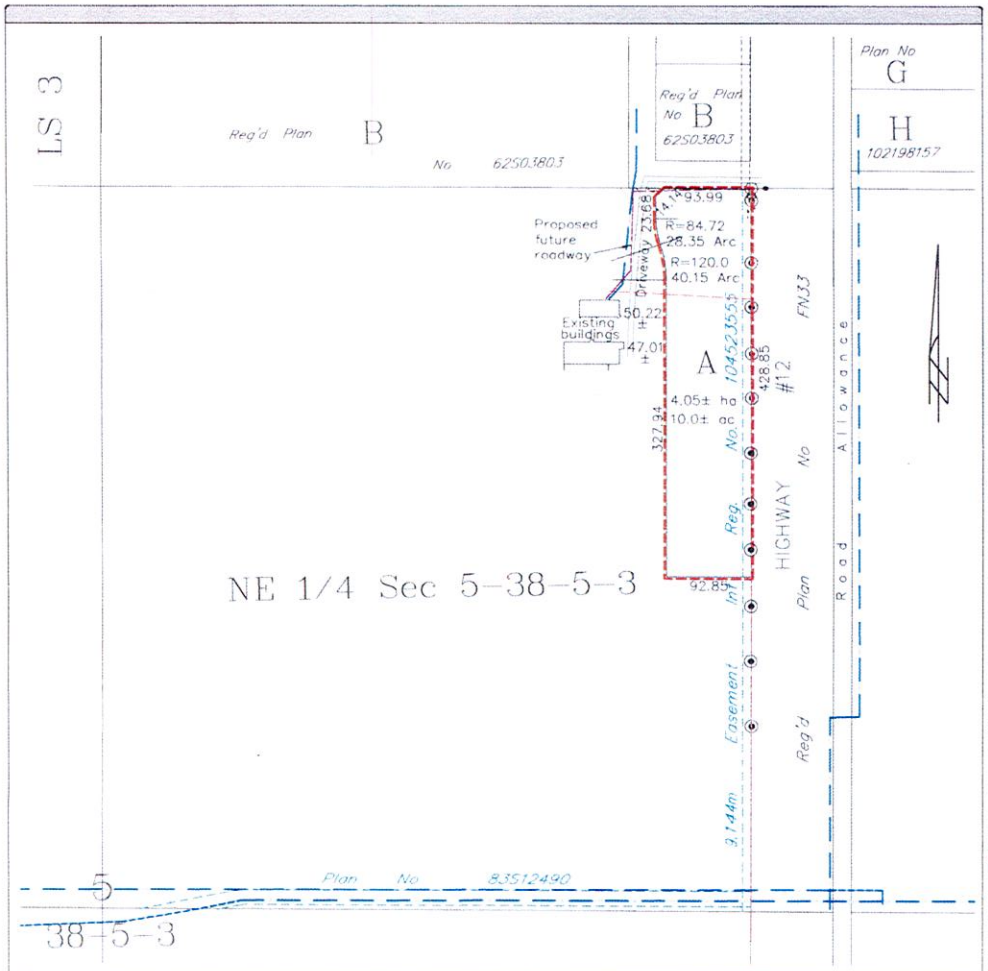
I hereby swear that all statements contained with this application are true, and I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath, and by virtue of the Canada Evidence Act.

Signature: Date: Dec 2/2021

Name: Webb Surveys Address: 222 Jessop Avenue

City/Town/Village: Saskatoon Prov.: SK Postal Code: S7N1Y4 Tel: 306-955-5330

Replies are to be sent to (please specify): ☐ a ■ b ☐ c



COMMUNITY PLANNING

OWNER

Registered Owner dd/mm/yy
The signature above indicates that I (we) approve the Plan of Proposed Subdivision as presented

PLAN SHOWING

PLAN OF PROPOSED SUBDIVISION

OF PART OF

NE1/4 SEC 5, TWP 38, RGE 5, W3 Mer

IN THE

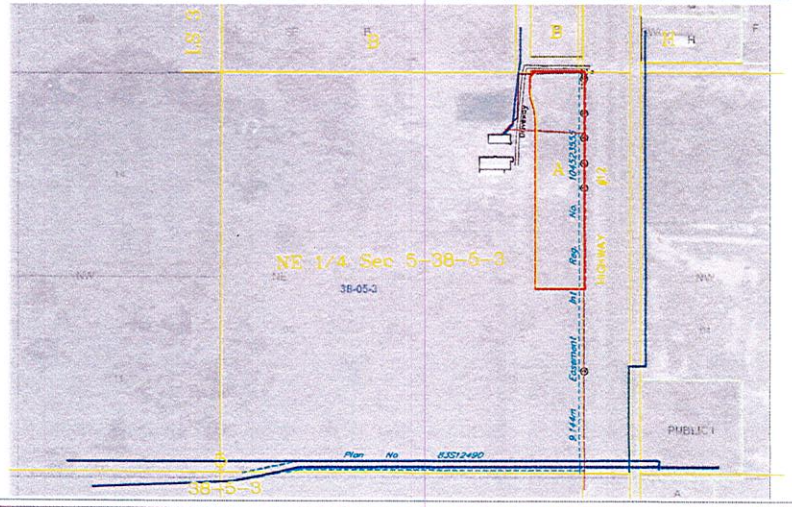
R.M. OF CORMAN PARK No. 344

SASKATCHEWAN

2021

SCALE = 1: 5000

KEY PLAN



NOTES

- MEASUREMENTS ARE IN METRES AND DECIMALS THEREOF.
- SOME MEASUREMENTS ARE APPROXIMATE AND MAY DIFFER FROM THE FINAL PLAN OF SURVEY BY AS MUCH AS 5 METRES.
- PORTION TO BE APPROVED IS OUTLINED WITH A BOLD DASHED LINE AND CONTAINS 4.05± ha (10.0± ac)

Buried Gas Line
Buried Electrical Line
Buried Phone Line
Power pole & anchor

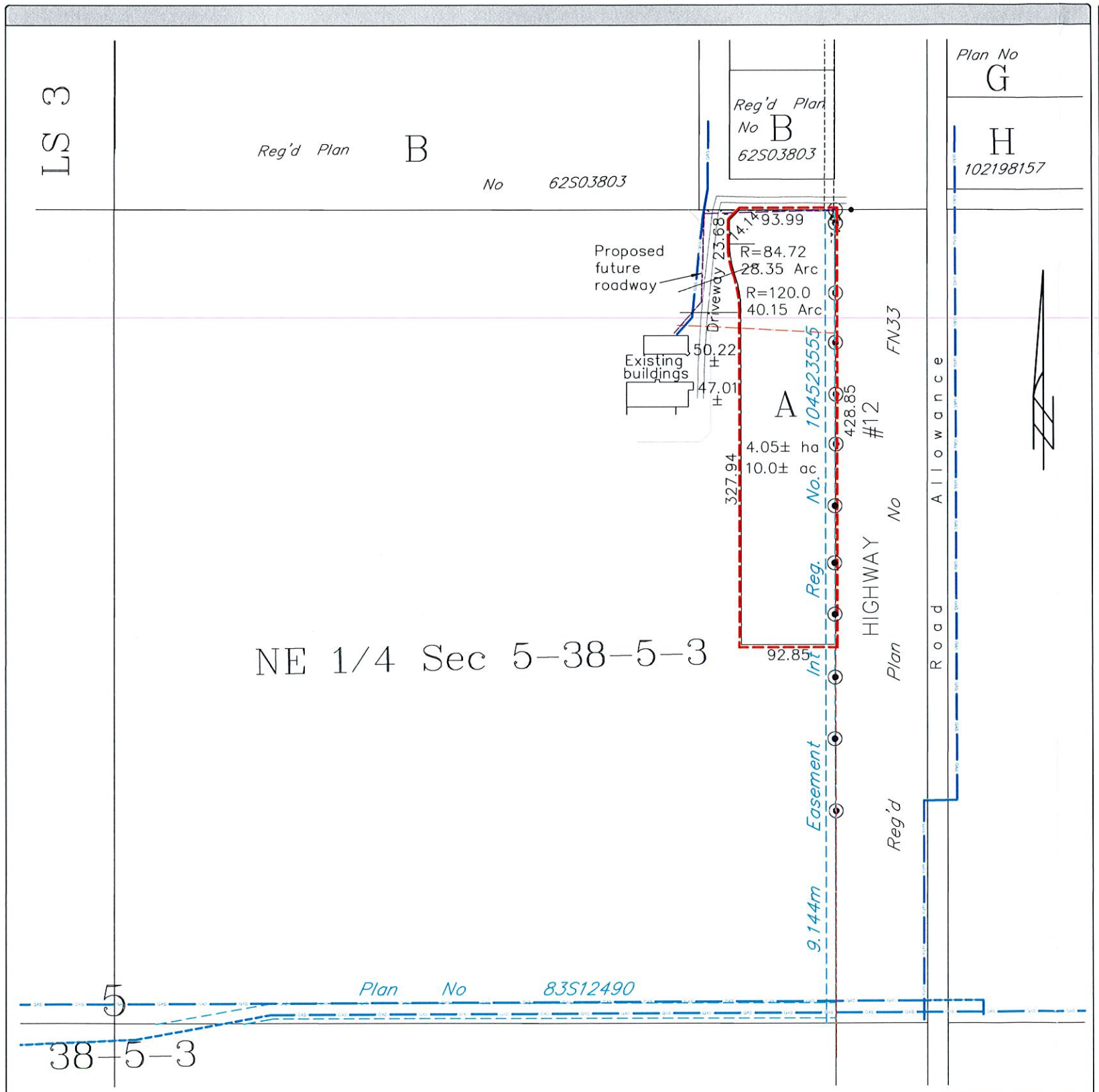
SURVEYORS CERTIFICATION

December 2, 2021
Date

Saskatchewan Land Surveyor

Pebb Surveys
A division of Midwest Surveys Inc
222 JESSOP AVE
SASKATOON, SK
S7N 1Y4
TEL 306-955-5330

DATE	REVISION / ISSUED	JOB No
30/11/2021		SC-0241-21



PLAN SHOWING

PLAN OF PROPOSED SUBDIVISION

OF PART OF

NE1/4 SEC 5, TWP 38, RGE 5, W3 Mer

IN THE

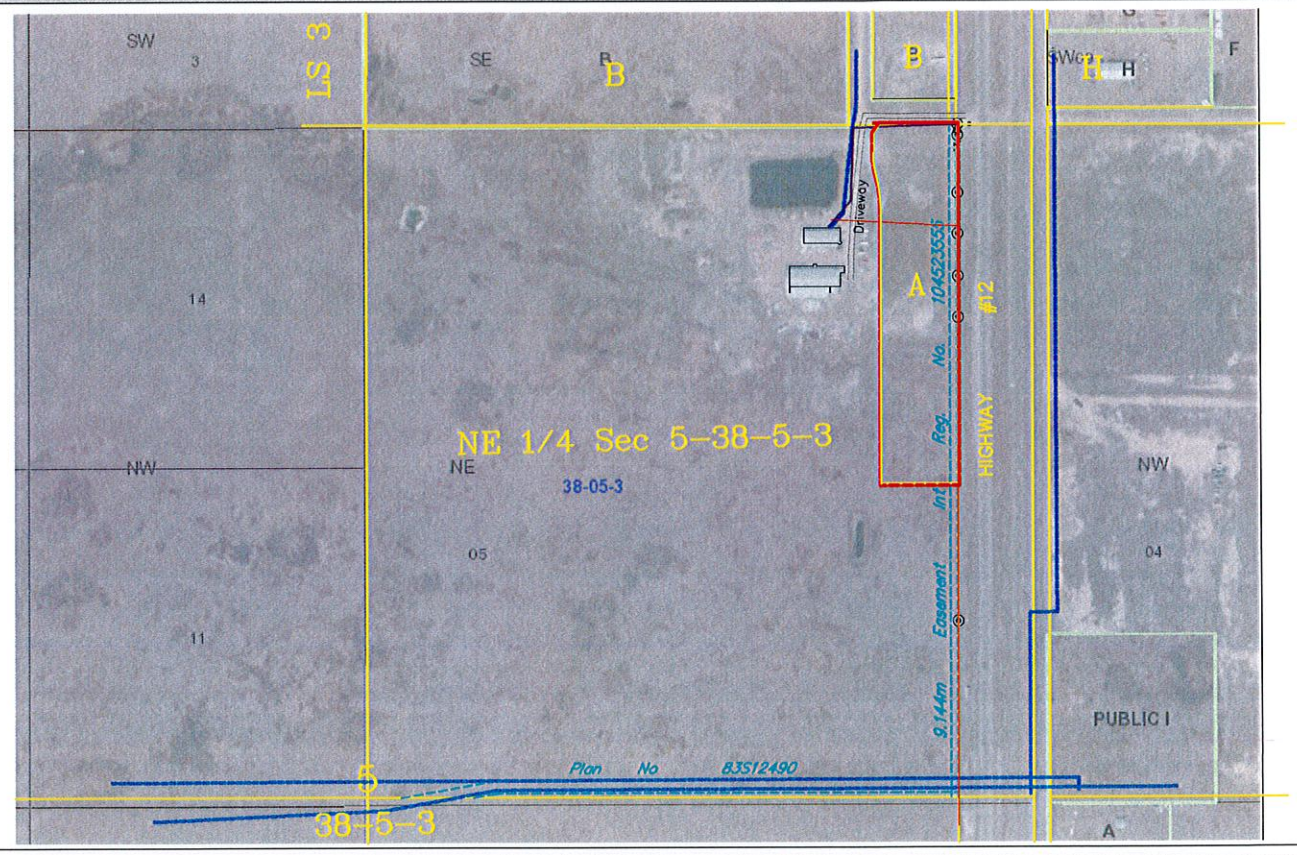
R.M. OF CORMAN PARK No. 344

SASKATCHEWAN

2021

SCALE = 1: 5000

KEY PLAN



NOTES

- MEASUREMENTS ARE IN METRES AND DECIMALS THEREOF.
- SOME MEASUREMENTS ARE APPROXIMATE AND MAY DIFFER FROM THE FINAL PLAN OF SURVEY BY AS MUCH AS 5 METRES.
- PORTION TO BE APPROVED IS OUTLINED WITH A BOLD DASHED LINE AND CONTAINS 4.05± ha (10.0± ac)

Buried Gas Line
Buried Electrical Line
Buried Phone Line
Power pole & anchor

SURVEYORS CERTIFICATION

December 2, 2021
Date

Saskatchewan Land Surveyor

SASKATCHEWAN LAND SURVEYORS ASSOC. 338 SLS

COMMUNITY PLANNING

OWNER

Registered Owner dd/mm/yy
The signature above indicates that I (we) approve the Plan of Proposed Subdivision as presented.

Webb Surveys
A division of Midwest Surveys Inc.
222 JESSOP AVE
SASKATOON, SK
S7N 1Y4
TEL: 306-955-5330

DATE	REVISION / ISSUED	JOB No.
30/11/2021		SC-0241-21

SURVEYED BY: DB/CE | CALC'D BY: CAS | DRAWN BY: CAS

Province of Saskatchewan
Land Titles Registry
Title

Title #: 147692199
Title Status: Active
Parcel Type: Surface
Parcel Value: $4,300,000.00 CAD
Title Value: *$4,300,000.00 CAD*
Converted Title: 89S19016
Previous Title and/or Abstract #: 142969786

As of: 27 Oct 2021 08:18:58
Last Amendment Date: 02 Jun 2021 14:12:26.890
Issued: 12 Jan 2016 07:49:43.083

Municipality: RM OF CORMAN PARK NO. 344

Anthony Nienhuis and Fred Friesen are the registered owners, as joint tenants, of Surface Parcel #117386770

Reference Land Description: NE Sec 05 Twp 38 Rge 05 W 3 Extension 0
As described on Certificate of Title 89S19016.

This title is subject to any registered interests set out below and the exceptions, reservations and interests mentioned in section 14 of *The Land Titles Act, 2000.*

Registered Interests:

Interest #:
173796924

CNV Easement

Value: N/A
Reg'd: 13 Feb 1953 01:25:23
Interest Register Amendment Date: N/A
Interest Assignment Date: N/A
Interest Scheduled Expiry Date: N/A
Expiry Date: N/A

LSD's 16 & 9
Holder:
Sask. Power Corporation
N/A
Regina, Saskatchewan, Canada
Client #: 101076623

Int. Register #: 104523555
Converted Instrument #: FA5123

Interest #:
173796913

CNV Pipeline Easement

Value: N/A
Reg'd: 04 May 1983 02:18:38
Interest Register Amendment Date: N/A
Interest Assignment Date: 02 Jun 2021 14:12:27
Interest Scheduled Expiry Date: N/A
Expiry Date: N/A

Holder:
TRANSGAS LIMITED
700 - 1777 Victoria Ave
Regina, Saskatchewan, Canada S4P 4K5
Client #: 105200985

Int. Register #: 104523533
Converted Instrument #: 83S17854 Refers to Plan 83S12490
Feature #: 100068229

Interest #:
173796957

Planning and Development Act, 2007-Interest Protecting Agreement (Section 235)

Value: N/A
Reg'd: 09 Jan 2014 13:54:31
Interest Register Amendment Date: N/A
Interest Assignment Date: N/A
Interest Scheduled Expiry Date: N/A
Expiry Date: N/A

Holder:
RURAL MUNICIPALITY OF CORMAN PARK NO. 344
111 PineHouse Drive
Saskatoon, Saskatchewan, Canada S7K 5W1
Client #: 101591580

Int. Register #: 119714092

Interest #:
173797015

Mortgage

Value: $2,800,000.00 CAD
Reg'd: 12 Jan 2016 07:49:44
Interest Register Amendment Date: N/A
Interest Assignment Date: N/A
Interest Scheduled Expiry Date: N/A
Expiry Date: N/A

Holder:
Affinity Credit Union 2013
130 1st Avenue North
Saskatoon, Saskatchewan, Canada S7K 0G1
Client #: 128811720

Int. Register #: 121339605

Interest #:
173797037

Assignment of Rents

Value: N/A
Reg'd: 12 Jan 2016 07:49:45
Interest Register Amendment Date: N/A
Interest Assignment Date: N/A
Interest Scheduled Expiry Date: N/A
Expiry Date: N/A

Holder:
Affinity Credit Union 2013
130 1st Avenue North
Saskatoon, Saskatchewan, Canada S7K 0G1
Client #: 128811720

Int. Register #: 121339616

Addresses for Service:

Name	Address
Owner: Anthony Nienhuis Client #: 106548082	Box 111 RR 4 Saskatoon, Saskatchewan, Canada S7K 3J7
Owner: Fred Friesen Client #: 121136778	Box 111 R.R. #4 Saskatoon, SK, Canada S7K 3J7

Notes:

Parcel Class Code: Parcel (Generic)

Back

Back to top

Utility Declaration Form

Government of Saskatchewan

Utility Requirements under
The Planning and Development Act, 2007
The Saskatchewan Telecommunications Act
The SaskEnergy Act and The Power Corporation Act

I (We), ANTHONY NIENHUIS AND FRED FRIESEN of
(full legal name - no initials)

BOX 111 RR 4, SASKATOON, SASKATCHEWAN S7K 3J7
(address or community of residence)
in the Province Saskatchewan, hereby declare that:

1. I am (We are) the registered owner(s) as defined by Section 2(b 2) of *The Subdivision Regulations* of the land being subdivided on the attached plan of proposed subdivision (plan) dated NOV. 2021 and signed by BRAD J. LUEY a Saskatchewan Land Surveyor/Registered Professional Planner.

2. The legal description of the land being subdivided is:

Parcel Number	Title Number	Lot/Parcel	Block	Plan Number
117386770	147692199			

Reference Description: NE ¼ Section 05 Township 38 Range 05 W 3rd Meridian

3. I (We) have viewed the subdivision plan or parcel tie removal and understand there may be existing utility lines that may or may not be registered on title.

4. I (We) understand the existing utility lines are in place pursuant to unregistered statutory easements and that utility companies have no legal obligation to remove or relocate them.

I (We) agree to either 5A or 5B. (Please strike out the non-applicable paragraph either 5A or 5B.)

5A. I (We) have no objection to the location of the utility lines on the land to be subdivided and will grant any formal written easement agreements or forms as may be required by the utility company owning the line(s)

OR

5B. I (We):
   a) Request removal or relocation of existing _____ power, gas or telecommunications utility lines (circle the appropriate utility) indicated on the plan/application for subdivision approval and have contacted the utility company owning the lines; and
   b) Have no objection to the location of other utility lines and will grant any formal written easement agreement or form as may be required by the utility company owning the line(s) upon written request.

6. If a formal written easement agreement is granted I (we) will not sell or transfer any part of the land until the easement is returned to the utility company and registered on the title to the land if required.

7. I (We) agree that if I (we) fail to return a formal written easement agreement to the utility company within a reasonable period of time I (we) will have otherwise deemed to consent to the location of the utility line(s) in their current location.

8. I (We) understand that this application agreement and declaration will remain in force and bind any successor owners of title to the parcel(s) of land created by this subdivision. Please supply the name, address and phone number of the utility company representative contacted about moving existing lines or extending new lines if required as part of 5B.

I (We) understand this form may expedite subdivision application review and I (we) agree to signing all of the necessary easements as requested by the utility companies.

Signed in the _____,
in the Province of Saskatchewan,
this _____ day of _____, 20___

Signature of Landowner

Signature of Landowner

Signature of Landowner

Signature of Landowner

nienhuis@sasktel.net
E-mail address of landowner(s)

This form must be submitted to the Ministry of Government Relations, Community Planning Branch with a completed *Application to Subdivide Land*.
Community Planning File: _____

Bill Delainey

From:	Tyler Gore <tgore@gflenv.com>
Sent:	December 1, 2022 1:43 PM
To:	Bill Delainey; Ken Wasden
Cc:	Zachary Merilees; Mike Pawluski
Subject:	RE: 2020-4508-00 - Corman Park North Business CDR
Follow Up Flag:	Follow up
Flag Status:	Flagged

Hi Bill,

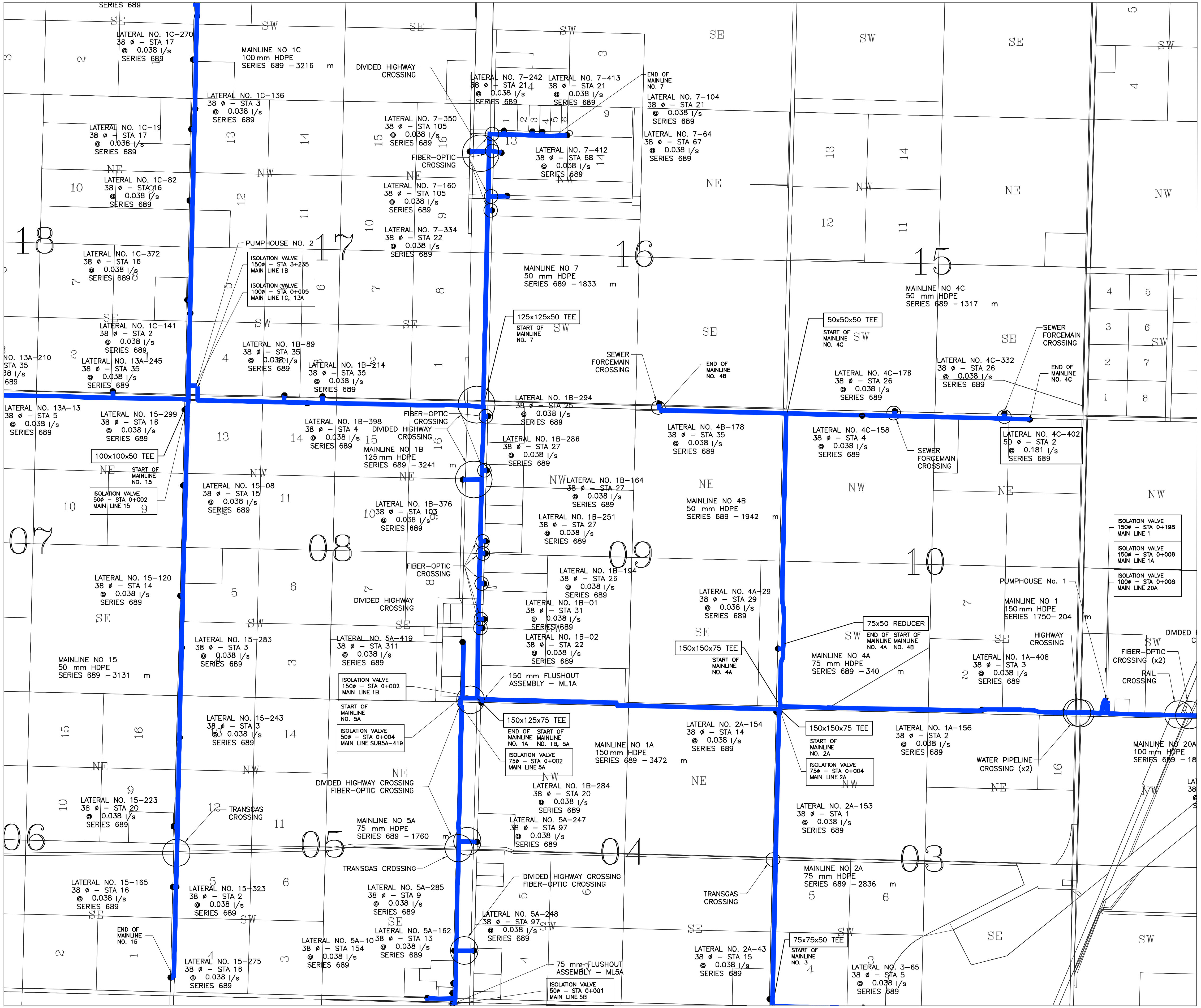
I wanted to reach out to you as I know Zach may be a week or two away from returning. He's enjoying some time off surrounding the arrival of a new member of his family.

I will introduce myself – I am the District Manager for our Saskatoon operations. I have also included my colleague Ken Wasden, who is our Account Manager for Saskatoon and area. Given the proximity of this development to our shop, we are definitely capable of supporting this subdivision for septic services as well as any of the other services we provide. I have attached a copy of our Property Maintenance Plan that outlines some of these services.

Please reach out to Ken or myself if you have any questions or require additional information.

Regards,

Tyler Gore | District Manager, Saskatoon
GFL Environmental Inc.
100 Cory Rd, Saskatoon, SK S7K 3J7
T (877) 244-9500 | **F** (306) 244-9501 | **C** 1(306) 202-9024 | tgore@gflenv.com | www.gflenv.com



NOTES

PROFESSIONAL ENGINEER
D.C.K.POON
SASKATOON
SASKATCHEWAN

ASSOCIATION OF PROFESSIONAL ENGINEERS OF SASKATCHEWAN
CERTIFICATE OF AUTHORIZATION
SAL ENGINEERING LTD.
NUMBER 309
PERMISSION TO CONSULT HELD BY:

DISCIPLINE	SASK. REG. No.	SIGNATURE
Municipal	4947	
Transportation		
Project Management		

No.	Date	Revision	By	App'd
6	MAY 25 2010	RECORD DRAWINGS	SCL	DCP
5	AUG. 20 2008	REVISED ROUTING, SUBSCRIBERS	SCL	DCP
4	JUL. 25 2008	REVISED SUBSCRIBERS	SCL	DCP
3	APR. 11 2008	ISSUED FOR TENDER	SCL	DCP
2	MAR. 25 2008	ISSUED FOR 90% REVIEW	SCL	DCP
1	FEB. 8 2008	PRELIMINARY PIPELINE ROUTING	SCL	DCP

SAL Engineering Ltd.

INTERVALLEY WATER
INCORPORATED
INTERVALLEY PROJECT – 2008

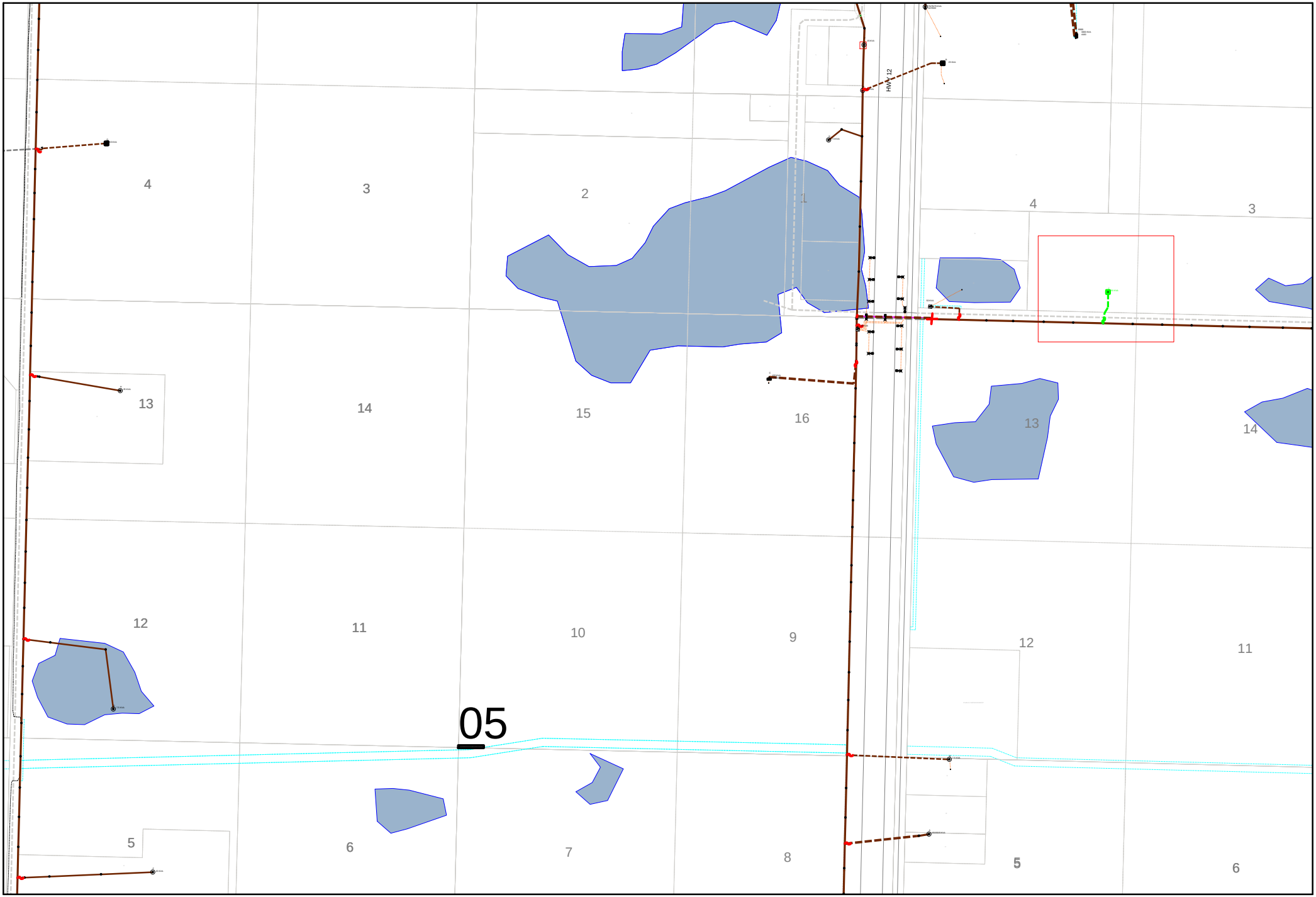
LOW PRESSURE
WATER PIPELINE ROUTING
MAINLINE 1A-C,2A,4A-C,5A,7,15

PLAN DATE: FEB. 8, 2008 SCALE: 1 : 10,000

Plan No. P-02 Sheet 2 of 31

File Name: P:\Municipal\Intervalley\Design\IWI Routing-07


SE
E
D
A
SW 08
SE 08
HWY 12
SW 09
C
B
G
F
H
38-05-3
NW 05
NE 05
HWY 12
NW 04
PUBLIC I
SW 05
SE 05
HWY 12
SW 04



Saskpower | **jrozon**

X/Y: 385505, 5789449

Scale: 1 CM = 217 M

N

02/03/21 11:05

Appendix D - Traffic Impact Assessment

From: Adnan, Syed HI
To: Ellen McLaughlin
Cc: Bill Delainey; Landell, Andrea HI
Subject: RE: Corman Park North Business TIA
Date: September 8, 2022 3:23:02 PM
Attachments: image001.png
image002.png

Hi Ellen,

Thanks for sending the final TIA report. We have completed our review, since all of the previous comments have been addressed and incorporated into the document, and there is no further action needed. You can consider this email as 'Approval of the TIA'.

In the next step, MoH will be sending you the Draft Partnership Agreement shortly.

Please contact me if you have any questions.

Thanks,
Adnan

From: Ellen McLaughlin <mclaughline@ae.ca>
Sent: Tuesday, August 9, 2022 2:28 PM
To: Adnan, Syed HI <syed.adnan@gov.sk.ca>
Cc: Landell, Andrea HI <andrea.landell@gov.sk.ca>; Eger, Ethan HI <ethan.eger@gov.sk.ca>; Perera, Nicholi HI <nicholi.perera@gov.sk.ca>; Bill Delainey <delaineyb@ae.ca>
Subject: RE: Corman Park North Business TIA

Hello Syed,

The report has been updated to reflect our conversation below.

Regards,

Ellen McLaughlin, P.Eng. *(She/Her)*
Transportation Planning Engineer
Associated Engineering (Sask.) Ltd.
1922 Park Street, Regina, SK S4N 7M4
Tel: 306.721.2466 | Cel: 306.741.3245 | Dir: 306.271.0883

From: Adnan, Syed HI <syed.adnan@gov.sk.ca>
Sent: Friday, August 5, 2022 9:42 AM
To: Ellen McLaughlin <mclaughline@ae.ca>
Cc: Landell, Andrea HI <andrea.landell@gov.sk.ca>; Eger, Ethan HI <ethan.eger@gov.sk.ca>; Perera, Nicholi HI <nicholi.perera@gov.sk.ca>; Bill Delainey <delaineyb@ae.ca>
Subject: RE: Corman Park North Business TIA

Hi Ellen,

Thanks for your email. Hope you had a great vacation.

Thanks for the explanation of the use of growth factors.
However, regarding the use of a 1.45 growth factor on the minor road, can you please add this clarification (mentioned in your email below) in your report?

Please reach out to me if you have any questions.

Thanks,
Adnan

From: Ellen McLaughlin <mclaughline@ae.ca>
Sent: Wednesday, August 3, 2022 1:46 PM
To: Adnan, Syed HI <syed.adnan@gov.sk.ca>
Cc: Landell, Andrea HI <andrea.landell@gov.sk.ca>; Eger, Ethan HI <ethan.eger@gov.sk.ca>; Perera, Nicholi HI <nicholi.perera@gov.sk.ca>; Bill Delainey <delaineyb@ae.ca>
Subject: RE: Corman Park North Business TIA

Hello Syed,

Thank you for your patience while I was on vacation last week.

We used a 1.45 growth factor on the minor road to represent the unknown background growth expected in the region. The P4G North Concept Plan identifies significant development adjacent to the minor road in addition to the area covered in this TIA. If this is a concern, we can discuss a sensitivity analysis with our client using reduced growth rates on the minor road.

The 1.30 growth factor used for the intersection treatment warrants was used to project the peak hour volumes to the 10^{th} year after construction according to SKS 2.3.1-C. We used Eq. 10 and a GF_{15} of 1.45.

Please let me know if you'd like to set up a meeting to discuss further. My afternoons are open for the remainder of the week.

Ellen McLaughlin, P.Eng. *(She/Her)*
Transportation Planning Engineer
Associated Engineering (Sask.) Ltd.
1922 Park Street, Regina, SK S4N 7M4
Tel: 306.721.2466 | Cel: 306.741.3245 | Dir: 306.271.0883

From: Adnan, Syed HI <syed.adnan@gov.sk.ca>
Sent: Thursday, July 21, 2022 9:26 AM
To: Ellen McLaughlin <mclaughline@ae.ca>
Cc: Landell, Andrea HI <andrea.landell@gov.sk.ca>; Eger, Ethan HI <ethan.eger@gov.sk.ca>; Perera, Nicholi HI <nicholi.perera@gov.sk.ca>
Subject: RE: Corman Park North Business TIA

Good Morning Ellen,

Thank you for your submission of the TIA for Overpass Farms (Corman Park North Business Park). We have reviewed your TIA and have a couple of comments:

- Can you please clarify the use of a 1.45 growth factor on the minor road (TWP Rd 381) as the Traffic factors provided by Traffic Services group was for the Highway only?
- Please send us a calculation/ clarification for a 1.30 growth factor used to complete the warrant analysis as we were not able to replicate the growth factor using SKS 2.3.1-C.

Please reach out to me for future correspondence as a point of contact for this TIA.

Thanks,

Syed Adnan, EIT, PMP (he/him)
Government of Saskatchewan
Operations Project Engineer
Traffic Engineering and Development, Ministry of Highways

18-3603 Millar Avenue
Saskatoon, Canada S7P 0B2
Office: 306-933-5197
Cell : 306-220-9806
Syed.Adnan@gov.sk.ca

Saskatchewan

Twitter | LinkedIn | Facebook | YouTube

From: Ellen McLaughlin <mclaughline@ae.ca>
Sent: Wednesday, May 25, 2022 11:37 AM
To: Andersen, Laura HI <laura.andersen@gov.sk.ca>
Cc: Bill Delainey <delaineyb@ae.ca>; Eger, Ethan HI <ethan.eger@gov.sk.ca>
Subject: Corman Park North Business TIA

Hello Laura,

The Corman Park North Business Park TIA draft report is attached for your review and comment. Of note, we revised the trip generation assumptions following our previous email submission and modified our approach using a Floor Area Ratio closer to that seen in the East Cory business park. Let me know if you'd like to meet and discuss our approach or recommendations.

Regards,

Ellen McLaughlin, P.Eng. *(She/Her)*
Transportation Planning Engineer
Associated Engineering (Sask.) Ltd.
1922 Park Street, Regina, SK S4N 7M4
Tel: 306.721.2466 | Cel: 306.741.3245 | Dir: 306.271.0883

Associated Engineering | 75 YEARS

REPORT

Overpass Farms

Corman Park North Business Park
Traffic Impact Assessment

AUGUST 2022

EXECUTIVE SUMMARY

Associated Engineering has been retained by Overpass Farms and Martensville Building and Lumber to determine the traffic impacts of the proposed Corman Park North Business Park industrial and commercial development north of Saskatoon, on the west side of Highway No. 12, within the Rural Municipality of Corman Park No. 344.

The proposed development is expected to generate 111 two-way vehicle trips in the PM peak hour and 856 two-way trips daily.

Access to the development is planned at the temporary intersection of Highway No. 12 and the west approach of Township Road 381. The Ministry has indicated that temporary access points such as Township Road 381 will not be removed until the construction of the Saskatoon Freeway or if traffic safety becomes a concern. Long-term provisions have been made for a service road through the property to the north (Lutheran Road) and south (Township Road 380).

The majority of traffic using the Township Road 381 intersection is travelling to and from the east due to existing developments on the east side of Highway No. 12. The Level of Service (LOS) on the east approach is below desirable levels and will continue to deteriorate as traffic volumes on Highway No. 12 increase, resulting in fewer gaps to cross and/or enter the highway. This is expected regardless of the proposed development.

Traffic on the west leg will increase as a result of development traffic. LOS is forecast to fall below desirable levels for some of the movements. A warrant analysis indicates that a southbound right turn lane is warranted at the intersection. Median acceleration lanes may alleviate a portion of minor road vehicle delay but would only benefit a relatively small volume of drivers.

The following summarizes the findings and recommendations described in this report. The Development Related Recommendations are based on the analysis of traffic generated by the proposed development. The Ministry of Highways Related Recommendations are based on plans the Ministry already has in place for this intersection, regardless of the proposed development.

Development Related Recommendations

1. Construct a southbound right turn lane at the intersection of Highway No. 12 and Township Road 381 before full buildout. This is warranted based on development traffic volumes.

Ministry of Highways Related Recommendations:

1. Construct a northbound right turn lane at the intersection of Highway No. 12 and Township Road 381. This is warranted based on background traffic volumes and registered in the Safety Improvement Program.
2. Construct a southbound left turn lane at the intersection of Highway No. 12 and Township Road 381. This is warranted based on background traffic volumes and registered in the Safety Improvement Program.
3. Consider additional safety measures to address the pattern of far side right-angle collisions at the intersection of Highway No. 12 and Township Road 381.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

Associated Engineering has been retained by Overpass Farms and Martensville Building and Lumber to determine the traffic impacts of the proposed Corman Park North Business Park industrial and commercial development located north of Saskatoon, on the west side of Highway No. 12 and within the Rural Municipality of Corman Park No. 344. This development is part of the broader regional development identified in the Saskatoon North Partnership for Growth (P4G) North Concept Plan. The study location is illustrated in **Figure 1-1**.

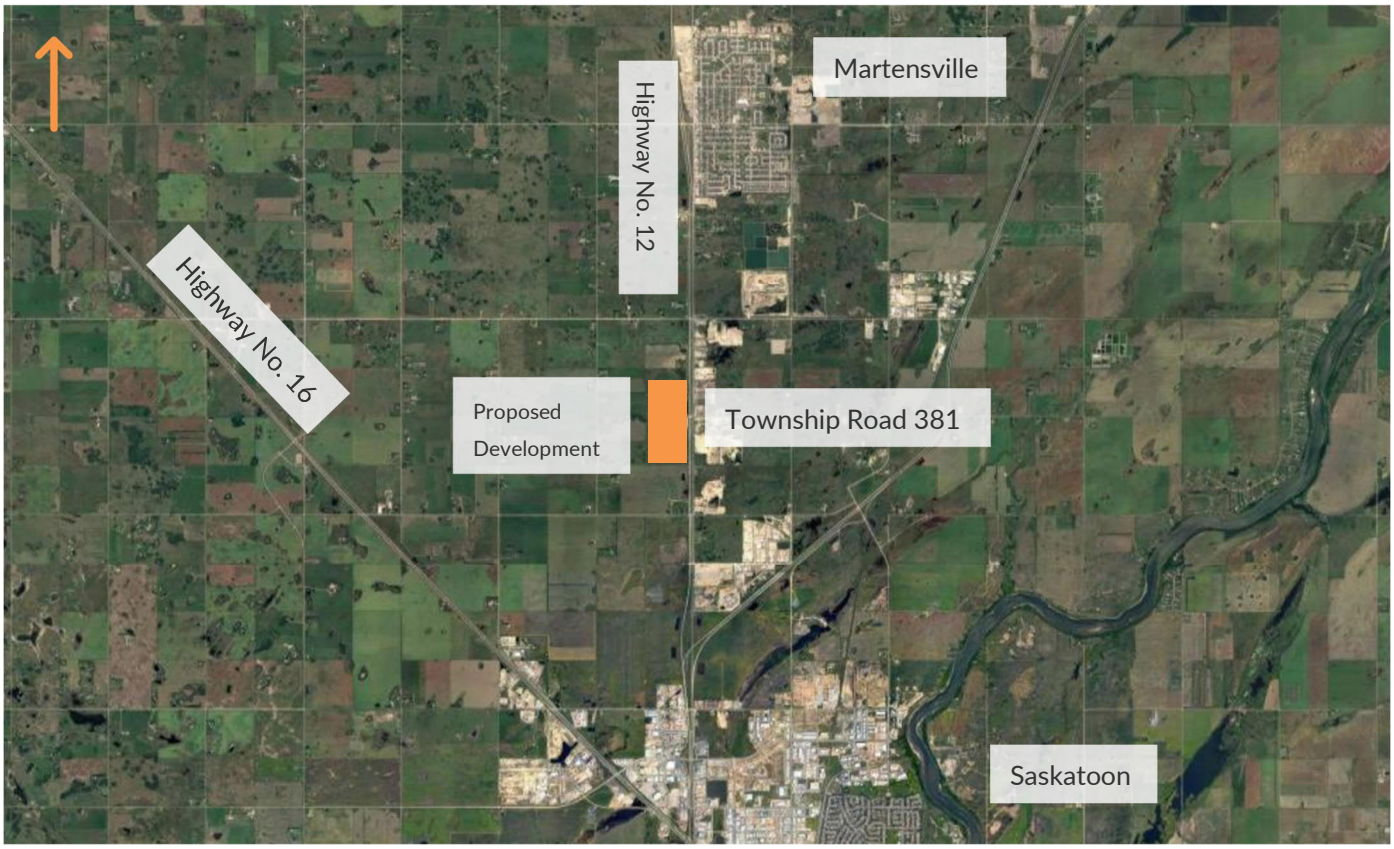


Figure 1-1
Study Location

Preliminary site plans indicated an estimated total developable area of 60 ha within the study area. Development is anticipated to consist of low-density commercial and industrial uses. The proposed site plan is illustrated in **Figure 1-2**.

Since the proposed development is located near a Provincial Highway, Ministry of Highways (MoH) standards apply to this report. This report is intended to meet MoH traffic impact study requirements and focuses on motor vehicle traffic. As a rural location, the site is not expected to generate significant pedestrian or cyclist traffic and there will be no transit service, therefore these modes are not considered in this report.

Figure 1-2
Proposed Site Plan

2 BACKGROUND

2.1 Existing Roadway

Highway No. 12 is a four-lane divided highway that supports regional traffic and a significant amount of commuting between Martensville and Saskatoon. The intersection has been constructed with a northbound left turn lane and intersection area lighting. A northbound right turn lane and southbound left turn lane have been identified as part of the Safety Improvement Program (SIP), and the timing of implementation is unknown.

Township Road 381 (TWP Rd 381) is a two-lane gravel road within the jurisdiction of Corman Park. The west leg of Township Road 381 continues for approximately 130 m before ending at a service road.

For this analysis, we have assumed that the Saskatoon Freeway and other improvements to Highway No. 12 have not been implemented before development full build-out.

2.2 Proposed Access

Highway No. 12 is classified at Access Management Level R-1. According to the Roadside Management Manual (RSMM-430-30), all permanent access points are to be spaced a minimum of 3.2 km apart and long-term planning should account for the construction of service roads and interchanges rather than direct access. The Ministry has indicated that temporary access points such as Township Road 381 will not be removed until the construction of the Saskatoon Freeway or if safety is a concern. No new access is proposed as a result of this development and long-term provisions have been made for an internal service road parallel to the Highway.

2.3 Speed Limit

The posted speed limit of Highway No. 12 is 110 km/hr. The design speed is assumed to be 130 km/hr based on Standard Plan 20020. There is no posted speed limit on Township Road 381; we have assumed that the regulatory speed on this road is 80 km/hr based on the SGI Saskatchewan Drivers Handbook (2021) and the design speed is assumed to be 10 km/hr above the regulatory limit.

2.4 Geometrics

The terrain appears to be flat with no noticeable sight distance limitations. No survey was conducted along the highway right-of-way.

2.5 Surrounding Land Use

Surrounding land uses are predominantly agricultural with some industrial development to the east and southeast.

3 TRAFFIC VOLUMES

3.1 Design Hour and Horizon Year

Associated Engineering completed a manual traffic count on Thursday, March 24, 2022, at the intersection of Highway No. 12 and TWP Rd 381. In consultation with the Ministry of Highways, the count was conducted in the afternoon from 3:30 pm to 6:30 pm. The peak hour occurred between 4:30 pm and 5:30 pm.

Construction is expected to begin in 2022 and is anticipated to take 15 years to reach full build-out. The horizon year for full build-out is therefore 2037.

3.2 Background Traffic

Background traffic volumes for 2022 were determined by adjusting the manual traffic counts using factors obtained by the MoH document Travel on Saskatchewan Highways (2016).

- The volumes were adjusted to annual averages for a Rural Commuter Highway based on the day and month of the count. For a Thursday in March, a seasonal adjustment factor of 0.98 was used.
- The traffic volumes were converted to background traffic volumes for the 2037 design horizon year using a 15-year growth factor of 1.45 for Highway No. 12 as provided by MoH Traffic Services Branch. The Saskatoon North Partnership for Growth (P4G) North Concept Plan identifies significant development adjacent to the minor road in addition to the area covered in this TIA. As a result, this growth factor was applied to all movements on the major and minor road.
- The typical PM peak hour represents 8.3% of daily traffic for a Rural Commuter Highway.
- MoH Traffic Services Branch has indicated that traffic volumes along Highway No. 12 have returned to pre-pandemic levels. No special factor was applied to traffic volumes to adjust for the ongoing Covid-19 pandemic.

Figure 3-1 and **Figure 3-2** illustrated the 2022 and 2037 background traffic volumes for the PM peak hour. Raw traffic counts and communication regarding growth factors and Covid-19 factors are included in **Appendix A**.

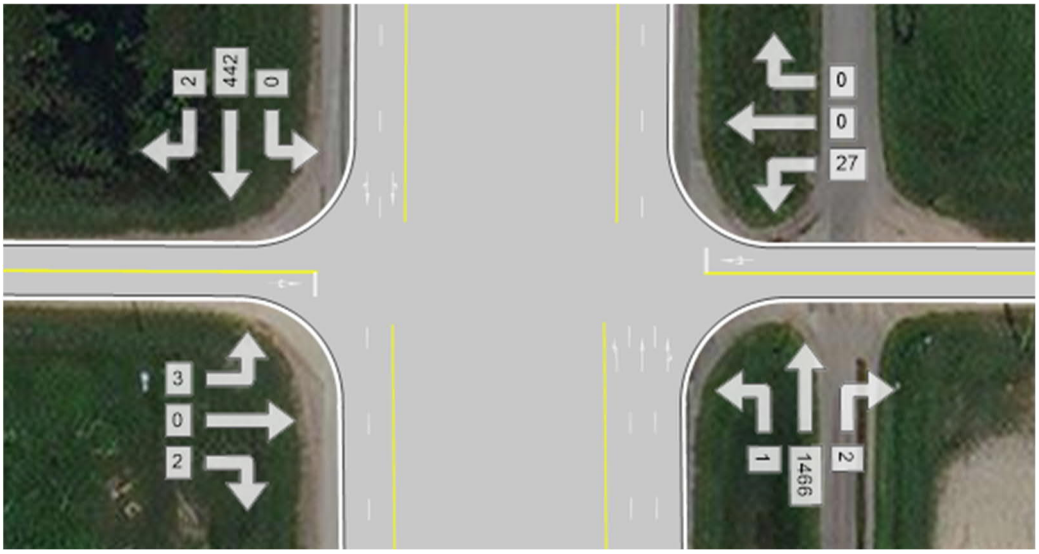


Figure 3-1
Existing Conditions Traffic Volumes – 2022 PM Peak

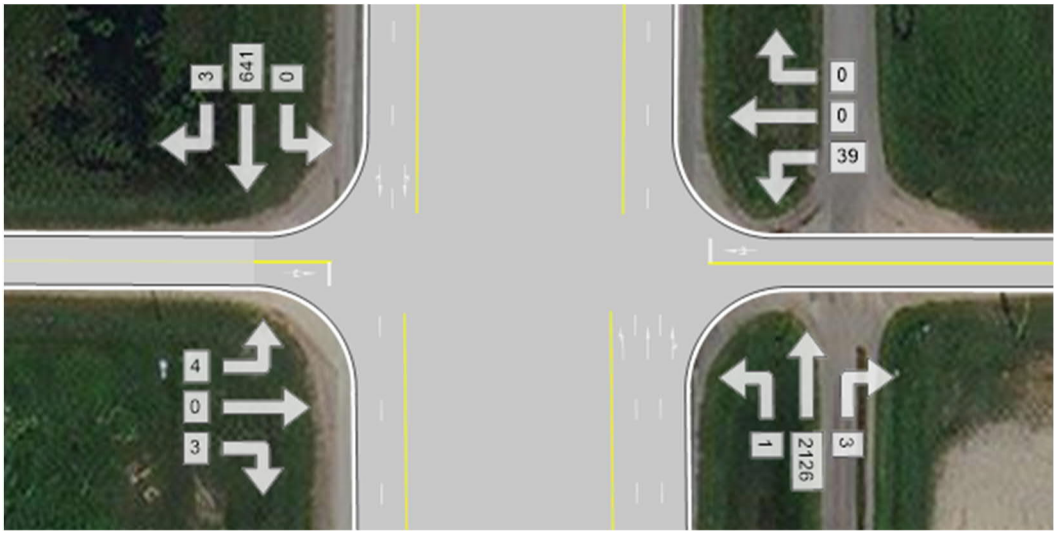


Figure 3-2
Background Traffic Volumes – 2037 PM Peak

3.3 Daily Traffic Volumes

AADT on Highway No. 12 was estimated using the 2019 Traffic Volume Map published by the Ministry of Highways while AADT on TWP Rd 381 was estimated using the manual traffic count data converted to daily traffic volumes based on the Travel on Saskatchewan Highways publication. The growth factor supplied by MoH was applied to all turns on the major and minor roads; however, we do not know the exact development plans that may contribute to growth on the minor road. **Figures 3-3** and **Figure 3-4** illustrate AADT estimates in 2022 and 2037.

Figure 3-3
2022 AADT

Figure 3-4
2037 AADT

3.4 Truck Volumes

Based on traffic counts, trucks represent between 3% and 5% of vehicle traffic on Highway No. 12 depending on the direction of travel. Detailed heavy truck volumes are supplied with traffic count summaries in **Appendix A**.

Ministry of Highways intersection improvement warrants use a Passenger Car Equivalent (PCE) to translate truck presence to an equivalent number of passenger cars. The MoH default value of 1.7 was applied to all turning movements for intersection improvement warrants. The PCE standard is not applied to lighting warrants.

3.5 Development Traffic

3.5.1 Trip Generation

Preliminary site plans estimate approximately 60 ha developable area comprising a combination of low-density commercial and industrial uses. We have assumed that the Floor Area Ratio (FAR) for the commercial area is approximately 0.07 based on our work with similar projects and the East Cory Industrial Park to the southeast. The Gross Floor Area (GFA) is estimated to be 453,4000 square feet (4 ha).

Trip generation rates for the proposed development were estimated using the Institute of Transportation Engineers' Trip Generation Manual, 10th Edition (ITE TGM). The ITE TGM is a resource that was developed for dense urban environments which generate much more traffic than rural Saskatchewan. Based on the remote location of this development and the longer commuting distance relative to similar urban destinations, we have adjusted trip generation rates to reflect semi-rural travel patterns.

A variety of land uses were selected to represent the many possible businesses that may choose to develop within the business park. General light industrial (LUC 110), industrial park (LUC 130), warehousing (LUC 150), and Recreational

vehicle sales (LUC 842) were chosen as representative samples. Trip generation was reduced by 25% in the peak period and 50% over the day to represent the expected lower trip generation of a semi-rural location relative to the published case for a typical U.S. suburb.

Trip generation rates for the PM peak hour of adjacent street traffic are summarized in **Table 3-1**.

Table 3-1
Trip Generation – PM Peak

Land Use	Units		Trip Gen Rate	% Entering	Trips In	% Exiting	Trips Out	Total Trips
General Light Industrial LUC 110	91	1000 SF GFA	0.29	13%	4	87%	22	26
Industrial Park LUC 130	45	1000 SF GFA	0.30	21%	2	79%	10	14
Warehousing LUC 150	272	1000 SF GFA	0.17	27%	12	73%	33	45
Recreational Vehicles LUC 842	45	1000 SF GFA	0.58	31%	8	69%	18	26

Trip generation rates for daily traffic are summarized in **Table 3-2**.

Table 3-2
Trip Generation – Daily

Land Use	Units		Trip Gen Rate	% Entering	Trips In	% Exiting	Trips Out	Total Trips
General Light Industrial LUC 110	91	1000 SF GFA	2.21	50%	100	50%	100	200
Industrial Park LUC 130	45	1000 SF GFA	6.86	50%	155	50%	155	310
Warehousing LUC 150	272	1000 SF GFA	0.87	50%	119	50%	119	238
Recreational Vehicles LUC 842	45	1000 SF GFA	2.35	50%	54	50%	54	108

The site is expected to produce 111 vehicle trips in the PM peak and 856 vehicle trips daily.

3.5.2 Pass-by Trips

Properties adjacent to highways often attract pass-by trips. Based on the type of expected development and accessibility of the site, we have assumed that up to 10% of inbound trips will be diverted from Highway No. 12.

The site is expected to divert 3 trips in the PM peak and 43 trips daily.

3.5.3 Trip Distribution and Assignment

We have estimated trip distribution based on the surrounding population and employment centres. We expect the majority of traffic will travel to nearby communities including Saskatoon. As such, we have allocated 70% of site trips to the south and the remaining 30% of trips to and from the north.

Table 3-3
Trip Distribution

Origin/Destination	Share (%)	PM Peak Trips	Daily Trips
North of Development	30%	33	257
South of Development	70%	78	599

All trips will access the site via the intersection of Highway No. 12 and TWP Rd 381. Site-generated traffic is illustrated in **Figure 3-5**.

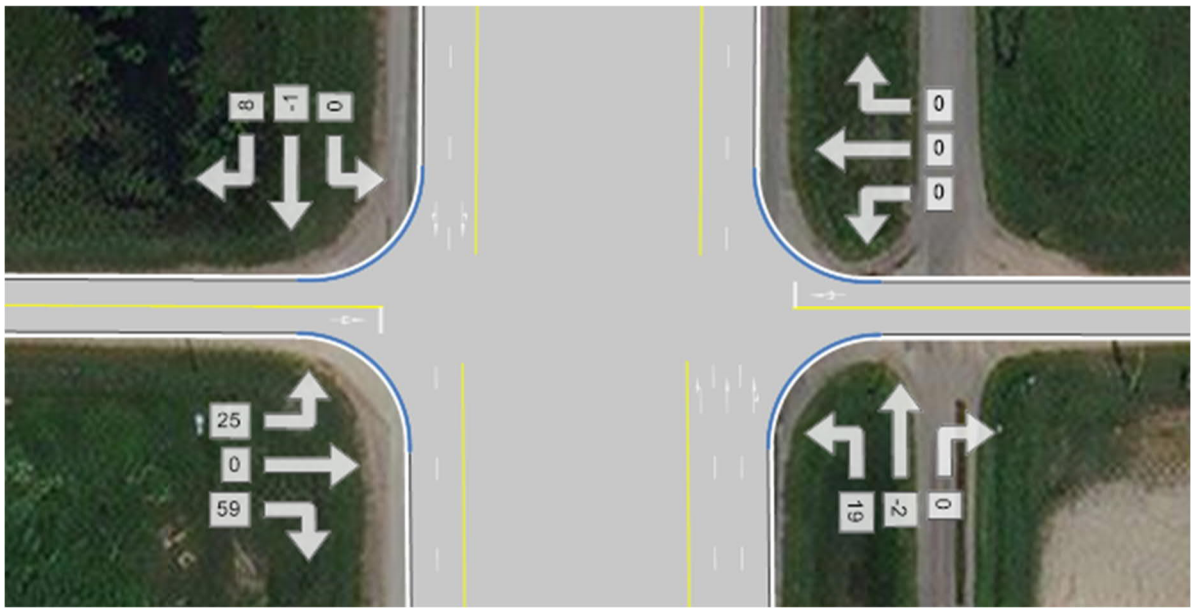


Figure 3-5
Net Development Traffic Volumes – PM Peak

3.6 Total Traffic

The combined traffic volumes for 2037 were calculated by adding the future background and development traffic volumes together. **Figure 3-6** illustrates the total volumes for the PM peak hour in 2037.

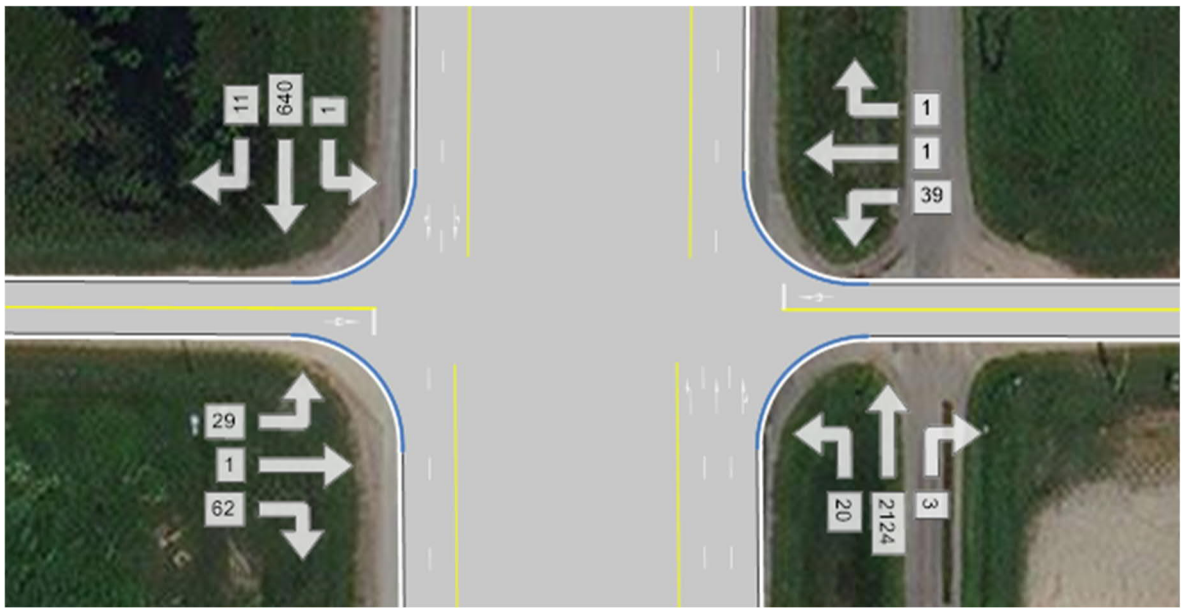


Figure 3-6
Full Build-out Traffic Volumes – 2037 PM Peak

Figure 3-7 illustrates the expected 2037 AADT at full build-out.

Figure 3-7
2037 AADT – Full Build-out

4 TRAFFIC ANALYSIS

4.1 Analysis Method

The study intersection was analyzed using PTV Vistro™ software and the methods described in the Highway Capacity Manual, 6th Edition (2016) to determine delays and associated level of service (LOS) for the background and full build-out traffic conditions. It is assumed that traffic is evenly distributed throughout the design hour

4.2 Level of Service

4.2.1 2022 Existing Conditions

The PM peak hour Level of Service and volume to capacity ratio (v/c) are summarized in **Figures 4-1** for the 2022 existing conditions. **Appendix B** includes a detailed Level of Service report.

Figure 4-1
Intersection Operation – 2022 Existing Conditions

While on-site, staff noted that vehicles making a westbound left turn execute this maneuver in two stages. During the peak hour, we observed four vehicles were typically waiting on the east leg until it was safe to proceed to the median. Two vehicles were typically in the median waiting to merge on the highway southbound. A westbound left turn was generally completed within 30 seconds of arrival at the intersection.

The results of the existing conditions Vistro model generally match observations made in the field. LOS on the minor road already shows signs of deterioration in 2022, a result of heavy conflicting northbound traffic volumes and limited acceptable gaps on Highway No. 12. The v/c ratios on the minor road are within acceptable limits. While delay times may be higher than desirable, the minor road can support the current traffic demand during the PM peak hour. A southbound median acceleration lane would reduce delays for westbound left traffic but does not address the time accrued waiting to cross the northbound lanes. A median acceleration lane benefits a relatively low volume of drivers and other network improvements are likely to redistribute traffic that negates the need for this improvement.

4.2.2 2037 Background Conditions

The PM peak hour Level of Service and volume to capacity ratio (v/c) are summarized in **Figures 4-2** for the 2037 background conditions. **Appendix B** includes a detailed Level of Service report.

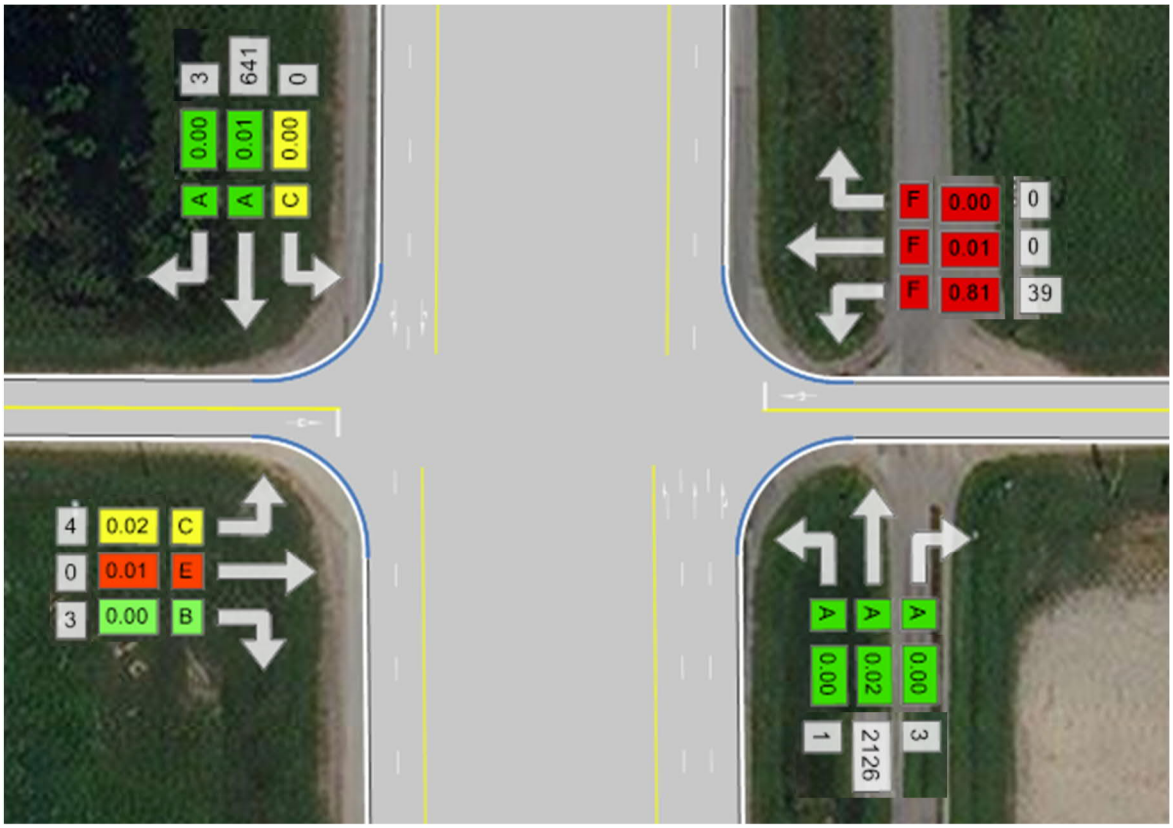


Figure 4-2
Intersection Operation – 2037 Background Conditions

LOS on the minor road continues to deteriorate in 2037, traffic volumes increase on Highway No. 12 and acceptable gaps are reduced. The westbound left v/c ratio indicates that the minor road is approaching capacity and changes to geometry or traffic control should be considered. A southbound median acceleration lane would reduce delays for westbound left traffic but does not address the time accrued waiting to cross the northbound lanes. A median acceleration lane benefits a relatively low volume of drivers and other network improvements are likely to redistribute traffic that negates the need for this improvement.

4.2.3 2037 Full Build-Out Conditions

The PM peak hour Level of Service and volume to capacity ratio (v/c) are summarized in **Figures 4-3** for the 2037 full build-out conditions. **Appendix B** includes a detailed Level of Service report.

Figure 4-3
Intersection Operation – PM Peak 2037 Full Build-Out

LOS on the minor road continues to deteriorate as a result of development traffic. Operational concerns on the east approach identified in the 2037 background condition are still present. The v/c ratios on the west approach are within acceptable limits but delay increases above desirable thresholds for eastbound through and left traffic. Eastbound traffic volumes are so low that is it more reasonable to tolerate delay than to resolve the issue – i.e. constructing an interchange. A northbound median acceleration lane may reduce eastbound left delays; however, this benefits a relatively low volume of drivers and other network improvements are likely to redistribute traffic that negates the need for this improvement.

4.3 MoH Warrants

4.3.1 Intersection Treatment

An MoH system warrant analysis was carried out at the intersection of Highway No. 12 and TWP Rd 381 for right and left-turn lanes, Standard Plans 20614 and 20610 respectively, to determine if development traffic is expected to trigger intersection improvements.

A northbound left turn lane has already been installed at the study intersection. A northbound right turn lane and southbound left turn lane are logged in the SIP database. Results are summarized in **Table 4-1** and MoH warrants are provided in **Appendix C**.

Table 4-1
Intersection Treatment

Analysis Horizon	NB Left Turn Lane	NB Right Turn Lane	SB Left Turn Lane	SB Right Turn Lane
2022 Existing Conditions	Constructed	Registered in SIP	Registered in SIP	Not Warranted
2037 Background Conditions	Constructed	Registered in SIP	Registered in SIP	Not Warranted
2037 Full Build-out	Constructed	Registered in SIP	Registered in SIP	Warranted

Considered in isolation, a southbound right turn lane is warranted at TWP Rd 381 as a result of development traffic. In reality, this development may be one of many in the area to contribute to traffic demand for this improvement.

4.3.2 Intersection Lighting

MoH Standard DM 2621 distinguishes between two types of intersection illumination: intersection delineation lighting and intersection area lighting. Intersection delineation lighting refers to a single lamp post installed on the minor leg, illuminating the area where a vehicle would be stopped. Intersection area lighting includes one lamp post on the minor leg as well as three lamp posts along the highway upstream of the intersection in each direction.

Intersection area lighting has already been constructed at the study location. No further assessment was conducted.

4.3.3 Collision History

MoH Traffic Engineering and Development Branch provided AE with collision history within 3 km of the study intersection from 2016 to 2022. Three collisions occurred at the intersection of Highway No. 12 and TWP Rd 381.

Of these collisions, two were far side right-angle collisions making westbound left turns, citing a disregard for the right of way while in the median. This type of collision is among the most common at high-speed divided highway locations. Risk-taking behaviour that results in this type of collision can increase as available gaps in traffic decrease. A more detailed road safety audit would be required to adequately assess this issue, but a variety of treatment options are available to address this collision pattern varying from installing yield signs and centre line pavement markings in the median to constructing median acceleration lanes.

5 RECOMMENDATIONS

The following summarizes the findings and recommendations described in this report:

Development Related Recommendations

1. Construct a southbound right turn lane at the intersection of Highway No. 12 and Township Road 381 before full buildout. This is warranted based on development traffic volumes.

Ministry of Highways Related Recommendations:

1. Construct a northbound right turn lane at the intersection of Highway No. 12 and Township Road 381. This is warranted based on background traffic volumes and registered in the Safety Improvement Program.
2. Construct a southbound left turn lane at the intersection of Highway No. 12 and Township Road 381. This is warranted based on background traffic volumes and registered in the Safety Improvement Program.
3. Consider additional safety measures to address the existing pattern of far side right-angle collisions at the intersection of Highway No. 12 and Township Road 381.

CLOSURE

This report was prepared for the Overpass Farms to determine the traffic impacts of the proposed Corman Park North Business Park industrial and commercial development north of Saskatoon, on the west side of Highway No. 12, within the Rural Municipality of Corman Park No. 344.

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:

Ellen McLaughlin, P.Eng.

Reviewed by:

Monique Beaudry, P.Eng., RPP, MCIP

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Signature: Esther Vennard

Date: August 8, 2022

APPENDIX A - TRAFFIC COUNTS

Ellen McLaughlin

From: Jaworski, Derek HI <Derek.Jaworski@gov.sk.ca>
Sent: Thursday, April 14, 2022 2:39 PM
To: Ellen McLaughlin
Subject: RE: Corman Park North TIA

Ellen:

The 15-year growth factor for this section of Highway 12 is 1.45, and the K factor is 0.120 representing Regional Commuter traffic. The vehicle total recorded by the permanent counter just north of this location on March 24 was higher than the Thursdays nearest this date in 2019, so no COVID factor is required.

Thanks,
-Derek J.

From: Ellen McLaughlin <mclaughline@ae.ca>
Sent: Thursday, April 14, 2022 2:02 PM
To: Jaworski, Derek HI <Derek.Jaworski@gov.sk.ca>
Subject: RE: Corman Park North TIA

Hello Derek,

Have you had an opportunity to review the growth factors, etc. for this corridor yet?

Thank you!

Ellen McLaughlin, P.Eng. *(She/Her)*
Transportation Planning Engineer
Associated Engineering (Sask.) Ltd.
1922 Park Street, Regina, SK S4N 7M4
Tel: 306.721.2466 | Cel: 306.741.3245 | Dir: 306.271.0883

From: Ellen McLaughlin
Sent: Tuesday, April 5, 2022 9:20 AM
To: Derek Jaworski (Derek.Jaworski@gov.sk.ca) <Derek.Jaworski@gov.sk.ca>
Subject: Corman Park North TIA

Howdy again!

I'm working on another TIA north of Saskatoon. The site access is located at the intersection of Highway No. 12 and Township Road 381 – between the Highway No. 12 and 11 diverge and the Martensville interchange. Can you provide the 15 year growth factor and covid factor for the corridor? We collected counts on Thursday March 24.

Regards,

Ellen McLaughlin, P.Eng. *(She/Her)*
Transportation Planning Engineer
Associated Engineering (Sask.) Ltd.
1922 Park Street, Regina, SK S4N 7M4
Tel: 306.721.2466 | Cel: 306.741.3245 | Dir: 306.271.0883

Traffic Count Data Summary

Highway 12 & Township Road 381		Northbound						Southbound						Eastbound						Westbound						Total	Pedestrians *(Crossing in front of vehicles facing)*				Departure Leg Vehicle Totals			
Date: March 24, 2022		Left		Through		Right		Left		Through		Right		Left		Through		Right		Left		Through		Right			E/W *(NB)*	E/W *(SB)*	N/S *(EB)*	N/S *(WB)*	NB	SB	EB	WB
Time Interval		Car	Truck	Car	Truck	Car	Truck	Car	Truck	Car	Truck	Car	Truck	Car	Truck	Car	Truck	Car	Truck	Car	Truck	Car	Truck	Car	Truck									
15:00	15:15																									0					0	0	0	0
15:15	15:30																									0					0	0	0	0
15:30	15:45	1	0	193	10	3	2	0	0	134	6	0	0	1	2	0	0	0	0	0	0	0	0	0	0	352					206	140	5	1
15:45	16:00	2	0	237	8	6	0	1	0	149	14	0	0	0	1	0	0	1	0	6	1	0	0	0	0	426					246	171	7	2
16:00	16:15	0	0	245	11	0	0	1	1	133	5	1	0	0	0	0	0	0	0	4	0	0	0	0	1	402					257	142	2	1
16:15	16:30	3	0	305	21	1	1	0	0	96	8	0	1	0	0	0	0	4	0	5	0	0	0	0	0	445					326	113	2	4
16:30	16:45	0	0	348	12	1	0	0	0	115	11	1	0	1	1	0	0	2	0	8	0	0	0	0	0	500					362	136	1	1
16:45	17:00	0	0	403	13	0	0	0	0	88	2	0	0	0	0	0	0	0	0	8	0	0	0	0	0	514					416	98	0	0
17:00	17:15	1	0	343	14	0	0	0	0	107	2	1	0	0	0	0	0	0	0	4	0	0	0	0	0	472					357	113	0	2
17:15	17:30	0	0	355	9	1	0	0	0	119	7	0	0	1	0	0	0	0	0	8	0	0	0	0	0	500					365	134	1	0
17:30	17:45	0	1	235	4	0	0	0	0	118	2	0	0	0	0	0	0	0	0	4	0	0	0	0	0	364					239	124	0	1
17:45	18:00	0	0	187	6	0	0	0	0	102	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	300					194	104	0	2
18:00	18:15	0	0	182	5	0	0	0	0	91	5	1	0	2	0	0	0	0	0	1	0	0	0	0	0	287					189	97	0	1
18:15	18:30	0	1	158	9	0	0	0	1	93	3	0	0	0	0	0	0	0	0	2	0	0	0	0	0	267					167	98	1	1
18:30	18:45																									0					0	0	0	0
18:45	19:00																									0					0	0	0	0
PM Peak Subtotal		1	0	1449	48	2	0	0	0	429	22	2	0	2	1	0	0	2	0	28	0	0	0	0	0		0	0	0	0	1500	481	2	3
PM Peak Total (non-PCE)		**1**		**1497**		**2**		**0**		**451**		**2**		**3**		**0**		**2**		**28**		**0**		**0**										
PM Peak %Truck			0%		3%		0%		0%		5%		0%		33%		0%		0%		0%		0%		0%									

APPENDIX B - VISTRO REPORTS

Corman Park North Business Park

Vistro File: \...\Corman_Park.vistro
Report File: \...\Appendix_B.1.pdf

Scenario 1 2022 Existing
5/13/2022

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Highway 12 and TWP Rd 381	Two-way stop	HCM 6th Edition	WB Left	0.213	40.8	E

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Highway 12 and TWP Rd 381

Control Type:	Two-way stop	Delay (sec / veh):	40.8
Analysis Method:	HCM 6th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.213

Intersection Setup

Name	Highway 12			Highway 12			TWP Rd 381			TWP Rd 381		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [m]	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
No. of Lanes in Entry Pocket	1	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [m]	250.00	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [m]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [km/h]	110.00			110.00			50.00			70.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 12			Highway 12			TWP Rd 381			TWP Rd 381		
Base Volume Input [veh/h]	1	1466	2	0	442	2	3	0	2	27	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	5.00	2.00	2.00	5.00	2.00	10.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	-4	0	0	-2	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	1	0	0	0	1	0	0	1	1
Total Hourly Volume [veh/h]	1	1462	2	1	440	2	3	1	2	27	1	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	366	1	0	110	1	1	0	1	7	0	0
Total Analysis Volume [veh/h]	1	1462	2	1	440	2	3	1	2	27	1	1
Pedestrian Volume [ped/h]	0			0			0			0		

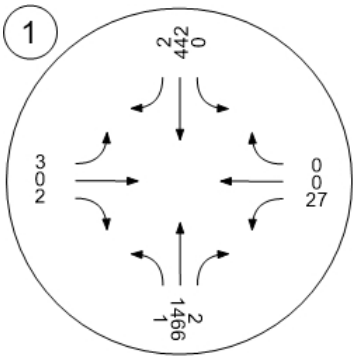
Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			Yes	Yes
Storage Area [veh]	0	0	2	2
Two-Stage Gap Acceptance			Yes	Yes
Number of Storage Spaces in Median	0	0	2	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.21	0.01	0.00
d_M, Delay for Movement [s/veh]	8.23	0.00	0.00	12.89	0.00	0.00	16.96	25.76	9.75	40.85	32.94	22.34
Movement LOS	A	A	A	B	A	A	C	D	A	E	D	C
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.01	0.00	0.00	0.05	0.05	0.05	0.79	0.79	0.79
95th-Percentile Queue Length [m/ln]	0.02	0.00	0.00	0.05	0.03	0.00	0.36	0.36	0.36	6.03	6.03	6.03
d_A, Approach Delay [s/veh]	0.01			0.03			16.02			39.94		
Approach LOS	A			A			C			E		
d_I, Intersection Delay [s/veh]	0.66											
Intersection LOS	E											

Report Figure 1a: Traffic Volume - Base Volume



Corman Park North Business Park

Vistro File: \...\Corman_Park.vistro
Report File: \...\Appendix_B.2.pdf

Scenario 2 2037 Background
5/13/2022

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Highway 12 and TWP Rd 381	Two-way stop	HCM 6th Edition	WB Left	0.811	209.1	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Highway 12 and TWP Rd 381

Control Type:	Two-way stop	Delay (sec / veh):	209.1
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.811

Intersection Setup

Name	Highway 12			Highway 12			TWP Rd 381			TWP Rd 381		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [m]	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
No. of Lanes in Entry Pocket	1	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [m]	250.00	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [m]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [km/h]	110.00			110.00			50.00			70.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 12			Highway 12			TWP Rd 381			TWP Rd 381		
Base Volume Input [veh/h]	1	1466	2	0	442	2	3	0	2	27	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	5.00	2.00	2.00	5.00	2.00	10.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.4500	1.4500	1.4500	1.4500	1.4500	1.4500	1.4500	1.4500	1.4500	1.4500	1.4500	1.4500
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	1	0	0	0	1	0	0	1	1
Total Hourly Volume [veh/h]	1	2126	3	1	641	3	4	1	3	39	1	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	532	1	0	160	1	1	0	1	10	0	0
Total Analysis Volume [veh/h]	1	2126	3	1	641	3	4	1	3	39	1	1
Pedestrian Volume [ped/h]	0			0			0			0		

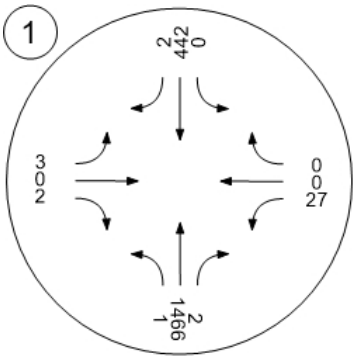
Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			Yes	Yes
Storage Area [veh]	0	0	2	2
Two-Stage Gap Acceptance			Yes	Yes
Number of Storage Spaces in Median	0	0	2	2

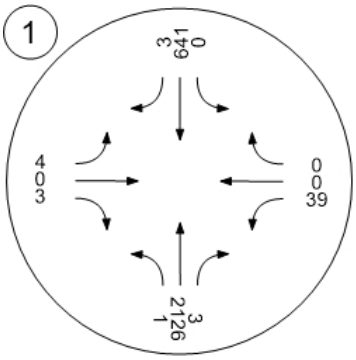
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.02	0.00	0.00	0.01	0.00	0.02	0.01	0.00	0.81	0.01	0.00
d_M, Delay for Movement [s/veh]	8.85	0.00	0.00	19.36	0.00	0.00	24.71	49.66	10.87	209.07	177.78	150.66
Movement LOS	A	A	A	C	A	A	C	E	B	F	F	F
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.01	0.01	0.00	0.10	0.10	0.10	3.41	3.41	3.41
95th-Percentile Queue Length [m/ln]	0.02	0.00	0.00	0.09	0.05	0.00	0.79	0.79	0.79	26.02	26.02	26.02
d_A, Approach Delay [s/veh]	0.00			0.03			22.64			206.88		
Approach LOS	A			A			C			F		
d_I, Intersection Delay [s/veh]	3.08											
Intersection LOS	F											

Report Figure 1a: Traffic Volume - Base Volume



Report Figure 1c: Traffic Volume - Future Background Volume



Corman Park North Business Park

Vistro File: \...\Corman_Park.vistro
Report File: \...\Appendix_B.3.pdf

Scenario 3 2037 Full BUildout
5/13/2022

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Highway 12 and TWP Rd 381	Two-way stop	HCM 6th Edition	WB Left	0.874	239.3	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Highway 12 and TWP Rd 381

Control Type:	Two-way stop	Delay (sec / veh):	239.3
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.874

Intersection Setup

Name	Highway 12			Highway 12			TWP Rd 381			TWP Rd 381		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [m]	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60
No. of Lanes in Entry Pocket	1	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [m]	250.00	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48	30.48
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [m]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [km/h]	110.00			110.00			50.00			70.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Highway 12			Highway 12			TWP Rd 381			TWP Rd 381		
Base Volume Input [veh/h]	1	1466	2	0	442	2	3	0	2	27	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	5.00	2.00	2.00	5.00	2.00	10.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.4500	1.4500	1.4500	1.4500	1.4500	1.4500	1.4500	1.4500	1.4500	1.4500	1.4500	1.4500
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	19	0	0	0	0	8	25	0	59	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	-2	0	0	-1	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	1	0	0	0	1	0	0	1	1
Total Hourly Volume [veh/h]	20	2124	3	1	640	11	29	1	62	39	1	1
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	531	1	0	160	3	7	0	16	10	0	0
Total Analysis Volume [veh/h]	20	2124	3	1	640	11	29	1	62	39	1	1
Pedestrian Volume [ped/h]	0			0			0			0		

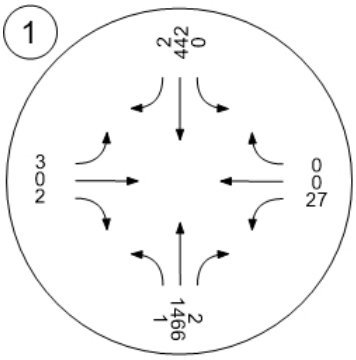
Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane			Yes	Yes
Storage Area [veh]	0	0	2	2
Two-Stage Gap Acceptance			Yes	Yes
Number of Storage Spaces in Median	0	0	2	2

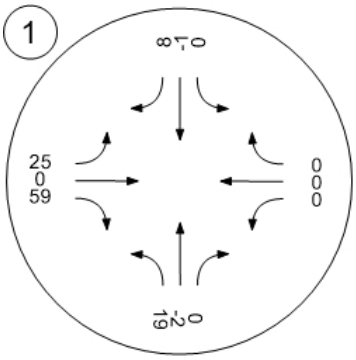
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.02	0.00	0.00	0.01	0.00	0.16	0.01	0.09	0.87	0.01	0.00
d_M, Delay for Movement [s/veh]	8.95	0.00	0.00	19.33	0.00	0.00	26.85	53.46	11.86	239.26	205.00	175.01
Movement LOS	A	A	A	C	A	A	D	F	B	F	F	F
95th-Percentile Queue Length [veh/ln]	0.07	0.00	0.00	0.01	0.01	0.00	0.64	0.64	0.64	3.61	3.61	3.61
95th-Percentile Queue Length [m/ln]	0.50	0.00	0.00	0.09	0.05	0.00	4.86	4.86	4.86	27.54	27.54	27.54
d_A, Approach Delay [s/veh]	0.08			0.03			17.04			236.85		
Approach LOS	A			A			C			F		
d_I, Intersection Delay [s/veh]	3.91											
Intersection LOS	F											

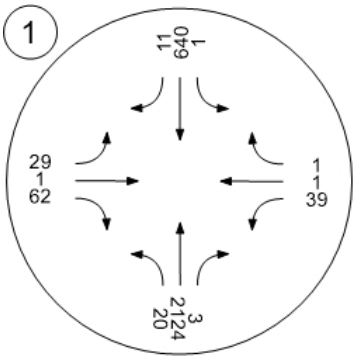
Report Figure 1a: Traffic Volume - Base Volume



Report Figure 1d: Traffic Volume - Net New Site Trips



Report Figure 1f: Traffic Volume - Future Total Volume



APPENDIX C - MOH WARRANTS

Turning Lane Warrants
Worksheet for Four Lane Rural Highways

Highway:	**Highway 12**
Crossroad:	**TWP Rd 381**
Scenario:	**PM Peak - 2037 Background**

Highway Direction A:	**NB**	Usually WB or NB
Highway Direction B:	**SB**	Usually EB or SB
Truck Equivalency (E_T)	**1.7**	MHI Standard: 1.7

NB Data	NBL	NBT	NBR	NB Total
Hourly Vol (veh/h)	**1**	**2126**	**3**	2130
Truck %	**2.0%**	**3.0%**	**2.0%**	3%
Equiv Vol (pce/h)	1	2171	3	2175
Growth Factor	**1.30**	**1.30**	**1.30**	
Future Equiv Vol (pce/h)	1	2822	4	2827
Opposing Conflict?	**1**	**1**	**1**	Yes: 1 No: 0

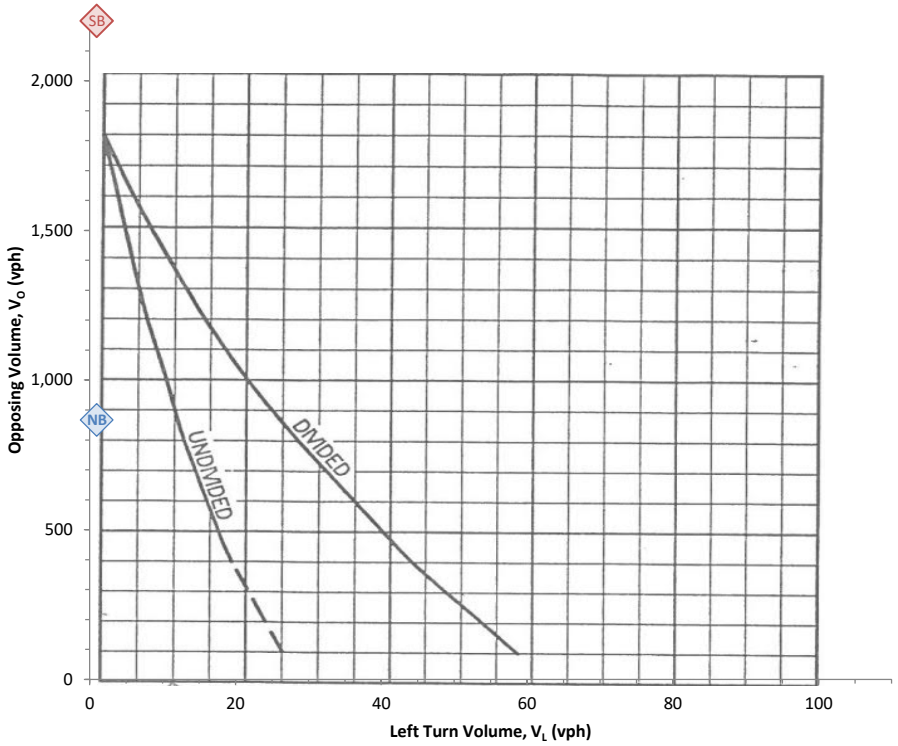
SB Data	SBL	SBT	SBR	SB Total
Hourly Vol. (veh/h)	**1**	**641**	**3**	645
Truck %	**2%**	**5%**	**2%**	5%
Equiv Vol (pce/h)	1	663	3	667
Growth Factor	**1.30**	**1.30**	**1.30**	
Future Equiv Vol (pce/h)	1	862	4	867
Opposing Conflict?	**1**	**1**	**1**	Yes: 1 No: 0

Notes:

- No warrant if the plotted point falls to the left of the applicable line
- Right and left turn lanes are warranted at:
  -Intersections with other Provincial Highways
  -Industrial Access Roads
  -Provincial Campgrounds and Picnic Sites
- Length of turning lane is related to speed. See SP 20618.
- For right turn lane on four-lane highways, advancing volume should be half of the directional volume with no further reduction for left turning vehicles.
- Use the corrected peak hour volumes (vph) projected to the 10th year after construction. See SKS 2.3.1-C (formerly DM 502-3) for correction factors.

Saskatchewan Ministry of Highways and Infrastructure
Warrants for Left Turn Lanes - 4 Lane Rural Highways
Standard Plan STP 20610

Associated Engineering



	Calculated		Plotted	
	NB	SB	NB	SB
Left Turn Volume, V_L	1	1	1	1
Opposing Volume, V_O	867	2827	867	2200

Turning Lane Warrants
Worksheet for Four Lane Rural Highways

Highway:	**Highway 12**
Crossroad:	**TWP Rd 381**
Scenario:	**PM Peak - 2037 Background**

Highway Direction A:	**NB**	Usually WB or NB
Highway Direction B:	**SB**	Usually EB or SB
Truck Equivalency (E_T)	**1.7**	MHI Standard: 1.7

NB Data	NBL	NBT	NBR	NB Total
Hourly Vol (veh/h)	**1**	**2126**	**3**	2130
Truck %	**2.0%**	**3.0%**	**2.0%**	3%
Equiv Vol (pce/h)	1	2171	3	2175
Growth Factor	**1.30**	**1.30**	**1.30**	
Future Equiv Vol (pce/h)	1	2822	4	2827
Opposing Conflict?	**1**	**1**	**1**	Yes: 1 No: 0

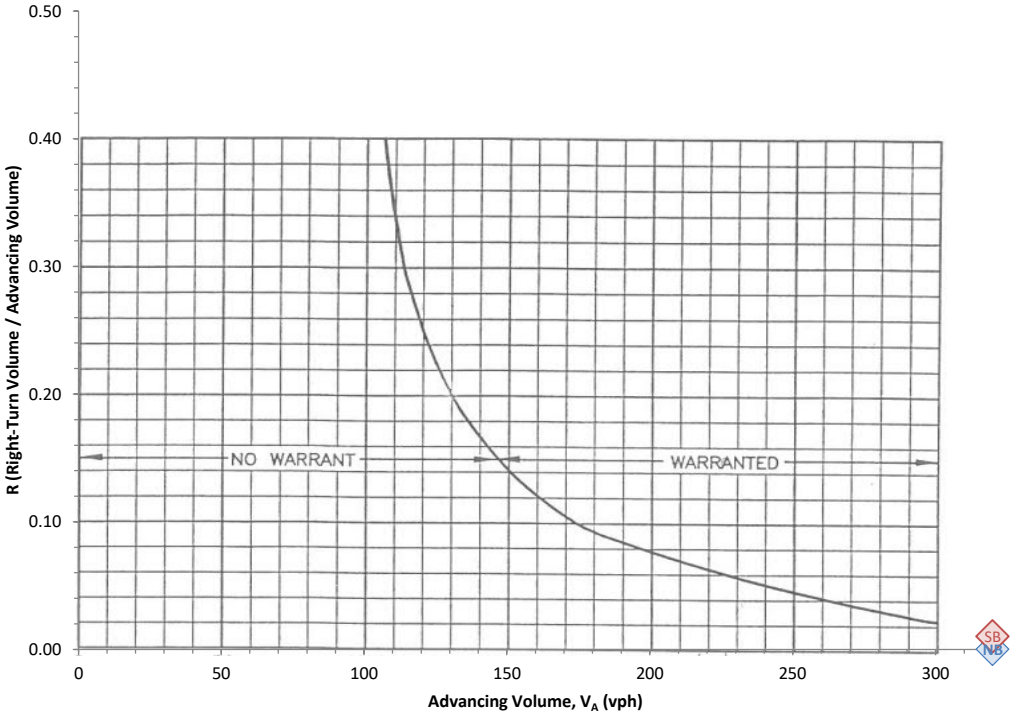
SB Data	SBL	SBT	SBR	SB Total
Hourly Vol. (veh/h)	**1**	**641**	**3**	645
Truck %	**2%**	**5%**	**2%**	5%
Equiv Vol (pce/h)	1	663	3	667
Growth Factor	**1.30**	**1.30**	**1.30**	
Future Equiv Vol (pce/h)	1	862	4	867
Opposing Conflict?	**1**	**1**	**1**	Yes: 1 No: 0

Notes:

- No warrant if the plotted point falls to the left of the applicable line
- Right and left turn lanes are warranted at:
  -Intersections with other Provincial Highways
  -Industrial Access Roads
  -Provincial Campgrounds and Picnic Sites
- Length of turning lane is related to speed. See SP 20618.
- For right turn lane on four-lane highways, advancing volume should be half of the directional volume with no further reduction for left turning vehicles.
- Use the corrected peak hour volumes (vph) projected to the 10th year after construction. See SKS 2.3.1-C (formerly DM 502-3) for correction factors.

Saskatchewan Ministry of Highways and Infrastructure
Warrants for Right Turn Lanes - Rural Highways
Standard Plan 20614

Associated Engineering



	Calculated		Plotted	
	NB	SB	NB	SB
Advancing Volume, V_A	1414	434	320	320
R (V_R / V_A)	0	0.01	0.00	0.01

Turning Lane Warrants
Worksheet for Four Lane Rural Highways

Highway:	**Highway 12**
Crossroad:	**TWP Rd 381**
Scenario:	**PM Peak - 2037 Full Build Out**

Highway Direction A:	**NB**	Usually WB or NB
Highway Direction B:	**SB**	Usually EB or SB
Truck Equivalency (E_T)	**1.7**	MHI Standard: 1.7

NB Data	NBL	NBT	NBR	NB Total
Hourly Vol (veh/h)	**20**	**2124**	**3**	2147
Truck %	**30.0%**	**3.0%**	**2.0%**	3%
Equiv Vol (pce/h)	24	2169	3	2196
Growth Factor	**1.30**	**1.30**	**1.30**	
Future Equiv Vol (pce/h)	31	2820	4	2855
Opposing Conflict?	**1**	**1**	**1**	Yes: 1 No: 0

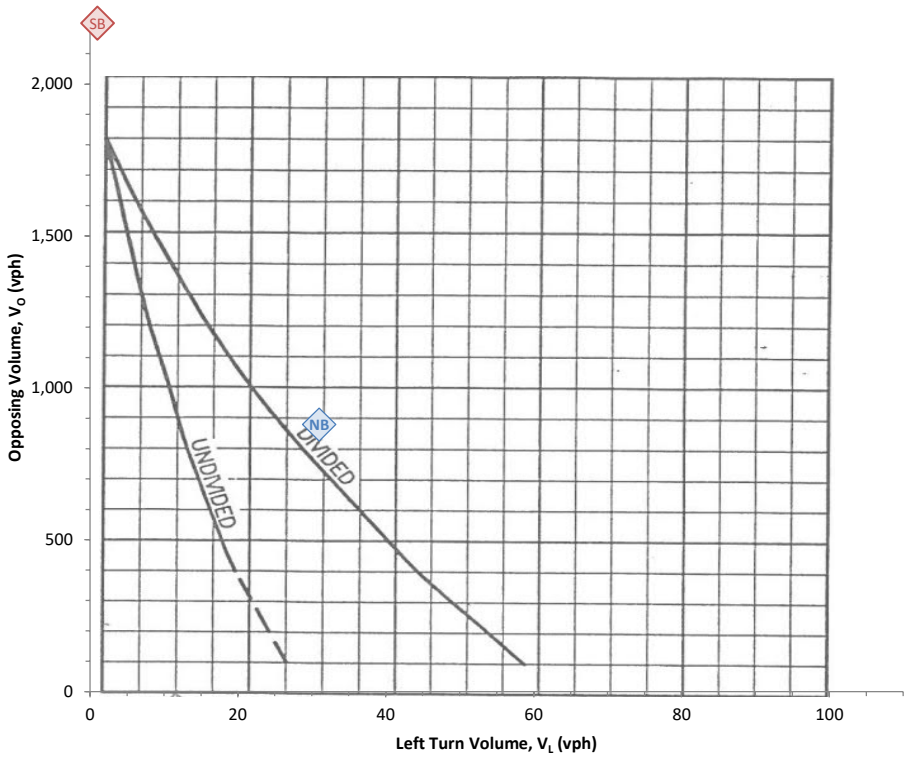
SB Data	SBL	SBT	SBR	SB Total
Hourly Vol. (veh/h)	**1**	**640**	**11**	652
Truck %	**2%**	**5%**	**30%**	5%
Equiv Vol (pce/h)	1	662	13	676
Growth Factor	**1.30**	**1.30**	**1.30**	
Future Equiv Vol (pce/h)	1	861	17	879
Opposing Conflict?	**1**	**1**	**1**	Yes: 1 No: 0

Notes:

- No warrant if the plotted point falls to the left of the applicable line
- Right and left turn lanes are warranted at:
  - -Intersections with other Provincial Highways
  - -Industrial Access Roads
  - -Provincial Campgrounds and Picnic Sites
- Length of turning lane is related to speed. See SP 20618.
- For right turn lane on four-lane highways, advancing volume should be half of the directional volume with no further reduction for left turning vehicles.
- Use the corrected peak hour volumes (vph) projected to the 10th year after construction. See SKS 2.3.1-C (formerly DM 502-3) for correction factors.

Saskatchewan Ministry of Highways and Infrastructure
Warrants for Left Turn Lanes - 4 Lane Rural Highways
Standard Plan STP 20610

Associated Engineering



	Calculated		Plotted	
	NB	SB	NB	SB
Left Turn Volume, V_L	31	1	31	1
Opposing Volume, V_O	879	2855	879	2200

Turning Lane Warrants
Worksheet for Four Lane Rural Highways

Highway:	**Highway 12**
Crossroad:	**TWP Rd 381**
Scenario:	**PM Peak - 2037 Full Build Out**

Highway Direction A:	**NB**	Usually WB or NB
Highway Direction B:	**SB**	Usually EB or SB
Truck Equivalency (E_T)	**1.7**	MHI Standard: 1.7

NB Data	NBL	NBT	NBR	NB Total
Hourly Vol (veh/h)	**20**	**2124**	**3**	2147
Truck %	**30.0%**	**3.0%**	**2.0%**	3%
Equiv Vol (pce/h)	24	2169	3	2196
Growth Factor	**1.30**	**1.30**	**1.30**	
Future Equiv Vol (pce/h)	31	2820	4	2855
Opposing Conflict?	**1**	**1**	**1**	Yes: 1 No: 0

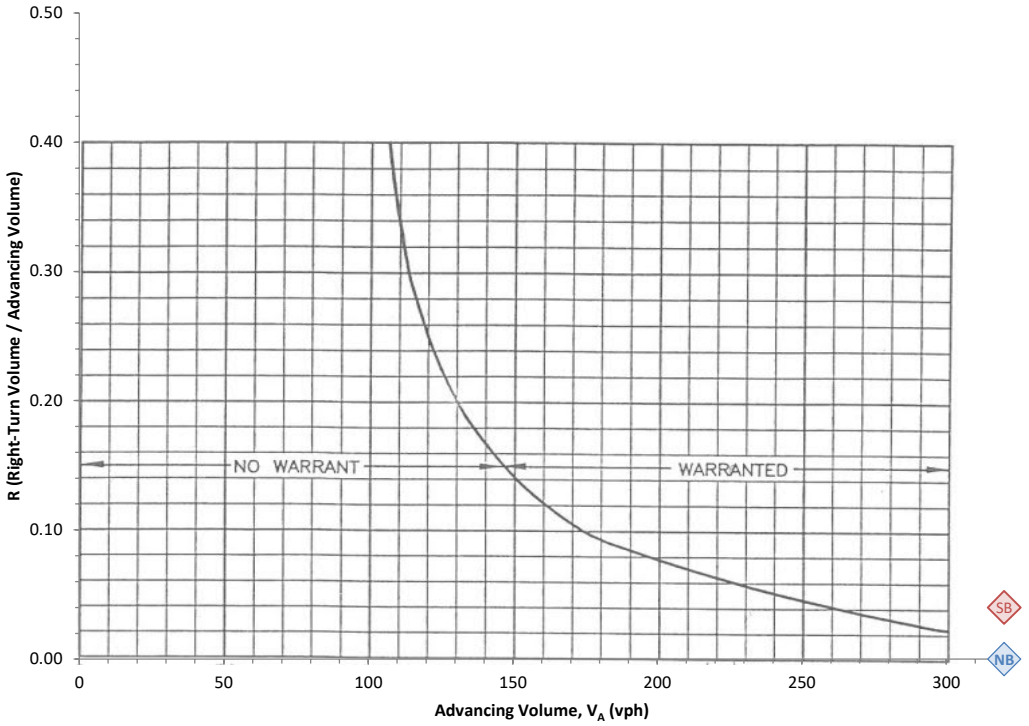
SB Data	SBL	SBT	SBR	SB Total
Hourly Vol. (veh/h)	**1**	**640**	**11**	652
Truck %	**2%**	**5%**	**30%**	5%
Equiv Vol (pce/h)	1	662	13	676
Growth Factor	**1.30**	**1.30**	**1.30**	
Future Equiv Vol (pce/h)	1	861	17	879
Opposing Conflict?	**1**	**1**	**1**	Yes: 1 No: 0

Notes:

- No warrant if the plotted point falls to the left of the applicable line
- Right and left turn lanes are warranted at:
  - -Intersections with other Provincial Highways
  - -Industrial Access Roads
  - -Provincial Campgrounds and Picnic Sites
- Length of turning lane is related to speed. See SP 20618.
- For right turn lane on four-lane highways, advancing volume should be half of the directional volume with no further reduction for left turning vehicles.
- Use the corrected peak hour volumes (vph) projected to the 10th year after construction. See SKS 2.3.1-C (formerly DM 502-3) for correction factors.

Saskatchewan Ministry of Highways and Infrastructure
Warrants for Right Turn Lanes - Rural Highways
Standard Plan 20614

Associated Engineering



	Calculated		Plotted	
	NB	SB	NB	SB
Advancing Volume, V_A	1428	440	320	320
R (V_R / V_A)	0	0.04	0.00	0.04

Appendix E - Policy Compliance Table

P4G Official Community Plan Policy Compliance

Policy	Report Section	Compliance
Section 6.0 Natural and Heritage Resources		
6.3.5 Impacts to Natural and Heritage Resources Subdivisions and development must be designed and constructed to ensure that alterations to the landscape or other natural conditions avoid or mitigate on and offsite impacts to natural and heritage resources.	Section 2.3 Appendix A	✓
6.3.6 Integration of Natural Features Development should integrate and complement natural features and landscapes including the incorporation of natural vegetation and conserved wetlands.	Section 3.1	✓
8.0 Water Resources and Wetlands		
8.3.1 Source Water Protection Development shall not restrict the use of groundwater or surface water or alter the flow of surface water in a way that detrimentally affects other property or the ecology of the drainage system.	Section 4.2 and 4.3	✓
8.3.2 Runoff from Site Development Untreated stormwater runoff from a multi-parcel development should be directed to a retention pond or similar feature to reduce sediment and pollutants inputs into surface water and wetlands.	Section 4.3 Appendix G	✓
8.3.5 Wetlands Protection and Development Development in the District should: a) Avoid impacts to wetlands where reasonably possible; b) Address impacts to wetlands where avoidance cannot be fully achieved; and c) Undertake compensatory mitigation for any negative impacts to significant wetlands from development.	Section 3.1	✓
8.3.6 Least Disturbance to Wetlands Development and subdivision designs that ensure the least possible disturbance and alteration of retained wetlands will be encouraged.	Section 3.1	✓
10.0 General		
10.3.1 Land Use Compatibility Development shall be compatible with surrounding uses.	Section 3.3	✓

Policy	Report Section	Compliance
15.0 Future Urban Growth Areas		
15.3.5 Development Standards for Intended Uses Development standards for intended uses in the Future Urban Growth Areas shall be consistent with the development standards in any adjacent urban municipality to allow for integration with the urban municipality in the future with consideration for the type of use proposed.	Section 4	✓
15.3.9 Multi Parcel Interim Land Use in Future Urban Growth Areas A multi parcel interim use may be permitted in Future Urban Growth Areas provided that: a) The proposal is consistent with more detailed planning for the area; b) Where detailed planning has not been completed for the area, the proposal aligns with the projected future urban land use identified by the adjacent urban municipality; c) It is designed to transition to future urban servicing; d) A site design that limits fragmentation of the parcel is provided; and e) A subdivision design that allows for re-subdivision to urban-sized parcels is provided.	Section 3 and 4	✓
15.3.10 Development Standards for Interim Uses Development standards for interim uses in the Future Urban Growth Areas shall conform as closely as possible to the development standards used in the adjacent urban municipality to allow for integration with the urban municipality in the future with consideration for the type of use proposed.	Section 4	✓
15.3.16 Dedication of Reserves in Future Urban Growth Areas In determining the recommended dedication of municipal reserve land or cash-in-lieu for subdivisions for interim uses in Future Urban Growth Areas, Corman Park shall consider: a) Current and future land use planning and development standards for the area; b) The potential for significant public amenities, including open space recreational opportunities, integrated trail systems, and continuous pedestrian linkages; and c) The costs to Corman Park and the adjacent urban municipality. The adjacent urban municipality shall be consulted regarding dedication of municipal	Section 3.2	✓

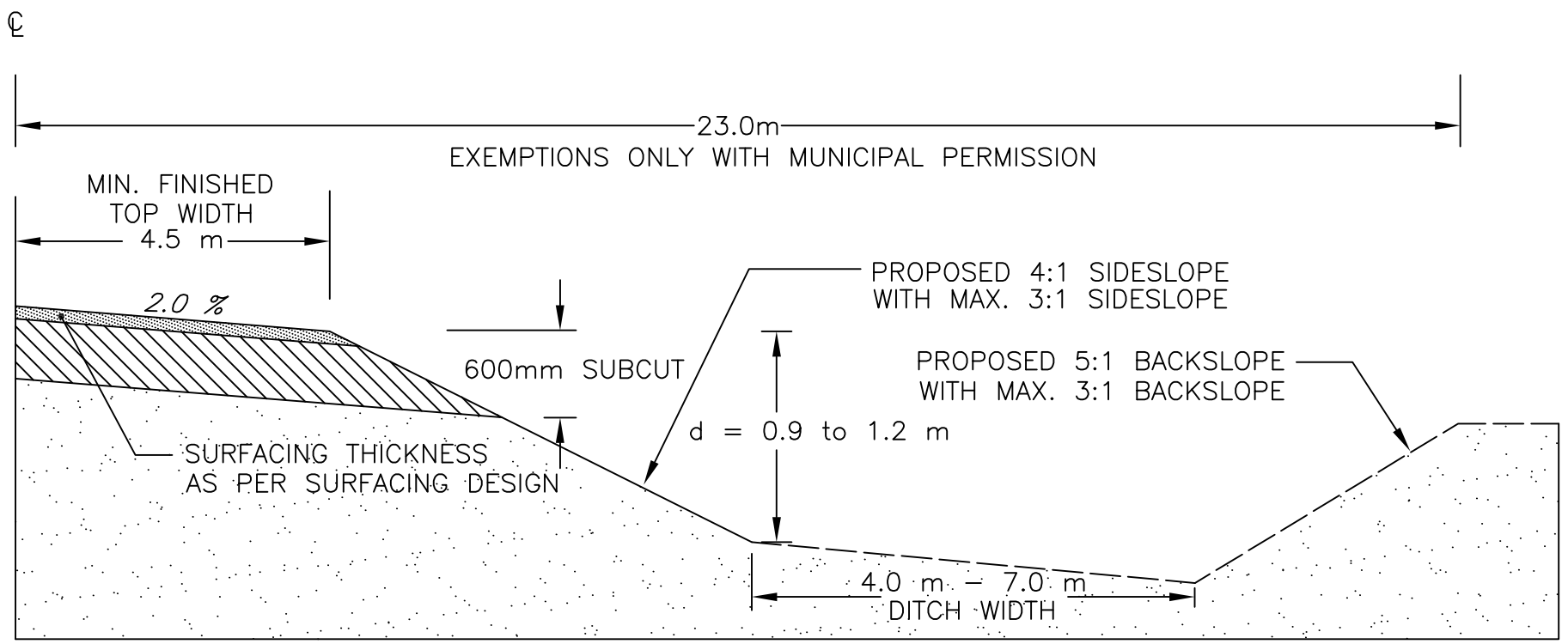
Policy	Report Section	Compliance
reserve and any necessary transfer of dedicated land or cash-in-lieu.		
15.3.22 Designation on Schedule B – District Land Use Map Areas designated as Urban Commercial/Industrial on Schedule B – District Land Use Map shall be further designated as Urban Commercial areas or Urban Industrial areas through Concept Plans or other detailed planning acceptable to the adjacent urban municipality. Urban Commercial development and Urban Industrial development must be located in the areas designated as such on Schedule B – District Land Use Map.		✓
15.2.23 Interim Commercial Uses Interim commercial uses may be considered in the Urban Commercial/Industrial areas. Low capital intensities are encouraged for interim commercial uses in Urban Commercial/Industrial areas.	Section 3.4	✓
15.3.25 Detailed Planning for Multi Parcel Interim Commercial and Industrial Development Detailed planning for multi parcel interim uses in Urban Commercial/Industrial areas shall be required and developed to the satisfaction of Corman Park and the adjacent urban municipality, and may include: a) Subdivision and site design that facilitates a transition to urban development; b) Roadway and other infrastructure planning that facilitates a transition to urban development; c) The proposed water, wastewater and stormwater management systems, and the alignment with existing and future systems; d) Consideration of the location, type and timing of future urban development; e) A transportation impact assessment where the use may result in a significant impact on existing and future road networks; f) A phasing plan; g) Analysis of infrastructure costs; and h) Area grading plan that enables a transition to future urban development.	Section 3 and 4	✓

Policy	Report Section	Compliance
17.0 Green Network Study Area		
17.3.1 Refinement The P4G municipalities will work collaboratively to refine the boundaries of the Green Network Study Area.	Section 2.3 and 3.1	✓
17.3.2 Refinement Criteria Refinement of the boundaries of the Green Network Study Area will be conducted according to a standard, consistent methodology that considers: a) Wetlands; b) Drainage areas; c) Conveyance areas, such as streams, rivers, and swales; d) Habitat corridors for wildlife movement; e) Important viewsheds, such as the viewshed of Wanuskewin Heritage Park; and f) Important ecological areas.	Section 3.1	✓
17.3.3 Refinement Through Concept Plans Prior to the development of a region-wide study, the Green Network Study Area may be refined by a Concept Plan or other detailed assessment.	Section 3.1	✓
17.3.5 Siting of Development Development located within the Green Network Study Area shall: a) Be sited and developed to ensure that impacts are avoided or mitigated; and b) Demonstrate to the satisfaction of Corman Park through supporting environmental and technical plans, that any potential negative impacts have been avoided or mitigated.	Section 3.1	✓
17.3.6 Natural Vegetation and Native Habitat Impacts to natural vegetation and native habitat from development must be minimized.	Section 2.3 Appendix A	✓
17.3.7 Integration with Stormwater Management The Green Network Study Area should be integrated with the regional stormwater management system where feasible. Integration should consider the sensitivity and ecological functions of wetlands and watercourses and their associated riparian areas to ensure sustainability within their context.	Section 3.1 and 4.3 Appendix G	✓

Policy	Report Section	Compliance
17.3.8 Habitat Corridors Habitat corridors should be preserved in the Green Network Study Area to maintain connections for wildlife movement throughout the region.	Section 2.3 Appendix A	✓
23.0 Servicing		
23.3.2 Coordination of Development and Infrastructure Planning Subdivisions and developments must be designed and constructed to respect the planned extensions of infrastructure as detailed in Concept Plans and regional servicing plans.	Section 4	✓
25.0 Wastewater		
25.3.4 Rural On-Site Wastewater Disposal Development in the District shall meet or exceed the on-site sewage treatment requirements established by the Saskatchewan Health Authority as contained in the Review Process for Onsite Wastewater Disposal Systems for Developments and Subdivisions.	Section 4.2	✓
26.0 Stormwater		
26.3.1 Integration of Green Network Study Area Planning for and refinement of the Green Network Study Area will include of stormwater management and drainage.	Section 3.1 Appendix G	✓
26.3.2 Drainage Plans Development must be designed and constructed to avoid or mitigate on and off-site impacts from alteration to drainage.	Section 4.3 Appendix G	✓
26.3.3 Existing Watercourses and Wetlands Existing water courses and wetlands must be retained in their natural state as much as possible. Inflows should be managed to reduce peak flows and minimize pollutant and sediment loading.	Section 3.1 and 4.3 Appendix G	✓
26.3.10 “No Net Impact” Standard On-site stormwater management controls for site development will be encouraged to meet a “no net impact” standard, 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.	Section 4.3 Appendix G	✓

Policy	Report Section	Compliance
27.0 Transportation		
27.3.3 Roadway Access Development must meet all municipal and provincial regulations respecting access to and from provincial highways and municipal roads.	Section 4.4 Appendix D	✓
27.3.4 Minimize New Roadway Construction To make the most efficient use of existing roadway facilities, residential, commercial, and industrial subdivisions and developments will be encouraged to locate adjacent to existing roads that have been designed and constructed to accommodate them.	Section 4.4 Appendix D	✓
27.3.5 Access Requirements for Developments Residential, commercial, industrial, recreational, and regional infrastructure and institutional developments shall have year-round, legal, all weather physical access to a municipally maintained roadway.	Section 4.4 Appendix D	✓
27.3.6 Safe Access and Egress Developments must include safe access and egress from adjacent roadways without disruption of the roadway function. The type and number of access points provided onto municipal roadways may be limited through shared points of access along shared driveways or service roads where applicable.	Section 4.4 Appendix D	✓

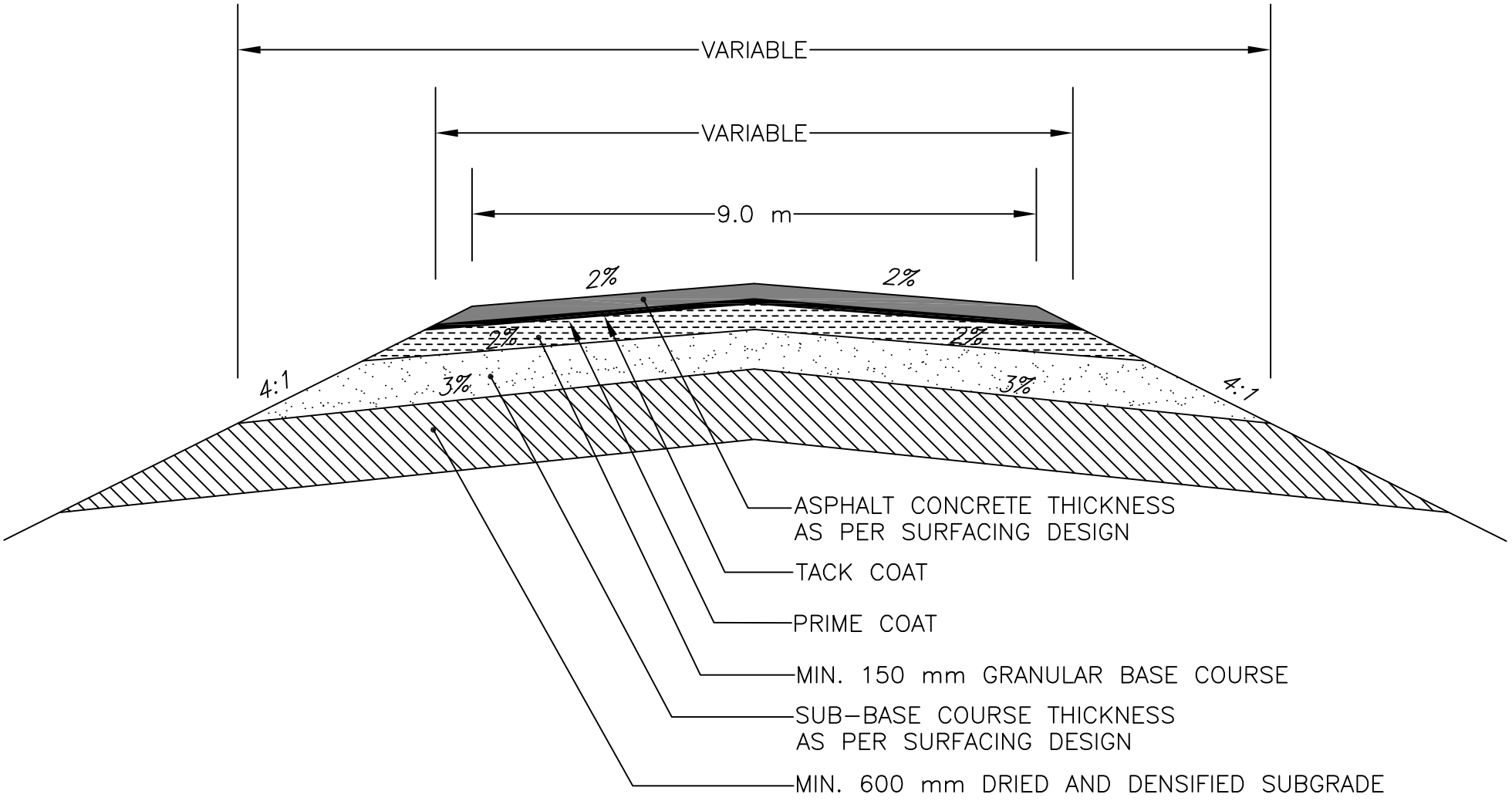
Appendix F - Corman Park Road Standard



Rural Municipality of Corman Park

PUBLIC WORKS
INDUSTRIAL PAVED - TYPICAL CROSS SECTION SUBGRADE

DATE: 2017	SCALE: NTS	DRAWN BY: WOOD E&I



Rural Municipality of Corman Park

PUBLIC WORKS
INDUSTRIAL PAVED - TYP. SURFACING STRUCTURE
ASPHALT CONCRETE

DATE: 2017	SCALE: NTS	DRAWN BY: WOOD E&I

1. Description

- Road design and construction standards for Industrial Paved (asphalt concrete) roads as designed within the Rural Municipality of Corman Park, No. 344 (Municipality).

2. Miscellaneous

- For the purposes of this document, the term “proponent” shall be used to address duties that shall be undertaken by the owner, developer, contractor and engineer interchangeable.
- During construction, the proponent shall be responsible for all traffic accommodation measures. This shall include but not limited to:
  - Proper signing of all access roads whereby traffic (construction or local) may access existing Municipality roads.
  - Traffic gravel shall be applied, if or as necessary for local traffic.
  - Proper measures shall be taken to ensure that local traffic can safely interact with construction equipment.
- The proponent shall ensure that all necessary Haul Road Agreements are in place including any provisions for dust control prior to the hauling of materials.
- Dust control to be applied on any approved detour routes.

3. Required Right-Of-Way Standards

- Minimum allowable Right-of-Way (ROW) purchased shall be 46.0 meters (m).
  - With special approval, the Municipality may permit that a 30.0 m ROW be purchased and utilized.
- The proponent shall be responsible for the purchase of all ROW.
- The minimum allowable ROW for cul-de-sacs and turnabouts purchased shall be 60.0 m with a minimum of 15.0 m radius for the driving surface.
- The road shall be designed and constructed in the center of the ROW unless with special permission of the Municipality.

4. Road Widths and Geometric Standards

4.1. Finished Road Width and Height

- The finished asphalt driving surface (paved width before the start of the asphalt slope) shall be as follows:
  - For fill heights of 3.0 m or less (where the road surface is from 0.0 m to 3.0 m in height), a 9.0 m finished road top width (asphalt) shall be required.
  - For fill heights greater than 3.0 m (where the road surface is from 3.1 metres in height or more), a 9.6 m finished road top width (asphalt) shall be required.

- The road cross-fall (slope) shall be constructed to 2.0% with any curves must be constructed with the proper super-elevation.
- The average shoulder elevation of the road surface should be approximately 0.9 m to 1.2 m above the adjacent ground except in cut areas.
- The subgrade surface shall not be less than 1.5 m above high water level on the ground water table. (ie: level to which free water would rise in a hole sunk in the ground).

4.2. Surfacing and Hydraulic Design

- A grading, surfacing and hydraulic design shall be completed, signed and stamped by a Professional Engineer registered with the Association Of Professional Engineers and Geoscientists of Saskatchewan (APEGS) and licensed to practice (Permission to Consult in this field of expertise) within the Province of Saskatchewan.
- The surfacing structure shall be based upon the Saskatchewan Ministry of Highways and Infrastructure's Shell Curve method and shall be based on a 15 year design life (N_{15}).
- Soils testing shall be in accordance with the Saskatchewan Ministry of Highways and Infrastructure's Standard Test Procedures manual.
- Hydraulic structures (culverts) with significant flows shall be designed (sized) in accordance with the Saskatchewan Ministry of Highways and Infrastructures Hydraulic Manual and shall be based on a Q^{25} flow (1 in 25 year (1:25)) frequency.
  - The Municipality may request that the design be based on a Q^{50} flow (1 in 50 year (1:50)) frequency based on the location (proximity) of any residences upstream of the crossing.
  - The proponent shall apply for, and shall meet all of the listed requirements, an Aquatic Habitat Protection Permit (AHPP) from SaskWatershed Authority for hydraulic passages requiring such.

4.3. Sideslopes

- Sideslopes shall range from 3:1 to 4:1 depending upon situation and with approval from the Municipality.
  - The standard required sideslope shall be 4:1.
    - For road fills ranging from 0.0 to 3.0 m in height, the sideslope shall be 4:1.
    - For road fills ranging in height from 3.0 m to 4.0 m, the toe of slope shall be 12.0 m from shoulder of the road.
    - For road fills greater than 4 m the sideslope shall be 3:1.
  - If upon review by the Municipality, a sideslope of 3:1 may be allowed only with special permission from the Municipality.

4.4. Ditch Bottom Widths

- Ditch bottom widths shall be range from 4.0 to 7.0 m depending upon grade height and backslope requirements.
  - The desirable is 7.0 m for snow storage.

4.5. Backslopes

- Sideslopes shall range from 5:1 to 3:1 depending upon the situation and with approval from the Municipality.
  - The standard required back slope shall be 5:1.
    - A backslope of ranging from a minimum of 3:1 to the standard backslope of 5:1 will be allowed in conjunction with maximizing the ditch bottom width.

4.6. Maximum Road Gradient

- The maximum road gradient allowed shall be 5.0%.
- With special approval by the Municipality, a 6.0% gradient may be allowed.

4.7. Stopping Sight and Intersection Distances

- The stopping sight distance for intersections with any road shall be a minimum of 200 m. This is based upon the SARM guidelines for a 100 km/h road design.
- The minimum length of road (constructed past an approach) shall be 100 m.
  - This is done in order to meet Stopping Sight Distances, snow and ice removal and road maintenance.
- For intersecting roads, the sight triangles shall be clear of any obstructions.
  - The sight triangle shall be a minimum of 85.0 m from the point of intersection on municipal roads and grid intersections and to a maximum of 140.0 m on primary grid roads using 80 km/h design speed; and a minimum of 140.0 m from the point of intersection on municipal roads 200 m for a highway on another heavy haul using 100 km/hr design speed.

5. Snow Clearance Standards

- When shoulder grade elevation is 0.3 m or less above natural surface at 15.0 m to 20.0 m from center line then the backslope must be flattened using a variable slope of 5:1 to a maximum of 3:1.

6. Road Construction

6.1. Clearing and Grubbing

- Timber, brush, duff (vegetation), roots, logs and stumps shall be completely cleared from the surface of the Right-of-Way.
- Debris from clearing and grubbing operations shall not be used in the construction of embankments (any portion of the road structure).
- Debris from clearing and grubbing operations shall not be buried within the Right-Of-Way.

6.2. Removal and Replacement of Topsoil

- All topsoil within the Construction Footprint shall be removed and stockpiled.
  - The Construction Footprint is defined as the area within the cut or fill stakes.
- The Contractor shall install appropriate sediment control to ensure no sedimentation from topsoil stockpiles enters into adjacent water bodies.
- Upon completion of the construction, topsoil shall be replaced to a uniform depth over the Construction Footprint excluding the road surface.
  - The maximum compacted depth of topsoil replaced will be 100 mm.
- Stones (rocks) 75 mm or more in diameter shall be removed and disposed of from the topsoil replaced.

6.3. Drainage (culvert) Installations

- If the foundation is unsuitable, the bottom of the bed shall be sub-cut to a minimum of 0.3 m below the granular backfill layer.
- A geotextile fabric shall be installed to separate the ground surface from the granular materials.
  - A minimum 8 ounce (Geotex 801 or equivalent) nonwoven geotextile shall be used.
- The bedding line shall be shaped to fit the culvert.
- Corrugated metal pipe culverts (CSP) shall be placed with the inside circumferential laps pointing downgrade and with the longitudinal laps at the sides or quarter points. The sections of the culvert shall be firmly joined with coupling bands. Joints shall be as tight as possible.
- Culverts shall be to the following minimum sizes unless larger sizes are required to meet flow requirements:
  - Approach culverts shall be a minimum of 400 mm in diameter.
  - Through grade culverts shall be a minimum of 600 mm in diameter.
- CSP culverts shall have a minimum thickness of 2.0 mm (12 gauge).
- Granular material shall be composed of sand or gravel free from undesirable quantities of soft or flaky particles, loam, and organic or other deleterious material. Granular material shall comply with the following requirements:

Sieve Designation	Percent by Weight Passing Canadian Metric Sieve Series		
	TYPE		
	115	116	10
50 mm	100	-	100
9.0 mm	-	100	-
900 µm	-	30 - 100	-
400 µm	-	15 - 75	-
160 µm	-	0 - 10	-
71 µm	0 - 15	-	0 - 20
Plasticity Index	0 - 6	0 - 6	0 - 6

- For backfilling all types of culverts and bridge abutments, Type 115 shall be used.
- For backfilling subsurface drain pipes, Type 116 shall be used as a filter Material.

- For backfilling curbs, curbs and gutters, sidewalks, driveways, storm sewers, and manholes, catch basins, and other ancillary structures, Type 10 shall be used.
- Earth backfill under the haunches of culverts, except those in approaches not to be paved shall be compacted with mechanical impact tampers.
- After the earth backfill and granular backfill has been placed and compacted around the culvert, the remainder of the embankment shall be constructed by drying the earth material to at least the optimum moisture content and compacted to an average of not less than one-hundred (100) percent of the maximum density as determined by a Saskatchewan Ministry of Highways and Infrastructure Standard Proctor test.
- The earth material above the bedding line shall be placed, simultaneously and uniformly, in lifts on each side of the culvert. In subcut sections, the lift shall extend to the limits of the sub-cut; otherwise the lifts shall extend not less than 15 m from each side of the culvert.
- No objectionable material shall be used within that portion of the embankment above or below the bedding line on culverts through the roadbed.
- The embankment, within three diameters or three span; of the culvert barrel, shall be free from rocks having a dimension of 80 mm or greater when measured in any direction.
- Random riprap shall be installed at all culvert locations where the culvert diameter is greater than 800 mm.
    - A nonwoven geotextile shall be placed prior to the placement of the riprap material.

6.4. Subgrade Embankments

- Earth embankments shall consist of acceptable earth material and rock material free from objectionable quantities of organic matter, frozen soil, stumps, trees, moss, and other unsuitable materials.
- The embankment shall be constructed by placing the material in successive layers.
- The depth of each layer shall not be more than fifteen (15) centimetres (cm) uncompacted. The full width of each segment of each layer shall be bladed with a motor grader at least twice prior to being compacted.
- The slopes and surface of the embankment shall be shaped and trimmed to a uniform smooth surface conforming to the cross-sections shown on the plans, or as staked.
- Stones having a dimension of eight (8) cm or more when measured in any direction shall be removed from the top fifteen (15) cm of the subgrade.
- The following requirements will apply for all embankments:
    - When unsuitable material is encountered below the natural ground surface in embankment areas, the material shall be excavated and removed.
    - The embankment layer (other than at culverts including the sub-cut backfill layer) from 750 mm to 600 mm below the top of the subgrade shall be dried to within 3% of the optimum moisture content.
    - Each layer of the top 600 mm of the subgrade shall be dried to at least the optimum moisture content and compacted to an average of not less than one-

hundred (100) percent of the maximum density as determined by the Saskatchewan Ministry of Highways and Infrastructure Standard Proctor test. The moisture and densities will be considered satisfactory when:

- All individual moisture test results are equal to or less than the optimum moisture content.
- Density test results average not less than one hundred (100) percent of the maximum density.
- All individual density tests are greater than ninety-eight (98) percent of the maximum density.

  - If the moisture existing in the soil is insufficient for compacting to the specified density and for finishing, the proponent may elect to add water.
  - The foregoing requirements will also apply to backfill of subcuts and the embankment required to prepare the beds and backfill drainage structures.

- Approaches to be constructed as per Municipalities Approach Construction policy.

6.5. Traffic Gravel

- Traffic gravel shall comply with Type 106.

Sieve Designation	Percent by Weight Passing Canadian Metric Sieve Series
	TYPE
	106
40.0 mm	-
31.5 mm	-
22.4 mm	100
18.0 mm	63 – 92
5.0 mm	0 – 50
2.0 mm	0 – 35
400 µm	
Fractured Faces	40% Minimum

- A tolerance of 3% in the percent by weight passing the maximum size sieve shall be permitted.

6.6. Traffic Gravel Behind Construction

- Type 106 Traffic Gravel shall be placed and spread on a newly constructed subgrade surface.
- Traffic gravel Type 106 shall not be deposited until the subgrade surface has been compacted (to the required density) and trimmed.
- Traffic gravel shall be dumped and spread uniformly on the subgrade surface as required.
- Traffic gravel shall be applied to the finished surface of all approaches.

6.7. Sub-Base Course

- Sub-base aggregate shall be composed of sound, hard, and durable particles of sand, gravel and rock free from injurious quantities of soft or flaky particles, shale, loam, clay balls and organic or other deleterious material.
- Sub-base course shall comply with the requirements listed in following table:

Sieve Designation	Percent by Weight Passing Canadian Metric Sieve Series
50 mm	100
2.0 mm	0 – 80.0
400 µm	0 – 45.0
160 µm	0 – 20.0
71 µm	0 – 8.0
Plasticity Index	0 – 6

A tolerance of 3% in the percent by weight passing the maximum size sieve shall be permitted providing 100% of the oversize passes the 63.0 mm sieve.

- The thickness of any one compacted lift of sub-base course shall not exceed 120 mm.
- Sub-base courses shall be compacted until no further settlement is apparent and the particles are well keyed into place.
- The finished surface of the sub-base course shall be true to grade and cross section and free of any surface defects, rutting or deformations the placement of the next course.

6.8. Granular Base Course

- Base aggregate shall be composed of sound, hard and durable particles of sand, gravel and rock free from injurious quantities of elongated, soft or flaky particles, shale, loam, clay balls and organic or other deleterious material.
- Base Course Mix (Type 33) shall comply with the requirements listed in following table:

Sieve Designation	Percent by Weight Passing Canadian Metric Sieve Series
18.0 mm	100
12.5 mm	75.0 – 100.0
5.0 mm	50.0 – 75.0
2.0 mm	32.0 – 52.0
900 µm	20.0 – 35.0
400 µm	15.0 – 25.0
160 µm	8.0 – 15.0
71 µm	6.0-11.0
Plasticity Index	0 - 6.0
Fractured Faces (%)	50.0% Minimum
Lightweight Pieces	5.0% Maximum

- A tolerance of 3% in the percent by weight passing the maximum size sieve shall be permitted providing 100% of the oversize passes the 22.4 mm sieve.
- Granular Base Mix shall be spread on dry and unfrozen surfaces and shall not be compacted if the atmospheric temperature is less than 2° Celsius.
- The finished surface of the Granular Base Course shall be true to grade and cross section and free of any surface defects.
- The Granular Base Course shall be considered satisfactory when:
  - It contains no surface defects.
  - The average density meets or exceeds 100% of maximum density.
  - All individual test results are greater than 98% of maximum density.
  - The moisture content is less than or equal to the optimum moisture content.
- A prime coat shall be placed on the finished final lift of Granular Base Course
  - Prime coat shall be placed within 24 hours, weather permitting.

6.9. Asphalt Prime and Tack Coat

- The proponent may elect to use MC-30, an emulsified asphalt primer, road-mixed SS-1, road-mixed SS-1H for the prime coat.
  - If using SS-1 or SS-1H, the SS-1 must be incorporated into the top 25 mm to 50 mm of the Granular Base Course.
- SS-1 or SS-1H emulsified asphalt shall be used as a tack coat.
- The tack coat shall be applied in accordance with the application rates outlined in the following table:

Surface Type	Application Rate (L/m^2)		
	Residual	Undiluted	Diluted (one part water to one part emulsified asphalt)
New Asphalt Concrete	0.14 – 0.18	0.23 – 0.32	0.45 – 0.60

- Potable water shall be used to dilute the emulsified asphalt.
- The tack coat shall be applied in a single application and uniformly across the prepared surface.
- Asphalt for prime coat and tack coat shall not be applied to a prepared surface when:
  - The surface temperature is less than 2° C.
  - The weather is misty, rainy, or if rain is impending.
- Traffic will not be permitted to travel on prime coat until 6 hours after application. After 6 hours, excess asphalt remaining on the surface shall be blotted by sand before traffic is permitted to travel on the surface.

6.10. Asphalt Concrete

- Virgin aggregate used for Asphalt Concrete shall be composed of sound, hard and durable particles of sand, gravel and rock, free from injurious quantities of elongated, soft or flaky particles, shale, clay, loam, ironstone, coal and organic or other deleterious materials.

- Type 150 – 200A asphalt shall be used as bituminous binder.
  - This material shall meet the requirements of Saskatchewan Ministry of Highways and Infrastructure's Specifications for Manufactured Materials (SMM) For Asphalt Cements.
- Hydrated-lime or liquid anti-strip shall be used as an anti-stripping agent.
  - The stripping potential shall not exceed 5% as determined by SMHI Standard Test Procedure (STP 204-15).
  - Liquid anti-stripping agent shall be added at a rate of approximately 1.0% of the weight of liquid asphalt added.
  - The amount of hydrated lime added shall be approximately 1% of the total dry aggregate by weight.
  - The Contractor shall ensure the procedures and equipment used for the addition of hydrated lime anti-stripping agent are adequate to ensure that the hydrated lime is added at a uniform consistent rate.
- Only the following Mix Design Type will be permitted:

Sieve Designation	Percent By Weight Passing Canadian Metric Sieve Series
12.5 mm	100
9.0 mm	76-89
5.0 mm	50-60
2.0 mm	30-48
900 um	19-38
400 um	10-26
160 um	3-10
71 um	2-5
Fracture Minimum %	70 (1 face)
Sand Equivalent Minimum %	45
Los Angeles Abrasion (% loss)	35 (max)
Organic Content (% passing 5 mm)	1.0
Marshal Blows	50
Marshal Stability (kN) at 60ºC min	8
Retained Stability (min %)	75
Marshal Flow Index (mm)	2-4
Air Voids in Mixture	3-5
Voids Filled With Asphalt %	70-80
Min Film Thickness	8.0

- A tack coat shall be applied and allowed to fully cure prior to the placement of the asphalt mix (paving operations).
- Asphalt concrete shall be spread on dry, clean, and unfrozen surfaces.

- Asphalt concrete shall be placed in accordance with the following temperature limitations:
  - Paving may begin, for other than the final lift, when the temperature is 0° C provided the temperature is forecast, by Environment Canada, for the closest location to the project, to reach at least 5° C that day.
  - The final lift of asphalt concrete shall not be placed if:
    - The atmospheric temperature is less than 5° C;
    - The surface temperature is less than 7° C.
- The asphalt concrete mat shall be constructed to a field density range of 97% to 98% of the Marshall Density based on readings from a correlated Nuclear Densometer gauge.
  - The proponent will develop a correlation between the results of the nuclear gauge and the results of the asphalt concrete cores obtained from the compacted lift of asphalt concrete. The density results obtained from the cores will be used to correct the Field Density results obtained from the nuclear gauge.
- The asphalt mat shall be constructed so that:
  - There are no pavement depressions.
  - Longitudinal construction joints from one lift to the next shall be separated by at least 100 mm.
- The minimum and maximum thickness of a compacted lift of asphalt concrete shall meet the following requirements:
  - Minimum asphalt mat thickness shall be 30 mm.
  - Maximum asphalt mat thickness shall be 50 mm.
- The asphalt mix temperature in the paver shall not be less than 110° C.
- Contact faces of curbs, gutters, manholes, and sidewalks shall be coated with asphalt using a hand applicator before placing the asphalt mix.
- When paving is discontinued on the roadway, the asphalt concrete shall be temporarily feathered to a slope of 10 horizontal to 1 vertical. When paving is resumed, the transverse joint shall be straight and have a vertical face when the taper is removed.
- Asphalt mix shall not be placed or allowed to fall on previously laid top lift asphalt concrete or the existing asphalt concrete.
- Transverse construction joints from one lift to the next shall be separated by at least 2.0 m.
- The proponent shall construct the asphalt mat so that there are no areas of:
  - Segregation.
  - Surface defects which may consist of:
    - Roller marks.
    - Open texture.
    - Improper matching of longitudinal and/or transverse joints.
    - Cracking or tearing.
    - Contamination by diesel, hydraulic fluids, detergent or other harmful products.
    - Foreign objects or materials that are detrimental to the asphalt concrete.
    - Clay balls or oversized materials.
  - Any repairs required shall be to the satisfaction and approval by the Municipality.

6.11. Seeding

- Prior to seeding, the area to be seeded shall be true to grade and cross section and free from irregularities.
- The proponent shall harrow the seeded areas immediately after the seeding is completed.
- The seed material shall contain the following blend of seeds:

Seed Mix Common Name	% of Mix
Sheep's Fescue	15
Canada Blue Grass	15
Blue Fescue	15
Hard Fescue	15
Chewings Fescue	15
Creeping Red Fescue	15
Perennial Rye Grass	10

- The seed application rate shall be 14 kg per hectare (31 lbs per acre).
- The Municipality may approve other grass seed mixtures having similar grass seeds or slight changes in mixture percentages.

7. Design and Construction Certification

- The Municipality reserves the right to request any and/or all test result(s) or other associated documentation at any stage of the project.
- Upon completion of the project and prior to the start of the warranty period, the proponent's Engineer and/or engineering firm shall complete and submit a signed and sealed Statutory Declaration stating that all design and construction criteria/specifications in accordance with the parameters aforementioned have been met.
    - The Engineer of Record shall be a Professional Engineer registered with the Association Of Professional Engineers and Geoscientists of Saskatchewan (APEGS) and licensed to practice (Permission to Consult) within the Province of Saskatchewan.
    - The Engineer(s) of Record shall have reviewed and/or been involved with the design and/or construction of the project and shall have firsthand knowledge of the work completed.

Appendix G - Conceptual Stormwater Management Plan

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

TECHNICAL MEMORANDUM

Issue Date:	June 6, 2022	**File No.:**	AERIS
To:	RM of Corman Park	**Previous Issue Date:**	N/A
From:	Karisa Purvis, P.Eng.	**Project No.:**	2022-4710-00
Client:	Nienhuis Contracting Ltd.		
Project Name:	Nienhuis Contracting Advisory Services		
Subject:	Conceptual Stormwater		

1 INTRODUCTION

Associated Engineering (Sask.) Ltd. (AE) has been retained by Nienhuis Contracting Ltd. to provide an updated conceptual drainage plan for the proposed site development in the RM of Corman Park (RM). There are ongoing discussions between the RM, the City of Saskatoon (City), and Nienhuis Contracting Ltd., as this land will eventually be further developed to match Saskatoon's long-term development plan. This memo is intended to provide conceptual baseline levels to be used to evaluate the future stormwater needs of the site.

2 CONCEPTUAL DRAINAGE PLAN

The natural topography of the site indicates that the drainage direction of the development and surrounding land is to the southeast. In general, the area drains from the west, through the development east, then reaches the Highway 12 ditch, and eventually enters into the Opimihaw Creek. The site appears to have two (2) existing low-lying areas that will be filled in during construction. LiDAR data was used to develop contours for the project site and verify where the water would naturally discharge during a storm event. A topographic survey should be completed as part of the detailed design. The natural flow path can be seen in the attached Figure 1.

Site development will need to provide storage volumes for:

- Natural storage volumes due to filling in natural low areas that exist on the site currently as permanent storage;
- Permanent storage of the incremental increase in run-off generation from the development of the site; and,
- Active storage for run-off associated with a 1:100-year storm event.

To determine the small portion of the permanent storage that is required to account for the existing natural storage, the LiDAR contours were used to determine the dead storage volume on-site.

To determine the permanent storage due to incremental development and the active storage requirements, the LiDAR data was utilized to determine the contributing area and general drainage of the site and surrounding lands. The contributing area to the site is approximately 146 hectares and can be seen in the attached Figure 1. The contributing area is comprised of the development itself and a portion of the upstream area to the west.

As the site is undeveloped, it is assumed that the pre-development run-off coefficient is 0.30. Conceptual stormwater plans done in 2021 outlined two (2) post-development scenarios. For this memo, we have focused only on the final heavy industrial post-development scenario. This scenario includes mostly paved surfaces and buildings, with an average C value of 0.9. This updated stormwater plan also now includes two (2) ponds instead of one (1).

The following table summarizes the values that were used in each situation and the resulting stormwater volumes.

Table 2-1
Stormwater Volumes

	North Pond	South Pond
Contributing Area (ha)	114	32
Development C Value	0.9	0.9
Weighted C Value of Catchment Area	0.55	0.89
Permanent Storage Due to Difference in Pre- and Post-Development Flows	41,000 m^3	20,800
Natural Storage Volumes	4,400 m^3	0 m^3
Total Permanent Storage Requirement	45,400 m^3	20,800 m^3
Active Storage for 1:100-year flood event	63,000 m^3	30,600 m^3
Total Storage Requirements	**108,400 m^3**	**51,400 m^3**

The RM of Corman Park should be contacted prior to detailed design to ensure that all drainage and storage pond requirements have been met. The above volumes could be reduced if there were grassed, or landscaped areas incorporated into the development.

An outlet structure restricting the release rate to the 100-year 24-hour average pre-development release rate of 0.37 m^3/s and 0.10 m^3/s for the north and south ponds, respectively. The stormwater would discharge east off the site into the existing natural drainage path in the Highway 12 ditch. Discharge for the north pond will require some highway ditch re-grading, pending approval from the Ministry of Highways. This proposed outlet would need to be confirmed through a topographical survey during detailed design to confirm it is not altering natural drainage patterns.

Once surface runoff is released from the development stormwater ponds into the Highway 12 ditch, the drainage path follows regional drainage as per the P4G Green Network Pilot Project: Report (2019) and P4G North Concept Plan (2022). Runoff from the project area flows east and connects to the South Saskatchewan River via Opimihaw Creek shown on the attached figures from the P4G Green Network Pilot Project: Report.

3 CLOSURE

This memo was prepared for Overpass Farms to provide conceptual stormwater volumes to have discussions with the City and the RM to determine steps moving forward.

Should you have any questions please feel free to contact our office.

Prepared by:

Karisa Purvis, P.Eng.
Project Engineer

PROFESSIONAL ENGINEER
K.R. PURVIS
MEMBER 29148
2022-06-07
SASKATCHEWAN

Reviewed by:

Ryan Karsgaard, P.Eng.
Project Engineer

ASSOCIATION OF PROFESSIONAL ENGINEERS
AND GEOSCIENTISTS OF SASKATCHEWAN
CERTIFICATE OF AUTHORIZATION
ASSOCIATED ENGINEERING (SASK.) LTD.
NUMBER C116
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CIVIL	09763	

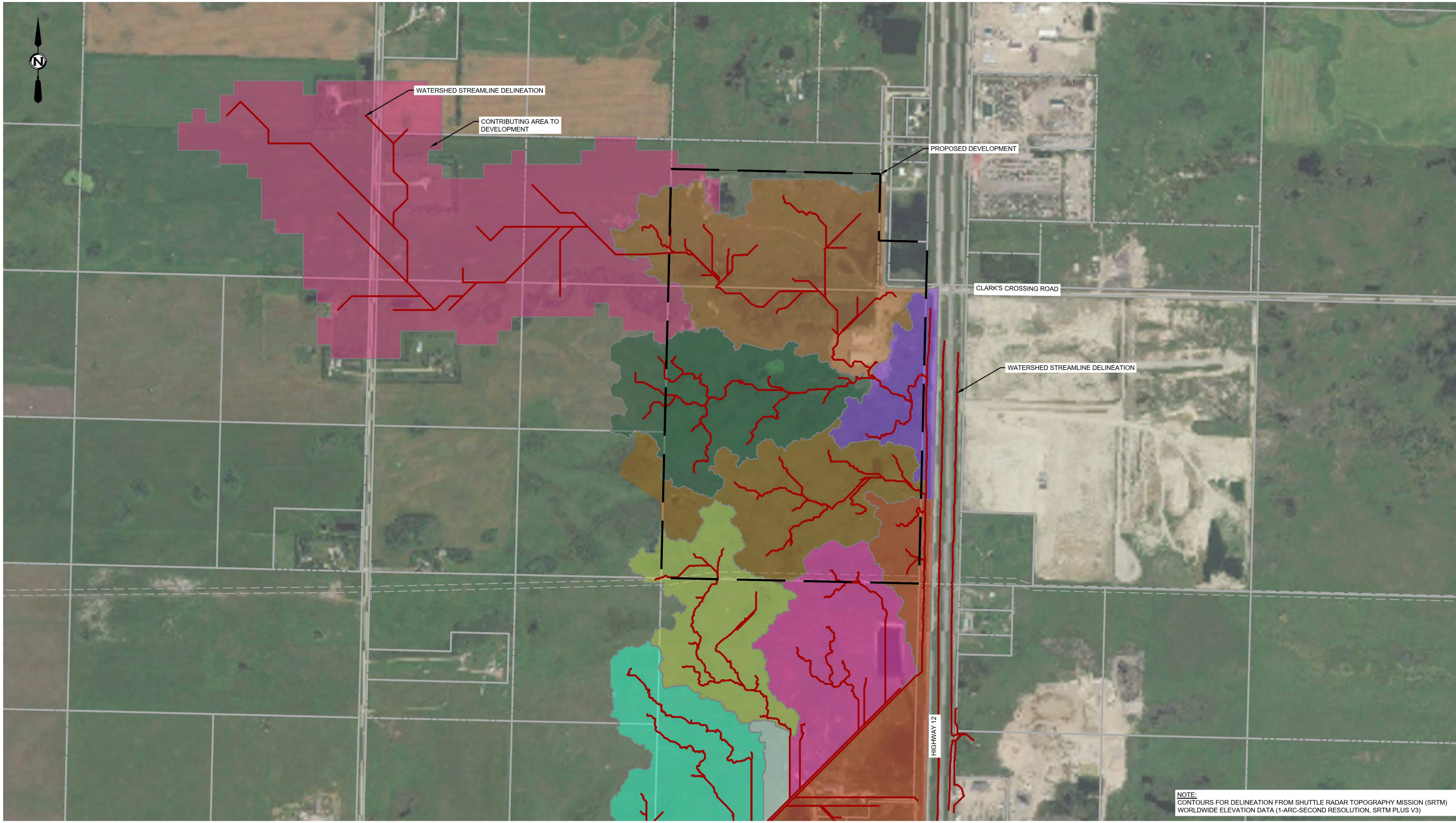
ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date: June 7, 2022

REFERENCES

City of Saskatoon (COS). 2019. Green Network Pilot Project Report. Engineering & Planning, City of Saskatoon, Saskatoon, SK.

City of Saskatoon (COS). 2022. Saskatoon North Partnership for Growth P4G North Concept Plan. Planning and Development, City of Saskatoon, Saskatoon, SK.

IF NOT 25 mm ADJUST SCALES
25 mm
SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



NOTE:
CONTOURS FOR DELINEATION FROM SHUTTLE RADAR TOPOGRAPHY MISSION (SRTM) WORLDWIDE ELEVATION DATA (1-ARC-SECOND RESOLUTION, SRTM PLUS V3)

PLOT DATE: 6/7/2022 9:53:03 AM
SAVE DATE: 5/3/2022 1:37:35 PM SAVED BY: PAWLUSKIM
DWG PATH: \\ae.ca\data\working\sas\2020-4508-00\civil\4508-00-c-fig-1.dwg

Associated Engineering

BEST MANAGED COMPANIES
Platinum member

AE PROJECT No.	20224710.00
SCALE	1:5000
APPROVED	K. PURVIS
DATE	2022MAY03
REV	0
DESCRIPTION	ISSUED FOR MEMO

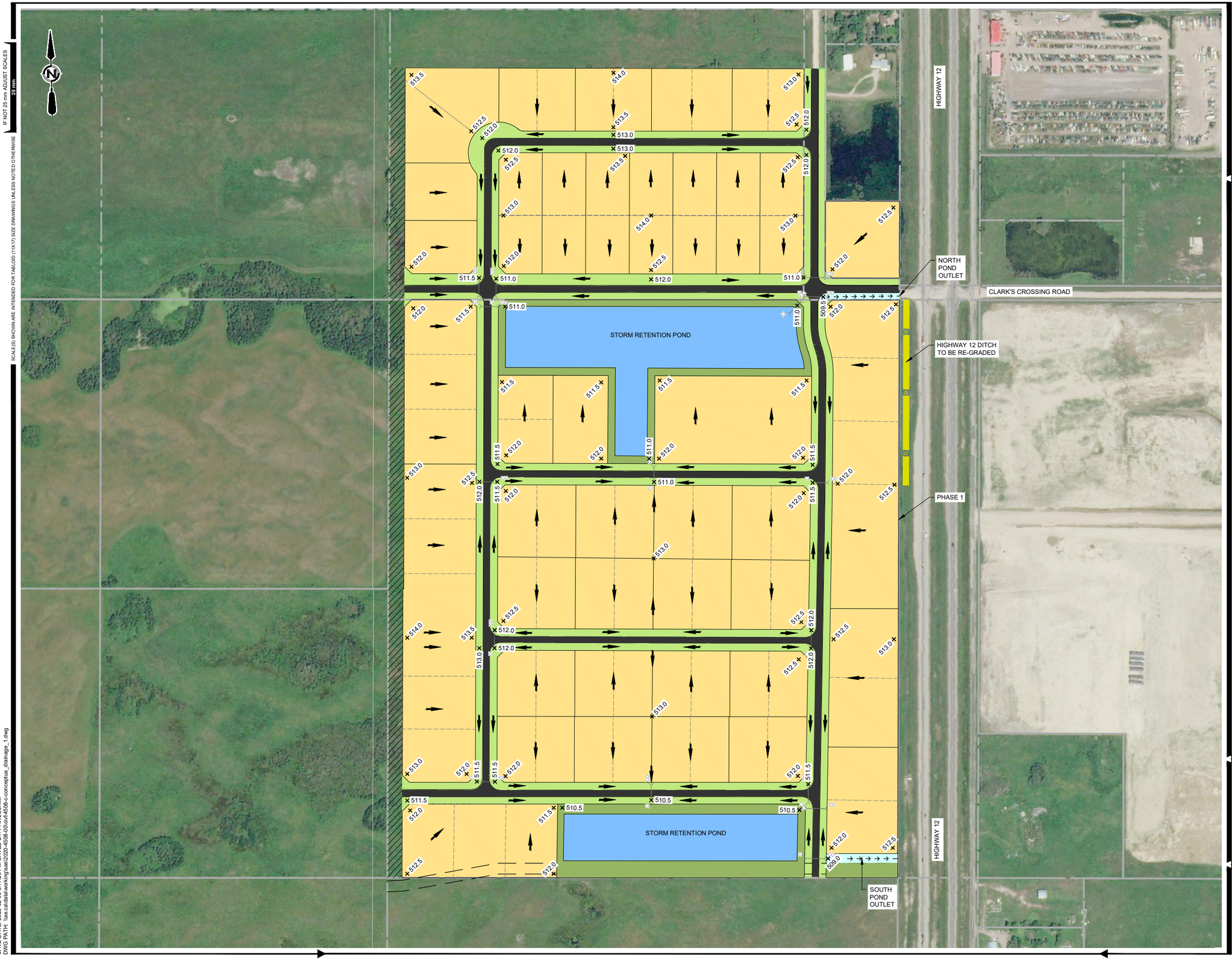
FIGURE 1

NORTH CORMAN BUSINESS PARK
CONCEPTUAL DESIGN REVIEW

CIVIL
PLAN
CONTRIBUTING AREA

IF NOT 25 mm ADJUST SCALES
25 mm

SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE



NOTES:
1. NORTH POND OUTLET IS 509.5 m
2. SOUTH POND OUTLET IS 509.0 m

FIGURE 2

NORTH CORMAN BUSINESS PARK
CONCEPTUAL DESIGN REVIEW

CIVIL
PLAN
DRAINAGE PLAN OVERVIEW

AE PROJECT No.	20224710-00
SCALE	1:2500
APPROVED	K. PURVIS
DATE	2023FEB03
REV	0
DESCRIPTION	ISSUED FOR MEMO

PLOT DATE: 2023-02-06 11:24:51 AM
SAVE DATE: 2023-02-03 3:17:26 PM SAVED BY: PAWLUSKIM
DWG PATH: \\ae.ca\data\working\sas\2020-4508-00\civil\4508-c-conceptua_drainage_1.dwg

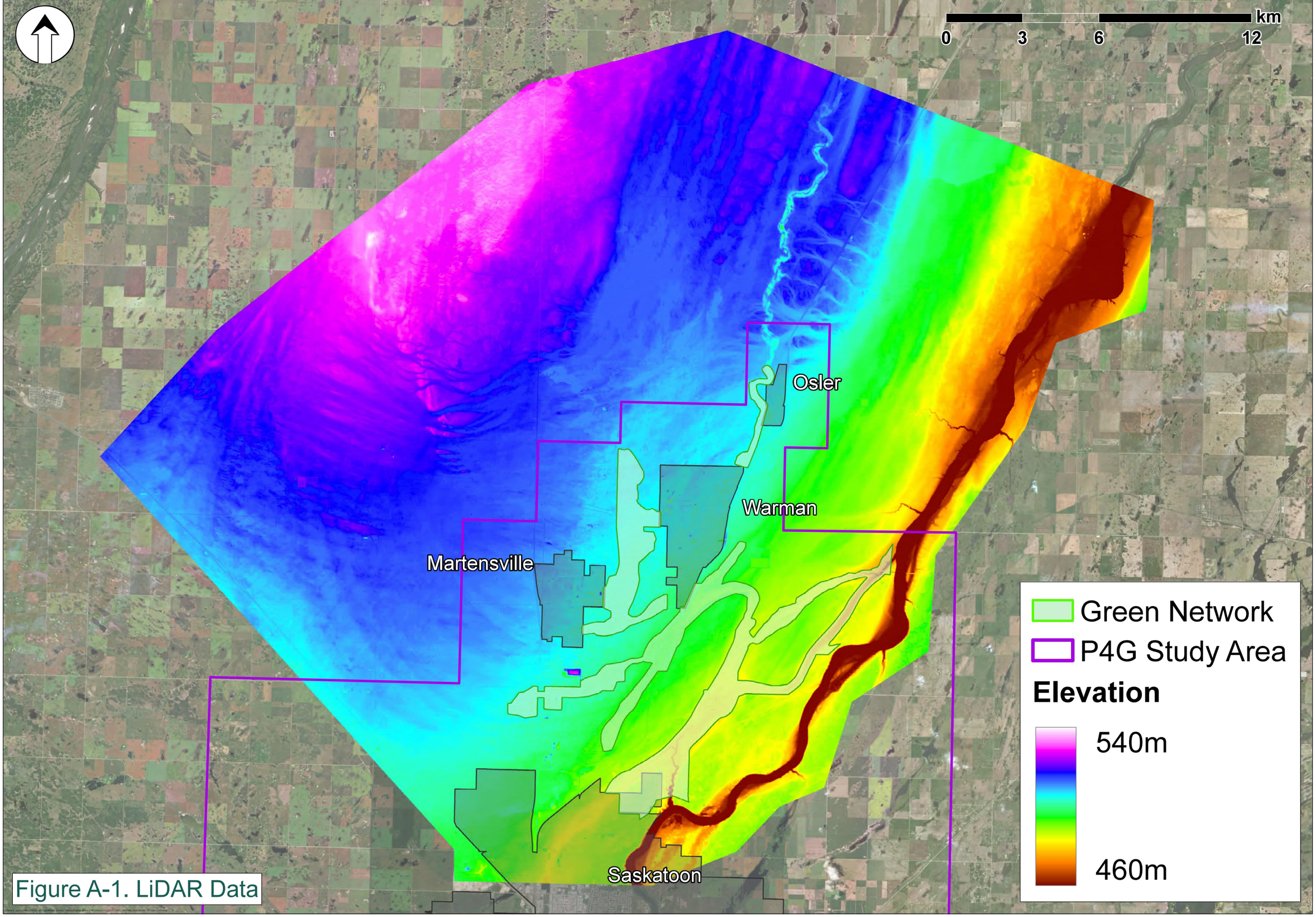


Figure A-1. LiDAR Data

km
0
3.75
7.5
15
Dalmeny
Osler
Warman
Martensville
Development Location
Saskatoon
Green Network
P4G Study Area
Lidar Boundary
Major Flow Path
Watershed Areas
Figure A-2. Watersheds and Major Flow Paths

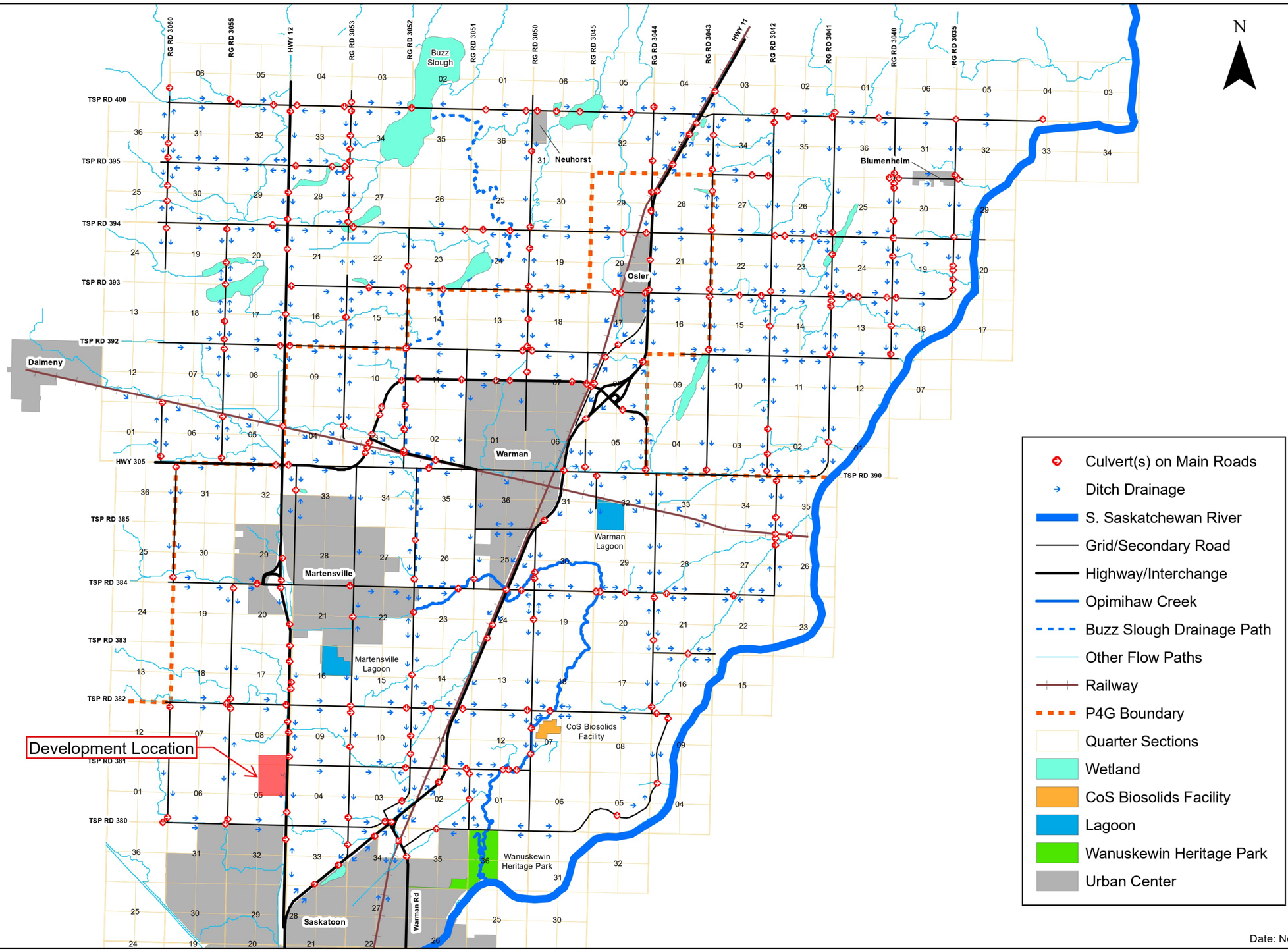


Figure C-1. P4G North Sector Drainage Map

Not for engineering design or construction

		File No.:	civl
		Project No.:	2020-4508
		By:	K. Purvis
Client:	Overpass Farms Inc.	Date:	20-Dec-22
Project:	Corman Park North Business CDR	Chk'd:	
Subject:	Conceptual Stormwater Design	Date:	

Only enter values into blue boxes

Procedure:

Pre-Development Calcs *this calculates peak but average post development also needs to be calculated

1. Determine the closest weather station to your site using:
   \\S-sas-fs-01\workgroups\sas_infrastructure\Resources_IDF Data_IDF_Google_App\IDF_Station_Locator_Localisateur.html
2. Open the text file for the closest weather station from here:
   \\S-sas-fs-01\workgroups\sas_infrastructure\Resources_IDF Data_NEW_IDF_SK
3. Input the corresponding coefficient (A) and exponent (B) for your chosen design storm
4. Based on site conditions, select an approproate method of calculationg time of concentration (T_c)
5. Input remaining data for known variables

Post-Development Calcs

* *Common variables from pre-development calcs will be carried forward*

6. Calculate T_c using the same method as pre-development, summing the various reaches
7. Determine the weighted c by inputing the specific areas and corresponding c values

Site Pond Size

* *Common variables from pre-development and post-development calcs will be carried forward*

8. Determine the appropriate AMC factor based on the chosen design storm
9. Enter in average pre-development rate into release rate
10. Based on climate adaptation considerations, determine an approporate safety factor
11. Refine the time step interval until the "Max Storage Vol Req'd" is near the middle of the table. Insert more rows if required.
12. ***State all of your assumptions below.***

Design Assumptions:

-rational coeff taken from scanned textbook showing slope and return period
- development area was split at a natural tipping point to separate contributing area for the two ponds
- Updates to reflect City of Saskatoon design standards

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		File No.:	civl
		Project No.:	2020-4508
		By:	K. Purvis
Client:	Overpass Farms Inc.	Date:	20-Dec-22
Project:	Corman Park North Business CDR	Chk'd:	
Subject:	Pre-Development Calcs	Date:	

Only enter values into blue boxes

Area = 1210662 m^2 or 121.0662 ha

Time of Concentration - FAA Airport Method:

$$T_c = \frac{(1.1 - C)\, L^{0.5}}{1.44\, S^{1/3}}$$

Where:
L = Length (m)
S = Slope (m/m)
C = Runoff Coefficient

Travel:

Natural conditions - # m from furthest point to the natural pond

L =	2862.5	m
S =	0.001	m/m
C =	0.05	

Time of Concentration Calculation:

T_c = 357.49 mins

FAA Rational Runoff Coefficients

Lawns	0.05-.35
Forest	0.05-0.25
Cultivated Land	0.08-0.41
Meadow	0.10-0.50
Parks, Cemetaries	0.10-0.25
Unimproved Areas	0.10-0.30
Pasture	0.12-0.62
Residential Areas	0.30-0.75
Business Areas	0.50-0.95
Industrial Areas	0.50-0.90
Asphalt Streets	0.70-0.95
Brick Streets	0.70-0.85
Roofs	0.75-0.95
Concrete Streets	0.70-0.95

Intensity Calculation:

$I = A \times T_c^{\,B}$

Where T_c is in Hours

1:100	I =	12.92	mm/hr

Intensity Variables:

Saskatoon Int'l Airport		
1:100	A =	44.1
	B =	-0.688

Flow:

Q = C I A

Where:
Q = Flow m^3/s
C = Runoff Coefficient
I = Intensity (mm/hr)
A = Area (m^2)

Return Rate 96.5 mm/24hr
Average Intensity 1.1169E-06

1:100	Q =	0.22	m^3/s	Peak Flow Rate
1:100	Q =	0.07	m^3/s	Average Flow Rate

***this would be pond release rate

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

		File No.:	civl
		Project No.:	2020-4508
		By:	K. Purvis
Client:	Overpass Farms Inc.	Date:	20-Dec-22
Project:	Corman Park North Business CDR	Chk'd:	
Subject:	Pre-Development Calcs	Date:	

Only enter values into blue boxes

Area = 253853 m^2 or 25.3853 ha

Time of Concentration - FAA Airport Method:

$$T_c = \frac{(1.1 - C)\, L^{0.5}}{1.44\, S^{1/3}}$$

Where:
L = Length (m)
S = Slope (m/m)
C = Runoff Coefficient

Travel:

Natural conditions - # m from furthest point to the property low point

L =	667.5	m
S =	0.001	m/m
C =	0.05	

FAA Rational Runoff Coefficients

Lawns	0.05-.35
Forest	0.05-0.25
Cultivated Land	0.08-0.41
Meadow	0.10-0.50
Parks, Cemetaries	0.10-0.25
Unimproved Areas	0.10-0.30
Pasture	0.12-0.62
Residential Areas	0.30-0.75
Business Areas	0.50-0.95
Industrial Areas	0.50-0.90
Asphalt Streets	0.70-0.95
Brick Streets	0.70-0.85
Roofs	0.75-0.95
Concrete Streets	0.70-0.95

Time of Concentration Calculation:

T_c = 183.69 mins

Intensity Calculation:

$I = A \times T_c^{\,B}$

Where T_c is in Hours

1:100	I =	20.42	mm/hr

Intensity Variables:

Saskatoon Int'l Airport		
1:100	A =	44.1
	B =	-0.688

Flow:

Q = C I A

Where:
Q = Flow m^3/s
C = Runoff Coefficient
I = Intensity (mm/hr)
A = Area (m^2)

Return Rate 96.5 mm/24hr
Average Intensity 1.1169E-06

1:100	Q =	0.07	m^3/s	Peak Flow Rate

1:100	Q =	0.01	m^3/s	Average Flow Rate

***this would be pond release rate

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

		File No.:	civl
		Project No.:	2020-4508
		By:	K. Purvis
Client:	Overpass Farms Inc.	Date:	20-Dec-22
Project:	Corman Park North Business CDR	Chk'd:	
Subject:	Post-Development Calcs	Date:	

Only enter values into blue boxes

Area = 1210662 m^2 or 121.0662 ha

Time of Concentration - FAA Airport Method:

$$T_c = \frac{(1.1 - C)\, L^{0.5}}{1.44\, S^{1/3}}$$

Where:
L = Length (m)
S = Slope (m/m)
C = Runoff Coefficient

Travel:

1.0 # m Across undeveloped area

L =	1665.3	m
S =	0.001	m/m
C =	0.05	

2 # m across lot*

L =	140	m
S =	0.008	m/m
C =	0.60	

3 # m through ditch*

L =	132	m
S =	0.001	m/m
C =	0.10	

*You can have multiple travel calculations depending on how many different surfaces the runoff passes through/over. Adjust Sum Tc accordingly

FAA Rational Runoff Coefficients

Lawns	0.05-.35
Forest	0.05-0.25
Cultivated Land	0.08-0.41
Meadow	0.10-0.50
Parks, Cemetaries	0.10-0.25
Unimproved Areas	0.10-0.30
Pasture	0.12-0.62
Residential Areas	0.30-0.75
Business Areas	0.50-0.95
Industrial Areas	0.50-0.90
Asphalt Streets	0.70-0.95
Brick Streets	0.70-0.85
Roofs	0.75-0.95
Concrete Streets	0.70-0.95

Time of Concentration Calculation:

1.0	T_c =	272.67	mins
2.0	T_c =	20.54	mins
3.0	T_c =	79.79	mins
Sum	T_c =	373.00	mins

Intensity Calculation:

$I = A \times T_c^{\,B}$

Where T_c is in Hours

1:100	I =	12.55	mm/hr

Flow:

$Q = c\, I\, A$

Where:
Q = Flow m^3/s
C = Runoff Coefficient
I = Intensity (mm/hr)
A = Area (m^2)

Intensity Variables:

Saskatoon Int'l Airport		
1:100	A =	44.1
	B =	-0.688

Area Breakdown:

Area #	Coefficient	Area	Description
1	0.05	635387.7	External Contributing Area
2	0.60	560415.3	Gravelled Lots and Roads
3	0.10	14859	Grassed Ditch
Weighted	0.30	1210662	

standards have 0.5 for gravel road or 0.6 for in
standards 0.1 for landscaped areas

1:100	Q =	1.28	m^3/s	Peak Release Rate

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

		File No.:	civl
		Project No.:	2020-4508
		By:	K. Purvis
Client:	Overpass Farms Inc.	Date:	20-Dec-22
Project:	Corman Park North Business CDR	Chk'd:	
Subject:	Post-Development Calcs South Pond	Date:	

Only enter values into blue boxes

Area = 253853 m^2 or 25.3853 ha

Time of Concentration - FAA Airport Method:

$$T_c = \frac{(1.1 - C)\, L^{0.5}}{1.44\, S^{1/3}}$$

Where:
- L = Length (m)
- S = Slope (m/m)
- C = Runoff Coefficient

Travel:

1.0 # m through lot

L =	183	m
S =	0.008	m/m
C =	0.60	

2 # m through ditch*

L =	603	m
S =	0.001	m/m
C =	0.10	

*You can have multiple travel calculations depending on how many different surfaces the runoff passes through/over. Adjust Sum Tc accordingly

FAA Rational Runoff Coefficients

Lawns	0.05-.35
Forest	0.05-0.25
Cultivated Land	0.08-0.41
Meadow	0.10-0.50
Parks, Cemetaries	0.10-0.25
Unimproved Areas	0.10-0.30
Pasture	0.12-0.62
Residential Areas	0.30-0.75
Business Areas	0.50-0.95
Industrial Areas	0.50-0.90
Asphalt Streets	0.70-0.95
Brick Streets	0.70-0.85
Roofs	0.75-0.95
Concrete Streets	0.70-0.95

Time of Concentration Calculation:

1.0	T_c =	23.49	mins
2.0	T_c =	170.53	mins
Sum	T_c =	194.01	mins

Intensity Calculation:

$I = A \times T_c^{\,B}$

Where T_c is in Hours

1:100	I =	19.67	mm/hr

Flow:

$Q = c\, I\, A$

Where:
- Q = Flow m^3/s
- C = Runoff Coefficient
- I = Intensity (mm/hr)
- A = Area (m^2)

Intensity Variables:

Saskatoon Int'l Airport		
1:100	A =	44.1
	B =	-0.688

Area Breakdown:

Area #	Coefficient	Area	Description
1	0.60	244562	
2	0.10	9291	
Weighted	0.58	253853	

1:100	Q =	0.81	m^3/s	Peak Release Rate

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

		File No.:	civl
		Project No.:	2020-4508
		By:	K. Purvis
Client:	Overpass Farms Inc.	Date:	20-Dec-22
Project:	Corman Park North Business CDR	Chk'd:	
Subject:	Site Pond Size	Date:	

Only enter values into blue boxes

Area =	121.0662	ha	
Weighted C =	0.30		
AMC factor =	1.25		
Modified C =	0.38		
T_c =	373.00	minutes	
Design Storm =	1:100	yr	
IDF Coefficient A =	44.1		
IDF Exponent B =	-0.688		
Pond Release Rate	0.068	m^3/s	** *Need to calculate average release rate*
Safety Factor =	1.00	*climate adaptation*	
Time step	110	minutes	

Duration of Storm D (minutes)	Rainfall Intensity I (mm/hr)	Peak Flow Q_{in} (m^3/s)	Volume of Runoff V_{ro} (m^3)	Volume of Release Q_{rel} (m^3)	Required Storage Volume V_{stor} (m^3)	
373	12.5	1.60	35741	1513	34228	
483	10.5	1.34	38891	1959	36932	
593	9.1	1.16	41380	2406	38974	
703	8.1	1.04	43656	2852	40805	
813	7.3	0.93	45512	3298	42214	
923	6.7	0.86	47405	3744	43661	
1033	6.2	0.79	49088	4190	44898	
1143	5.8	0.74	50818	4637	46181	
1253	5.5	0.70	52852	5083	47769	
1363	5.1	0.65	53321	5529	47791	
1473	4.9	0.63	55326	5975	49351	
1583	4.6	0.59	55848	6422	49427	
1693	4.4	0.56	57088	6868	50220	
1803	4.2	0.54	58093	7314	50779	
1913	4.1	0.52	60145	7760	52385	
2023	3.9	0.50	60447	8206	52241	
2133	3.8	0.49	62198	8653	53546	
2243	3.7	0.47	63656	9099	54557	
2353	3.5	0.45	63107	9545	53562	
2463	3.4	0.43	64137	9991	54145	
2573	3.3	0.42	65148	10438	54711	
2683	3.2	0.41	65841	10884	54957	
2793	3.1	0.40	66362	11330	55032	
2903	3.1	0.40	68975	11776	57199	
3013	3.0	0.38	69239	12222	57016	
3123	2.9	0.37	69518	12669	56849	
3233	2.8	0.36	69445	13115	56330	
3343	2.8	0.36	71808	13561	58247	
3453	2.7	0.35	71477	14007	57470	
3563	2.7	0.35	73754	14454	59301	<<Max Storage Vol Req'd
3673	2.6	0.33	73166	14900	58266	
3783	2.5	0.32	72407	15346	57061	
3893	2.5	0.32	74512	15792	58720	

Required Active Storage Volume = **59300** m3

Required Dead Storage Volume = **38550** m3

Required Dead Storage Volume from Lows = **4410** m3

Based on "Modified Rational Method," as described in Appendix A-9 of *Standards for Soil Erosion and Sediment Control for New Jersey,* July 1999

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

		File No.:	civl
		Project No.:	2020-4508
		By:	K. Purvis
Client:	Overpass Farms Inc.	Date:	20-Dec-22
Project:	Corman Park North Business CDR	Chk'd:	
Subject:	Site Pond Size	Date:	

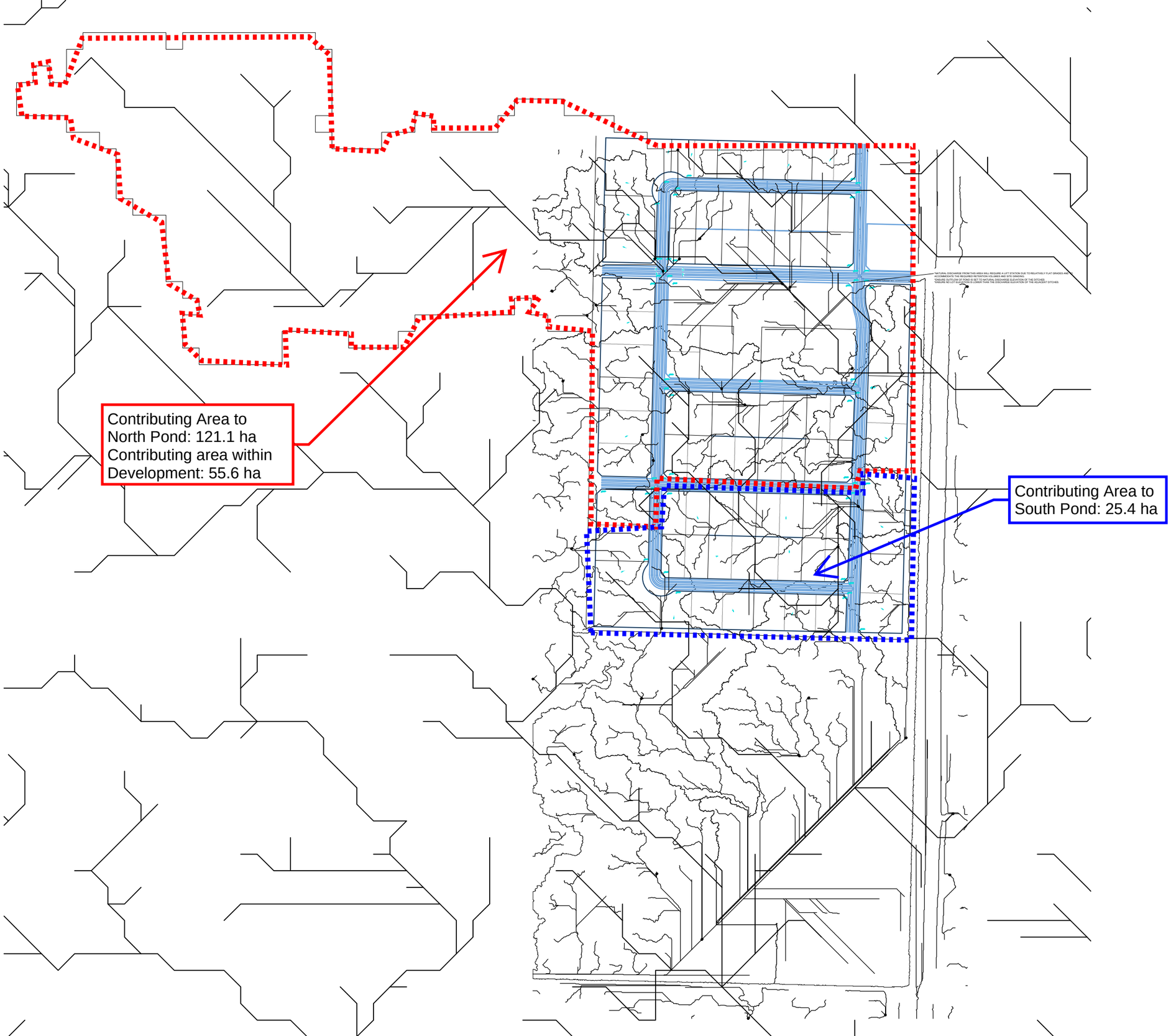
Only enter values into blue boxes

Area =	25.3853	ha	
Weighted C =	0.58		
AMC factor =	1.25		
Modified C =	0.73		
T_c =	194.01	minutes	
Design Storm =	1:100	yr	
IDF Coefficient A =	44.1		
IDF Exponent B =	-0.688		
Pond Release Rate	0.014	m^3/s	** *Need to calculate average release rate*
Safety Factor =	1.00	*climate adaptation*	
Time step	140	minutes	

Duration of Storm D (minutes)	Rainfall Intensity I (mm/hr)	Peak Flow Q_{in} (m^3/s)	Volume of Runoff V_{ro} (m^3)	Volume of Release Q_{rel} (m^3)	Required Storage Volume V_{stor} (m^3)	
194	19.7	1.01	11804	165	11639	
334	13.5	0.70	13928	284	13644	
474	10.6	0.55	15529	403	15126	
614	8.9	0.46	16873	522	16351	
754	7.7	0.40	17915	641	17274	
894	6.9	0.36	19042	760	18282	
1034	6.2	0.32	19791	880	18912	
1174	5.7	0.29	20639	999	19641	
1314	5.3	0.27	21524	1118	20406	
1454	4.9	0.25	21985	1237	20748	
1594	4.6	0.24	22667	1356	21311	
1734	4.4	0.23	23513	1475	22038	
1874	4.1	0.21	23725	1594	22131	
2014	3.9	0.20	24289	1713	22576	
2154	3.8	0.20	25331	1832	23499	
2294	3.6	0.19	25464	1951	23512	
2434	3.5	0.18	26287	2070	24217	
2574	3.3	0.17	26255	2189	24066	
2714	3.2	0.17	26869	2308	24560	
2854	3.1	0.16	27399	2428	24971	
2994	3.0	0.15	27665	2547	25118	
3134	2.9	0.15	28018	2666	25352	
3274	2.8	0.14	28287	2785	25503	
3414	2.7	0.14	28473	2904	25569	
3554	2.7	0.14	29640	3023	26617	
3694	2.6	0.13	29700	3142	26558	
3834	2.5	0.13	29675	3261	26414	
3974	2.5	0.13	30759	3380	27379	
4114	2.4	0.12	30608	3499	27109	
4254	2.4	0.12	31650	3618	28031	
4394	2.3	0.12	31110	3737	27372	
4534	2.2	0.11	30741	3857	26884	
4674	2.2	0.11	31690	3976	27714	
4814	2.2	0.11	32639	4095	28544	
4954	2.1	0.11	32102	4214	27888	
5094	2.1	0.11	33009	4333	28676	
5234	2.0	0.10	32346	4452	27894	
5374	2.0	0.10	33211	4571	28640	
5514	2.0	0.10	34077	4690	29386	<<Max Storage Vol Req'd
5654	1.9	0.10	33246	4809	28436	
5794	1.9	0.10	34069	4928	29141	

Required Active Storage Volume = **29390** m3

Required Dead Storage Volume = **16660** m3


Contributing Area to
North Pond: 121.1 ha
Contributing area within
Development: 55.6 ha
Contributing Area to
South Pond: 25.4 ha

From:	Widynowski, Damon GR
To:	Bill Delainey
Subject:	FW: R1016-21S RM of Corman Park No. 344 - Subdivision Referral
Date:	September 14, 2022 9:25:05 AM
Attachments:	image001.png image002.png R1016-21S TITLE.pdf R1016-21S UD.pdf R1016-21S APP.pdf R1016-21S PPS.pdf mem_Nienhuis_Conceptual_Stormwater.pdf

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Good Morning Bill,

Please see below requested comments from WSA that I received while on vacation. Let me know if you have any further questions.

Thank you,

Damon Widynowski
Government of Saskatchewan
Planning Consultant
Community Planning, Ministry of Government Relations

978 – 122 3rd Avenue North
Saskatoon, Canada S7K 2H6
Bus: 306-933-5382
Fax: 306-933-7720

From: Jessica Phelps <Jessica.Phelps@wsask.ca>
Sent: Thursday, September 8, 2022 9:33 AM
To: Widynowski, Damon GR <damon.widynowski@gov.sk.ca>
Cc: Spencer McNie <Spencer.McNie@wsask.ca>; Caroline Wiebe <Caroline.Wiebe@wsask.ca>
Subject: R1016-21S RM of Corman Park No. 344 - Subdivision Referral

Hi Damon,

Water Security Agency (WSA) Rural Water Services has completed our review of information submitted for the proposed subdivision file R1016-21S – RM of Corman Park No. 344 – NE-05-38-05-W3M.

Rural Water Services staff – North Battleford, have reviewed recent and historical aerial imagery (some historical flooding has been observed in available imagery), conducted a cursory hydrological assessment, and an in office file review. Based on available imagery, portions of the proposed parcel have developed resulting in highly disturbed topography. This area is part of the proposed Nienhuis Contracting Ltd. site development, therefore the proposed subdivision must adhere to the Conceptual Stormwater management plan provided by Associated Engineering.

Any new permanent structures should be built on topographical highs and be constructed away from obvious low spots and drainage runs. The proponent is reminded that they are not to block, divert, drain, fill, or otherwise alter natural drainage conditions without prior approval from WSA. There are no projects or complaints tied to this parcel that would be affected by the subdivision.

WSA has no further comments at this time.

Regards,

Jessica

Jessica Phelps - Geoscientist-in-Training, B.Sc. Hons
Technologist, Rural Water Services
402 Royal Bank Tower 1101 - 101st Street
North Battleford, SK S9A 0Z5
Ph: 306.480.6792
wsask.ca | jessica.phelps@wsask.ca

Please consider the environment before printing this e-mail

Water Security Agency

From: Widynowski, Damon GR <damon.widynowski@gov.sk.ca>
Sent: Thursday, July 21, 2022 4:41:57 PM
To: WSA EMMS Sub Reviews <emmssubreviews@wsask.ca>
Cc: Spencer McNie <Spencer.McNie@wsask.ca>; Caroline Wiebe <Caroline.Wiebe@wsask.ca>
Subject: R1016-21S RM of Corman Park No. 344 - Subdivision Referral

RM of Corman Park No. 344
NE ¼ Section 05-38-05-W3M
Proposed Parcel A – Commercial Use
Proposed Remainder of NE ¼ Section 05-38-05-W3M – Agriculture Use

Our file: R1016-21S
Surveyor file: SC-0241-21

Hello,

Section 13 of *The Subdivision Regulations, 2014* (Regulations), requires us to send a copy of the attached application to your office as it is our opinion that your ministry or agency may be affected by the proposed subdivision.

The subdivision will create the new parcel(s) as identified within the bold dashed line; however, your comments and requirements will apply to **the land that is being subdivided**, ie. all of the source parcel, not just the land inside the bold dashed line.

We are seeking direction from your office to help confirm the suitability of this land for the intended use as outlined in section 14 of the Regulations. It is our understanding that the applicant has already been in contact with WSA and that the conceptual drainage plan attached has received positively.

We kindly request your comments, recommendation and/or reasoning behind that decision within 40 days of receipt of this email so that we may process this application accordingly. **We appreciate that timelines may be impacted by COVID-19.** Please advise if additional time or information is needed before you respond.

Thank you,

Damon Widynowski
Government of Saskatchewan
Planning Consultant
Community Planning, Ministry of Government Relations

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