



**SOUTH AREA DEVELOPMENT PLAN
(SADP) LAND USE AND SERVICEABILITY
STUDY**

June 4, 2024

Prepared for:
RM of Corman Park

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SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY

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Executive Summary

The south portion of the RM has experienced significant growth in the last few years. The Rural Municipality of Corman Park (RM) has retained Stantec Consulting Ltd. (Stantec) to complete the South Area Development Plan (SADP) Land Use and Serviceability Study. Stantec was commissioned by RM to complete a two-phased approach to create, evaluate and support a coherent and sustainable future development plan for the area located within the south RM (South Area Development Plan (SADP) study area, Figure 1.1.

The RM of Corman Park – Phase 1 – Background Report included a desktop review of available information and field reconnaissance, including survey of culverts at sectional junctions, collection of traffic data at twenty intersections, and visual inspection of the condition of all roadways within the study area. The Phase 1 study provides a general inventory of the existing conditions and constraints with respect to groundwater, potable water, wastewater, drainage, the natural environment, transportation, and shallow utility infrastructure. This information was detailed in the RM of Corman Park – Phase 1 – Background Report (November 28, 2023).

Phase 2 of the evaluation focuses on the future development and growth strategy portrayed through the South Area Development land use plan, future servicing strategies, potential future costs, and cost recovery options.

The South Area Development Land Use Plan has been organized into three planning cells:

- **Planning Cell 1**, located west of Highway 11
- **Planning Cell 2**, located between Highway 11 and Highway 16
- **Planning Cell 3**, located east of Highway 16

Planning Cell 1

The principal land use within Planning Cell 1 is envisioned to be country residential with a variety of densities.

Dundurn Rural Water Utility (DRWU) already services the existing part of The Village at Crossmount development (Direct Control District - DCD). It is assumed that the currently undeveloped part of the DCD will also be serviced by DRWU. The existing potable water distribution networks of the providers can be extended to cover the adjacent proposed residential developments. Based on development history within the study area, new water utilities can also be incorporated to service the future residential subdivisions. The households within the agricultural lands are assumed to use groundwater wells for their potable and non-potable water needs.

A new WWTF will need to be reviewed and expedited to be able to service all of the medium density land use within the SADP due to the SADP medium density wastewater needs exceeding the capacity of the Des Nedhe Utilities Corporation Wastewater Treatment Facility (WWTF) current agreement with the RM.



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY

It is assumed that the stormwater management concept at the Village at Crossmount will be progressed to detailed design to service the entire DCD area. This development has sufficient storage in a natural low area described in the Comprehensive Development Reports (CDR).

The Highway Commercial parcels will provide on-site storage for their incremental runoff, while releasing at controlled rates to the Highway 11 west ditch. The general drainage direction of this ditch is to the south.

Based on the changes in traffic volumes on the roadway network, the following intersections and roadways are expected to require improvement:

- Highway 11 & Melness Road / Township Road 352 intersection,
- Township Road 354 / Baker Road – Range Road 3041 to Highway 219,
- Range Road 3053 – Township Road 354 / Baker Road to Township Road 352 / Victor Road,
- Township Road 354 / Baker Road & Range Road 3053 intersection, and
- Highway 219 & Township Road 354 / Baker Road intersection.

Planning Cell 2

The principal land use within Planning Cell 2 is agriculture. An Employment Area, which allows for rural industrial and commercial uses is located immediately east of Highway 11 and north of Township Road 350.

The only land use to require potable water lines in this area is the Employment Area. It is assumed that the proposed employment area will be serviced by DRWU. The existing DRWU potable water lines follow the Highway 11 alignment, being located east of the highway. The households within the agricultural lands are assumed to use groundwater wells for their potable and non-potable water needs.

It is assumed that all the proposed developments in the Employment Area will submit CDRs complete with drainage and stormwater management plans. Industrial Park type developments may size one or two larger size stormwater ponds to service the entire park, whereas smaller developments will provide lot-size stormwater management solutions.

Based on the changes in traffic volumes on the roadway network, the following intersections and roadways are expected to require improvement:

- Melness Road / Township Road 352 – Highway 11 to Range Road 3045,
- Tamke Road / Township Road 350 – Highway 11 to Range Road 3044,
- Range Road 3045 - Melness Road / Township Road 352 to Tamke Road / Township Road 350, and
- Range Road 3045 & Melness Road / Township Road 352 intersection.



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Planning Cell 3

Adjacent to Highway 16 the area is envisioned as an Employment Area allowing for rural industrial and commercial uses. Agriculture is maintained as a separation between future employment area uses and existing and future country residential located in the northeastern portion of the plan area. There is existing commercially zoned parcel in the northeast quarter of Section 11.

Lost River Water Utility (LRWU) already services the four existing Residential Country developments in the northeast corner of the study area. LRWU also services the existing commercial parcel. It is assumed that LRWU will extend its existing network to service the future residential subdivisions north of Highway 394 (Patience Lake Road). It is assumed that SaskWater will extend its existing line with additional potable water lines into this area, as required by its future industrial customers. These customers may incorporate new water utilities at the time. The households within the agricultural lands are assumed to use groundwater wells for their potable and non-potable water needs.

It is assumed that all the proposed developments in the Employment Area will submit CDRs complete with drainage and stormwater management plans. Industrial Park type developments may size one or two larger size stormwater ponds to service the entire park, whereas smaller developments will provide lot-size stormwater management solutions.

Based on existing practices in the already developed residential areas in the northeast corner of this planning cell, it is assumed that:

- Residential developments within quarter-sections with natural storage will preserve these natural areas and they will use them to store the incremental runoff due to development.
- Residential developments within quarter-sections without significant natural storage will provide storm-ponds located in designated areas.
- There may be some potential to utilize the existing storage south of Highway 394, on N 12-36-04 W3M.

Developing the full Employment Area in the southeast corner of this planning cell will pose some drainage related challenges due to the isolated slough system located on these lands. The existing sloughs are relatively long and narrow trenches, parallel to the Highway 16 alignment. The most affected section is 25-35-04 W3M, where approx. 56 hectares (ha) are covered by large sloughs considered National Hydro Network (NHN) permanent waterbodies. It is assumed that the presence of this slough system will limit the developable industrial area, however, it may be repurposed for stormwater management to store the incremental runoff originating from the adjacent industrial development. Infilling this slough system is not recommended, given its natural storage role for large flood events.



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY

Based on the changes in traffic volumes on the roadway network, the following intersections and roadways are expected to require improvement:

- Range Road 3041 – Highway 394 to Highway 16,
- Range Road 3040 – Highway 394 to Highway 16,
- Floral Road / Township Road 360 – Range Road 3041 to Range Road 3040, and
- Range Road 3041 & Floral Road / Township Road 360 intersection.

Infrastructure Implementation

Private developers planning projects within the study area will need to coordinate their detailed designs and infrastructure upgrades for potable water, wastewater, stormwater, road infrastructure and pedestrian pathways including any approaches or tie-ins to the RM's infrastructure, and shallow utilities within the RM of Corman Park. The developers will also be required to coordinate with the individual water utility companies and shallow utility companies.

All development serviceability, designs and infrastructure upgrades including an opinion of probable cost should be submitted to the RM for their review and approval as part of the service agreement process and prior to proceeding with the development. Costs associated with the designs, construction, maintenance, and usage fee agreements will be the responsibility of the developer. The RM of Corman Park should not incur any costs associated with new infrastructure.

It is assumed that private developers planning Country Residential Estates, Country Residential, Highway Commercial, Employment or Community Service projects and Agriculture areas within the study area, will be utilizing holding tanks, conventional septic systems, advanced treatment systems or mound systems, and they will need to coordinate their development serviceability, detailed designs and infrastructure upgrades with the RM. If the RM chooses to build their own WWTF, it is recommended the RM consider a location in proximity to both the lands designated as Medium Density Country Residential areas and the South Saskatchewan River. It is assumed the cost of a new WWTF will be the responsibility of the RM.

Costs have not been included for expansion of the Des Nedhe Utilities Corporation WWTF beyond the current capacity of 217 m³/day. It is assumed that any expansions done to the WWTF would be completed by the English River First Nation and it would be recovered through user fees.

Upgrades to roadways and intersections within the RM will be required. The details of the improvements required should be determined through further study at the time of the development as there may be an opportunity to share costs of RM roadway upgrades with the adjacent developers.



Acronyms / Abbreviations

AAFC	Agriculture and Agri-Food Canada
ac	Acre
ADT	Average Daily Traffic
AHPP	Aquatic Habitat Protection Permits
BOD	Biochemical Oxygen Demand
CoS	City of Saskatoon
CDR	Comprehensive Development Report
DCD	Direct Control District – The Village at Crossmount
DFO	Department of Fisheries and Oceans
DRWU	Dundurn Rural Water Utility
DUIS	Downstream Use and Impact Study
ENV	Ministry of Environment
km ²	Square kilometers
ha	Hectare
HCB	Heritage Conservation Branch
HRIA	Heritage Resource Impact Assessment
LRWU	Lost River Water Utility
LS	Lift Station
MOA	Ministry of Agriculture
MoH	Ministry of Highways
NHN	National Hydro Network
P4G	Saskatoon North Partnership for Growth
RM	Rural Municipality of Corman Park
SADP	South Area Development Plan
SHA	Saskatchewan Health Authority
SOCC	Species of Conservation Concern
SSR	South Saskatchewan River
SWMP	Storm Water Management Plan
TAC	Transportation Association of Canada
TIA	Traffic Impact Assessment
TSS	Total Suspended Solids
WHPA	Wildlife Habitat Protection Act
WSA	Water Security Agency
WWTF / WWTP	Wastewater Treatment Facility / Plant



1 INTRODUCTION

The south portion of the RM of Corman Park (RM) has experienced significant growth in the last few years. The RM has retained Stantec Consulting Ltd. (Stantec) to complete the South Area Development Plan (SADP) Land Use and Serviceability study.

The project area is approximately 120 km² in size and it is defined by the South Area Development Plan (SADP) boundary shown in Figure 1.1.

The SADP Land Use and Serviceability Study includes the following components:

- A summary of the land use plan and planning assumptions developed for the SADP study area;
- An overview of the SADP study area discussing existing drainage, water and wastewater infrastructure, the existing road network, a groundwater summary and a natural area screening summary;
- The proposed SADP servicing strategy for potable water, groundwater, wastewater, stormwater, transportation and shallow utilities,
- An SADP implementation plan discussing development phasing and a summary of costs and costing assumptions.



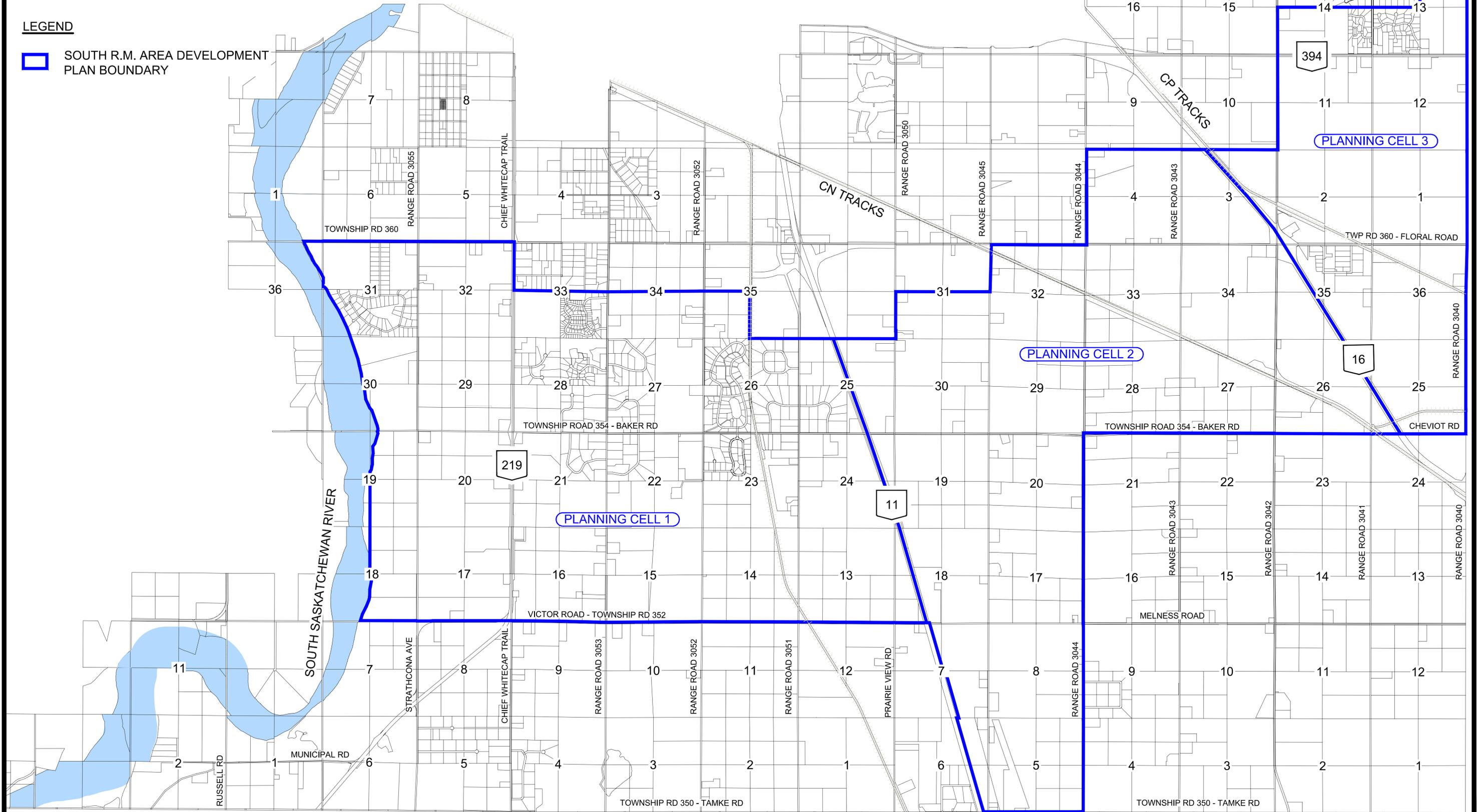


SOUTH R.M. AREA DEVELOPMENT PLAN

FIGURE 1.1 PROJECT STUDY AREA

LEGEND

 SOUTH R.M. AREA DEVELOPMENT PLAN BOUNDARY



2 LAND USE PLAN

This section provides an overview of the SADP land use plan and the planning assumptions used to complete the SADP Serviceability.

The SADP land use plan, as shown in Figure 2.1, has been organized into three planning cells:

- **Planning Cell 1** (located west of Highway 11),
- **Planning Cell 2** (located between Highway 11 and Highway 16), and
- **Planning Cell 3** (located east of Highway 16).

2.1 PLANNING CELL 1

The principal land use within Planning Cell 1 is envisioned to be country residential in a variety of densities. This is a continuation of existing country residential development already located within the Planning Cell 1 area and within the P4G lands directly to the north.

The **Country Residential Estate** land use proposes the development of larger lot country residential to accommodate minor agricultural/hobby farm pursuits such as the keeping and training of horses. The proposed location of this land use is adjacent to existing larger lot country residential development.

The **Country Residential** land use, with proposed lot sizes of 1.0 ha to 4.05 ha in size, allows for on-site wastewater disposal in the form of septic fields. This size of lots allows for one septic field with sufficient space to construct a new septic field in the future, when required. The areas proposed for this form of country residential development are generally located in areas with water line capacity of 100 mm or less and in other areas water lines will need to be installed to facilitate this proposed density.

Medium Density Country Residential land uses are proposed in the northern portion of the planning area to take advantage of proximity to existing higher capacity waterlines (150 mm to 300 mm) and the potential to connect to the Des Nedhe Utilities Corporation WWTF. Proximity to wastewater treatment facilities is an important consideration for medium density country residential. The lot sizes of 0.2 ha (0.5 ac) or less are not sufficient for an on-site septic field.

The **Crossmount Direct Control District** reflects the existing and proposed development for the Crossmount aging-in-place community. The Crossmount development provides a variety of housing forms as well as commercial (agri-tourism), small agricultural (orchards) and health services.

Highway Commercial development is proposed at the intersection of Highway 11 and Township Road 354. This location takes advantage of its proximity to Saskatoon as well as existing and future country residential development on the west side of Highway 11.

There is existing commercial zoned land that is reflected on Figure 2.1 adjacent to the north plan boundary in the northeast quarter of Section 32.



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY

2 LAND USE PLAN

Agriculture land use will continue to be supported adjacent to the South Saskatchewan River. A number of the lands adjacent to the river have been identified as having species of conservation concern, as well as heritage resources.

The Cranberry Flats Conservation Area is identified under the **Conservation** land use. This land use identifies lands that are environmentally sensitive areas and natural areas.

Existing **Recreation** land uses have been identified which include the Riverside Country Club located adjacent to the South Saskatchewan River and the Grasswood Horse Park located adjacent to Range Road 3052.

The lands adjacent to Township Road 352, on which Corman Park School and South Corman Park Community Association are located, has been identified as a **Community Services** land use.

The existing **South Saskatoon Landfill** has been identified. Development within the vicinity of the landfill will need to comply with provincial landfill setback requirements.

2.2 PLANNING CELL 2

The principal land use within the Planning Cell 2 between Highway 11 and 16 is agriculture. The proposed land use will continue to support agricultural activities and an agricultural lifestyle.

The lands identified as **Agricultural Research Lands** are owned by the University of Saskatchewan. The intent of this land use is to recognize the valuable research conducted on these lands and ensure that new developments on neighbouring lands do not unduly interfere with the continuation of these activities.

An **Employment Area**, which allows for rural industrial and commercial uses, is identified in the southern portion of this area adjacent to Highway 11. It is recommended that commercial development be located directly adjacent to Highway 11 to take advantage of highway exposure and to provide a visual buffer to more industrial uses located within the Employment Area. The location of the Employment Area located adjacent to Highway 11 and at the intersection of Highway 11 and Township Road 354 takes advantage its proximity to Saskatoon as well as existing and future country residential development on the west side of Highway 11.



2.3 PLANNING CELL 3

The area adjacent to Highway 16 is envisioned as an **Employment Area** allowing for rural industrial and commercial uses. The location of the Employment Area takes advantage of existing multi-modal transportation opportunities in the form of access to Highway 16 and CP Railway lines. CP Railway spur lines are currently in use by existing adjacent businesses and there is opportunity for further expansion. Similar opportunities should be considered for the CN railway line located in the southern portion of the Employment Area. The Employment Area is a continuation of employment opportunities adjacent to existing rural industrial and commercial uses along Highway 16 identified in the P4G area to the north. As part of the Employment Area, commercial uses should be considered directly adjacent to Highway 16 to take advantage of the of the high visibility location and access by the traveling public. Commercial uses also provide a visual buffer between highway travelers and more industrial uses located behind.

Agriculture is maintained as a separation between future employment area uses and existing and future country residential located in the northeastern portion of the plan area.

The continuation of **Country Residential** is proposed in the northeastern portion of the plan area. Proposed densities allow for on-site servicing. This use aligns with country residential development that is envisioned in the P4G directly to the west and north of the plan area.

There is existing commercially zoned land that is reflected on the map in the northeast quarter of Section 11.

2.4 LAND USE INTENTS

Below is the intent of each proposed land use identified in the land use plan.

Agriculture: The intent of this land use is to preserve large blocks of agricultural land and avoid its premature fragmentation through subdivision.

Agricultural Research Lands: Addresses lands that are owned by University of Saskatchewan. The intent is to recognize the valuable research conducted on these lands and ensure that new developments on neighbouring lands do not unduly interfere with the continuation of these activities.

Commercial: The intent of this land use is to accommodate commercial uses that are compatible with rural environments and do not require an urban level of service.

Community Services: To accommodate uses that provide programming, services, or amenities that contribute to the physical, social, and mental well-being of the RM's residents.

Conservation: This use identifies lands that are environmentally sensitive areas and natural areas.

Country Residential: The intent of this land use is to accommodate multi-parcel country residential development with lot sizes of 1.0 ha (2.47 ac) – 4.05 ha (10 ac), which allow for on-site servicing.



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY 2 LAND USE PLAN

Country Residential Estate: The intent of this land use is to accommodate multi-parcel country residential development with large enough lots 4.05 ha (10 ac) – 6.07 ha (15 ac) to accommodate minor agricultural pursuits such as the keeping of horses.

Employment Area: The intent of these lands is to accommodate a variety of commercial and industrial uses that are compatible with rural environments and do not require an urban level of service.

Highway Commercial: The intent of the land use is to accommodate commercial development along the Highway 11 corridor.

Medium Country Residential: The intent of the Medium Density Country Residential land use is to provide for comprehensively planned multi-parcel country residential subdivisions with piped water and wastewater with lot sizes of 0.2 ha (0.5 ac) or less.

Landfill: This use identifies an existing land use. Development in proximity to it will be required to provide separation distances based upon provincial requirements.

Crossmount Direct Control District: The intent of this land use is to allow for the variety of housing forms that have been developed and are proposed for the Crossmount aging-in-place community/agri-tourism commercial development.

Recreation: The intent of this land use is to accommodate active and passive recreation development.



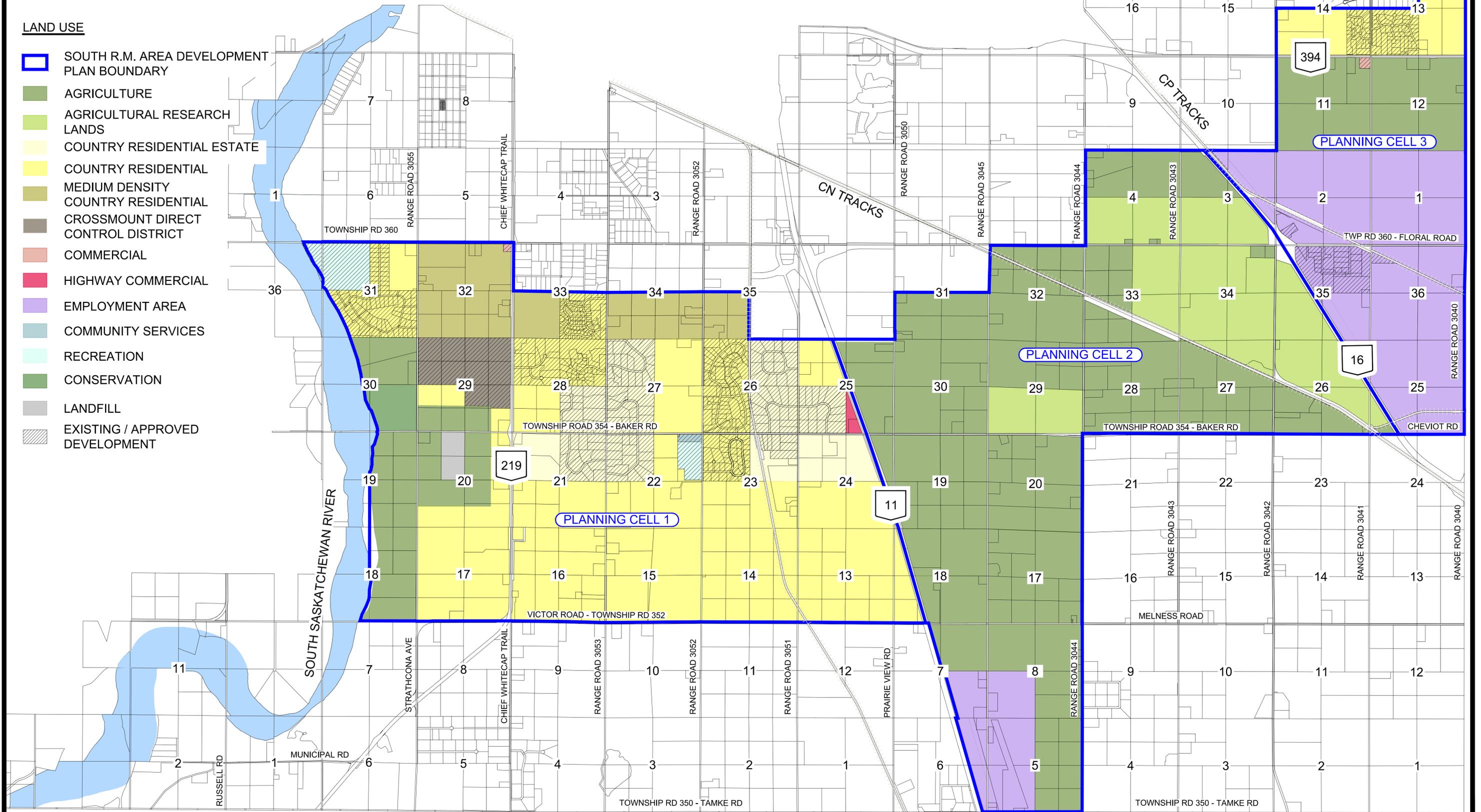


SOUTH R.M. AREA DEVELOPMENT PLAN

FIGURE 2.1 LAND USE CONCEPT

LAND USE

- SOUTH R.M. AREA DEVELOPMENT PLAN BOUNDARY
- AGRICULTURE
- AGRICULTURAL RESEARCH LANDS
- COUNTRY RESIDENTIAL ESTATE
- COUNTRY RESIDENTIAL
- MEDIUM DENSITY COUNTRY RESIDENTIAL
- CROSSMOUNT DIRECT CONTROL DISTRICT
- COMMERCIAL
- HIGHWAY COMMERCIAL
- EMPLOYMENT AREA
- COMMUNITY SERVICES
- RECREATION
- CONSERVATION
- LANDFILL
- EXISTING / APPROVED DEVELOPMENT



3 SITE OVERVIEW

3.1 EXISTING DRAINAGE

The SADP study area falls within three main watersheds named The Beaver (Brightwater) Creek at the Mouth, South Saskatchewan River at the City of Saskatoon (CoS), and South Saskatchewan River at St. Louis. Table 3.1 provides the study area breakdown for each watershed drainage area per planning cell.

Table 3.1 Study Area Watershed Characteristics

Study Area Watershed	Part of AAFC* Watershed	General Drainage Directions	Drainage Area (km ²)			
			Planning Cell 1	Planning Cell 2	Planning Cell 3	Total
South	The Beaver (Brightwater) Creek at the Mouth	NE - SW to Beaver Creek	15.64	9.82	–	25.46
West	South Saskatchewan River at Saskatoon	E - W to South Saskatchewan River	35.44	1.23	–	36.67
East	South Saskatchewan River at St. Louis	SE - NW to South Saskatchewan River	–	35.22	22.78	58.00
Total Areas			51.08	46.27	22.78	120.13

Note: *Agriculture and Agri-Food Canada (AAFC) watershed delineation.

A drainage map with watershed divides and general drainage directions is provided in Figure 3.1 Existing Drainage. It is noted that a large slough system within Planning Cell 2 is part of the Green Network natural drainage network. This drainage corridor will fill and spill during flood years, with an overall northwest drainage direction, towards the City of Saskatoon.



SOUTH R.M. AREA DEVELOPMENT PLAN

FIGURE 3.1 EXISTING DRAINAGE FEATURES

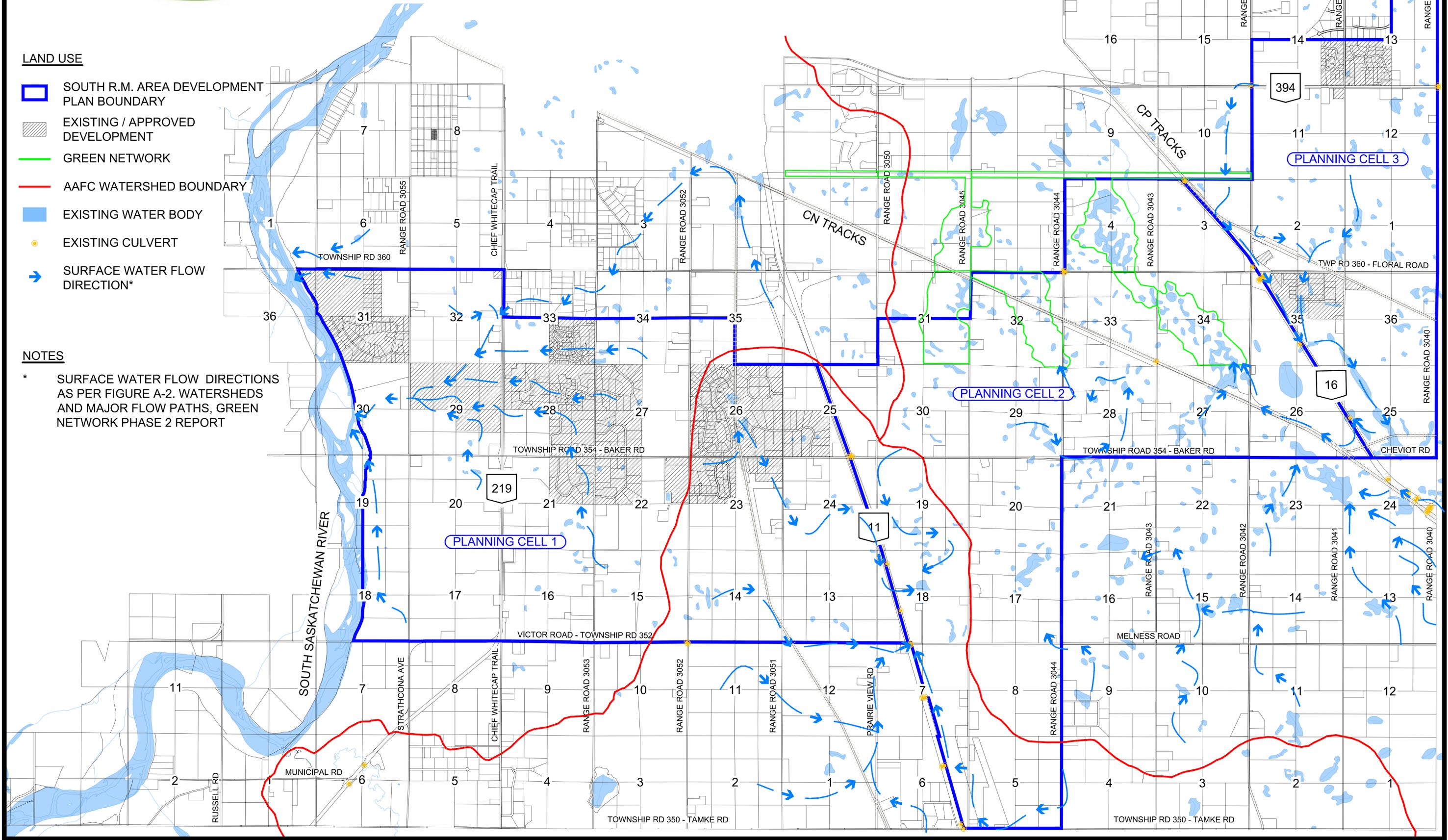


LAND USE

- SOUTH R.M. AREA DEVELOPMENT PLAN BOUNDARY
- EXISTING / APPROVED DEVELOPMENT
- GREEN NETWORK
- AAFC WATERSHED BOUNDARY
- EXISTING WATER BODY
- EXISTING CULVERT
- ➔ SURFACE WATER FLOW DIRECTION*

NOTES

* SURFACE WATER FLOW DIRECTIONS AS PER FIGURE A-2. WATERSHEDS AND MAJOR FLOW PATHS, GREEN NETWORK PHASE 2 REPORT



3.2 EXISTING WATER AND WASTEWATER INFRASTRUCTURE

The potable water distributed within the SADP study area is treated by the City of Saskatoon (CoS), and then managed by SaskWater, a Crown corporation that provides water supply services to municipalities, First Nations, and businesses outside of the major cities. Of key importance is the SaskWater Clarence Avenue Booster Station located within the City of Saskatoon. Existing developments within the Study Area are supplied, through SaskWater, by several private water utility providers currently operating within the study area. The RM of Corman Park also has water supply lines within the SADP study area. The existing potable distribution network is shown on Figure 3.2, with ownership detail provided in Figure 4.1 in Section 4.1.

An existing wastewater treatment facility currently exists directly west of Highway No.11 on the Grasswood Reserve 192J, south of the City of Saskatoon, which is owned and operated by the Des Nedhe Utilities Corporation (English River First Nation). The treatment facility was constructed to service development on the English River First Nation **landsand** adjacent lands within the study area. The current capacity of the treatment facility is 276 m³/day with potential to expand to 500 m³/day. Future expansion to 1,000 m³/day and 2,500 m³/day have also been discussed.

A second existing wastewater treatment facility is also being developed within the Crossmount DCD. It is partially constructed at this time, and it is assumed that it will be expanded to treat all the wastewater effluent produced by the DCD. It is assumed that no wastewater will be transported directly to the Des Nedhe Utilities Corporation WWTF or new RM owned WWTF and all wastewater will be treated within the DCD.

Currently, except for the DCD noted above, there are no wastewater collections systems (gravity systems, lift stations or forcemains) within the study area. The wastewater for all the current approved developments are managed using a conventional septic system, advanced treatment system, mound system or holding tanks.



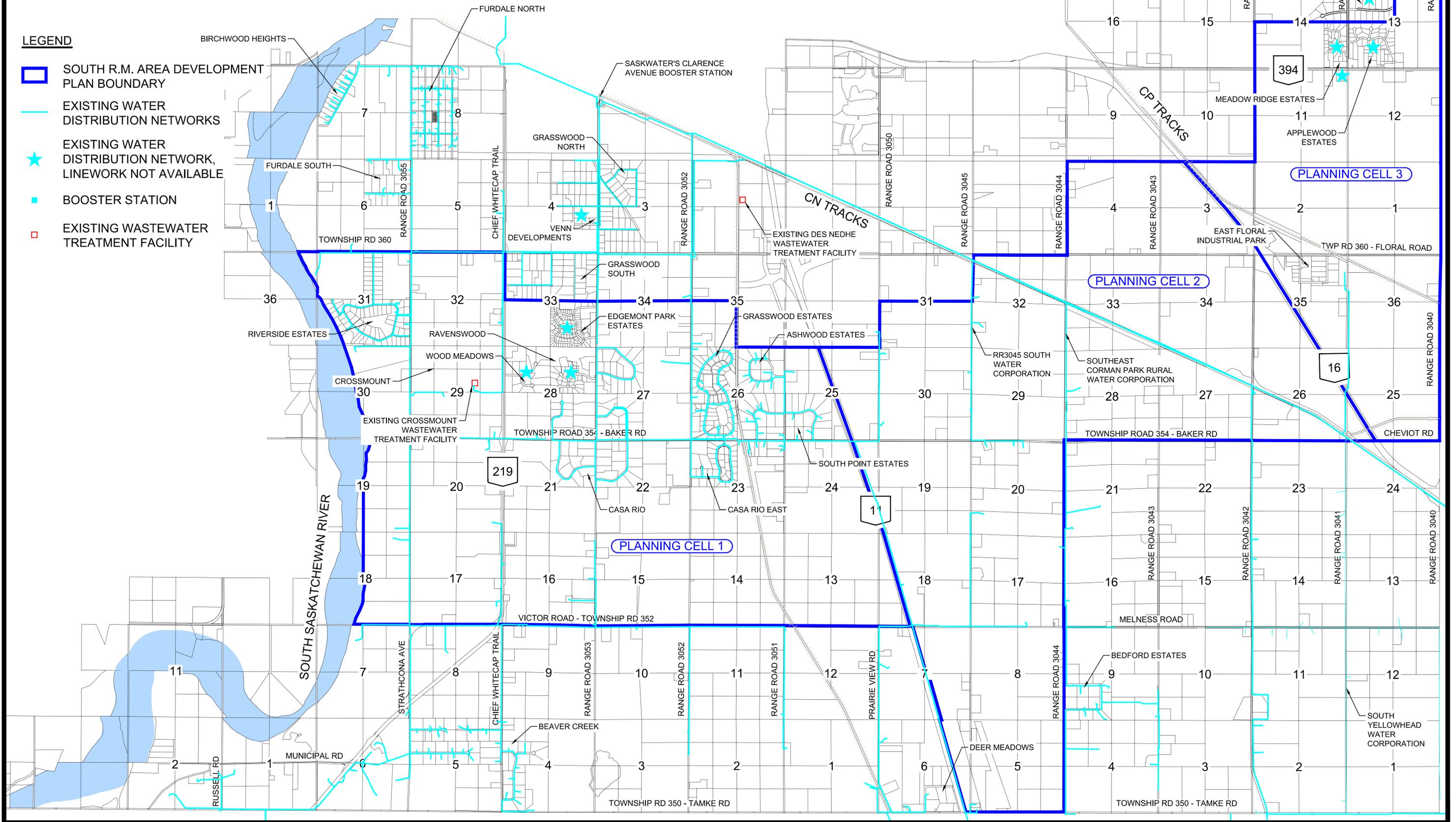


SOUTH R.M. AREA DEVELOPMENT PLAN

FIGURE 3.2 EXISTING WATER AND WASTEWATER INFRASTRUCTURE

LEGEND

- ▭ SOUTH R.M. AREA DEVELOPMENT PLAN BOUNDARY
- EXISTING WATER DISTRIBUTION NETWORKS
- ★ EXISTING WATER DISTRIBUTION NETWORK, LINEWORK NOT AVAILABLE
- BOOSTER STATION
- EXISTING WASTEWATER TREATMENT FACILITY



3.3 EXISTING ROAD NETWORK

3.3.1 ROADWAY CONDITION

A visual inspection of road condition was completed for all asphalt, seal, and gravel surfaced roadways within the project limits. Summer roadways were not assessed but are listed in the roadway inventory. Each roadway received a rating from 1 to 5 with 1 being the best condition and 5 being the worst condition. The details of the road condition assessment are contained within the RM of Corman Park – Phase 1 – Background Report (November 28, 2023).

Generally, the roadways were found to be in good condition. Issues which were observed with gravel coverage are expected to be addressed when the graders make their next pass for regular maintenance. It should be noted that the roadway inspections occurred in a dry year so there was essentially no standing water present along any roadways.

3.3.2 ROADWAY CLASSIFICATION

The SADP study area roadways were classified based on the existing traffic volumes, heavy vehicle percentages, access, and connecting roadway type. Existing average daily traffic (ADT) and heavy vehicle percentages were collected using traffic count cameras and existing RM roadway traffic volume maps. The existing roadway data is shown in Table 3.2.

Table 3.2 Existing Traffic Data

Roadway	Intersection Leg/Location	ADT	TADT	Width (m)
Haight Road	North	117	18	8.5
Range Road 3044	South	88	9	7.5
Floral Road	East	217	27	9
Floral Road	West	194	20	9
Range Road 3041	North	5	2	-
Range Road 3041	South	29	4	5.5
Township Road 364	East	309	23	8.5
Township Road 364	West	321	23	8.5
Range Road 3041	North	474	6	7.5
Range Road 3041	South	12	0	3
Highway 394	East	1,054	54	-
Highway 394	West	1,442	56	-
Freeborn Road	North	111	24	8
Floral Road	East	847	249	8
Floral Road	West	900	245	8



**SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY
3 SITE OVERVIEW**

Roadway	Intersection Leg/Location	ADT	TADT	Width (m)
Range Road 3042	North	499	12	7
Range Road 3042	South	460	9	7
Baker Road	East	10	0	7
Baker Road	West	59	5	8.5
Chases Bluff Road	North	68	6	7.5
Range Road 3040	South	0	0	-
Tamke Road	East	121	8	8
Tamke Road	West	105	8	8
Winmill Road	North	30	2	7.5
Winmill Road	South	63	1	7.5
Township Road 352	East	189	14	9
Melness Road	West	242	11	8.5
Range Road 3044	North	9	1	7.5
Tamke Road	East	90	8	8.5
Tamke Road	West	89	7	9
Range Road 3045	North	21	2	7.5
Range Road 3045	South	50	9	7.5
Township Road 354	East	229	7	8.5
Township Road 354	West	250	12	9
Range Road 3050	North	22	0	7
Prairie View Road	South	52	0	7.5
Highway 11	East	12,296	2,146	-
Highway 11	West	12,338	2,146	-
Prairie View Road	North	16	2	8.5
Prairie View Road	South	20	2	-
Tamke Road	East	66	7	9
Tamke Road	West	60	7	10
Range Road 3052	North	88	16	8.5
Range Road 3052	South	96	8	8.5
Victor Road	East	170	25	10.5
Victor Road	West	180	29	10.5
Range Road 3053	North	80	15	8.5
Range Road 3053	South	119	14	7
Victor Road	East	163	14	10.5



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY
3 SITE OVERVIEW

Roadway	Intersection Leg/Location	ADT	TADT	Width (m)
Victor Road	West	156	11	10.5
Range Road 3055	North	23	1	6.5
Range Road 3055	South	72	3	6
Highway 219	East	3,834	118	-
Highway 219	West	3,787	116	-
Russell Road	North	8	0	7
Russell Road	South	15	0	7
Municipal Road	East	48	4	9
Municipal Road	West	29	4	8
Range Road 3052	North	61	4	8
Range Road 3052	South	124	7	8.5
Township Road 354	East	673	6	8
Township Road 354	West	696	7	8
Range Road 3052	North	91	4	8
Range Road 3052	South	296	18	8
Grasswood Road	East	3,250	84	8.5
Grasswood Road	West	3,261	78	8.5
Clarence Avenue South	North	3,988	60	8.5
Range Road 3053	South	2,005	64	8
Grasswood Road	East	3,309	75	8.5
Grasswood Road	West	2,948	87	8
Strathcona Avenue	North	160	13	6.5
Strathcona Avenue	South	445	8	7
Grasswood Road	East	1,446	27	8
Grasswood Road	West	1,099	30	7.5
Strathcona Avenue	North	20	13	4.6
Strathcona Avenue	South	295	9	6.5
Cartwright Street	East	1,036	28	6.5
Cartwright Street	West	775	10	6.5
8th Street East	Rock Ridge Road - Highway 316	60	10	-
Cheviot Road	Range Road 3040 - Highway 316	170	7	-
Prairie Steel Lane/Township Road 352	Range Road 3040 - Highway 316	160	8	-
8th Street East	Winmill Road - Freeborn Road	90	-	-
Freeborn Road	8 Street - Highway 394	120	6	-



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY
3 SITE OVERVIEW

Roadway	Intersection Leg/Location	ADT	TADT	Width (m)
Freeborn Road	Highway 394 - Township Road 360	70	-	-
Range Road 3042	Township Road 360 - Township Road 354/Baker Road	420	7	-
Range Road 3042	Melness Road - Township Road 350	320	-	-
Floral Road/Township Road 360	Range Road 3044 - Winmill Road	140	13	-
Township Road 354	Range Road 3045 - Range Road 3044	140	-	-
Melness Road	Range Road 3045 - Range Road 3044	260	7	-
Grasswood Road	Range Road 3052 - Highway 11	2780	103	-
Floral Road/Township Road 360	Highway 11 - Range Road 3050	350	31	-
Township Road 354	Range Road 3051 - Highway 11	830	29	-
Victor Road	Range Road 3051 - Prairie View Road	260	29	-
Clarence Avenue	Cartwright Street - Grasswood Road	3980	112	-
Grasswood Road	Highway 219 - Clarence Avenue	2650	64	-
Clarence Avenue	Grasswood Road - Township Road 354	860	7	-
Township Road 354	Highway 219 - Clarence Avenue	470	11	-
Range Road 3054	Township Road 352/Victor Road - Poplar Grove Drive	230	-	-

The roadway classification criteria utilized for the project is outlined in Table 3.3. It was developed with reference to the Transportation Association of Canada Geometric Design Guide Table 2.6.4 which outlined roadway classification criteria for rural roadways. No RM roadways were classified as freeways, with the highway network including Highway 11 and Highway 16 filling the freeway classification. Highways 219 and 394 are understood to act as arterial roadways for the area.

Table 3.3 Roadway Classification Criteria

Criterion	Classification		
	Local	Collector	Arterial
Traffic Volume	<125	100 –1,000	>750
Heavy vehicle Percentage	Predominantly passenger cars <5% heavy trucks	<30% heavy trucks	<20% trucks
Land Access	Access is primary consideration	Traffic movement and access equally important	Access is secondary consideration
Connections	Locals Collectors	Locals Collectors Arterials	Collectors Arterials Freeways



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY

3 SITE OVERVIEW

The existing roadway classifications are shown in Figure 3.3. The following roadways were classified as arterial:

- Township Road 362/Cartwright Street from Range Road 3055 to Highway 219,
- Township Road 360/Grasswood Road from the west project limit to Rang Road 3052,
- Range Road 3053/Clarence Avenue north of Township Road 354,
- Township Road 360/Floral Road west of Highway 16, and
- Township Road 354/Baker Road from Range Road 3051 to Highway 11.

The majority of the lengths of Range Road 3055, Township Road 354, Township Road 352, and Range Road 3042 were classified as collector roadways.



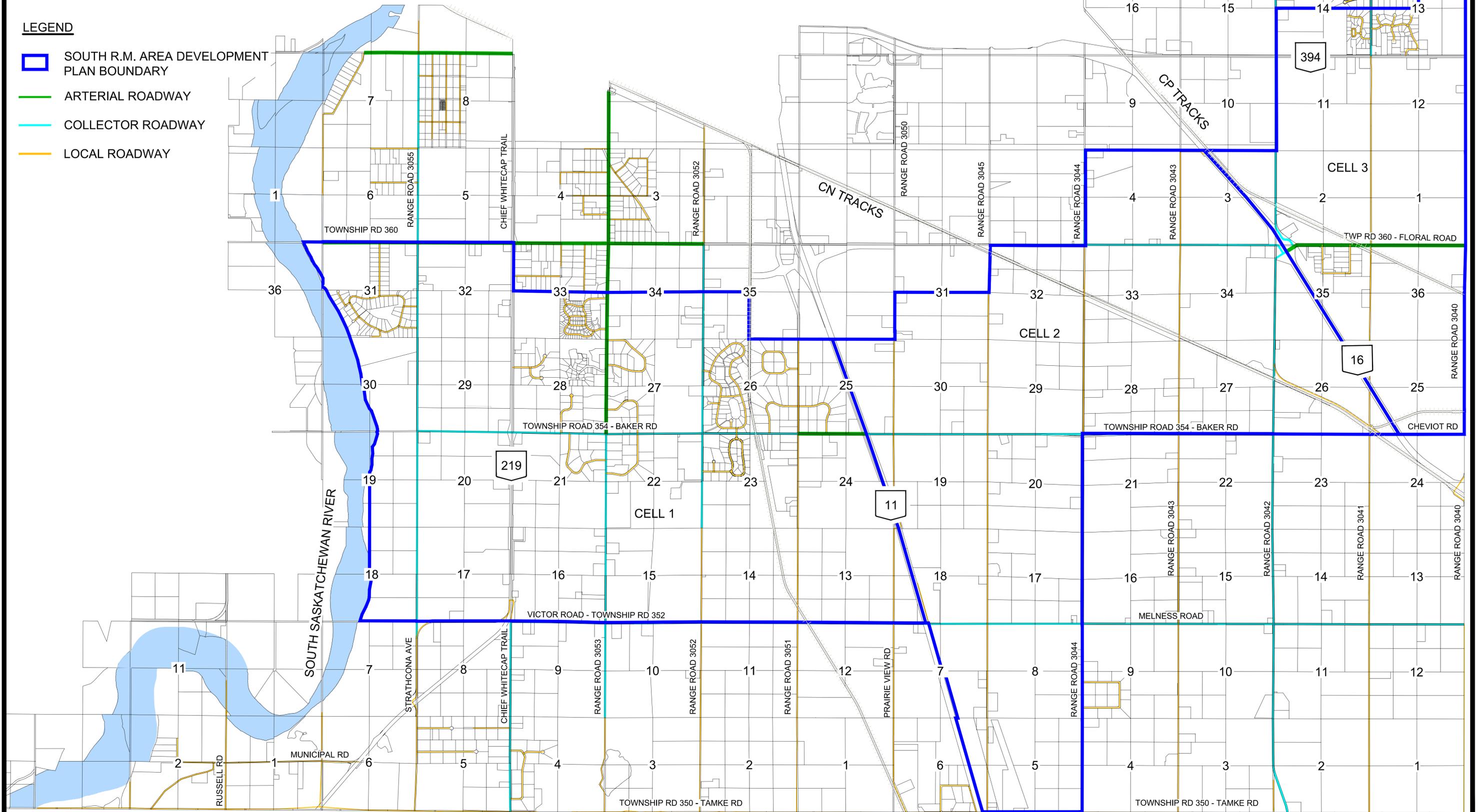


SOUTH R.M. AREA DEVELOPMENT PLAN

FIGURE 3.3 EXISTING ROAD NETWORK

LEGEND

- ▭ SOUTH R.M. AREA DEVELOPMENT PLAN BOUNDARY
- ARTERIAL ROADWAY
- COLLECTOR ROADWAY
- LOCAL ROADWAY



3.4 GROUNDWATER SUMMARY

A desktop groundwater study was conducted by Stantec for the RM of Corman Park – Phase 1 – Background Report (November 28, 2023). The objectives of this study were to characterize the aquifers within the SADP Study Area, including their extents, hydrogeologic properties and current usage rate and to discuss the potential for connection with deeper aquifers where possible. It is noted that the groundwater study boundary covered a larger area than the current SADP study area noted in Figure 1.1.

Deeper aquifers present within the study area included the Judith River Aquifer, the Ardkenneth and Cruikshank Aquifers of the Bearpaw Formation, the Empress Group Aquifer, the Mennon, Dundurn and Warman Aquifers of the Sutherland Group and the Floral Formation and Battleford Aquifers of the Saskatoon Group. The surficial aquifer present within the study area was also reviewed.

The study concluded that water of the deeper aquifers was generally not suitable for human consumption, irrigation or livestock watering without treatment. The Floral Formation and the surficial aquifer had relatively fresh, calcium-magnesium-bicarbonate type water which could be used as a water source, however, both aquifers were vulnerable to contamination from surface sources.

Based on the SADP plan and servicing, it was assumed that groundwater was not considered as a potable water source for future residential, commercial, institutional and employment area development. However, it is assumed that groundwater could be used for domestic and non-domestic purposes on agricultural lands. Domestic use will require treatment.

Further discussion on the groundwater balance calculation is included in Section 4.4.

3.5 NATURAL AREA SCREENING

Screenings were completed on the Study Area's wetlands and biophysical features including land cover composition, Species of Conservation Concern (SOCC), and special land designation to identify potential constraints that could require mitigation and/or additional surveys prior to development. A Heritage screening was also completed to determine heritage sensitivities and archaeological sites. More detail is provided in the RM of Corman Park – Phase 1 – Background Report (November 28, 2023) and in Section 4.1 of this report.



4 SERVICING STRATEGY

4.1 NATURAL AREA CONSIDERATIONS

4.1.1 NATURAL AREA SCREENING RESULTS

The natural area screening results are summarized from the RM of Corman Park – Phase 1 – Background Report (November 28, 2023).

Wetlands

There are 1,675 wetlands found within the study area, ranging from wetland Class II to Class V wetlands and dugout. The total Study area is approximately 24,643.4 ha with wetlands accounting for approximately 1,211.8 ha, or 5% of the study area.

Landcover Composition

The study area consists of approximately 34% agriculture, 30% pasture/ forages, 8% shrubland, 8% urban/developed, 5% wetlands and 7% grasslands. Areas of native vegetation are potential habitat for SOCC including grassland, shrubland, forests land and wetlands.

Species of Conservation Concern

There are 35 historical records of plant SOCC, 36 historical records or wildlife SOCC/features, and 6 historical records of fish SOCC within the Study Area including a 1 km buffer. Many of these observations were recorded along the South Saskatchewan River south of Saskatoon, Saskatchewan in areas with native vegetation (e.g., grassland, shrubland, forests).

Special Land Designations

HABISask was used to determine if there were any special land designations within the Study Area. There is one conservation area, one private conservation easement land management under the provincial crown, five land claims and ten Wildlife Habitat Protection Act (WHPA) managed areas within the study area.

Sensitive Land Designations

There is one known Migratory Bird Concentration Site within the study area in the area surrounding the South Saskatchewan River. Due to the proximity of the South Saskatchewan River and several wetlands within the Study Area it is expected there is potential for SOCC.



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY 4 SERVICING STRATEGY

Heritage Resources

Of the 416 quarter sections located within the study area, one hundred and ten (110) are heritage sensitive, seventy-two (72) are conditionally heritage sensitive, and two hundred and thirty-four (234) are not sensitive. A Provincial Archaeological Sites Database query identified forty-four (44) archaeological sites that have been documented in the Study Area.

4.1.2 NATURAL AREA SCREENING RECOMMENDATIONS

Areas with special land designation and sensitive features will require additional discussion with and approvals from Ministry of Environment (ENV), Department of Fisheries and Oceans Canada (DFO), Ministry of Agriculture (MOA) and the Heritage Resource Branch. Potential approvals and permits for developing in these areas include:

- Clearance from ENV may be required for projects that encroach or develop on natural areas including grasslands and wetland.
- Aquatic Habitat Protection Permits (AHPP) are required for any works within the bed, boundary, or bank of wetlands and other water features (e.g., watercourses).
- Crown mineral lands selected by Saskatchewan First Nations under either Treaty Land Entitlement or Specific Claim Settlement Agreements may become reserve land under the terms of a Land Claim Agreement. Approval from the First Nation and/or the Saskatchewan Ministry of First Nations and Métis Relations may be required for projects that encroach or develop on land claims land. Approvals from Indigenous Services Canada may also be required for development on First Nations land.
- Crown Land Work Authorizations and/or Crown Land Clearances will be required for work on Ministry of Agriculture (MOA) or ENV Crown Lands (including WHPA lands)
- Reviews and/or approvals under the federal Fisheries Act with DFO may be required for any proposed works occurring in or fish habitat such as the South Saskatchewan River.

Biophysical surveys may be required in support of projects that require the approvals and permits listed above. Completion of biophysical surveys will further support the identification of site-specific conditions, identify sensitive environmental features requiring mitigation, and confirm approval requirements.

A Heritage Resource Review Referral (Heritage Referral) to the Heritage Conservation Branch (HCB) should be submitted for any ground disturbance activities in sensitive and conditionally sensitive quarter sections in the Study Area to determine Heritage Resource Impact Assessment (HRIA) requirements pursuant to Section 63 of *The Heritage Property Act*.

Should a HRIA be initiated for future project work within the study area, it is recommended that a pre-impact HRIA be completed in snow and frost-free conditions before any ground disturbance activities. Avoidance of archaeological sites is always the best mitigation. However, depending on the site type, context of discovery and degree of conflict, other mitigations may be required. General heritage resource mitigation measures that should be considered include:



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY

4 SERVICING STRATEGY

- Detailed assessment.
- Implementing site protection such as stabilization practices, fences.
- Surface collection to salvage archaeological resources.
- Construction monitoring.
- Salvage/compensatory mitigation.
- Phase 1 (small scale) excavation.

In the event a site of special nature is identified, an increased avoidance buffer of up to 250 m may be required. Recommendations for appropriate mitigative measures are subject to approval by the HCB.

4.2 POTABLE WATER

4.2.1 POTABLE WATER DESIGN INFORMATION

4.2.1.1 Potable Water Providers

The potable water distributed within the SADP study area is treated by the City of Saskatoon (CoS), and then managed by SaskWater, a Crown corporation that provides water supply services to municipalities, First Nations, and businesses outside of the major cities.

Existing developments within the study area are supplied, through SaskWater, by several private water utility providers currently operating within the Study Area:

- Dundurn Rural Water Utility (DRWU),
- Lost River Water Utility (LRWU),
- Woods Water Corporation,
- Canron Water Supply,
- South Yellowhead Water Corp.,
- Range Road 3045 South Water Corp., and
- Southeast Corman Park Waterline.

The RM of Corman Park also has water supply lines within the SADP study area.

Table 4.1 provides a summary of the rural water supply arrangements for each existing development within the Study Area. The table also indicates whether a CDR was made available for each existing development. Future developments were not included.

Figure 4.1 shows the existing potable water pipelines, colour-coded by provider, in the context of the SADP boundary. The areas where the water network linework could not be obtained in full are marked with stars, also colour-coded by provider.



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY 4 SERVICING STRATEGY

Appendix A.2 of the RM of Corman Park – Phase 1 – Background Report (November 28, 2023) includes additional information: Figure A.1.2 – the existing potable water pipelines for SaskWater, DRWU and the RM of Corman park, colour-coded by size, and additional plans provided in PDF form by the RM of Corman Park for some of the other suppliers.

Table 4.1 Study Area Potable Water Supply – Existing Developments

Development	Type of Development	Number of Lots	Potable Water Supplier	CDR available
Birchwood Heights	Rural Residential	12	DRWU	
Furdale North	Rural Residential	67	DRWU	
Furdale South	Rural Residential	19	DRWU	
Riverside Estates	Rural Residential	85	RM of Corman Park	
Beaver Creek	Rural Residential	56	DRWU	
Grasswood North	Rural Residential	86	RM of Corman Park	
Venn Developments	Rural Residential	5	LRWU	
Grasswood South	Rural Residential	46	RM of Corman Park	
Edgemont Park	Rural Residential	99	LRWU	Yes
Wood Meadows	Rural Residential	17	Woods Water Corporation	
Casa Rio	Rural Residential	77	RM of Corman Park	
Crossmount Cider Company	Commercial	n/a	DRWU	
The Village at Crossmount	Retirement Community	n/a	DRWU	Yes
Grasswood Estates	Rural Residential	78	DRWU	Yes
Casa Rio East	Rural Residential	37	RM of Corman Park	
Ashwood Estates	Rural Residential	15	DRWU	
South Point Estates	Rural Residential	41	DRWU	
Deer Meadows	Rural Residential	8	DRWU	
Bedford Acres	Rural Residential	15	Southeast Corman Park Rural Water Corporation	
Tuscan Ridge Estates	Rural Residential	43	LRWU	Yes
Hidden Ridge Estates	Rural Residential	30	LRWU	
Meadow Ridge Estates	Rural Residential	27	LRWU	Yes
Applewood Estates	Rural Residential	39	LRWU	Yes
Ravenswood	Rural Residential	40	Woods Water Corporation	
East Floral Industrial Park Ltd.	Industrial	n/a	East Floral Industrial Park Ltd.	Yes

In addition to the information presented in the table above, there are other waterlines which service various farmyards within the SADP Study Area, including: South Yellowhead Water Corp., Range Road 3045 South Water Corp. and Southeast Corman Park Waterline.



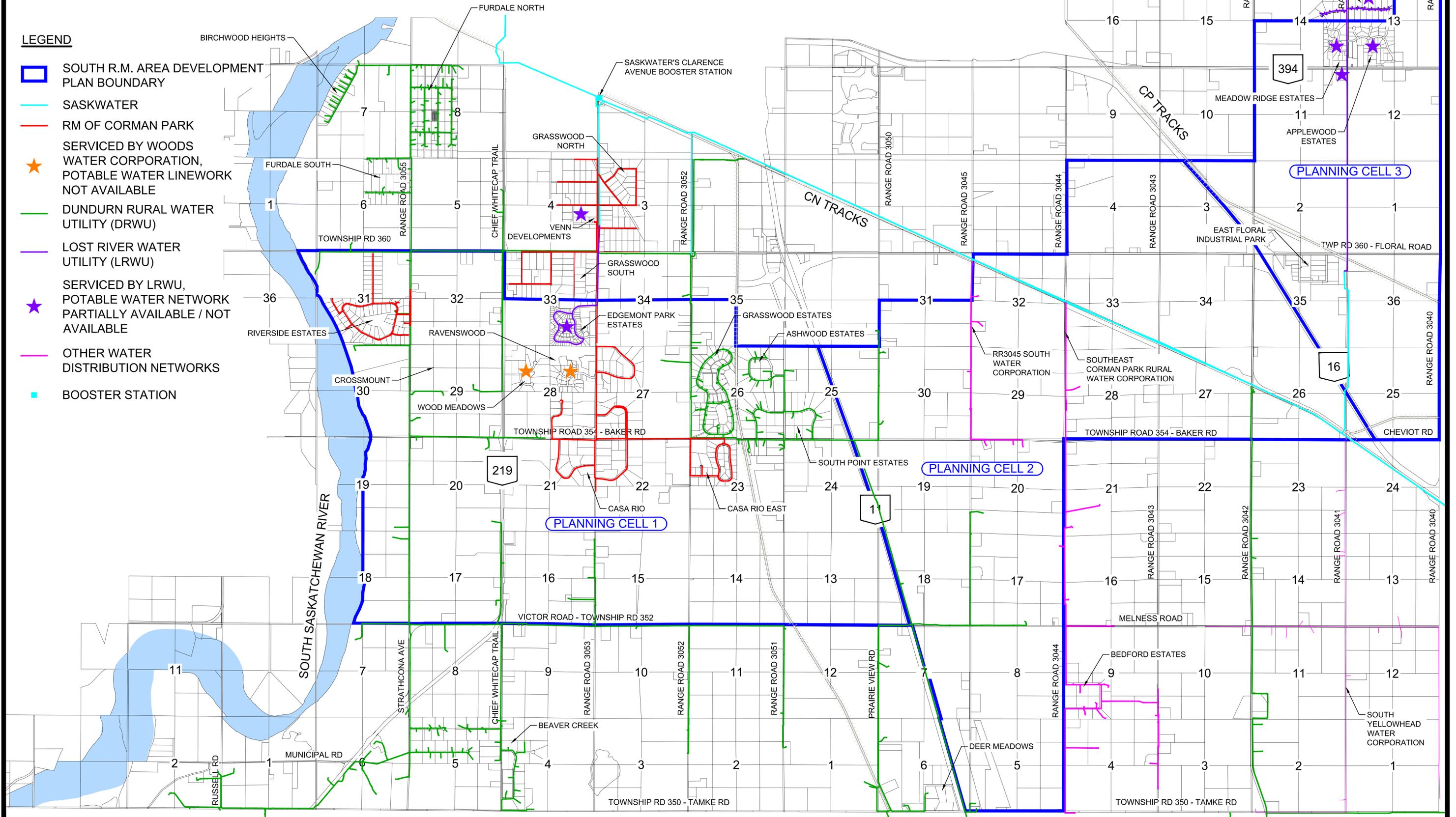


SOUTH R.M. AREA DEVELOPMENT PLAN

FIGURE 4.1 EXISTING WATER DISTRIBUTION NETWORKS

LEGEND

- ▭ SOUTH R.M. AREA DEVELOPMENT PLAN BOUNDARY
- SASKWATER
- RM OF CORMAN PARK
- ★ SERVICED BY WOODS WATER CORPORATION, POTABLE WATER LINEWORK NOT AVAILABLE
- DUNDURN RURAL WATER UTILITY (DRWU)
- LOST RIVER WATER UTILITY (LRWU)
- ★ SERVICED BY LRWU, POTABLE WATER NETWORK PARTIALLY AVAILABLE / NOT AVAILABLE
- OTHER WATER DISTRIBUTION NETWORKS
- BOOSTER STATION



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY 4 SERVICING STRATEGY

4.2.1.2 Low Pressure Rural Pipeline Systems Characteristics

The existing residential water distribution systems are low pressure rural pipeline systems with characteristics different from those of urban systems:

- Delivery is based on an average flow over a 24-hour period, typical values being around 0.5 US gallons/minute (1.9 L/minute). Alternative calculations are done in Imperial gallons/min, with the conversion rate being 1 Imperial gallon = 1.2 US gallon.
- Fire flows are not provided.
- The layout is based on a branch design, with minimal or no looping.
- Most rural pipelines are designed with in-house storage (cistern) systems which increases the reliability of water supply. In the event of loss of flow from the supply line, the property owner relies on the reserve water from their storage tank until flow is restored.
- Property owners are expected to install their own in-house pressure system to provide the desired pressure.

Recent country residential Comprehensive Development Reports (CDRs) show average flows of 0.5 US gal/min supplied per lot, equivalent to 720 US gal/day (2,725 L/day) Although the system pressures are low, the daily volumes are sufficient for residential consumption, considering municipal Average Day Demands are approx. 400 L/cap/day and Peak Day Demands are approx. 800 L/cap/day.

Typical residential storage tanks can have 300 US gallons (1,135 L) to 1,000 US gallons (3,785 L) capacities.

4.2.1.3 Groundwater Wells

Potable groundwater wells exist within the SADP study area. It is understood that some of them are used by residents in the agricultural land use designation to provide water for domestic and other uses. It is noted that:

- A precise count of these wells and their existing uses was not available.
- WSA reports well locations by quarter-sections, with the well markers at the centroid of the quarter-sections.

4.2.1.4 Relevant CDR Summaries

Potable water servicing summaries are provided for several representative existing developments, as extracted from their CDRs to provide an existing servicing baseline for the SADP Serviceability. None of the residential CDRs reviewed as part of the Background Study provide fire flow pressures.



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY

4 SERVICING STRATEGY

Ravenswood – Country Residential

Potable water will be supplied by a private low pressure water line that presently services the Wood Meadows development via the Casa Rio water supply line.

The Water Supply Agreement between the RM of Corman Park and the Developer is included in Appendix D of the CDR, which details the terms of agreement for supplying treated water for any additional development in the subject property. This agreement is for a water connection to supply a maximum volume of 2,160 Imperial gallons per day, at a maximum flow rate of 1.5 Imperial gallons/minute to the proposed development. Saskwater confirmation was received.

Individual lots will be supplied with a typical low pressure rural service of 720 US gal/day (0.5 US gallons/minute) and with between 300 and 1,000 US gallons of reserve. As the source is low pressure, each property owner will be required to install a privately owned cistern and pressure system within their properties. This Country Residential system does not offer sufficient pressure to be utilized for centralized firefighting services.

The Village at Crossmount – DCD

Potable water will be supplied to the Village at Crossmount by the DRWU. A connecting pipe from the Dundurn pipeline to the site will be installed to fill a Treated Water Storage Reservoir. The intent of the reservoir is to provide water for fire suppression and to provide a storage buffer between the rate at which the pipeline can fill the reservoir and the peak consumption of The Village at Crossmount. The storage reservoir would be a below ground concrete chamber that would act as the foundation for a small pumphouse building. The building would house distribution pumps and a standby fire pump to distribute the treated water to the Village. A natural gas backup generator would provide backup power for uninterrupted water supply, and fire flow in the event of a power outage. The building would also house chemical testing equipment, and chemical feed equipment, to ensure the potable water meets regulatory standards.

The distribution system would consist of a network of buried pipes sized to meet fire flow requirements at all locations in the development. Preliminary sizing of mains indicates the pipe required will range in size from 150 mm to 200 mm in diameter, with minor lengths of 250 mm diameter pipe required. The proposed pipe material is PVC (polyvinyl chloride). The distribution system will incorporate gate valves on the mains at regular intervals to allow for portions of the network to be isolated. Although an intent to install hydrants was included in the CDR, based on information received from the RM, Crossmount currently has no hydrants.

1022068225 Sask Corp - Industrial

This is an approx. 4.3 ha (10.6 ac) site located within the East Floral Industrial Park. The proposed land use at this parcel is to provide four lots to accommodate uses in the M1 – Light Industrial Development zoning district. The lots range in size from approximately 0.80 ha (1.97 ac) to 1.48 hectares (3.65 ac).

SaskWater has a potable water system located just west of the proposed development.



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY

4 SERVICING STRATEGY

Catteral & Wright has calculated the average day potable water demand to be approximately 2,725 L/day (0.5 US gallons/minute) for the entire development site. Each lot may require an individual reservoir and pump to meet peak day demands and fire suppression, if required.

The recommended minimum storage for each lot is equal to the average daily consumption if no fire suppression is required, or twice the average daily consumption if fire suppression is required.

4.2.1.5 Potable Water Correspondence Summary

SaskWater

The following information was received from SaskWater in June 2023, regarding potable water servicing for future developments:

SaskWater infrastructure has some additional capacity, but it was not built to support large residential developments. As the development gets further from the SaskWater Clarence Avenue Booster Station, the less capacity is available. The initial SaskWater infrastructure was constructed to supply potash mines southeast of Saskatoon and was later converted to potable water. Much of the existing capacity has already been picked up by rural water utilities, towns and villages so understanding the future development needs will help with the evaluation. The following considerations apply to the potential servicing of future developments:

- SaskWater will typically need to twin or expand infrastructure in some way to deliver very large quantities of water to areas that are not very close to their main supply line (industrial volumes or large commercial requirements). SaskWater can likely supply some additional country residential, and possibly small community development near/along their main supply line.
- SaskWater will require approval from Saskatoon to supply any new customer inside the boundaries of the P4G area.*
- SaskWater has non-potable infrastructure, however almost the entire capacity of that infrastructure has been contracted out. There is limited capacity available so expansion would be required.
- For any large development, where new infrastructure would be required, SaskWater would be willing to engage in discussions on how they can fill the capacity/needs for these developments.
- SaskWater supply systems are not looped or redundant, so they are not able to guarantee supply or pressure; outages for service and maintenance will occur. Their supply systems are designed to support communities or developments that have their own storage. The normal supply is based on average day demands with some consideration for peak summer flows.

Note: *It is assumed that SaskWater will also require approval from Saskatoon to supply new customers inside the SADP planning study area.



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY

4 SERVICING STRATEGY

DRWU

The following information was received in May 2023 from SAL Engineering who maintain the DRWU network:

- The DRWU waterline system has no hydrants.
- At current usage rates, the DRWU waterline system generally has plenty of additional capacity remaining for future connections. However, it should be noted that additional capacity is dependent on specific location and elevation, flow rate requested, proximity to pumphouses, proximity to larger diameter mainlines, approval from SaskWater, etc., and therefore additional capacity is typically analyzed on a case-by-case basis.

4.2.1.6 Information Gaps

The RM contacted LRWU to obtain their potable water network linework, however LRWU were unable to provide the information. The Woods Water Corporation linework was also not available. It was decided to progress the potable water servicing task with the available information.

Figure 4.1 identifies the areas where the potable water networks are missing or incomplete.

4.2.2 POTABLE WATER SERVICING STRATEGY

4.2.2.1 Water Servicing Assumptions

It is assumed that:

- The future development within the SADP Plan boundary will be serviced by low pressure rural pipeline systems where the water supply is provided by SaskWater. These systems will not provide fire flow pressures and it was assumed it will not have hydrants installed on the supply lines.
- Groundwater was not considered as a potable water source for future country residential development. However, it is assumed that groundwater may be used for domestic use on agriculture land uses. It is noted that many of the existing farmsteads within the agricultural land use designation are already serviced by low-pressure rural potable water pipelines, as shown in Figure 4.1.
- Based on input from the RM, the potable water servicing of future residential units located within the agricultural lands will assume potable water provided by groundwater wells, considering 5 residential homes per quarter section. The research agricultural land use is not included in this demand calculation.
- A groundwater balance calculation was completed assuming 5 residential homes per quarter section for the agriculture land use.
- For the agricultural land use, it is assumed that each household will treat their groundwater for domestic uses with private onsite water treatment system(s).



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- Each development, regardless of land-use, will have potable water storage. Potable water storage tanks may be installed on each lot, or such as to service multiple lots.
- The residential and community services development will not store water for fire protection.
- The DCD, Highway Commercial and Light Industrial development may store water for fire protection, if required by their specific activities and as agreed with the Saskatoon Fire and Protective Services.
- The recommended minimum storage for each lot is equal to the average daily volume if no fire suppression is required, or twice the average daily consumption if fire suppression is required.
- Based on Section 4.2.1.5 the existing SaskWater network has limited remaining capacity. For any large development with extensive water demands, where new infrastructure would be required, SaskWater would be willing to engage in discussions on how they can fill the capacity/needs for these developments.

4.2.2.2 Expansion of Existing Potable Water Distribution Networks

As discussed with the RM, it is assumed that SaskWater will have sufficient capacity to service the proposed development in the SADP planning study area. Required upgrades to the SaskWater infrastructure (booster station and potable water pipelines) are beyond the scope of this serviceability study.

Planning Cell 1 - Area West of Highway 11

The proposed land uses within this planning cell include all three types of residential, the Crossmount DCD and some Highway Commercial west of Highway 11 by South Point Estates.

As shown in Figure 4.2, the RM of Corman Park, DRWU, LRWU and the Woods Water Corporation have existing potable water infrastructure in the area between South Saskatchewan River and Highway 11. The existing potable water distribution networks of these providers can be extended to cover the adjacent proposed residential developments. Based on development history within the SADP, new water utilities can also be incorporated to service the future residential subdivisions.

DRWU already services the existing part of the DCD (The Village at Crossmount) development. It is assumed that the currently undeveloped part of the DCD will also be serviced by DRWU.

Existing DRWU potable water lines cross Highway 11 in the vicinity of the proposed Highway Commercial development. It is assumed that DRWU will service this future development.



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Planning Cell 2 - Area between Highway 11 and Highway 16

The only land use to require potable water in this area is the Employment Area located immediately east of Highway 11 and north of Township Road 350.

It is assumed that the proposed employment area will be serviced by DRWU since existing DRWU potable water lines follow the Highway 11 alignment, being located east of the highway.

Planning Cell 3 - Area East of Highway 16

The proposed land uses in this area include:

- Country Residential in the northeast corner of the study area, and
- Employment Area east of Highway 16 and north of Cheviot Road.

As shown in Table 4.1 and Figure 4.1, LRWU already services the four existing Residential Country developments the northeast corner of the study area: Tuscan Ridge Estates, Hidden Ridge Estates, Meadow Ridge Estates, Applewood Estates. LRWU also services the existing commercial parcel south of Meadow Ridge Estates, The Barn at Wind's Edge.

It is assumed that LRWU will extend its existing network to service the future residential subdivisions north of Highway 394 (Patience Lake Road).

An existing SaskWater line follows the CN Rail alignment. An existing 100 mm potable water line (the Carron Water Supply pipeline) is extended from this line to the north, to the East Floral Industrial Park.

It is assumed that SaskWater will extend additional potable water lines into this area, as required by its future industrial customers. These customers may incorporate new water utilities at the time.



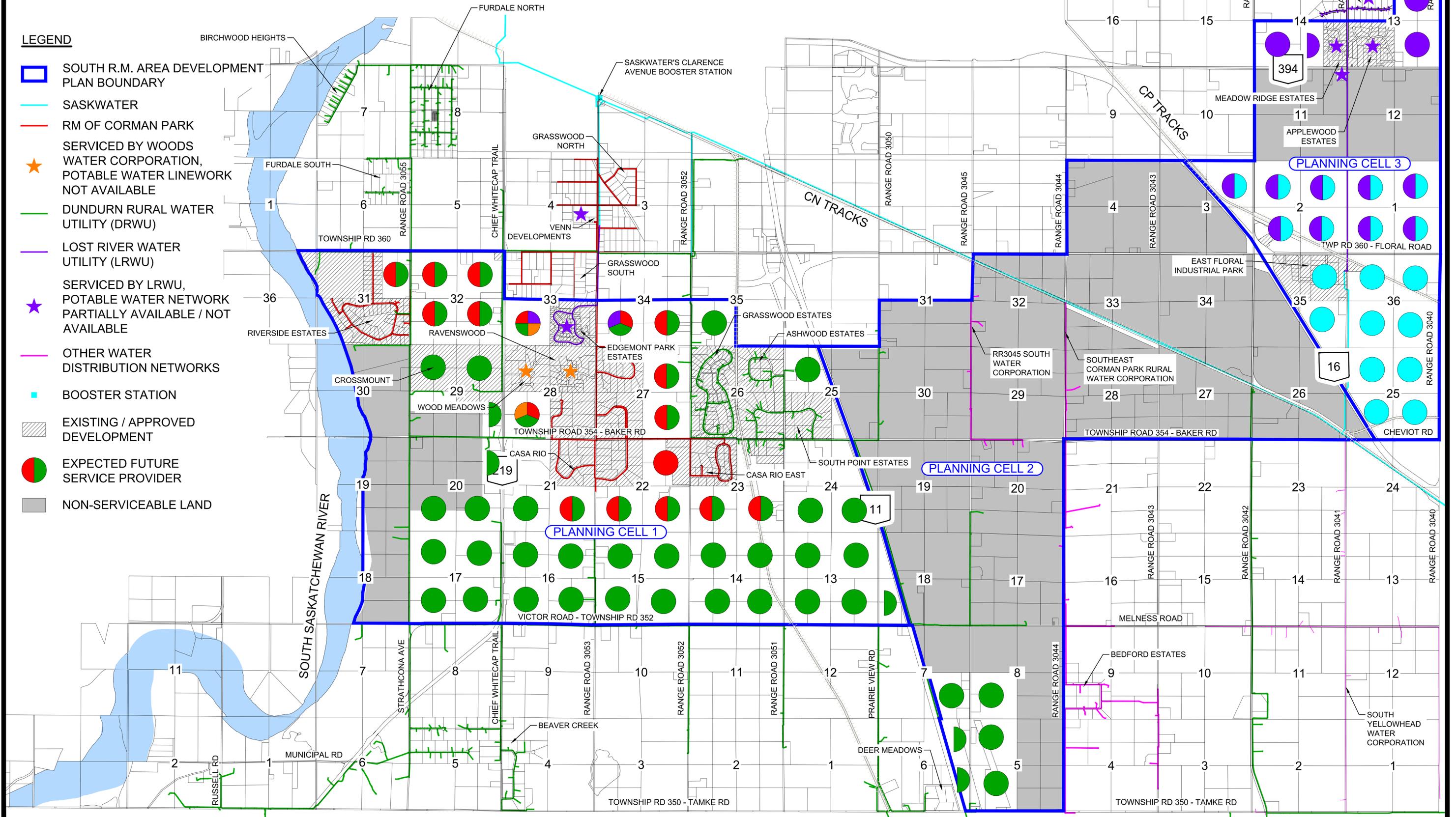


SOUTH R.M. AREA DEVELOPMENT PLAN

FIGURE 4.2 PROPOSED EXPANSION OF WATER DISTRIBUTION NETWORKS

LEGEND

- SOUTH R.M. AREA DEVELOPMENT PLAN BOUNDARY
- SASKWATER
- RM OF CORMAN PARK
- ★ SERVICED BY WOODS WATER CORPORATION, POTABLE WATER LINEWORK NOT AVAILABLE
- DUNDURN RURAL WATER UTILITY (DRWU)
- LOST RIVER WATER UTILITY (LRWU)
- ★ SERVICED BY LRWU, POTABLE WATER NETWORK PARTIALLY AVAILABLE / NOT AVAILABLE
- OTHER WATER DISTRIBUTION NETWORKS
- BOOSTER STATION
- EXISTING / APPROVED DEVELOPMENT
- ● EXPECTED FUTURE SERVICE PROVIDER
- NON-SERVICEABLE LAND



4.2.3 POTABLE WATER OUTPUT – WATER DEMAND

The following unit density assumptions were made for the serviceable land uses where the estimates are feasible by full quarter-sections:

Table 4.1 Estimated Residential and Industrial Unit Densities per Quarter-Section

Proposed Land Use		Serviceable %*	Lot Size (ha)			Estimated nr. Lots per quarter-section
			Min.	Max.	Avg.	
Residential	Country Residential Estate	80%	4.05	6.07	5.06	15**
	Country Residential	80%	1.00	4.05	2.53	40**
	Medium Density Country Residential	75%	0.10	0.20	0.15	250
Employment Area		80%	1.00	4.05	2.53	20**

Notes:

* Serviceable percentage of each quarter-section (not including roads and open space).

** Based on planning lot sizes and a review of the existing lot density for these land uses.

Other Land uses estimates:

- The agricultural land use considers 5 residential units per quarter-section.
- The Community Services and Highway Commercial parcels are limited in size. One unit (lot) is considered for the Community Service Parcel (existing school to be expanded) and two Units (lots) for Highway Commercial.

The Crossmount DCD area is not included, as it has been already approved.



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The land use breakdown per planning cell is included in Table 4.2.

Table 4.2 Serviceable Area per Planning Cell

Planning Cell	Serviceable Land Uses	Area (ha)
Cell 1 west of Highway 11	Country Residential Estate	200.1
	Country Residential	2,282.9
	Medium Density Country Residential	507.5
	Community Services (School Expansion) *	2.6
	Highway Commercial	10.6
	Agriculture	501.3
Cell 2 between Highway 11 and Highway 16	Employment Area	288.4
	Agriculture	3,129.2
Cell 3 east of Highway 16	Country Residential	290.0
	Employment Area	1,092.7
	Agriculture	508.6

Note: Only the proposed development is included in the table. The developed and already approved areas are not accounted for. The agricultural research lands in Planning Cell 2 are not included.

The following assumptions were made about the average daily volumes of water to be supplied for the serviceable land per unit.

Table 4.3 Projected Unit Water Demands except DCD

Proposed Land Use		Average Day Volume Supplied per Unit (L/day)	Potable Water Storage	Fire Suppression Storage
Residential	Country Residential Estate	720 US gal/day/lot	individual lot tank	n/a
	Country Residential	720 US gal/day/lot	individual lot tank	n/a
	Medium Density Country Residential	288 US gal/day/lot	individual lot tank or communal tanks	n/a
Agriculture – assuming groundwater wells		720 US gal/day/lot	individual lot tank	n/a
Highway Commercial		1,800 US gal/day/lot*	individual lot tank	n/a
Employment Area		144 US gal/day/lot	individual lot tank	as required
Community Services – assumes a 143 cap population increase with the expansion of the existing school		1440 US gal/day/lot	individual lot tank	n/a

Note: *High level estimate which may change based on the intended commercial activities



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The potable water serviceable areas for each planning cell are summarized in Table 4.4.

Table 4.4 Potable Water Serviceable Areas per Planning Cell

Planning Cell	Serviceable Land Uses	Area* (ha)	Equivalent Quarter-sections	Lots / Quarter-section*	Number Lots
1	Country Residential Estate	200.1	3.1	15	47
	Country Residential	2,282.9	35.7	40	1,427
	Medium Density Country Residential	507.5	7.9	250	1,983
	Community Services (School Expansion)**	2.6	n/a	n/a	1
	Highway Commercial	10.6	n/a	n/a	2
	Agriculture	501.3	7.8	5	40
2	Employment Area	288.4	4.5	20	91
	Agriculture	3,129.2	48.9	5	245
3	Country Residential	290.0	4.5	15	68
	Employment Area	1,092.7	17.1	20	342
	Agriculture	508.6	7.9	5	40

Notes:

* From Table 4.2

** School expansion area as half of the 5.2 ha Community Services area



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The projected unit water demands in Table 4.3 were used to calculate the potable water demands for each planning cell. A summary of these demands is included in Table 4.5.

Table 4.5 Potable Water Demands per Planning Cell

Planning Cell	Serviceable Land Uses	Number Lots	Unit Water Demand (US gal/day/lot)	Estimated Water Demand per Land Use (US gal/day)	Estimated Water Demand per Land Use (m³/day)
1	Country Residential Estate	47	720	33,840	128.1
	Country Residential	1,427	720	1,027,440	3,889.3
	Medium Density Country Residential	1,983	288	571,104	2,161.9
	Community Services (School Expansion)	1	1,440	1,440	5.5
	Highway Commercial	2	1,800	3,600	13.6
	Agriculture	40	720	28,800	109.0
	Sub-total Planning Cell 1				1,666,224
2	Employment Area	91	144	13,104	49.6
	Agriculture	245	720	147,400	667.7
	Sub-total Planning Cell 2				189,504
3	Country Residential	68	720	48,960	185.3
	Employment Area	342	144	49,248	186.4
	Agriculture	40	720	28,800	109.0
	Sub-total Planning Cell 3				127,008
Total Study Area				1,982,736	7,505.5



4.3 WASTEWATER

4.3.1 WASTEWATER DESIGN INFORMATION

4.3.1.1 Design Guidelines

- The following design guidelines, codes, standards, and existing reports was used during development of the wastewater section of the servicing study to supplement the RM's existing design and development standards:
 - City of Saskatoon, Design and Development Standards Manual, latest edition,
 - WSA, Sewage Works Design Standard, EPB 503, latest edition,
 - P4G District Official Community Plan,
 - Saskatchewan Health Authority, Sewer, and Water Line Installation, and
 - RM supplied CDRs.

4.3.1.2 Wastewater Servicing Assumptions

- Wastewater calculations are completed using the rational method.
- Assumed serviceable area (percentage) is the total area less roads, green spaces, and municipal parcels (pump stations, stormwater facilities & wastewater facilities).
- Assumed that no storm sewer connections (sump pumps and roof leaders) will be connected to the wastewater sewer system.
- Assumed that the gravity sewers will be designed and installed in accordance with the City of Saskatoon Design Standards and Construction Specifications as well as the WSA Sewage Works Design Standards.
- Assumed that sanitary manholes and holding tanks will be placed outside of storm pond areas to minimize infiltration.
- Country Residential Estate: For both existing and future Country Residential Estate designated areas, it is assumed the wastewater is treated onsite using a conventional septic system, advanced treatment system or mound system and that no wastewater will be transported to the Des Nedhe Utilities Corporation Wastewater Treatment Facility (WWTF) or a new WWTP.
- Country Residential: For both existing and future Country Residential designated areas, it is assumed the wastewater will be treated onsite using a conventional septic system, advanced treatment system or mound system and no wastewater will be transported to the Des Nedhe Utilities Corporation WWTF or a new WWTF.



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- Medium Density Country Residential: Assumed that treatment of the wastewater is via community cluster system where the wastewater is collected using a gravity pipe system terminating at a pump station, then pumped via a forcemain to the Des Nedhe Utilities Corporation WWTF or a new WWTF. A series of connected pump stations with appropriately sized wet wells may be used to be more efficient.
 - Serviceable area 75% of total land area.
 - Average lot size 0.15 ha.
 - Lots per quarter section 250.
 - 3.3 people per unit.
 - 330 litres per capita per day.
 - Infiltration 15 m³/day/ha (serviceable area).
 - Wastewater generated 3.4 m³/day/lot (825m³/day/quarter section).
- Highway Commercial: Assumed that a holding tank will be used. The holding tank will be periodically pumped out and transported to a local pump station connected to the Des Nedhe Utilities Corporation WWTF, directly to the Des Nedhe Utilities Corporation WWTF, to an existing wastewater drop off location or a new WWTF. As noted, a holding tank is assumed for the wastewater calculations; however, a conventional septic system, advanced treatment system or mound system may also be considered.
 - 1 Lot for each site – total 2 lots.
 - Infiltration 2 m³/day/lot.
 - Water usage 6.8 m³/day/lot.
 - Wastewater generated 8.8 m³/day/lot.
- Employment Area: Assumed that a holding tank will be used. The holding tank will be periodically pumped out and transported to a local pump station connected to the Des Nedhe Utilities Corporation WWTF, directly to the Des Nedhe Utilities Corporation WWTF, to an existing wastewater drop off location or a new WWTF. As noted, a holding tank is assumed for the wastewater calculations; however, a conventional septic system, advanced treatment system or mound system may also be considered.
 - Serviceable Area 80% of total land area.
 - Average Lot size 2.53 ha.
 - Lots per quarter section 20.
 - Infiltration 0.9 m³/day/lot.
 - Water usage 0.6 m³/day/lot.
 - Wastewater generated 1.5 m³/day/lot (30m³/day/quarter section).



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- Community Service (South Corman Park School): Assumed the South Corman Park current student population of 232 with an expansion to a student population of 375 by the year 2028. Assumed that a holding tank will be used. The holding tank will be periodically pumped out and transported to a local pump station connected to the Des Nedhe Utilities Corporation WWTF, directly to the Des Nedhe Utilities Corporation WWTF, to an existing wastewater drop off location or a new WWTF. As noted, a holding tank is assumed for the wastewater calculations; however, a conventional septic system, advanced treatment system or mound system may also be considered.
 - Total 1 lot (5.2 ha).
 - Infiltration 2 m³/day/lot.
 - Water usage 11.0 m³/day/lot.
 - Wastewater generated 13.0 m³/day/lot (year 2028 student population of 375).
- DCD: Assumed that treatment of the wastewater is via a community cluster system where the wastewater is collected using a gravity pipe system terminating at a pump station, then pumped via a forcemain to the current WWTF situated within the DCD. It is assumed that no wastewater will be transported to the Des Nedhe Utilities Corporation WWTF or a new WWTF.
- Agriculture: For agriculture areas, it is assumed the wastewater will be treated onsite using a conventional septic system, advanced treatment system or mound system and no wastewater will be transported to the Des Nedhe Utilities Corporation WWTF or a new WWTF. Assumed that RM will be allotted 500 m³/day of wastewater service capacity at the Des Nedhe Utilities Corporation WWTF through their current agreement with the English River First Nation. Should requirements exceed 500 m³/day consideration for a new WWTF will need to be reviewed and expedited to be able to service all of the medium density land use within the SADP.
- Assumed private on-site wastewater disposal systems implemented on lands, within the study area, will be determined independently through the current SHA wastewater permit application requirements. Specific details on each of these SHA permits will be provided by the developers to the RM, in the form of a digital copy of each approved SHA permit.

4.3.2

WASTEWATER OUTPUT – CAPACITY

4.3.2.1 Wastewater Capacity – Des Nedhe Utilities Corporation Wastewater Treatment Facility (WWTF)

- The Des Nedhe Utilities Corporation (English River First Nation) WWTF has a current disposal capacity of 217 m³/day using evaporation and irrigation, as originally outlined in the SADP Background Study.
- As per the RM's e-mail dated January 10th, 2024 – The RM has entered into an agreement with Des Nedhe Utilities Corporation securing 500 m³/day of wastewater treatment capacity through their WWTF.



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- If the current capacity of the Des Nedhe Utilities Corporation WWTF is increased from 217 m³/day to 500 m³/day or beyond, a permanent wastewater disposal system will be required. As noted in the RM of Corman Park – Wastewater Forcemain Feasibility Memo, Dated February 10, 2023, permanent wastewater disposal methods currently proposed for the Des Nedhe Utilities Corporation WWTF include disposal from the facility via a future forcemain to the City of Saskatoon’s Storm Sewer System or outfall at the South Saskatchewan River; however, neither of these options have yet to be approved by any regulatory bodies. For the purposes of this study and as requested by the RM of Corman Park, it is assumed that a permanent wastewater disposal method will be approved by the required regulatory agencies for the Des Nedhe Utilities Corporation WWTF and for a new WWTP if required.

4.3.2.2 Wastewater Outputs

Wastewater outputs were calculated based on the estimated residential and industrial unit densities per proposed land use per quarter section (Table 4.6) and projected unit wastewater storage requirements per land use per unit (Table 4.7). The study area was broken into three planning cells and using Table 4.7, the number of lots in each planning area was calculated (Table 4.8). Using Table 4.7 and Table 4.8, total storage required (m³/day) was calculated for each planning cell (Table 4.9) Storage required for the total study area is also shown in Table 4.9.

Table 4.6 Estimated Residential and Industrial Unit Densities per Quarter-Section

Proposed Land Use		Serviceable %*	Lot Size (ha)			Estimated # of Lots per quarter-section
			Min.	Max.	Avg.	
Residential	Country Residential Estate	80%	4.05	6.07	5.06	15**
	Country Residential	80%	1.00	4.05	2.53	40**
	Medium Density Country Residential	75%	0.10	0.20	0.15	250
Employment Area		80%	1.00	4.05	2.53	20**

* Serviceable percentage of each quarter-section (not including roads and open space).

** Based on planning lot sizes and a review of the existing lot densities typical for these land uses.

Notes:

1. The Community Services and Highway Commercial parcels are limited in size. One unit (lot) is considered for the Community Service Parcel (existing school to be expanded) and two units (lots) for Highway Commercial.
2. The agricultural land use considers 5 residential units per quarter-section.



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Table 4.7 Projected Unit Wastewater Storage Requirements

Proposed Land Use		Sanitary System Type	Water Usage (m ³ /Day/Lot)	Infiltration (m ³ /Day/Lot)	Total Storage Required (m ³ /Day/Lot)
Residential	Country Residential Estate	Conventional Septic / Advanced Treatment / Mound	N/A	N/A	N/A
	Country Residential	Conventional Septic / Advanced Treatment / Mound	N/A	N/A	N/A
	Medium Density Country Residential	Cluster System	1.1	2.3	3.4
Agriculture		Conventional Septic / Advanced Treatment / Mound	N/A	N/A	N/A
Highway Commercial		Holding Tank / Conventional Septic / Advanced Treatment / Mound	7.0	2.0	9.0
Employment Area		Holding Tank / Conventional Septic / Advanced Treatment / Mound	0.6	0.9	1.5
Community Services		Holding Tank / Conventional Septic / Advanced Treatment / Mound	11.0	2.0	13.0

Notes:

1. For areas using conventional septic systems, advanced treatment systems or mound systems it is assumed no wastewater will be transported to the Des Nedhe Utilities Corporation WWTF or new WWTF should one be required.
2. For areas using a cluster system it is assumed the wastewater is collected using a gravity pipe system terminating at a pump station, then pumped via a forcemain to the Des Nedhe Utilities Corporation WWTF or new WWTF should one be required.
3. For areas using a holding tank it is assumed the holding tank will be periodically pumped out and transported to a local pump station connected to the Des Nedhe Utilities Corporation WWTF, directly to the Des Nedhe Utilities Corporation WWTF or new WWTF should one be required.
4. For the Highway Commercial, Employment Area and Community Services Areas, it is assumed a holding tank will be used. A septic system, advanced treatment systems or mound system may also be considered.
5. For the Community Services (School Site), student numbers noted above take into consideration the current South Corman Park School student population of 232 will be expanded to a student population of 375 by the year 2028.



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4 SERVICING STRATEGY**

Table 4.8 Wastewater Serviceable Areas/Lots per Planning Cell

Planning Cell	Serviceable Land Uses	Area (ha)	Equivalent Quarter-sections	Lots / Quarter-section*	Number Lots
1	Country Residential Estate	200.1	3.1	15	47
	Country Residential	2,282.9	35.7	40	1,427
	Medium Density Country Residential	507.5	7.9	250	1,983
	Community Services (School Expansion)**	2.6	n/a	n/a	1
	Highway Commercial	10.6	n/a	n/a	2
	Agriculture	501.3	7.8	5	40
2	Employment Area	288.4	4.5	20	91
	Agriculture	3,129.2	58.9	5	245
3	Country Residential	290.0	4.5	15	68
	Employment Area	1,092.7	17.1	20	342
	Agriculture	508.6	7.9	5	40

Note: School expansion area as half of the 5.2 ha Community Services area.

- The projected unit wastewater storage requirements in Table 4.7 and number of units in Table 4.8 were used to calculate the total sanitary storage requirements for each planning cell. A summary of the storage requirements is included in Table 4.9.



**SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY
4 SERVICING STRATEGY**

Table 4.9 Wastewater Storage Requirements per Planning Cell

Planning Cell	Serviceable Land Use	Number of Lots	Daily Storage Requirements (m³/Day/Lot)	Total Storage Required (m³/Day)
1	Country Residential Estate	47	N/A	N/A
	Country Residential	1427	N/A	N/A
	Medium Density Country Residential Total	1983	3.4	6,742.2
	Medium Density Country Residential - Breakdown of Effluent Directed to LS 1	496	3.4	1,686.4
	Medium Density Country Residential - Breakdown of Effluent Directed to LS 2	248	3.4	843.2
	Medium Density Country Residential - Breakdown of Effluent Directed to LS 3	743	3.4	2,526.2
	Medium Density Country Residential - Breakdown of Effluent Directed LS 4	496	3.4	1,686.4
	Community Services (School Expansion)	1	13.0	13.0
	Highway Commercial	2	9.0	18.0
	Agriculture	40	N/A	N/A
Sub-total Planning Cell 1				6,773.2
2	Employment Area	91	1.50	136.5
	Agriculture	245	N/A	N/A
	Sub-total Planning Cell 2			
3	Country Residential	68	N/A	N/A
	Employment Area	342	1.50	513.0
	Agriculture	40	N/A	N/A
	Sub-total Planning Cell 3			
Total Study Area				7422.7



4.3.3 WASTEWATER SERVICING STRATEGY

4.3.3.1 Wastewater Collection

- Wastewater flows generated from the study area will be handled differently for each land use type.
- For Medium Density Country Residential areas, the proposed use of a community cluster system is recommended, where the wastewater is collected and conveyed by gravity sanitary sewers to a pump station, then pumped via a forcemain to the Des Nedhe Utilities Corporation WWTF or new WWTF.
- For Country Residential Estates, Country Residential and Agriculture areas, use of conventional septic systems, advanced treatment systems or mound systems are recommended where the wastewater is handled onsite, and no wastewater will be transported to the Des Nedhe Utilities Corporation WWTF or a new WWTF should one be required.
 - **Conventional Septic Systems:** These are the most common solution for rural properties, consisting of a septic tank and a leach field. The septic tank processes and separates solid waste, while the leach field disperses the liquid effluent into the ground.
 - **Advanced Treatment Systems:** For properties with limited space or poor soil conditions, advanced systems that provide additional treatment to the effluent before it reaches the leach field are used. These systems often include aerobic treatment units and sand filters.
 - **Mound Systems:** For properties with high groundwater levels or shallow soil layers, mound systems are an alternative. These systems raise the leach field above the natural soil surface for better filtration and aeration.
- For Highway Commercial, Employment and Community Service land uses, use of holding tanks is recommended whereas the holding tank will be periodically pumped out and transported to a local pump station connected to the Des Nedhe Utilities Corporation WWTF, directly to the Des Nedhe Utilities Corporation WWTF, to an existing wastewater drop off location or a new WWTF. Use of conventional septic systems, advanced treatment systems or mound systems may be considered if approved by the RM.
 - **Holding Tanks:** In areas where leach fields are not feasible, holding tanks are used to store wastewater, which is then periodically pumped out and transported to a WWTF.
- Before the implementation of any wastewater septic system within a private land development, wastewater septic systems must meet residential strength discharge requirements as a minimum to be permitted by the SHA. These requirements typically include specific limits on the concentration of key pollutants such as Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), and fecal coliform bacteria.



4.3.3.2 Wastewater Pump Stations and Forcemains

- For Medium Density Country Residential areas, smaller lot sizes and increased densities would eliminate the use of conventional septic systems, advanced treatment systems or mound systems. The use of a community cluster system is recommended, whereas the wastewater is collected and conveyed by gravity sanitary sewers to a pump station, then pumped via a forcemain to the Des Nedhe Utilities Corporation WWTF or a new WWTP.
- The Medium Density Country Residential Areas are all in Planning Cell 1, Quarter Sections NW-32-35-05-W3, NE-32-35-05-W3, SW-32-35-05-W3, SE-32-35-05-W3, SW-33-35-05-W3, SE-34-35-05-W3, SW-34-35-05-W3 and SW-35-35-05-W3.
- If the wastewater from the Medium Density Country Residential Areas is to be directed to the Des Nedhe Utilities Corporation WWTF, it is proposed to have centrally located wastewater lift stations as shown on Figure 4.3 (Proposed Wastewater Facilities – Option 1) in Quarter Sections SW-32-35-05-W3, SW 33-35-05-W3, SW-34-35-05-W3 and SE-34-35-05-W3.
 - The proposed wastewater lift stations will be interconnected with forcemains. Forcemains connecting the lift stations will increase in size from west to east as flows increase. Pumping capacity at each lift station will also increase from west to east as flows increase.
 - To minimize front end costs for the developers, it is proposed that development proceed from east to west with the first lift station (LS1) built being in the SE-34-35-05-W3 quarter section which would service both quarter sections SW-35-35-05-W3 and SE-34-35-05-W3. The pump capacity in LS1 and the forcemain from LS1 to the Des Nedhe Utilities Corporation WWTF would have to have the capacity for peak flows based on daily flows 6,742.2 m³/Day (medium density flows only) as noted in Table 4.9. LS 1 includes flows from LS 2, LS 3 and LS 4.
 - The second proposed lift station (LS2) would be constructed in SW-34-35-05-W3 and it would service only the SW-34-35-05-W3 quarter section. The pump capacity in LS2 and the forcemain from LS2 to LS1 would have to have the capacity for peak flows based on daily flows 5,055.8 m³/Day (medium density flows) as noted in Table 4.9. LS 2 includes flows from LS 3 and LS 4.
 - The third proposed lift station (LS3) would be constructed in SW 33-35-05-W3 and it would service quarter sections SW-33-35-05-W3, SE-32-35-05-W3 and NE-32-35-05-W3. The pump capacity in LS3 and the forcemain from LS3 to LS2 would have to have the capacity for peak flows based on daily flows 4,212.6 m³/Day (medium density flows) as noted in Table 4.9. LS 3 includes flows from LS 4.
 - The fourth proposed lift station (LS4) would be constructed in SW 32-35-05-W3 and it would service quarter sections SW-32-35-05-W3 and NW-32-35-05-W3. The pump capacity in LS4 and the forcemain from LS4 to LS3 would have to have the capacity for peak flows based on daily flows 1,685.4 m³/Day (medium density flows) as noted in Table 4.9.



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY

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- If the wastewater from the Medium Density Country Residential Areas is to be directed to the new WWTF proposed in NE-30-35-05-W3 (see Section 4.3.3.4 below), the proposed locations of the wastewater lift stations would remain the same as above and as shown on Figure 4.4 (Proposed Wastewater Facilities – Option 2) in Quarter Sections SW-32-35-05-W3, SW 33-35-05-W3, SW-34-35-05-W3 and SE-34-35-05-W3.
 - For Option 2 the proposed wastewater lift stations will be interconnected with forcemains. The forcemains connecting the lift stations would increase in size from east to west as flows increase. Pumping capacity at each lift station will also increase from east to west as flows increase.
 - For Option 2 to minimize front end costs for the developers, it is proposed that development proceed from west to east with the first lift station (LS4) built being in the SW-32-35-05-W3 quarter section which would service both quarter sections SW-32-35-05-W3 and NW-32-35-05-W3. The pump capacity in LS4 and the forcemain from LS4 to the new WWTF would have to have the capacity for peak flows based on daily flows 6,742.2 m³/Day (medium density flows). as noted in Table 4.9. LS 4 includes flows from LS 3, LS 2 and LS 1. The second proposed lift station (LS3) would be constructed in SE-33-35-05-W3 and it would service quarter sections SE-32-35-05-W3, NE-32-35-05-W3 and SW-33-35-05-W3. The pump capacity in LS3 and the forcemain from LS3 to LS4 would have to have the capacity for peak flows based on daily flows 5,055.8 m³/Day (medium density flows) as noted in Table 4.9. LS 3 includes flows from LS 2 and LS 1.
 - The third proposed lift station (LS2) would be constructed in SW 32-35-05-W3 and would service only the SW-34-35-05-W3 quarter section. The pump capacity in LS2 and the forcemain from LS2 to LS3 would have to have the capacity for peak flows based on daily flows 2,529.6 m³/Day (medium density flows) LS 2 includes flows from LS 1.
 - The fourth proposed lift station (LS1) would be constructed in SE 34-35-05-W3 and it would service quarter sections SE-34-35-05-W3 and SW-35-35-05-W3. The pump capacity in LS1 and the forcemain from LS1 to LS2 would have to have the capacity for peak flows based on daily flows 1,686.4 m³/Day (medium density flows).
- The proposed routes for both Option 1 and Option 2 are preliminary and they will need to be refined based on development phasing.
- The above calculated daily flows are based on assumptions made in section 4.3.1.2 above. Since proposed construction would start at the furthestmost downstream pump station it would be prudent to oversize the pump stations and the forcemain closest to the WWTF to allow for variances to the number of units to be built in the future upstream areas.
- The daily flows of 6,742.2 m³/Day for Medium Density Country Residential areas exceed the maximum 500 m³/day available at the Des Nedhe Utilities Corporation WWTF (noted above in section 4.2.2.1). Consideration will have to be given to alternatives such as expanding the Des Nedhe Utilities Corporation WWTF or constructing a new WWTF.



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY

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4.3.3.3 Holding Tanks

- For Highway Commercial, Employment and Community Service areas, the calculated daily flows assume the use of holding tanks and transportation of the effluent:
 - To a local pump station connected to the Des Nedhe Utilities Corporation WWTF, or
 - Directly haul the holding tank effluent to the Des Nedhe Utilities Corporation WWTF or
 - Directly haul the holding tank effluent to the new RM owned WWTF, or
 - Directly haul the holding tank effluent to another site outside of the RM, such as the City of Saskatoon.
- The daily flows of 680.5 m³/Day for Highway Commercial, Employment and Community Service areas exceed the maximum 500 m³/day available at the Des Nedhe Utilities Corporation WWTF (noted above in section 4.2.2.1). Consideration should be given to alternatives such as expanding the Des Nedhe Utilities Corporation WWTF or constructing a new WWTF.

4.3.3.4 Wastewater Treatment Facilities

- The current capacity of the Des Nedhe Utilities Corporation WWTF is 217 m³/day. It is assumed the current capacity of the WWTF will be increased and that the RM will be allotted 500 m³/day of wastewater service capacity at the Des Nedhe Utilities Corporation WWTF through their current agreement with the English River First Nation Reserve. Should requirements exceed 500 m³/day consideration for a new WWTF will be reviewed or other alternatives will be reviewed.
- Daily wastewater flows of 7422.7 m³/day noted in Table 4.9 exceed the RM allotted 500 m³/day noted above.
- If a new WWTF is considered, a location in proximity to the lands designated as Medium Density Country Residential areas and the South Saskatchewan River would be desirable. Lands designated as Medium Density Country Residential would be the only lands using a cluster system, where the wastewater is collected and conveyed by gravity sanitary sewers to a lift station, then pumped via a forcemain to a WWTF. The closer the end users are to the WWTF and the closer the WWTF is to a potential outlet, in this case the South Saskatchewan River, the less front-end costs are incurred, and the less maintenance costs will be incurred. A potential location for a new WWTF would be in the NE-30-35-05-W3 quarter section. Any wastewater effluent outfalls to the South Saskatchewan River would have to be approved by the required regulatory bodies.

4.3.3.5 Wastewater Discussions and Recommendations

A new WWTF will need to be reviewed and expedited to be able to service all of the medium density land use within the SADP due to the SADP medium density wastewater needs exceeding the capacity of the Des Nedhe Utilities Corporation Wastewater Treatment Facility (WWTF) current agreement with the RM.



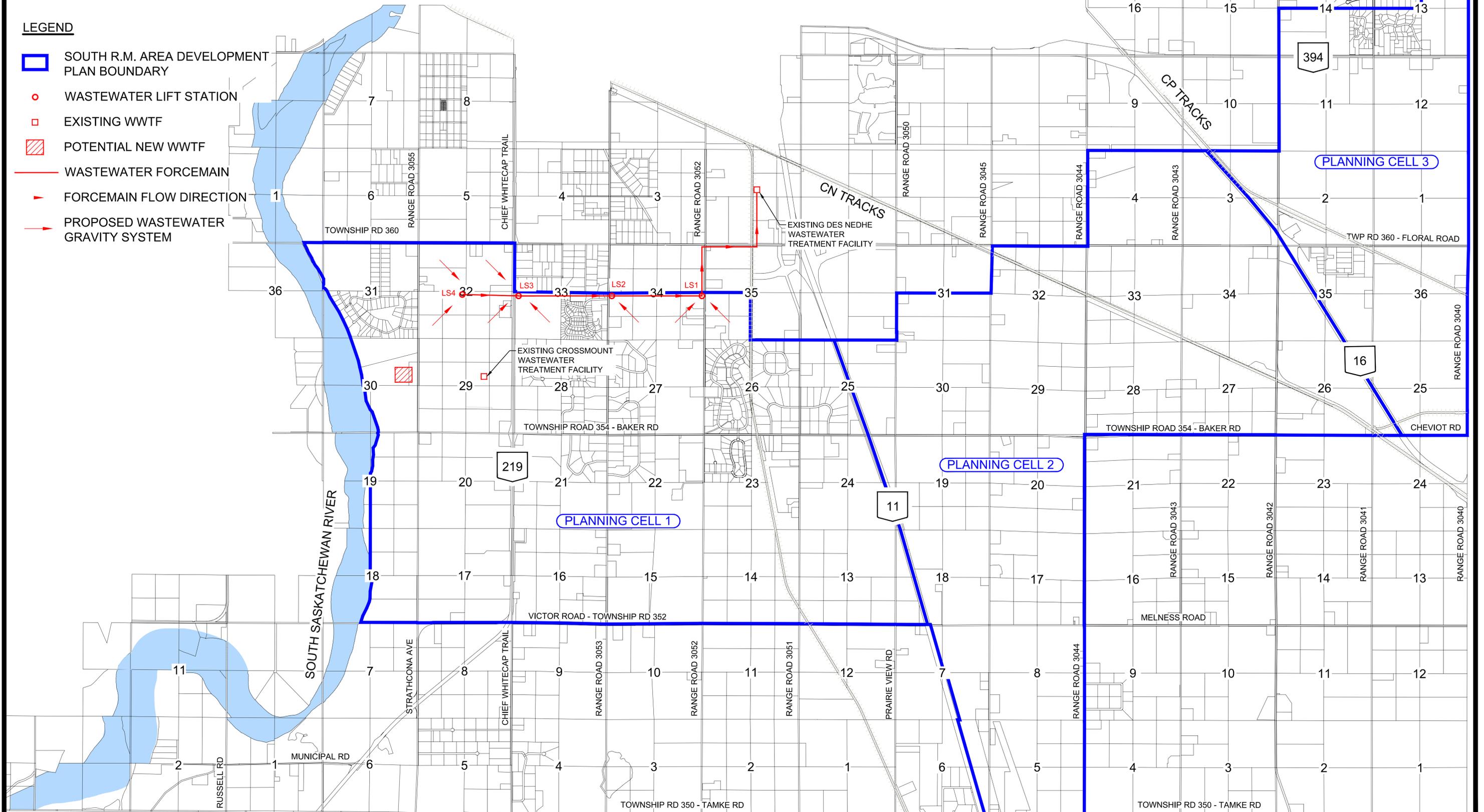


SOUTH R.M. AREA DEVELOPMENT PLAN

FIGURE 4.3 PROPOSED WASTEWATER FACILITIES OPTION 1

LEGEND

- ▭ SOUTH R.M. AREA DEVELOPMENT PLAN BOUNDARY
- WASTEWATER LIFT STATION
- ▣ EXISTING WWTF
- ▨ POTENTIAL NEW WWTF
- WASTEWATER FORCEMAIN
- ▶ FORCEMAIN FLOW DIRECTION
- PROPOSED WASTEWATER GRAVITY SYSTEM



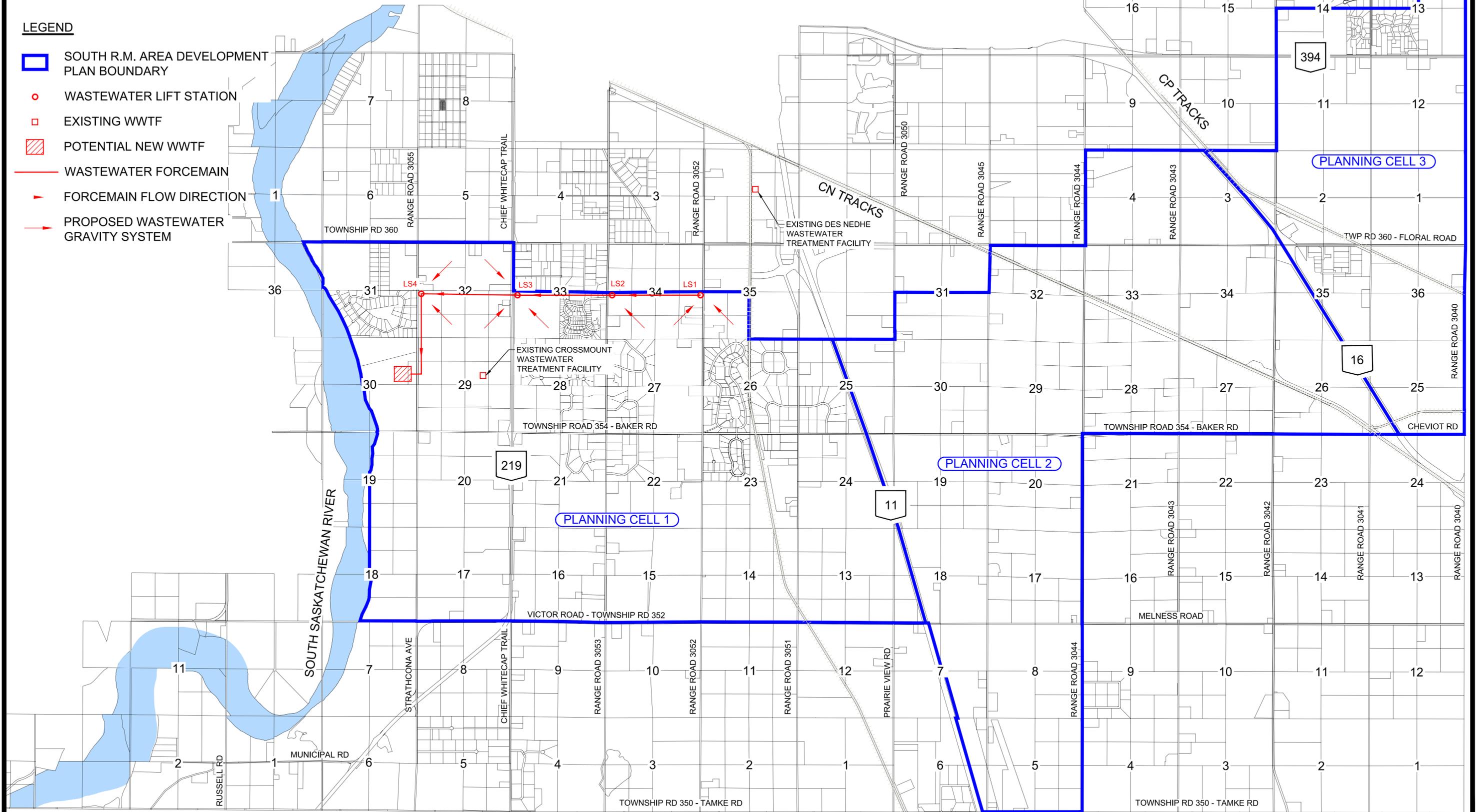


SOUTH R.M. AREA DEVELOPMENT PLAN

FIGURE 4.4 PROPOSED WASTEWATER FACILITIES OPTION 2

LEGEND

- ▭ SOUTH R.M. AREA DEVELOPMENT PLAN BOUNDARY
- WASTEWATER LIFT STATION
- ▣ EXISTING WWTF
- ▨ POTENTIAL NEW WWTF
- WASTEWATER FORCEMAIN
- ▶ FORCEMAIN FLOW DIRECTION
- PROPOSED WASTEWATER GRAVITY SYSTEM



4.4 GROUNDWATER

A streamlined water balance is provided estimating the amount of additional water being discharged into the surficial groundwater flow system. A schematic illustrating the withdrawal and recharge sources are shown in Figure 4.5. The amount of additional water returned into the surficial groundwater flow system is summarized in Table 4.10, in the balance column. The daily volumes are obtained from Table 4.5 in Section 4.2.3.

The assumed groundwater uses withdrawn from the surficial aquifer is based on the agriculture land-use, with a density of 5 residential lots per quarter section. The groundwater use includes only the residential demand of the households, with no provision for irrigation or livestock watering. However, it is noted that many of the existing farmsteads within the agricultural land use designation are already serviced by low-pressure rural potable water pipelines, as shown in Figure 4.1. It is likely that some of the proposed agriculture residential lots will cover part of their residential demand with piped water.

The following land uses import piped water, which is assumed to return to the surficial groundwater flow via conventional septic systems, advanced treatment systems or mound systems: Country Residential Estate, Country Residential, Agriculture, Community Service (School Expansion), Highway Commercial and Employment Area. It is assumed that all wastewater returned to ground will contribute to groundwater recharge, although part may be lost to evaporation or plant uptake.

Table 4.10 Additional Water Returned to Surficial Aquifer

Planning Cell	Applicable Land Uses	Groundwater Use (m ³ /day)	Wastewater Returned (m ³ /day)	Balance per planning cell *
1	Country Residential Estate	N/A	128.1	4,037
	Country Residential	N/A	3,889.3	
	Community Services (School Expansion)	N/A	5.5	
	Highway Commercial	N/A	13.6	
	Agriculture	109.0	109.0	
2	Employment Area	N/A	49.6	49.6
	Agriculture	667.7	667.7	
3	Country Residential	N/A	185.3	371.7
	Employment Area	N/A	186.4	
	Agriculture	109.0	109.0	
Totals		885.7	5,343.5	4,457.8

Note: * Daily volume of wastewater returned – Daily volume of groundwater extracted.

Water returning to ground from watermain breakages was not included in this calculation.



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY

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While the streamlined water balance approach to the amount of additional water being discharged into the surficial groundwater flow system provides a useful comparison between the groundwater extracted and the wastewater returned by the applicable land-uses; a complete groundwater balance would also need to include additional input information about the groundwater recharge processes, such as those driven by precipitation, be it rainfall or snowmelt.

In winter, there is substantial snow redistribution by wind. Snow transport usually relocates snow to sloughs, drainage channels or valleys where it is more likely to run off to a water body upon melt. Some sublimation of snow also occurs during snow transport.

Evaporation consumes most rainfall on the prairies and occurs quickly via direct wet surface evaporation from rainfall intercepted on plant canopies and wet soil or soil cover surfaces. Evaporation also occurs from sloughs and wetlands where redistribution of spring snowmelt runoff water into topographic depressions provides for wet surface conditions through much of the spring and summer.

Runoff occurs when the input of rainfall or snowmelt exceeds the infiltration capacity of the soil, which depends on the soil cover, soil type and seasonal conditions. The resulting runoff is directed to surface flow paths and ultimately to watercourses and water bodies, with no overall impact on groundwater recharge. Land-uses with large percentages of impervious area will generate more runoff compared to pre-development conditions, limiting the amount of water which can infiltrate in the underlying soils.

For pervious vegetated surfaces, most infiltrated water is held in the root zone until withdrawn by the plant for transpiration. Only a small portion of the infiltrated water is able to percolate below the vegetation root zone and travel to the surficial aquifer zone. Some infiltration may also occur from pothole depressions with coarse and porous soils at the bottom, however most such sloughs and wetlands have seasonal losses mostly dominated by evaporation and plant uptake.

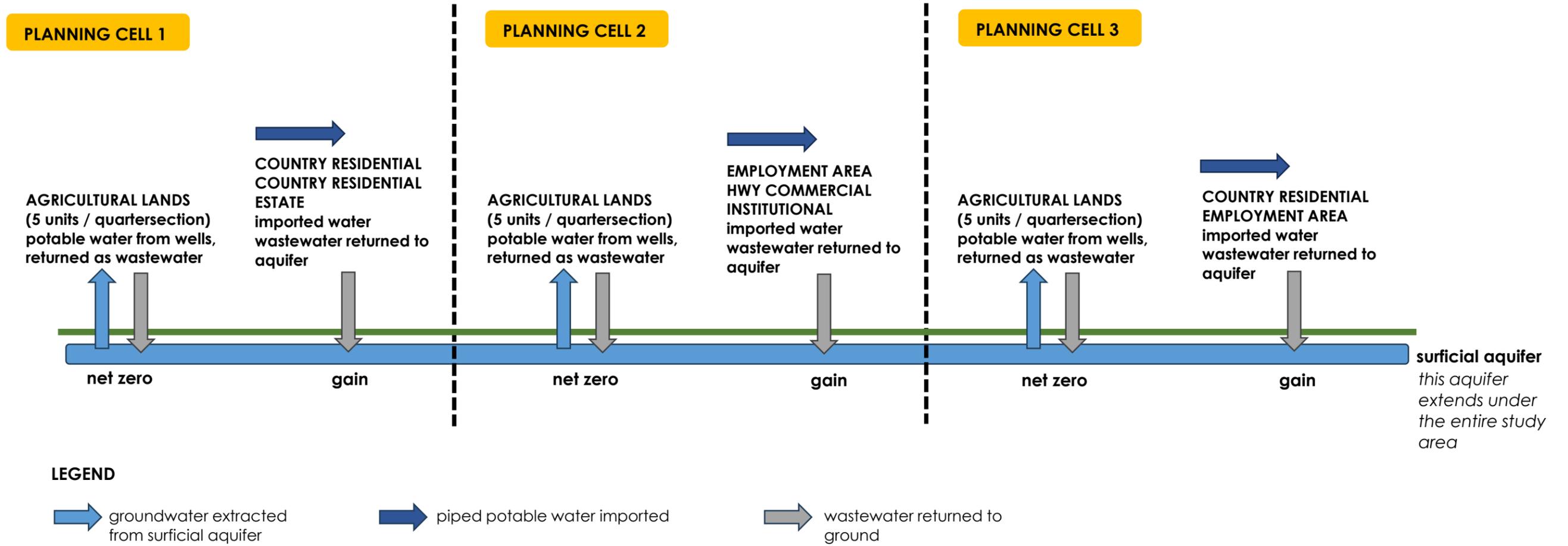
Based on the “Hydrogeology Mapping of NTS Mapsheet Saskatoon 73B” (2011) report by MDH Engineered Solutions, the surficial aquifer extends under most of the NTS plate 73B, including the bulk of the SADP study area. The south tip of the SADP area falls into NTS plate 72, which has not been studied to date, however, the surficial aquifer may extend further to the south.

The MDH study applied the Aquifer Vulnerability Index (AVI) method to characterize groundwater vulnerability within NTS 73B. It was concluded that the majority of the Saskatoon 73B area is susceptible to contamination from surface sources, as referenced in Figure G12 (Appendix G) of the MDH study.

However, the depth, thickness, and extent of individual gravels, sands, silts, and clays within the surficial sediment deposits are highly variable and the hydraulic connectivity between these units is complex. Since the vulnerability of the surficial aquifer is dependent on the lithologies and thickness of any aquitard sediments near surface within the surficial stratified deposits, follow-up studies would be needed to determine what parts of the proposed SADP development would directly overlie the most vulnerable parts of the surficial aquifer.



SOUTH R.M. AREA DEVELOPMENT PLAN
FIGURE 4.5 ADDITIONAL WATER SOURCES SCHEMATIC



Notes:

1. Medium Density Residential imports potable water and directs wastewater to WWTPs
2. Balance calculations do not include potable water leakage from rural pipelines or a precipitation infiltration component
3. It is assumed that the wastewater returned to ground will contribute to groundwater recharge, although part may be lost to evaporation or plant uptake

4.5 STORMWATER

4.5.1 STORMWATER DESIGN INFORMATION

The overall drainage features within the study area are shown in Figure 3.1, Section 3.1, which discusses the existing drainage features of the SADP study area.

4.5.1.1 Stormwater Servicing Summary

A review of the stormwater servicing practices was completed using the CDRs of existing developments, provided by RM, within the study area. These are summarized in Table 4.11. The rural residential subdivisions use roads with ditch profiles that are graded to convey runoff to stormwater ponds located in natural low areas. In most cases, the ponds are sized to store the incremental post-development runoff for a 1:100-year CoS design storm, plus an additional 25%. In some cases, the storage only covers a 1:100-year CoS design storm.

Table 4.11 Stormwater Management within the SADP – Existing Developments*

Development	Type of Development	CDR Year	Stormwater Storage
Applewood Estates	Rural Residential	2011	Natural low area with sufficient storage for at least 1:100 year storm
Tuscan Ridge Estates	Rural Residential	2014	Natural low areas with sufficient storage for at least 1:100 year storm
Meadow Ridge Estates	Rural Residential	2016	Natural low area with sufficient storage for 1:100 year storm + 25%
Grasswood Estates	Rural Residential	2012	Two on-site ponds with sufficient storage for 1:100 year storm + 25%
Edgemont Park	Rural Residential	2018	Two on-site ponds with sufficient storage for 1:100 year storm + 25%
The Village at Crossmount	Retirement Community (Direct Control District)	2013 (draft)	Recommendations for detailed drainage plan to be developed as part of the design phase of the project
1022068225 Sask Corp	Industrial	n/a	Multiple stormwater ponds sized to provide storage for 1:100 year storm + 25%

Note: *Available CDRs.

The Ravenswood proposed country residential development was not included in this table but, the CDR drainage assumptions are discussed in Section 4.5.1.2.



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY

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4.5.1.2 Relevant CDR Summaries

Stormwater servicing summaries are provided for several representative existing developments, as extracted from their Comprehensive Development Reports (CDRs) to provide an existing servicing baseline for the SADP Serviceability.

Meadow Ridge Estates – Country Residential

Stormwater runoff will be conveyed via overland surface drainage routes using roadside ditches, swales and culverts. No minor piped stormwater sewer collection systems are proposed. Existing low areas will be incorporated into the drainage plan and expanded where necessary to provide sufficient stormwater runoff storage. Drainage runs will be incorporated along road right-of-way's following the existing patterns with minimal adjustments for development.

The pre-development imperviousness of the existing site is estimated to be 5%. The post-development imperviousness of the entire site is estimated to be 12% upon full build-out of the subdivision, therefore, an overall increase in the runoff volume is anticipated. The additional runoff produced by the development will be contained in the natural and constructed low areas. Final sizing of the storage areas will be completed during detailed design of the subdivision.

The pre-development volume of runoff produced during the 1:100 year storm (producing 90 mm depth of rainfall over 24 hours) from the total parcel size of 62.346 ha is 17,300 m³. The volume of post-development runoff produced from this area is approximately 21,300 m³, resulting in additional storage requirements of 4,000 m³. To account for no stormwater capacity downstream during extreme events, an additional 25% storage volume has been included, so the total volume of additional runoff to be contained onsite is 5,000 m³. Since the existing storage areas can accommodate this excess volume of runoff, additional storage areas are not required.

Ravenswood – Country Residential

A Storm Water Management Plan (SWMP) was prepared by WSP Canada Inc. in collaboration with Associated Engineering Ltd. The SWMP was prepared according to the RM zoning standards and in consultation with the WSA. The plan ensures that there is sufficient storm water storage available to accommodate a 1:100-year storm event without generating increased runoff resulting from the full development of the property. The proposed subdivision layout has been designed to optimize natural low-lying areas for common storage using six small stormwater retention ponds constructed within dedicated municipal utility parcels. By following the natural drainage paths and situating stormwater ponds in existing low-lying areas, development of the site effectively mimics the natural pre-development drainage system and reduces the need for extensive grading.



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The Village at Crossmount – DCD

The 1:100-year CoS design storm was considered in the runoff volume calculations: a pre-development volume of 29,250 m³ and a post-development volume of 39,365 m³.

A large stormwater pond is planned in the northeast portion of the proposed development, in existing low area shown on Drawing 2 of the CDR (Appendix A of the CDR). The stormwater retention area shown on Drawing 2 is indicated by the blue shaded areas. The dark blue area indicates land from an elevation of 501 m to 502 m above sea level which covers approximately 7.6 hectares of land. The light blue indicates land between 502 m and 503 m which covers an area of 25.5 hectares. The projected storm runoff of 39,365 m³ translates to a flood level of approximately 0.52 m deep over the area shown as the dark blue color. A deeper pond may be excavated in this area with a normal water level near 501 m to allow for a permanent source of water on site to be used for irrigation. The water level would increase by approximately 0.52 m in a major rain event, with a significant allowance for much larger flood volumes to occur up to an elevation of 503 m (approximately 331,000 m³). The normal operating level of a pond constructed in this area could be safely operated below an elevation of 502.5 m and still provide several times the required volume of storage up to the elevation of 503 m. The drainage system will also include small storage ponds/features located in the Village Centre and near the Art Barn. The only existing pond on site is a very small pond near the proposed Art Barn location that will be maintained and developed into a feature. A small feature pond will be constructed in the Village Centre to facilitate local drainage. The concept at this stage is to provide minimal storm retention volume in the design of this pond but allow it to surcharge slightly and drain via a constructed swale to the northeast retention pond. The finished elevations of the pond levels will be determined during the detailed design phase. A detailed drainage plan will be developed as part of the design phase of the project.

1022068225 Sask Corp - Industrial

A Storm Water Management Review was completed by Catterall & Wright Consulting Engineers (Appendix D of the CDR).

To manage the increased impermeability and associated runoff of the proposed development, a preliminary grading plan with 4 preliminary pond locations was developed. The purpose of the storm water ponds is to provide attenuation during storm events, thereby minimizing the effect of the development on surrounding properties. Catterall & Wright prepared a preliminary lot grading plan for the development which contains all runoff from the site into a storm water detention pond system which includes individual ponds for each site and a single controlled outlet. The 4 ponds were sized to provide storage for the 1:100 year storm event with an additional 25% storage while maintaining a post-development runoff rate less than the pre-development runoff rate of approximately 1450 L/s.

The pond storage volume required for the full development totals 1,400 m³. A breakdown of the proposed pond storage volumes for each site is noted below: Site 1 = 260 m³, Site 2 = 275 m³, Site 3 = 380 m³ and Site 4 = 480 m³. The proposed storm water detention ponds should require minimal maintenance, limited to clearing vegetation growth near the culvert inlets. The outlet rate of the storm sewer has been designed below the pre-development runoff rate. This improves the downstream runoff condition, and it allows for the front yards of this development to directly drain to the highway ditch.



4.5.2 STORMWATER SERVICING STRATEGY

4.5.2.1 Stormwater Servicing Assumptions

It is assumed that all the proposed development, regardless of the proposed land-use, will implement stormwater management practices based on the current RM of Corman park CDR recommendations.

- The proposed development stormwater ponds will be sized to store the incremental post-development runoff for a 1:100-year CoS design storm, plus an additional 25%.
- The post-development peak flows leaving the development should not exceed the pre-development peak flows for the 1:100-year CoS design storm event.

Planning Cell 1 - Area West of Highway 11

As shown by Figure 3.1, most of the lands west of Highway 11 (35.44 km²) drain west, to the South Saskatchewan River (SSR). A narrow strip of land located along the SSR east bank constitutes the effective drainage area of the river, whereas the remainder of the watershed falls within the non-effective drainage area of the SSR. This area has relatively few pothole depressions, with most of these being small ephemeral sloughs. The drainage divide is located roughly west of the Casa Rio development.

The remainder of Planning Cell 1 (15.64 km²), located between the natural drainage divide and Highway 11, drains to the southwest, towards Brightwater (Beaver) Creek. This area has the same sparse pothole coverage as the are draining directly towards the SSR. A cluster of small size sloughs are located on W 14-35-05 W3M.

Proposed land uses include all three types of residential, the Crossmount DCD and some Highway Commercial at Highway 11 by South Point Estates. It is assumed that all the proposed residential and Highway Commercial developments will submit individual CDRs complete with drainage and stormwater management plans.

The feasibility of regional ponds for the future residential development in this planning cell is low, considering that the future subdivisions will likely cover just one or two quarters-sections of land and will have a looped road network with one or more internal open spaces with stormwater storage capabilities.

Based on existing practices in the already developed residential areas, it is assumed that:

- Residential developments within quarter-sections with natural storage will preserve these natural areas and will use them to store the incremental runoff due to development.
- Residential developments within quarter-sections without significant natural storage will provide storm-ponds located in designated areas.

It is assumed that the stormwater management concept in the Village at Crossmount CDR will be progressed to detailed design, such as to service the entire DCD area. This development has sufficient storage in a natural low area described in the CDR.



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The Highway Commercial parcels assumed to be located in the triangle area between South Point Estates and Highway 11 will provide on-site storage for their incremental runoff, while releasing at controlled rates to the Highway 11 ditch west ditch. The general drainage direction of this ditch is to the south.

Planning Cell 2 - Area between Highway 11 and Highway 16

This planning cell includes a triple drainage divide:

- A small area of 1.32 km² drains to the north, towards the Highway 11 interchange south of the City of Saskatoon. This area does not have substantial pothole storage but, it will remain agricultural.
- A sliver of land of 9.82 km² located between Highway 11 and the drainage divide, drains southwest towards Brightwater (Beaver) Creek. Slough storage is concentrated between Township Road 354 to the north and Township Road 350 to the south (with a large slough located on 18-35-04 W3M, at the Clement Farms Greenhouse), however this area is not considered for future development. The only land use to require stormwater management is the Light Industrial (Employment) Area located immediately east of Highway 11 and north of Township Road 350.
- The remainder of the planning cell, approximately 35.22 km², drains towards a large slough system, part of the Green Network natural drainage features. This important drainage corridor will fill and spill during flood years, with an overall northwest drainage direction, towards the City of Saskatoon. During most years these large sloughs will expand without overflowing to the northwest. No future development is proposed for this area, which will remain agricultural.

It is assumed that all the proposed developments in the Employment Area will submit CDRs complete with drainage and stormwater management plans. Industrial Park type developments may size one or two larger size stormwater ponds to service the entire park, whereas smaller developments will provide lot-size stormwater management solutions.

Planning Cell 3 - Area East of Highway 16

The entire planning cell area (22.78 km²) drains to the southwest, towards the Green Network slough system, located west of Highway 16.

- The area north of Highway 394 (Patience Lake Road) has little natural storage, with most natural low areas being small, ephemeral sloughs. The currently undeveloped area is planned as Country Residential.
- Between Road 394 and CN Railway, there are pockets of middle sized sloughs, some with permanent water bodies. The two land sections south of Road 394 will remain agricultural, with the remainder planned as Employment Area.
- South of CN Railway and north of Cheviot Road, there is an isolated slough system, located in the southeast corner of the Study Area. This area is poorly drained, although drainage will eventually cross Highway 16 east to west, via multiple culvert crossings.



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4 SERVICING STRATEGY

It is assumed that all the proposed developments in this area will submit individual CDRs complete with drainage and stormwater management plans.

Based on existing practices in the already developed residential areas in the northeast corner of this planning cell, it is assumed that:

- Residential developments within quarter-sections with natural storage will preserve these natural areas and will use them to store the incremental runoff due to development.
- Residential developments within quarter-sections without significant natural storage will provide storm-ponds located in designated areas.
- There may be some potential to utilize the existing storage south of Road 394, on N 12-36-04 W3M.

Developing the full Employment Area in the southeast corner of this planning cell will pose some drainage related challenges due to the isolated slough system located on these lands. The existing sloughs are relatively long and narrow trenches, parallel to the Highway 16 alignment. The most affected section is 25-35-04 W3M, where approx. 56 ha are covered by large sloughs considered National Hydro Network (NHN) permanent waterbodies. It is assumed that the presence of this slough system will limit the developable industrial area, however, it may be repurposed for stormwater management to store the incremental runoff originating from the adjacent industrial development. Infilling this slough system is not recommended, given its natural storage role for large flood events.

It is assumed that all the proposed developments in the Employment Area will submit CDRs complete with drainage and stormwater management plans. Industrial Park type developments may size one or two larger size stormwater ponds to service the entire park, whereas smaller developments will provide lot-size stormwater management solutions.



4.5.3 STORMWATER OUTPUT – STORAGE VOLUMES

The stormwater serviceable area of the proposed development is summarized in Table 4.12. The agriculture land use is not included in the stormwater serviceable land uses.

Table 4.12 Stormwater Serviceable Area per Planning Cell

Planning Cell	Serviceable Land Uses	Area (ha)
1	Country Residential Estate	200.1
	Country Residential	2,282.9
	Medium Density Country Residential	507.5
	Community Services (School Expansion)*	2.6
	Highway Commercial	10.6
2	Employment Area	288.4
3	Country Residential	290.0
	Employment Area	1,092.7

Note: * School expansion area as half of the 5.2 ha Community Services area.

A summary of Runoff coefficients used in the storage calculations is provided in Table 4.13.

Table 4.13 Runoff Coefficients Summary

Serviceable Land Uses	Runoff coefficient, C
Undeveloped*	0.05
Undeveloped with standing water (Planning Cell 3, future Light Industrial area)**	0.10
Country Residential Estate**	0.20
Country Residential**	0.35
Medium Density Country Residential*	0.60
Community Services (School Expansion)**	0.50
Highway Commercial**	0.90
Employment Area*	0.60

Notes:

*Values based on CoS Stormwater Design Standards, Table B-2.

**Values based on typical cover for the existing / intended land use.

The 1:100 Year City of Saskatoon design storm is based on the historical rainfall event from June 1983, with a total rainfall depth of 96.5 mm. Incorporating an additional 25% rainfall depth results in a 121 mm design rainfall depth to be used in the storage calculations.



**SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY
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It is assumed that all the proposed development stormwater ponds will be sized to store the incremental post-development runoff for a 1:100-year City of Saskatoon (CoS) design storm, plus an additional 25%. The post-development peak flows leaving the development should not exceed the pre-development peak flows for the 1:100-year CoS design storm event.

The Rational Method was used to provide high-level estimates of pre and post development runoff volumes for each of the serviceable land uses, in each planning cell.

$$\text{Pre-development Runoff Volume (m}^3\text{)} = \text{Development Area (m}^2\text{)} \times \text{Pre-development Runoff Coefficient} \times \text{Design Rainfall Depth (m)}$$

$$\text{Post-development Runoff Volume (m}^3\text{)} = \text{Development Area (m}^2\text{)} \times \text{Post-development Runoff Coefficient} \times \text{Design Rainfall Depth (m)}$$

$$\text{Incremental Runoff Volume (m}^3\text{)} = \text{Post-development Runoff Volume (m}^3\text{)} - \text{Pre-development Runoff Volume (m}^3\text{)}$$

A summary of the estimated runoff volumes for each planning cell is provided in Table 4.14.

Table 4.14 Estimated Runoff Volumes Area per Planning Cell

Planning Cell	Serviceable Land Uses	Pre-Development Runoff Volume (m ³)	Post-Development Runoff Volume (m ³)	Incremental Runoff Volume to Store (m ³)
1	Country Residential Estate	1,211	4,843	3,632
	Country Residential	13,812	96,681	82,869
	Medium Density Country Residential	3,070	36,845	33,775
	Community Services (School Expansion)	16	158	142
	Highway Commercial	64	1,155	1,091
Sub-total Planning Cell 1		18,173	139,682	121,509
2	Employment Area	1,745	20,938	19,193
Sub-total Planning Cell 2		1,745	20,938	19,193
3	Country Residential	1,755	12,282	10,528
	Employment Area	13,222	79,331	66,109
Sub-total Planning Cell 3		7,488	91,613	76,637
Total Study Area		34,894	252,233	217,339

These high-level storage volumes will need to be refined during the design stages of each proposed development, once hydrologic and hydraulic stormwater models are developed. These models will incorporate infiltration parameters for the representative soils, as well as tailwater conditions for the storm pond outfalls.



4.6 TRANSPORTATION

The following sections outline the projection of future traffic volumes for the study area, assuming full build out of the developable areas for all land uses. It also compares the projected traffic volumes to the current traffic volumes and provides recommendations for road network changes to support development.

4.6.1 TRANSPORTATION OUTPUT – TRIP GENERATION

The trips that are expected to be generated by the future development area were calculated using the Institute of Transportation Engineers Trip Generation Manual, 11th Edition. The land uses to determine the trip generation for the employment area land use included an average rate from light industrial land uses (industrial blend) and commercial land uses (commercial bend). It was assumed that the employment area would consist of 50% commercial and 50% light industrial areas. All trip generation calculations were completed for the weekday peak hour of adjacent street traffic. Trip generation was completed by quarter section in order to more easily distribute the trips to the roadway network. The following describes the trip generation rate and the entering and exiting percentages for each land use for the AM and PM peak hours.

Highway Commercial: The average rate of the following ITE Trip Generation commercial land uses were used to estimate a highway commercial blended trip generation rate. The land uses utilized are as follows: 848 – Tire Store, 932 – High-Turnover (Sit-Down) Restaurant, 934 – Fast-Food Restaurant with Drive-Through Window, 942 – Automobile Care Center, 945 – Convenience Store/Gas Station, 947 – Self-Service Car Wash, and 950 – Truck Stop. The resulting average rate for the commercial blend was 14.76 for the AM peak and 12.24 for the PM peak. The average rate for the trips entering and exiting also estimated from the land uses was 59% and 41% for the AM peak hour and 51% and 49% for the PM peak hour. It was estimated that 80% of the land use area would be serviceable with a 15% building coverage.

Community Services (School): ITE Trip Generation Land use 520 – Elementary School was utilized to estimate the number of trips that will be generated by the additional enrollment of 143 students at the South Corman Park School. The percent of trips entering and exiting was 54% and 46% for the AM peak hour and 46% and 54% for the PM peak hours.

Country Residential: ITE Trip Generation Land use 210 – Single Family Detached was utilized to estimate the number of trips that will be generated by the country residential units. A density assumption of 0.2 units/hectare is used for this land use. The percent of trips entering and exiting was 25% and 75% for the AM peak hour and 63% and 37% for the PM peak hours.

Country Residential Estate: ITE Trip Generation Land use 210 – Single Family Detached was utilized to estimate the number of trips that will be generated by the country residential estate units. A density assumption of 0.4 units/hectare is used for this land use. The percent of trips entering and exiting was 25% and 75% for the AM peak hour and 63% and 37% for the PM peak hours.



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Medium Density Country Residential: ITE Trip Generation Land use 210 – Single Family Detached was utilized to estimate the number of trips that will be generated by the medium density country residential units. A density assumption of 2 units/ acre is used for this land use. The percent of trips entering and exiting was 25% and 75% for the AM peak hour and 63% and 37% for the PM peak hours.

Crossmount Direct Control District: ITE Trip Generation Land use 251 – Senior Adult Housing - Single Family and Senior Adult Housing – Multifamily were utilized to estimate the number of trips that will be generated by the single and multifamily senior housing units in the control district. Land use 251 has the percent of trips entering and exiting of 33% and 67% for the AM peak hour and 61% and 39% for the PM peak hours. Land use 252 has the percentage of trips entering and exiting of 34% and 66% for the AM peak hour and 56% and 44% for the PM peak hours. The conceptual site development plan with the proposed residential units for the Crossmount DCD was used to determine the number of units expected for this land use and is attached in Appendix A.

Employment Area Light Industrial Blend: The average rate of the following ITE Trip Generation industrial Land uses were used to estimate a light industrial blended rate. The land uses utilized are as follows: 110 – General Light Industrial, 150 - Warehousing, and 170 - Utility. The resulting average rate for the light industrial blend was 0.88 for the AM peak and 2.37 for the PM peak. The average rate for the trips entering and exiting also estimated from the land uses was 85% and 15% for the AM peak hour and 30% and 70% for the PM peak hour. A 10% building coverage and 80% serviceable area was assumed for this land use.

Employment Area Commercial Blend: The average rate of the following ITE Trip Generation commercial land uses were used to estimate a commercial blended rate. The land uses utilized are as follows: 640 – Animal Hospital/Veterinary Clinic, 810 – Tractor Supply Store, 811 – Construction Equipment Rental Store, 817 – Nursery (Garden Center), 823 – Factory Outlet Center, 840 – Automobile Sales (New), and 842 – Recreational Vehicle Sales. The resulting average rate for the commercial blend was 1.29 for the AM peak and 2.62 for the PM peak. The average rate for the trips entering and exiting also estimated from the land uses was 75% and 26% for the AM peak hour and 39% and 61% for the PM peak hour. A 15% building coverage and 80% serviceable area was assumed for this land use.



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Table 4.15 Peak Hour Generated Traffic Volumes

Planning Cell	Serviceable Land Uses	Size	Unit	AM Peak Hour			PM Peak Hour		
				Vehicle Trips (vph)			Vehicle Trips (vph)		
				Total	In	Out	Total	In	Out
Cell 1	Country Residential Estate	81	Units	67	16	51	89	57	32
	Country Residential	454	Units	417	105	312	504	322	182
	Medium Density Country Residential	2094	Units	1,431	358	1,073	1,963	1,236	727
	Community Services (School Expansion)	143	Students	57	49	106	11	12	23
	Crossmount Direct Control District (DCD 1)	819	Units	235	78	157	277	166	111
	Highway Commercial	137	1000 sq ft.	1,193	829	2,022	855	821	1,676
Cell 2	Employment Area	2947	1000 sq ft.	4,142	2,774	1,368	3,631	2,034	1,597
Cell 3	Country Residential	58	Units	53	13	40	63	40	23
	Employment Area	11558	1000 sq ft.	16,247	10,877	5,370	14,248	7,980	6,268

The future development generates a total vehicle trip of 24,720 for the AM peak hour and 22,474 for the PM peak hour.

4.6.2 TRANSPORTATION SERVICING CONCEPT TRANSPORTATION OUTPUT – TRIP DISTRIBUTION

The development generated trips were distributed throughout the roadway network to determine the future traffic volumes on the roadway network and identify roadway improvements, major intersections which may require turning lanes, and roadway classification changes. The distribution represents the direction the trip that would travel on the RM of Corman Park roadway network, with respect to the geographic location of the trip generator/development. For example, a trip generated from NW-17-35-05-W3 that has an origin or destination in Saskatoon would be distributed to the east as it would use the RM roadway to its east to connect to the highway network (Highway 219) which would then connect it to Saskatoon.

Trip distribution was determined based on the existing distribution of traffic from similar land uses in the same geographic area. This information was determined from the existing traffic data collected during the background study. Table 4.16 outlines the trip distribution applied to the traffic generated by each land use, split by geographic location.



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Table 4.16 Trip Distribution

Land Use & Area	Direction	Distribution %
Residential: Cell 1 west of Highway 219	North	5%
	South	14%
	East	76%
	West	5%
Residential: Cell 1 north of Township Road 354, between Highway 219 and Highway 11	North	33%
	South	16%
	East	27%
	West	24%
Residential: Cell 1 south of Township Road 354, between Highway 219 and Highway 11	North	16%
	South	15%
	East	34%
	West	34%
Crossmount Direct Control District	North	33%
	South	16%
	East	46%
	West	5%
Community Services (School Expansion)	North	34%
	South	8%
	East	43%
	West	15%
Highway Commercial: Cell 1	North	41%
	South	26%
	East	12%
	West	20%
Employment Area: Cell 2	North	60%
	South	40%
	East/West	-
Employment Area: Cell 3	North	43%
	South	26%
	East	6%
	West	25%
Residential: Cell 3	North	27%
	South	1%
	East	32%
	West	40%



**SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY
4 SERVICING STRATEGY**

4.6.3 TRANSPORTATION OUTPUT – PROJECTED TRAFFIC VOLUMES

The development generated traffic volumes were added to the existing traffic volumes outlined in Section 3.3 to determine the projected traffic volumes. Table 4.17 outlines the average daily traffic volume (ADT) for each roadway segment in the study area.

Table 4.17 Projected Daily Traffic Volumes

Roadway	Location	ADT
8th Street / Township Road 364	Range Road 3041 - Range Road 3040	775
Township Road 360 / Floral Road	Highway 16 - Range Road 3040	32,892
Range Road 3041	8th Street – Highway 394	474
Range Road 3041	Highway 394 - Floral Road / Township Road 360	24,875
Range Road 3041	Floral Road / Township Road 360 - Highway 16	35,293
Range Road 3040	8th Street East - Highway 394	186
Range Road 3040	Highway 394 - Floral Road / Township Road 360	11,298
Range Road 3040	Floral Road / Township Road 360 - Highway 16	30,048
Freeborn Road / Range Road 3042	8th Street - Highway 394	149
Freeborn Road / Range Road 3042	Highway 394 - Floral Road / Township Road 360	19,659
Melness Road / Township Road 352	Range Road 3044 - Highway 11	25,907
Tamke Road / Township Road 350	Range Road 3044 - Highway 11	17,199
Range Road 3045	Township Road 352 / Melness Road - Tamke Road / Township Road 350	42,825
Winmill Road / Range Road 3043	Melness Road / Township Road 352 - Hwy 16	961
Grasswood Road/ Township Rd 360	West project limit - Highway 219	8,630
Grasswood Road/ Township Rd 360	Highway 219 - Range Road 3053/Clarence Avenue	11,422
Grasswood Road/ Township Rd 360	Range Road 3053/Clarence Avenue - Highway 11	12,150
Township Road 354	Range Road 3053/Clarence Avenue - Highway 11	22,769
Township Road 352 / Victor Road	Highway 219 - Range Road 3053/Clarence Avenue	734
Township Road 352 / Victor Road	Range Road 3053/Clarence Avenue - Highway 11	1,346
Range Road 3055	Township Road 352 - Township Rd 360	1,724
Range Road 3052	Township Road 352 - Township Rd 360	900
Prairie View Road	Township Road 352 – Highway 11	238
Range Road 3053 / Clarence Avenue	Township Road 360 – CN Tracks / project limit	10,172
Range Road 3053 / Clarence Avenue	Township Road 360 – Township Road 352	3,557



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4 SERVICING STRATEGY**

4.6.4 TRANSPORTATION SERVICING STRATEGY

The classification of the roadway network was updated using the projected ADT and the roadway classification criteria outlined in Section 3.3.2. Table 4.18 summarizes the projected ADT and updated roadway classification and compares the projected values to the existing values. Where the projected ADT is noted as no change, it represents no change in traffic volume due to development within the planning area. The roadways may see traffic growth due to development outside of the planning area.

Table 4.18 Comparison of Existing and Projected Conditions

Roadway	Location	ADT		Classification	
		Existing	Projected	Existing	Projected
8th Street / Township Road 364	Range Road 3041 - Range Road 3040	315	775	Collector	Collector
Range Road 3041	South of 8 th Street	29	No change	Local	Local
Range Road 3041	North of Highway 394	474	474	Collector	Collector
Range Road 3041	Highway 394 - Floral Road / Township Road 360		24,875	Local	Arterial
Range Road 3041	Floral Road / Township Road 360 - Highway 16		35,293	Local	Arterial
Range Road 3040	8th Street East - Highway 394		186	Local	Local
Range Road 3040	Highway 394 - Floral Road / Township Road 360		11,298	Local	Collector
Range Road 3040	Floral Road / Township Road 360 - Highway 16		30,048	Local	Collector
Freeborn Road / Range Road 3042	8th Street - Highway 394	124	149	Collector	Collector
Freeborn Road / Range Road 3042	Highway 394 - Floral Road / Township Road 360	111	19,659	Collector	Collector
Range Road 3042	Township Road 360 – Highway 394		198	Local	Local
Township Road 360 / Floral Road	Highway 16 - Range Road 3040	874	32,892	Arterial	Arterial
Township Road 360 / Floral Road	West of Highway 16	206	No change	Collector	Collector
Range Road 3044 / Haight Road	Highway 16 - Melness Road / Township Road 352	103	No change	Collector/ Local	Local



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Range Road 3044	South of Melness Road / Township Road 352	9	No change	Local	Local
Range Road 3042	Highway 16 – Township Road 352 / Melness Road	480	No change	Collector	Collector
Range Road 3042	South of Township Road 352 / Melness Road	330	No change	Collector	Collector
Township Road 354 / Baker Road	Range Road 3044 – Range Road 3042	59	No change	Local	Local
Township Road 354	Highway 11 - Range Road 3044	240	No change	Collector	Collector
Range Road 3045	Floral Road / Township Road 360 – Township Road 352 / Melness Road	50	No change	Local	Local
Melness Road / Township Road 352	Range Road 3044 - Highway 11	216	25,907	Collector	Arterial
Tamke Road / Township Road 350	Range Road 3044 - Highway 11	90	17,199	Local	Collector
Range Road 3045	Township Road 352 / Melness Road - Tamke Road / Township Road 350	36	42,825	Local	Arterial
Winmill Road / Range Road 3043	Melness Road / Township Road 352 - Hwy 16	63	961	Local	Local
Range Road 3050	North of Highway 11	22	No change	Local	Local
Prairie View Road	Township Road 352 / Victor Road – Highway 11	52	238	Local	Local
Prairie View Road	Township Road 352 / Victor Road – Township Road 350 / Tamke Road	18	No change	Local	Local
Township Road 350 / Tamke Road	West of Highway 11	63	No change	Local	Local
Township Road 354	Highway 11 – Range Road 3051	855	22,769	Arterial	Arterial
Township Road 354	Range Road 3051 – Range Road 3053	685	22,769	Collector	Arterial
Township Road 352 / Victor Road	Range Road 3053/Clarence Avenue - Highway 11	268	1,346	Collector	Collector
Grasswood Road/ Township Rd 360	Range Road 3053/Clarence Avenue - Highway 11	3,256	12,150	Arterial	Arterial
Range Road 3052	Township Rd 360 – Township Road 354 / Baker Road	296	900	Collector	Collector



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Range Road 3052	Township Road 354 / Baker Road - Township Road 352 / Victor Road	124	900	Collector / Local	Collector
Range Road 3052	South of Township Road 352 / Baker Road	88	No change	Local	Local
Grasswood Road/ Township Rd 360	Hwy 219 - Range Road 3053/Clarence Avenue	3,129	11,422	Arterial	Arterial
Range Road 3053 / Clarence Avenue	Township Road 360 / Grasswood Road – CN Tracks / project limit	3,988	10,172	Arterial	Arterial
Range Road 3053 / Clarence Avenue	Township Road 360 / Grasswood Road – Township Road 354 / Baker Road	2,005	3,557	Arterial	Arterial
Range Road 3053 / Clarence Avenue	Township Road 354 / Baker Road – Township Road 352 / Victor Road	119	3,557	Collector	Arterial
Range Road 3053 / Clarence Avenue	South of Township Road 352 / Victor Road	80	No change	Collector	Local
Township Road 354 / Baker Road	Range Road 3053 / Clarence Avenue – Highway 219	484	3,348	Collector	Arterial
Cartwright Street	West of Highway 219	1036	No Change	Arterial	Arterial
Strathcona Avenue	North of Cartwright Street	20	No Change	Local	Local
Range Road 3055	Cartwright Street – Township Road 360	295	No Change	Collector	Collector
Range Road 3055	Township Road 352 – Township Road 360	303	1,724	Collector	Collector
Grasswood Road/ Township Rd 360	West project limit - Highway 219	1,273	8,630	Arterial	Arterial
Township Road 352 / Victor Road	Highway 219 - Range Road 3053/Clarence Avenue	160	734	Collector	Collector
Range Road 3054	South of Township Road 352 / Victor Road	237	No Change	Collector	Collector
Range Road 3055	South of Township Road 352 / Victor Road	48	No Change	Local	Local
Russell Road	West of Highway 219	12	No Change	Local	Local



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4 SERVICING STRATEGY

Based on the changes in traffic volumes on the roadway network, the following intersections and roadways are expected to require improvements as development occurs:

- Range Road 3041 – Highway 394 to Highway 16,
- Range Road 3040 – Highway 394 to Highway 16,
- Floral Road / Township Road 360 – Range Road 3041 to Range Road 3040,
- Range Road 3041 & Floral Road / Township Road 360 intersection,
- Melness Road / Township Road 352 – Highway 11 to Range Road 3045,
- Tamke Road / Township Road 350 – Highway 11 to Range Road 3044,
- Range Road 3045 - Melness Road / Township Road 352 to Tamke Road / Township Road 350,
- Range Road 3045 & Melness Road / Township Road 352 intersection,
- Highway 11 & Melness Road / Township Road 352 intersection,
- Township Road 354 / Baker Road – Range Road 3041 to Highway 219,
- Range Road 3053 – Township Road 354 / Baker Road to Township Road 352 / Victor Road,
- Township Road 354 / Baker Road & Range Road 3053 intersection, and
- Highway 219 & Township Road 354 / Baker Road intersection.

The revised roadway classification are shown in Figure 4.6 and the intersections and roadways which are expected to require upgrades to support the study area development are shown in Figure 4.7.



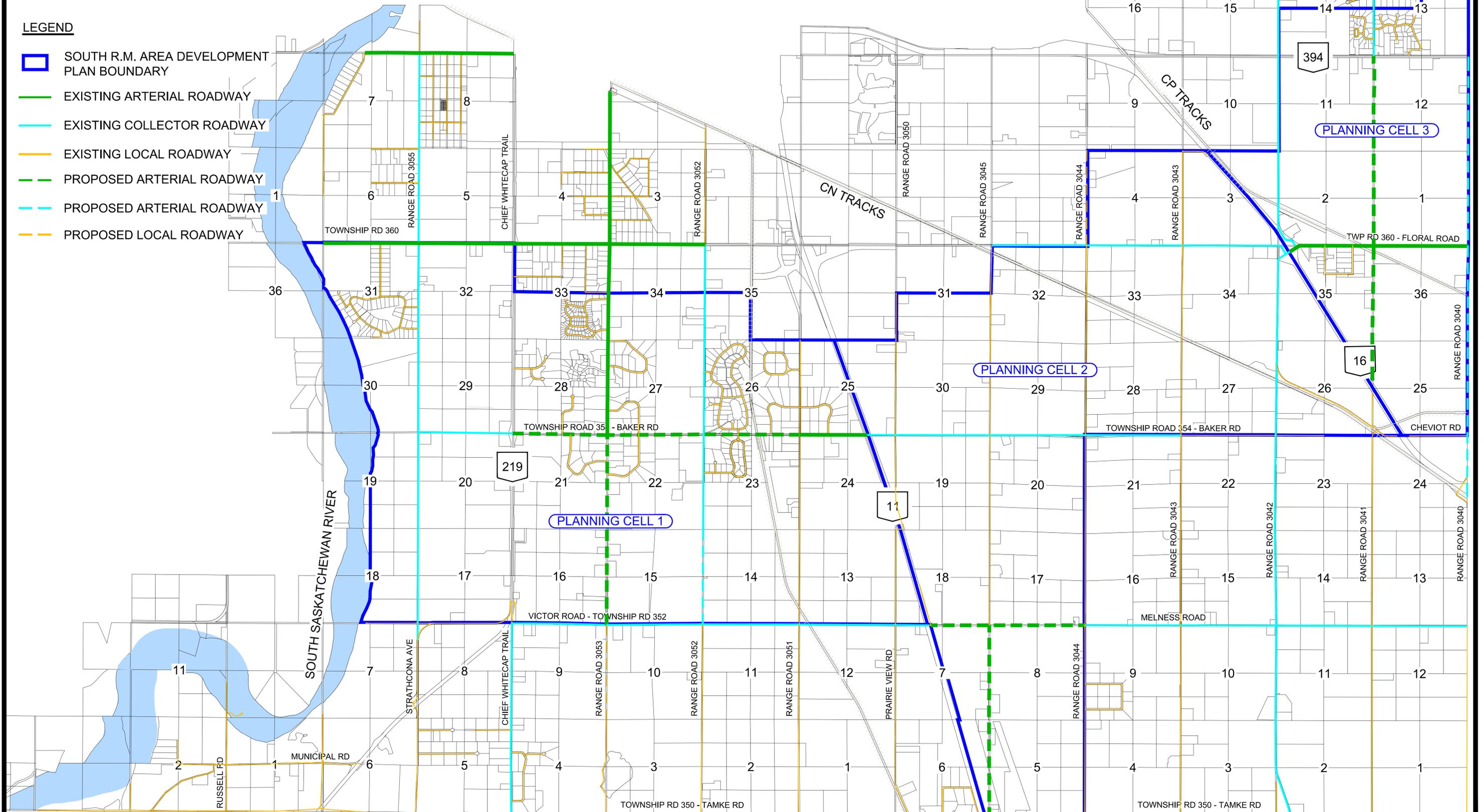


SOUTH R.M. AREA DEVELOPMENT PLAN

FIGURE 4.6 PROPOSED ROAD CLASSIFICATION UPGRADES

LEGEND

- ▭ SOUTH R.M. AREA DEVELOPMENT PLAN BOUNDARY
- EXISTING ARTERIAL ROADWAY
- EXISTING COLLECTOR ROADWAY
- EXISTING LOCAL ROADWAY
- - - PROPOSED ARTERIAL ROADWAY
- - - PROPOSED ARTERIAL ROADWAY
- - - PROPOSED LOCAL ROADWAY



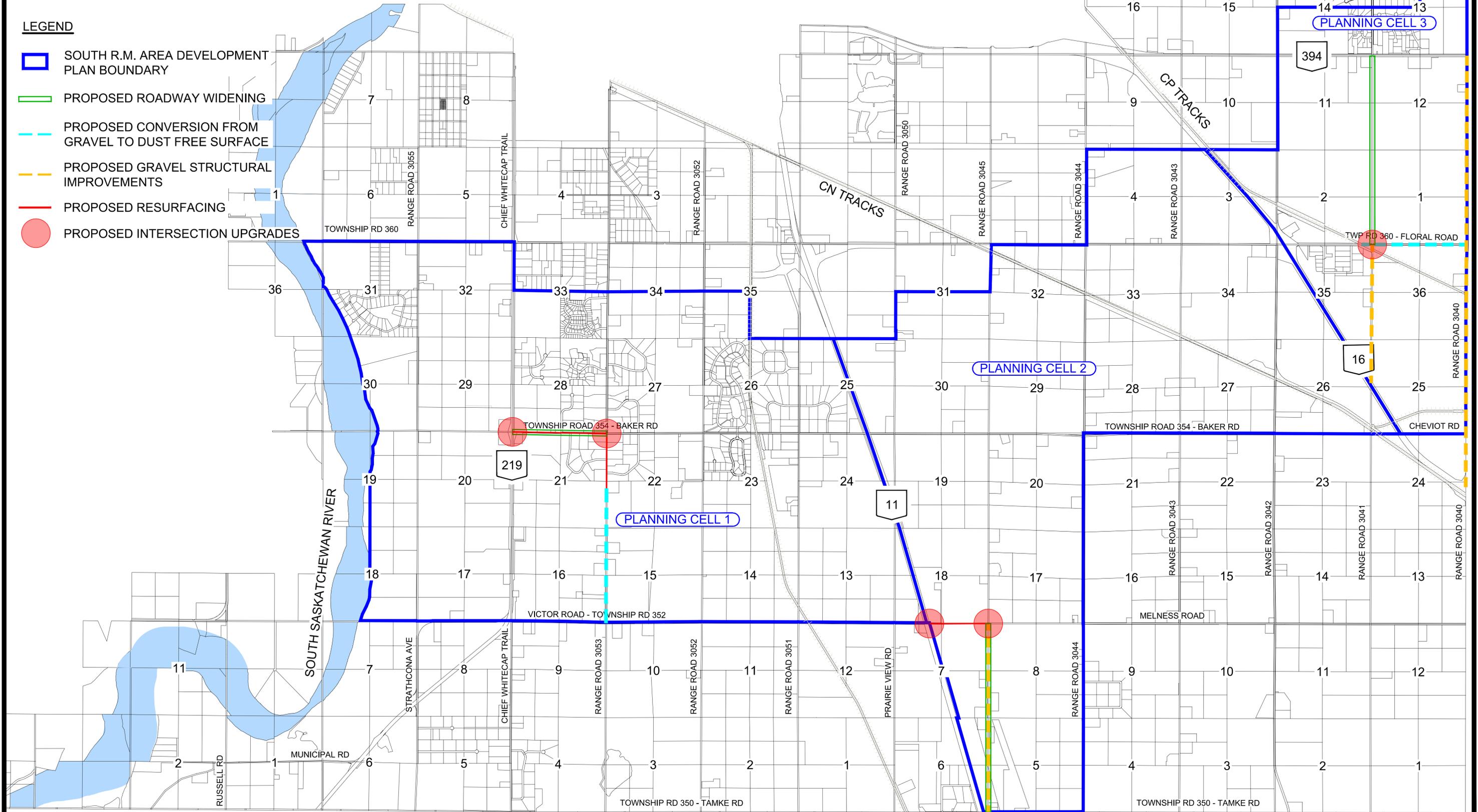


SOUTH R.M. AREA DEVELOPMENT PLAN

FIGURE 4.7 PROPOSED ROAD NETWORK UPGRADES

LEGEND

- ▭ SOUTH R.M. AREA DEVELOPMENT PLAN BOUNDARY
- ▬ PROPOSED ROADWAY WIDENING
- ▬ PROPOSED CONVERSION FROM GRAVEL TO DUST FREE SURFACE
- ▬ PROPOSED GRAVEL STRUCTURAL IMPROVEMENTS
- ▬ PROPOSED RESURFACING
- PROPOSED INTERSECTION UPGRADES



4.7 SHALLOW UTILITIES

Stantec requested locations for existing shallow utilities telecommunication, power, and natural gas distribution lines that have been identified by each known utility provider. The known utility providers within the study area included SaskTel, SaskPower, SaskEnergy, and Shaw. Existing SaskTel infrastructure is identified in Figure 4.8. Existing SaskPower infrastructure is identified in Figure 4.9. Existing SaskEnergy infrastructure is identified in Figure 4.10. Existing Shaw infrastructure is identified in Figure 4.11.

Private developers planning projects within the study area will need to contact the individual shallow utility companies at the time of detailed design to coordinate and confirm the required shallow utility design, offsite infrastructure upgrades and cost estimates required for each development. These designs and infrastructure upgrades should be submitted to the RM for their review and approval prior to proceeding with the development.



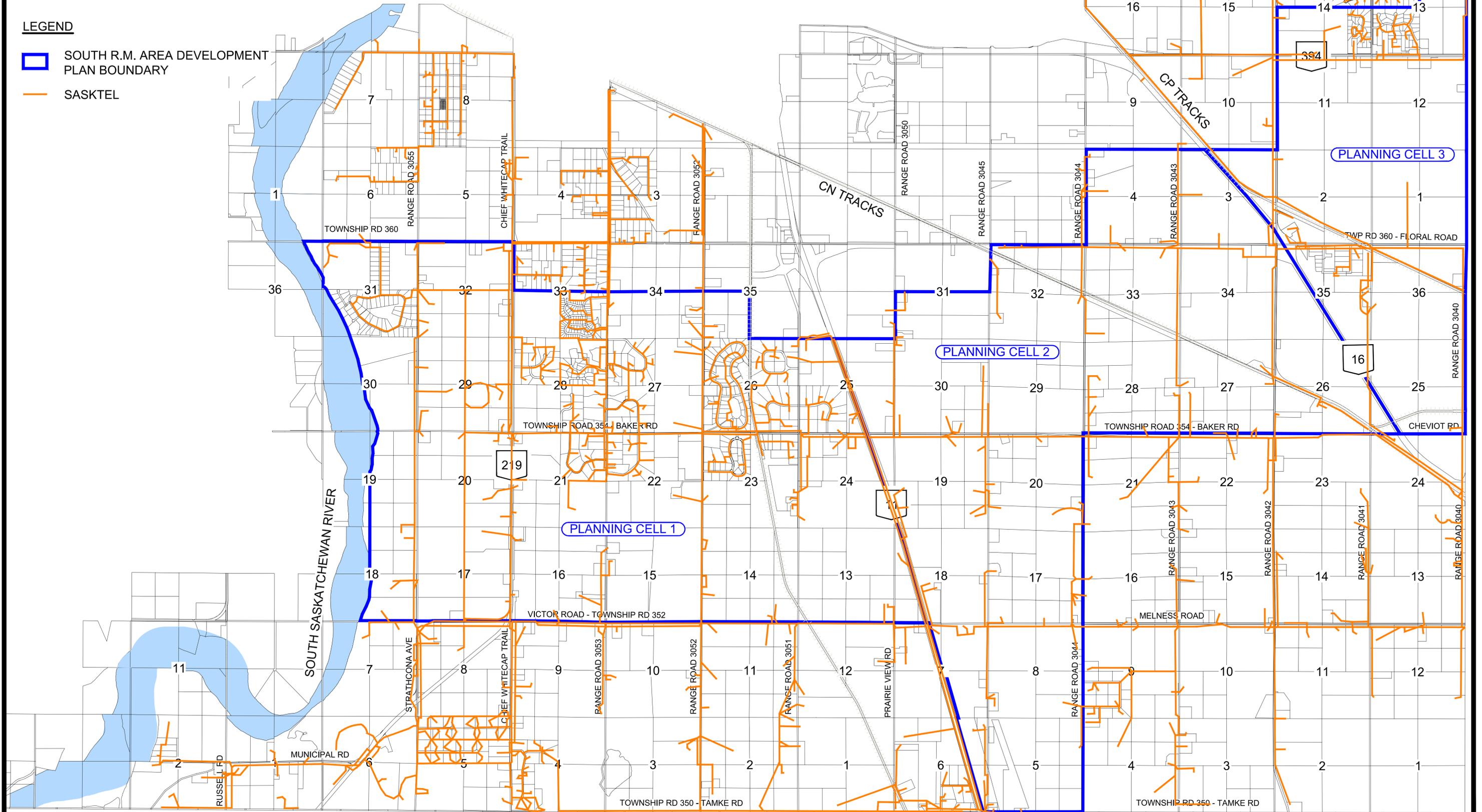


SOUTH R.M. AREA DEVELOPMENT PLAN

FIGURE 4.8 EXISTING SASKTEL INFRASTRUCTURE

LEGEND

- █ SOUTH R.M. AREA DEVELOPMENT PLAN BOUNDARY
- █ SASKTEL



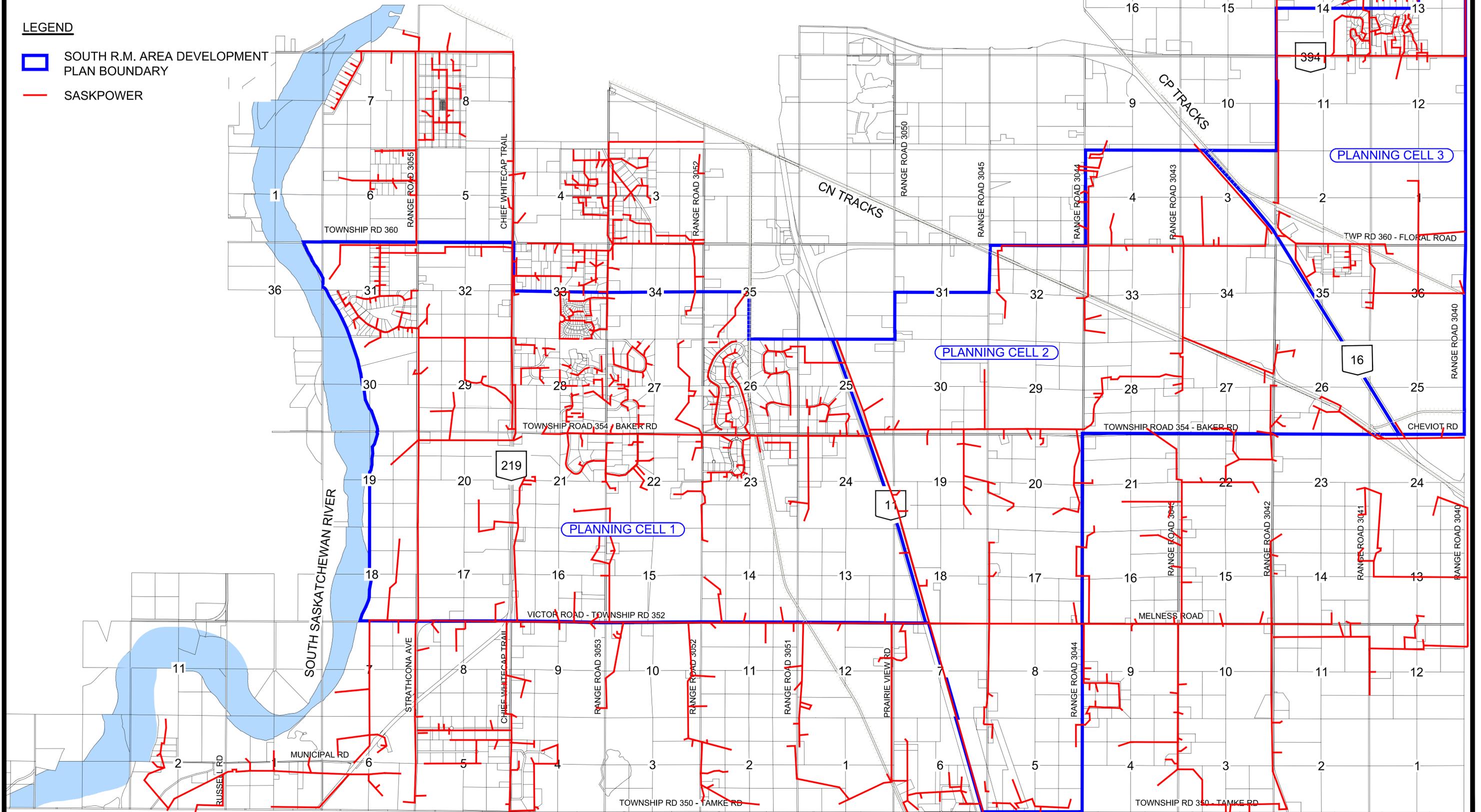


SOUTH R.M. AREA DEVELOPMENT PLAN

FIGURE 4.9 EXISTING SASKPOWER INFRASTRUCTURE

LEGEND

- █ SOUTH R.M. AREA DEVELOPMENT PLAN BOUNDARY
- █ SASKPOWER



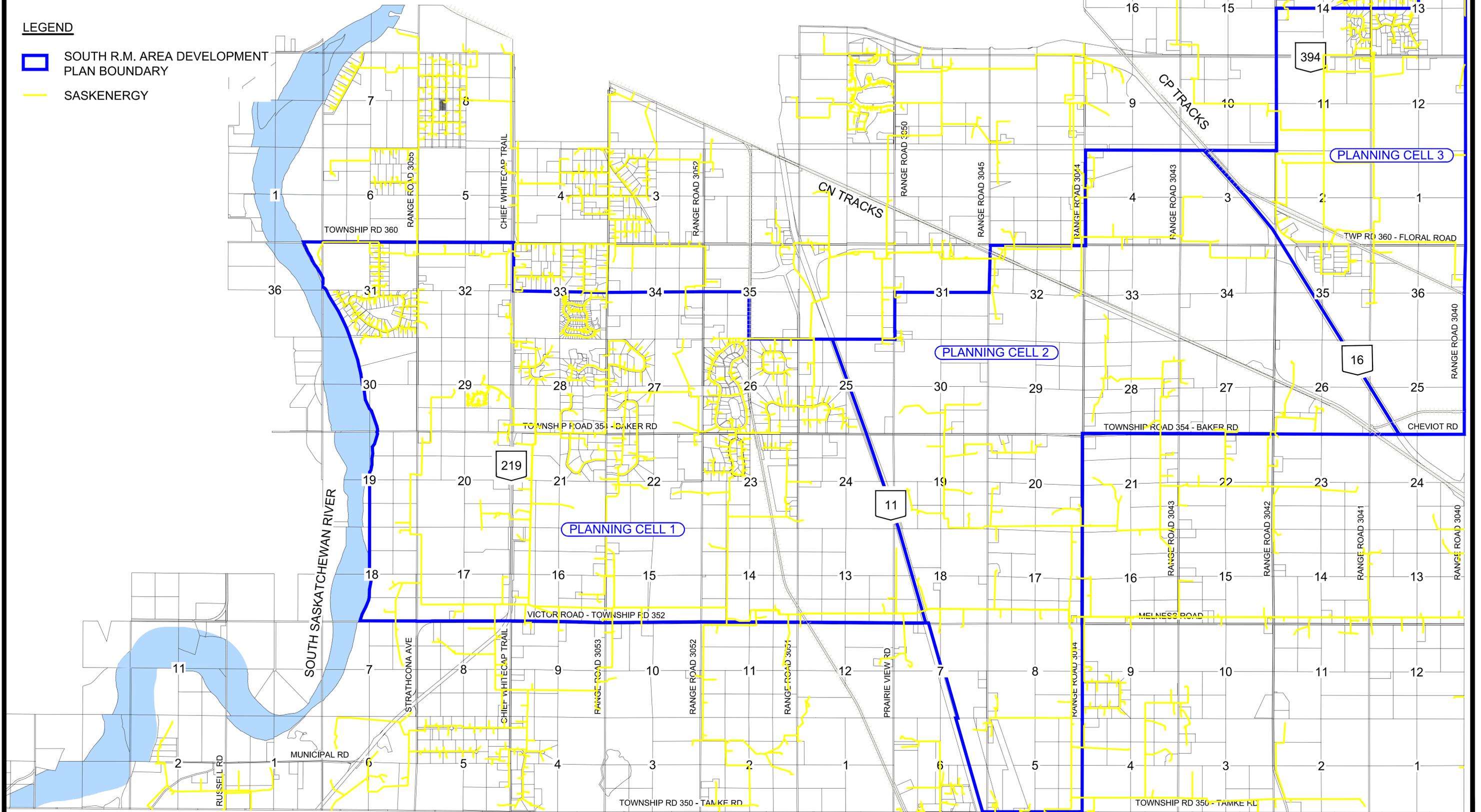


SOUTH R.M. AREA DEVELOPMENT PLAN

FIGURE 4.10 EXISTING SASKENERGY INFRASTRUCTURE

LEGEND

- SOUTH R.M. AREA DEVELOPMENT PLAN BOUNDARY
- SASKENERGY



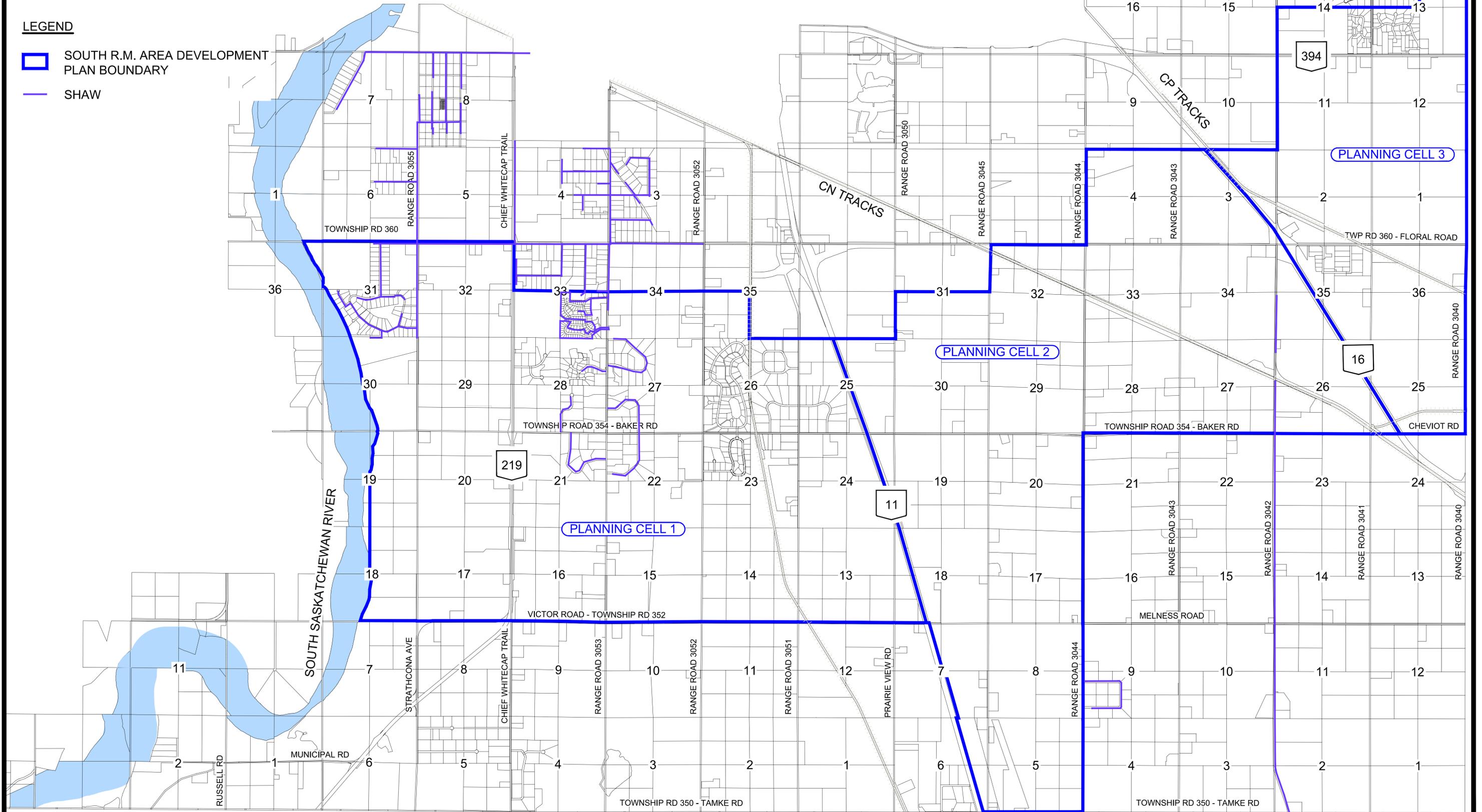


SOUTH R.M. AREA DEVELOPMENT PLAN

FIGURE 4.11 EXISTING SHAW INFRASTRUCTURE

LEGEND

- SOUTH R.M. AREA DEVELOPMENT PLAN BOUNDARY
- SHAW



5 IMPLEMENTATION

5.1 PHASING

The phasing hierarchy is prioritized by wastewater, potable water, transportation followed by stormwater management and groundwater as noted in the Phasing Figure 5.1.

5.1.1 WASTEWATER PHASING CONSIDERATIONS

It is proposed to develop the Medium Density Country Residential areas from east to west in 4 phases as noted below and in Figure 4.3 The sanitary phasing will still need to coincide with the water phasing as detailed in Section 5.1.2.

The first phase of development would include:

- SW-35-35-05-W3, and
- SE-34-35-05-W3.

The second phase of development would include:

- SW-34-35-05-W3.

The third phase of development would include:

- SW-33-35-05-W3, and
- SE-32-35-05-W3, and
- NE-32-35-05-W3.

The fourth phase of development would include:

- SE-32-35-05-W3, and
- NE-32-35-05-W3.

Should the RM option to build a new WWTP at the location noted on Figure 4.4, development should proceed from west to east also in 4 phases as noted below.

The first phase of development would include:

- SE-32-35-05-W3, and
- NE-32-35-05-W3.



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY 5 IMPLEMENTATION

The second phase of development would include:

- SW-33-35-05-W3, and
- SE-32-35-05-W3, and
- NE-32-35-05-W3.

The third phase of development would include:

- SW-34-35-05-W3.

The fourth phase of development would include:

- SW-35-35-05-W3, and
- SE-34-35-05-W3.

5.1.2 POTABLE WATER PHASING CONSIDERATIONS

Water servicing will proceed with a two-phase approach, illustrated in Figure 5.1. Groundwater servicing will not affect phasing.

Planning Cell 1 – West of Highway 11

The north half of this cell already has good coverage in terms of potable water distribution networks. The servicing of the proposed residential areas will proceed north to south. The first phase of development includes:

- The residential areas in the north half of this planning cell,
- The remainder of the DCD,
- The Highway Commercial parcels, and
- The Community Services parcel – future expansion of the existing school.

The second phase of development includes the remainder of the residential parcels within this planning cell.

Planning Cell 2 – East of Highway 11

The employment area within this cell is considered part of the second phase of development. The area is further away from the City of Saskatoon than the employment area in Planning Cell 3 and it has no current development. Water servicing will require an extension of the DRWU network into this area and potential upgrades to their existing network.

Planning Cell 3 – West of Highway 11

The residential and employment lands within this cell can proceed concurrently.



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY 5 IMPLEMENTATION

The first phase of development includes:

- The residential areas north of Highway 394 (Patience Lake Road), and
- Employment area both north and south of the existing Floral Industrial Park.

The second phase of development will include the remainder of the employment area:

- North strip, located south of agricultural area, and
- South parcels, by Cheviot Road.

5.1.3 TRANSPORTATION PHASING CONSIDERATIONS

As the road network is primarily existing throughout the study area, transportation will not dictate development phasing. Local roadways interior to the developments, localized roadway improvements, and intersection improvements will be constructed at the time of development by the developer. It is recommended that a Traffic Impact Assessment (TIA) be completed for each development to confirm the roadway improvements warranted at the time of each development. The TIAs will also provide more detailed information on the timing of when improvements would be required such as at 50% of full build out of each development.





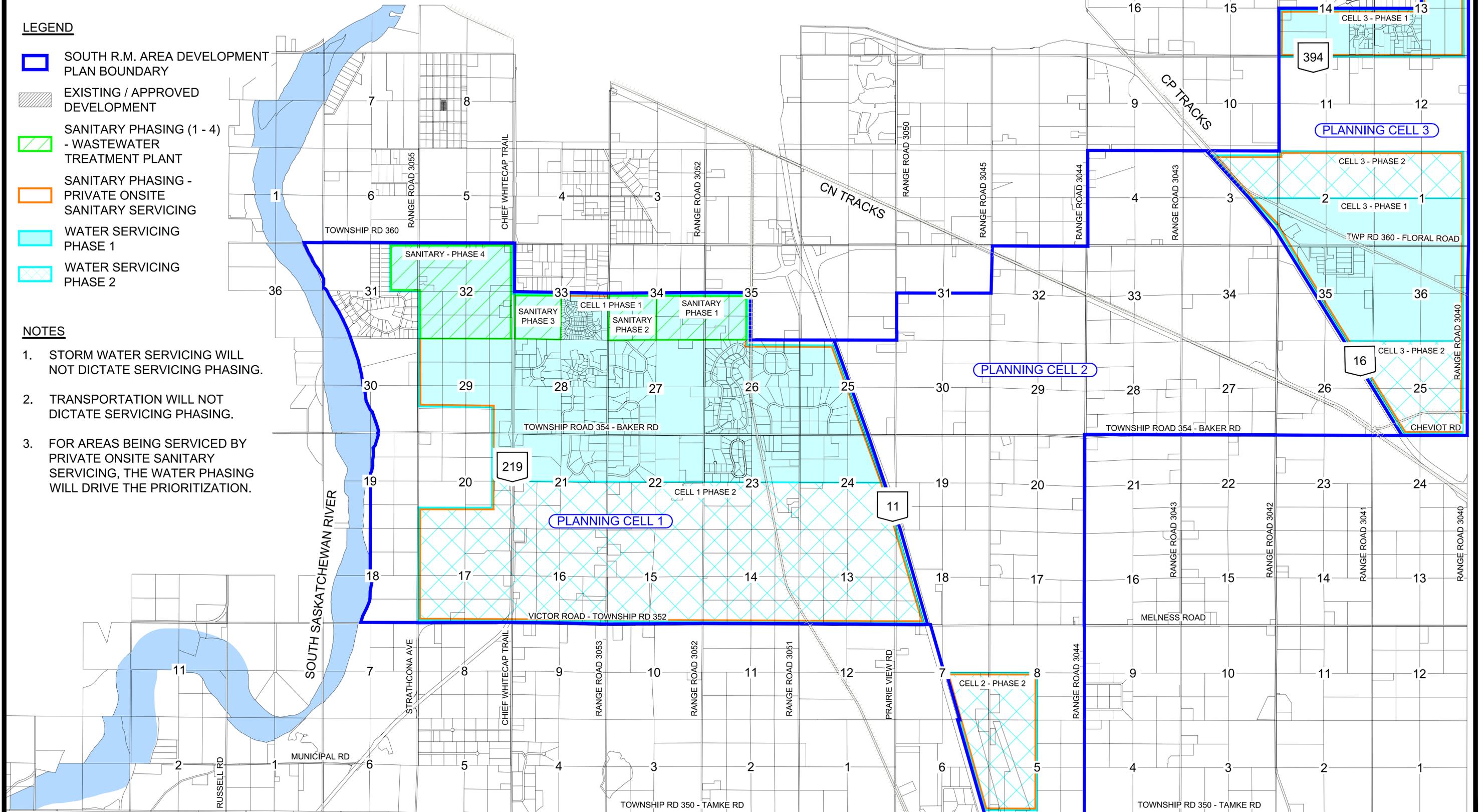
FIGURE 5.1 - PHASING PLAN

LEGEND

- SOUTH R.M. AREA DEVELOPMENT PLAN BOUNDARY
- EXISTING / APPROVED DEVELOPMENT
- SANITARY PHASING (1 - 4) - WASTEWATER TREATMENT PLANT
- SANITARY PHASING - PRIVATE ONSITE SANITARY SERVICING
- WATER SERVICING PHASE 1
- WATER SERVICING PHASE 2

NOTES

1. STORM WATER SERVICING WILL NOT DICTATE SERVICING PHASING.
2. TRANSPORTATION WILL NOT DICTATE SERVICING PHASING.
3. FOR AREAS BEING SERVICED BY PRIVATE ONSITE SANITARY SERVICING, THE WATER PHASING WILL DRIVE THE PRIORITIZATION.



5.1.4 STORMWATER PHASING CONSIDERATIONS

Stormwater management within the study area will not affect the phasing of the development.

As noted in Section 4.5.2, future residential subdivisions will likely cover just one or two quarters-sections of land and it is assumed that they will have a looped road network with one or more internal open spaces with stormwater storage capabilities. The Highway Commercial parcels will provide on-site storage for their incremental runoff. Regarding the Employment Area, Industrial Park type developments may size one or two larger size stormwater ponds to service the entire park, whereas smaller developments will provide lot-size stormwater management solutions.

It is assumed that all the proposed development, regardless of the proposed land-use, will store the incremental post-development runoff for a 1:100-year CoS design storm, plus an additional 25% and the post-development peak flows leaving the development will not exceed the pre-development peak flows for the 1:100-year CoS design storm event.



5.2 SUMMARY OF COST AND ASSUMPTIONS

5.2.1 WATER

Private developers planning projects within the study area will need to contact the individual water utility providers noted in Section 4.2.1.1 and coordinate their development serviceability, detailed designs and infrastructure upgrades with these companies. All development serviceability, designs and infrastructure upgrades including an opinion of cost should be submitted to the RM for their review and approval as part of the service agreement process and prior to proceeding with the development. Maintenance agreements and water usage agreements will be between the developer/end-user and the water utility company. The private developers will be responsible for all costs associated with design and construction of the water infrastructure within the development and for water infrastructure upgrades within RM of Corman Park right-of-ways. Costs associated with maintenance of the water infrastructure and usage fees agreements will be the responsibility of the developer and the water utility companies. The RM should not incur costs associated with new water infrastructure installed in the planning area.

5.2.2 WASTEWATER

Private developers planning Medium Density Country Residential projects within the study area using cluster systems (refer to Section 4.3.2) will need to coordinate their serviceability, detailed designs and infrastructure upgrades with the RM. All development serviceability, designs and infrastructure upgrades including an opinion of cost should be submitted to the RM for their review and approval as part of the service agreement process and prior to proceeding with the development. Maintenance agreements and wastewater usage fee agreements between the developer/end-user and the RM will be required. The private developers will be responsible for all costs associated with design and construction of the wastewater infrastructure within the development and for wastewater infrastructure upgrades within RM of Corman Park right-of-ways. Costs associated with maintenance of the wastewater infrastructure and usage fees agreements will be the responsibility of the developer.

Private developers planning Country Residential Estates, Country Residential, Highway Commercial, Employment or Community Service projects and Agriculture areas within the study area, using holding tanks, conventional septic systems, advanced treatment systems or mound systems will need to coordinate their detailed designs and infrastructure upgrades with the RM of Corman Park. All development serviceability, designs and infrastructure upgrades including an opinion of cost should be submitted to the RM for their review and approval as part of the service agreement process and prior to proceeding with the development. For those projects using a holding tank, wastewater usage fee agreements between the developer/end-user and the RM will be required. The private developers will be responsible for all costs associated with design and construction of the wastewater infrastructure within the development. For Country Residential Estates, Country Residential, Highway Commercial, Employment or Community Service projects and Agriculture areas within the planning area, the RM should not incur costs associated with new wastewater infrastructure.



SOUTH AREA DEVELOPMENT PLAN (SADP) LAND USE AND SERVICEABILITY STUDY 5 IMPLEMENTATION

For the Des Nedhe Utilities Corporation WWTF no costs have been included for expansion past the current capacity of 217 m³/day. It is assumed that any expansions done to the WWTF would be completed by the English River First Nation and it would be recovered through user fees.

If the RM of Corman Park were to build their own WWTF, it is recommended the RM consider a location in proximity to both the lands designated as Medium Density Country Residential areas and the South Saskatchewan River. A potential location to consider a new WWTF would be in the SE-30-35-05-W3 quarter section. A Class 5 opinion of cost (OPC) for design and construction of a new WWTF with the capacity of 7,500 m³/day including and outfall to the South Saskatchewan River, has been provided in Table 5.1. Land acquisition and pre-design study costs have not been included; however, a placeholder has been left in the OPC for the RM's costs.

The cost estimate was determined using a daily average annual flow (AAF) of 7,500 m³/day, historical cost data from past projects, and construction cost indexes from RSMeans to adjust for inflation. The expected accuracy range for the Class 5 cost estimate is from -50% to +100% as per the Standard Classification for Cost Estimate Classification System (ASTM Standard E2516-11).

Table 5.1 Summary of Estimated Capital Cost for the WWTF and Effluent Outfall

Description	Cost
WWTF and Effluent Outfall Project Capital Cost	\$ 59,841,823
Contingency (20%)	\$ 11,968,365
Engineering (10%)	\$ 5,984,182
RM of Corman Park Cost	TBD
Total Project Capital Cost	\$ 77,794,370

In the absence of a Downstream Use and Impact Study (DUIS) and with the assumption that treated effluent will be discharged in the South Saskatchewan River, the capital cost estimate for a WWTF was based on membrane bioreactor (MBR) technology. A DUIS would serve as the basis for determining the effluent discharge criteria and, as a result, the extent of nutrient removal required. The MBR technology is well known for producing high-quality effluent capable of meeting current and, potentially, more stringent effluent regulations in the future, which may be required for discharge into the South Saskatchewan River.

In addition to the high-quality effluent, an MBR wastewater treatment process also provides the following benefits for relatively dense residential developments:

- Potential water reuse applications, such as irrigation, for the treated effluent thus minimizing environmental footprint of wastewater treatment.
- Reduced footprint and setback distance from adjacent residential areas when compared to lagoons and other mechanical treatment processes.



5.2.3 STORMWATER

Private developers will be responsible for all costs associated with design and construction of the stormwater infrastructure within their development and for any stormwater infrastructure upgrades within RM of Corman Park right-of-ways.

Costs associated with maintenance of the stormwater infrastructure will be the responsibility of the RM, as outlined within the developer's agreement. The RM currently has no usage fees agreements.

5.2.4 TRANSPORTATION

Private developers will be responsible for all costs associated with design and construction of the road infrastructure and pedestrian pathways within their development including any approaches and tie-ins to the RM of Corman Park infrastructure. Costs associated with maintenance of the roadway and pathway infrastructure within the development will be the responsibility of the RM of Corman Park.

Upgrades to roadways and intersections within the current RM of Corman Park will be required. The details of the improvements required should be determined through further study at the time of the development. For example, roadway widening may include widening lanes and shoulders and/or adding additional lanes, depending on the traffic capacity required. There may be an opportunity to share costs of RM roadway upgrades with the adjacent developers. Table 5.2 outlines an opinion of probably cost for the following upgrades which may be required. The expected accuracy range for the Class 5 cost estimate is from -50% to +100% as per the Standard Classification for Cost Estimate Classification System (ASTM Standard E2516-11).

- Intersection improvement – turning lanes:
 - Range Road 3041 & Floral Road / Township Road 360,
 - Range Road 3045 & Melness Road / Township Road 352,
 - Highway 11 & Melness Road / Township Road 352,
 - Township Road 354 / Baker Road & Range Road 3043, and
 - Highway 319 & Township Road 354 / Baker Road.
- Roadway improvements – widening:
 - Township 354 – 1.6 km from Highway 219 to Range Road 3053,
 - Range Road 3045 – 3.2 km from Township Road 352 to Township Road 350, and
 - Range Road 3041 – 3.2 km from Highway 394 to Township Road 360.
- Roadway improvements – conversion from gravel to dust free surface:
 - Range Road 3053 – 2.3 km north of Township Road 352, and
 - Township Road 360 – 1.9 km from rail crossing to Range Road 3040.



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- Roadway improvements – gravel surface structural improvements:
 - Range Road 3041 – 2.3 km from Township Road 360 to Highway 16,
 - Range Road 3045 – 3.2 km from Township Road 352 to Township Road 350, and
 - Range Road 3040 – 7.5 km from Highway 394 to Highway 16.
- Roadway improvements – resurfacing:
 - Range Road 3053 – 1 km south of Township Road 354,
 - Township Road 354 – 1.6 km from Highway 219 – Range Road 3053, and
 - Township Road 352 – 1 km from Highway 11 – Range Road 3045.

Table 5.2 Transportation Opinion of Probable Cost

Item	Rate	Unit	Quantity	Cost
Intersection Improvement	\$300,000	treatment	8	\$2,400,000
Roadway Improvements - Widening	\$300,000	km	8	\$2,400,000
Roadway Improvements - Conversion from Gravel to Dust Free Surface	\$1,200,000	km	4.2	\$5,040,000
Roadway Improvements - Gravel Surface Structural Improvements	\$800,000	km	13	\$10,400,000
Roadway Improvements - Resurfacing	\$450,000	km	3.6	\$1,620,000
Subtotal				\$21,860,000
Engineering	15%			\$3,279,000
RM of Corman Park Cost	TBD			TBD
Contingency	20%			\$4,372,000
PST	6%			\$1,311,600
GST	5%			\$1,093,000
Total				\$31,915,600



5.2.5 SHALLOW UTILITIES

Private developers will be responsible for all costs associated with design and construction of the shallow utility infrastructure within their development and for any shallow utility infrastructure upgrades within RM of Corman Park right-of-ways. After construction is complete, the shallow utility companies typically take ownership of their infrastructure and maintain their own infrastructure. The RM of Corman Park should not incur any costs associated with new shallow utility infrastructure or future maintenance of the shallow utility infrastructure installed in the planning area.

