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Athabasca Flats East Servicing Study

Prepared For:
Town of Whitecourt

Presented By:
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March 15, 2013

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1.0 INTRODUCTION

To accommodate growth the Town of Whitecourt has identified that additional land is required for residential land development. In 2007 an Area Structure Plan (ASP) was completed for the Athabasca Flats East area in the NW 31-59-11-5. The Athabasca Flats East ASP outlined existing development constraints, potential development concepts and provided overall land use concept for the area.

Current development in the Athabasca Flats ASP area consists of the initial phases of The Meadows, a 4.15 ha land lease community with potential for a further 8.86 ha expansion and River Stone Estates, a single family residential development of approximately 57 lots on 5.76 ha.

Land developers have expressed interest in additional residential development in the area but are unable to do so until an overall servicing strategy is in place.

Development issues that have been encountered have included the lack of depth of the gravity sewer main servicing resulting in excessive amounts of fill being required and the lack of suitable fill material being readily available. The design of the River Stone Estates Development has utilized the existing gravity sewer system and thus requires significant amounts of imported fill. The Meadows development has reduced the fill requirements by installing a sanitary sewer lift station and have constructed a stormwater management facility thus reducing fill requirements and providing a source of fill material. The Meadows is a condominium development and thus the lift station is privately owned and operated. Therefore the primary servicing issue in the Athabasca Flats East area is that the land is low lying and sloping to the east while the existing gravity sewer mains drain to the west. This creates a situation requiring either a sanitary sewer lift station or excessive amounts of fill to continue development in the area.

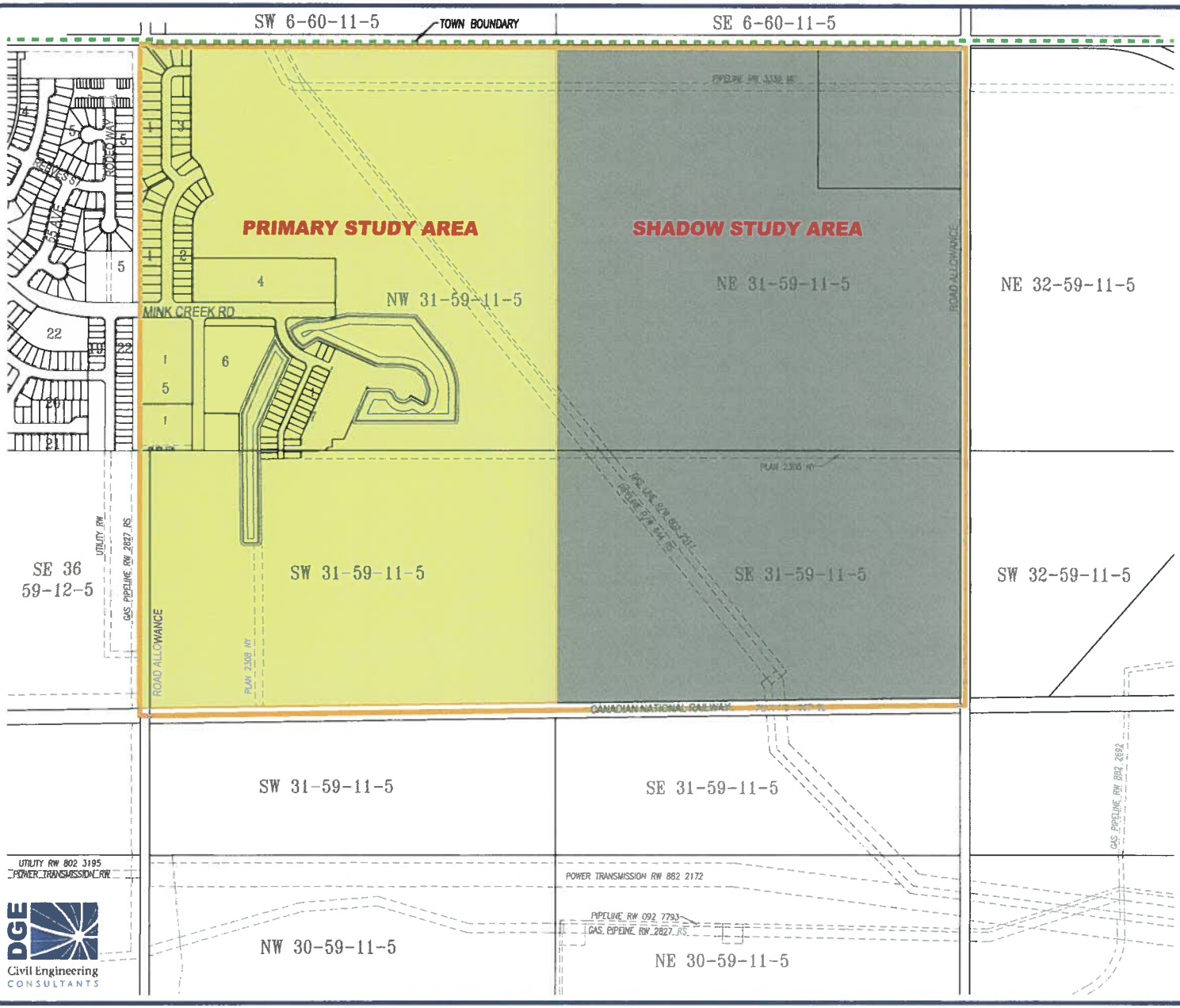
The servicing study is also required to address the requirements for arterial roadways, stormwater management and water distribution.

The existing development along with interest in future development is typically in smaller parcel sizes that do not economically support the initial investment in infrastructure needed to support the development of the Athabasca Flats East area as a whole. Therefore the Town has commissioned the preparation of the Athabasca Flats East Servicing Study to provide information required to develop the overall servicing strategy.

The Athabasca Flats East Servicing Study is intended to focus on lands within the Athabasca Flats East Area Structure Plan described as the NW ¼ 31-59-11-5 and SW 31-59-11-5 north of the railway tracks. Shadow planning is provided for the remainder of the developable area in Section 31-59-11-5 between the railroad tracks to the south and Flats Road to the north as shown on Figure 1.0 - Study Area.

1.1 Terms of Reference

The Study will include preliminary servicing for the NW 31-59-11-5 and SW 31-59-11-5 north of the railway tracks with shadow planning for the remainder of the developable area in Section 31 north of the railway tracks as shown on Figure 1.0 - Study Area. This study will focus on:



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ATHABASCA FLATS EAST SERVICING STUDY

LEGEND

TOWN BOUNDARY

STUDY BOUNDARY

FIGURE 1.0
STUDY AREA

1:7500
MARCH, 2013

- Arterial Roadways
- Grading (the determination of fill quantities and sources of fill for the primary service area).
- Drainage and Stormwater Management.
- Sanitary Sewer.
- Potable Water

2.0 LAND USE AND ROADS

Land use and development concepts for this study were adopted from the Athabasca Flats East ASP and the Town of Whitecourt Municipal Development Plan and are presented on Figure 2.0 - Land Use.

Arterial roads as identified on the Figure 2.1 - Roads consist of Mink Creek Road and School Road.

2.1.1 Mink Creek Road

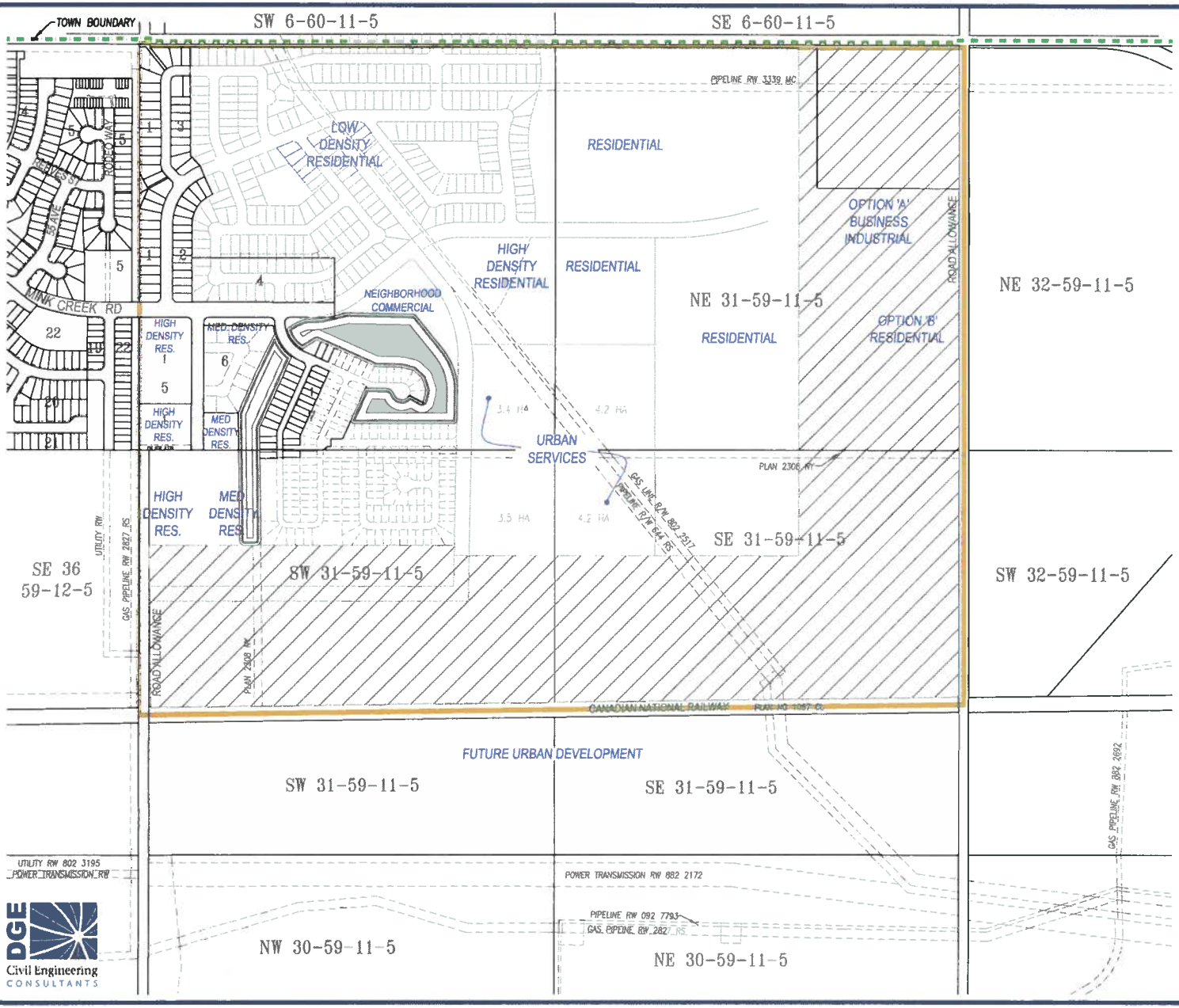
Mink Creek Road is the main east-west arterial and will provide access to downtown Whitecourt. Mink Creek Road will be a four lane arterial roadway with a width of 15.0 m from lip of gutter to lip of gutter.

Mink Creek Road will connect to the Future 33rd Street in the NE 31-59-11-5. 33 Street will provide north-south connections.

Approximately 240 m of Mink Creek Road will need to be constructed to reach the east boundary of the NW 31-59-11-5.

Table 2-1 - Costs - Mink Creek Road

Item	*Description*	*Unit*	*Quantity*	*Unit Price*	*Total*
1	Geotextile	m2	4200	4.7	$19,740
2	450 mm depth pit-run gravel	m2	3960	32.14	$127,274
3	310 mm depth 20 mm Crush Gravel	m2	3620	29	$104,980
4	165 mm Asphalt Pavement	m2	3240	24.25	$78,570
5	Asphalt Prime & Tack Coat	m2	3240	1.46	$4,730
6	Curb and Gutter	m	480	104	$49,920
7	Common Excavation	m3	6000	16.5	$99,000
8	Watermain & Appurtenances Allowance	m	240	550	$132,000
9	Stormsewer Allowance	m	240	600	$144,000
	Total				$760,215
	Cost per lineal metre				$3,168



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ATHABASCA FLATS EAST SERVICING STUDY

LEGEND

- TOWN BOUNDARY
- STUDY BOUNDARY
- BUSINESS INDUSTRIAL

FIGURE 2.0
LANDUSE

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MARCH, 2013

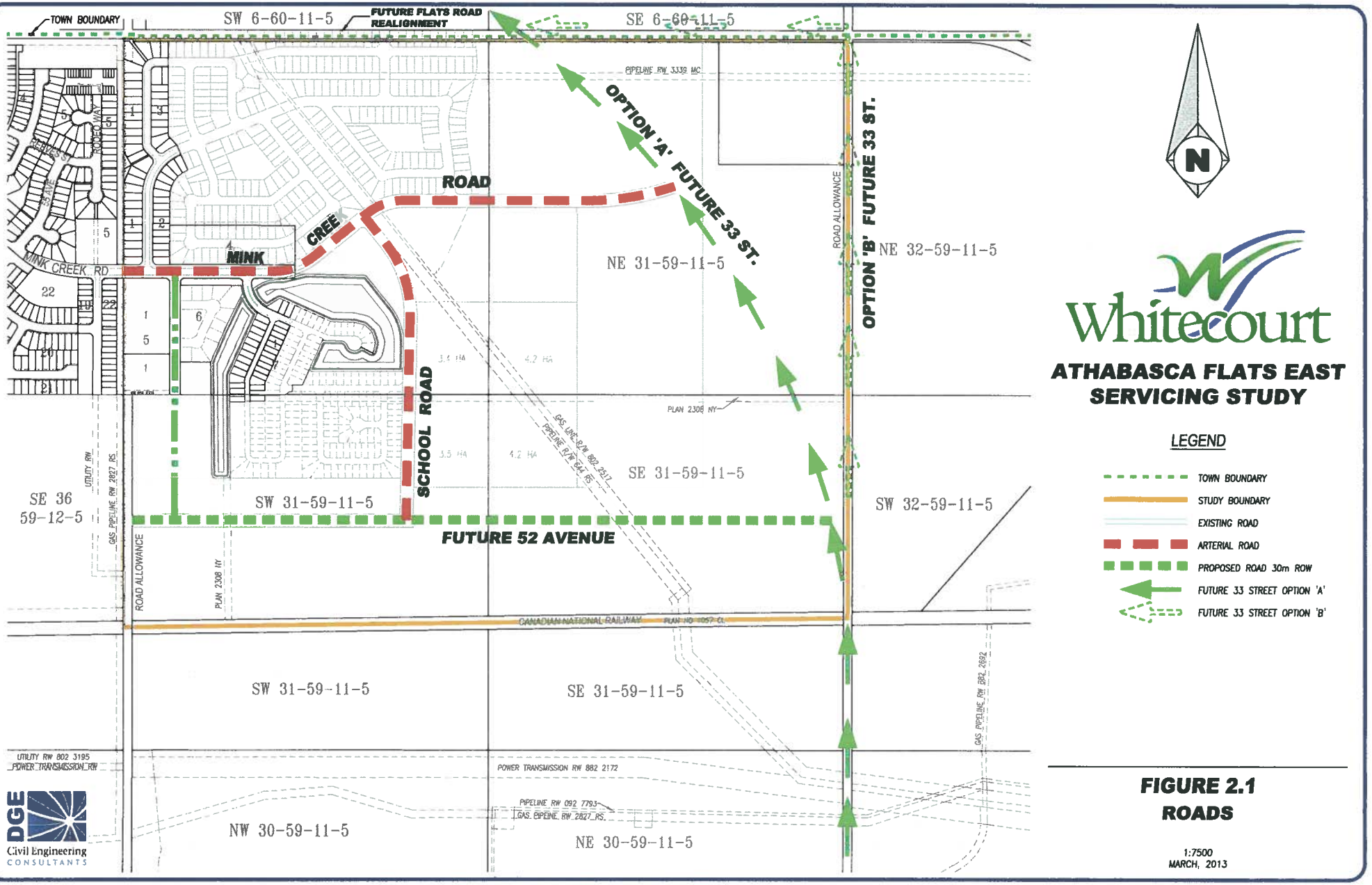
TOWN BOUNDARY
SW 6-60-11-5
FUTURE FLATS ROAD REALIGNMENT
SE 6-60-11-5
PIPELINE RW 3339 MC
OPTION 'A' FUTURE 33 ST.
ROAD
CREE
MINK
MINK CREEK RD
NE 31-59-11-5
ROAD ALLOWANCE
OPTION 'B' FUTURE 33 ST.
NE 32-59-11-5
SCHOOL ROAD
PLAN 2308 NY
GAS LINE & RW 802 2317
PIPELINE RW 824 RS
SE 31-59-11-5
SW 32-59-11-5
SE 36
59-12-5
SW 31-59-11-5
FUTURE 52 AVENUE
UTILITY RW
GAS PIPELINE RW 2827 RS
ROAD ALLOWANCE
PLAN 2308 NY
CANADIAN NATIONAL RAILWAY
PLAN NO 1057 CL
SW 31-59-11-5
SE 31-59-11-5
GAS PIPELINE RW 882 2692
UTILITY RW 802 3195
POWER TRANSMISSION RW
POWER TRANSMISSION RW 882 2172
PIPELINE RW 092 7793
GAS PIPELINE RW 2827 RS
NW 30-59-11-5
NE 30-59-11-5
N
Whitecourt
ATHABASCA FLATS EAST SERVICING STUDY
LEGEND
TOWN BOUNDARY
STUDY BOUNDARY
EXISTING ROAD
ARTERIAL ROAD
PROPOSED ROAD 30m ROW
FUTURE 33 STREET OPTION 'A'
FUTURE 33 STREET OPTION 'B'
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FIGURE 2.1
ROADS
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2.1.2 School Road

School Road will provide a north-south link between the extension of 52nd Avenue and Mink Creek Road.

School Road will be a four lane arterial roadway with a width of 15.0 m from lip of gutter to lip of gutter.

Approximately 220 m of School Road will need to be constructed to reach the south boundary of the NW 31-59-11-5.

Table 2-2 - Costs - School Road

Item	*Description*	*Unit*	*Quantity*	*Unit Price*	*Total*
1	Geotextile	m2	3860	4.7	$18,142
2	450 mm depth pit-run gravel	m2	3640	32.14	$116,990
3	310 mm depth 20 mm Crush Gravel	m2	3330	29	$96,570
4	165 mm Asphalt Pavement	m2	2980	60	$178,800
5	Asphalt Prime & Tack Coat	m2	2980	1.46	$4,351
6	Curb and Gutter	m	440	104	$45,760
7	Common Excavation	m3	5350	16.5	$88,275
8	Watermain & Appurtenances Allowance	m	220	550	$121,000
9	Stormsewer Allowance	m	220	600	$132,000
	Total				$801,887
	Cost per lineal metre				$3,645

3.0 STORMWATER MANAGEMENT

3.1 Study Area

The primary servicing study area is the Athabasca Flats East area comprised of the NW 31-59-11-W5, and land in the SW 31-59-11-W5 which is located north of the railroad tracks. Consideration is required for the servicing the remainder of the lands within the Town boundaries located in the adjacent E ½ 31-59-11-5 as well as accommodating stormwater runoff generated from River Valley Estates, Phase 3 and undeveloped land in the SE 36-59-12-5 that currently drains into The Meadows stormwater management pond.

3.2 Land Use

In Accordance with the Athabasca Flats East Area Structure Plan land uses in the NW 31-59-11-5 are primarily Low Density Residential, with areas of Medium and High Density Residential, Mobile Home Park, Neighbourhood Commercial and Urban Services. In accordance with the Municipal Development Plan land uses in the SW-31-59-11-5 are primarily Business Industrial with areas of Medium and High Density Residential, Mobile Home Park, and Urban Services. Land uses are shown on Figure 2.0 Land Use.

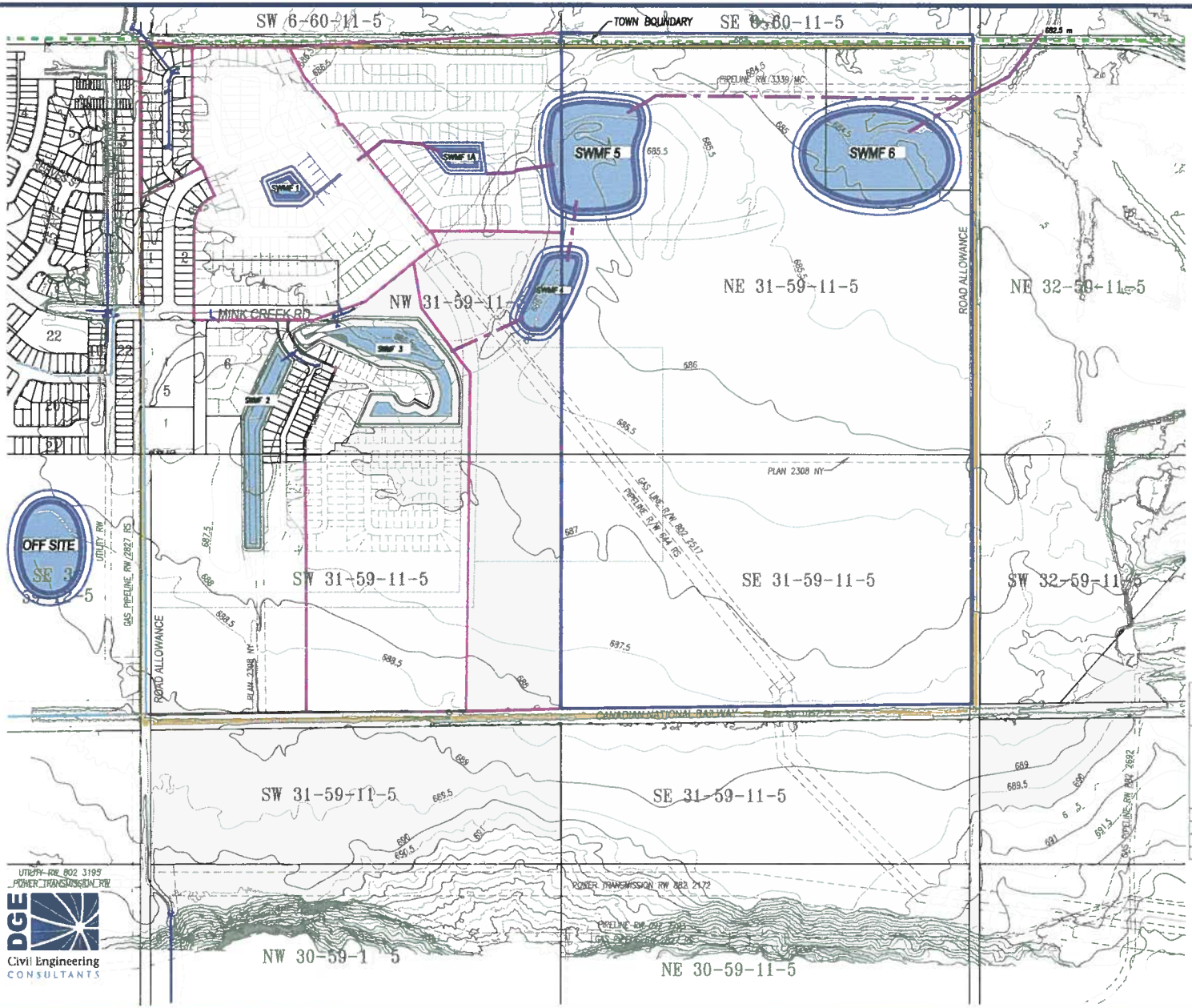
In accordance with the Municipal Development Plan land in the NE 31-59-11-5 is split between Residential and Business Industrial with areas of Urban Services. Land in the SE 31-59-11-5 is primarily Business Industrial with areas of Residential and Urban Services.

3.3 Existing Stormwater Management

River Stone Estates, situated in the north west portion of the study area was designed to drain to the north and will thus not impact the remainder of the lands in the study area.

A SWM facility was constructed as part of The Meadows development. This pond is identified as SWMF's 2 and 3 on Figure 3.0 - Stormwater Management. These SWMF's were designed and constructed to be integrated into the overall SWM plan for the Athabasca Flats East ASP area.

A single family home and yard development is located in the north east corner of the NE 31-59-11-5. It is anticipated that this area would be redeveloped in accordance with the Municipal Development Plan when the area is developed.



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ATHABASCA FLATS EAST SERVICING STUDY

LEGEND

- TOWN BOUNDARY
- STUDY BOUNDARY
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- EXISTING GROUND CONTOUR
- STORM DRAINAGE BASIN BOUNDARY

DRAINAGE BASIN	SWMF	NWL (m)	HWL (m)	FB EL (m)	Area at NWL (m^2)	Live Storage (m^3)	Drainage Area (ha)	Allowable Discharge (L/s)
WEST		685	685.45	686.35	3,937	9	12.70	28.03
	1A	684	685.	686.	4 0??	2,067	15.50	
	2	e.	.03	686 6	1. 6.5	5,149	7 70	33.0
	3	685 65	686 02	e86.6	31 196	14 145	24.96	35.69
	4	684 6	685.65	686.2	13,946	15 261	19.15	27 38
	5	684	685.05	686.2	30,047	45,6??	0.00	0.00
	Total				95,093	83,767		50.88
EAST	6	683 5	684.64	685.5	49,036	,.25	07 40	53 58
OFF SITE	OFF SITE	684.9	68 .05	68?.?	22,.4?	797	18.	0?.

BASED ON AN ALLOWABLE DISCHARGE RATE OF 1.43 L/s/Ha

FIGURE 3.0
STORMWATER MANAGEMENT

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3.4 Servicing Constraints

3.4.1 Physical Constraints

3.4.1.1 Water Table

A geotechnical Report was prepared by P. Machibroda Engineering to support the preparation of the Athabasca Flats East Area Structure Plan in October 2006. Three test holes from that study provide depth to groundwater as measured from existing ground, no geodetic elevations of the test holes were provided. The interpolated groundwater elevations are TH 06-2 - 684.6, TH06-3 - 685.51 and TH06-6 - 685.3.

3.4.1.2 Athabasca River 100 Year Flood Level

The Alberta Environment Flood Hazard Study, 1989 provides the 100 year design flood elevation of the Athabasca River as:

- 686.0 m at the extension of the west boundary of the study area,
- 685.65 at the extension of the west boundary of NE 31-59-11-5, and
- 684.58 at the extension of the east boundary of NE 31-59-11-5.

3.4.2 Athabasca Flats East Area Structure Plan

The Drainage section of the ASP is summarized as:

- Stormwater drainage poses some challenges due to the high water table.
- A conventional piped stormwater system would be below groundwater elevation and partially below river discharge levels at times of the year.
- Maximizing the existing natural drainage courses and surface drainage will be pursued.
- The storm drainage system will be designed to accommodate 50% site coverage of buildings and hard surface areas in low density residential areas and higher levels on other sites.
- Wet pond type stormwater management facilities will be constructed utilizing the existing drainage courses and discharged through existing channels at or near existing discharge rates.
- Wet ponds will be excavated to a depth of 3 to 4 m below ground level to ensure they are full of water.
- Bank slopes will be landscaped to provide a visual amenity, however the ponds will not offer contact recreation.
- Dry ponds will be created in the school site adding additional storage volume. These dry ponds will be used for sports fields during dry periods.

3.4.3 Town of Whitecourt Standards

Section 4.0 Storm Drainage System of the Town of Whitecourt's Servicing Standards for Local Improvements provides the design and construction criteria for stormwater management and storm sewer systems in the Town. A summary of the relevant design criteria are as follows:

- General: Stormwater Management Systems shall consist of a major system to accommodate the 100 year storm condition utilizing overland flow and/or

storm water ponds. The minor storm sewer will accommodate a 1:5 year storm condition utilizing a piped system. The Stormwater Management System shall be designed in accordance with Alberta Environment and Sustainable Resource Development (formerly Alberta Environmental Protection) Guidelines.
- Drainage Ditches are allowed to convey storm water under special controlled conditions.
- Piped Systems shall have a minimum depth of cover of 1.5m to top of pipe.

3.4.4 Alberta Environment and Sustainable Resources Development Standards and Guidelines

Alberta Environment's Standards and Guidelines for Municipal Waterworks, Wastewater & Storm Drainage Systems, January 2006 provide a brief summary of the design standards and guidelines for storm drainage systems in Alberta. Detailed standards and guidelines are described in the AENV publication Stormwater Management Guidelines for the Province of Alberta, January 1999.

A summary of relevant criteria from these documents are as follows:

- Pipe Cover, the minimum depth of cover to pipe crown shall be 1.2m.
- Wet Ponds should be designed to control peak discharge as well as meet water quality objectives to meet Water Act and AEPEA.
- Footings of adjacent building to be above the maximum elevation of the permanent pool.

3.4.5 Topography

The Study area generally drops at an average grade of 0.2% from an elevation of 689 m in the south west corner of the primary service area to a low of 684 m +/- in the north east corner of the NE 31-59-11-5. See Figure 3.0 - Stormwater Management.

In a west to east direction the site drops approximately 2 m (0.13%) along the north boundary adjacent to Flats Road and 1.5 m (0.1%) along the quarter line between the north and south half's of section 31-59-11-5.

Two potential areas exist for an outfall from the study area to the Athabasca River. A ditch extending north from Flats Road north to an oxbow located along the line between SW and SE 6-60-11-5 at an elevation of 684.5 and an oxbow connecting through the NW 59-11-5 and SW 5-60-11-5 at an elevation of about 682.5 m. Lands north of Flats Road are in Woodlands County.

3.5 Servicing Objective

The objective of the stormwater management system is to meet the requirements of Alberta Environment and Sustainable Resource Development and the Town of Whitecourt while facilitating the development of the Athabasca Flats East Area.

3.6 Servicing Concept

Figure 3.0 - Stormwater Management presents the servicing concept in accordance with the intent of the Athabasca Flats East Area Structure Plan locating the SWM facilities in the existing drainage areas. This servicing is general in nature and is intended only to provide potential development concepts for the study area.

The study identifies six stormwater management facilities along with the existing facility servicing the Meadows and adjacent lands (SWMF's 2 and 3).

The off-site pond is presented to identify the need for stormwater runoff form the SE 36-59-12-5 to be released at a controlled rate of 1.43 l/s/ha into the study area, the size of this pond and water elevations are presented for preliminary purposes only, actual design of the stormwater management facility, or facilities is at the discretion of the design engineer.

SWMF's 1 and 1A are suggested as neighbourhood amenities and to provide stormwater drainage within the development areas to reduce flow lengths and thus fill required to provide grade. It is anticipated these ponds would be connected with a submerged pipe. The NWL of these ponds is suggested as 685.0, HWL 684.5. These ponds would provide about 3,850 m^3 of live storage. SWMF 1 and 1A would discharge to SWMF 5, the rate would not be controlled to the suggested 1.43 l/s/ha.

SWMF2 is the west portion of the Meadows SWMF, this pond is partially completed, with the portion in the NW 31-59-11-5 constructed, while the portion in the SW 31-59-11-5 has not been completed. The design NWL of this pond is 686.65, HWL of 685.65 and freeboard elevation is 686.2 providing a live storage volume of 5,150 m^3. It has a drainage service area of 27.7 ha. SWMF 2 is integral with SWMF 3.

SWMF 3 is the main portion of the Meadows SWMF, it has been constructed and has the same water elevations as SWMF 2. It provides a live storage volume of 14,150 m^3 and has a drainage service area of 24.96 ha. Currently SWMF 3 has an interim discharge structure. The ultimate design is for SWMF 3 to discharge at a controlled rate into SWMF 4. It is anticipated that SWMF 3 would discharge through a control structure and submerged pipe to SWMF 4 along with an overland emergency flow channel. Crossing of the future roadway and the existing pipeline R/W's will significantly influence the design.

SWMF 4 is proposed in the lower area between the existing pipeline R/W's and the future extension of Mink Creek Road. This pond has a preliminary NWL of 684.60, HWL of 685.65 and freeboard elevation of 686.20. This pond would provide 15,500 m^3 of live storage for the drainage service area of 19.15 ha. SWMF 4 would discharge, at a controlled rate, to SWMF 5 through a control structure and submerged pipe along with an overland flow channel.

SWMF 5 is proposed in the lower area adjacent to the west boundary in the NE 31-59-11-5 and south of the existing pipeline R/W. This pond has a preliminary NWL of 684.0, an HWL of 685.65 and a freeboard elevation of 686.2. It will provide 45,000 m^3 of live storage. SWMF 5 would be the final pond and provide the required live storage and controlled discharge for the cumulative drainage area. A storm sewer, preliminarily

sized at 900 mm, would be provided through the NE 31-59-11-5 discharging from SWMF 5 to the ox bow drainage course in the SE 5-59-11-5. The discharge structure would be designed to accommodate the controlled discharge from SWMF's 5 and 6. It is anticipated the design of the SWM facilities will have to prevent the potential backflow of flood waters from the Athabasca River into the stormwater management system. In the interim it is anticipated a ditch would be constructed and replaced as development proceeds.

SWMF 6 is intended to service the majority of the drainage area in the NE and SE of 31-59-11-5. It is shown conceptually as one large pond, however at the discretion of the designer and approval authorities smaller ponds located throughout the drainage service area could be utilized. SWMF 6 would discharge at a controlled rate to a common structure utilized by SWMF 5 in SE 5-59-11-5.

3.7 Stormwater Management Phasing

The stormwater management system can be phased in accordance with development in the service area. The SWM ponds serve the dual function of meeting the stormwater management requirements and providing fill for the development area. Therefor phasing will be dictated by both the need for stormwater management and the need to provide fill for the development area.

3.7.1 Initial Phase

Based on current interest by developers it is anticipated that single family residential development will continue to lead development in the Athabasca Flats East area. The construction of SWMF 4 while not directly required for stormwater management would provide the required fill for a significant portion of the single family area.

Details and cost analysis of this option are discussed in Section 4 Grading.

4.0 GRADING

4.1 Grading Objective

The grading objective of this study is to minimize the amount of fill required for development of Athabasca Flats East ASP area while meeting the stormwater management and drainage requirements and considering the ground water table, the 100 year flood elevation of the Athabasca River and the impacts of existing development in and around the study area.

4.2 Study Area

The primary servicing study area to be evaluated for grading is the Athabasca Flats East area comprised of the NW 31-59-11-W5, and land in the SW 31-59-11-W5 which are located north of the railroad tracks. Greater emphasis is given to the future residential areas to the north of Mink Creek Road in the NW 31-59-11-5.

4.3 Grading Considerations

4.3.1 Existing Topography

The Study area generally drops at an average grade of 0.2% from an elevation of 689 m in the south west corner of the primary service area to a low of 684 m +/- in the north east corner of the NE 31-59-11-5. See Figure 3.0 - Stormwater Management.

In a west to east direction the site drops approximately 2m (0.13%) along the north boundary adjacent to Flats Road and 1.5 m (0.1%) along the quarter line between the north and south half's of section 31-59-11-5.

Two potential areas exist for an outfall from the study area to the Athabasca River. A ditch extending north from Flats Road north to an oxbow located along the line between SW and SE 6-60-11-5 at an elevation of 684.5 +/- and an oxbow connecting through the NW 59-11-5 and SW 5-60-11-5 at an elevation of about 682.5 +/-. Lands north of Flats Road are in Woodlands County.

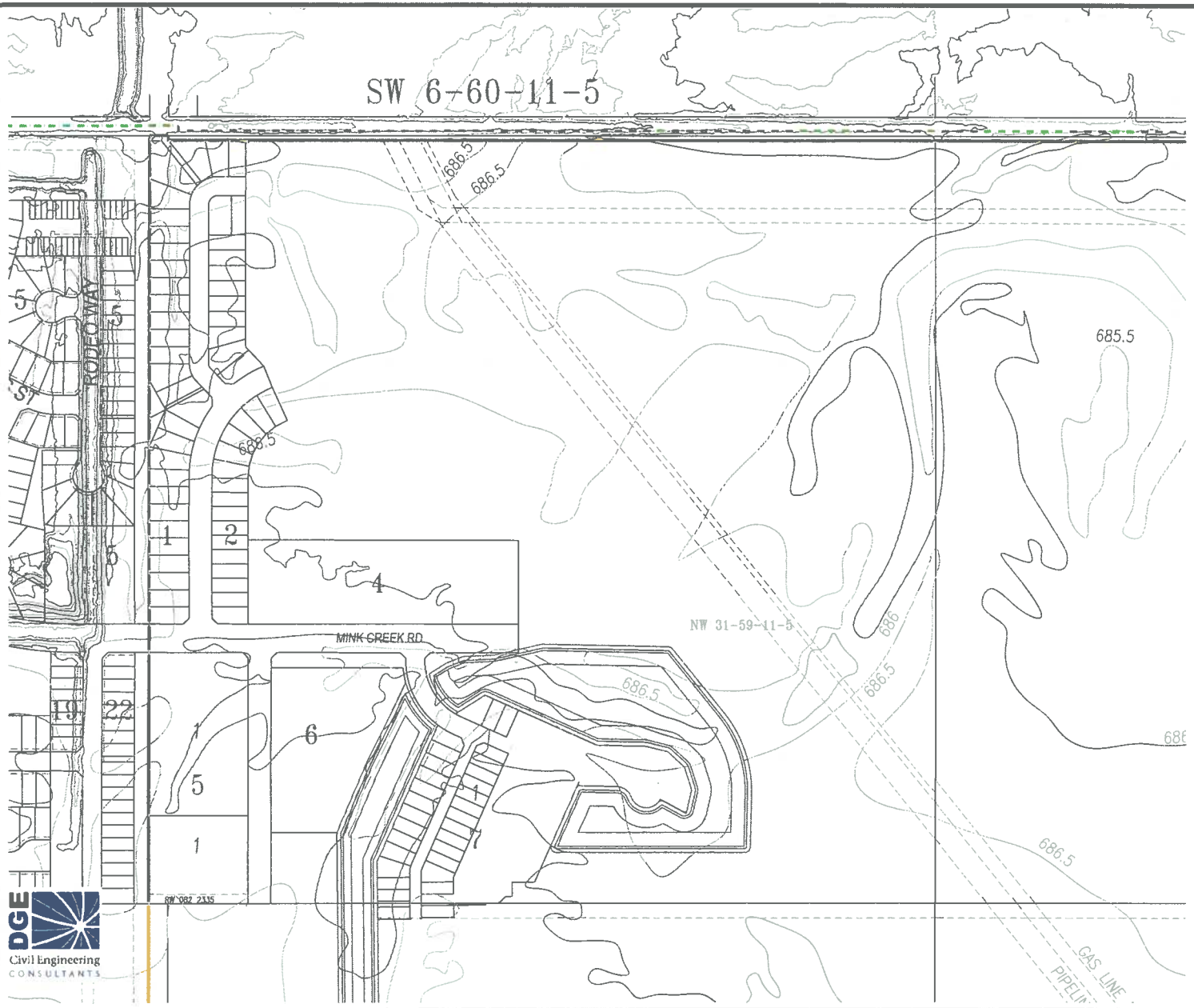
4.3.2 Geotechnical

A geotechnical investigation for the Athabasca Flats East Area Structure Plan was undertaken by P. Machibroda Engineering in 2006. The report summarizes the findings as a thin layer of topsoil (0.15 to 0.25m), a layer of high plastic clays (between 0.5 and 3.0m), followed by gravel deposits to nine metres in depth. The water table lies within 2.0 m of the surface.

4.3.3 Athabasca River Flood Levels

The Alberta Environment Flood Hazard Study, 1989 provides the 100 year design flood elevation of the Athabasca River as:

- 686.0 m at the extension of the west boundary of the study area,
- 685.65 at the extension of the west boundary of NE 31-59-11-5, and
- 684.58 at the extension of the east boundary of NE 31-59-11-5.



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Whitecourt

ATHABASCA FLATS EAST SERVICING STUDY

LEGEND

TOWN BOUNDARY

STUDY BOUNDARY

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FIGURE 4.0
EXISTING CONDITIONS

1:2500
MARCH, 2013

4.3.4 Existing Development

River Stone Estates, situated in the north west portion of the study area was graded to accommodate sanitary sewer servicing by gravity mains extending form existing Town infrastructure. As a consequence the subdivision grading design calls for fills up to and exceeding two metres in depth.

The Meadows is a mobile home subdivision constructed in conjunction with a SWM facility. This site achieved an earthwork balance and its design grades call for cuts/fills plus or minus one half metre.

A single family home and yard development is located in the north east corner of the NE 31-59-11-5. It is anticipated that the home would be removed and this area would be redeveloped in accordance with the Municipal Development Plan when the area is developed.

4.4 Grading Concept

4.4.1 Grading Concepts Based on SWM & Drainage Criteria

The site is proposed to be graded in accordance with Figure 4.1 - Grading Concept. The grading requirements were established based on the normal water levels of the proposed SWM facilities and the requirement for 1.5 m of cover measured from the obvert of storm sewer piping. Reducing this to 1.2 m of cover in accordance with Alberta Environments standards could reduce fill requirements substantially.

The grading concept presented in Figure 4.1 would require 250,000 m^3 of fill to develop the residential area north of Mink Creek Road in the NW 31-59-11-5. Reducing the storm sewer cover requirement from 1.5 to 1.2 could save up to 100,000 m^3 of fill.

The multifamily residential area in the NW 31-59-11-5 south of Mink Creek Road and west of SWMF 3 would require 77,000 m^3 of fill to bring it within 0.2 m of the design grades shown.

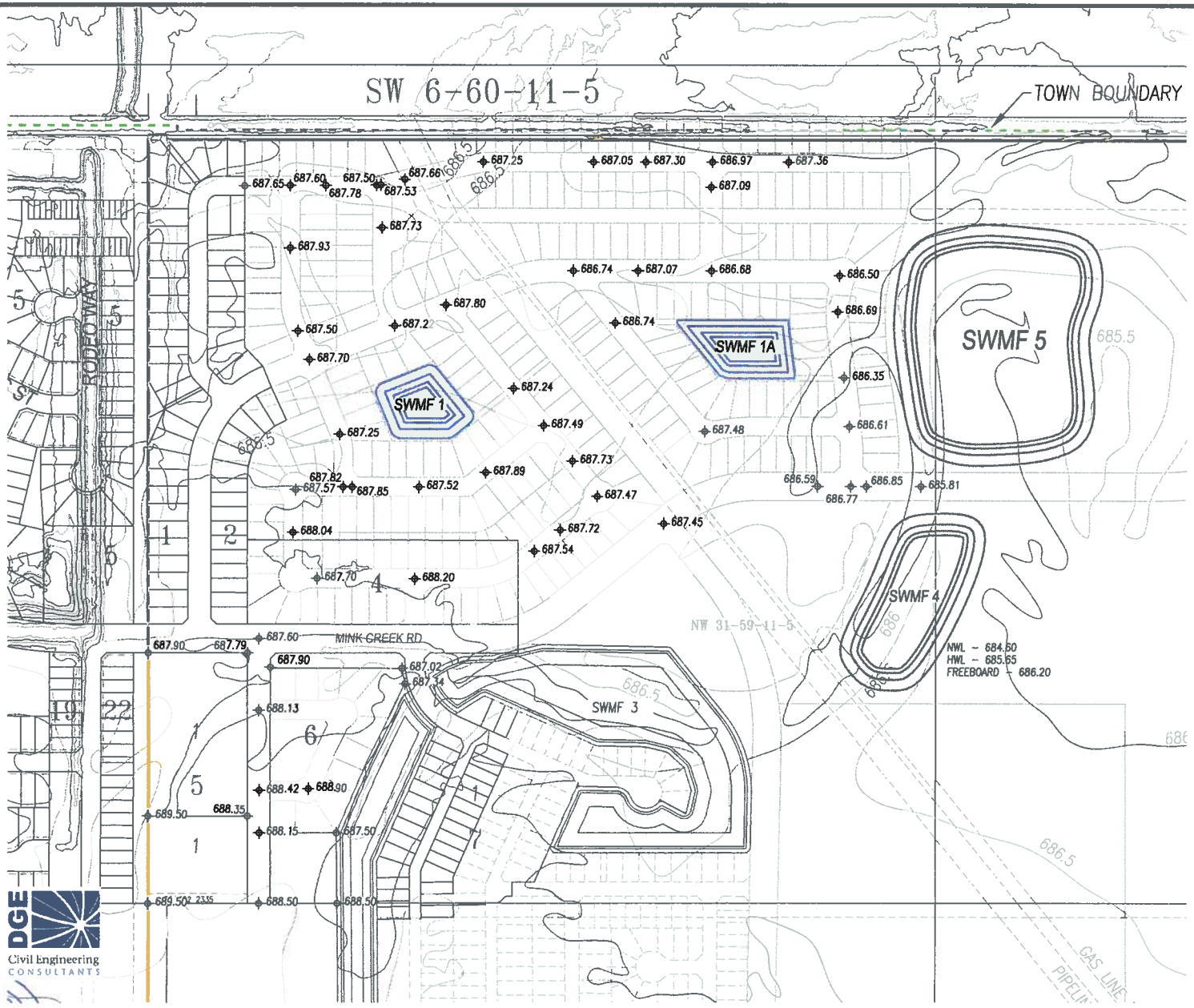
It is estimated that 80,000 m^3 of fill could be available from SWMF 4. If utilized for the residential area north of mink creek road it would leave a shortfall of 170,000 m^3. Alternately the fill could be used to complete the grading in the multi-family area. Reduction of the requirement for cover over the storm sewer to 1.2 m could result in a savings of up to 100,000 m^3 of imported fill in the single family residential area valued at up to $2,000,000.

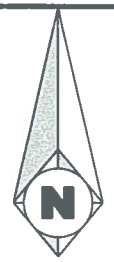
It is estimated that 290,000 m^3 of fill would be available from SWMF 5, however it is anticipated this fill will be required for development of the SE 31-59-11-5.

4.4.2 Grading Concept Based on Sanitary Sewer Criteria

An analysis was undertaken to determine if portions of the site could be serviced with gravity mains.

An extension of the 250 mm main installed on Mink Creek Road would allow servicing of approximately 2.3 ha. This would require an additional 5,500 m^3 of fill, in addition to





Whitecourt

ATHABASCA FLATS EAST SERVICING STUDY

LEGEND

- TOWN BOUNDARY
- STUDY BOUNDARY
- 686.99 DESIGN ELEVATION

FIGURE 4.1
GRADING CONCEPT

1:2500
MARCH, 2013

DGE Civil Engineering CONSULTANTS

DATE PLOTTED: March 14, 2013
CAD FILE NAME: S:\Common\01 Projects\TOW - Town of Whitecourt\TOW-0001-Athabasca Flats East SS\Engineering\Drawings\30-Preliminary\Production Drawings_Final Figures\TOW-0001-30-FIG 4-GRADING - GRADA

the 29,500 m^3 that is required as discussed in 4.4.1 above. It has been determined that placing 5,500 m^3 of fill would cost approximately $48,000/ha and would be more expensive than the lift station cost estimated in Section 5.

Installation of a new sanitary trunk main north of Flats Road, connecting invert to invert with the existing main would allow for servicing about 5.4 ha of land in the NW corner adjacent to River Stone Estates, however an additional 26,500 m^3 of fill would be required above the 84,500 m^3 that is required as discussed in 4.4.1 above. Placing 26,500 m^3 of fill would cost $90,000/ha. This cost is significantly above the lift station costs estimated in Section 5.

Grading concepts based on gravity sanitary sewer servicing will not be considered further because of the additional cost of fill that would be required.

4.4.3 Initial Phase

A potential first phase is to excavate SWMF 1, 1A and 4 and fill the residential area as shown on Figure 4.2 - Initial Phase Grading Concept.

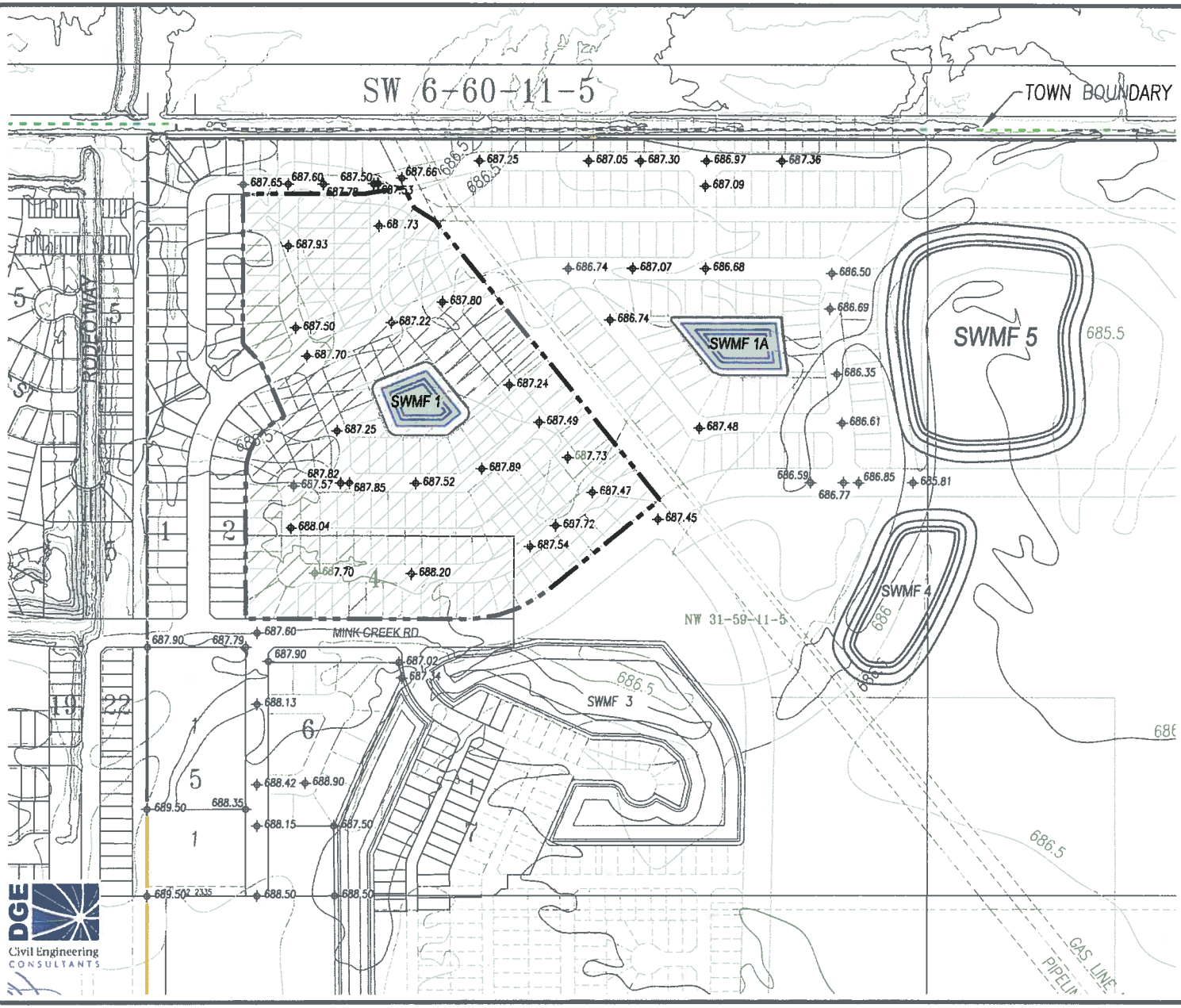
This would require stripping and stockpiling topsoil and organics from the SWM facilities and the residential area to be filled, excavating the pond and compacting to embankment, finish grading the pond, installing the inlet and outlet structures and constructing a temporary outlet ditch.

4.5 Cost Analysis

The following cost analysis is for grading the 33.85 ha of residential area in the NW 31-59-11-5 north of Mink Creek Road and developing SWMF 4. A source for 170,000 m^3 of fill is required.

Table 4-1 - Grading Costs Residential Area - 33.9 ha

Item	*Description*	*Unit*	*Quantity*	*Unit Price*	*Total*
1	Striping and Stockpile Topsoil	m3	108,000	3	$ 324,000
2	Cut From SWMF 4 Compact in Place	m3	80,000	15	$ 1,200,000
3	Imported Fill, Compact in Place	m3	170,000	20	$ 3,400,000
4	SWMF Inlet/Outlet Structures	LS	1	50,000	$ 50,000
5	SWMF Topsoil, Seeding & Rip-Rap	LS	1	150,000	$ 150,000
6	Temporary Outfall Ditch	m	1,100	100	$ 110,000
6	Engineering & Contingency (15%)	%	1	15%	$ 768,600
	Total				$ 6,002,600
	Cost per Ha				$ 177,329



N

Whitecourt

ATHABASCA FLATS EAST SERVICING STUDY

LEGEND

- TOWN BOUNDARY
- STUDY BOUNDARY
- 686.99 DESIGN ELEVATION
- AREA TO BE GRADED WITH EXCAVATION FROM SWMF 4

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FIGURE 4.2
INTIAL PHASE - GRADING CONCEPT

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MARCH, 2013

CAD FILE NAME: S:\Common\01 Projects\TOW - Town of Whitecourt\TOW-0001-Athabasca Flats East SS\Engineering\Drawings\30-Preliminary\Production Drawings_Final Figures\TOW-0001-30-FIG 4-GRADING - GRADIN

DATE PLOTTED: March 14, 2013

Table 4-2 - Initial Phase Grading Costs

Item	*Description*	*Unit*	*Quantity*	*Unit Price*	*Total*
1	Striping and Stockpile Topsoil	m3	55,000	3	$ 165,000
2	Cut From SWMF 4 Compact in Place	m3	80,000	15	$ 1,200,000
3	Imported Fill, Compact in Place	m3	0	20	$ -
4	SWMF Inlet/Outlet Structures	LS	1	50,000	$ 50,000
5	SWMF Topsoil, Seeding & Rip-Rap	LS	1	150,000	$ 150,000
6	Temporary Outfall Ditch	m	1,100	100	$ 110,000
6	Engineering & Contingency (15%)	%	1	15%	$ 234,750
	Total				$ 1,909,750
	Cost per Ha				$ 119,359.38

5.0 SANITARY SEWER SERVICING

5.1 Study Area

The primary servicing study area is the Athabasca Flats East area comprised of the NW 31-59-11-W5, and land in the SW 31-59-11-W5 located north of the railroad tracks. Consideration is also given for servicing the lands located in the adjacent E ½ of 31-59-11-5 located north of the railway tracks.

5.2 Land Use

In Accordance with the Athabasca Flats East Area Structure Plan land uses in the NW 31-59-11-5 are primarily Low Density Residential, with areas of Medium and High Density Residential, Mobile Home Park, Neighbourhood Commercial and Urban Services. In accordance with the Municipal Development Plan Land uses in the SW-31-59-11-5 are primarily Business Industrial with areas of Medium and High Density Residential, Mobile Home Park, and Urban Services. Land uses are shown on Figure 2 - Land Use.

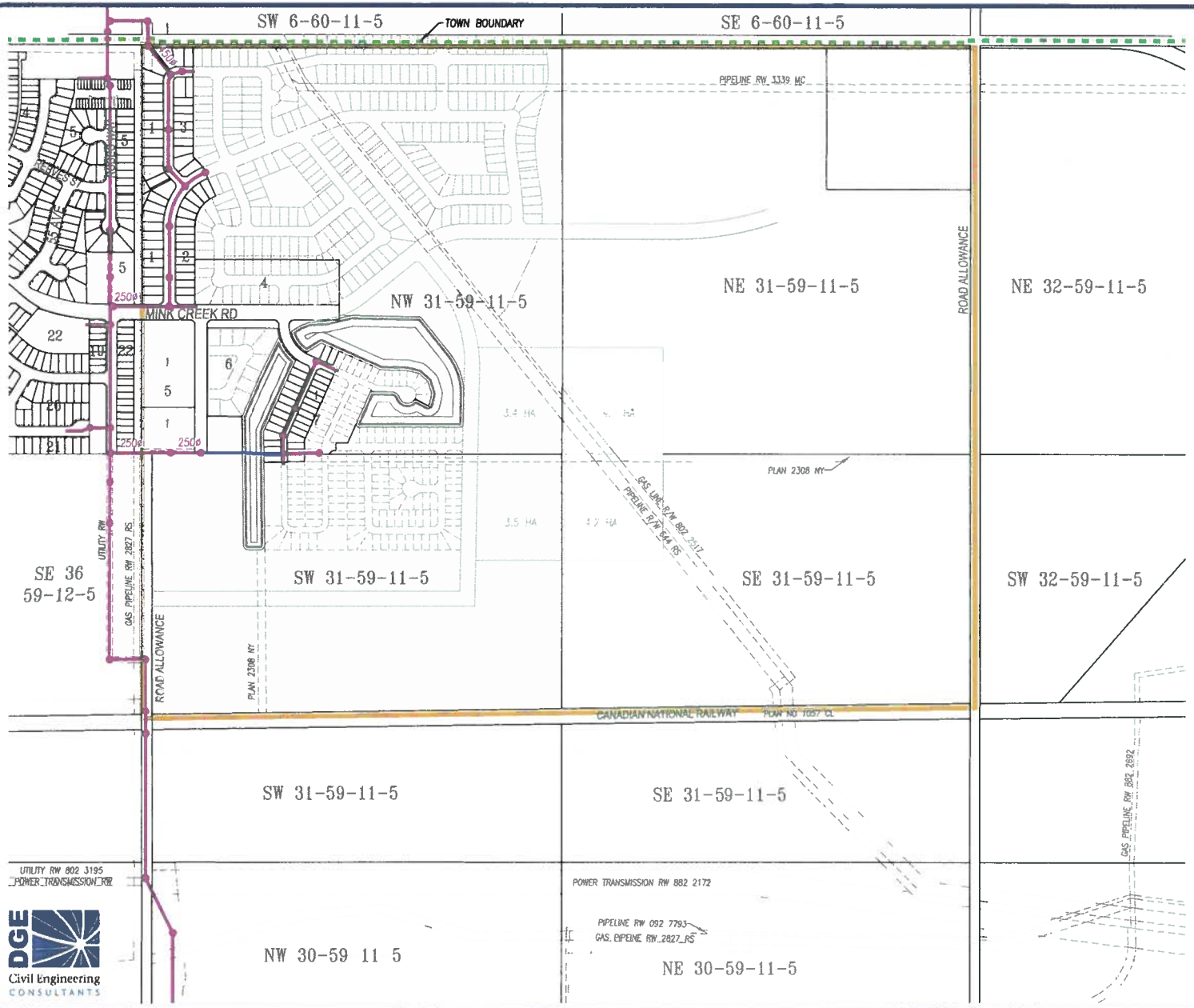
In accordance with the Municipal Development Plan land in the NE 31-59-11-5 are split between Residential and Business Industrial with areas of Urban Services while land in the SE 31-59-11-5 are primarily Business Industrial with areas of Residential and Urban Services.

5.3 Existing Sanitary Servicing

In anticipation of servicing portions of the Athabasca Flats East area a 450mm diameter sanitary main was installed to the north west corner of the NW 31-59-11-5, but due to grade constraints it will be limited to servicing a portion of River Stone Estates a 57 lot residential development along the west boundary of the NW 31-11-59-5. The remainder of Riverstone Estates is serviced by a 250mm main that has been extended east in the north boulevard of Mink Creek Road. This main has the potential to service additional residential areas however its service area will be limited by the available grade.

A 250mm gravity sewer main was installed in a PUL along the south boundary of the NW 31-59-11-5 from the trunk sewer main in the SE 36-59-12-5 east terminating with a manhole positioned in the future north/south roadway . This main has the potential to service the Medium and High Density Residential in the W ½ of 31-59-11-5, in addition to receiving the flow for a lift station installed to service The Meadows. The Meadows lift station was installed to service the first Phase of the Meadows as well as approximately 22 acres of future Mobile Home Park development in the W ½ of 31-59-11-5.

The Existing Sanitary Sewer Services are shown on Figure 5.0 - Existing Sanitary Sewer.



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ATHABASCA FLATS EAST SERVICING STUDY

LEGEND

- TOWN BOUNDARY
- STUDY BOUNDARY
- EXISTING SANITARY SEWER
- EXISTING FORCEMAIN

FIGURE 5.0
EXISTING SANITARY SEWER

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MARCH., 2013

5.4 Servicing Constraints

5.4.1 Town of Whitecourt Servicing Standards

Section 3.0 Sanitary Sewer System of the Town of Whitecourt's Servicing Standards for Local Improvements provides the design and construction criteria for sanitary sewer systems in the Town. A summary of the relevant design criteria are as follows:

Residential Contribution

- 40 persons per hectare
- 360 Litres per capita per day
- Peaking Factor to be the larger of 2.5 or Harmon's Peaking Factor

Industrial Flows

- 22.5 m3 per gross hectare per day
- Peaking Factor of 3

Commercial Flows

- 17 m3 per hectare per day
- Peaking Factor of 3

Infiltration

- An infiltration allowance of 0.28 litres per second per gross hectare per day to be included in the sewage contribution calculation for Residential, Industrial and Commercial flows.

Mains

- Minimum depth of bury of 3.0 m measured from the crown to finished grade.
- Minimum grades of pipe to be as recommended by Alberta Environmental Protection Standards and Guidelines.

Lift Stations

- While not specifically stated in the Servicing Standards the Town would like to minimize the number of lift stations.

5.4.2 Historical Sewage Flows

5.4.2.1 Town of Whitecourt Municipal Servicing Study, January 1992

The Town of Whitecourt Municipal Servicing Study, January 1992 was undertaken to facilitate planning for the 20 year time horizon (1992-2011). The study objectives were identified as:

1. To identify problem areas with the Town's existing facilities.
2. To provide for planned expansion of the major facilities.
3. To address conservation measures which may reduce or eliminate expansion requirements.

Table 5 of this study presents historical wastewater flows for the years 1981 through 1990. The population of Whitecourt grew from 5,585 in 1981 to 6,692 in 1990. During this time the average gross sewage flow averaged 463 l/c/d, with a maximum of 600 l/c/d in 1989 and a minimum of 411 l/c/d in 1984. Gross wastewater flows include wastewater generated for all sources including residential, commercial, industrial, infiltration and truck haul from sources outside the Town boundary.

The study uses the concept of total equivalent population to predict future sewage flows. This concept assigns the number of people per unit area that would generate the same quantity of sewage as the commercial, institutional and industrial land use would generate per unit area. The design criteria assigned to the equivalent population was the same as for residential population. Sewage flows were peaked using Harmon's formula.

Based on equivalent population the study reports a 1990 average sewage flow of 320 l/d/c and predicts a 450 l/c/d average sewage flow in 2011. The study does not state the actual equivalent population, but the Proposed Sanitary Sewer Analysis presented in Appendix D shows 40 p/ha for residential, 46 p/ha for commercial, 93/ha for C.B.D. and 62/ha for light industrial areas.

This study projected an actual 2011 population of 12,502 with average daily sewage flows of 29,317 m^3.

The Study also identified the need for a lift station in the NE 30-59-11-5 with a capacity of 160 l/s.

5.4.2.2 Town of Whitecourt Utility Report

DGE reviewed excerpts from the 2010 Water and Wastewater Annual Report along with Additional 2011 and 2012 data supplied by the Town's Utilities Department and provides the following summary:

Annual sewage flows were reported as:

- 2010 1,240,335 m3 (3396 m3/average d)
- 2011 1,438,233 m3 (3940 m3/average d)
- 2012 (estimated) 1,358,748 m3 (3723 m3/average d)

Table 1 of the Waste Water Lift Stations Annual Report 2010 provided total and average flows from the Town's lift stations. The average daily flows of selected lift stations are summarized as follows:

- North Haven 43 m3/d
- Phase II 133 m3/d
- West Whitecourt 193 m3/d
- Hilltop Industrial 102 m3/d

North Haven lift station serves 36 single family and 32 medium density dwelling units, for an average of 632 litres per dwelling unit, or, based on the Census figure of 2.6 people per dwelling, 243 l/c/d average flow.

Phase II lift station serves 16.5 hectares, of residential and institutional land, with an average flow of 133 cu m/day, or 8.1 cu m /ha/day. At the 40 people per hectare, this is 201 l/c/d.

Hilltop lift station serves 61 ha if industrial land with an average daily flow of 102 m^3/d which results in an average flow of 1.67 m^3/d/ha.

West Whitecourt 2010 Served 70 ha industrial, daily flow 193 m3/d which results in a average daily flow of 2.8 m^3/ha/d. Adjusted to remove the hotel & trailer park results in an average daily flow of 2.3 m^3/d/ha.

Flows in 2011 were 16% higher than 2010 while the population and developed area remained relatively constant; therefore the increase is attributed to infiltration and inflow due to a significantly increased amount of precipitation during the year.

Based on a population of 9605 the gross average sewage flow generated in 2011 (highest sewage flow year on record) is 410 l/c/d. Gross sewage flows include all residential, commercial, industrial, infiltration, inflow and truck haul sewage received at the sewage treatment plant.

5.4.2.3 Analysis of Historical Sewage Flows

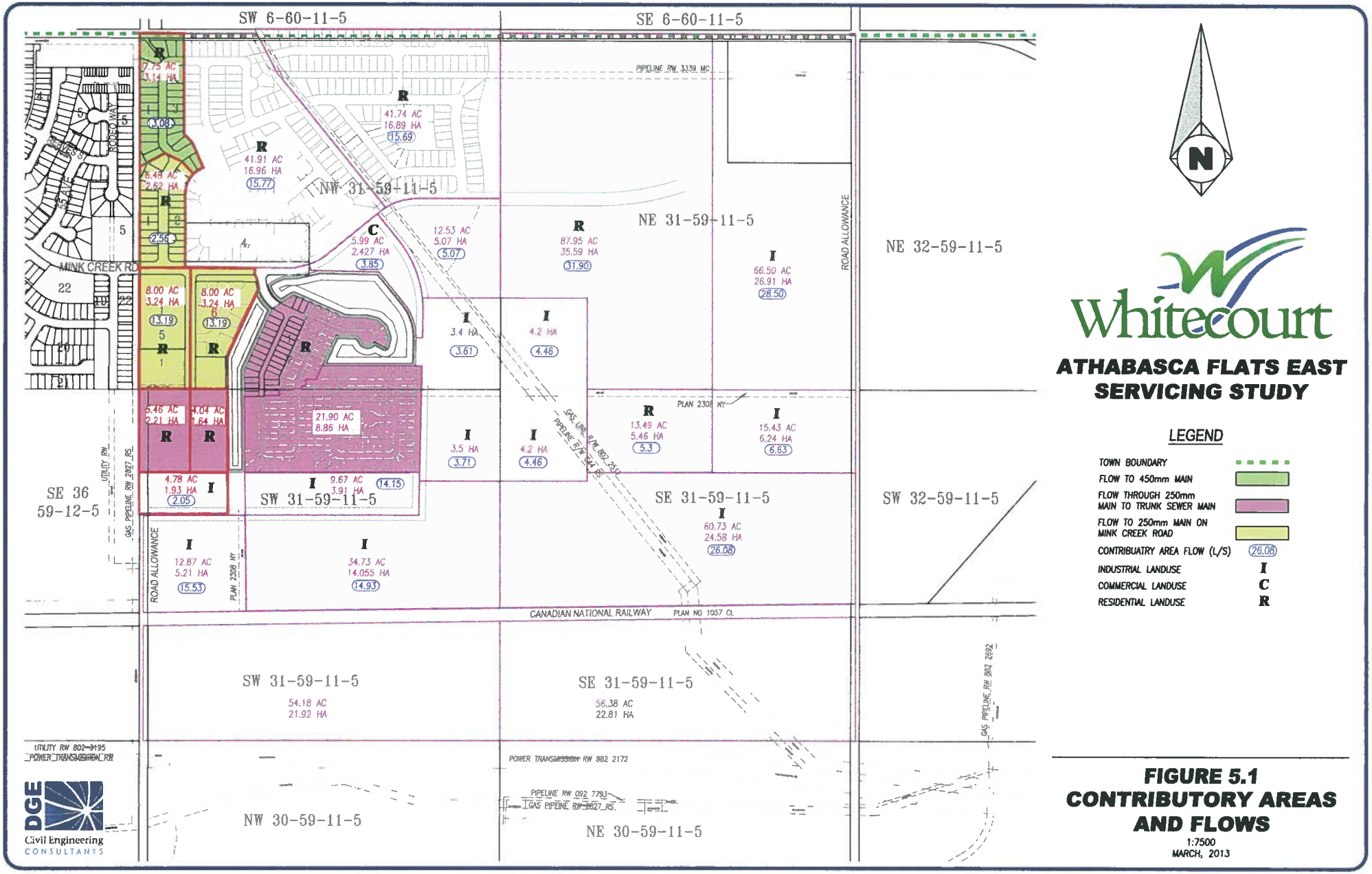
The 1992 Municipal Servicing Study projected a 2011 population of 12,502 with average daily sewage flows of 29,317 m^3 resulting in gross average sewage flows of 2345 l/c/d. The water treatments plant operational records indicate average daily flows of 3396 m^3 with a population of 9605 resulting in a gross average sewage flow of 354 l/c/d. Actual 2011 gross daily sewage flows are only 15% of the projected flows on a per capita generation basis.

Based on the 2010 Utility Report the average daily residential sewage, infiltration and inflow observed at the North Haven lift station was 243 l/c/d. The average daily industrial sewage, infiltration and inflow observed at the West Whitecourt lift station was 2.3 m^3/d/ha.

5.4.2.4 Discussion of Sewage Flow Generation

The generation of sewage flows on a per capita basis has declined since the 1992 study and appears to be considerably less than the Design Criteria presented in Section 3.0, Sanitary Sewer System of the Town of Whitecourt Servicing Standards, January 1999.

The reduced flows are attributed to water conservation measures put in place in the 2000's along with improvements in sewage pipes and manholes that reduces infiltration and inflow. The significant reduction of industrial sewage flow generation can be attributed to the type of industry prevalent in the Whitecourt area consisting of oilfield and forest industry support services that utilize the majority of the serviced land for equipment and materials storage with the office/shops only generating flows from washroom facilities.



Whitecourt

ATHABASCA FLATS EAST SERVICING STUDY

LEGEND

- TOWN BOUNDARY
- FLOW TO 450mm MAIN
- FLOW THROUGH 250mm MAIN TO TRUNK SEWER MAIN
- FLOW TO 250mm MAIN ON MINK CREEK ROAD
- CONTRIBUATRY AREA FLOW (L/S) (26.08)
- INDUSTRIAL LANDUSE I
- COMMERCIAL LANDUSE C
- RESIDENTIAL LANDUSE R

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FIGURE 5.1
CONTRIBUTORY AREAS AND FLOWS

1:7500
MARCH, 2013

5.4.3 Alberta Environment Standards & Guidelines

Sizing of sewers - Sewer mains to be designed to have a hydraulic capacity such that the sewer is flowing at 80% of depth when conveying the estimated design peak flow.

5.4.4 Topography

The Study area generally drops at an average grade of 0.2% from an elevation of 689 m in the south west corner of the primary service area to a low of 684 m +/- in the north east corner of the NE 31-59-11-5. See Figure 3.0 Stormwater Management.

In a west to east direction the site drops approximately 2m (0.13%) along the north boundary adjacent to Flats Road and 1.5 m (0.1%) along the quarter line between the north and south half's of section 31-59-11-5.

5.5 Existing Sewer Connections

The existing 450 main located at the north west corner of the study area has an invert of 684 m +/- and a capacity of 127.5 litres per second. An estimated Flow of 3.1 litres per second will be generated by the proposed 27 lots of the River Stone development and infiltration allowance leaving spare capacity of 124.4 litres per second

The 250 mm main installed adjacent to Mink Creek Road has an invert of 684.5 m and a capacity of 31 litres per second, an estimated Flow of 2.6 litres per second will be generated by the proposed 27 lots of the River Stone development and infiltration allowance leaving spare capacity of 28.4 litres per second.

The 250mm main installed adjacent to the south boundary of the NW 31-59-11-5 has an invert of 685.22m and a capacity of 31 litres per second. A flow of 9.14 litres per second will be generated by The Meadows development leaving spare capacity of 21.86 l/s.

5.6 Servicing Objectives

To provide sanitary sewer servicing to the primary servicing area of the Athabasca Flats East Area Structure Plan area in the NW 31-59-11-5 and the lands north of the railroad tracks in the SW 31-59-11-5 in the most cost efficient manner while reducing the fill required to construct the subdivision and considering the servicing requirements of the east half of 31-59-11-5 located north of the railway tracks.

5.7 Servicing Options

Two servicing concepts for sanitary sewer servicing were considered, the first an extension of existing mains to maximize the area serviceable by gravity, and the installation of a lift station to provide service to the study area.

5.7.1 Gravity Servicing Options

Two gravity servicing options were explored, extending the existing 250mm main in Mink Creek Road to service a portion of residential area north of Mink Creek Road and

east of River Stone Estates and making a new connection to the sanitary trunk main north of Flats Road and extending a new trunk main east.

5.7.1.1 Mink Creek Road Connection

A 250 mm main was extended in the north boulevard of Mink Creek Road to service a portion of River Stone Estates and was extended to provide a potential connection point for additional residential areas to the east. As shown on Figure 5.2 - Mink Creek Road Main Extension the main could be extended through a R/W or PUL and service an area as shown. This concept would require fill in excess of that required for grading and stormwater management of approximately 5,500 m^3, and would remove the area of 2.4 ha from cost sharing of the future lift station.

5.7.1.2 Gravity Trunk Main

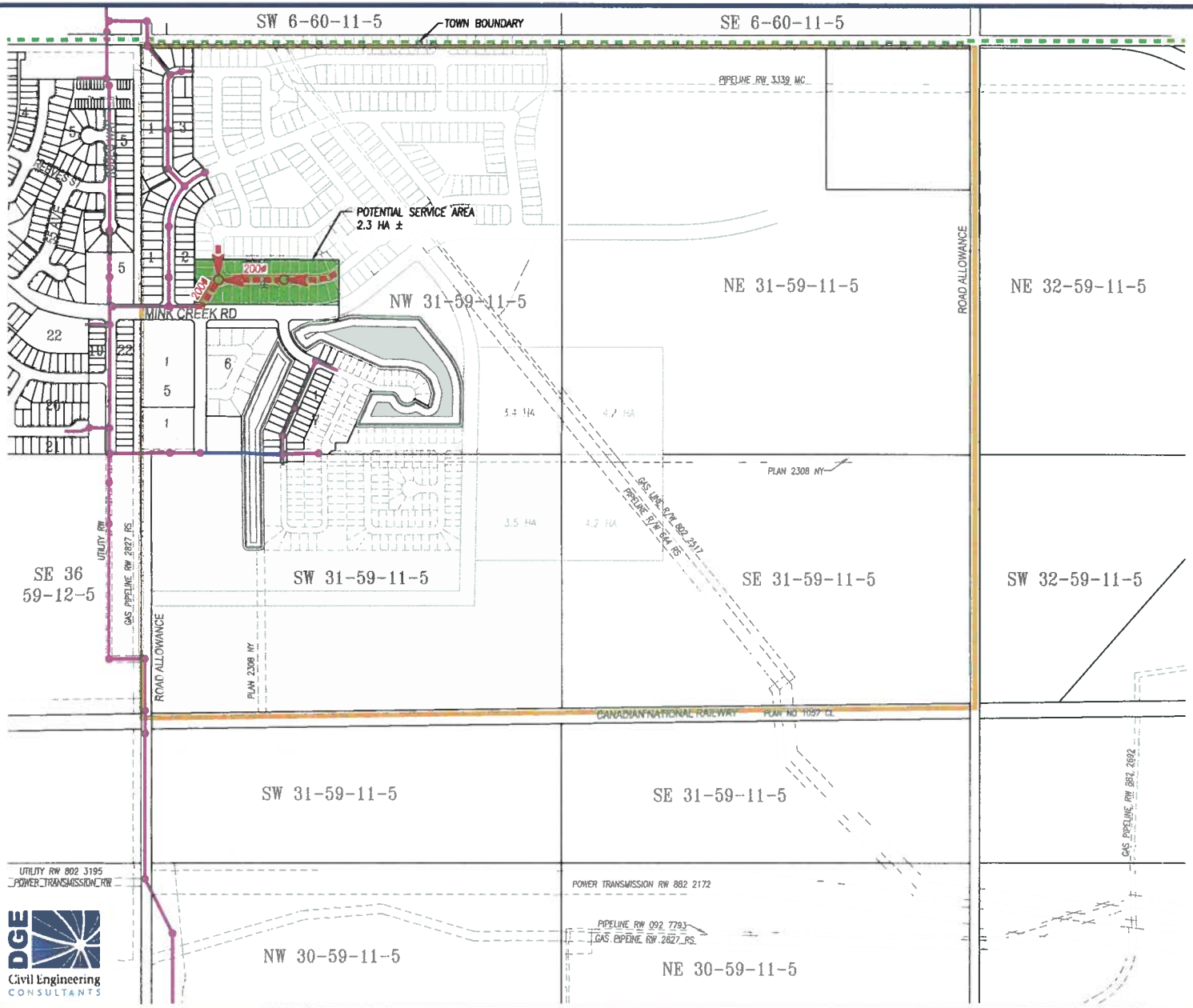
The option of installing a gravity trunk main on the north side of Flats Road extending east was investigated because it has the potential to service portion of the service area and possibly country residential subdivisions proposed for Woodland County. Figure 5.3 - Flats Road Gravity Trunk Mains shows a plan profile of the Main. A 600mm diameter main was evaluated at 0.1% slope. The main does not have the required 3.0m of cover from 0+000 to 0+080 as it crosses a drainage ditch, from 0+080 to 0+240 3.0 m of cover is maintained, from 0+240 to 0+440 the main fluctuates between 2.3 and 3 m of cover, after 0+440 cover drops rapidly to 1.75 m and the pipe daylights at 1+020. Therefore this main does not have the depth required to provide gravity sewer services to the residential developments in Woodlands County to the east.

A small area in the north east portion of the study area a shown on Figure 5.4 - Gravity Trunk Main Service Area could potentially be serviced by a gravity main, however the service area would not justify a main larger than 250 mm in diameter. A 250 mm diameter main has a minimum slope of 0.28%. As shown on the Figures 5.3 and 5.4 the 250mm main would be at minimum cover on the north side of Flats Road but could service an area of approximately 5.4 Ha with an additional 26,500 m^3 of fill placed. This would also remove 5.4 ha from cost sharing of a future lift station.

5.7.2 Lift Station Servicing Options

Based on the previous section it is accepted that gravity sewer servicing is not a viable option, therefore the options for providing sewage pumping will be evaluated. This study looks at the following alternatives:

- Alternative 'A' - Providing a lift station for the Athabasca Flats East ASP area and lands south to the railroad tracks described as the NW 31-59-11-5 and the Portion of the SW 31-5-11-5 north of the railroad tracks as shown on Figure 5.5.
- Alternative 'B' - Providing a lift station to service the NE 31-59-11-5 and the Portion of the SE 31-5-11-5 north of the railroad tracks in addition to the Athabasca Flats East ASP area and lands south to the railroad tracks.
  - Option 1 - Provide a lift station in a central location as shown on Figure 5.6.
  - Option 2 - Provide a lift station at the east end of the study area as shown on Figure 5.7.



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ATHABASCA FLATS EAST SERVICING STUDY

LEGEND

- TOWN BOUNDARY
- STUDY BOUNDARY
- EXISTING SANITARY SEWER
- EXISTING FORCEMAIN
- PROPOSED SANITARY SEWER
- POTENTIAL SERVICE AREA

FIGURE 5.2
MINK CREEK ROAD MAIN EXTENSION

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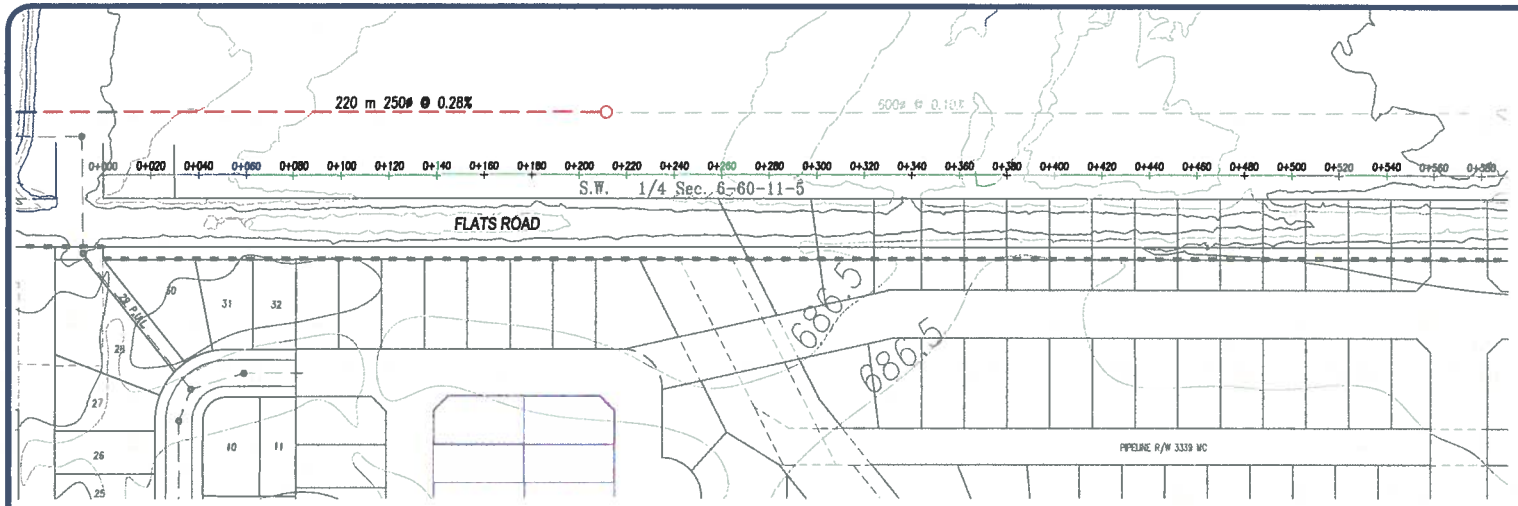

PLAN
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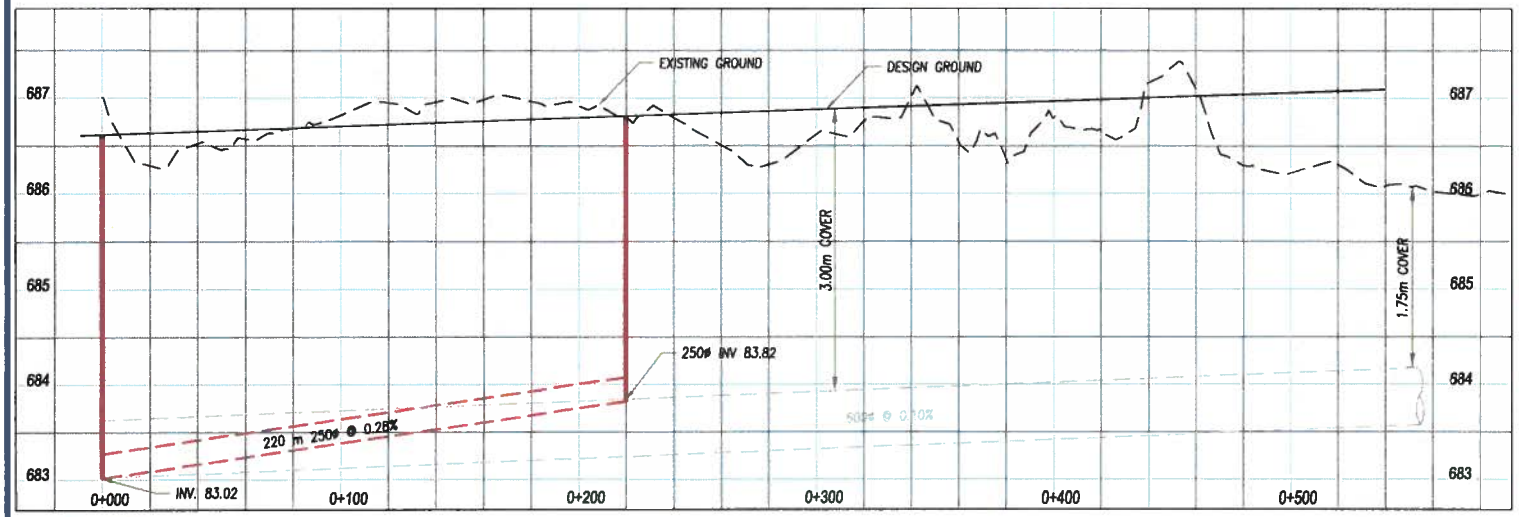

PROFILE
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ATHABASCA FLATS EAST SERVICING STUDY

LEGEND

TOWN BOUNDARY

FIGURE 5.3
FLATS ROAD
GRAVITY TRUNK MAIN-PLAN PROFILE

SCALE AS NOTED
MARCH, 2013

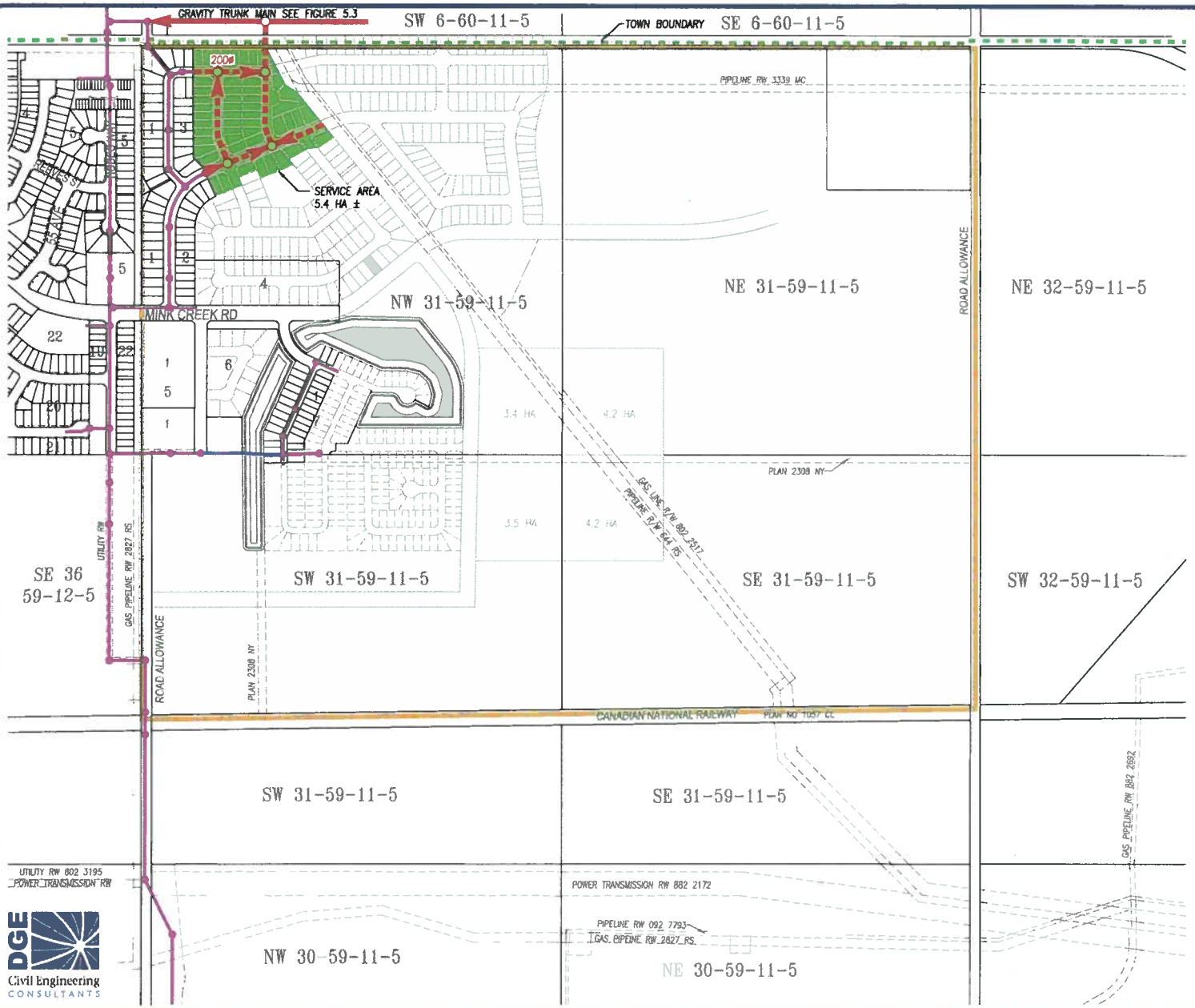
GRAVITY TRUNK MAIN SEE FIGURE 5.3
SW 6-60-11-5
TOWN BOUNDARY
SE 6-60-11-5
PIPELINE RW 3339 MC
200m
SERVICE AREA
5.4 HA ±
NW 31-59-11-5
NE 31-59-11-5
NE 32-59-11-5
ROAD ALLOWANCE
MINK CREEK RD
3.4 HA
4.2 HA
PLAN 2308 NY
GAS LINE 8/NE 882 2317
PIPELINE RW 644 RS
3.5 HA
4.2 HA
SE 36
59-12-5
UTILITY RW
GAS PIPELINE RW 2827 RS
SW 31-59-11-5
SE 31-59-11-5
SW 32-59-11-5
ROAD ALLOWANCE
PLAN 2308 NY
CANADIAN NATIONAL RAILWAY
PLAN RO 1057 CL
SW 31-59-11-5
SE 31-59-11-5
GAS PIPELINE RW 882 2824
UTILITY RW 802 3195
POWER TRANSMISSION RW
POWER TRANSMISSION RW 882 2172
PIPELINE RW 092 7793
GAS PIPELINE RW 2827 RS
NW 30-59-11-5
NE 30-59-11-5
N
Whitecourt
ATHABASCA FLATS EAST
SERVICING STUDY
LEGEND
TOWN BOUNDARY
STUDY BOUNDARY
EXISTING SANITARY SEWER
EXISTING FORCEMAIN
PROPOSED SANITARY SEWER
PROPOSED GRAVITY TRUNK MAIN
POTENTIAL SERVICE AREA
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FIGURE 5.4
GRAVITY TRUNK MAIN
SERVICE AREA
1:7500
MARCH, 2013

- Alternative 'C' - Providing a lift station in for the Athabasca Flats East ASP area and lands south to the railroad tracks described as the NW 31-59-11-5 and the Portion of the SW 31-5-11-5 north of the railroad tracks, and providing an additional lift station to service the NE 31-59-11-5 and the Portion of the SE 31-5-11-5 north of the railroad tracks as shown on Figure 5.8.

5.7.2.1 Alternate 'A'

This option provides a lift station for the Athabasca Flats East ASP area and lands south to the railroad tracks described as the NW 31-59-11-5 and the Portion of the SW 31-5-11-5 north of the railroad tracks. The design criteria for the lift station are as follows:

- Peak sewage flows of 82.38 l/s as calculated in accordance with the Town of Whitecourt Servicing Standards.
- The depth of the lift station from design ground to the inlet invert is 6.7 m.
- The depth of the lift station from existing ground to the inlet invert is 5.4 m
- Wet well storage of approximately 23 m^3
- A 300 mm HDPE forcemain approximately 440 m in length.
- A service area of 71.4 ha.

The lift station would be located as shown on Figure 5.5. This location optimizes the pipe sizing and minimum slope requirements to minimize the depth of the lift station.

The gravity sewage mains under this option would consist of 200 to 375mm diameter mains.

Table 5-1 - Sanitary Sewer Servicing Alternative 'A'

Item	*Description*	*Unit*	*Quantity*	*Unit Price*	*Total*
1	Lift Station 23 m3	LS	1	1,900,000	$1,900,000
2	300 mm Dia Forcemain	m	440	300	$132,000
3	Gravity Trunk Main				
	375 mm Dia	m	385	300	$115,500
4	Engineering & Contingency (15%)	%	1	15%	$322,125
	Total				$2,469,625
	Cost per Ha				$34,589

5.7.2.2 Alternative 'B'

This alternate would provide a lift station to service the NE and NW 31-59-11-5 and the Portion of the SE and SW 31-5-11-5 north of the railroad tracks. This alternative evaluate two options, Option 1 provides a lift station in the NW 31-59-11-5 south of Mink Creek Road while Option 2 proposes a lift station in the north east portion of the NE 31-59-11-5.

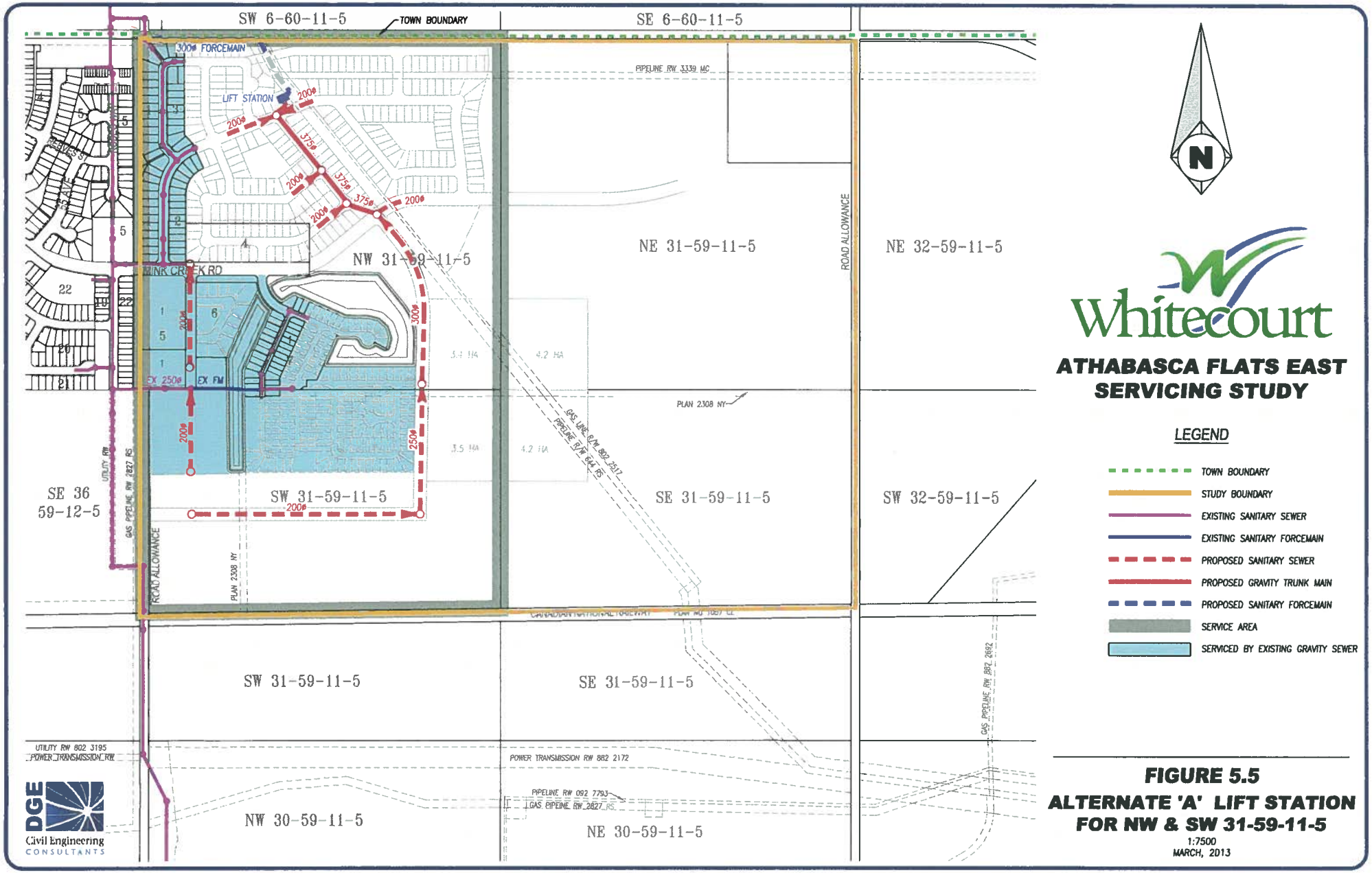
SW 6-60-11-5
TOWN BOUNDARY
SE 6-60-11-5
300ø FORCEMAIN
LIFT STATION
200ø
375ø
PIPELINE RW 3339 MC
NW 31-59-11-5
NE 31-59-11-5
ROAD ALLOWANCE
NE 32-59-11-5
MINK CREEK RD
EX 250ø
EX FM
300ø
250ø
4.2 HA
3.5 HA
PLAN 2308 NY
GAS LINE RW 802 2317
PIPELINE RW 644 PS
SE 36
59-12-5
SW 31-59-11-5
SE 31-59-11-5
SW 32-59-11-5
UTILITY RW
GAS PIPELINE RW 2827 RS
ROAD ALLOWANCE
PLAN 2308 NY
CANADIAN NATIONAL RAILWAY
PLAN NO 1087 CL
SW 31-59-11-5
SE 31-59-11-5
GAS PIPELINE RW 882 2692
UTILITY RW 802 3195
POWER TRANSMISSION RW
POWER TRANSMISSION RW 882 2172
PIPELINE RW 092 7793
GAS PIPELINE RW 2827 RS
NW 30-59-11-5
NE 30-59-11-5
N
Whitecourt
ATHABASCA FLATS EAST
SERVICING STUDY
LEGEND
TOWN BOUNDARY
STUDY BOUNDARY
EXISTING SANITARY SEWER
EXISTING SANITARY FORCEMAIN
PROPOSED SANITARY SEWER
PROPOSED GRAVITY TRUNK MAIN
PROPOSED SANITARY FORCEMAIN
SERVICE AREA
SERVICED BY EXISTING GRAVITY SEWER
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FIGURE 5.5
ALTERNATE 'A' LIFT STATION
FOR NW & SW 31-59-11-5
1:7500
MARCH, 2013

5.7.2.2.1 Option 1

A lift station would be located in NW 31-59-11-5 south on Mink Creek Road and near future Road B as shown on Figure 5.6. The design criteria for the lift station are as follows:

- Peak sewage flows of 181.51 l/s.
- The depth of the lift station from design ground to inlet invert is 9.5m
- The depth of the lift station from existing ground inlet invert is 9 m
- Wet well storage of approximately 50 m^3
- A 400 mm HDPE forcemain approximately 800 m in length
- A service area of 174 ha

Gravity sewer mains to service the NW 31-59-11-5 and the portion of SW 31-59-11-5 north of the tracks would consist of 200 through 450 mm diameter mains. A trunk main from the NE would consist of 375 through 525 mm diameter mains. Mains in excess of 300 mm are considered trunk mains as such the oversizing would be cost shared by lands within its contributory area.

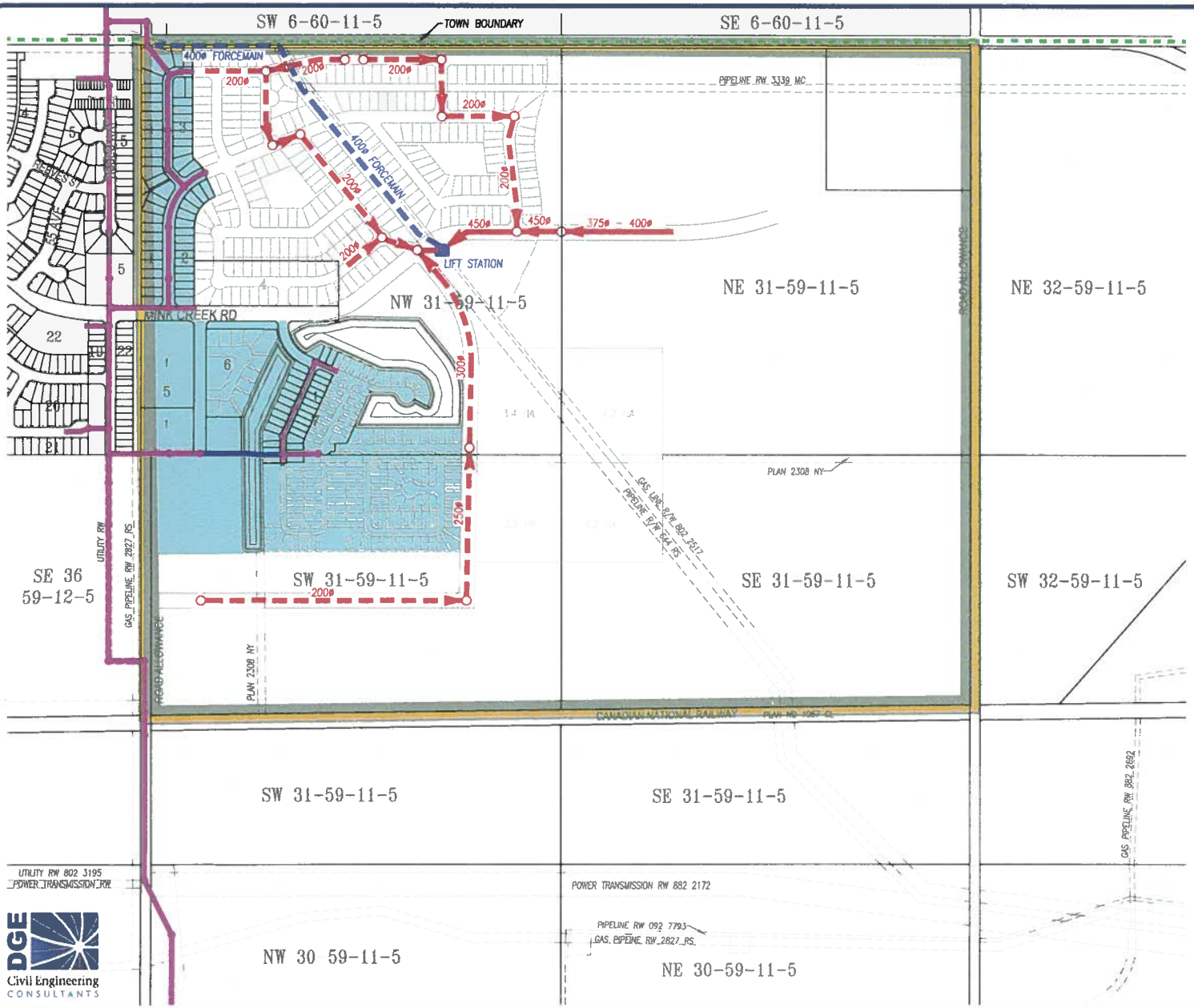
Table 5-2 - Sanitary Servicing Alternate 'B' - Option 1

Item	*Description*	*Unit*	*Quantity*	*Unit Price*	*Total*
1	Lift Station 50 m3	LS	1	4,250,000	$4,250,000
2	400 mm Dia Forcemain	m	800	350	$280,000
3	Gravity Trunk Main				
4	375 mm Dia	m	300	350	$105,000
	450 mm Dia	m	390	450	$175,500
	525 mm Dia	m	120	675	$81,000
6	Engineering & Contingency (15%)	%	1	15%	$733,725
	Total				$5,625,225
	Cost per Ha				$32,329

5.7.2.2.2 Option 2

A lift station would be located in the NE 31-59-11-5 as shown on Figure 5.7. The design criteria for the lift station are as follows:

- Peak sewage flows of 181.51 l/s.
- The depth of the lift station from design ground to inlet invert is 8 m
- The depth of the lift station from ground level to lowest invert is 8 m
- Wet well storage of approximately 50 m^3
- A 450 mm HDPE forcemain approximately 1600 m in length.
- A service area of 174 ha



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ATHABASCA FLATS EAST SERVICING STUDY

LEGEND

- TOWN BOUNDARY
- STUDY BOUNDARY
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- PROPOSED SANITARY SEWER
- PROPOSED GRAVITY TRUNK MAIN
- PROPOSED SANITARY FORCEMAIN
- SERVICE AREA
- SERVICED BY EXISTING GRAVITY SEWER

FIGURE 5.6
ALTERNATE 'B' OPTION 1
CENTRAL LIFT STATION

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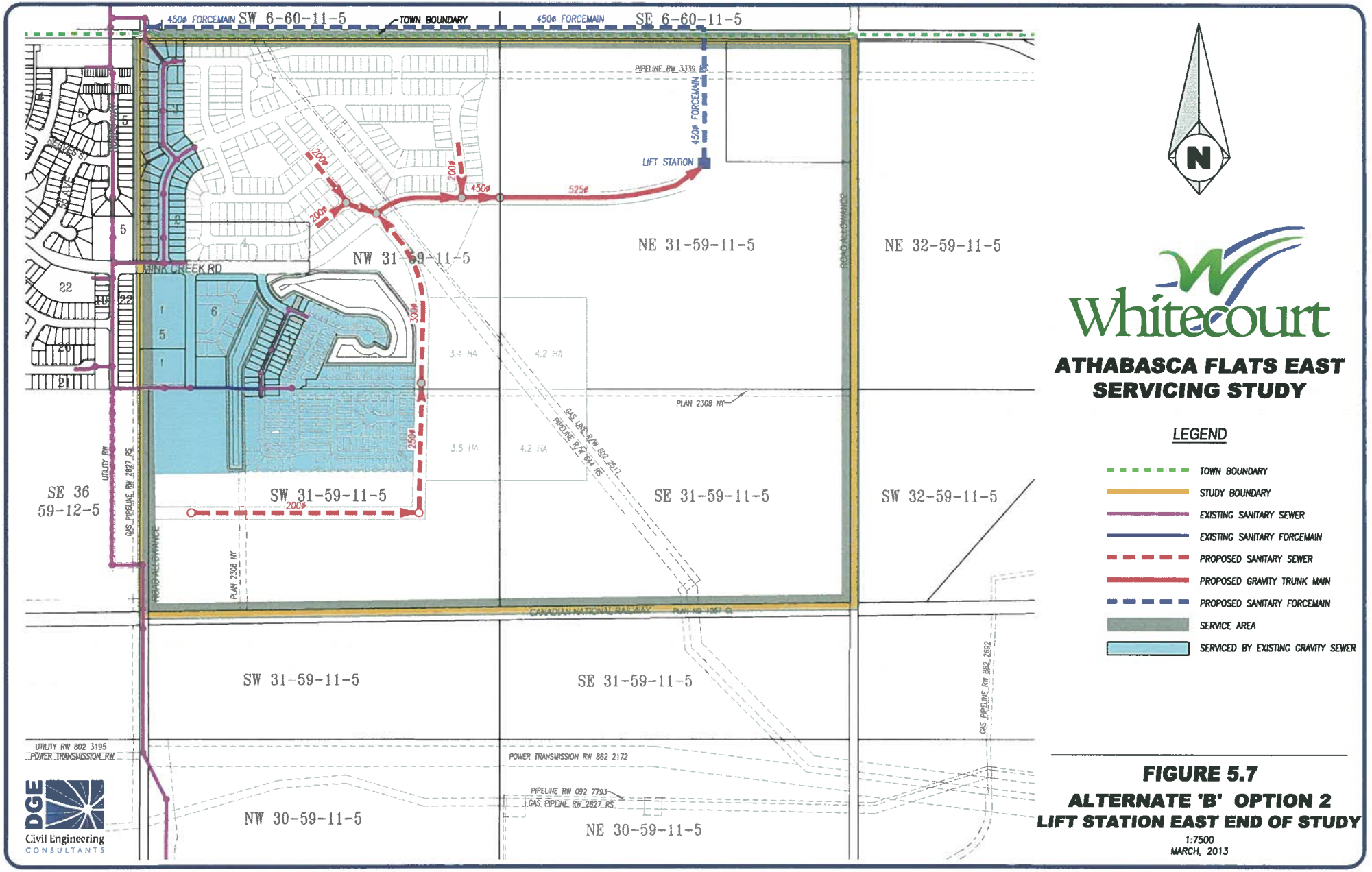

450ø FORCEMAIN
SW 6-60-11-5
TOWN BOUNDARY
450ø FORCEMAIN
SE 6-60-11-5
PIPELINE RW 3339
450ø FORCEMAIN
LIFT STATION
200ø
450ø
525ø
NW 31-59-11-5
NE 31-59-11-5
NE 32-59-11-5
ROAD ALLOWANCE
LINK CREEK RD
300ø
3.4 HA
4.2 HA
PLAN 2308 NY
GAS LINE R/W 802 2517
PIPELINE R/W 844 RS
3.5 HA
4.2 HA
250ø
SE 36
59-12-5
SW 31-59-11-5
200ø
SE 31-59-11-5
SW 32-59-11-5
UTILITY RW
GAS PIPELINE RW 2827 RS
ROAD ALLOWANCE
PLAN 2308 NY
CANADIAN NATIONAL RAILWAY
PLAN NO 1967 CL
SW 31-59-11-5
SE 31-59-11-5
GAS PIPELINE RW 882 2692
UTILITY RW 802 3195
POWER TRANSMISSION RW
POWER TRANSMISSION RW 882 2172
PIPELINE RW 092 7793
GAS PIPELINE RW 2827 RS
NW 30-59-11-5
NE 30-59-11-5
N
Whitecourt
ATHABASCA FLATS EAST
SERVICING STUDY
LEGEND
TOWN BOUNDARY
STUDY BOUNDARY
EXISTING SANITARY SEWER
EXISTING SANITARY FORCEMAIN
PROPOSED SANITARY SEWER
PROPOSED GRAVITY TRUNK MAIN
PROPOSED SANITARY FORCEMAIN
SERVICE AREA
SERVICED BY EXISTING GRAVITY SEWER
DGE
Civil Engineering
CONSULTANTS
FIGURE 5.7
ALTERNATE 'B' OPTION 2
LIFT STATION EAST END OF STUDY
1:7500
MARCH, 2013

This option would require the construction of a sanitary trunk main ranging in size from 375 to 525 mm in diameter. This main would be a trunk main as such the oversizing would be cost shared by lands within its contributory area.

It is anticipated that development in the NE & SE 31-59-11-5 would occur after significant development has occurred in the Athabasca Flats Area Structure Plan area and the road and water infrastructure has been extended east. Therefore construction of a lift station would precede other development in the adjacent area but would require detail planning to establish the lift station location and routes for the gravity trunk main and forcemain as well as power and communication infrastructure.

Table 5-3 - Sanitary Servicing Alternative 'B' - Option 2

Item	*Description*	*Unit*	*Quantity*	*Unit Price*	*Total*
1	Lift Station 50 m3	LS	1	4,000,000	$4,000,000
2	450 mm Dia Forcemain	m	1600	425	$680,000
3	Gravity Trunk Main				
4	375 mm Dia	m	220	350	$77,000
	450 mm Dia	m	90	400	$36,000
	525 mm Dia	m	470	625	$293,750
6	Engineering & Contingency (15%)	%	1	15%	$763,013
	Total				$5,849,763
	Cost per Ha				$33,619

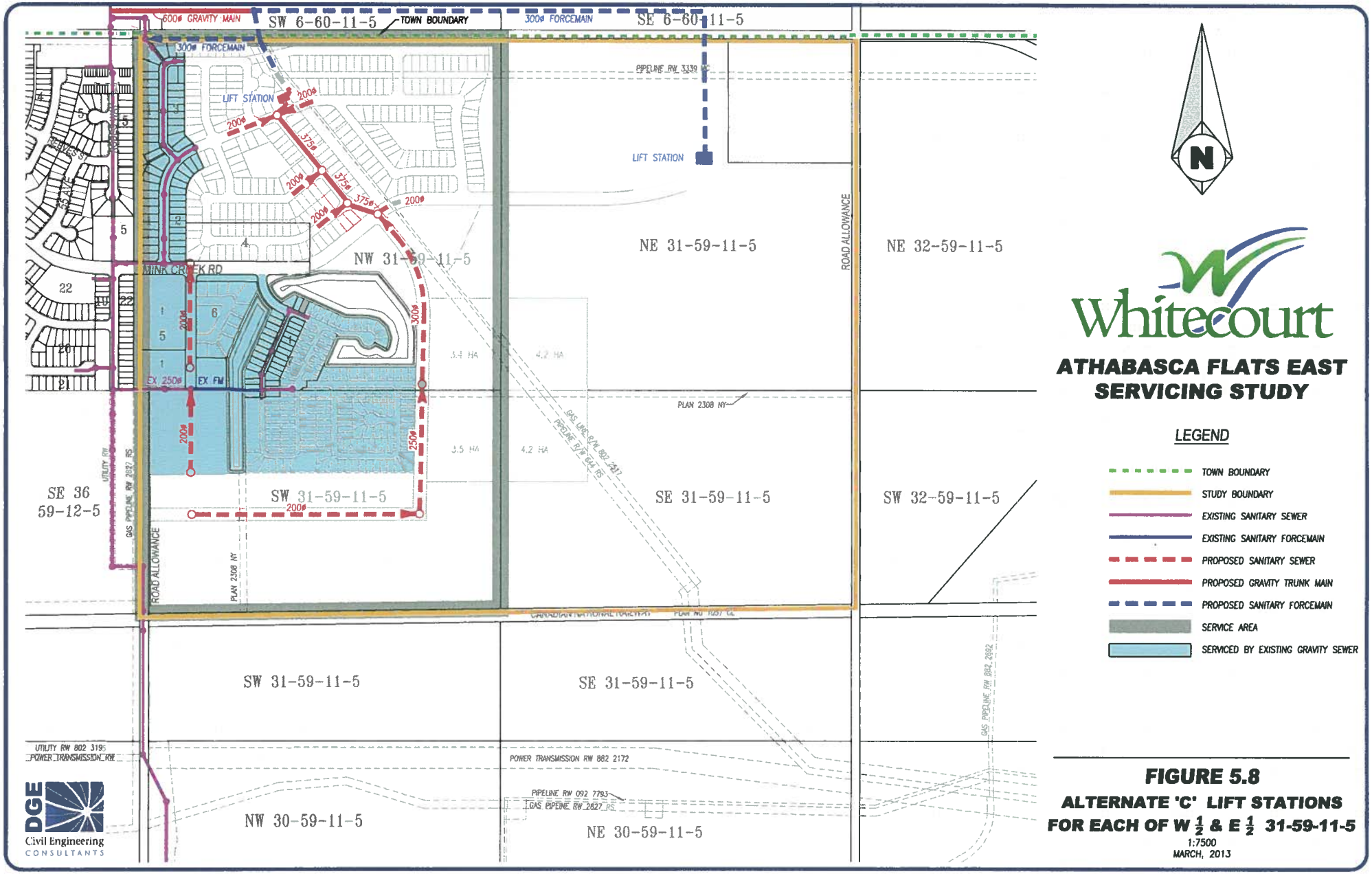
5.7.2.3 Alternative 'C'

As shown on Figure 5.8 - Alternative 'C' -a lift station is proposed for the Athabasca Flats East ASP area and lands south to the railroad tracks described as the NW 31-59-11-5 and the Portion of the SW 31-5-11-5 north of the railroad tracks, and an additional lift station is proposed to service the NE 31-59-11-5 and the Portion of the SE 31-5-11-5 north of the railroad tracks.

A 600 mm diameter gravity sewer main would be installed north of Flats Road for a distance of 280 m to avoid elimination of the installation of two forcemains along this length of line.

The design criteria for the lift station in the NW 31-59-11-5 are as follows:

- Peak sewage flows of 82.38 l/s as calculated in accordance with the Town of Whitecourt Servicing Standards.
- The depth of the lift station from design ground to the inlet invert is 6.7 m.
- The depth of the lift station from existing ground to the inlet invert is 5.4 m
- Wet well storage of approximately 23 m^3
- A 300 mm HDPE forcemain approximately 160 m in length.
- A service area of 71.4 ha.


600ø GRAVITY MAIN
SW 6-60-11-5
TOWN BOUNDARY
300ø FORCEMAIN
SE 6-60-11-5
300ø FORCEMAIN
LIFT STATION
200ø
375ø
PIPELINE RW 3139
LIFT STATION
NE 31-59-11-5
ROAD ALLOWANCE
NE 32-59-11-5
NW 31-59-11-5
MINK CREEK RD
EX 250ø
EX FM
3.4 HA
4.2 HA
PLAN 2308 NY
GAS LINE RW 882 2617
PIPELINE RW 644 RS
3.5 HA
4.2 HA
SE 36
59-12-5
SW 31-59-11-5
SE 31-59-11-5
SW 32-59-11-5
UTILITY RW
GAS PIPELINE RW 2627 RS
ROAD ALLOWANCE
PLAN 2308 NY
SW 31-59-11-5
SE 31-59-11-5
GAS PIPELINE RW 882 2692
UTILITY RW 802 3195
POWER TRANSMISSION RW
POWER TRANSMISSION RW 882 2172
PIPELINE RW 092 7793
GAS PIPELINE RW 2627 RS
NW 30-59-11-5
NE 30-59-11-5
N
Whitecourt
ATHABASCA FLATS EAST
SERVICING STUDY
LEGEND
TOWN BOUNDARY
STUDY BOUNDARY
EXISTING SANITARY SEWER
EXISTING SANITARY FORCEMAIN
PROPOSED SANITARY SEWER
PROPOSED GRAVITY TRUNK MAIN
PROPOSED SANITARY FORCEMAIN
SERVICE AREA
SERVICED BY EXISTING GRAVITY SEWER
DGE
Civil Engineering
CONSULTANTS
FIGURE 5.8
ALTERNATE 'C' LIFT STATIONS
FOR EACH OF W ½ & E ½ 31-59-11-5
1:7500
MARCH, 2013

The design criteria for the lift station in the NE 31-59-11-5 are as follows:

- Peak sewage flows of 99.1 l/s.
- The depth of the lift station from design ground to inlet invert is 9.5m
- The depth of the lift station from existing ground inlet invert is 9 m
- Wet well storage of approximately 27 m^3
- A 350 mm HDPE forcemain approximately 1320 m in length
- A service area of 102.6 ha

Table 5-4 - Sanitary Servicing Alternate 'C'

Item	*Description*	*Unit*	*Quantity*	*Unit Price*	*Total*
NW 31-59-11-5					
1	Lift Station 23 m3	LS	1	1,900,000	$1,900,000
2	300 mm Dia Forcemain	m	160	300	$48,000
3	Gravity Trunk Main				
	- 375 mm Dia	m	385	300	$115,500
	- 600 mm Dia	m	280	700	$196,000
	Engineering & Contingency (15%)				$338,925
	Total NW 31-59-11-5				$2,598,425
NE 31-59-11-5					
4	Lift Station 27 m3	LS	1	2,500,000	$2,500,000
5	350 mm Dia Forcemain	m	1320	350	$462,000
6	Gravity Trunk Main				
	- 375 mm Dia	m	220	350	$77,000
	- 450 mm Dia	m	90	400	$36,000
	Engineering & Contingency (15%)	%	1	15%	$461,250
	Total NE 31-59-11-5				$3,536,250
Total Alternative 'C'					$6,134,675
	Cost per Ha				$35,257

5.7.2.4 Phasing

A lift station will be required to facilitate further development in the Athabasca Flats East area in the most economical fashion. Two alternatives have been evaluated for ultimate development, however the ultimate design lift stations are cost prohibitive to construct during the initial phases of development of the area. In order to reduce the initial investment required to start the project a smaller temporary lift station could be installed to service the first few phases of the development. Once the temporary lift station reaches capacity it would be removed and the ultimate design lift station would be installed. This approach would increase the overall cost of development of the area, but would allow for a lower initial investment to allow construction of the initial phases of the development. The temporary lift station could be reused to facilitate

additional development in the area, for example it could be relocated from the NW 31-59-11-5 to the adjacent NE or other areas in the Town or even potentially to serve the acreage developments in the County that are adjacent to the study area. The objective would be to construct as much as possible of the permanent infrastructure and limit the amount of temporary infrastructure, and thus reduce the total overall cost while facilitating initial development.

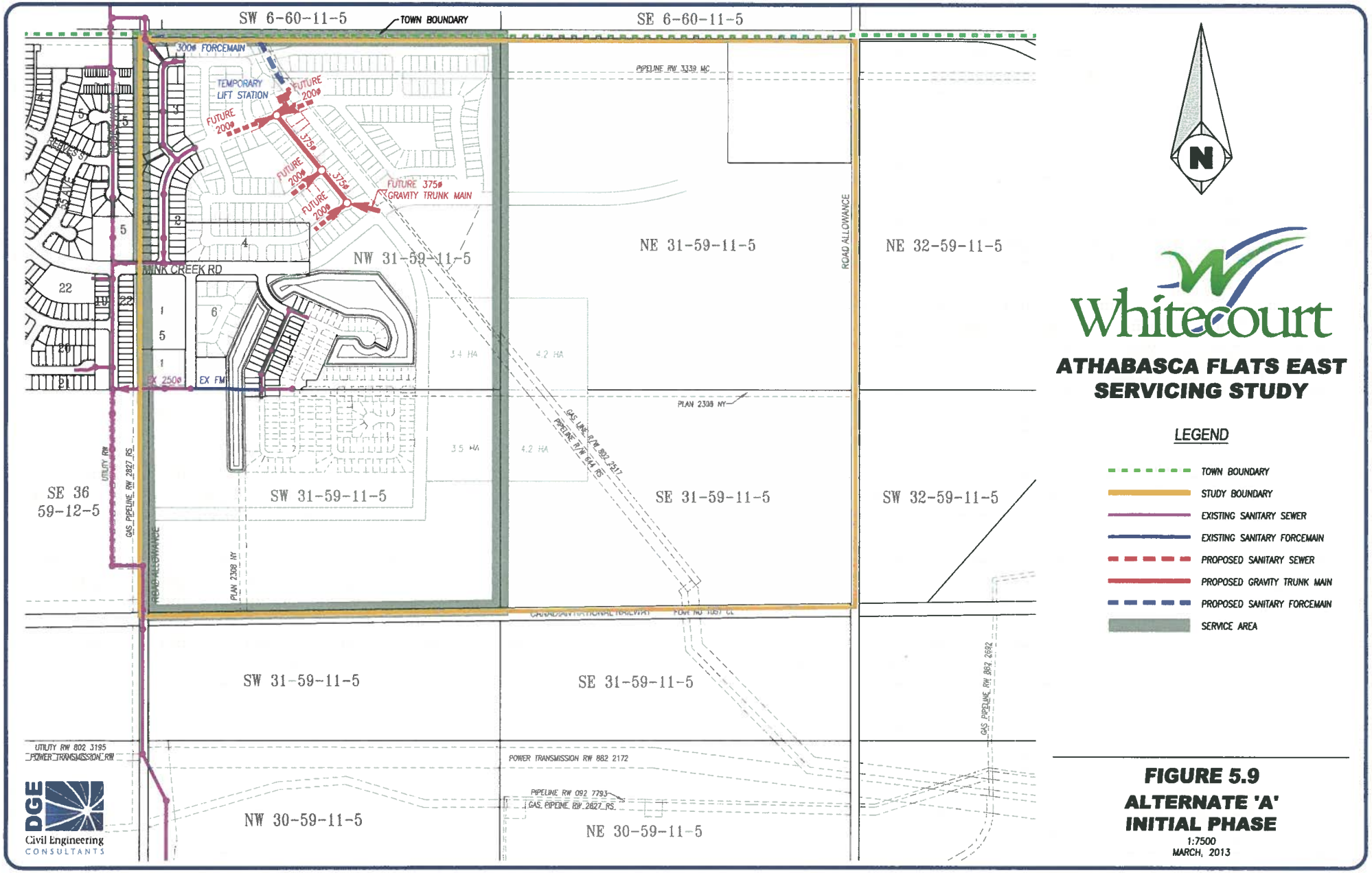
5.7.2.4.1 Alternative 'A' Initial Phase

As presented in Table 5.5 - Alternative 'A' - Initial Phase Costing, a temporary lift station, the ultimate design forcemain and 300 m of 375 gravity trunk main would be installed, individual developers would install the 200 mm diameter collection mains as required by their development as shown on Figure 5.9 - Alternate A - Initial Phase.

This approach increases the overall cost of sanitary servicing the area by $187,500 from $2,469,625 to $2,657,125, and increases the overall per Hectare cost by $1,626 from $35,589 to $37,215. However development can be commenced with a sanitary sewer servicing cost of only $542,800 compared to $2,469,625 if the temporary lift station option is utilized.

Table 5.5 - Alternative 'A' Initial Phase

Item	*Description*	*Unit*	*Quantity*	*Unit Price*	*Total*
Initial Phase Construction					
1	Temporary Lift Station	LS	1	250,000	$250,000
2	300 mm Dia Forcemain	m	440	300	$132,000
3	Gravity Trunk Main				
	- 375 mm Dia	m	300	300	$90,000
4	Engineering & Contingency (15%)	%	1	15%	$70,800
	Total First Phase				$542,800
Final Phase Construction					
5	Lift Station 23 m3	LS	1	1,900,000	$1,900,000
6	Gravity Trunk Main				
	- 375 mm Dia	m	85	300	$25,500
7	Engineering & Contingency (15%)	%	1	15%	$288,825
8	Salvage Value of Temp Lift Station	LS	1	-100,000	-$100,000
	Total Final Phase Construction				$2,114,325
Total All Phases					***$2,657,125***
	Cost per Ha				$37,215


SW 6-60-11-5
TOWN BOUNDARY
SE 6-60-11-5
300ø FORCEMAIN
TEMPORARY LIFT STATION
FUTURE 200ø
FUTURE 375ø GRAVITY TRUNK MAIN
PIPELINE RW 3339 MC
NW 31-59-11-5
NE 31-59-11-5
NE 32-59-11-5
ROAD ALLOWANCE
LINK CREEK RD
EX 250ø
EX FM
PLAN 2308 NY
SE 36 59-12-5
SW 31-59-11-5
SE 31-59-11-5
SW 32-59-11-5
GAS PIPELINE RW 2827 RS
UTILITY RW
PLAN 2308 NY
SW 31-59-11-5
SE 31-59-11-5
GAS PIPELINE RW 882 2692
UTILITY RW 802 3195
POWER TRANSMISSION RW
POWER TRANSMISSION RW 882 2172
PIPELINE RW 092 7793
GAS PIPELINE RW 2827 RS
NW 30-59-11-5
NE 30-59-11-5
N
Whitecourt
ATHABASCA FLATS EAST SERVICING STUDY
LEGEND
TOWN BOUNDARY
STUDY BOUNDARY
EXISTING SANITARY SEWER
EXISTING SANITARY FORCEMAIN
PROPOSED SANITARY SEWER
PROPOSED GRAVITY TRUNK MAIN
PROPOSED SANITARY FORCEMAIN
SERVICE AREA
DGE
Civil Engineering
CONSULTANTS
FIGURE 5.9
ALTERNATE 'A'
INITIAL PHASE
1:7500
MARCH, 2013

5.7.2.4.2 Alternative 'B' Initial Phase

This Alternative proposes to service the area north of the railway tracks in Section 31-59-11-5 with a single lift station. Option 1 locates the lift station in The NW 31-59-11-5 in the area south east of Mink Creek Road and School Road. Option 2 proposes a lift station in the north east portion of the NE 31-59-11-5.

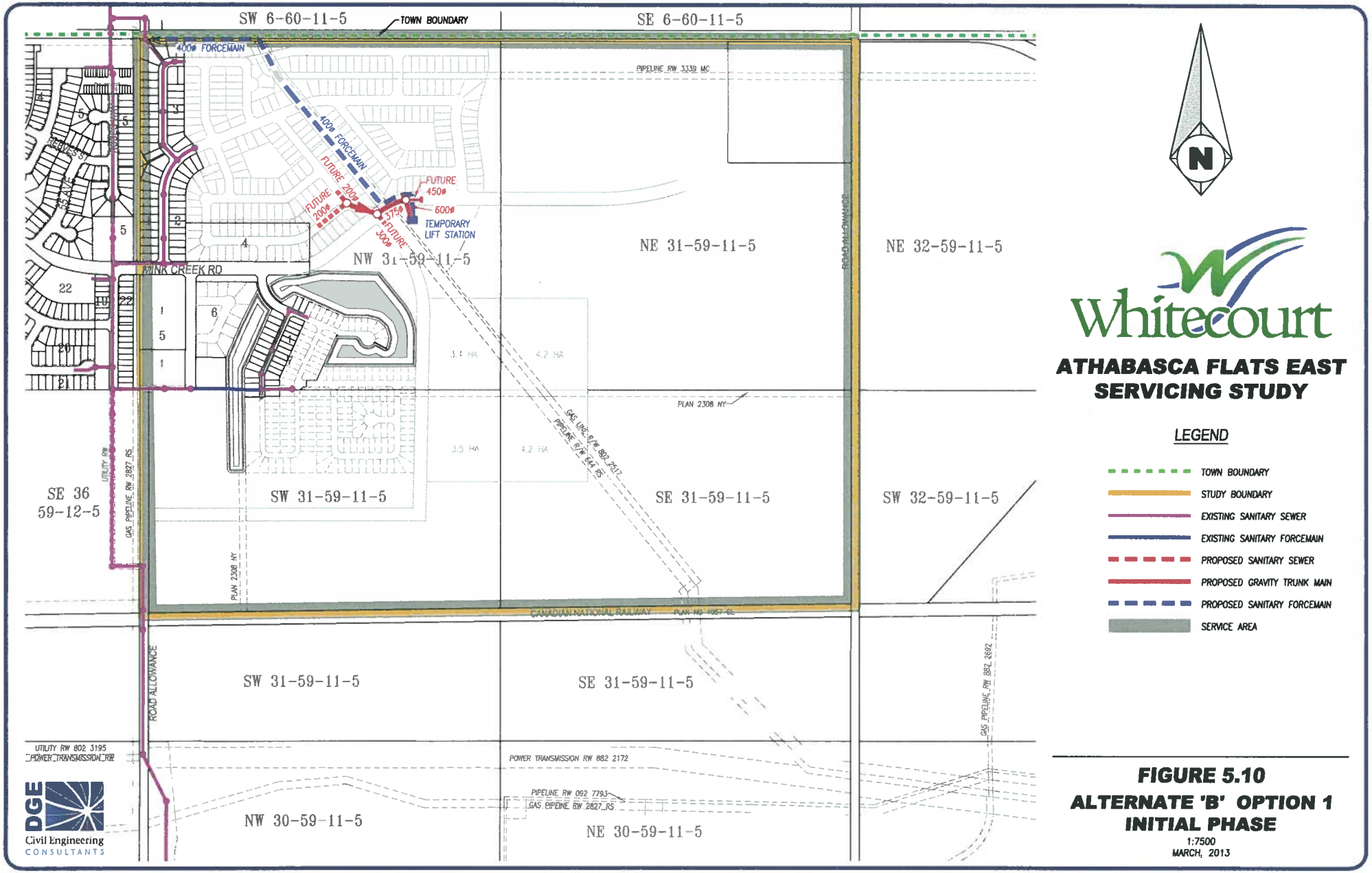
5.7.2.4.2.1 Option 1 Initial Phase

As presented in Table 5.6 - Alternative 'B' - Option 1 Initial Phase Costing, a temporary lift station, the ultimate design forcemain, 165 m of 375 mm diameter and 40 m of 525 mm diameter gravity trunk main would be installed, individual developers would install the 200 mm diameter collection mains as required by their development as shown on Figure 5.10 - Alternate 'B' - Option 1 Initial Phase.

This approach increases the overall cost of sanitary servicing the area by $302,500 from $5,625,225 to $5,927,725, and increases the overall per Hectare cost by $1,739 from $32,329 to $34,067. However development can be commenced with a sanitary sewer servicing cost of $821,963 compared to $5,625,225 if the temporary lift station option is utilized.

Table 5.6 - Alternative 'B' - Option 1 Initial Phase Costing

Item	*Description*	*Unit*	*Quantity*	*Unit Price*	*Total*
Initial Phase Construction					
1	Temporary Lift Station	LS	1	350,000	$350,000
2	400 mm Dia Forcemain	m	800	350	$280,000
3	Gravity Trunk Mains				
	- 375 mm Dia	m	165	350	$57,750
	- 525 mm Dia	m	40	675	$27,000
4	Engineering & Contingency (15%)	%	1	15%	$107,213
	Total Initial Phase Construction				$821,963
Final Phase Construction					
5	Lift Station 50 m3	LS	1	4,250,000	$4,250,000
6	Gravity Trunk Main				
	375 mm Dia	m	135	350	$47,250
	450 mm Dia	m	390	450	$175,500
	525 mm Dia	m	80	675	$54,000
7	Engineering & Contingency (15%)	%	1	15%	$679,013
8	Salvage Value of Temp Lift Station	LS	1	-100,000	-$100,000
	Total Final Phase Construction				$5,105,763
Total All Phases					***$5,927,725***
	Cost per Ha				$34,067


SW 6-60-11-5
TOWN BOUNDARY
SE 6-60-11-5
400ø FORCEMAIN
PIPELINE RW 3339 MC
400ø FORCEMAIN
FUTURE 200ø
FUTURE 200ø
FUTURE 450ø
600ø
375ø
FUTURE 300ø
TEMPORARY LIFT STATION
NW 31-59-11-5
NE 31-59-11-5
NE 32-59-11-5
ROAD ALLOWANCE
LINK CREEK RD
3.4 HA
4.2 HA
PLAN 2308 NY
3.5 HA
4.2 HA
GAS LINE R/W 882 2517
PIPELINE R/W 864 RS
SE 36
59-12-5
UTILITY RW
GAS PIPELINE RW 2827 RS
SW 31-59-11-5
SE 31-59-11-5
SW 32-59-11-5
PLAN 2308 NY
CANADIAN NATIONAL RAILWAY
PLAN NO 1057 GL
ROAD ALLOWANCE
SW 31-59-11-5
SE 31-59-11-5
GAS PIPELINE RW 882 2692
UTILITY RW 802 3195
POWER TRANSMISSION RW
POWER TRANSMISSION RW 882 2172
PIPELINE RW 092 7793
GAS PIPELINE RW 2827 RS
NW 30-59-11-5
NE 30-59-11-5
N
Whitecourt
ATHABASCA FLATS EAST SERVICING STUDY
LEGEND
TOWN BOUNDARY
STUDY BOUNDARY
EXISTING SANITARY SEWER
EXISTING SANITARY FORCEMAIN
PROPOSED SANITARY SEWER
PROPOSED GRAVITY TRUNK MAIN
PROPOSED SANITARY FORCEMAIN
SERVICE AREA
DGE
Civil Engineering
CONSULTANTS
FIGURE 5.10
ALTERNATE 'B' OPTION 1
INITIAL PHASE
1:7500
MARCH, 2013

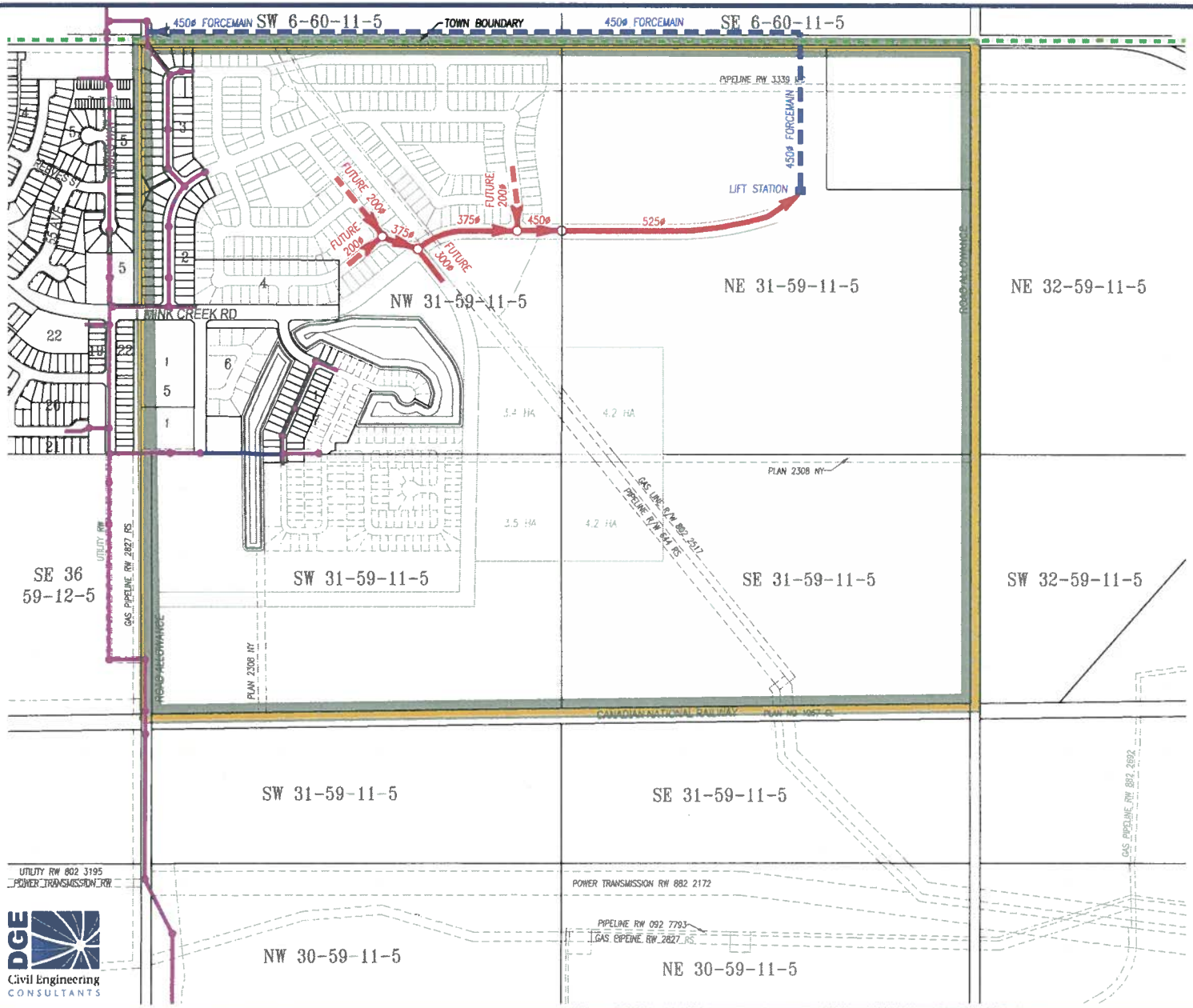
5.7.2.4.2.2 Option 2 Initial Phase

As presented in Table 5.7 - Alternative 'B' - Option 2 Initial Phase Costing, a temporary lift station, the ultimate design forcemain, 165 m of 375 mm diameter, 90 m of 450 mm diameter and 470 m of 525 mm diameter gravity trunk main would be installed, individual developers would install the 200 mm diameter collection mains as required by their development as shown on Figure 5.11 - Alternate 'B' - Option 2 Initial Phase.

This approach increases the overall cost of sanitary servicing the area by $360,000 from $5,849,763 to $6,209,763, and increases the overall per Hectare cost by $2,069 from $33,619 to $35,688. However development can be commenced with a sanitary sewer servicing cost of $1,687,625 compared to $5,849,763 if the temporary lift station option is utilized.

Table 5.7 - Alternate 'B' - Option 2 - Initial Phase Costing

Item	*Description*	*Unit*	*Quantity*	*Unit Price*	*Total*
Initial Phase Construction					
1	Temporary Lift Station	LS	1	400,000	$400,000
2	450 mm Dia Forcemain	m	1600	425	$680,000
3	Gravity Trunk Mains				
	- 375 mm Dia	m	165	350	$57,750
	- 450 mm Dia	m	90	400	$36,000
	- 525 mm Dia	m	470	625	$293,750
4	Engineering & Contingency (15%)	%	1	15%	$220,125
	Total				$1,687,625
Final Phase Construction					
5	Lift Station 50 m3	LS	1	4,000,000	$4,000,000
6	Gravity Trunk Main				
	375 mm Dia	m	55	350	$19,250
7	Engineering & Contingency (15%)	%	1	15%	$602,888
8	Salvage Value of Temp Lift Station	LS	1	-100,000	-$100,000
	Total				$4,522,138
Total All Phases					***$6,209,763***
	Cost per Ha				$35,688



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Whitecourt

ATHABASCA FLATS EAST SERVICING STUDY

LEGEND

- TOWN BOUNDARY
- STUDY BOUNDARY
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- PROPOSED SANITARY SEWER
- PROPOSED GRAVITY TRUNK MAIN
- PROPOSED SANITARY FORCEMAIN
- SERVICE AREA

FIGURE 5.11
ALTERNATE 'B' OPTION 2
INITIAL PHASE

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MARCH, 2013

5.7.2.4.3 Alternative 'C' Initial Phase

Phasing of Alternate 'C' is expected to be incorporated independently for the NW-31-59-11-5 and the NE 31-59-11-5. It is expected development will occur in the near future in the NW but at this point timing for development in the NE is unknown.

Initial phasing of the NW is similar to Alternative 'A', excepting a portion of the forcemain has been replaced with gravity main. However based on expected construction requirements the installation of a large diameter gravity main is expected to be more costly than the duplication of smaller diameter forcemains. The option of installing dual forcemains as opposed to a gravity main should be explored during the detail design.

Initial phasing options for the NE will be set by the timing of the development. Potentially the temporary lift station form the NE could be relocated, however for the purposes of this study it is assumed a new temporary lift station will be required.

Table 5.8 - Alternate 'C' NW 31-59-11-5 Initial Phase Costing

Item	*Description*	*Unit*	*Quantity*	*Unit Price*	*Total*
Initial Phase Construction - NW 31-59-11-5					
1	Temporary Lift Station	LS	1	250,000	$250,000
2	300 mm Dia Forcemain	m	160	300	$48,000
3	Gravity Trunk Main				
	- 375 mm Dia	m	300	300	$90,000
	- 600 mm Dia	m	280	700	$196,000
4	Engineering & Contingency (15%)				$87,600
	Total NW 31-59-11-5				$671,600
Final Phase Construction NW 31-59-11-5					
5	Lift Station 23 m3	LS	1	1,900,000	$1,900,000
6	Gravity Trunk Main				
	- 375 mm Dia	m	85	300	$25,500
7	Engineering & Contingency (15%)				$288,825
8	Salvage Value Temporaary Lift Station	LS	1	-100,000	-$100,000
	Total NW 31-59-11-5				$2,114,325
Total All Phases NW 31-59-11-5					***$2,785,925***
Cost per Ha NW 31-59-11-5					$37,597

Table 5.9 - Alternate 'C' NE 31-59-11-5 Initial Phase Costing

Item	*Description*	*Unit*	*Quantity*	*Unit Price*	*Total*
Initial Phase Construction - NE 31-59-11-5					
1	Temporary Lift Station	LS	1	330,000	$330,000
2	350 mm Dia Forcemain	m	1320	350	$462,000
3	Gravity Trunk Main				
	- 375 mm Dia	m	100	350	$35,000
4	Engineering & Contingency (15%)	%	1	15%	$124,050
	Total NE 31-59-11-5				$951,050
Final Phase Construction NE 31-59-11-5					
5	Lift Station 27 m3	LS	1	2,500,000	$2,500,000
6	Gravity Trunk Main				
	- 375 mm Dia	m	120	350	$42,000
	- 450 mm Dia	m	90	400	$36,000
7	Engineering & Contingency (15%)	%	1	15%	$386,700
8	Salvage Value Temp Lift Station	LS	1	-100,000	-$100,000
	Total NE 31-59-11-5				$2,864,700
Total All Phases NE 31-59-11-5					***$3,815,750***
Cost per Ha NE 31-59-11-5					$38,196

5.7.2.5 Cost Summary

Table 5.10 summarizes the costs of each of the sanitary sewer servicing alternatives. Alternative 'A', Phased offers the lowest initial investment required but is also one of the highest cost per Hectare options. Alternate 'B' Option 1 has the lowest per Hectare cost, but has the highest initial investment required. Phasing adds between $187,500 for Alternative 'A' to $360,000 for Alternative 'B' Option 2 to the total cost of the servicing option. The phasing option for Alternative 'C' adds $128,800 to the initial investment required to service the NW 31-59-11-5 due to the extra cost of installing a large diameter gravity main.

Table 5.10 - Sanitary Sewer Servicing Cost Summary

Description	*Total Cost*	*Cost per Ha*	*Initial Investment Required*
Alternative 'A'			
- Phased	$2,657,125	$37,215	$542,800
- Not Phased	$2,469,625	$34,589	$2,469,625
Alternative 'B' Option 1			
- Phased	$5,927,725	$34,067	$821,963
- Not Phased	$5,625,225	$32,329	$5,625,225
Alternative 'B' Option 2			
- Phased	$6,209,763	$35,688	$1,687,625
- Not Phased	$5,849,763	$33,619	$5,849,763
Alternative 'C'			
- Phased NW 31-59-11-5	$2,785,925	$37,597	$671,600
- Phased NE 31-59-11-5	$3,815,750	$38,196	$951,050
- Not Phased	$6,134,675	$35,257	$6,134,675

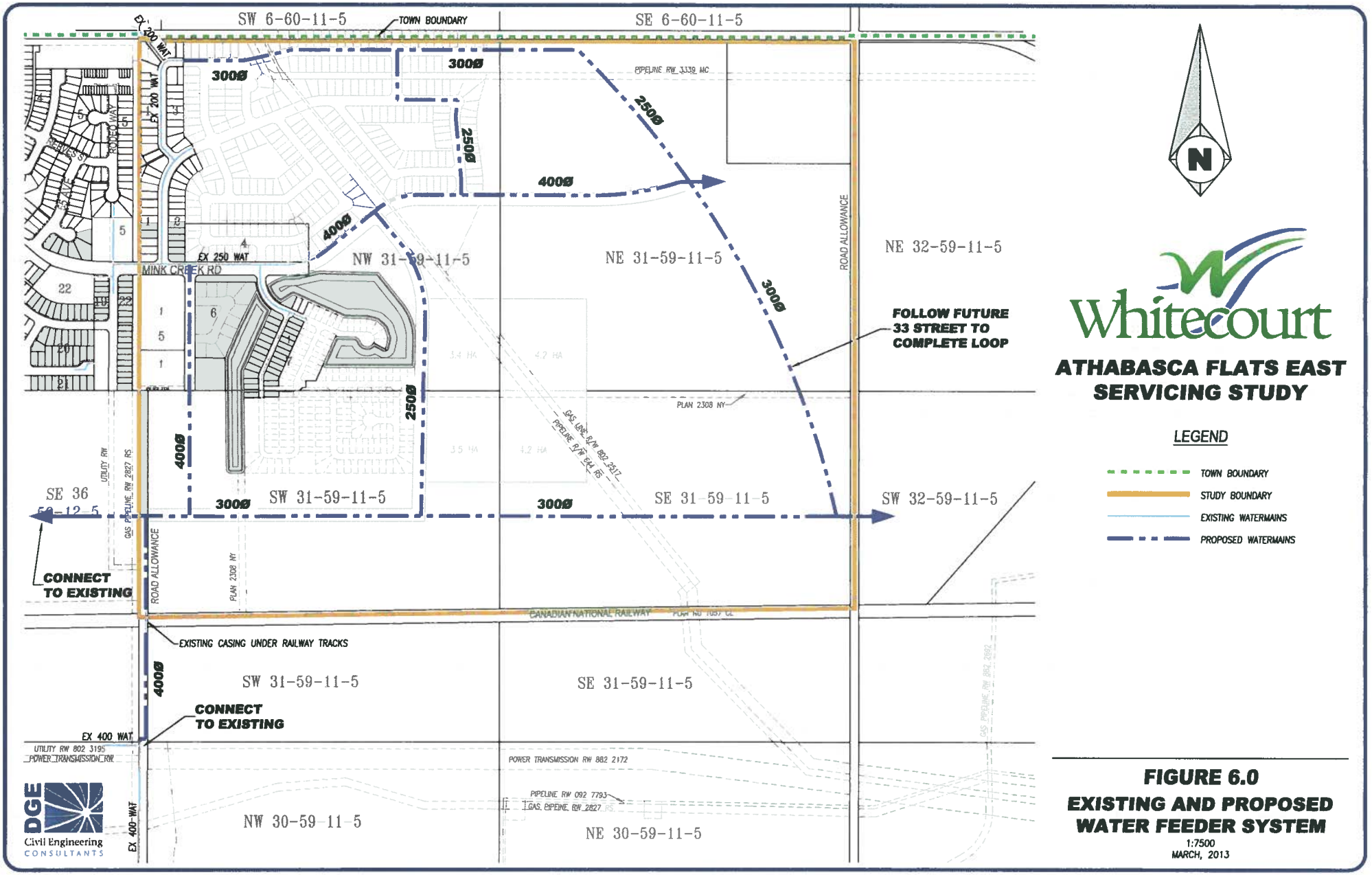
6.0 WATER DISTRIBUTION

Chapter 4 - Water Distribution and Storage of the Town of Whitecourt Municipal Servicing Study, January 1992 provides recommendations for the orderly development of the water distribution system. Plan 2 of the 1992 Study provides recommended water trunk main location and sizing this information is presented on Figure 6 - Water Distribution System in this report.

Plan 2 shows a 300 mm diameter trunk main running parallel to Flats road in the north of the study area with a connection to a 200 mm main in the existing development to the west in the NE 36-5-11-5. A 200 mm stub has been provided from River Stone Estates through Lot 28 PUL for future connection.

A 400 mm diameter main is recommended along the extension of Mink Creek Road. To date a continuation of the 250mm dia main has been extended along Mink Creek Road.

A 400mm diameter main is recommended along the future 52 Avenue along with north south interconnections varying between 250 and 400 mm diameter.


SW 6-60-11-5
TOWN BOUNDARY
SE 6-60-11-5
EX 200 WAT
300Ø
250Ø
400Ø
PIPELINE RW 3339 MC
NE 32-59-11-5
ROAD ALLOWANCE
FOLLOW FUTURE 33 STREET TO COMPLETE LOOP
EX 250 WAT
MINK CREEK RD
NW 31-59-11-5
NE 31-59-11-5
PLAN 2308 NY
GAS PIPELINE RW 802 2317
SE 36
SW 31-59-11-5
SE 31-59-11-5
SW 32-59-11-5
UTILITY RW
GAS PIPELINE RW 2827 RS
CONNECT TO EXISTING
EXISTING CASING UNDER RAILWAY TRACKS
CANADIAN NATIONAL RAILWAY
EX 400 WAT
UTILITY RW 802 3195
POWER TRANSMISSION RW
POWER TRANSMISSION RW 882 2172
PIPELINE RW 092 7793
GAS PIPELINE RW 2827 RS
NW 30-59-11-5
NE 30-59-11-5
EX 400 WAT
N
Whitecourt
ATHABASCA FLATS EAST SERVICING STUDY
LEGEND
TOWN BOUNDARY
STUDY BOUNDARY
EXISTING WATERMAINS
PROPOSED WATERMAINS
DGE
Civil Engineering
CONSULTANTS
FIGURE 6.0
EXISTING AND PROPOSED WATER FEEDER SYSTEM
1:7500
MARCH, 2013

DGE Civil Engineering CONSULTANTS

Athabasca Flats Servicing Study

March 15, 2013

CORPORATE AUTHORIZATION

This document entitled *"Athabasca Flats Servicing Study"* was prepared by DGE Civil Engineering Consultants Inc. for the account of The Town of Whitecourt. The material contained within this report reflects DGE's best judgement with the information made available at the time of preparation. DGE Civil Engineering Consultants Inc. accepts no responsibility for damages incurred by a third party who makes use or relies on information contained within this report.

Martin Gillett, P.Eng.

Principal