

ARBOUR RIDGE ESTATES

OUTLINE PLAN



Environmental
Agricultural
Structural
Civil
Municipal

PREPARED FOR:
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1.0 Introduction

1.1 Purpose

The purpose of the Arbour Ridge Outline Plan is to supplement information provided in the Area Structure Plan that was approved by City Council under bylaw 5438. This report provides additional details with respect to the conceptual land use plan and infrastructure servicing design to support the management of urban development of approximately 53.4 hectares of land located south of Six Mile Coulee and east of Mayor Magrath Drive (refer to Figure 1).

The Outline Plan provides additional information to the policy framework that guides the development of Arbour Ridge and specifically addresses:

- Land use by type, size and location
- Transportation network
- Proposed underground service designs
- General location of amenities
- Sequence of development
- Development setbacks from Six Mile Coulee
- Other development issues specific to the area

This Outline Plan establishes the design context for future design and development decisions for the subdivision plan, construction of urban services, and development permits for future individual properties.

This plan has been prepared using the Area Structure Plan (ASP) as a foundation. The additional detail provided in this document was derived using the ASP as a base and the gated outline plan process to ensure consistency with both ASP and City rules and regulations.

1.2 Location and Area

The lands subject to this Outline Plan are situated in southeast Lethbridge. The Outline Plan is linear in shape, bounded on the north and east by Six Mile Coulee; to the west is Mayor Magrath Drive and the south boundary is defined by the City municipal boundary as shown in Figures 1 and 2 (Appendix A).

The majority of the lands are in native pasture. Five residences are located within the Outline Plan boundaries.

Six Mile Coulee is a steep-sided glacial melt water channel that physically defines the northern and eastern limits of the development area. The coulee has a depth of 29 metres at the western end of the area and becomes shallow at the south eastern edge of the area, rising to within 10 metres of prairie level. Six Mile Coulee is used as a drain by the St. Mary's River Irrigation District and during irrigation season a stream flows through the coulee. The coulee also receives overland storm water flows from the surrounding agricultural lands that are within the drainage basin for the coulee.

The Outline Plan area comprises approximately 53.4 developable hectares of land. Developable hectares is defined as the lands located above top-of-bank setback which can be used for urban purposes, including residential lots, parks, storm ponds, roadways, etc.

1.3 Land Ownership

Current land ownership for the Outline Plan area is summarized in Figure 2 and in tabular form in Table 1. There are two major landowners in the plan area. Triangle Three Developments owns approximately 26.5 hectares of developable hectares of land while 25.2 developable hectares are owned by V. M. Jubber Professional Corp. Two smaller parcels of land under separate ownership are also located in the plan area. Their total approximate developable area equals 1.7 hectares.

The developable land is modified from the values reflected in the Area Structure Plan due to a revised setback line and a storm pond configuration revision (refer to Section 2.3).

Table 1: Land Ownership

Current Owner	Title Area (HA)	Above Top-of Bank Setback
Triangle Three	41	26.5
Jubber	43	25.2
Adams	1	1
Mattu	0.7	0.7
Total	83.9	53.4

* setback line estimated using topographic map

1.4 Background

The lands subject to this Outline Plan were annexed into the City of Lethbridge in January 1984 as part of a comprehensive annexation proposal. One of the objectives of the annexation proposal was to place Six Mile Coulee within the

City limits. The annexation boundary followed land ownership boundaries rather than the topographic boundary of the coulee. Therefore, a narrow sliver of prairie level lands on the south side of Six Mile Coulee were also annexed into the City along with the coulee.

Initial planning policy of the City suggested that the prairie level lands on the south side of the coulee would not be urbanized because of their small size and remote location. Further, it was thought that urban utility services would be uneconomical. However, in the mid to late 1990's, it was shown that there was a niche market for estate sized lots on the edge of the City. The narrow linear lands on the south side coulee were adaptable for this low density land use. It was also shown that urban utility services could be provided economically as a result of recent growth and servicing on the north side of the coulee. Consequently, low density residential development began on the south side of the coulee, west of Mayor Magrath Drive.

In June 2003, City Council adopted the Southeast Lethbridge Urbanization Plan (SELUP). This plan provides a conceptual framework for the preparation of area structure plans and eventual urbanization of the southeast region of the City. In the SELUP document, it is suggested that the area subject to this Outline Plan be used for country estate purposes. Country estates are defined in SELUP as large lot single family homes on sites between 0.2 and 0.4 ha in size. In July 2005, City Council reviewed the size requirements associated with country estate development and reduced the minimum requirements to 0.135 hectares (0.33 acres) for individual lots.

In April of 2007 the Area Structure Plan was approved by City Council under bylaw 5438 (refer to Appendix B). This plan will serve as a foundation for completing the Outline Plan and subdivision design.

1.5 Public Hearing

As part of the ASP approval process, a public hearing was held on April 16, 2007 in the City of Lethbridge Council chambers. Questions were presented and addressed. All presented issues were resolved and the ASP was ultimately approved.

2.0 Situation Analysis

2.1 Site Overview

As shown in Figure 2 (Site and Ownership Map), the site is linear in shape along the south and west sides of Six Mile Coulee. The Outline Plan area is relatively level with a gentle slope towards the coulee. The highest point of land is 911.0 m, located on the south boundary of the site, mid-point between the eastern and western limits of the site. In general the deviation in elevation does not exceed 1.5 meters.

Views of the coulee are attained nearest the coulee lip and the Rocky Mountains can be observed to the southwest. Land along the north side of Six Mile Coulee is currently used for country residential purposes; however, plans are in place to allow urban development as part of the Southgate neighbourhood. To the west, is Mayor Magrath Drive, beyond which is a country estate subdivision similar to the proposal contained in this Outline Plan. The City limit forms the southern boundary, beyond which is agricultural land located within the County of Lethbridge.

2.2 Physical Environment

The Outline Plan area topography, geology, soils and drainage is suitable for urban development. The bedrock underlying the Outline Plan area is part of the Belly River formation and is between 100 m and 120 m thick, and consists mainly of deposits of light coloured shale and sandstone. No outcropping of the bedrock occurs adjacent to the property in Six Mile Coulee as the bedrock is overlain by approximately 100 m of glacial till from 3 previous ice sheets. The till is overlain by localized lacustrine deposits.

2.3 Slope Stability

Typically, coulee slopes in the Lethbridge area are susceptible to slope instability, especially as a result of the introduction of urban water. The limit of development adjacent to the coulee is established through a site specific geotechnical study (refer to Appendix C) and establishment of a development setback line in accordance with the River Valley Area Redevelopment Plan Bylaw (RVARP). A site specific geotechnical study was conducted for this property to evaluate slope stability (refer to Appendix C). The study was conducted by EBA Engineering and Consultants Ltd. The purpose of this study was to determine an acceptable development setback line adjacent to Six Mile Coulee. The scope of the study included two soil borings to determine the elevation of the Lenzie silt layer beneath the subject property.

The EBA report indicated that the Lenzie silt layer was encountered at an average elevation of 890 m (EBA, 2009). Recommendations from that report also indicated that a 4:1 slope from the Lenzie silt layer be used to determine the development setback line adjacent 6 mile coulee where the elevation of Lenzie silt layer was above the bottom of the Coulee.

It was also determine that in several locations the bottom of the coulee was located above the level of the Lenzie silts. In these locations it was recommended that the development setback line be located either at a 3:1 slope from the bottom of the Coulee or 6 m from the top of bank (as defined in the RVARP). The development setback line shown in Figures included in the Outline Plan, reflect the recommendations made by the EBA report and subsequent setback distance requirement letter (refer to Appendix D). In addition, EBA evaluated the Chuck Adams land for setback and provided a letter confirming the location of the said setback.

Consequently, a portion of prairie level land immediately adjacent to the coulee between the top-of-bank and development setback line is deemed to be unsuitable for urban development. All lands below the top-of-bank development setback line will be designated Environmental Reserve at the time of subdivision.

2.4 Existing Land Use

As shown on Figure 2 (Site and Ownership Map), several houses are located within the plan area. In general, most of the land is used as dryland pasture. A small dam has been created across a finger of the coulee in the southwest portion of the site and during wet weather some ponding of water occurs. During subdivision design, the dam will be retained to provide the base for a walking path as per Area Structure Plan. In addition, a Phase I Site Assessment has been completed for the land (refer to Appendix H).

2.5 Historical Resources

A historical resources overview of the site was conducted by Arrow Archaeology Ltd. (refer to Appendix D). The overview was submitted to Alberta Community Development for review and it was concluded that a historical resources impact assessment is not required.

3.0 Municipal Objectives and Policy

3.1 Municipal Development Plan

The Municipal Development Plan is a statutory plan which outlines the long term development vision for the City of Lethbridge. The Municipal

Development Plan does not contain any policy that is specific to the Outline Plan area. There are a number of general policies regarding housing, environment, river valley trail system, parks and open space that have been reflected in the ASP and Outline plan.

Housing	Ensure that the community's wide range of housing needs are met.
Environment	Adhere to the top-of-bank setback line policies outlined in the River Valley Area Redevelopment Plan.
River Valley Trail System	Continuous trails along the top of the river valley should be a major feature of new residential developments overlooking the valley.
Parks and Open Space	Locate parks and open spaces in new residential areas to maximize use, accessibility and aesthetic appeal while reducing overall land requirements.

3.2 Southeast Lethbridge Urbanization Plan

The Urbanization Plan is not a statutory plan, but was adopted by City Council through resolution. The purpose of SELUP is to provide a policy framework and implementation strategy to facilitate and coordinate the orderly development of southeast Lethbridge. SELUP provides direction for the preparation of ASPs in this area. Specific planning goals in SELUP which apply to this Outline Plan include:

Land Use	Harmonize new development with existing land uses; Provide compatibility between various land uses; Accommodate an orderly transition from rural to urban uses; Protect private property from natural hazards.
Transportation	Maintain current high service levels for automobile mobility;

Storm Water Management	Improve quality of storm water before it is released into the river; Regard and promote storm water as a sustainable resource; Develop innovative ways to use storm water for recreation; Provide public safety and property protection from storm water flooding.
Natural Areas	Recognize the biophysical uniqueness of Six Mile Coulee and ensure that the health and future of the natural systems of the coulee are maintained and enhanced; Integrate wildlife into the urban environment.
Neighbourhood Character	Design complete neighbourhoods with themes that complement community values; Create neighbourhoods that the residents can relate to; Encourage a safe and pleasant walking environment in residential areas; Design neighbourhoods that encourage social interaction; Ensure appropriate inclusion of and connections to natural areas.

Figure 3 contains the Development Concept map from SELUP and demonstrates the land use context in which the ASP has been prepared.

3.3 Land Use Bylaw

A portion of the Outline Plan area is classified as U-R (Urban Reserve). The purpose of this district is to control subdivision and development until the required municipal services are available, Area Structure Plans are approved, and more appropriate alternative land use districts are applied.

Two Direct Control districts also apply to portions of the ASP area. Direct Control Bylaw 4583 applies to the western portion of the site. The purpose of this bylaw was to allow the creation of an additional lot to accommodate a single detached dwelling.

Direct Control Bylaw 4727 applies to the central portion of the ASP area. The purpose of Bylaw 4727 was to allow for the subdivision of the original quarter-section and the creation of a number of residential acreages on the north side

of Six Mile Coulee. This bylaw does not allow for further subdivision on the south side of the coulee.

Upon adoption of the Outline Plan, an application will be made to amend the Land Use Bylaw in a manner that will facilitate the intended urban development described in the ASP and Outline Plan. Under this process the U-R designation and two Direct Control Bylaws will be repealed.

4.0 Land Use Concept

4.1 Development Objectives

The overall goal of the Arbour Ridge Outline Plan is to build upon the framework established in the ASP and create a well designed, attractive and liveable residential area. The key objectives of this Outline Plan are:

- Provide an additional detail and design to the framework established in the ASP;
- Provide a additional design detail to further demonstrate the viability of this development and consistency with Lethbridge planning and design requirements;
- Ensure that development is setback sufficiently from the edge of Six Mile Coulee to protect development;
- Provide for a transportation concept with sufficient flexibility to accommodate the future alignment of 43rd Street South;
- Respect the long term agricultural intentions of adjacent landowners in the County of Lethbridge.

4.2 Land Use Concept Overview

The general land use concept is depicted on Figure 4 (Land Use Plan). The purpose of the land use concept is to show the general relationship of proposed land uses. It is intended to guide future growth and development within the boundaries of the Outline Plan area. Therefore the location and size of the land uses shown on Figure 4 are conceptual and general.

The Arbour Ridge area, when complete, will be comprised primarily of single family homes on large lots. The isolated location of the development and relatively small size does not warrant the provision of land uses normally found in other residential areas in Lethbridge. It has been concluded that local commercial, religious assembly and school sites, for example are not warranted in this area. Ancillary residential land uses will be limited to small park development which serves the local area. Where possible, storm water storage facilities may be located adjacent to park areas and designed for passive amenity purposes.

The overall gross developable area is 53.4 hectares. The net area available for residential lots will be 39.2 hectares. Based upon the minimum lot size of 0.135 hectares (0.33 acres) the maximum number of dwelling units is expected to be 269 (refer to Tables 2 & 3).

Table 2: Land Use Predictions

	Hectares	Percent
Gross Area		
Environmental Reserve	30.5	36.4
Gross Developable Area	53.4	63.6
Total	83.9	100.0
Gross Developable Area		
Roads & Walkways	8.6	16.1
Municipal Reserve (Parks)	2.5	4.7
Utilities/Storm Ponds	3.1	5.8
Net Developable Area	39.2	73.4
Total	53.4	100.0
Net Developable Area		
Low Density Residential	39.2	100.0
Total	39.2	100.00

Table 3: Population Projections

	Dwelling Units	Units per Hectare	Persons per Unit	Total Population	Persons per Hectare
Gross Developable Area 53.4 ha	265	5.0	3.0	795	14.9
Net Developable Area 39.2 ha	265	6.8	3.0	795	20.3

As shown in Table 2, currently 4.7% of the development has been set aside for municipal reserve or park. The municipal reserve dedication will be a combination of land and cash in lieu to achieve the required 10% deduction.

5.0 Transportation

A Traffic Impact Assessment was completed for the entire development by Bunt and Associates and was included in the Area Structure Plan. Although the layout has changed slightly from that shown in the ASP, the overall traffic patterns have not changed. As a result, the plan is still valid for the purpose of this document (refer to Appendix E).

5.1 Road Network

A single collector roadway will traverse the area from the northwest to the southeast. The collector roadway will intersect with Mayor Magrath Drive (Highway 5) in the northwest. Until it is decided if permanent access to 43rd Street will be available, designs will ensure adequate access to and from Highway 5 and assume a single access point. An emergency access will be provided at the south end of the development to 60th Ave. (refer to Figure 5)

5.2 Highway 5 Interface

The intersection of Mayor Magrath Drive and the Arbour Ridge collector roadway occurs immediately at the southern City limits. Consequently, Mayor Magrath Drive transitions into Highway 5 at this intersection. Highway 5 is a Provincial highway within the County of Lethbridge.

5.3 Traffic Impact Assessment

A Traffic Impact Assessment was performed for the subdivision by Bunt & Associates (refer to Appendix E). The purpose of this analysis was to evaluate the effect of utilizing one access point to Highway 5.

The following are the conclusions and recommendations listed in the TIA:

1. Access from a single point is feasible;
2. The TIA indicated that the approximate peak daily flow will occur during PM peak hour and result in approximately 1 vehicle per dwelling;
3. A speed reduction to 60 kph on Highway 5 past the proposed entrance is recommended;
4. A type IV access has been proposed for this development. As part of the access design the super elevation in the curve should be removed for the length of the access modifications;
5. A mountable median will be provided in the primary access road to the development up to the first main intersection.

A copy of the Traffic Impact Assessment and the Area Structure Plan, have been submitted to Alberta Transportation for review. Comments from Alberta transportation are attached.

5.4 Transit Routes

The roads within the development have been designed to accommodate recreational vehicles and buses. As such the transit routes can be designed to

accommodate City and development needs. Provisions shall be included in the design to allow for transit bus turn arounds at the south end of the plan area.

6.0 Municipal Infrastructure

6.1 Sanitary Sewer Collection System

Two new lift stations will be required to service this area (refer to Figure 6). The lift station located closest to Highway 5 will be sized to also service the developed City lands on the west side of Mayor Magrath Drive to the South Ridge and Sandstone developments. The lift station located on the Jubber property (Figure 6) will be designed to service only the Jubber property (service area S1-S3). The sanitary sewer will discharge in the Mayor Magrath trunk as per the Southeast Lethbridge Urbanization Plan. A connection from Southgate will also be considered depending upon the timing of construction. The City will specify the exact location of the connection.

An estimation of peak and average sewage flow was developed to ensure adequate capacity in that line. A preliminary layout of the sewer and lift station is shown in Figure 6. The sewage main will be designed to adequately service the needs of the future Jubber expansion (Phase 3, 4 and 5). The estimated sewage production volumes are shown in Table 4.

Table 4: Predicted Sewage Production

Area	Pop	PF	DWF l/d	WWF l/d	II l/d	Total m ³ /d	Total l/s
Triangle Three	426	4.01	683,136	213,000	63,900	960	11
Jubber	345	4.05	559,157	172,500	51,750	783	9
Total	771*	3.87	1,245,293	385,500	115,650	1,743	20

*Population figure taken from the ASP & varies slightly from the population shown in the Outline Plan. This table was confirmed by the City of Lethbridge.

As mentioned above the predicted peak wet sewage flow from Arbour Ridge is approximately 20 l/s sewer line sizing has been provided (refer to ASP). In addition, sewage flow from Sandstone and South Ridge is expected to be 20 l/sec (As per the City of Lethbridge).

Line sizing design has also been completed for the development itself. These lines have been designed using City of Lethbridge design criteria. Design Calculations are included in Appendix F. The development has been divided into 9 sewage flow areas. Service areas S1-S4 are located on the Jubber land and service areas S5-S9 are on the Triangle Three land. Flow was calculated from each area to size the main needed to service the referred to area. The design calculations use Manning's equation to calculate flow, depth and

velocity from each flow area. These calculations indicate that a 200 mm PVC sewer will adequately handle the design flows. As per City of Lethbridge design standards 200 mm sewage pipe has been utilized through the entire development. Preliminary sizing of sanitary sewer lines and connection points are shown in Figure 6 including key invert and manhole elevations at key locations. The actual elevations are conceptual only and will most likely change before the design is complete.

Sewage lift station # 1 will be designed to accommodate flow from the City of Lethbridge land (including the Southridge and Sandstone developments) and will not include flow from future development in the county.

The sanitary sewer flowing to lift station # 1 will include areas S4-S9. The areas serviced by lift station # 2 will include S1-S3. A forcemain will be provided to connect lift station # 2 to lift station # 1.

6.2 Water Supply and Distribution

Site water will be provided by an existing 250 mm main that is located on the west side of Highway 5. A preliminary layout of the water main is shown in Figure 7. The water distribution system has been designed to adequately service the needs of the future Jubber expansion as well (Phase 3, 4, and 5).

Twinning of the existing 250 mm water main along Highway 5 will be required to meet City of Lethbridge servicing standards for the proposed development.

Predicted water usage for this subdivision is estimated based on predicted population and average daily demand. Using an average peak daily demand of 700 l/d/cap (City of Lethbridge Design Standards Section 4.02), the average demand is estimated to be 540,000 l/d. In addition to this, the expected fire flow will be 75 l/sec. Based on the City of Lethbridge Design Standard, the peak hour demand is expected to be 1.9 ml/d.

Water lines have been sized using the US EPANET Software. Pipe sizes and lengths and node elevations were entered into the software. The design was completed by assigning the fire flow at the farthest southeast corner of the development and regular peak demand throughout the network.

The results of this analysis indicated that using the pipe sizes depicted in Figure 7, headloss during a fire flow and peak demand is calculated to be 129 kpa through the system (Run 1). According to the City Engineer, the pressure available in the 250 mm supply line is 500 kpa. With headloss of 129 kpa the residual head during a fire event is well above the required pressure of 366 kpa. In addition, EPANET was used to analyze the distribution network during peak average daily peak demand (20 lps). The result of this analysis, (Run 2)

indicates negligible headloss through the watermain network (Refer to Appendix F for input and result information).

6.3 Major and Minor Storm Drainage System

A Master Drainage Plan was completed for Arbour Ridge Estates by Westhoff Engineering and Resource Inc. (Westhoff, 2006). Information from this report was used to develop a preliminary drainage plan (refer to attachment). As with the TIA, the subdivision layout has changed since the ASP was approved, but the study area and resulting pond sizes have not. In addition, contributing drainage areas are slightly smaller due to increased setback requirement as per the geotechnical study. As a result, this study is still applicable to the development.

The site is relatively flat with a slight ridge running east to west through the property. A portion of offsite drainage will flow towards the subdivision (see Figure 8). Runoff from offsite overland flow impacting the developed area will be diverted to the drainage ditch on Highway 5 or piped through the subdivision to the coulee. Pipes to convey this flow will be sized to accommodate a 1 in 5 year event (90 l/sec/hect) and the roads or right of way will be designed to accommodate the 100 year event. A special line assignment might be required should the Adams property not be developed at the same time as the Triangle lands.

Onsite storm water will be captured in two ponds; Pond 1 and Pond 2. Pond 1 is proposed to be a wet pond and capture runoff from the Triangle Three land (refer to Figure 8). Pond 2 is proposed to be a wet pond, and will capture runoff from the Jubber land. Each pond will discharge to Six Mile Coulee at a rate not exceeding a total flow rate of 6.25 l/s/ha. The area of the storm pond areas shown in Figure 8 exceed the minimum aerial extent recommended by Westhoff. Proposed pond elevations have also been shown in Figure 8. A liner will be designed and installed.

Makeup water will be provided by St. Mary's Irrigation District (refer to Appendix G). The proposed route of the irrigation line is from the SMRID ditch, also shown in Figure 8. A pump will be required to transfer water from the irrigation ditch to the wet ponds.

The preliminary storm drain layout is shown in Figure 8. An impervious area assumption of 35% was utilized to estimate runoff and size drainage structures. In addition, aerial photos of the Southridge Subdivision were utilized to estimate impervious areas in similar developments. This analysis indicated the 35% is appropriate for this type of development (refer to Area Structure Plan).

Preliminary sizing of storage lagoon and drain pipe has been performed (refer to Figure 8). The pipe and overland flow design is based on the basin areas

designated in Figure 8. Design analysis has been completed using the US EPA SWMM model and has been designed to contain a 4 hour 5 year storm within the storm drain system. Analysis with respect to a 100 year 24 hour storm was also conducted and compared to the 1 in 5 year event to estimate overland flow volumes. As a rule of thumb, one third of the flow is accommodated in the piping system and two thirds within the right of way.

Based on this analysis the peak unit overland flows are 160 l/sec/hect. The predicted depth of overland flow with the street is 20 cm. The design flow used to size the piping is based on a unit flow rate of 90 l/sec/hect. Peak flow for a 1 in 5 year storm and a 1 in 100 year 24 hour storm are included in Table 5. For additional design information refer to Appendix F.

Table 5: Peak Runoff Values

Location	Peak 1:5 yr 4 hr event	Peak 1:100 yr 24 hr event
Peak flowrate to pond 1 (less the pond area)	2.1 m ³ /s	6.1 m ³ /s
Peak flowrate to pond 2	1.6 m ³ /s	4.4 m ³ /s
Unit Flow Rate	90 l/sec/hect	250 l/sec/hect

* This Table was reviewed by the City of Lethbridge

6.4 Shallow Utilities

Shallow utilities, including electrical services, natural gas telephone and cable television required to service the Outline Plan area can be achieved by extensions to the existing infrastructure.

Natural gas will be provided by ATCO gas and will come from a high pressure line located on the south east corner of the Jubber property. ATCO gas has already installed a supply line (that follows the proposed R/W) extending from the Jubber property to Highway 5.

Electrical service will be provided by the City of Lethbridge and will come from Highway 5. A full electrical design will be provided for the development in the subdivision plan stage.

Telus will provide phone service and is already providing for access to the site. In order to accommodate shallow utilities adjacent Adam's Property special considerations within the North side of the right of way may be required.

7.0 Sequence of Urban Growth

7.1 Phasing

The development phasing for the Outline Plan area should proceed in an orderly pattern based upon servicing availability. The direction of development is shown on Figure 5 (proposed layout). It is proposed that development will begin in the northwest area of the site and conclude in the southeast area. Prior to beginning Phase 3, the storm pond and other related infrastructure must be completed.

8.0 Parks and Landscaping

Parks and areas surrounding the drainage ponds will be designed to City of Lethbridge standards.

There are three primary park areas proposed for the development. The first park is located just east of Pond 1 and will be approximately 0.73 ha in area. It is proposed that this park area also include a playground toy for children and several park benches. The equipment will meet City of Lethbridge standards and be situated to be at least 30 m from any property line and 50 m from Arbour Ridge Drive. This park will be landscaped, (include turf) and be irrigated.

The second park will be located on the southeast portion of the Jubber property and will be .94 ha in area. This park will include benches and will be landscaped to match the surrounding coulee. Bushes shrubs and grasses will be selected so that irrigation is not required.

The third park will be located south of pond 2 and will be .80 ha in area. This park will include benches and will be landscaped to match the surrounding area. This park will be irrigated.

Land surrounding the drainage ponds will be graded to meet Alberta Environment slope requirements. Landscaping will be designed to beautify the pond areas and irrigation will be provided to support landscaping. Trees, shrubs, grasses and plants will be selected based on their suitability to grow in this region. Natural rock and other landscaping features will also be used to enhance and beautify these areas.

Land adjacent the coulee will be left in its natural state and consist of natural grasses and plants. It is the developer's intention to construct a pathway along the bank as shown in Figure 4.

The island located in Arbour Ridge Green will be constructed of materials requiring low maintenance.

9.0 Architectural Controls

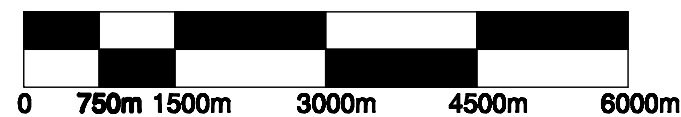
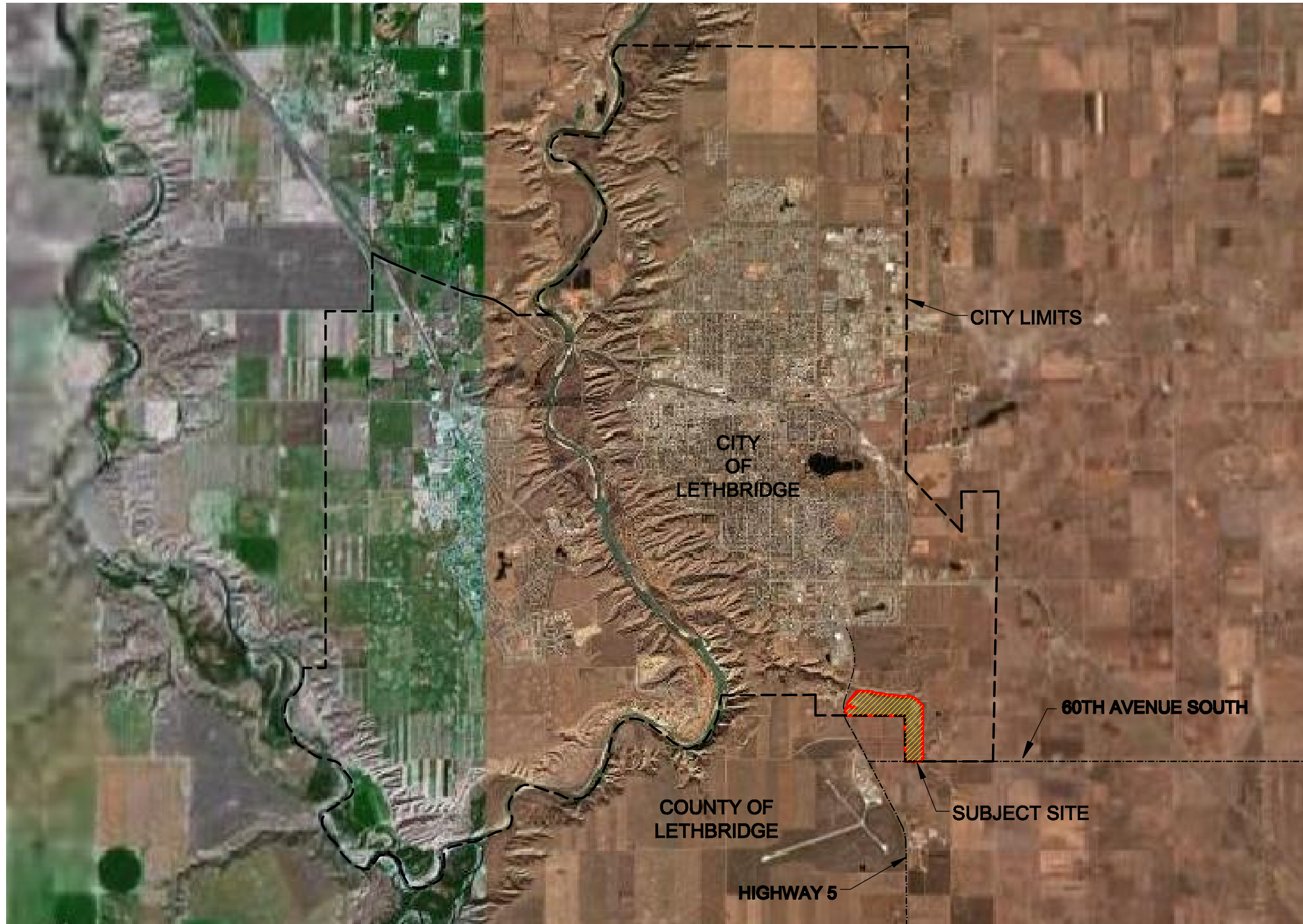
Architectural controls will be finalized and enforced by an architect. Key points to be included in these controls include:

- 1) Minimum house size
- 2) Allowable construction type
- 3) Allowable finish materials
- 4) Minimum landscaping requirements
- 5) Covered garage requirements

10.0 Wetland Assessment

A Wetland Assessment was completed by EBA Consulting Engineers LTD for the area located within the coulee behind the old dam (refer to Appendix I). Based on this assessment the wetland is classified as a class II temporary wetland. There are no plans to develop or change the wetland area. However, since storm water bypass drainage will continue to flow into the south end of the wetland area; AENV approval will be required for any changes to drainage patterns.

In addition, a letter from Alberta Fish and Wildlife has been received indicating concerns over snakes and hawks have been mitigated.



APPROXIMATE SCALE = 1:75,000



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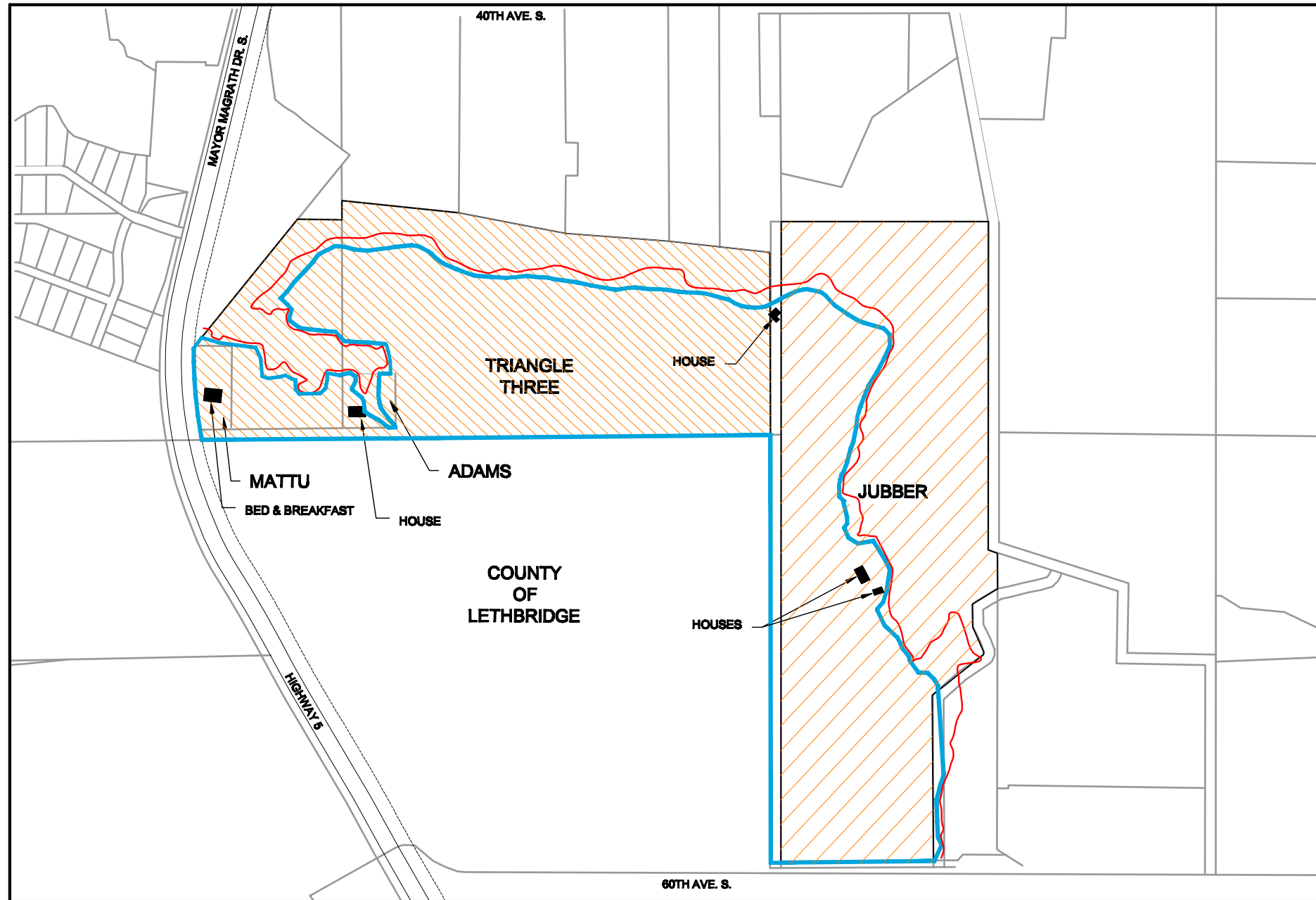
CLIENT
TRIANGLE THREE DEVELOPMENTS

PROJECT TITLE
ARBOUR RIDGE ESTATES LAYOUT PLAN

DRAWING TITLE
LOCATION PLAN

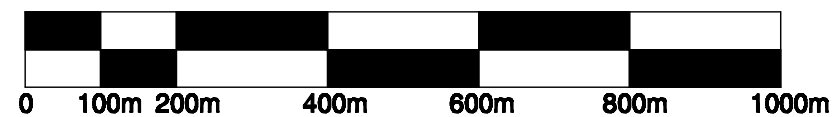
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DESIGN HE	PROJECT NO. 06020
DRAWN MDO	SCALE AS SHOWN
CHECKED HE	SHEET NO. FIGURE 1
APPROVED HE	DATE DRAWN SEPT. 17, 2009



* PROJECTED TOP OF BANK & SETBACK ARE BASED ON CRITERIA SET FORTH IN THE CITY OF LETHBRIDGE RIVER VALLEY AREA DEVELOPMENT PLAN (BYLAW 5277) & SITE SPECIFIC GEOTECHNICAL ENGINEERING BY EBA ENGINEERING CONSULTANTS LTD.
 -TOP OF BANK IS DETERMINED AS THE POINT WHERE THE COULEE DROPS AT A SLOPE GREATER THAN 15%

— OUTLINE PLAN BOUNDARY
 — PROJECTED TOP OF BANK



APPROXIMATE SCALE = 1:10,000



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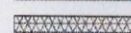



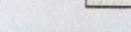


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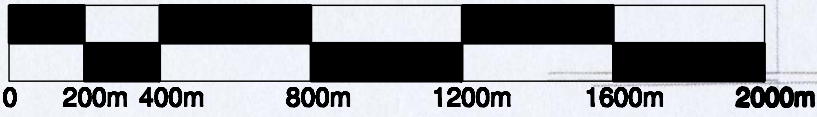
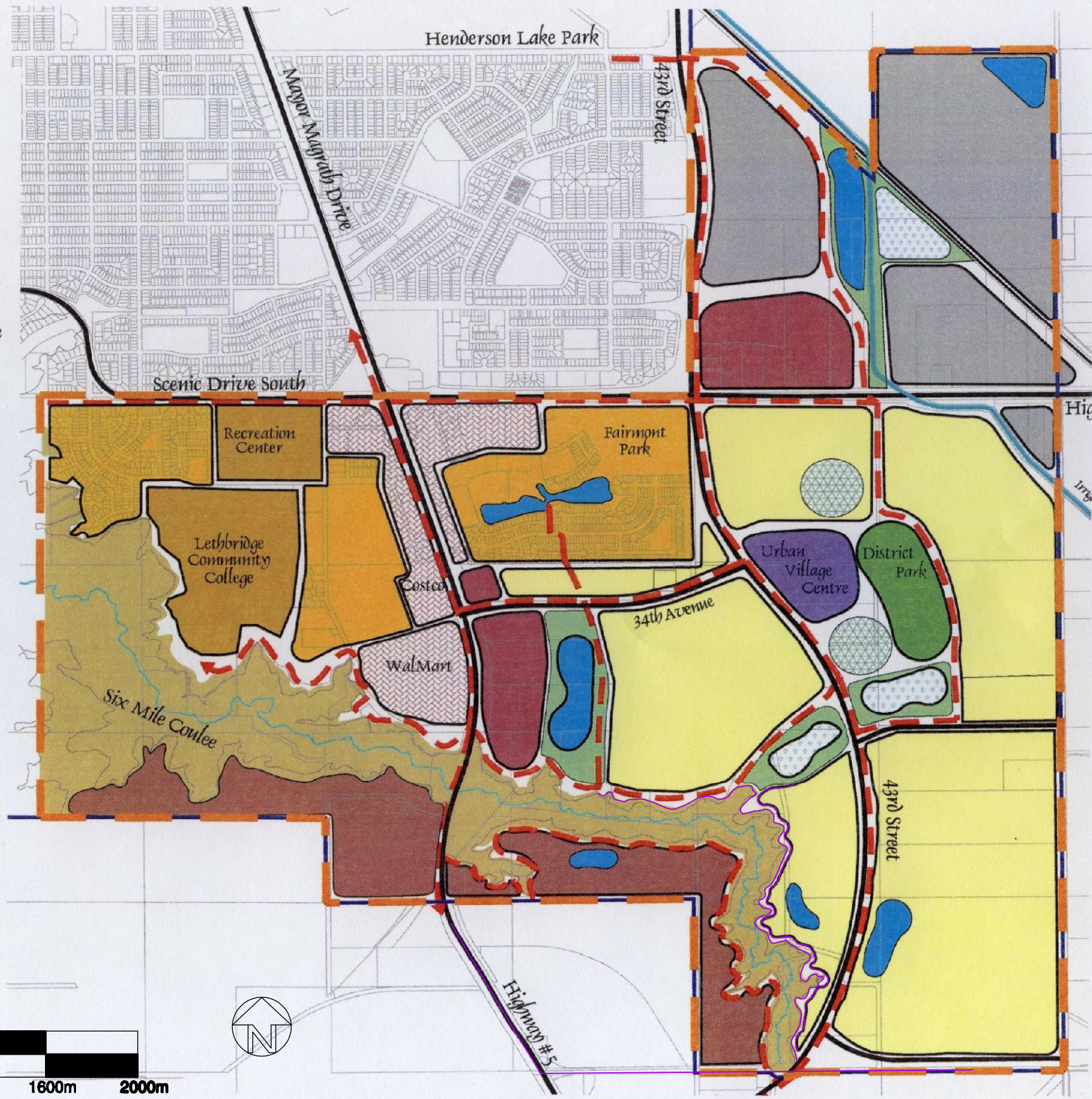
PROJECT TITLE
ARBOUR RIDGE ESTATES LAYOUT PLAN

DRAWING TITLE
SITE & OWNERSHIP MAP

#	REVISION	DATE	BY

DESIGN HE	PROJECT NO. 06020
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APPROVED HE	
DATE DRAWN SEPT. 17, 2009	

-  Neighbourhood Proposed
-  Existing
-  Proposed County Estates
-  Commercial Proposed
-  Existing
-  Urban Village Center
-  Employment Center
-  Existing Institutional
-  Possible Future County Employment Centre
-  Storm Water Management Facilities
-  Wet ponds
-  District Park
-  Open space
-  Major School Sites
-  Six Mile Coulee
-  Pedestrian and Bicycle Linkages
-  City Boundary
-  Possible Future Interchange



APPROXIMATE SCALE = 1:20,000



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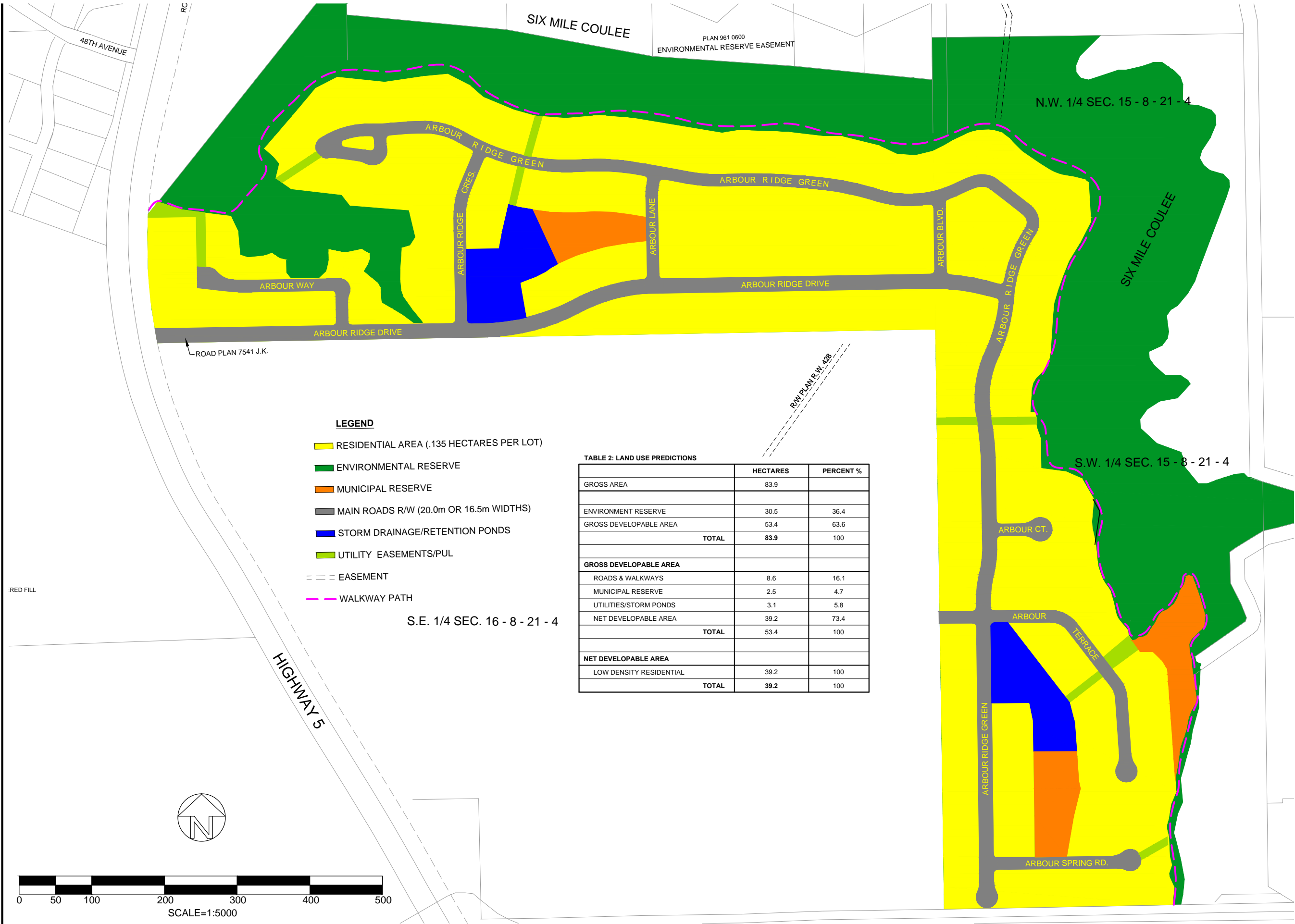
PROJECT TITLE
ARBOUR RIDGE ESTATES LAYOUT PLAN

DRAWING TITLE
SELUP DEVELOPMENT CONCEPT

DRAWING STATUS

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APPROVED	HE		
DATE DRAWN	SEPT. 17, 2009		



LEGEND

- RESIDENTIAL AREA (.135 HECTARES PER LOT)
- ENVIRONMENTAL RESERVE
- MUNICIPAL RESERVE
- MAIN ROADS R/W (20.0m OR 16.5m WIDTHS)
- STORM DRAINAGE/RETENTION PONDS
- UTILITY EASEMENTS/PUL
- EASEMENT
- WALKWAY PATH

TABLE 2: LAND USE PREDICTIONS

	HECTARES	PERCENT %
GROSS AREA	83.9	
ENVIRONMENT RESERVE	30.5	36.4
GROSS DEVELOPABLE AREA	53.4	63.6
TOTAL	83.9	100
GROSS DEVELOPABLE AREA		
ROADS & WALKWAYS	8.6	16.1
MUNICIPAL RESERVE	2.5	4.7
UTILITIES/STORM PONDS	3.1	5.8
NET DEVELOPABLE AREA	39.2	73.4
TOTAL	53.4	100
NET DEVELOPABLE AREA		
LOW DENSITY RESIDENTIAL	39.2	100
TOTAL	39.2	100

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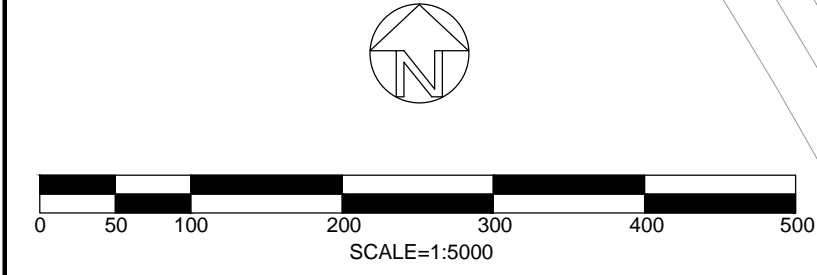
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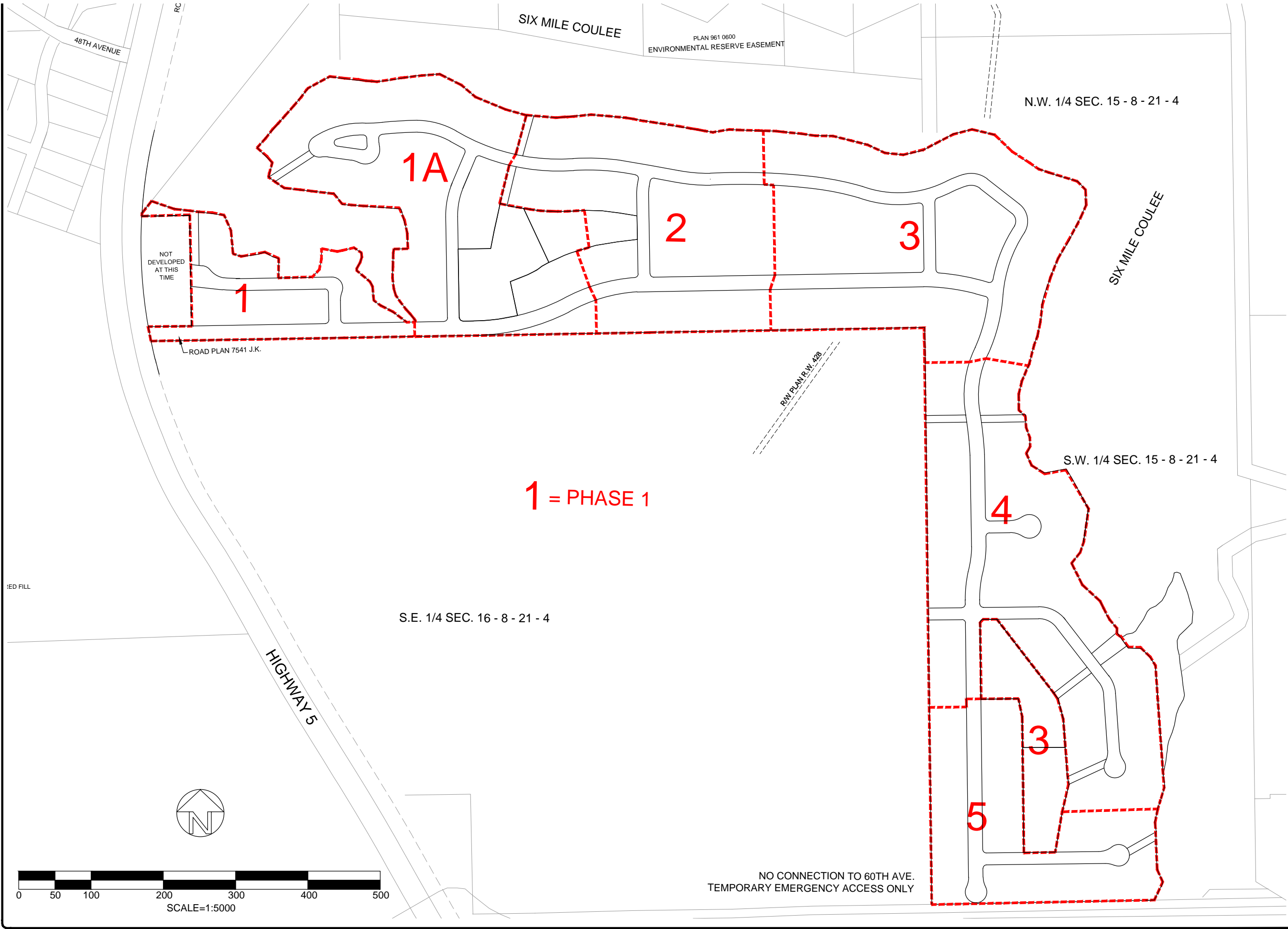
DRAWING TITLE
LAND USE PLAN

DRAWING STATUS

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APPROVED	HE	DATE DRAWN	SEPT. 17, 2009





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TRIANGLE THREE

PROJECT TITLE
ARBOUR RIDGE SUBDIVISION

DRAWING TITLE
PHASING PLAN

DRAWING STATUS

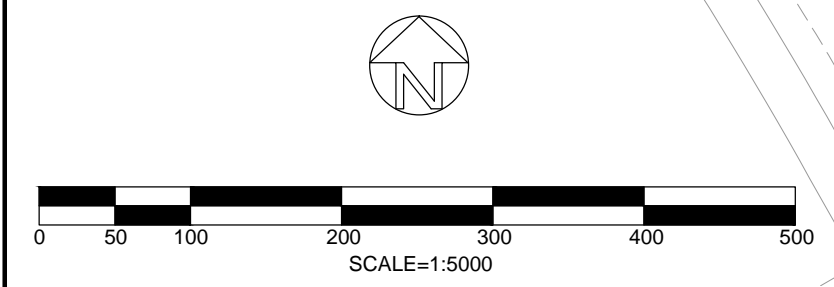
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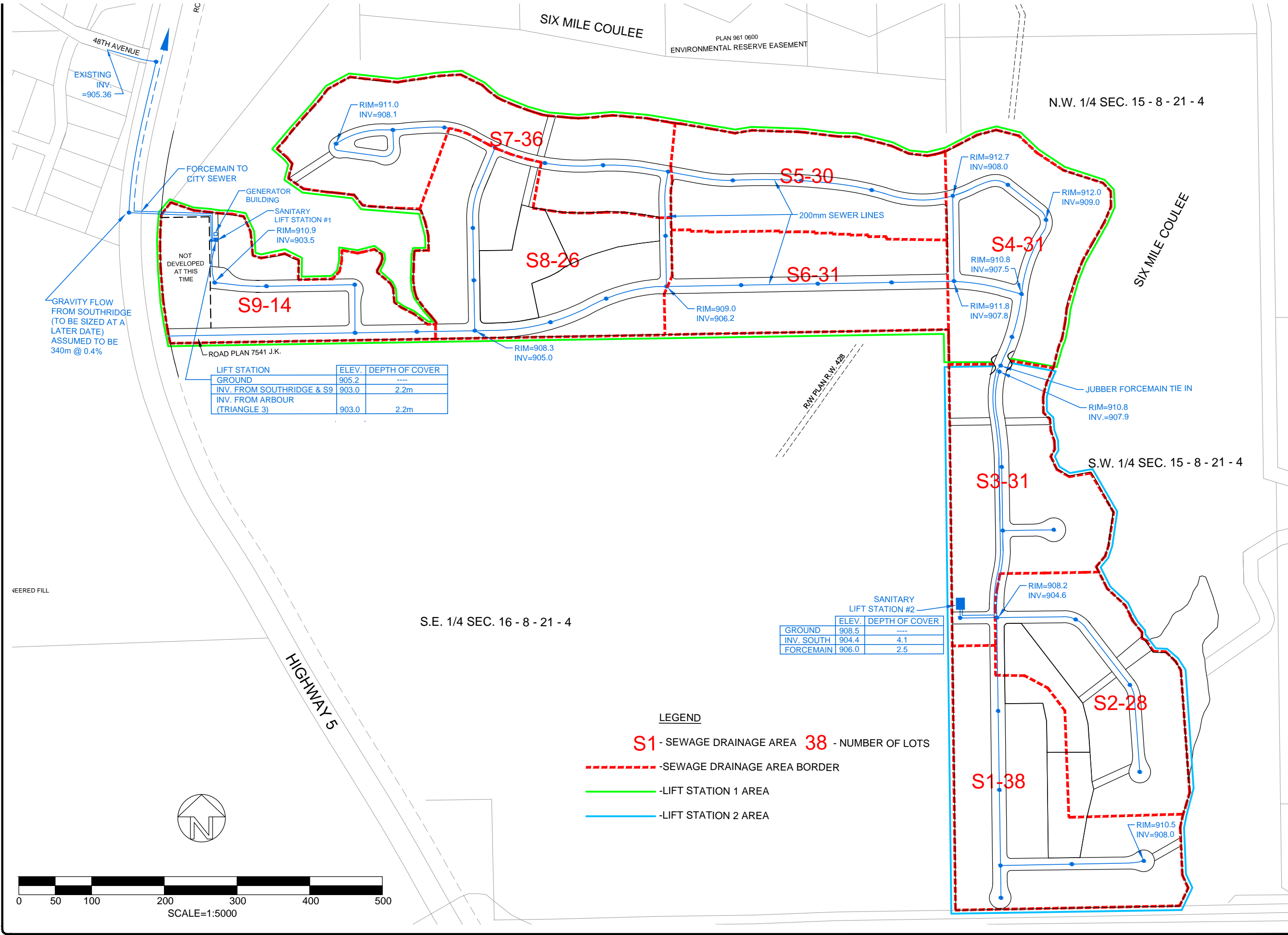
PROJECT NO.
06020

SCALE
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SHEET NO.
FIGURE 5



NO CONNECTION TO 60TH AVE.
 TEMPORARY EMERGENCY ACCESS ONLY

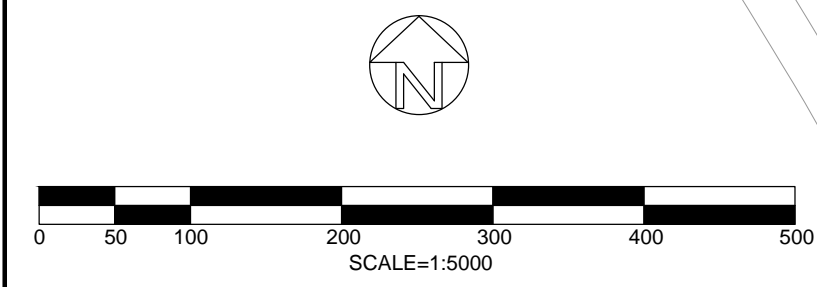


LIFT STATION	ELEV.	DEPTH OF COVER
GROUND	905.2	----
INV. FROM SOUTHRIDGE & S9	903.0	2.2m
INV. FROM ARBOUR (TRIANGLE 3)	903.0	2.2m

	ELEV.	DEPTH OF COVER
GROUND	908.5	----
INV. SOUTH	904.4	4.1
FORCEMAIN	906.0	2.5

LEGEND

- S1** - SEWAGE DRAINAGE AREA **38** - NUMBER OF LOTS
- - - - - -SEWAGE DRAINAGE AREA BORDER
- -LIFT STATION 1 AREA
- -LIFT STATION 2 AREA



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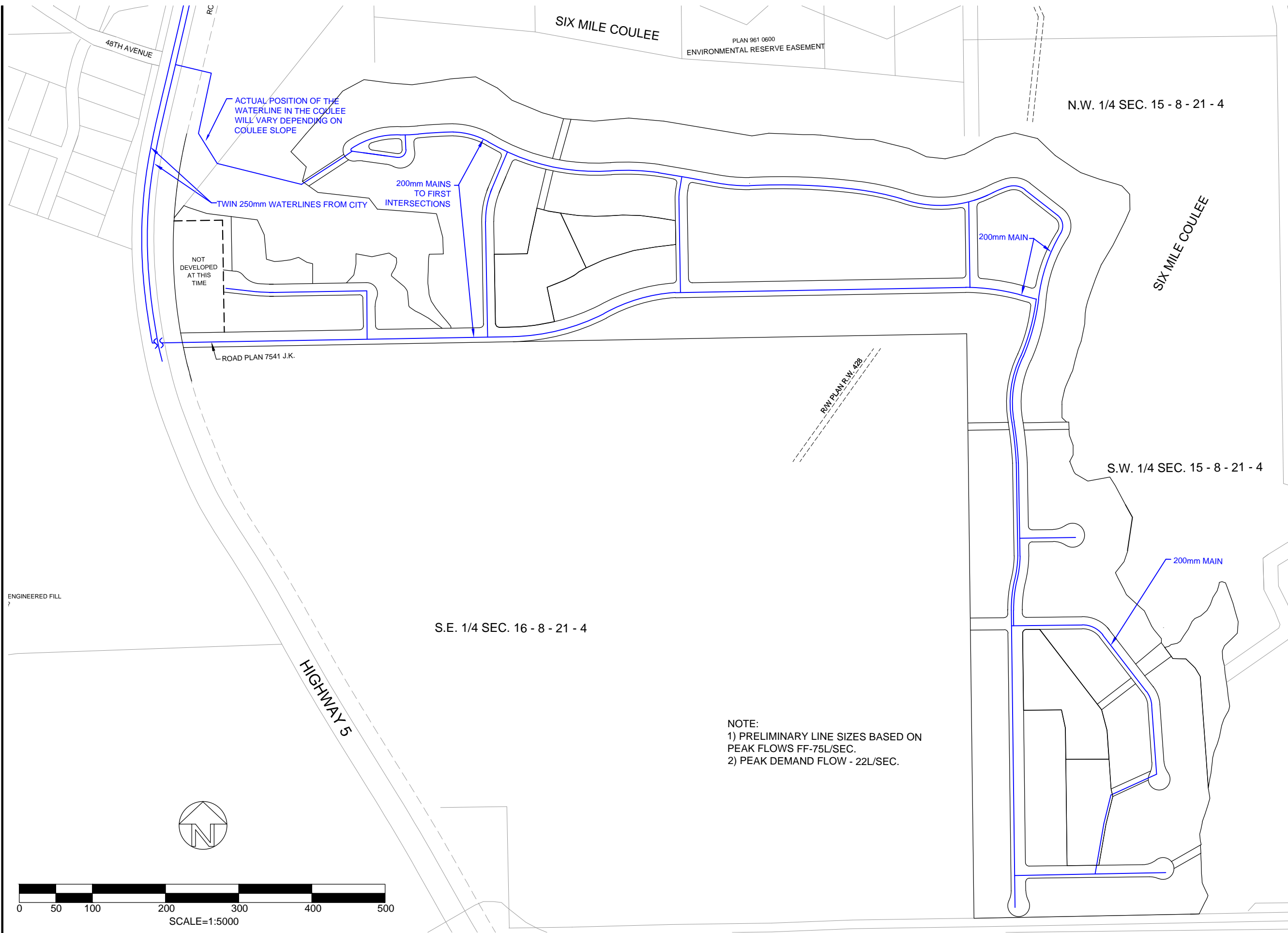
PROJECT TITLE
ARBOUR RIDGE ESTATES OUTLINE PLAN

DRAWING TITLE
PROPOSED SANITARY SEWER LAYOUT

DRAWING STATUS

#	REVISION	DATE	BY

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APPROVED	HE	DATE DRAWN	SEPT. 17, 2009



NOTE:
 1) PRELIMINARY LINE SIZES BASED ON PEAK FLOWS FF-75L/SEC.
 2) PEAK DEMAND FLOW - 22L/SEC.

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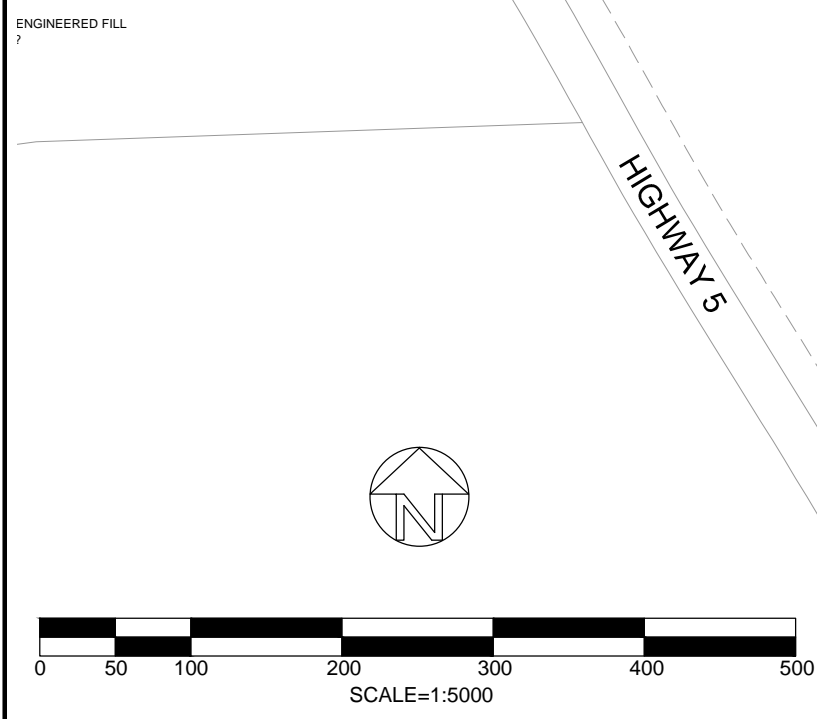
PROJECT TITLE
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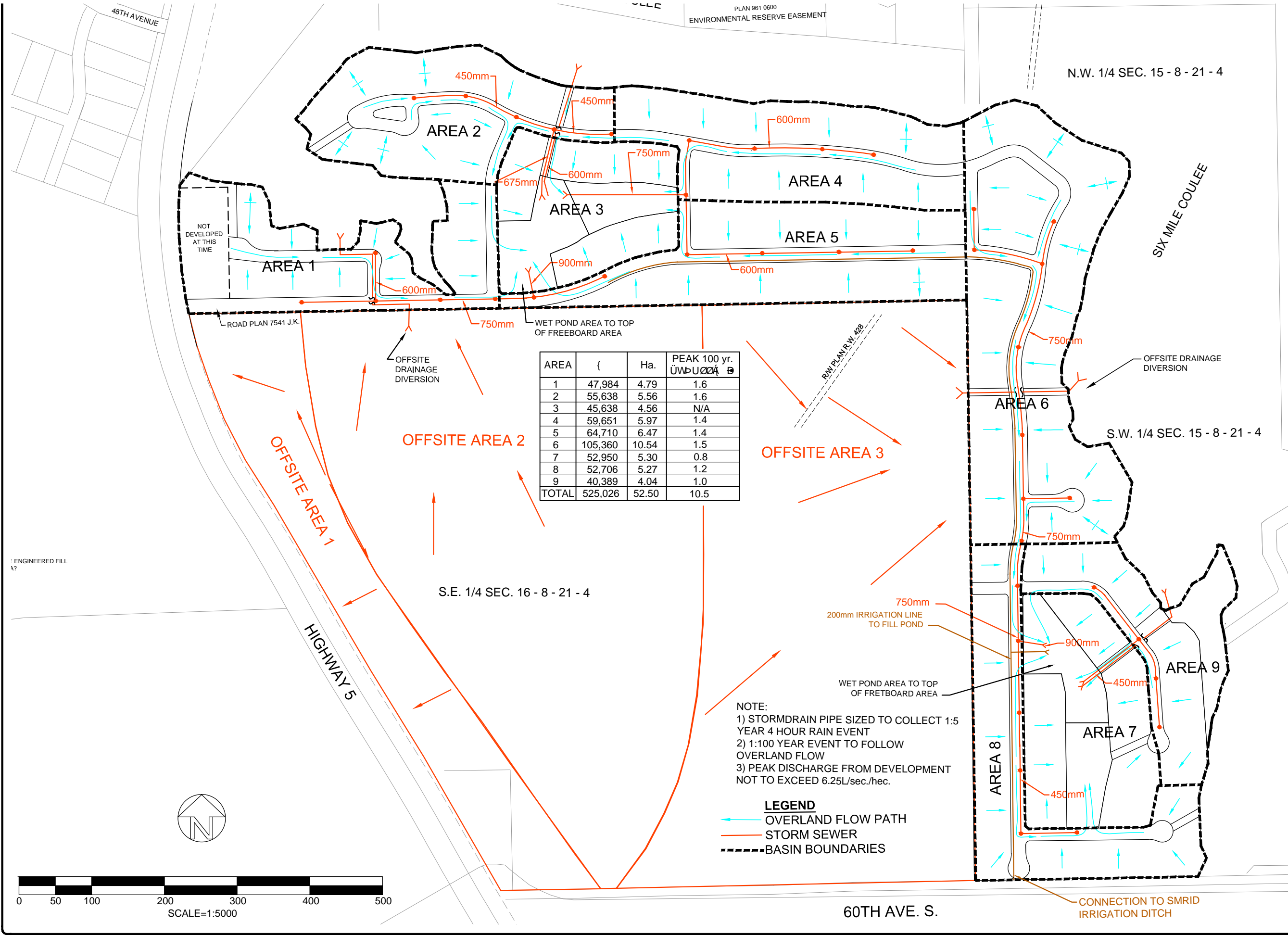
DRAWING TITLE
PROPOSED WATER SYSTEM LAYOUT

DRAWING STATUS

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DRAWN	MDO	SCALE	AS SHOWN
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APPROVED	HE	DATE DRAWN	SEPT. 17, 2009





AREA	{	Ha.	PEAK 100 yr. UVP UOQ B
1	47,984	4.79	1.6
2	55,638	5.56	1.6
3	45,638	4.56	N/A
4	59,651	5.97	1.4
5	64,710	6.47	1.4
6	105,360	10.54	1.5
7	52,950	5.30	0.8
8	52,706	5.27	1.2
9	40,389	4.04	1.0
TOTAL	525,026	52.50	10.5

NOTE:
 1) STORMDRAIN PIPE SIZED TO COLLECT 1:5 YEAR 4 HOUR RAIN EVENT
 2) 1:100 YEAR EVENT TO FOLLOW OVERLAND FLOW
 3) PEAK DISCHARGE FROM DEVELOPMENT NOT TO EXCEED 6.25L/sec./hec.

LEGEND
 — OVERLAND FLOW PATH
 — STORM SEWER
 - - - BASIN BOUNDARIES

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TRIANGLE THREE DEVELOPMENTS

PROJECT TITLE
ARBOUR RIDGE ESTATES OUTLINE PLAN

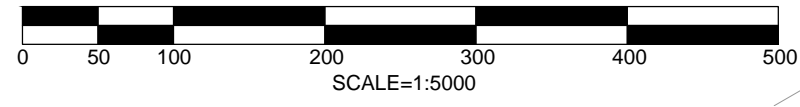
DRAWING TITLE
PROPOSED STORM DRAINAGE LAYOUT

DRAWING STATUS

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APPROVED	HE	DATE DRAWN	SEPT. 17, 2009

ENGINEERED FILL





Couleecreek

SOUTHGATE BLVD. S.

MAYOR MAGRATH DRIVE SOUTH

Sixmile Coulee

43 STREET SOUTH

ARBOURWOOD TERRACE S.

ARBOURWOOD TERRACE S.

PRAIRIE ROSE PLACE S.

PRAIRIE GARDEN WAY S.

PRAIRIE GRASS ROAD S.

SAGEBRUSH LANE S.

PRAIRIE ARBOUR BLVD. S.

PRAIRIE ARBOUR BLVD.

County of Lethbridge

ARBOURWOOD TERRACE

PRAIRIE CACTUS COVE

HIGHWAY 5

SWEETGRASS POINT

ARBOURWOOD TERRACE

CLOVER SPRING GLEN



County of Lethbridge Airport

60 AVENUE SOUTH