Sun Ridge

Outline Plan

City of Lethbridge

Prepared for

Department of Real Estate & Land Development

City of Lethbridge

Prepared by

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May 2004

Approved by the Municipal Planning Commission June 22, 2004

Adjustment Approved by the Development Review Committee February 22, 2011

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UMA Engineering Ltd. - Third Party Disclaimer

1.0 Introduction

1.1 PURPOSE

The purpose of the Sun Ridge Outline Plan is to establish a planning framework for the future subdivision and development of a land area located in the southwest sector of the City of Lethbridge to facilitate its early development (Figure 1).

1.2 LOCATION AND AREA

Sun Ridge is located south of the existing Mountain Heights neighbourhood and contains approximately 57.10 hectares.

1.3 BACKGROUND

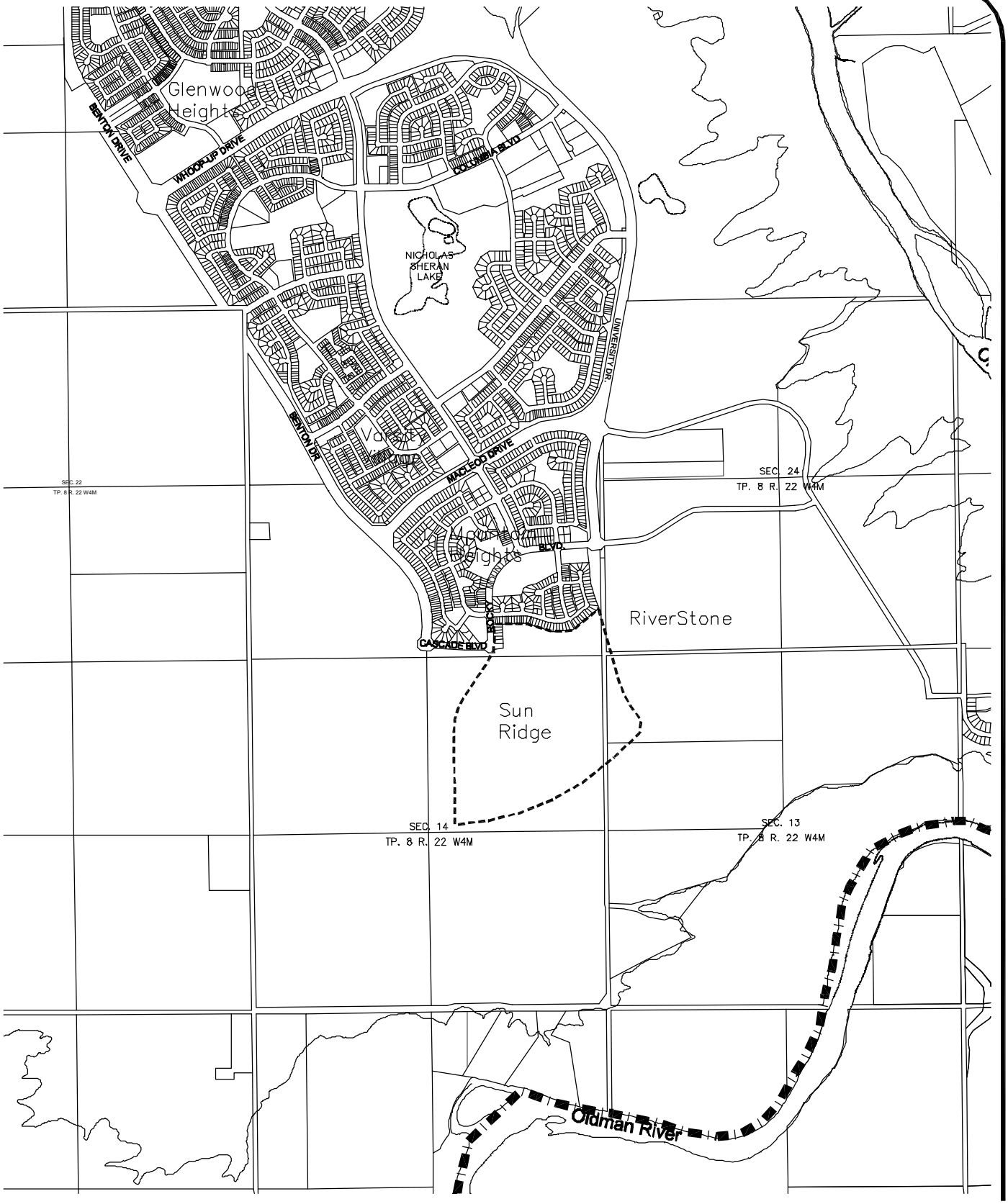
The development of West Lethbridge was first recommended in the City's 1964 General Plan. This was followed by the West Lethbridge Urbanization Plan in 1969. Residential development of West Lethbridge began in 1974 in the vicinity of the University and expanded to the north, west and south. Today there are more than 20,000 people in West Lethbridge, which is designated as one of the major growth sectors of the City.

Sun Ridge represents a southerly extension of contiguous residential development in West Lethbridge. The Mountain Heights/RiverStone/RiverBend Area Structure Plan was adopted in 1996, updated in 1999 and amended in 2003. The ASP provides a framework for the development of an area of three villages comprising 500 ha of the remaining lands between developed West Lethbridge and the Oldman River Valley.

The development of Sun Ridge will complete the overall development of the Mountain Heights 'village' as identified by the ASP. The name 'Sun Ridge' will ensure a more distinct entity for this Outline Plan – located within Mountain Heights.

1.4 PROPERTY OWNERSHIP

The City of Lethbridge is the majority landowner in the plan area. Denecky Brothers Grains Ltd. owns a small portion on the east boundary.* The two landowners included in the plan area are listed in Table 1-1, and shown graphically on Figure 2. Current land titles for these parcels are attached in Appendix A.



LEGEND

PLAN BOUNDARY

CITY OF LETHBRIDGE BOUNDARY

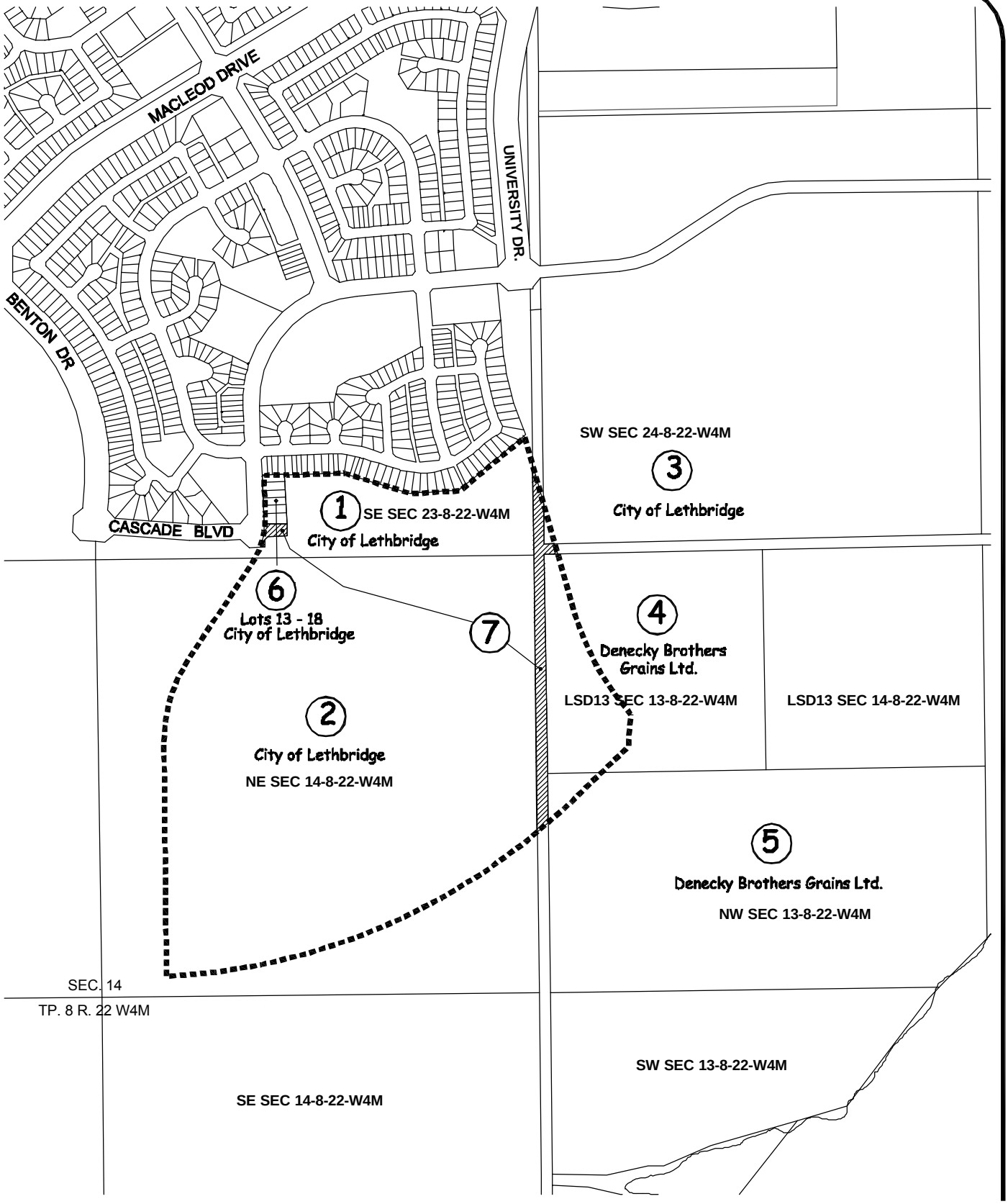
0 125 250 375m

SCALE 1:25,000

Sun Ridge Outline Plan

Location Plan

Figure 1



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Sun Ridge Outline Plan

Land Ownership Plan

Figure 2

Table 1-1 – Property Ownership

	Legal Description	Landowner	Certificate of Title	Area
1.	Pt SE 23-8-22-W4M	The City of Lethbridge	001 309 804 +83	6.76ha.
2.	Pt NE 14-8-22-W4M	The City of Lethbridge	751 130 428 C	44.33ha
3	Pt SW 24-8-22-W4M	The City of Lethbridge	041 072 310+30	0.07ha
4	Pt LSD 13-8-22-W4M	Denecky Brothers Grains Ltd.*	821 025 427 A	3.70ha
5	Pt NW 13-8-22-W4M	Denecky Brothers Grains Ltd*	821 024 828 B	0.46ha
6	Lot 13-18	The City of Lethbridge	Plan 911 1700	0.37ha.
7	Road Plan/Road All'ce	The City of Lethbridge		1.41 ha

* At the time of this Plan, the City of Lethbridge was acquiring these lands via a land exchange with the optioners of the Denecky Lands – Melcor Developments Ltd.

1.5 POLICY CONTEXT

1.5.1 Municipal Government Act

An Outline Plan provides greater definition regarding land use and the roadway system, pursuant to the passage of an Area Structure Plan (ASP). The Outline Plan is an intermediate plan within the family of plans, between the Area Structure Plan and the rezoning and subdivision process. An ASP is a statutory plan authorized by Section 633 of the Municipal Government Act (MGA), Statutes of Alberta, 1994, Chapter M-26.1. It is used in association with a Municipal Development Plan and Land Use Bylaw for facilitating subdivision and development of land within a municipality. Section 638 of the MGA requires that the ASP must describe:

- sequencing of development;
- proposed land uses, either generally or specifically;
- population density;
- the general location of major transportation and public utilities; and
- any other Planning matters that Council may consider necessary.

1.5.2 Municipal Development Plan

The City of Lethbridge Municipal Development Plan (MDP), Bylaw No.4902 states the objectives and policies for the coordination of orderly growth and development of the City.

Map 2 - of the MDP, Future Residential Growth Areas designates the Sun Ridge area for "Residential" development after the year 2000.

1.5.3 Adjacent Planning Areas

As stated earlier, Sun Ridge lies within the approved Mountain Heights/RiverStone/ RiverBend Area Structure Plan. Mountain Heights Village lies to the north and RiverStone to the east. RiverStone is currently being developed and the northern portion of Mountain Heights is fully developed. The extension of the future University Drive will define the east boundary of Sun Ridge and will separate it from RiverStone. Areas south and west are within the City of Lethbridge but are currently undeveloped.

1.5.4 Land Use Bylaw

The City of Lethbridge Land Use Bylaw 4100 defines land use districts for all lands within the City. All land within this proposed plan area is currently designated UR - Urban Reserve. Future Land Use Amendments will conform to the current Land Use Bylaw.

2.0 Site Conditions

2.1 SITE FEATURES

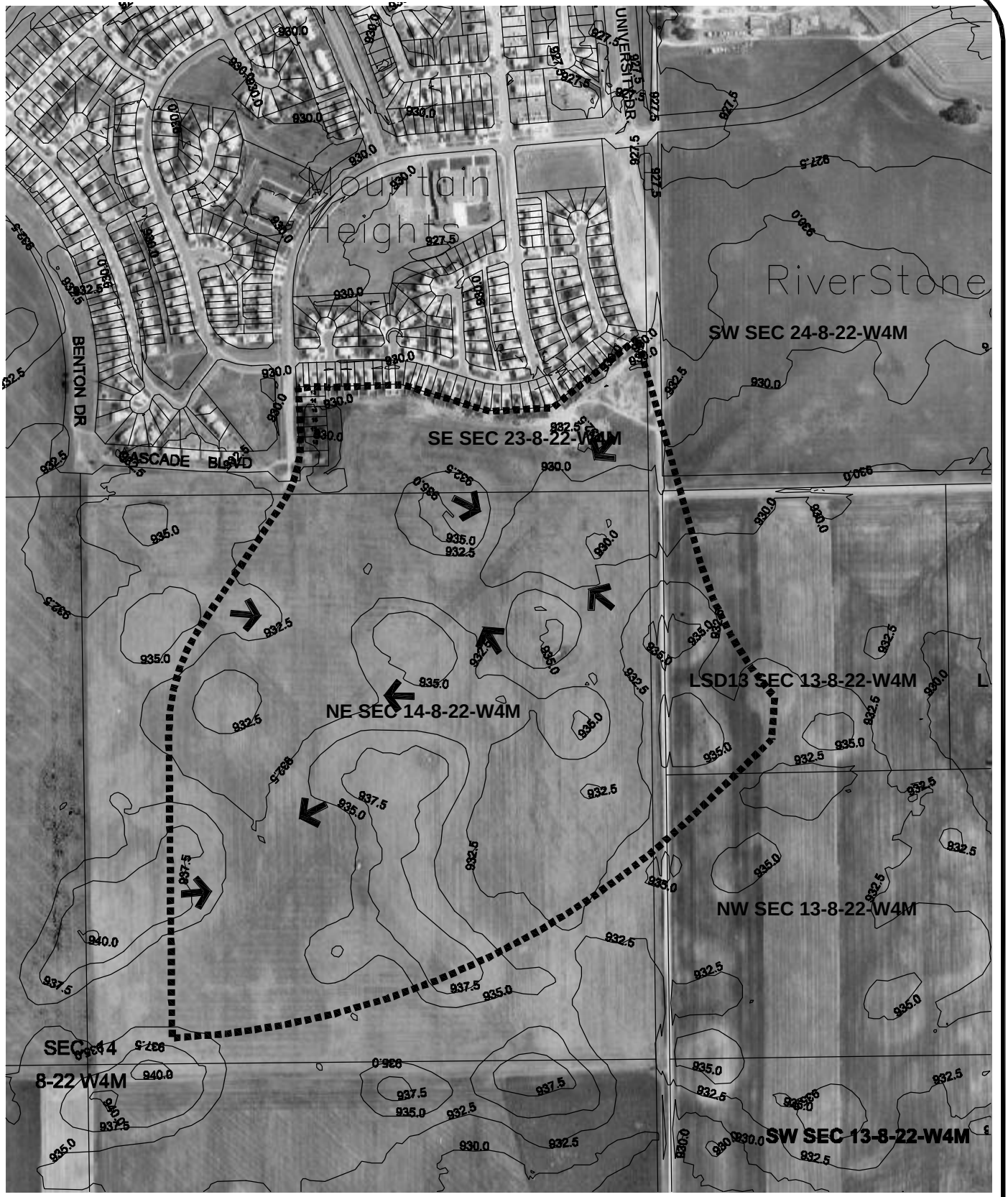
The plan area is gently rolling terrain with slopes ranging up to 4%. The highest elevation is approximately 937.5 m above sea level and the lowest is 930.0 m in the east central area. The difference in elevation between the high and low areas is approximately 7.5 m (Figure 3).

The natural drainage pattern follows the major topographical gradient from east to west. An existing natural overland drainage course crosses the southwest corner of the plan area. The subsurface soils for the area are generally identified as organic topsoil, glaciolacustrine clays, glacial clay till, and bedrock.

2.1.1 Existing Site Features

No substantial tree stands are contained in the plan area. It is vacant and currently under cultivation.

Six residential lots and a road right-of-way are currently registered in the northwest plan area. Due to servicing limitations, housing has not been developed on these lots. A re-subdivision, zoning, new servicing capabilities and road closure will be required to facilitate future development.



LEGEND

- PLAN BOUNDARY
- 935.0 CADASTRAL CONTOURS
- DRAINAGE DIRECTION

N

0 25 75 125 m
25 12.5 1:7500

Sun Ridge Outline Plan

Site Conditions

Figure 3

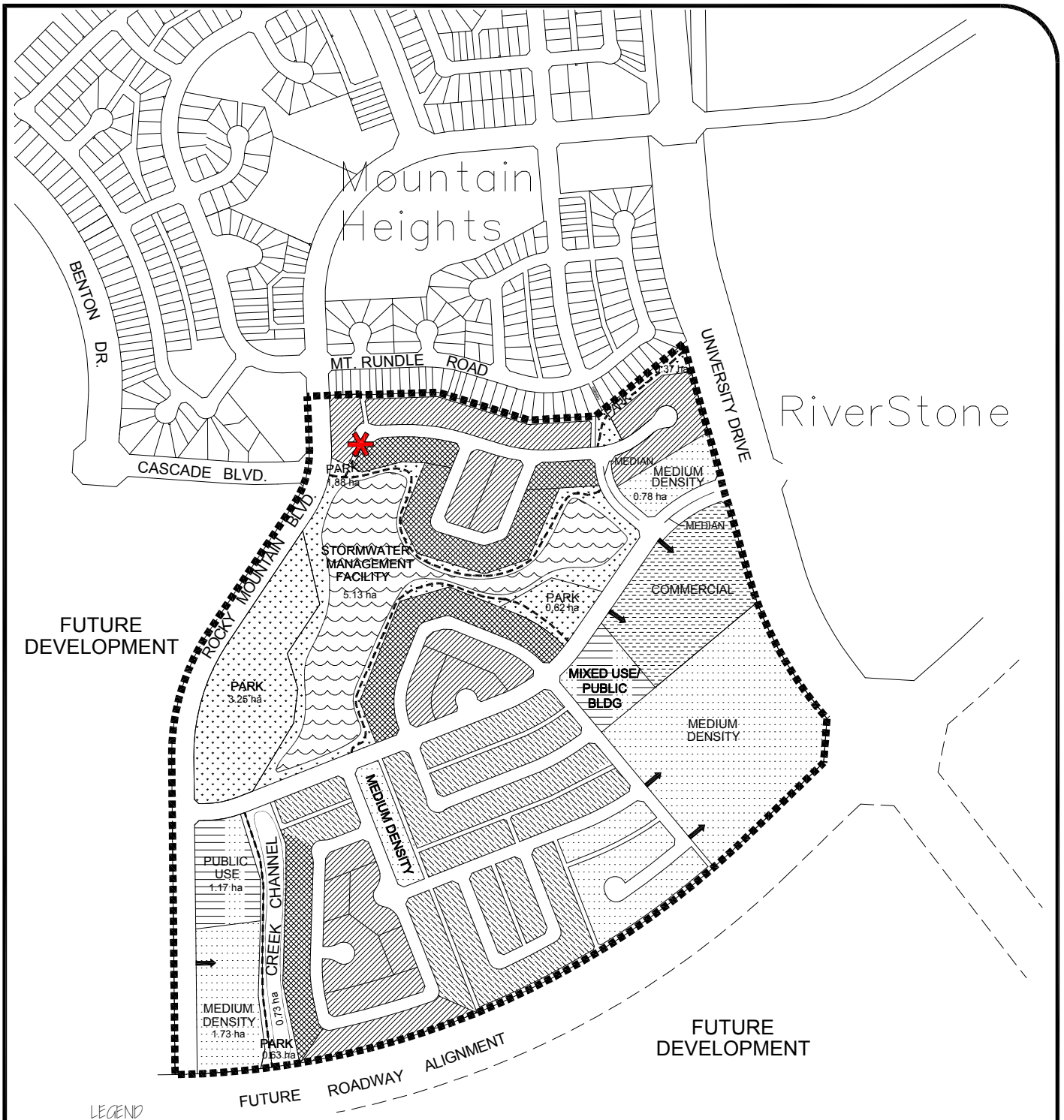
3.0 Planning Concept

3.1 DEVELOPMENT GOALS AND OBJECTIVES

The Sun Ridge Outline Plan provides an overall framework to develop an innovative residential neighbourhood. It will be developed to accommodate a variety of land uses that are responsive to changing trends and demographics, market conditions, community needs and preferences (Figure 4).

Key objectives and principles that have guided the preparation of the Sun Ridge Outline Plan are:

- Sun Ridge will provide opportunities for housing types that are having a difficult time being accommodated in the City.
- Sun Ridge will provide for a wide variety of housing types – small lot development, comprehensively-planned residential areas and mixed uses and promote innovating housing style, design, construction material use and land use.
- Lot sales will be sold on a 'first-come, first served' basis and/or a design competition basis.
- The creation of a show home builders group and the use of show homes will not be utilized in Sun Ridge.
- The City will act to use parts of Sun Ridge as a demonstration project in partnership with builders to illustrate successful and practical examples of sustainable and Smart Growth.
- The City will actively pursue grants from organizations such as the Federation of Canadian Municipalities (FCM) and Canada Mortgage and Housing Corporation (CMHC) to explore the feasibility and implementation of such demonstration projects.
- The City will work with businesses and organizations, e.g. utility companies, to implement such demonstration projects where established to be feasible.
- Major land parcels, i.e. for multi-family or commercial use, will be sold on a 'Proposal Call' basis. Proponents will be judged on the basis of innovation and the application of 'green' principles in design and construction.
- Sun Ridge will allocate five percent (5%) of its gross developable area as 'affordable housing'. A variety of housing styles and mixes will be utilized to achieve both rental and saleable units.



LEGEND

- PLAN BOUNDARY
- PATHWAY
- LOW DENSITY RESIDENTIAL
- LOW DENSITY RESIDENTIAL (WALKOUT-LOT)
- LOW DENSITY RESIDENTIAL (R-SL SMALL-LOT)
- MEDIUM DENSITY RESIDENTIAL
- MIXED USE SITE
- COMMERCIAL SITE
- PARK / OPEN SPACE CORRIDOR
- STORM WATER MANAGEMENT FACILITY
- EMERGENCY ACCESS

See Appendix G for February 22, 2011 land use adjustment

0 25 75 125 m
25 12.5 1: 7500

Sun Ridge Outline Plan

Development Concept

Figure 4

3.2 PUBLIC CONSULTATION

In order to obtain input from the community, an Open House was held on March 2, 2004 at the Dr. Gerald Probe School. Letters regarding the Open House were sent to all residents along Mt. Rundle Road backing onto the proposed Sun Ridge Development. Approximately 200 members of the public and the house building industry attended. The responses to the presentation and the questionnaire were both positive and supportive. The land use and open space was considered acceptable by a majority of the residents. Modifications were made to the plan as a result of the public input.

3.3 DEVELOPMENT CONCEPT

3.3.1 The Development Concept and Zoning

Sun Ridge will be a predominantly residential neighbourhood with a mix of commercial and public uses integrated into the overall land use pattern. The residential component will provide an opportunity to integrate a variety of residential housing forms and character, currently in demand in Lethbridge, in a Master Planned suburban setting. The allocation of Land Use is shown in Appendix B.

Sun Ridge will offer a full spectrum of housing types from conventional single detached housing through attached housing forms and mixed use residential/commercial development. Six sites offer opportunities for various types of multi-unit housing to further expand the housing options.

The parks and open space system is a very prominent design element in Sun Ridge. The system comprises a continuous open space corridor integrating parks, open space and stormwater management facilities. This open space corridor will create a strong sense of place within the community and define landmarks for the neighbourhood. The creek channel will convey drainage to the stormwater management facility and serve both a functional and aesthetic role in the community.

3.3.2 Opportunities for Innovation

Sun Ridge provides opportunities for innovative approaches to urban development which demonstrate the principles of sustainable design and smart growth. As the developer, the City is in a position to make arrangements to encourage innovation in urban development. Preference can be given to housing projects which demonstrate affordability, adaptability, water conservation, energy efficiency, materials recycling or other innovative approaches.

The City may pursue contributions from or partnerships with organizations such as the Federation of Canadian Municipalities and Canada Mortgage and Housing Corporation to support these innovative approaches. Partnerships with businesses and organizations may be developed to successfully implement practical and innovative ideas. In addition, five percent of the gross developable area will be allocated specifically for "affordable housing."

3.3.3 Residential Land Uses

The Land Use Concept shows a series of identifiable residential nodes or modules defined by the roadway and open space system. The format will facilitate a logical staging sequence and will provide opportunities for a range of housing to meet the needs of various target market groups including "move-up" and "move-down" buyers, first time home owners, active adult and the elderly.

Efforts will be made to create distinctive identities and character for individual modules within the overall neighbourhood plan.

The Land Use Concept designates two categories of residential land uses.

3.3.4 Low Density Residential

The low density residential component will include a compatible mix of lane and laneless modules. Lanes may be utilized to facilitate rear access, decrease on-street parking and limit direct driveway access to roadways.

The provision of innovative and affordable housing is an objective of the Sun Ridge Plan. Achievement of this objective may require unique and cost effective servicing provisions and modified road cross-sections. Any variations to City of Lethbridge standards would require approval from appropriate agencies and departments.

The remainder of the low-density area will be developed with single-detached housing units at a densities permitted within the R-CL (Comprehensive Low Density Residential – 37 v.p.h.), R-SL (Small Parcel Low Density Residential) and R-L (Low Density Residential) districts of the Land Use By-law.

Low density residential comprises 31.7 percent of the proposed residential land use.

The low density residential will generally be developed under existing residential districts of the land use bylaw. Modifications may be required to accommodate unique development requirements.

3.3.5 Medium Density Residential

Medium density sites are intended to accommodate a variety of market segments. Medium density sites could include units for singles, families, or adults, and may be a mix of rented and owned condominiums units. Proximity to amenity areas and access to collector and arterial roadways have influenced the location of medium density sites.

Incorporation of appropriate architectural detailing will be encouraged to ensure medium density development is complementary to and compatible with surrounding residential development. Particular attention will be paid to address transitions between land uses.

Medium density sites are designated for multi-family type development and may take the form of duplexes, townhouses, fourplexes or other attached housing. These sites will be developed in the 37 - 75 upha range.

Multiple-family residential comprises 11.8 percent of the land use area.

3.3.6 Multi Village Centre

Compact design and pedestrian and transit-orientation are hallmarks of a successful urban village centre and a key component of smart growth and sustainable development. The proposed 8.20 ha Multi Village Centre designated in the southeast plan area is a combination of residential, community and commercial elements intended to evolve into a vibrant urban village centre. Commercial, retail and public uses will anchor the area but the incorporation of housing is essential to distinguish it from other simple shopping centres. Establishing a human presence and a minimum level of daily activity is crucial to the success of the area. Housing could be developed in a live/work situation and could take the form of lofts, studios, apartments and condominiums. These units could accommodate all stages of life, from student to senior citizen. In addition to creating a more lively and interesting place to live, the Multi Village Centre will attract a variety of employers. Home based businesses could co-exist in a live/work situation. These could include, but are not limited to, independent offices providing professional and technological services. It could also include health care and insurance services or services related to law and real estate.

Special attention will be given to the interface area with residential development. Site development will be carefully monitored to avoid any negative effects of height and mass on adjacent areas. High quality and consistent architectural design will be encouraged.

3.3.7 Architectural Controls

Basic development guidelines will be established for the small lot areas. It is anticipated that the multi-family medium density sites will be sold on a 'proposal call' basis with guidelines for the sites to be established at the time of the proposal calls. Where controls are defined they will be registered against the title.

3.3.8 Parks, Open Space and Walkways

The parks and open space system is a fundamental design element of Sun Ridge. It consists of a naturalized stormwater pond, an associated creek channel and complementary pathway linkages. It is designed to create interesting views and diverse pedestrian experiences within the neighbourhood and provide links to adjacent neighbourhoods and Regional Trails on a combination of municipal reserve, public utility lots, on-street sidewalks and dedicated walkway links. No school sites are designated in the plan area. There is no intension to incorporate playground equipment in the Parks in Phases 1, 2 and 3 of the Sun Ridge Development.

The naturalized stormwater pond and creek channel will be a major visual and functional amenity within the neighbourhood. The shape, form and location of the stormwater system is intended to take full advantage of the existing topography and low areas and it also enables the pond to be constructed in phases as development proceeds. The sinuous design provides interest and maximizes opportunities for spectacular walkout lots on the pond. The naturalized stormwater facility and creek channel promote principles of sustainable design. The terraced ponds create opportunities for extensive naturalized planting at multiple levels. These terraced ponds increase stormwater treatment and still provide adequate storage requirements. Educational interpretive programs are often developed in conjunction with naturalized facilities and they can also contribute to reducing maintenance costs. The feasibility of supplementing the pond with irrigation water will be investigated to ensure a constant supply to maintain water at consistent levels. The naturalized central pond transitions into two manicured park areas. The east park is approximately 3.25 hectares and the west central park is approximately 0.62 hectares. These parks will provide active and passive recreational opportunities for the community.

Portions above the high water line of the facility may be accessible to the community residents and may be credited for municipal reserve.

Pedestrian and bicycle linkages will be encouraged within the neighbourhood as well as to the Regional Trail system.

3.4 TRANSPORTATION AND CIRCULATION

3.4.1 General Transportation Network

The Plan area is generally bound on the east by University Drive and to the south by Chinook Trail. Ongoing transportation reviews are planned to more clearly define the specific locations of connecting roadways. In the meantime, the City's Infrastructure Department has determined that Outline Planning work can proceed. A traffic Impact Assessment was completed for the plan area. The results are included in Appendix C.

3.4.2 Access and External Roadway System

Sun Ridge will have a transportation system composed of a single collector road and a series of local roads and lanes. A collector road from University Drive will provide the primary access to Sun Ridge. This access point is established by existing approved plans. The collector will continue west and slightly south through the central part of the neighbourhood and intersect with the future extension of Rocky Mountain Boulevard. This collector roadway will accommodate transit. Roundabouts may be incorporated at key intersections within the development.

3.4.3 Internal Roadway System

The internal roadways for Sun Ridge are shown on Figure 4 - Development Concept. Local traffic from the residential modules is directed to the collector road before exiting the neighbourhood onto perimeter roads. Lanes will be utilized to facilitate rear access, decrease on street parking and limit direct driveway access to roadways. An emergency vehicle route is shown adjacent to Rocky Mountain Boulevard to allow quick and easy access for these vehicles to the north portion of the plan area. Local traffic will be prevented from using this access.

The internal roadway network will comprise approximately 20 percent of the gross developable area of Sun Ridge, or 11.42 hectares.

3.4.4 Sound Attenuation

The dimensions of the arterial road right-of-way on University Drive (75 m) will permit berming and this is anticipated to adequately meet sound attenuation requirements.

3.4.5 Transit Routes

The City's transit authorities have advised that a bus route would follow the internal collector roadway system as shown in Figure 5. Since no schools are to be located in Sun Ridge, the implementation of a transit route will be commensurate with the growth of this community. Prospective bus stop locations are identified on the transit route map.

3.5 FIRE PROTECTION

The City's current 'response time' requirement is six minutes from the nearest fire station to the outer boundary of the development area. Figure 6 identifies the City's four and eight minute response time boundaries from the nearest fire station – Fire Station No. 2.

3.6 HISTORICAL RESOURCE POTENTIAL

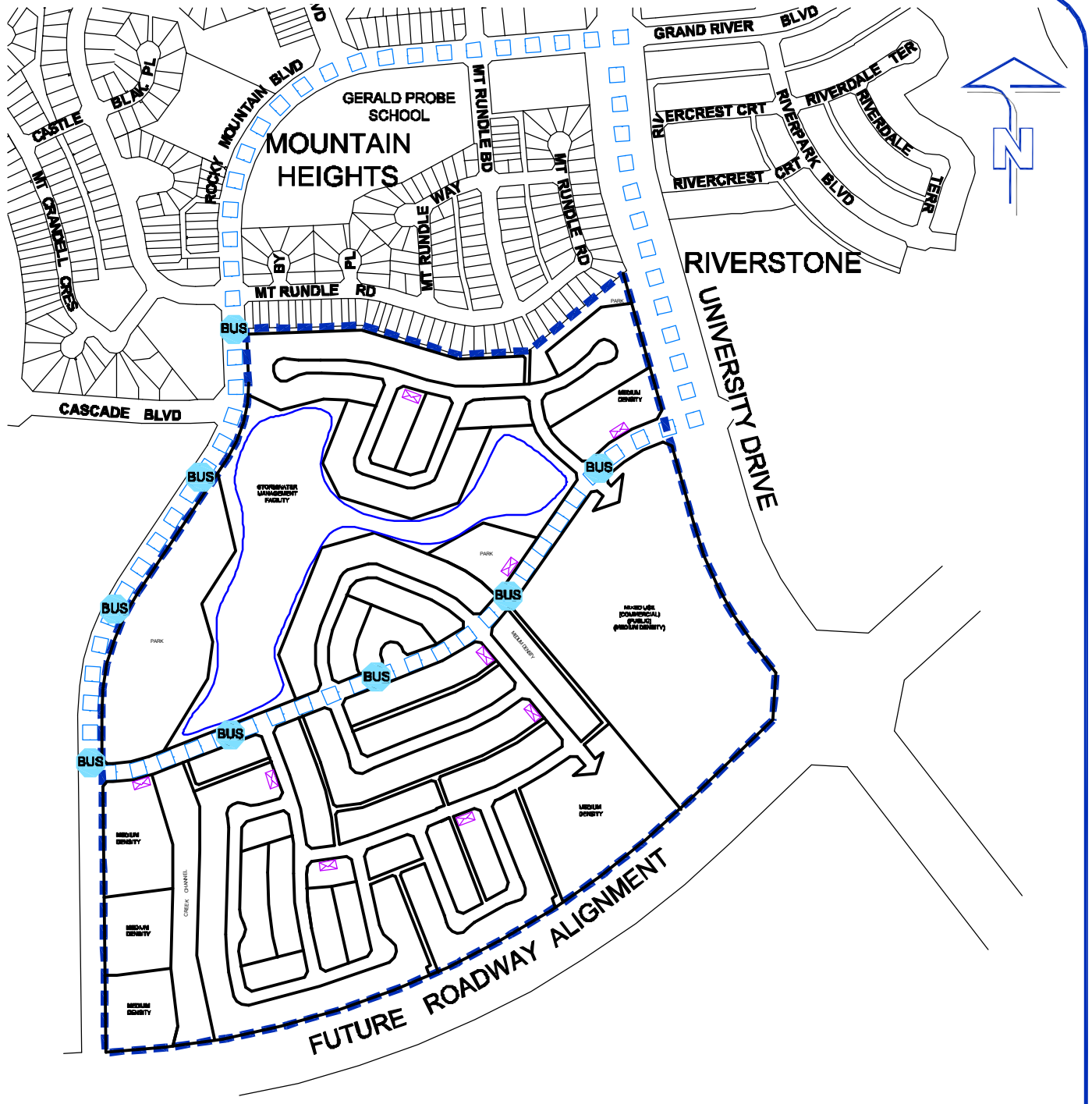
Arrow Archaeological performed a Historical Resource Overview Assessment on the proposed Sun Ridge development and no significant archaeological issues/items were identified (Appendix D).

3.7 COMMUNITY MAIL BOXES

Canada Post has provided super mailbox locations for Sun Ridge development and they are shown on Figure 5.

3.8 ENVIRONMENTAL SUSTAINABILITY AND SENSITIVE AREAS

The principles set out for the development of the area will explore the feasibility of a variety of sustainable possibilities. (See 3.1 - Development Goals and Objectives).



LEGEND

- OUTLINE PLAN BOUNDARY
- CANADA POST MAILBOX SITES
- BUS — POSSIBLE BUS STOP LOCATION (APPROX 200m SPACING)
- BUS ROUTE

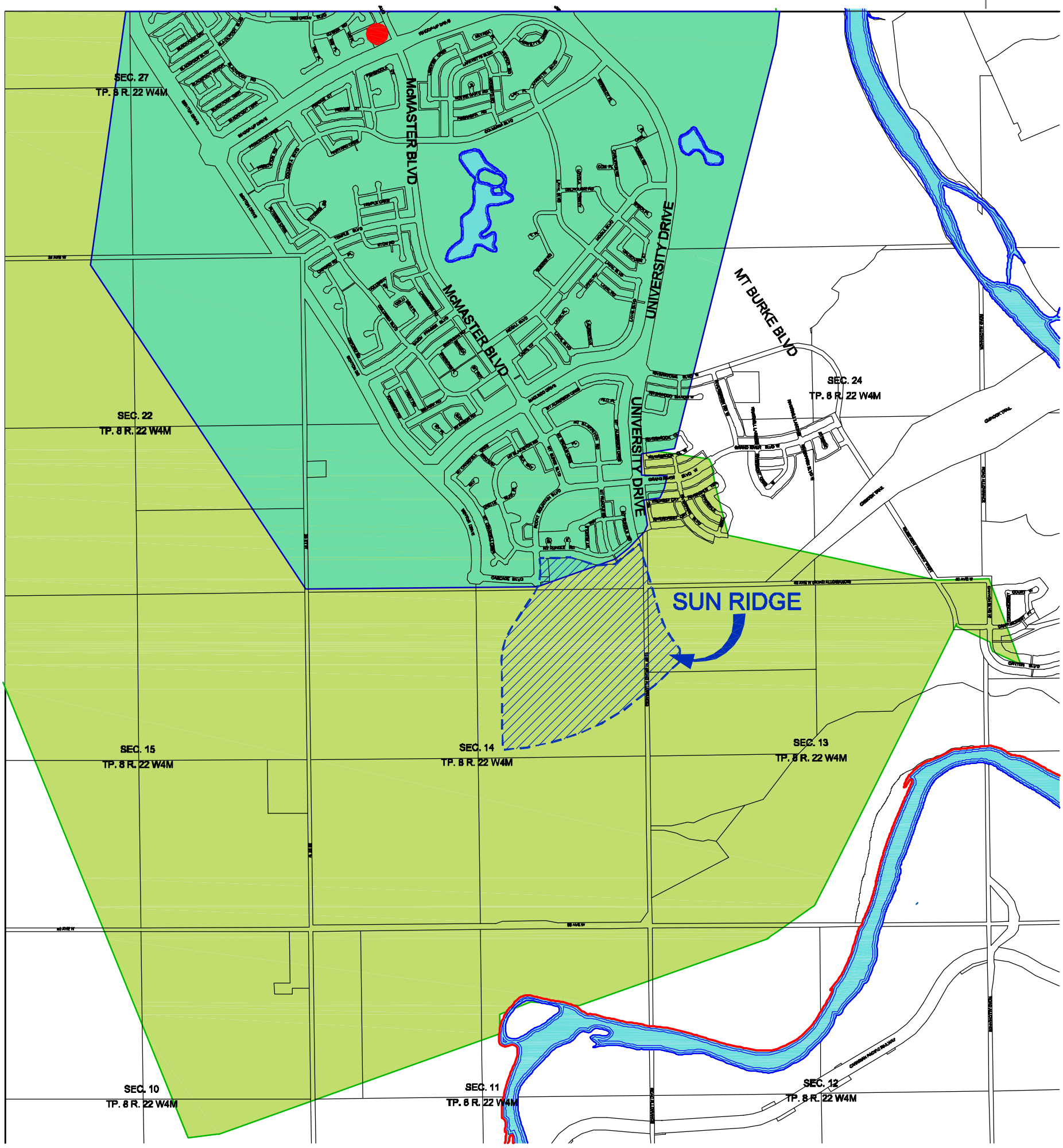
NOTES

ALLTRANSIT STOPS ARE APPROXIMATE AND ARE SUBJECT TO CHANGE AS SUN RIDGE DEVELOPS.

City of Lethbridge
Sun Ridge
Outline Plan

Community Mailboxes & Transit - Site Plan

Figure 5



LEGEND

- FIRE STATION #2
- 8 MINUTE RESPONSE TIME
- 4 MINUTE RESPONSE TIME

NOTES

RESPONSE TIMES LISTED ARE FROM FIRE STATION #2.

City of Lethbridge
Sun Ridge
Outline Plan

Emergency Response Times

Figure 6

4.0 Services

4.1 WATER DISTRIBUTION SYSTEM

The existing water distribution network in the area of the proposed development consists of:

- A 300 mm diameter water main along Cascade Boulevard and Rocky Mountain Boulevard

Proposed additions to the existing network in the area include:

- A 400 mm diameter water main along University Drive, and
- A 400 mm diameter water main along the along the north boundary of the proposed development, connecting the proposed University Drive water main to the existing 300 mm diameter main on Rocky Mountain Boulevard.

The water distribution network for the proposed development will connect to the existing 300 mm diameter main near the Rocky Mountain Boulevard and Cascade Boulevard intersection. The network will also connect to the proposed 400 mm diameter main on University Drive.

The proposed water distribution network is shown on Drawing 01-CL1001, appended to this section. The network will consist of PVC pipe and will be sized to satisfy the City's desired level of service objectives, specifically:

- A minimum pressure of 345 kPa (50 psi) during peak hour conditions and a maximum pressure of 621 kPa (90 psi) during low demand conditions.
- A minimum fire flow of 75 L/s under maximum day demand conditions with a minimum residual pressures of 150 kPa (22 psi).

With the exception of the extension of the existing 300 mm diameter main along Rocky Mountain Boulevard, the distribution network within the development will consist of 200 mm diameter pipe. (It should be noted that the 300 mm diameter main along Rocky Mountain Boulevard might need to be larger to accommodate a proposed future reservoir – However this would have no impact on the layout or sizing of the rest of the distribution network within the development.) No lots will be serviced from the 400 mm diameter mains along University Drive and along the north boundary of the development.

The proposed water distribution system was modeled at full development (population of 1,998) under peak hour demand (1,460 LPCD). A supply pressure of 352 Kpa was assumed at the three connections to the existing distribution network. Low demand conditions were not modeled, as meeting level of service objectives for maximum pressure is a certainty because of the relatively flat topography and constraints on operating pressures at connections to the existing distribution network.

The model results showed that the proposed network easily satisfies level of service objectives with respect to minimum pressure and fire flow under worst-case (peak hour demand) conditions.

Additional modeling also indicated that completion of the 400 mm diameter main along University Drive will be required even for the initial stages of the proposed development.

Model results are summarized graphically in Appendix E. The WaterCAD model and detailed results can be made available upon request.

4.2 SANITARY SEWER SYSTEM

Similar to the offsite water supply, the sanitary sewer for the east portion of the development will require a sanitary sewer line extension along University Drive from Grand River Boulevard (main access to the RiverStone) to the University Drive entrance to the Sun Ridge development. The west portion of the site will be serviced by a south extension of the sanitary sewer line presently terminating near the Rocky Mountain Boulevard / Cascade Boulevard intersection (Refer to attached Dwg. 01-CL1002.). The sewer system analysis including the Land Use and sewage generation rates are included on Drawing 01-CL7001. The contribution from the Sun Ridge Development will not be an issue on downstream capacity in the existing 675 mm sanitary trunk line along Rocky Mountain Boulevard.

4.3 STORMWATER MANAGEMENT

The ultimate discharge point for stormwater from the stormwater wetland shown on the Sun Ridge Outline Plan will be to the Oldman River Valley through a controlled discharge to the RiverStone stormwater collection system and outfall. The stormwater from major rainfall events within the Sun Ridge development will be piped to, stored and treated in the proposed stormwater wetpond. The stormwater wetpond will have a maintained water level through an irrigation water supply from the Lethbridge Northern Irrigation District canal to the north. The stormwater wetland is expected to be an amenity to the proposed development. (Refer to attached Drawing 01-CL1003, 01-CL1004 and 01-CL1005 and the Stormwater Report in Appendix F.)

4.4 SHALLOW UTILITIES

Franchise utilities, including power, natural gas and telephone service, are available from extension of existing nearby facilities. Power, gas and telephone lines and will be located within the road rights-of–way.

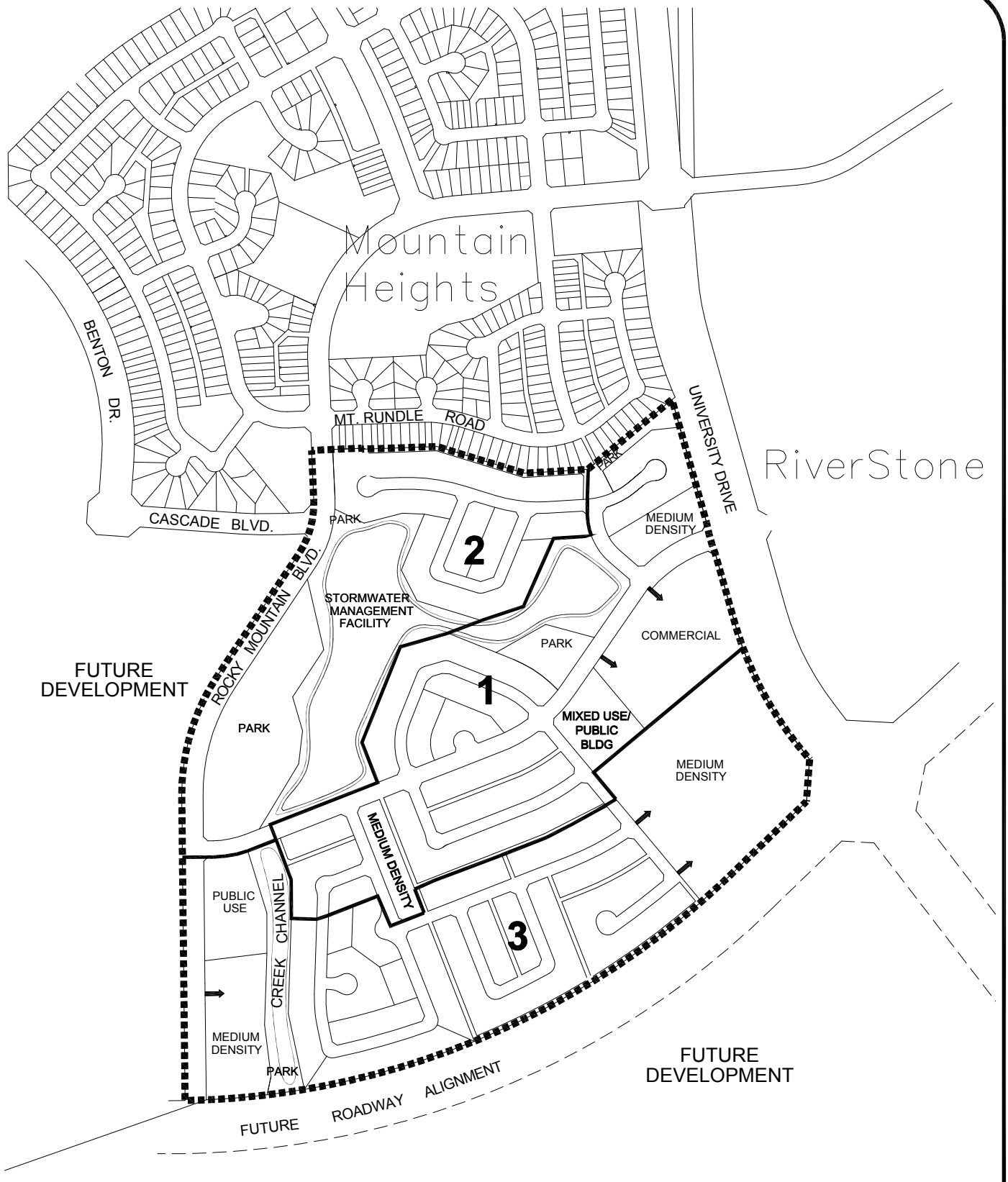
5.0 Implementation

5.1 Subdivision and Development Process

Following adoption of the Outline Plan, implementation of the plan will be on a stage-by-stage basis achieved through the City's redistricting and subdivision processes. It is recommended that the comments received from the Chinook Health Region concerning the Stormwater pond (i.e. signage, groundwater contamination and mosquito control) be addresses during the design stage of development.

5.2 Development Staging

Three stages of development are proposed for Sun Ridge. The third stage is identified for future development because it is subject to revision pending final determination of the future roadway alignment to the south. Stage 1 development is anticipated to begin in the fall of 2004. Proposed subdivision staging is shown in Figure 7.



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Sun Ridge Outline Plan

Staging Plan

Figure 7

Appendix A
Certificates of Title

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S
LINC 0030 265 392 | SHORT LEGAL 9111700;10;13 | TITLE NUMBER 031 444 938 +1

LEGAL DESCRIPTION

PLAN 9111700
BLOCK 10
LOT 13
EXCEPTING THEREOUT:

		HECTARES	(ACRES)	MORE OR LESS
PLAN 0313601	SUBDIVISION	0.002	0.01	

EXCEPTING THEREOUT ALL MINES AND MINERALS

ATS REFERENCE: 4;22;8;23;SE
ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 031 444 926 +1

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
031 444 938	23/12/2003	SUBDIVISION PLAN		

OWNERS

THE CITY OF LETHBRIDGE.
OF 910 - 4TH AVENUE S., LETHBRIDGE
ALBERTA T1J 0P6

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
911 193 000	28/08/1991	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE.

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS

910 - 4TH AVE. SOUTH, LETHBRIDGE
ALBERTA
AS TO PORTION OR PLAN:9111701

TOTAL INSTRUMENTS: 001

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 12 DAY OF MARCH, 2004 AT 09:21 A.M.

ORDER NUMBER:469929

CUSTOMER FILE NUMBER: 01122670001

END OF CERTIFICATE

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S
LINC
0019 543 322

SHORT LEGAL
9111700;10;18

TITLE NUMBER
911 192 998 +16

LEGAL DESCRIPTION
PLAN 9111700
BLOCK 10
LOT 18
EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE
ATS REFERENCE: 4;22;8;23;SE

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 751 130 428 B .

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
911 192 998	28/08/1991	SUBDIVISION PLAN		

OWNERS

THE CITY OF LETHBRIDGE.
OF 910 - 4TH AVENUE S., LETHBRIDGE
ALBERTA T1J 0P6

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(CONTINUED)

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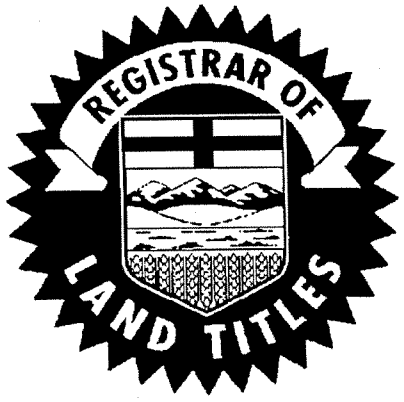
ORDER NUMBER:469929

CUSTOMER FILE NUMBER: 01122670001



END OF CERTIFICATE

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S
LINC 0019 543 314 | SHORT LEGAL 9111700;10;17 | TITLE NUMBER 911 192 998 +15

LEGAL DESCRIPTION
PLAN 9111700
BLOCK 10
LOT 17
EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE
ATS REFERENCE: 4;22;8;23;SE

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 751 130 428 B .

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
911 192 998	28/08/1991	SUBDIVISION PLAN		

OWNERS

THE CITY OF LETHBRIDGE.
OF 910 - 4TH AVENUE S., LETHBRIDGE
ALBERTA T1J 0P6

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
911 193 000	28/08/1991	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. 910 - 4TH AVE. SOUTH, LETHBRIDGE ALBERTA AS TO PORTION OR PLAN:9111701

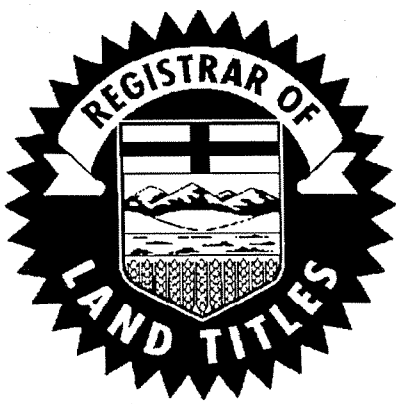
(CONTINUED)

TOTAL INSTRUMENTS: 001

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 12 DAY OF MARCH, 2004 AT 09:21 A.M.

ORDER NUMBER:469929

CUSTOMER FILE NUMBER: 01122670001



END OF CERTIFICATE

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S
LINC 0019 543 306 | SHORT LEGAL 9111700;10;16 | TITLE NUMBER 911 192 998 +14

LEGAL DESCRIPTION
PLAN 9111700
BLOCK 10
LOT 16
EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE
ATS REFERENCE: 4;22;8;23;SE

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 751 130 428 B .

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
911 192 998	28/08/1991	SUBDIVISION PLAN		

OWNERS

THE CITY OF LETHBRIDGE.
OF 910 - 4TH AVENUE S., LETHBRIDGE
ALBERTA T1J 0P6

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
911 193 000	28/08/1991	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. 910 - 4TH AVE. SOUTH, LETHBRIDGE ALBERTA AS TO PORTION OR PLAN:9111701

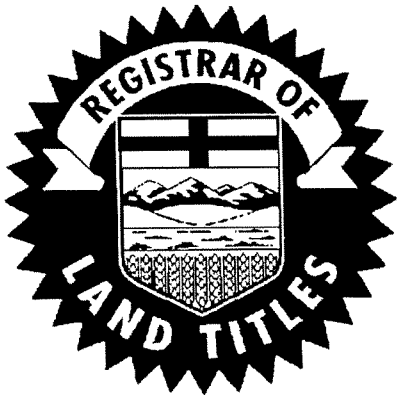
(CONTINUED)

TOTAL INSTRUMENTS: 001

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 12 DAY OF MARCH, 2004 AT 09:21 A.M.

ORDER NUMBER:469929

CUSTOMER FILE NUMBER: 01122670001



END OF CERTIFICATE

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0019 543 298	9111700;10;15	911 192 998 +13

LEGAL DESCRIPTION
PLAN 9111700
BLOCK 10
LOT 15
EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE
ATS REFERENCE: 4;22;8;23;SE

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 751 130 428 B .

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
911 192 998	28/08/1991	SUBDIVISION PLAN		

OWNERS

THE CITY OF LETHBRIDGE.
OF 910 - 4TH AVENUE S., LETHBRIDGE
ALBERTA T1J 0P6

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
911 193 000	28/08/1991	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. 910 - 4TH AVE. SOUTH, LETHBRIDGE ALBERTA AS TO PORTION OR PLAN:9111701

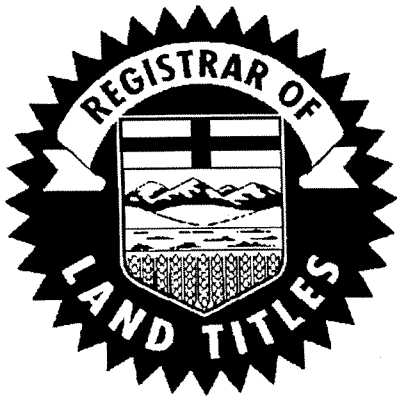
(CONTINUED)

TOTAL INSTRUMENTS: 001

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 12 DAY OF MARCH, 2004 AT 09:21 A.M.

ORDER NUMBER:469929

CUSTOMER FILE NUMBER: 01122670001



END OF CERTIFICATE

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S
LINC 0019 543 280 | SHORT LEGAL 9111700;10;14 | TITLE NUMBER 911 192 998 +12

LEGAL DESCRIPTION
PLAN 9111700
BLOCK 10
LOT 14
EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE
ATS REFERENCE: 4;22;8;23;SE

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 751 130 428 B .

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
911 192 998	28/08/1991	SUBDIVISION PLAN		

OWNERS

THE CITY OF LETHBRIDGE.
OF 910 - 4TH AVENUE S., LETHBRIDGE
ALBERTA T1J 0P6

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
911 193 000	28/08/1991	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. 910 - 4TH AVE. SOUTH, LETHBRIDGE ALBERTA AS TO PORTION OR PLAN:9111701

(CONTINUED)

TOTAL INSTRUMENTS: 001

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 12 DAY OF MARCH, 2004 AT 09:21 A.M.

ORDER NUMBER:469929

CUSTOMER FILE NUMBER: 01122670001

END OF CERTIFICATE

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0021 626 213	4;22;8;13;NW	821 025 427 A .

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 22 TOWNSHIP 8
SECTION 13
THE NORTH HALF OF THE NORTH WEST QUARTER AS SHOWN ON
THE TOWNSHIP PLAN APPROVED AT OTTAWA 15 JUNE 1915
CONTAINING 32.48 HECTARES (80.20 ACRES) MORE OR LESS
EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF LETHBRIDGE

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
821 025 427	12/02/1982			$49,100

OWNERS

DENECKY BROTHERS GRAINS LTD.
OF RR8, SITE 21, COMP 16
LETHBRIDGE
ALBERTA T1J 4P4
(DATA UPDATED BY: CHANGE OF ADDRESS 921043410)
(DATA UPDATED BY: CHANGE OF ADDRESS 021051458)

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
252LM .	12/04/1972	UTILITY RIGHT OF WAY GRANTEE - ALTALINK MANAGEMENT LTD.. ATTN: TRANSMISSION LAND DEPT

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
		PO BOX 20, STATION M CALGARY ALBERTA T2P2G9 AS TO PORTION OR PLAN:876LK (DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 021165386)
741 091 031	27/09/1974	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT
751 005 292	21/01/1975	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. "PORTION DESCRIBED"
871 226 112	08/12/1987	CAVEAT RE : AMENDING AGREEMENT CAVEATOR - ALTALINK MANAGEMENT LTD.. ATTN: TRANSMISSION LAND DEPT PO BOX 20, STATION M CALGARY ALBERTA T2P2G9 (DATA UPDATED BY: TRANSFER OF CAVEAT 021164252)
031 072 226	04/03/2003	CAVEAT RE : OPTION TO PURCHASE CAVEATOR - MELCOR DEVELOPMENTS LTD.. #900, 10310 JASPER AVENUE, EDMONTON ALBERTA T5J1Y8
031 090 059	19/03/2003	CAVEAT RE : OPTION TO PURCHASE , ETC. CAVEATOR - DENECKY BROTHERS GRAINS LTD. STRINGAM DENECKY P.O. BOX 757 LETHBRIDGE ALBERTA T1J3Z6 AGENT - STEVE DENECKY

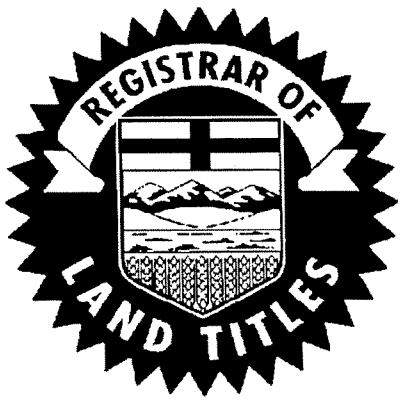
(CONTINUED)

TOTAL INSTRUMENTS: 006

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 11 DAY OF MARCH, 2004 AT 02:50 P.M.

ORDER NUMBER:467716

CUSTOMER FILE NUMBER: 01122670001



END OF CERTIFICATE

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0021 626 171	4;22;8;13;NW	871 024 828 B .

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 22 TOWNSHIP 8
SECTION 13
THE SOUTH HALF OF THE NORTH WEST QUARTER
CONTAINING 32.4 HECTARES (80 ACRES) MORE OR LESS
EXCEPTING THEREOUT:

PLAN	NUMBER	HECTARES (MORE OR LESS)	ACRES
SUBDIVISION	8710224	0.396	0.98

EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF LETHBRIDGE

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
871 024 828	17/02/1987			NIL

OWNERS

DENECKY BROTHERS GRAINS LTD.
OF RR8, SITE 21, COMP 16
LETHBRIDGE
ALBERTA T1J 4P4
(DATA UPDATED BY: CHANGE OF ADDRESS 921043410)
(DATA UPDATED BY: CHANGE OF ADDRESS 021051458)

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
252LM .	12/04/1972	UTILITY RIGHT OF WAY

(CONTINUED)

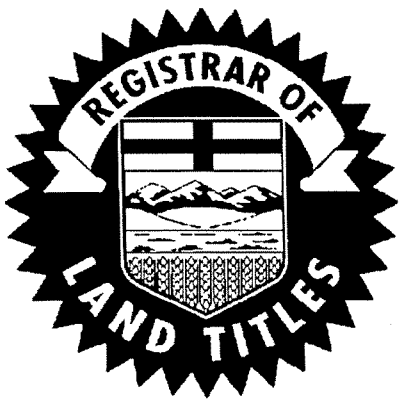
REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
		GRANTEE - ALTALINK MANAGEMENT LTD.. ATTN: TRANSMISSION LAND DEPT PO BOX 20, STATION M CALGARY ALBERTA T2P2G9 AS TO PORTION OR PLAN:876LK (DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 021165386)
741 091 031	27/09/1974	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT
871 226 111	08/12/1987	CAVEAT RE : AMENDING AGREEMENT CAVEATOR - ALTALINK MANAGEMENT LTD.. ATTN: TRANSMISSION LAND DEPT PO BOX 20, STATION M CALGARY ALBERTA T2P2G9 (DATA UPDATED BY: TRANSFER OF CAVEAT 021164252)

TOTAL INSTRUMENTS: 003

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 11 DAY OF MARCH, 2004 AT 02:50 P.M.

ORDER NUMBER:467716

CUSTOMER FILE NUMBER: 01122670001



END OF CERTIFICATE

(CONTINUED)

OTHER ADVICE PREPARED BY THE ORIGINAL PURCHASER AS PART OF THE ORIGINAL PURCHASER APPLYING PROFESSIONAL, CONSULTING OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0022 107 346	4;22;8;14;NE	751 130 428 C .

LEGAL DESCRIPTION
MERIDIAN 4 RANGE 22 TOWNSHIP 8
SECTION 14
QUARTER NORTH EAST
EXCEPTING THEREOUT ALL MINES AND MINERALS
AREA: 64.7 HECTARES (160 ACRES) MORE OR LESS

ESTATE: FEE SIMPLE

MUNICIPALITY: COUNTY OF LETHBRIDGE

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
751 130 428	19/11/1975		$160,000	

OWNERS

THE CITY OF LETHBRIDGE.
OF LETHBRIDGE
ALBERTA

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
751 003 083	14/01/1975	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. "DISCHARGED EXCEPT 20 FT STRIP BY INST. 761071193, 04 06 1976"

(CONTINUED)

TOTAL INSTRUMENTS: 001

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 11 DAY OF MARCH, 2004 AT 02:50 P.M.

ORDER NUMBER:467716

CUSTOMER FILE NUMBER: 01122670001

END OF CERTIFICATE

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0028 606 846	4;22;8;23;SE	001 309 804 +83

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 22 TOWNSHIP 8
SECTION 23
QUARTER SOUTH EAST
CONTAINING 64.7 HECTARES (160 ACRES) MORE OR LESS
EXCEPTING THEREOUT:

PLAN	NUMBER	HECTARES	ACRES
SUBDIVISION	7710684	0.615	1.52
SUBDIVISION	7911317	39.7	98.19
SUBDIVISION	9111700	15.31	37.8
SUBDIVISION	0010942	0.951	2.35
SUBDIVISION	0012775	0.129	0.32

EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 001 100 657 +64

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
001 309 804	30/10/2000	SUBDIVISION PLAN		

OWNERS

THE CITY OF LETHBRIDGE.
OF 910 - 4TH AVENUE S., LETHBRIDGE
ALBERTA T1J 0P6

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
021 388 150	05/11/2002	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AS TO PORTION OR PLAN:0213542

TOTAL INSTRUMENTS: 001

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 11 DAY OF MARCH, 2004 AT 02:50 P.M.

ORDER NUMBER:467716

CUSTOMER FILE NUMBER: 01122670001

END OF CERTIFICATE

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0021 626 171	4;22;8;13;NW	871 024 828 B .

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 22 TOWNSHIP 8
SECTION 13
THE SOUTH HALF OF THE NORTH WEST QUARTER
CONTAINING 32.4 HECTARES (80 ACRES) MORE OR LESS
EXCEPTING THEREOUT:

PLAN	NUMBER	HECTARES (MORE OR LESS)	ACRES
SUBDIVISION	8710224	0.396	0.98

EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF LETHBRIDGE

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
871 024 828	17/02/1987			NIL

OWNERS

DENECKY BROTHERS GRAINS LTD.
OF RR8, SITE 21, COMP 16
LETHBRIDGE
ALBERTA T1J 4P4
(DATA UPDATED BY: CHANGE OF ADDRESS 921043410)
(DATA UPDATED BY: CHANGE OF ADDRESS 021051458)

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
252LM .	12/04/1972	UTILITY RIGHT OF WAY

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
		GRANTEE - ALTALINK MANAGEMENT LTD.. ATTN: TRANSMISSION LAND DEPT PO BOX 20, STATION M CALGARY ALBERTA T2P2G9 AS TO PORTION OR PLAN:876LK (DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 021165386)
741 091 031	27/09/1974	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT
871 226 111	08/12/1987	CAVEAT RE : AMENDING AGREEMENT CAVEATOR - ALTALINK MANAGEMENT LTD.. ATTN: TRANSMISSION LAND DEPT PO BOX 20, STATION M CALGARY ALBERTA T2P2G9 (DATA UPDATED BY: TRANSFER OF CAVEAT 021164252)

TOTAL INSTRUMENTS: 003

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 11 DAY OF MARCH, 2004 AT 02:50 P.M.

ORDER NUMBER:467716

CUSTOMER FILE NUMBER: 01122670001

REGISTRAR OF LAND TITLES

END OF CERTIFICATE

(CONTINUED)

OTHER ADVICE PREPARED BY THE ORIGINAL PURCHASER AS PART OF THE ORIGINAL PURCHASER APPLYING PROFESSIONAL, CONSULTING OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S
LINC
0022 107 346

SHORT LEGAL
4;22;8;14;NE

TITLE NUMBER
751 130 428 C .

LEGAL DESCRIPTION
MERIDIAN 4 RANGE 22 TOWNSHIP 8
SECTION 14
QUARTER NORTH EAST
EXCEPTING THEREOUT ALL MINES AND MINERALS
AREA: 64.7 HECTARES (160 ACRES) MORE OR LESS

ESTATE: FEE SIMPLE

MUNICIPALITY: COUNTY OF LETHBRIDGE

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
751 130 428	19/11/1975		$160,000	

OWNERS

THE CITY OF LETHBRIDGE.
OF LETHBRIDGE
ALBERTA

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
751 003 083	14/01/1975	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. "DISCHARGED EXCEPT 20 FT STRIP BY INST. 761071193, 04 06 1976"

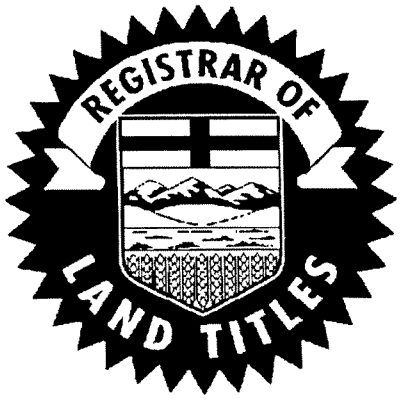
(CONTINUED)

TOTAL INSTRUMENTS: 001

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 11 DAY OF MARCH, 2004 AT 02:50 P.M.

ORDER NUMBER:467716

CUSTOMER FILE NUMBER: 01122670001



END OF CERTIFICATE

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0030 356 778	4;22;8;24;SW	041 072 310 +30

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 22 TOWNSHIP 8
SECTION 24
QUARTER SOUTH WEST
CONTAINING 64.7 HECTARES (160 ACRES) MORE OR LESS
EXCEPTING THEREOUT:

PLAN	NUMBER	HECTARES	(ACRES)	MORE OR LESS
ROAD	7410377	1.62	4.00	
ROAD	9112075	1.93	4.77	
SUBDIVISION	0010942	4.570	11.3	
SUBDIVISION	0012775	6.114	15.11	
SUBDIVISION	0110136	3.23	7.98	
ROAD	0113064	1.850	4.57	
SUBDIVISION	0211008	2.995	7.40	
SUBDIVISION	0214165	0.966	2.39	
SUBDIVISION	0214169	3.408	8.42	
SUBDIVISION	0410046	5.446	13.46	
SUBDIVISION	0410575	0.508	1.26	

EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 041 006 658 +69

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
041 072 310	23/02/2004	SUBDIVISION PLAN		

OWNERS

THE CITY OF LETHBRIDGE.
OF 910 - 4TH AVENUE SOUTH, LETHBRIDGE,
ALBERTA T1J 0P6

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
251LM .	12/04/1972	UTILITY RIGHT OF WAY GRANTEE - ALTALINK MANAGEMENT LTD.. ATTN: TRANSMISSION LAND DEPT PO BOX 20, STATION M CALGARY ALBERTA T2P2G9 AS TO PORTION OR PLAN:876LK (DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 021165386)
911 236 679	21/10/1991	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AS TO PORTION OR PLAN:9112076
001 100 666	17/04/2000	CAVEAT RE : DEFERRED RESERVE CAVEATOR - THE CITY OF LETHBRIDGE. CITY HALL 910 4 AVENUE SOUTH LETHBRIDGE ALBERTA AGENT - GEORGE KUHL.
001 309 807	30/10/2000	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. 910 - 4TH AVE. SOUTH, LETHBRIDGE ALBERTA AS TO PORTION OR PLAN:0012776
011 013 325	12/01/2001	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. 910 - 4TH AVE. SOUTH, LETHBRIDGE ALBERTA AS TO PORTION OR PLAN:0110137 AS TO AREAS A AND B
011 180 302	27/06/2001	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AS TO PORTION OR PLAN:0111728

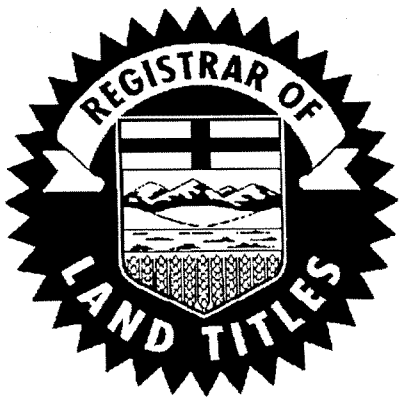
(CONTINUED)

TOTAL INSTRUMENTS: 006

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 11 DAY OF MARCH, 2004 AT 02:50 P.M.

ORDER NUMBER:467716

CUSTOMER FILE NUMBER: 01122670001



END OF CERTIFICATE

ALBERTA REGISTRIES

LAND TITLE CERTIFICATE

S
LINC 0021 626 213 | SHORT LEGAL 4;22;8;13;NW | TITLE NUMBER 821 025 427 A .

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 22 TOWNSHIP 8
SECTION 13
THE NORTH HALF OF THE NORTH WEST QUARTER AS SHOWN ON
THE TOWNSHIP PLAN APPROVED AT OTTAWA 15 JUNE 1915
CONTAINING 32.48 HECTARES (80.20 ACRES) MORE OR LESS
EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF LETHBRIDGE

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
821 025 427	12/02/1982			$49,100

OWNERS

DENECKY BROTHERS GRAINS LTD.
OF RR8, SITE 21, COMP 16
LETHBRIDGE
ALBERTA T1J 4P4
(DATA UPDATED BY: CHANGE OF ADDRESS 921043410)
(DATA UPDATED BY: CHANGE OF ADDRESS 021051458)

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
252LM .	12/04/1972	UTILITY RIGHT OF WAY GRANTEE - ALTALINK MANAGEMENT LTD.. ATTN: TRANSMISSION LAND DEPT

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
		PO BOX 20, STATION M CALGARY ALBERTA T2P2G9 AS TO PORTION OR PLAN:876LK (DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 021165386)
741 091 031	27/09/1974	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT
751 005 292	21/01/1975	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. "PORTION DESCRIBED"
871 226 112	08/12/1987	CAVEAT RE : AMENDING AGREEMENT CAVEATOR - ALTALINK MANAGEMENT LTD.. ATTN: TRANSMISSION LAND DEPT PO BOX 20, STATION M CALGARY ALBERTA T2P2G9 (DATA UPDATED BY: TRANSFER OF CAVEAT 021164252)
031 072 226	04/03/2003	CAVEAT RE : OPTION TO PURCHASE CAVEATOR - MELCOR DEVELOPMENTS LTD.. #900, 10310 JASPER AVENUE, EDMONTON ALBERTA T5J1Y8
031 090 059	19/03/2003	CAVEAT RE : OPTION TO PURCHASE , ETC. CAVEATOR - DENECKY BROTHERS GRAINS LTD. STRINGAM DENECKY P.O. BOX 757 LETHBRIDGE ALBERTA T1J3Z6 AGENT - STEVE DENECKY

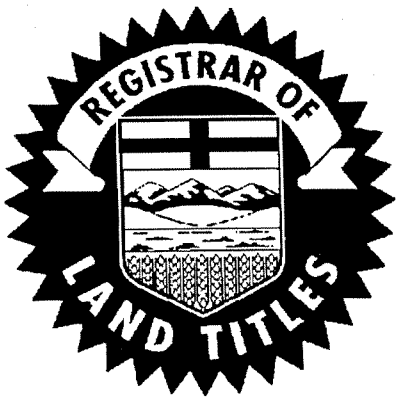
(CONTINUED)

TOTAL INSTRUMENTS: 006

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 11 DAY OF MARCH, 2004 AT 02:50 P.M.

ORDER NUMBER:467716

CUSTOMER FILE NUMBER: 01122670001



END OF CERTIFICATE

Appendix B
Land Use Statistics

OVERALL

Use	Hectares	%	Units	%	Population	%	Density ppgdha
Gross Area	**57.10**						
Arterials	0.00						
Sub-total	0.00						
Gross Developable Area	**57.10**						
Residential							
Low Density	18.12	31.7%	381	53.0%	1256	62.8%	
Medium Density	6.75	11.8%	338	47.0%	743	37.2%	
Subtotal - Residential	**24.87**	**43.6%**	**718**	**100.0%**	**1998**	**100.0%**	**35.0**
Others							
Circulation	11.42	20.0%					
Parks/Municipal Reserve	6.75	11.8%					
Stormwater Management Facility	5.86	10.3%					
Mixed Use (Commercial)	8.20	14.4%					
Subtotal - Other Uses	**32.23**	**56.4%**					

STAGE 1

Use	Hectares	%	Units	%	Population	%	Density ppgdha
Gross Area	**21.63**						
Arterials	0.00						
Subtotal	0.00						
Gross Developable Area	**21.63**						
Residential							
Low Density	9.18	42.4%	193	75.1%	636	81.9%	
Medium Density	1.28	5.9%	64	24.9%	141	18.1%	
Subtotal - Residential	**10.46**	**48.4%**	**257**	**100.0%**	**777**	**100.0%**	**35.9**
Others							
Circulation	4.32	20.0%					
Parks/Municipal Reserve	1.24	5.7%					
Stormwater Management Facility	1.20	5.5%					
Mixed Use (Commercial)	4.41	20.4%					
Subtotal - Other Uses	**11.17**	**51.6%**					

STAGE 2

Use	Hectares	%	Units	%	Population	%	Density ppgdha
Gross Area	**14.25**						
Arterials	0.00						
Subtotal	0.00						
Gross Developable Area	**14.25**						
Residential							
Low Density	2.59	18.2%	54	100.0%	179	100.0%	
Subtotal - Residential	**2.59**	**18.2%**	**54**	**100.0%**	**179**	**100.0%**	**12.6**
Others							
Circulation	2.85	20.0%					
Parks/Municipal Reserve	4.88	34.2%					
Stormwater Management Facility	3.93	27.6%					
Mixed Use (Commercial)	0.00	0.0%					
Subtotal - Other Uses	**11.66**	**81.8%**					

STAGE 3

Use	Hectares	%	Units	%	Population	%	Density ppgdha
Gross Area	**21.22**						
Arterials	0.00						
Subtotal	0.00						
Gross Developable Area	**21.22**						
Residential							
Low Density	6.35	29.9%	133	32.8%	440	42.2%	
Medium Density	5.47	25.8%	274	67.2%	602	57.8%	
Subtotal - Residential	**11.82**	**55.7%**	**407**	**100.0%**	**1042**	**100.0%**	**49.1**
Others							
Circulation	4.25	20.0%					
Parks/Municipal Reserve	0.63	3.0%					
Stormwater Management Facility	0.73	3.4%					
Mixed Use (Commercial)	3.79	17.9%					
Subtotal - Other Uses	**9.40**	**44.3%**					

Appendix C
Traffic Impact Assessment

Introduction

As requested, we have completed a traffic impact analysis for the Sun Ridge development. Our study is based on the revised outline plan for Sun Ridge, and includes traffic from surrounding neighbourhoods (existing & future). We have examined traffic volumes on University Drive, and provided an analysis for the intersection of University Drive and the E-W collector running through Sun Ridge as well as the intersection providing access to the commercial area within Sun Ridge. Details of our analysis are described below.

Trip Generation

Table 1 lists the land uses and trip rates used for Sun Ridge. The commercial trip rates have already been discounted for pass-by and multi-purpose trips. Traffic generation tables for Sun Ridge are attached.

Table 1: Trip Rates

Land Use	PM Peak Hour			AM Peak Hour		
	Trip Rate	% in	% out	Trip Rate	% in	% out
Low Density Residential	1.02 trips/du	64%	36%	0.77 trips/du	26%	74%
Medium Density Residential	0.92 trips/du	61%	39%	0.75 trips/du	29%	71%
Public Use	0.66 trips/1000sq.ft.	52%	48%	0.72 trips/1000sq.ft.	54%	46%
Commercial	4.30 trips/1000sq.ft.	39%	61%	2.74 trips/1000sq.ft.	69%	31%

Residential Trip Rates

Low-density residential trip rates were based on Land Use 210 – Single Family Detached Housing, from the Institute of Transportation Engineers Trip Generation Manual, 7th edition. Medium-density residential rates have been adjusted to reflect typical City of Lethbridge rates. The following dwelling unit densities and populations are based on the Sun Ridge Concept Plan:

- Low-density residential
  - 21 dwelling units per hectare
  - 3.3 people per dwelling unit
- Medium Density residential
  - 50 dwelling units per hectare
  - 2.2 people per dwelling unit

Public Use Trip Rates

Public use sites included institutional buildings such as churches, libraries, day care centres or lodges. It is anticipated that the public buildings will be churches. Public use trip rates were based on ITE Land Use 560 – Church. Ninety percent of the gross public use area was taken as developable with the remaining ten percent assumed to be roads and utility rights of ways, etc. Twenty percent of the developable site was taken as the building area.

Commercial Trip Rates

Commercial area trip rates will differ depending on the type of commercial development. For this reason, assumptions on the trip rates for the commercial areas had to be made. A variety of trip rates from the ITE Trip Generation Manual were combined to get an average trip rate for the commercial areas. The combination in **Table 2** was used. Developable area and gross leasable area were based on the same assumptions as for public use buildings.

Table 2: Commercial Breakdown

Code	Land Use	% of Total Commercial Area	Trip Rate /1000 sq.ft
820	Shopping Centre	30%	1.03
710	General Office Building	30%	1.55
720	Medical-Dental Office Building	6%	2.48
816	Hardware/Paint Store	5%	1.08
850	Supermarket	18%	3.25
912	Drive-In Bank	2%	12.34
932	High Turnover (Sit Down) Restaurant	4%	0.47
934	Fast-Food Restaurant with Drive-Through Window	3%	53.11
945	Gasoline/Service Sation with Convenience Market	2%	77.68

The commercial area will not be a regional centre. Instead, it will primarily serve local residents. Because of this, the number of pass-by trips will be relatively high. Pass-by trips are intermediate stops made on the way from an origin to a primary destination without a diversion in route. For example, stopping at the grocery store on the way home from work would be a pass-by trip if the grocery store was on the same road you take to get home. There is no increase in traffic on the road network from these trips. We reduced the commercial trips by 30% to account for these pass-by trips.

Because the commercial area will include a variety of land uses, several multi-purpose trips can be expected. Multi-purpose trips are stops at several commercial establishments within a commercial area. For example, if you went to the bank, stopped in at the grocery store and then picked up dinner on the way out, you have visited three different commercial areas, in a single trip. Like pass-by trips, multi-purpose trips do not increase traffic on the road network. We reduced the commercial trips by 15% to account for these multi-purpose trips.

Trip Assignment

Three separate phases were analysed:

- Today, including Phase 1 of Sun Ridge
- Phases 1, 2 & 3 of Sun Ridge are complete in the 10 year forecast
- The 20 year forecast includes the 120 acre development to the west of Sun Ridge.

Commercial Trips

Trips to the Commercial and Public Use areas were generated proportional to the populations in surrounding neighbourhoods. Values from the City of Lethbridge Transportation Master Plan (Figure 2.5) were used as well as expected populations for Sun Ridge and the future development immediately west of Sun Ridge. Populations for the three phases and percent distributions are given in **Table 3**.

Table 3: Commercial Trip Distribution

Distribution to Commercial/ Public Use Areas	Today		10 Year Forecast		20 Year Forecast	
	Population	% Distribution	Population	% Distribution	Population	% Distribution
From Sun Ridge	996	22%	3112	29%	312	22%
From Paradise Canyon Area	585	14%	1566	15%	2350	16%
From RiverStone	585	14%	2751	26%	3251	22%
From Mountain Heights	2157	50%	3250	30%	3652	25%
From future development to the West	0	0%	0	0%	2262	15%

The population for the future development west of Sun Ridge was based on 120 acres of land developed according to the statistics in the Sun Ridge Outline Plan. Land use breakdown, dwelling units, and population for this area are shown in **Table 4**.

Table 4: Future Development West of Sun Ridge

	Sun Ridge Area		West of Sun Ridge Area		
	(ha)	(%)	(ha)	Dwelling Units	Population
Parks	6.75	12%	5.83		
Circulation	11.42	20%	9.71		
Stormwater	5.86	11%	5.10		
Low Density	18.12	32%	15.30	321	1060
Medium Density	12.90	23%	10.93	546	1202
Commercial	2.05	4%	1.70		
Totals	**57.10**	**100%**	**48.56**	**868**	**2262**

Residential Trips

As University Drive is currently the only north-south connection in West Lethbridge, all residential trips use University Drive. Some take Rocky Mountain Boulevard to reach University Drive, while others travel are expected to use the E-W Collector through Sun Ridge. Phase 1 of the Sun Ridge development does not include a connection to Rocky Mountain Boulevard; so all Sun Ridge trips access University Drive off the E-W Collector. At build out, approximately 30% of the trips generated by Sun Ridge use Rocky Mountain Boulevard to access University Drive. The remaining 70% use the E-W collector to access University Drive.

Traffic from River Bend, including Paradise Canyon, was assumed to access University Drive travelling westbound at the intersection of the E-W Collector and University Drive (currently Paradise Canyon Boulevard/University Drive). One third of the traffic generated by RiverStone was also assumed to access University Drive at this intersection. The remaining traffic from RiverStone was assumed to access University Drive at Rocky Mountain Boulevard.

A connection to the future development west of Sun Ridge was assumed at the intersection of Rocky Mountain Boulevard and the E-W collector through Sun Ridge. Half of the trips generated by this development were assumed to travel along the E-W collector to University Drive. The other half were assumed to travel up Rocky Mountain Boulevard to University Drive.

Today's traffic on University Drive was estimated using 2001 traffic counts at the intersection of Paradise Canyon Boulevard and University Drive. To these counts was added trips generated by an additional 100 single-family dwelling units in Paradise Canyon; these are additional development since 2001 and soon to be added lots. No AM peak hour counts were available, so traffic movements were reversed to approximate AM flows.

Trips generated by RiverStone and River Bend were computed based on 0.278 trips per person in the peak hour. Directional distributions were assumed to be 60% in/40% out in the PM and 30% in/70% out in the AM.

Trip tables and turning movement conditions for three scenarios are enclosed for information. These tables are titled 1A-8A, 1B-8B and 1C-8C. A digital copy of these tables can be provided on request.

Intersection Analysis

Figure 1 shows the intersection locations considered in this assessment. Tables 1A to 8C show the traffic movements at the seven major intersections within Sun Ridge and on University Drive at three development scenarios.

Intersection 7 will generate more traffic than shown as no residential trips from Mountain Heights were included in this model. Intersections 6 and 7 were examined in detail. An HCS analysis was completed to determine lane requirements and intersection control. The values in Table 5 were used to determine lane requirements. Table 6 lists the results of the analysis.

Table 5: Intersection Analysis Parameters

	Signalized	Unsignalized
Peak hour factor	0.92	0.92
Saturation Flow (vph)	1750	1700
Level of Service	D or better	C or better
Volume-to-Capacity Ratio	0.80 or less	0.80 or less

Table 6: Intersection Requirements

	Intersection	Lane requirements	Control
Today	5	NB 1 Through-right-left SB 1 Through-right-left EB 1 Through-right-left WB 1 Through-right-left	North Bound/ South Bound Stop
	6	NB 1 Through-right-left SB 1 Through-right-left EB 1 Through-right-left WB 1 Through-right-left	Signalized
10 Year	5	NB 1 Through-right-left SB 1 Through-right-left EB 1 Through-right-left WB 1 Through-left 1 Right	North Bound/ South Bound Stop
	6	NB 1 Through-right-left SB 1 Through-right 1 Left EB 1 Through-right 1 Left WB 1 Through-left 1 Right	Signalized
20 Year	5	NB 1 Through-right-left SB 1 Through-right-left EB 1 Through-right-left WB 1 Through-right-left	Signalized
	6	NB 1 Through-right-left SB 1 Through 2 Left 2 Right EB 1 Through-right 2 Left WB 1 Through-left 2 Right	Signalized

Intersection 6

The intersection of the E-W Collector and University Drive will require signals for all three phases. Significant improvements could be made to this intersection by providing an alternate access to University Drive south of this intersection. This would reduce the high westbound right-turning movement in the morning and southbound left-turning movements in the evening. Providing a second major north-south route in West Lethbridge west of Sun Ridge would also

provide considerable improvement to this intersection. This would reduce the eastbound left-turning movements in the morning and southbound right-turning movements in the evening. The double left and right turn lanes could be eliminated if an alternate north-south route was available.

Intersection 5

This intersection will function as a simple two-way stop today and at the 10 year horizon. If traffic from the west development is not given an alternate route, signals will be required here at the 20 year horizon.

Other Intersections

Although they have not been analysed in detail, it is anticipated that intersections 1 through 4 will function as two-way stop controlled intersections with minimal lane requirements. Intersection 7 will require signals and left and right turning lanes.

Traffic on University Drive

Daily traffic volumes on University Drive adjacent to Sun Ridge were estimated based on the peak hour flows being 10% of the daily traffic flows. For today's estimate, traffic volumes are between 8000 and 9000 vehicle per day (vpd). In ten years, these flows will reach between 15,000 and 22,000 vpd and in 20 years these flows are in excess of 30,000 vpd. Providing an alternate north-south route for the 120 acre development west of Sun Ridge could reduce these numbers to in the order of 20,000 and 25,000 vpd.

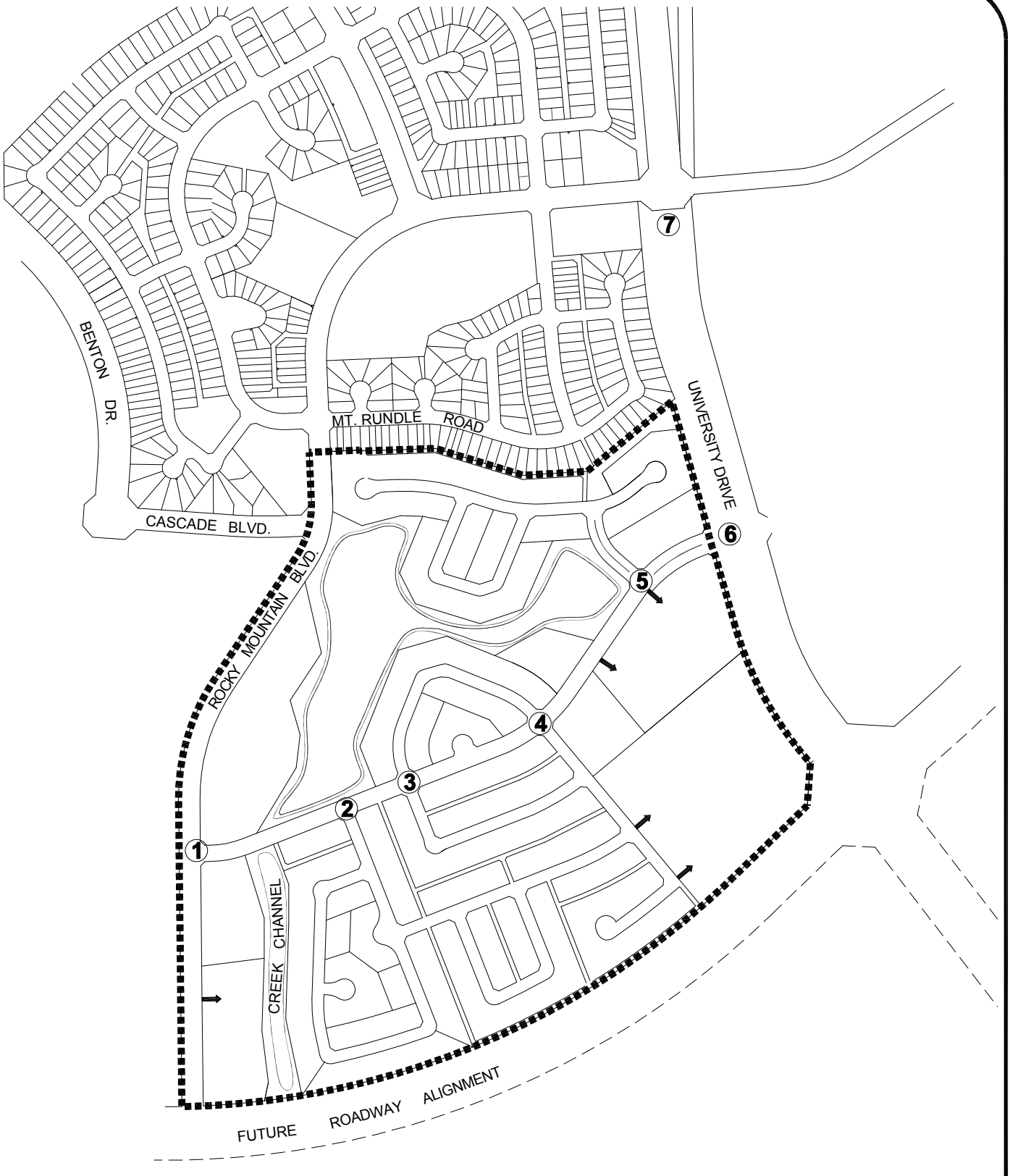
Temporary Roadway Routing

The extension of University Drive for access to Sun Ridge will impact the existing roadways providing access to Paradise Canyon and Popson Park. To mitigate this impact, we are recommending temporary access roadways be constructed as shown on **Figure 2**. This figure shows 40 Avenue (existing Paradise Canyon access) connecting to University Drive at the access to Sun Ridge. The south leg at this intersection will provide access to Popson Park and other properties to the south. The temporary access to Paradise Canyon is recommended to be a paved access and the access to the south will continue to function as a gravel access. The length of time that this access can remain in place will be dependent on how quickly RiverStone and Sun Ridge adjacent University Drive develop.

Conclusions and Recommendations

- Intersections 5 and 6 are acceptable with no further improvements at build-out of Phase 1 of Sun Ridge. Intersection 6 will require signals at completion of Phase 1. This is predicated on a combination of traffic from Sun Ridge and Paradise Canyon.

- Based on the 10 and 20 year forecasts, intersection 6 becomes a major signalized intersection with double left and right turn lanes. Intersection 5 requires signals when the development west of Sun Ridge is built.
- An alternate north-south route is recommended to alleviate traffic congestion on University Drive. This would reduce turning movements at intersections 6 and 7 and reduce overall traffic flow on University Drive and the east west collector through Sun Ridge.
- Relocating Paradise Canyon Boulevard to the south or providing an alternate access south of University Drive/ E-W Collector would further reduce congestion at Intersection 6.



LEGEND

PLAN BOUNDARY

2 INTERSECTION NUMBER

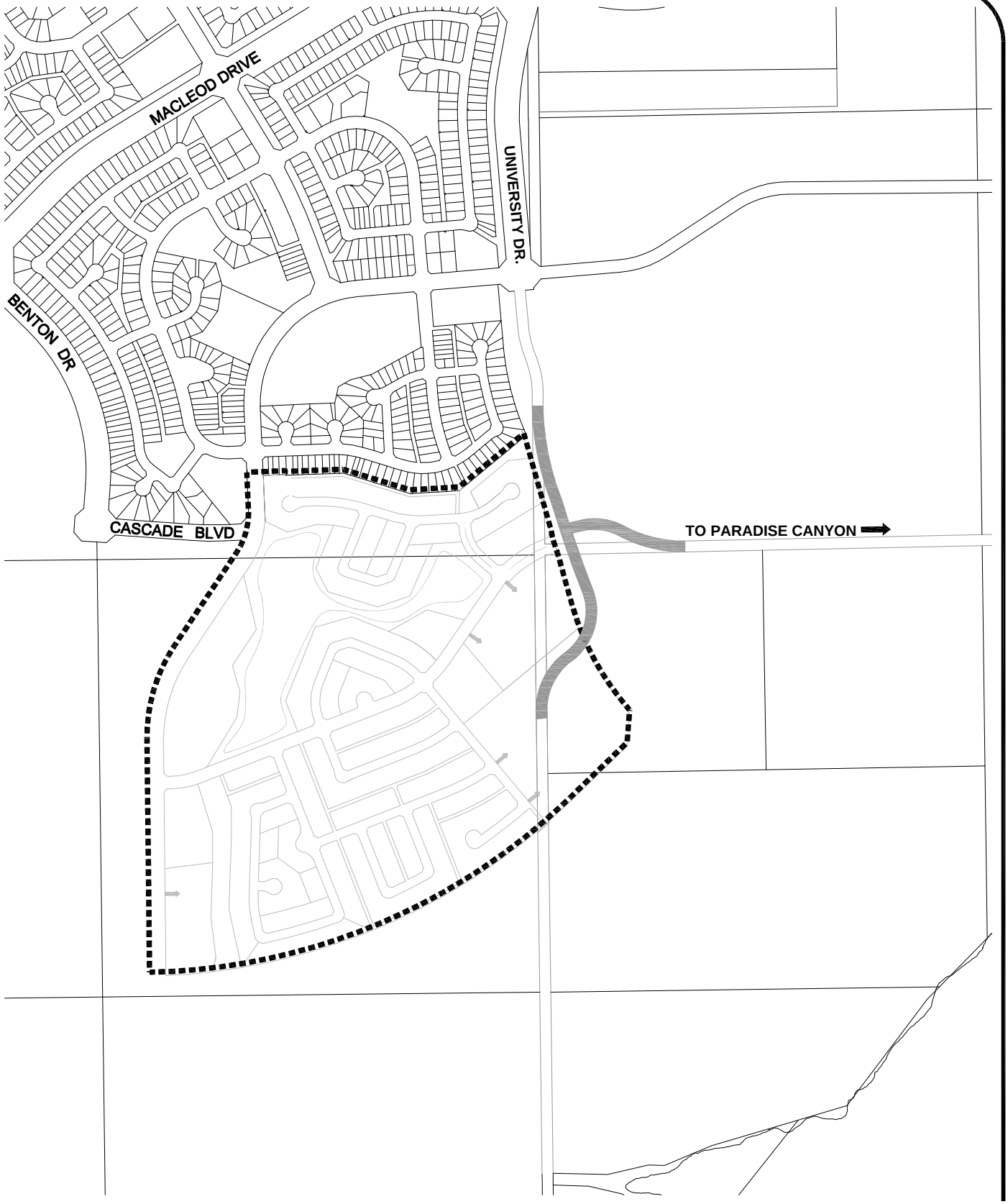
0 25 75 125 m

25 12.5 1:7500

Sun Ridge Outline Plan

NUMBERED INTERSECTIONS

Figure T1



LEGEND

PLAN BOUNDARY

ROAD RIGHT-OF-WAY

25 0 50 100 150m

50 SCALE 1:10,000

Sun Ridge
Outline Plan

TEMPORARY ROADWAY PLAN

Figure T2

LEGEND

PLAN BOUNDARY

A TRAFFIC ZONE

N

0 25 75 125 m

25 12.5 1: 7500

Sun Ridge
Outline Plan

TRAFFIC ZONES

Appendix D
Historical Resource Overview

Arrow
Archaeology
Limited

2315 20 Street, Coaldale, Alberta, T1M 1G5 Phone: 403 345 2812 Fax: 403 345 2817 Cell: 403 330 8376 Email: miraun@uleth.ca

2004 04 05

Randy Stevenson
UMA Engineering Ltd.
514 Stafford Drive
Lethbridge, Ab.
T1J 3Z4

Dear Randy:

Re: Sun Ridge Residential Subdivision-Historical Resources Overview

Introduction and Summary

We have conducted an historical resources overview and assessment of the proposed Sun Ridge Residential Subdivision. The area surveyed was that area outlined in your photo/map that you had supplied to us and this area is within NE ¼ 14-8-22-4, SE ¼ 23-8-22-4 and NW1/4 13-8-22-4. This area is considered to have low to moderate potential to contain historical resources and therefore an overview was considered to be an adequate step to determine whether or not the proposed subdivision area contained any historical resources. Our methodology is described more completely below, but included a brief field survey. The initial survey resulted in the identification of a small concentration of fire broken rock in one area. Fire broken rock is often indicative of human activity and is a common feature of archaeological sites in southern Alberta. We initially were unable to determine whether this material is in fact a result of ancient human activity or relatively recent human activity in the area. A more thorough examination of the find area was completed on April 2, 2004 and we did not locate any other material or indication that the fire broken rock was from an archaeological site. **This find has therefore been judged to be of no archaeological, historical or scientific significance and there are no further concerns with respect to this site or the subdivision area in general.**

Historical Resource Potential

Inasmuch as this area has been cultivated, the possibility of intact archaeological sites on the surface in the area was low. Cultivation, however, often results in bringing buried material to the surface. For this reason and given the subject area's proximity to the Oldman River Valley, an area of high archaeological potential, a surface examination was warranted and was completed. This survey allowed us to field truth our estimate of historical resource potential for the area and to identify any possible archaeological remains. Of the area covered by the subdivision the easternmost portion (essentially the NW ¼ of Section 13) was considered to offer the highest archaeological potential.

Methodology
Prior to carrying out the field survey, archival records and archaeological site inventory data were examined to determine whether there were any previously recorded sites in the area. In addition, the Province of Alberta's *Listing of Significant Historical Sites and Areas* (4th Edition, restricted version) was examined.

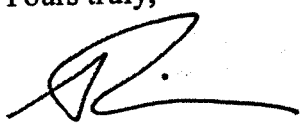
The proposed subdivision was then examined via a pedestrian survey to identify any historical resources or areas that had the potential to contain historical resources. The survey followed a regular transect across the area.

Results
There are no known or previously recorded sites within the proposed subdivision area. The field survey resulted in the discovery of a small concentration of fire broken rock. Fire broken rock is common indicator of past human camping/household activity. It occurs when rocks is heated in a hearth or, for example when heated rocks are placed in water to heat that water. Fire broken rocks, of course, also occur due to modern campfires and can occur (rarely) due to natural fires. The initial survey did not reveal any other cultural material, but the presence of fire broken rock means that a slightly more intensive examination of the area was required. This examination was conducted by an archaeologist and an archaeological field assistant on April 2, 2004. No other cultural material was found nor was there any contextual or other data that suggested the site was archaeological or had archaeological, historical or scientific significance. We therefore have concluded the fire broken rock was the result of a relatively recent fire in the area and that the material is not part of an archaeological site.

Recommendation
There are no further concerns with respect to this site or the subdivision area in general and we recommend that the development be permitted to proceed.

Please let me know if you have any questions.

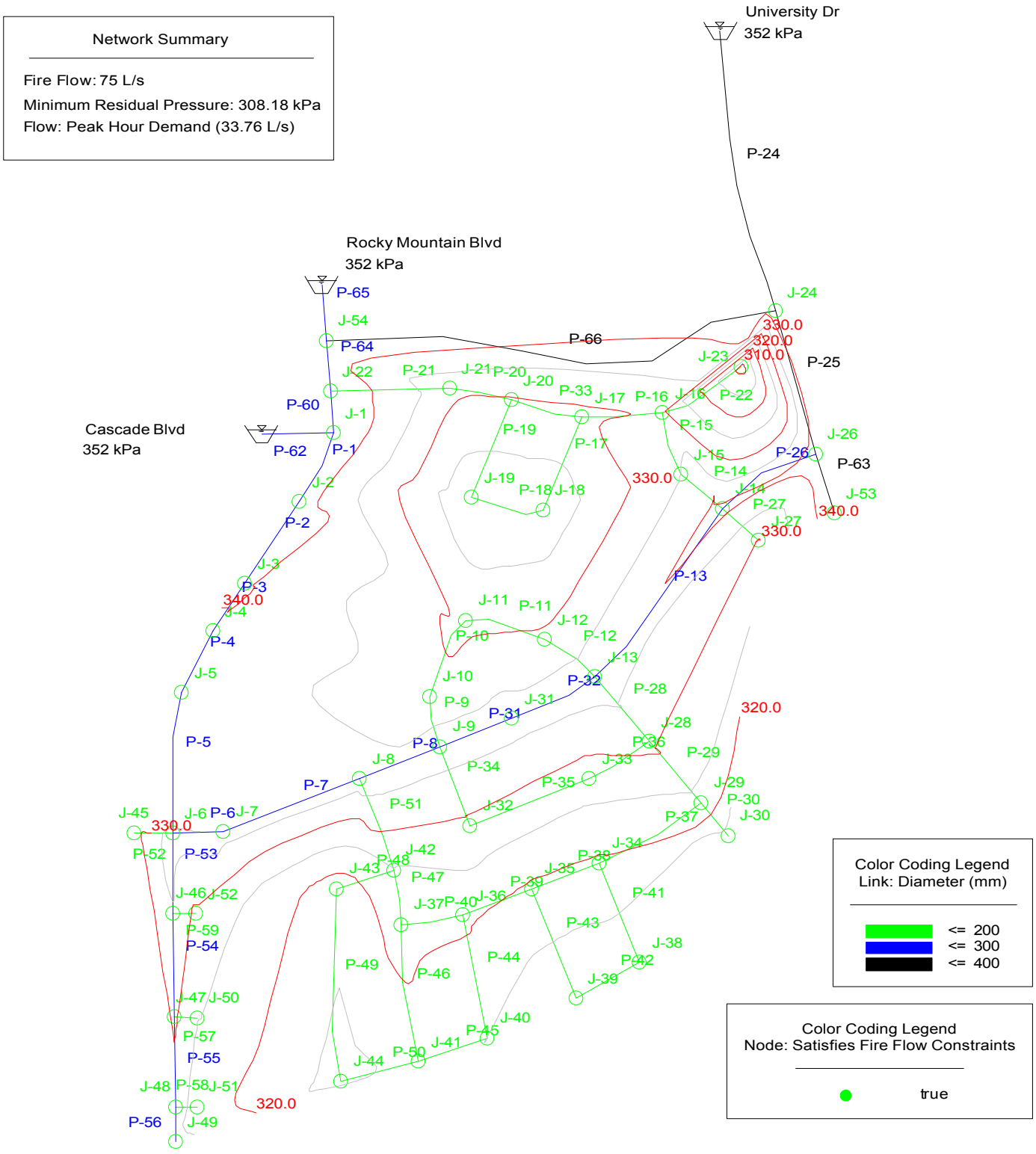
Yours truly,



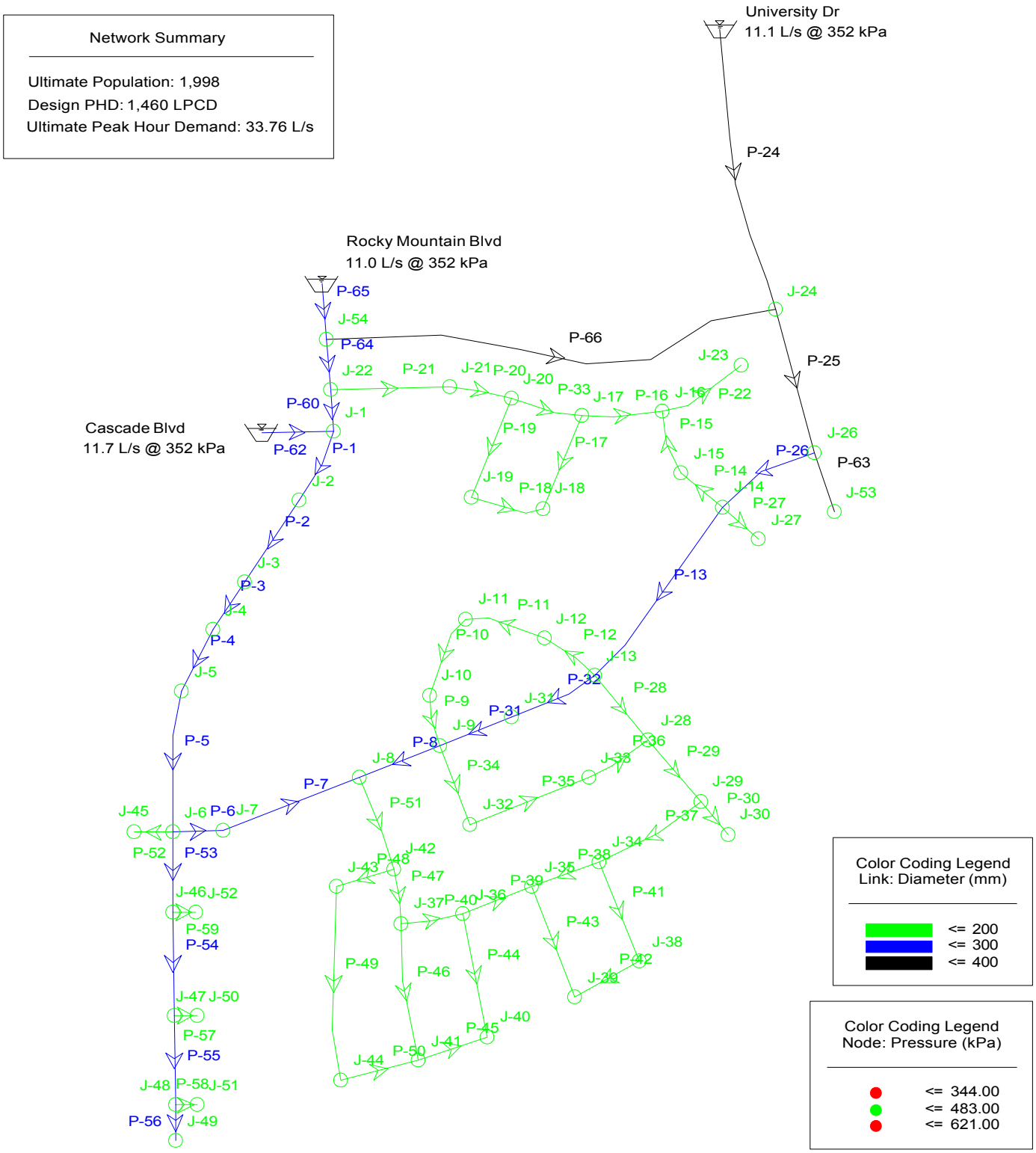
Neil Mirau

Appendix E
Water Distribution Analysis

Contour Plot - Residual Pressure
Scenario: Peak Hour Demand



Scenario: Peak Hour Demand



Appendix F
Stormwater Management Report

Sun Ridge, Lethbridge
Master Drainage Plan and Phase I Outline Planning Information

Prepared for:
City of Lethbridge

Prepared by:
UMA Engineering Ltd.

May 2004

File No.: 0112-267-00-02

Table of Contents **Page No.**

List of Appendices

EXECUTIVE SUMMARY

This report addresses the stormwater servicing requirements for the Sun Ridge development in the City of Lethbridge. It assesses the capacity, water quality and other related stormwater issues of the existing storm outfall, highlights current hydraulic concerns, and provides stormwater management objectives to guide future development in the Sun Ridge area.

The study provides an understanding of how the existing drainage system operates, and the impact development would have on the existing infrastructure. It is to be used as a planning document to provide a framework for future development, as well as provide an overview of the proposed system to meet the current stormwater objectives of the City of Lethbridge and Alberta Environment (AENV). The report also outlines order-of-magnitude cost estimates for the servicing options for the overall system to improve treatment and avoid flooding downstream of the development area.

Study Area

The study area includes 155 ha of the Sun Ridge development. This includes 57.10 ha of the initial phase of development in the east of the catchment. The current overland drainage boundary is shown in Figure 2.1. As can be seen, a minor portion of the proposed catchment currently discharges elsewhere, and some off-site flows enter the catchment. The net difference in catchment area is negligible.

A description of the catchment is presented in Section 2. Discussion of the proposed stormwater release rates for each sub-catchment is included in Section 4.1.

Drainage Systems

Some of the City's minor drainage system (storm sewers) was modelled in this study using the 1:5 year design storm. The 1:100 year design storm was used to model the major drainage system, which consists of overland flow, detention ponds and major swales.

Current Stormwater Issues

The primary concern is the amount of stormwater permitted to discharge into the existing Riverstone trunk sewer. The allowable discharge rate for the whole development is 2.907 m^3/s, as stated in the Riverstone Master Drainage Report (Stantec 2002). All stormwater drainage calculations are based on this outflow criterion.

The secondary concern is that selected areas within the site boundary do not naturally drain to the City's storm system. In many catchments the stormwater flows are discharged towards the northwest; this causes flooding problems during extreme rainfall events.

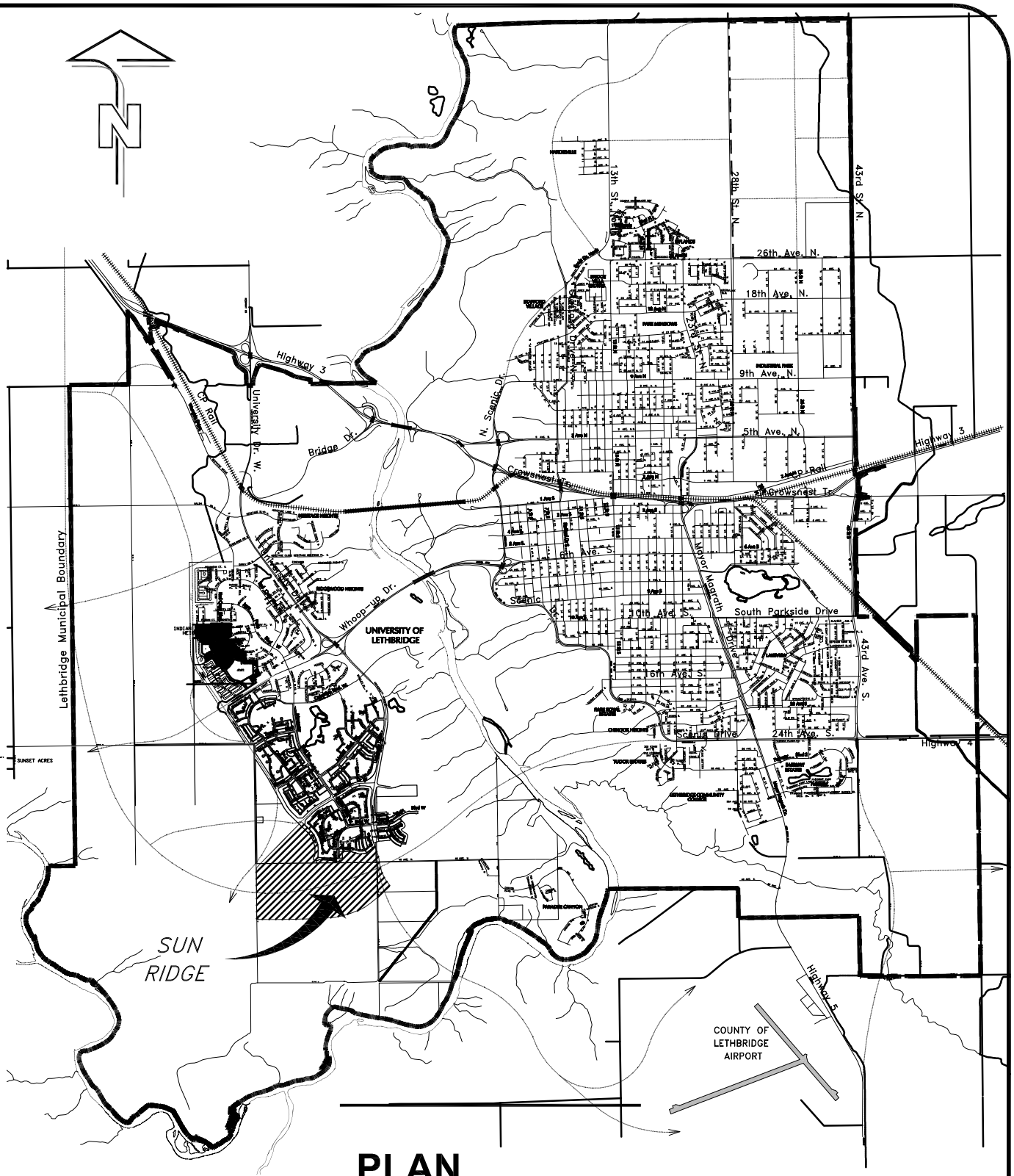
Water quality issues have been addressed in this report. The stormwater discharge from the Sun Ridge development complies with Alberta Environment Regulations, in that 85% of Total Suspended Solids (TSS) will be removed prior to discharge into the trunk sewer.

1. INTRODUCTION

The Sun Ridge development is situated in West Lethbridge, north of the Old Man River and 5 km south of Highway 3 (See Figure 1.1). The topography of the site is undulating throughout, with several large knolls scattered around the site. The maximum elevation difference is 7 m, and the catchment generally drains from southwest to northeast.

Due to the significant increased demand for development in and around Lethbridge, the City has engaged UMA to prepare a Master Drainage Plan to aid in future drainage planning and address several stormwater issues. This report will be a planning document that examines:

- The capacity of the existing system;
- Storm water quality issues;
- The proposed stormwater system that would meet the current storm water objectives of the City of Lethbridge and Alberta Environment; and
- Various cost estimates for the consolidated options.



PLAN

SCALE 1:75000

0 750 1500 2250 m

City of Lethbridge
Sun Ridge, Lethbridge
Master Drainage Plan

Location Plan

Figure -1

2. STUDY AREA DESCRIPTION

2.1 Study Area

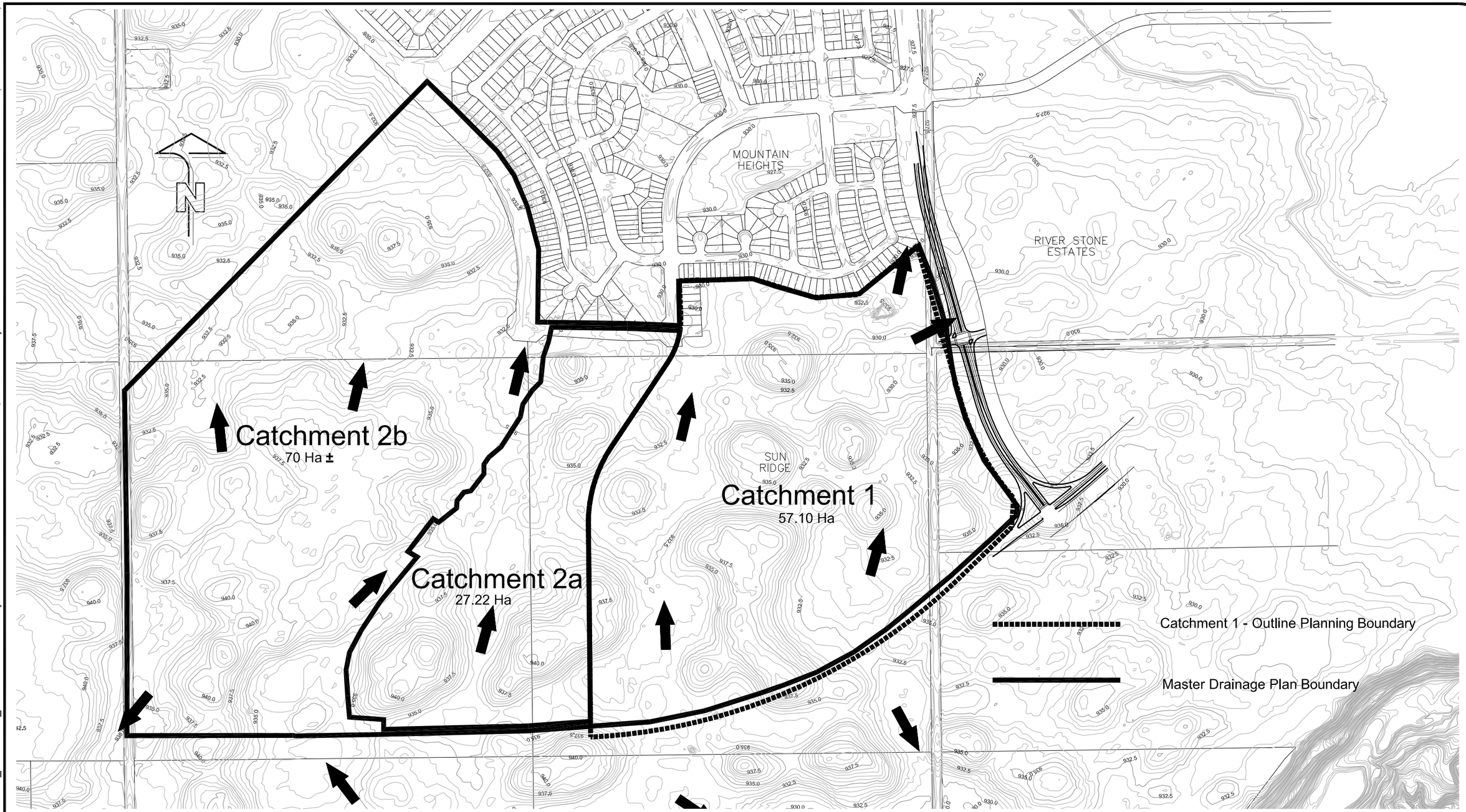
The study area comprises the land within the City boundary as shown on Figure 2.1. The study area totals 155 ha. For 57.10 ha of this development, Outline Planning Design has been completed. The natural drainage path in the development is generally from southwest to northeast, towards the existing Riverstone development. There are several topographical features that direct most of the overland stormwater flow towards the northeast. The northwest corner of the study area currently discharges to the north, and a small area in the southwest discharges to the south.

For the stormwater servicing of external areas, refer to the Riverstone Master Drainage Report (Stantec 2002).

The existing development in the area is limited to the new Riverstone subdivision to the northeast, and the Mountain Heights subdivision immediately to the north. A major arterial roadway, Chinook Trail, is proposed along the southern edge of the catchment, and an extension to Benton Drive is proposed through the centre of the catchment.

2.2 Existing Site Conditions

To facilitate discussion, the study area contained within the overall catchment boundary has been divided into 3 catchments shown in Figure 2.1. Boundaries of individual sub-catchments were determined based on the type of drainage, topography and the outfall location. Outline Planning Design is proposed for the area east of the Rocky Mountain Boulevard extension, with the area on the west side of Rocky Mountain Boulevard making up the remainder of this Master Drainage Plan.



PLAN

SCALE 1:7500 0 75 150 225 m

City of Lethbridge
Sun Ridge, Lethbridge
Master Drainage Plan

Site Plan

Figure - 2.1

Catchment 1 is defined as the catchment subject to Outline Planning, i.e. east of Rocky Mountain Boulevard and Catchment 2 is located to the west of Rocky Mountain Boulevard. Catchment 2 has been divided into two separate areas. Although area 2a is not included in the Outline Planning Area, stormwater management for this area has been included in Catchment 1.

3. PROPOSED DEVELOPMENT AREAS

3.1 Criteria For Non-Developable Areas

A review of the study area defined the non-developable areas based on the following criteria: slope setbacks, creek setbacks, floodplains, utility rights-of-way, and environmentally sensitive areas.

3.2 Land Use and Density of Developments

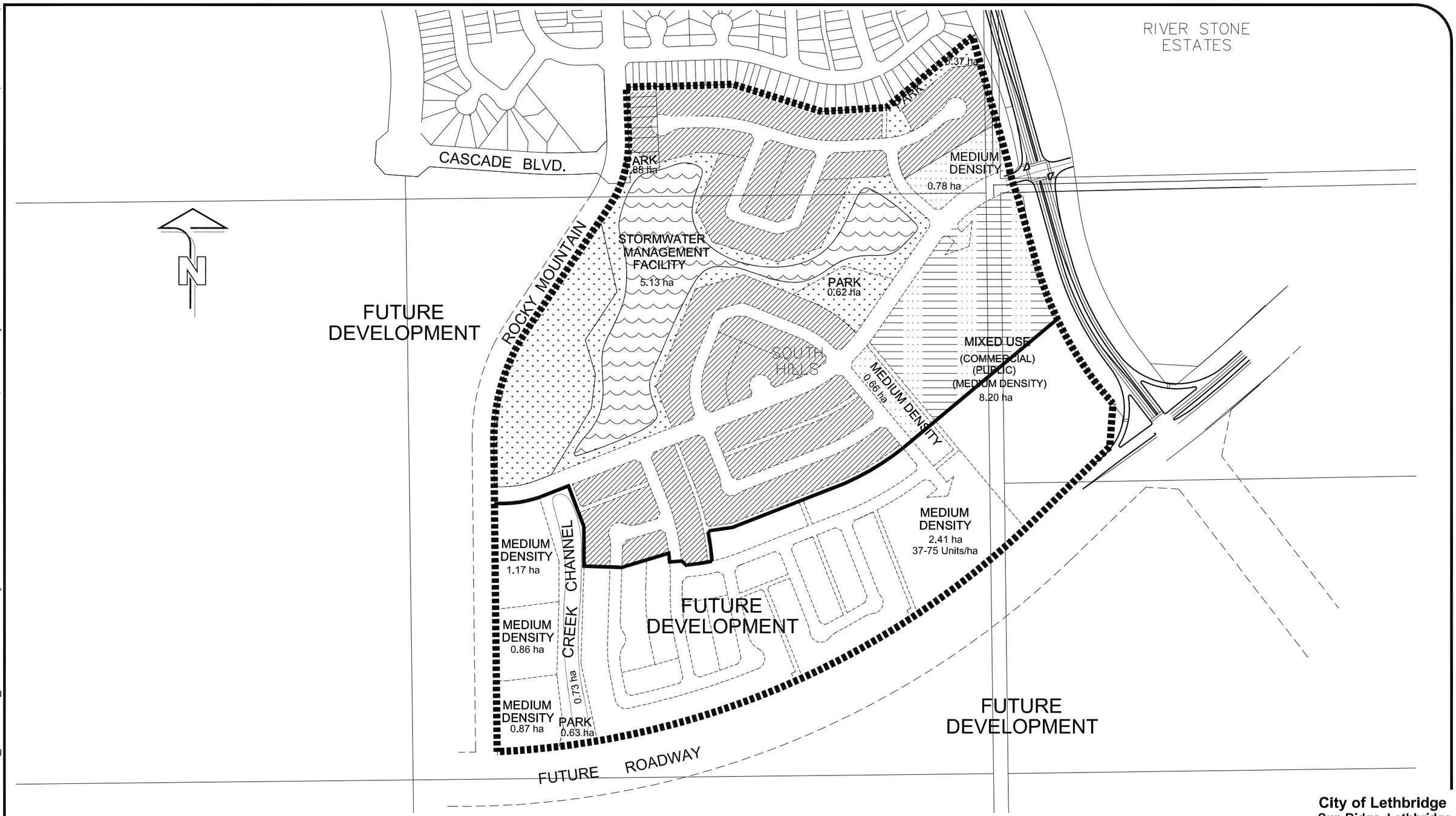
In accordance with the Municipal Development Plan, the developable areas are generally designated as Urban Reserve (UR) or General Agriculture (GA). Densities have been chosen for a mix of residential and commercial land uses. The population density for the study area is 30 people/ hectare. This population density criterion was used to calculate percent imperviousness for the lands to the west of Rocky Mountain Boulevard.

3.3 Proposed Development Areas

The proposed development areas for Catchment 1 are illustrated in Figure 3.1 and consist of the following land uses:

- Circulation 8.6 ha
- Parks/ Municipal Reserve 6.3 ha
- Commercial 5.0 ha
- Residential Subdivision 28.2 ha
- Utility (including stormwater) 7.5 ha
- Public 1.5 ha

Development in the above lands would occur in stages beginning with areas nearest to existing infrastructure.



PLAN

SCALE 1:5000

0 50 100 150 m

City of Lethbridge
Sun Ridge, Lethbridge
Master Drainage Plan

Catchment 1 - Concept Plan

Figure - 3.1

4. STORMWATER MANAGEMENT

4.1 General

The stormwater management study identifies the minor and major flows in the study area, and calculated the allowable discharge rates for future developments.

- For Catchment 1: The report includes an outline design that identifies outfall requirements, preliminary design of water quality enhancement facilities, and preliminary design of the minor system.
- For Catchment 2: The report includes a Master Drainage Plan that identifies outfall requirements, water quality enhancement facilities, and storage facilities to temporarily store the difference between the post and the pre-development runoff.

The maximum allowable discharge rate is set in the Riverstone Stormwater Management Plan. This report allows a discharge rate of 51 L/s/ha for 57 ha (2,907 L/s). However, the Sun Ridge development has been expanded to 155 ha, therefore, the unit discharge rate is 18.8 L/s/ha (=2,907/ 155).

4.1.1 Site Description

The existing sub-areas in Catchment 1 are currently undeveloped with no clearly defined watercourses; stormwater is conveyed as sheet flow over the catchment. There are several large knolls that have created natural dry ponds, so during minor storms there is no runoff from much of the study area.

The natural drainage within the study area is depicted by contours in Figure 2.1.

4.1.2 Pre-Development Drainage

Table 4.1 summarizes the 1:5 year flows for the undeveloped sub-catchments within the study area, and identifies the proposed point of discharge for each catchment when developed. These catchments are shown in Figure 4.1.

Table 4.1

1:100 and 1:5 Year Flows for all Sub-catchments

Sub-catchment	Point of Discharge (model Ref)	Area (ha)	Percent Impervious (%)	Existing 1:5 Year Flows (L/s/ha)	Existing 1:5 Year Flows (m^3/s)
E-1	3	4.27	60	14.3	0.061
E-2	4	3.36	75	22.0	0.074
E-3	6	3.04	75	19.4	0.059
E-4	7	4.36	60	19.7	0.086
E-5	10	4.33	60	19.4	0.084
E-6	12	4.48	75	19.6	0.088
E-7	14	5.11	50	20.5	0.105
E-8	17	3.17	85	24.6	0.078
E-9	19	5.22	65	19.5	0.102
E-10	23	2.39	10	18.4	0.044
E-11	24	1.79	10	27.9	0.050
E-12	26	6.76	95	16.1	0.109
E-13	31	6.11	55	22.4	0.137
E-14	34	4.54	65	16.7	0.076
E-15	36	4.72	85	21.0	0.099
E-16	40	6.35	50	22.8	0.145
E-17	66	1.76	60	29.5	0.052
E-18	68	3.16	70	21.2	0.067
E-19	70	5.11	60	18.8	0.096
E-20	71	2.67	65	21.7	0.058

PLAN

SCALE 1:7500

0 75 150 225 m

City of Lethbridge
Sun Ridge, Lethbridge
Master Drainage Plan

Subcatchment Areas

Figure - 4.1

Sub-catchment	Point of Discharge (model Ref)	Area (ha)	Percent Impervious (%)	Existing 1:5 Year Flows (L/s/ha)	Existing 1:5 Year Flows (m^3/s)
E-21	74	2.22	75	22.1	0.049
E-22	74	3.39	40	22.4	0.076
W-1	1	15.00	55	11.9	0.178
W-2	51	28.16	55	12.1	0.342
W-3	55	2.96	60	35.5	0.105
W-4	56	8.64	55	15.0	0.130
W-5	62	11.54	60	19.1	0.220

1:5 year pre-development and 1:100 year post-development hydrographs are shown in Appendix I.

4.1.3 Drainage Concept

Urbanization of the existing undeveloped basin will result in the increase of both the rate and the volume of runoff in the watershed. High percentage of impervious areas (buildings, roads, etc.) increases the volume of runoff and peak flows. Peak flows also increase with an introduction of effective drainage conveyance systems, such as underground storm sewers, streets and ditches.

Generally, an urban drainage system may be divided into two components, the minor system and the major system, which are often referred to as the "dual" drainage system.

Further to the "dual" drainage concept within the watershed, it is desirable to limit the allowable discharge rate from the drainage basin to the receiving water body. According to the AENV Storm Water Management Guidelines, 1999, post-development discharge rate should equal the pre-development rate, although for this study a fixed design discharge rate has already been determined. Also, Best Management Practice (BMP) should be incorporated in the drainage system to improve the quality of the storm effluent prior to discharging into adjacent streams. The BMP will be to current guidelines and standards at the time of development. The control of the stormwater

quantity, as well as quality, is necessary in order to minimize the ecological changes downstream of the urbanized area.

4.2 Stormwater Management Design Parameters

4.2.1 Minor System

The City of Lethbridge uses the 1:5 year flow to design local storm mains and trunk mains.

4.2.2 Major System

According to the Alberta Environment (AENV) Storm Water Management Guidelines, 1999, it is necessary to detain the difference between the post- and pre-development runoff on-site.

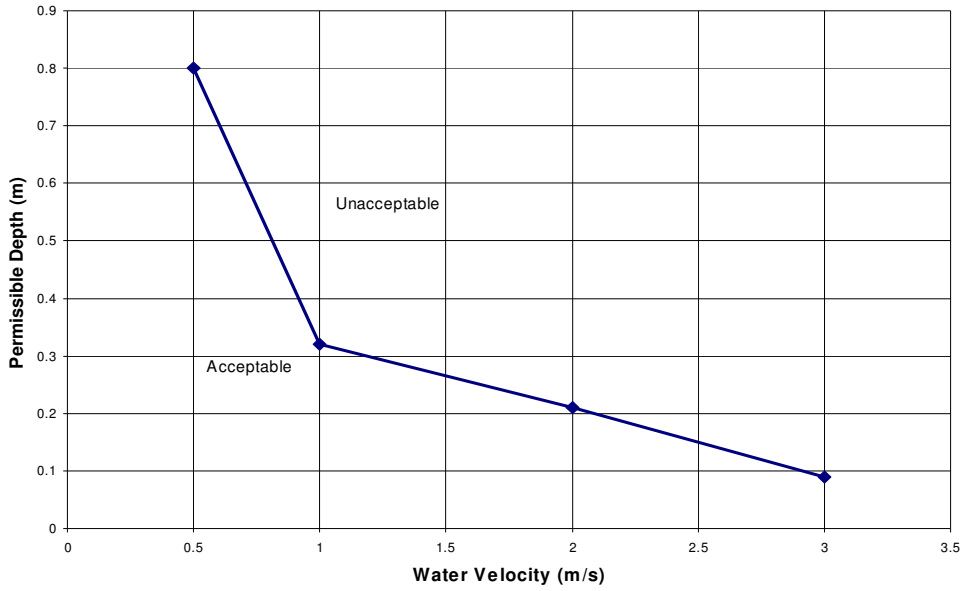
When designing a major conveyance system, it is necessary to ensure that the rate and volume of over land flow along the drainage routes are acceptable and that the trapped lows do not create safety hazards. The allowable depth and velocity of flow in gutters and swales recommended by AENV are shown in the following table and graph:

Allowable Velocity and Permissible Depths

Water Velocity (m/s)	Permissible Depth (m)
0.5	0.8
1.0	0.32
2.0	0.21
3.0	0.09

For roadways, the AENV Stormwater Management Guidelines state:

"… flow depths of no more than 0.30 m at the gutter are desirable. Standing water at low points should not exceed 0.50 m or extend to adjacent buildings. For arterial roads, the depths of flow should be less; typical criteria are that two lanes of traffic remain open and that the depth of flow be not greater than 0.05 m where major drainage flows across arterials. No buildings should be allowed in the area flooded by the major event unless they have been specially designed with flood proofing-techniques to withstand flood water."



Graphical Representation of Velocity and Permissible Depth

4.2.3 Computer Modelling

The stormwater system must be designed to satisfy guidelines for both water quality and quantity. There are several computer programs used for this purpose. For water quantity, XP-SWMM 2000 has been chosen to simulate runoff from a single storm event*. This single event will be either an

historical event or a synthetic storm (see 4.2.4 below). In accordance with the above, the 1:5 year and 1:100 year storms were modeled in this study.

In accordance with the AENV guidelines, and based on protection of receiving streams in terms of erosion and sedimentation, the 1:100 year storm was adopted in this study for design of the major system storm water facilities.

4.2.4 Design Storm

A design storm can be either a historical storm, which is considered to be critical for a given area, or a statistically derived synthetic design storm based on an acceptable limit of liability for a given statistical return storm. Synthetic storms are intended to simulate real storms where existing rainfall data is not available. Without historical data, quite often the 1:100 year synthetic storm is used to determine the peak runoff of a major storm event.

The most commonly used synthetic method for developing design storms is the Chicago Method. This method distributes the rainfall indicated by an intensity-duration-frequency (IDF) curve of a selected recurrence frequency (i.e., 1:100 year storm). The IDF data supplied by Atmospheric Environment Services for Lethbridge, included in Appendix II, was used to generate the Chicago design storm for this study. The 1:5 year 4 hour and the 1:100 year 24 hour design storm hyetographs are also included in Appendix I.

*The models' capabilities include generation of storm runoff hydrographs, runoff volumes, and routing of runoff through storage facilities and open channels. The model is commonly used in the design of stormwater management facilities in many Canadian municipalities. A detailed description of this model is included in the user manual XP-SWMM 2000 and the support data included in Appendix II.

4.3 The Stormwater Pond System

4.3.1 Introduction

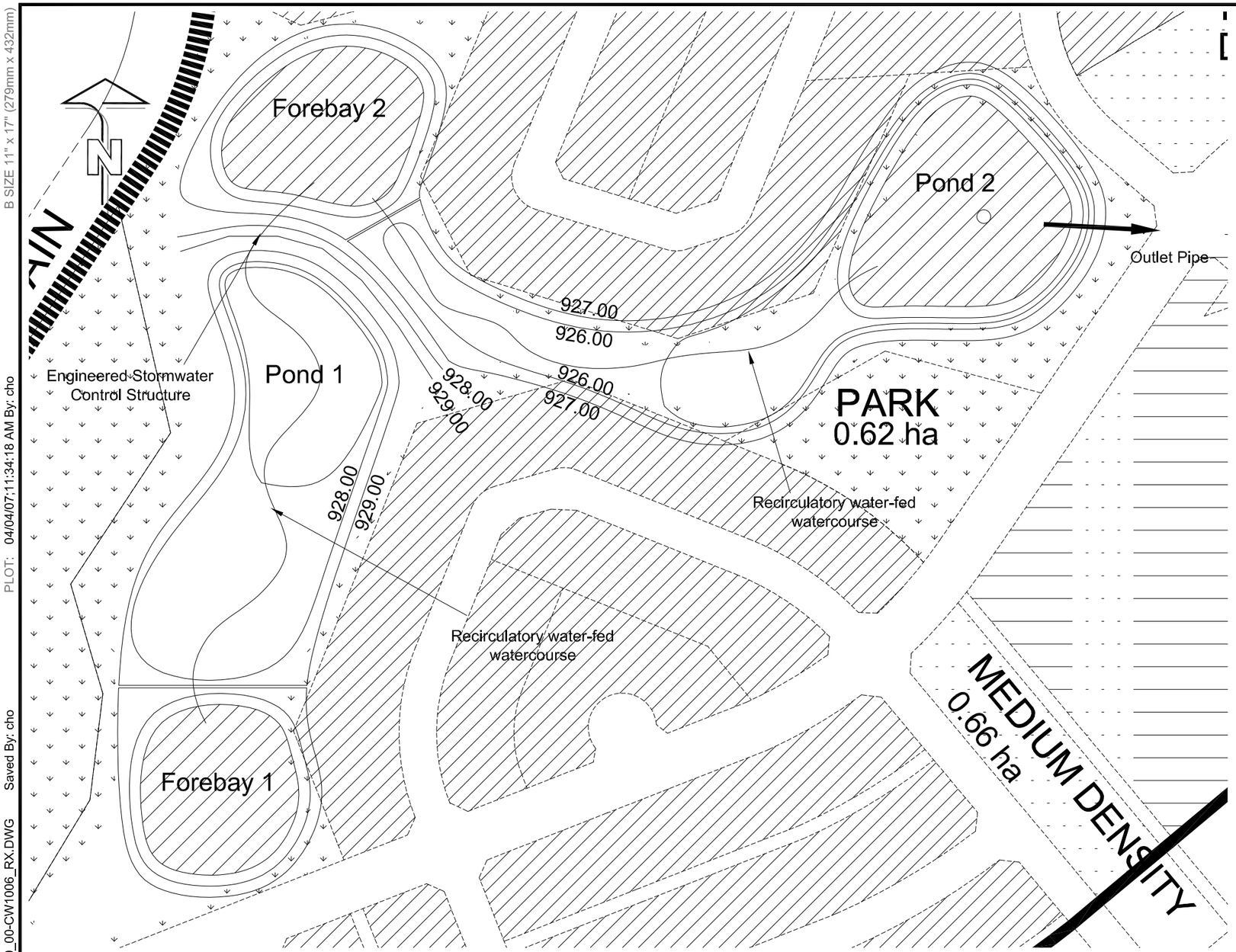
Due to the discharge restrictions imposed upon the majority of urban development, it is often necessary to store excess stormwater runoff prior to discharge from the site. If the allowable discharge rate is reasonably high, for example, around 50 to 70 L/s/ha then is it usually possible to store much of the stormwater temporarily, on the streets.

However, in areas with lower permissible release rates, or areas of high impermeability, extra stormwater storage facilities will be required.

In Sun Ridge, the allowable unit discharge rate is 18.8 L/s/ha (see section 4.1). As the proposed development is to be mainly residential, a stormwater pond system has been designed such that it becomes part of an amenity, rather than an imposition on the community. As part of the Outline Planning Design for Catchment 1, a stormwater pond system has been designed to accommodate drainage of areas Catchment 1 and Catchment 2a, with a throughflow of 18.8 L/s/ha being allowed from Catchment 2b. The pond system is illustrated on Figure 4.2.

4.3.2 Water Quality and Historical Rainfall Data

For water quality analysis, the QHM computer model has been chosen. Based on historical rainfall records applicable to the site, QHM can determine the theoretical amount of sediment accumulated in the stormwater runoff, and what percentage of it is retained in the stormwater facility. Alberta Environment Guidelines state that a minimum of 85% of Total Suspended Solids should be removed from the stormwater before discharge off-site.



PLAN

SCALE 1:2000 m

0 20 40 60

Forebay 1

Elevation (m)	Area (m²)	Stage Volume (m³)	Cumulative Volume (m³)	
926.00	1	0	0	
927.00	4362	1476	1476	
928.00	5616	4976	6452	NWL
928.10	6000	581	7033	

Pond 1

Elevation (m)	Area (m²)	Stage Volume (m³)	Cumulative Volume (m³)	
927.00	1	0	0	NWL
927.50	4618	781	781	
928.00	11583	3919	4700	
929.00	21637	16350	21051	

Forebay 2

Elevation (m)	Area (m²)	Stage Volume (m³)	Cumulative Volume (m³)	
924.00	1	0	0	
925.00	4694	1588	1588	
926.00	6025	5346	6934	NWL
926.10	6500	626	7560	

Pond 2

Elevation (m)	Area (m²)	Stage Volume (m³)	Cumulative Volume (m³)	
923.00	1	0	0	
924.00	6468	2183	2183	
925.00	8046	7243	9426	NWL
925.50	12427	5079	14505	
926.00	17117	7355	21859	
927.00	29396	22981	44841	

Normal Water Surface Area

City of Lethbridge
Sun Ridge, Lethbridge
Master Drainage Plan

Stormwater Pond System

Figure - 4.2

If evaporation records are available, QHM can also be used to predict the amount of stormwater storage utilized on any day, had development taken place when rainfall records began. By statistical analysis, it is then possible to determine the 1:100 year storage requirement.

A QHM model was run using 36 years of continuous historical rainfall data for the City of Lethbridge to confirm the sizing of the pond and estimate the sediment removal efficiency of the pond. For each year of the analysis, the model provides the maximum storage volume attained in the pond. A frequency analysis of model results was undertaken using the Weibull formula to establish return period plotting positions, followed by a manual 'Best-Fit' line to project the estimated 1:100 year volume.

4.3.3 Storm Pond Design

The stormwater system in Sun Ridge has been designed to discharge as much stormwater as possible, as high up in the pond system as possible, so as to allow for as much sediment deposition as possible. The following is a set of criteria, provided by Alberta Environment in the January 1999 *Stormwater Management Guidelines for the Province of Alberta*, with which to design the forebays of a stormwater pond system.

The required length of the forebay,

$$L_{fb} = \left(\frac{rQ_p}{V_s} \right)^{0.5}$$

where Q_p = peak flow from pond for design quality storm

r = length/width ratio

V_s = settling velocity for desired particle to settle.

The dispersion length,

$$L_{dis} = \left(\frac{8Q}{dV_f} \right)$$

where Q = inlet flow rate

d = depth of permanent pool in the forebay

V_f = desired velocity at the end of the forebay

Table 4.2 Proposed Forebay Sizing

Design Item	Formula	Minimum required	Actual Provided
Forebay 1 Length (m)	$L_{fb} = [rQ_p/V_s]^{0.5}$	$=(1 \times 1.01/0.003)^{0.5} = 58$	91
Forebay 1 Dispersion Length (m)	$L_{dis} = (8Q)/(dV_f)$	$= (8 \times 4.18)/(2 \times 0.5) = 33$	82
Forebay 2 Length (m)	$L_{fb} = [rQ_p/V_s]^{0.5}$	$=(1 \times 1.38/0.003)^{0.5} = 68$	89
Forebay 2 Dispersion Length (m)	$L_{dis} = (8Q)/(dV_f)$	$= (8 \times 1.83)/(2 \times 0.5) = 15$	37

Pond Design Summary

The principal design characteristics of the proposed sedimentation pond are summarized below:

Parameter	Pond 1
Permanent water level (PWL) – Main Pond	927.00 m
High water level (HWL) – Main Pond	929.00 m
Permanent pool volume	0 m^3
Active storage volume	21,051 m^3
Maximum discharge rate (1)	2.83 m^3/s

Parameter	Pond 1
Design Storm Peak Discharge Rate (2)	1.02 m^3/s
Detention time 1:100 year (1)	2.0 hrs
Detention time 1:2 year (2)	1.03 hrs
Pond surface area at PWL	1 m^2
Maximum depth of permanent pool	0 m
Pond surface area at HWL	16,350 m^2

Parameter	Pond 2
Permanent water level (PWL) – Main Pond	925.00 m
High water level (HWL) – Main Pond	927.00 m
Permanent pool volume	9426 m^3
Active storage volume	35,415 m^3
Maximum discharge rate (1)	2.91 m^3/s
Design Storm Peak Discharge Rate (2)	1.09 m^3/s
Detention time 1:100 year (1)	2.47 hrs
Detention time 1:2 year (2)	2.93 hrs
Pond surface area at PWL	8,046 m^2
Maximum depth of permanent pool	2.0 m
Pond surface area at HWL	29,396 m^2

1) Detention time calculated for 1:100 year storm as total volume divided by peak discharge

2) Detention time calculated for 1:2 year as total volume at 2 year elevation divided by peak discharge at 2 year elevation

Pond Volume

Alberta Environment Protection guidelines recommend that the permanent pool should be sized to store the volume of runoff from a 25 mm storm over the contributing area. For 84.3 ha

(Catchments 1 and 2a), this equates approximately 21,075 m^3 for this development. The total permanent volume for the pond system, including forebay, is 22,812 m^3 and meets this criterion.

Pond 1

Active storage is provided for the 1:100 year storm based on the pond discharge rate of 2.83 m^3/s. The 1:100 year active storage requirement is 21,042 m^3. The proposed pond system has an active storage volume of 21,051 m^3, with a rise of 2.0 m between the PWL and HWL.

Pond 2

Active storage is provided for the 1:100 year storm based on the pond discharge rate of 2.91 m^3/s. The 1:100 year active storage requirement is 35,341 m^3. The proposed pond system has an active storage volume of 35,415 m^3, with a rise of 2.0 m between the PWL and HWL.

Pond Layout

The pond layout is comprised of a forebay and a larger main pond, for a total area at PWL of 0.56 ha for pond 1 and 1.41 ha for pond 2, as illustrated in Figure 4.2. The layout shown in Figure 4.2 is designed to meet all engineering requirements within the constraints imposed by the existing topography and environment.

Flow enters pond 1 from forebay 1 and discharge is via a flow control structure to forebay 2. Pond 2 has a maximum depth of 2.0 m at PWL. Flow enters pond 2 from forebay 2 and discharges via a pipe and outfalls to the existing Riverstone storm system.

As can be seen from Figure 4.1, flow from subcatchment 2b enters the pond system at two points, forebay 1 and forebay 2. Flow enters these forebays at the pre-designated rate of 18.8 L/s/ha.

4.3.4 Modelling of Pond Sediment Removal

The QHM computer model was used to estimate the sediment removal rates from the pond. Parameters for sediment build-up rates, wash-off rates and infiltration rates were estimated using the *Strathcona Development Area Sediment Control Analysis-1990* by JN MacKenzie Engineering Ltd., as follows:

Build-up Rate:	0.003 kg/m^2/day
Equivalent Initial Accumulation:	30 days
Maximum Build-up:	0.10 kg/m^2
Impervious - Linear wash off rate, coefficient	3.39
Pervious - Linear wash off rate, coefficient	1.70

Sediment size distribution was also taken from the Strathcona report, which analyzed Calgary street sweeping samples to estimate an average sediment distribution for developed areas in Calgary. Although Lethbridge soils are sandier/siltier than Calgary's, the sediment distribution of street sweepings is not thought to be significantly different.

The input and output files for the QHM model are provided in Appendix II, but the water quality results for the removal efficiency of the proposed ponds are summarised in Table 4.3.

Table 4.3a Sediment removal in Forebay 1

Sediment Fraction	Size (um)	Size Fractions	Effective Settling Velocity (m/s)	Percentage Removal (%)
1	<5	2.8%	0.000013	54.9
2	5-10	1.2%	0.00005	66.1
3	10-20	1.2%	0.00035	85.7
4	20-75	5.8%	0.0013	94.6
5	>75	89%	0.005	99.0
Total		**100%**		**96.6**

Table 4.3b Sediment removal in Forebay 2

Sediment Fraction	Size (um)	Size Fractions	Effective Settling Velocity (m/s)	Percentage Removal (%)
1	<5	2.8%	0.000013	40.3
2	5-10	1.2%	0.00005	52.5
3	10-20	1.2%	0.00035	80.5
4	20-75	5.8%	0.0013	93.3
5	>75	89%	0.005	98.2
Total		**100%**		**94.5**

Table 4.3c Total Sediment removal by whole Pond System

Sediment Fraction	Size (um)	Size Fractions	Effective Settling Velocity (m/s)	Percentage Removal (%)
1	<5	2.8%	0.000013	77.1
2	5-10	1.2%	0.00005	89.2
3	10-20	1.2%	0.00035	98.9
4	20-75	5.8%	0.0013	99.9
5	>75	89%	0.005	100.0
Total		**100%**		**99.2**

The model was run using settling velocities for the assumed particle size distribution, where the settling velocities are based on calculations using Stokes' Law, as used in the 1990 Strathcona study. The model results indicate a total sediment removal of 99.2 % for the pond system. For particle sizes greater than 75 μm, the model estimated removal of 100 % of sediment entering the pond system over the 36-year simulation.

4.3.5 Pond Utilization

The continuous simulation results were used to determine utilization of the active storage volume for the 36-year simulation, as well as the resulting water level in the pond. These results are presented in Table 4.4 below.

Table 4.4a Storage Utilization and Water Level Distribution Analysis – Pond 1

Elevation	Active Storage Used (m^3)	Hours Utilized	% Time
927.00	0	312,000	100
927.10	156	6,346	2.0
927.50	781	692	0.2
928.00	4,700	41	<0.1
928.50	12,880	4	<0.1
928.80	17,780	0	0

As noted from the above table, the water level in the pond only exceeded an elevation of 928.0 m (i.e., 1.0 m above PWL) for 41 hours during the 36-year simulation period.

Table 4.4b Storage Utilization and Water Level Distribution Analysis – Pond 2

Elevation	Active Storage Used (m^3)	Hours Utilized	% Time
923.00	0	312,000	100
924.00	0	312,000	100
925.00	0	311,400	99.8
926.00	12,434	96.5	<0.1
926.40	21,624	9.5	<0.1
926.80	30,814	0	0

As noted from the above table, the water level in the pond only exceeded an elevation of 926.0 m (i.e., 1.0 m above PWL) for 96.5 hours during the 36-year simulation period.

5. OPTION DEVELOPMENT

The primary concern for the Sun Ridge development is the amount of stormwater allowed to discharge to the Riverstone trunk sewer.

Other concerns highlighted by the City are the areas of Sun Ridge that do not discharge into the Riverstone storm system. As part of the development of Catchment 1, it is proposed that some regrading work be completed at the north end of Catchment 2b, to divert overland flow into the proposed Catchment 1 storm system. This area, along with areas that currently do not discharge into the Riverstone storm system, is illustrated in Figure 2.1.

In light of discussions with The City of Lethbridge and the analysis completed for this study, UMA has created one stormwater system option, from five proposed, that will facilitate development in the Sun Ridge catchment.

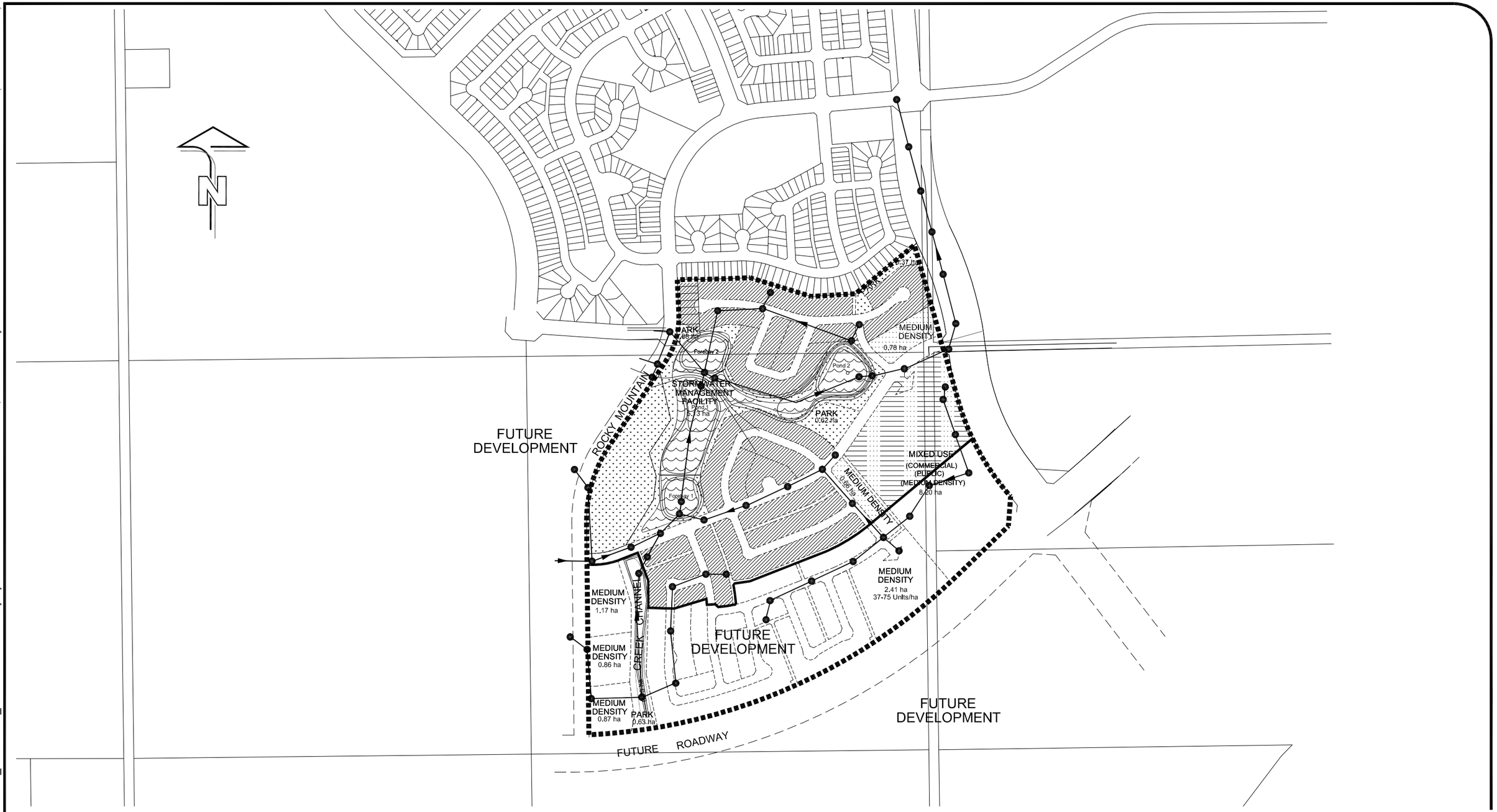
The proposed outline plan for the stormwater system is shown in Figure 5.1.

From the Riverstone Stormwater Master Drainage Plan, under option 5 of the drainage plans, the storm trunk outfall needs to be upgraded to discharge 14.25 m^3/s to accommodate the full capacity allotted to Sun Ridge and Mountain Heights.

5.1 General Storm Drainage Design

In general, streets in developed areas are used to convey the overland (major) stormwater flows. To facilitate this option, the following are recommended:

- Maximum ponding depth of local trapped lows should be within the limits recommended by Alberta Environment;



PLAN

SCALE 1:7500 0 75 150 225 m

City of Lethbridge
Sun Ridge, Lethbridge
Master Drainage Plan

Stormwater System Outline Design

Figure - 5.1

- Roof-leaders should not be connected to the minor system;
- Weeping tile drainage will be connected to the storm sewer by gravity feed. It is noted that the City does not allow weeping tile connections to sanitary sewers; and
- To minimize flooding downstream of the system, an inlet control device (ICD) should be considered at catch basins to control the inflow to the minor system.

Stormwater calculations performed in this study were based on an average imperviousness of 59.5%. For areas such as industrial/commercial and high-density residential development where impervious areas are higher, on-site detention with local restricted outflow to the main is recommended. Also, oil/grit separators should be considered locally to further enhance the water quality.

During detailed design, proposed drainage courses and facilities should be protected with registered easements. Geotechnical investigations are necessary to confirm the suitability of pond construction at proposed locations. Erosion and sediment control measures should also be implemented during construction to protect the natural drainage courses.

6. COST ESTIMATES

Below is a list of Class 2 cost estimates in 2003 dollars.

Catchment 1

Item	Cost ($)
180 Catchbasins	425,088
195 m of 375 mm diameter concrete pipe	17,809
444 m of 450 mm diameter concrete pipe	46,021
1534 m of 600 mm diameter concrete pipe	178,527
600 m of 675 mm diameter concrete pipe	73,391
203 m of 750 mm diameter concrete pipe	35,657
758 m of 900 mm diameter concrete pipe	183,268
261 m of 1,050 mm diameter concrete pipe	102,671
340 m of 1,200 mm diameter concrete pipe	107,821
708 m of 1,350 mm diameter concrete pipe	279,377
50 m of 1,500 mm diameter concrete pipe	22,406
Sediment forebays/ Wet Pond Liners	258,183
56 Manholes	244,377
Miscellaneous	59,800
Total	**2,034,396**

7. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

1. The underlying criterion used in this study for sizing of stormwater facilities is the maximum allowable stormwater release rate of 2,907 L/s from all 155 ha of the development to the Riverstone trunk sewer.

2. The 1:5 year storm was used to determine the minor flows in the study area, and the 1:100 year storm was used to size the major system facilities including stormwater detention ponds. Staged control structures in the ponds are recommended to limit pond outflows to pre-determined levels.

3. The primary concerns for the Sun Ridge development are:

    - Areas within the catchment discharging to the north
    - Discharge rate into the Riverstone trunk sewer

It is recommended the City adopts this master drainage plan as a tool to direct future design, analysis and construction of drainage facilities in the Sun Ridge development.

APPENDIX I

1:5 Year and 1:100 Year Storm Hyetographs
1:5 Year Pre-Development Hydrograph
1:100 Year Post-Development Hydrograph

APPENDIX II

XPSWMM Output File

APPENDIX III

QHM
Input and Output Files

APPENDIX G

Sunridge Outline Plan Adjustment - February 22, 2011

CITY OF
Lethbridge

Office of:
Development Services Department
Planning Section
Phone No. 320-3920

February 22, 2011

Stantec Consulting Ltd.
290 - 220 - 4 St. S.
Lethbridge, AB

Attention: Brad Schmidtke

Dear Sir:

RE: Sunridge Outline Plan adjustment – southeast mixed use site

The DRC reviewed your recent submission for an adjustment to the Sunridge Outline Plan and in consideration of the additional traffic analysis done by our Transportation Section, we are satisfied the proposed changes will not impact the existing residents or future development as contemplated in the original outline plan. The Development Review Committee is now in a position to sign off the requested outline plan adjustment.

Yours truly,

Barry Peat
Development Review Committee
City of Lethbridge

cc Real Estate and Land Development Manager
Development Review Committee

SunRidge Phase 3B
Outline Plan Adjustment

February 2011

1.0 Introduction

The SunRidge Phase 3B Outline Plan Adjustment has been prepared at the request of the City of Lethbridge Real Estate and Development (RELD). The Outline Plan Adjustment area has been highlighted on ***Figure 1.0 Area Context Plan***. The following document has been prepared based upon meetings with City of Lethbridge Planning, the Development Review Committee (DRC) and key members of Infrastructure Services.

The intent of this document is to provide:

- A comparison of Approved and Proposed Land Use Statistics
- An evaluation of the existing infrastructure system capacities, and the impacts of the proposed changes to existing infrastructure both positive and negative
- Confirmation that the proposed changes have no adverse impacts on the existing infrastructure systems
- Recommendations on alternative servicing strategies should an adverse impact be observed

All municipal infrastructure systems discussed in this document shall conform to City of Lethbridge Design Standards and Alberta Environment Guidelines. City of Lethbridge Design Guidelines have been used for all analysis.

Key Topics of the Outline Plan Adjustment Include:

- Land Use
- Water Distribution
- Storm Water Management
- Sanitary Sewer and Wastewater
- Transportation
- Conclusions and Recommendations

2.0 Land Use

The SunRidge Outline Plan Adjustment in the South East corner of the development as identified on ***Figure 2: Existing Land Use*** is comprised of a gross area of 10.05 ha.

Proposed land use designations are identified on ***Figure 3: Proposed Land Use.*** The key alterations to the previous layout and land use are:

- The reduction and re-orientation of the neighbourhood commercial zone
- The creation of a central roadway that will provide a secondary access to the South Side of SunRidge. Currently, SunRidge Boulevard is the only access to the south side of SunRidge.
- The refining of the land use designation of the medium density parcels to R-CM and R-37 where the original outline plan identified them as "medium density".

Based on current Land Use Zoning, the R-CM zone will remain unchanged and the remaining lands currently zoned as Urban Reserve will be rezoned to R-CM and R-37.

Population estimates presented below are based upon maximum zoning allowance for units and 1.9 people / unit.

Table 1 presents the original SunRidge Outline Plan Statistics for the Adjustment Area of 10.05ha identified as Phase 3B.

Table 1: Original Outline Plan Statistics Phase 3B

SunRidge 3B Area: Original Outline Plan	Area	% of			
Land Use and Population Estimates	**(Ha)**	**GDA**			
Gross Developable Area (GDA)	**10.05**	**100.0%**			
Public Land Use					
Public Right of Ways	0.00	0.0%			
Commercial (C-N)	3.44	34.2%			
Public Subtotal	**3.44**	**34.2%**			
			Population Estimates		
			Density	**Total**	**Area**
Residential Land Use			**(UPH)**	**Units**	**Population**
Urban Reserve (Assumed Medium Density Residential-R50)	3.85	38.3%	50	193	367
R-CM (Assumed R-37 Density)	2.76	27.5%	37	103	196
Residential Sub Total	**6.61**	**65.8%**		**296**	**563**
Total	**10.05**	**100.0%**	**People/GDA**		**56**

Table 2 presents the Outline Plan Adjustment Statistics as derived from proposed land use for Phase 3B.

Table 2: Proposed Outline Plan Statistics Phase 3B

SunRidge 3B Area: Outline Plan Adjustment Land Use and Population Estimates	Area (Ha)	% of GDA	Population Estimates Density (UPH)	Total Units	Area Population
Gross Developable Area (GDA)	**10.05**	**100.0%**			
Public Land Use					
Public Right of Ways	0.79	7.9%			
Commercial (C-N)	1.65	16.4%			
Public Subtotal	**2.44**	**24.3%**			
Residential Land Use					
Medium Density Residential-R37	1.80	17.9%	37	67	128
R-CM (Assumed R-37 Density)	5.81	57.8%	37	215	409
Residential Sub Total	**7.61**	**75.7%**		**282**	**537**
Total	**10.05**	**100.0%**	**People/GDA**		**53**

Table 3 presents a comparison of existing and proposed land use statistics and the resultant net change.

Table 3: Statistic Comparison between Existing and Proposed Land Use

Statistic Comparison	2004	2011	Net
Item	Outline Plan	Adjustment	Change
Public Right of Ways (ha)	0	0.79	0.79
Commercial (ha)	3.44	1.65	-1.79
Medium Density R-37 (ha)	2.76	7.61	4.85
Medium Density R-50 (ha)	3.85	0	-3.85
Dwelling Units	296	282	-14
Population	563	537	-26

3.0 Water Distribution

3.1 EXISTING SERVICING

The Outline Plan Amendment Boundary Area is currently serviced by three water service stubs as identified on ***Figure 4.0 Water Distribution System***

Stub 1 is a 200mm diameter pipe extending south from SunRidge Boulevard. Stub 2 is a 200mm diameter pipe extending east along Mount Sundance Road. Stub 3 is a 200mm diameter pipe extending south along Mount Sundance Manor West. Under the original outline plan, further looping of these water lines was not anticipated, except within the localized area that they serviced.

3.2 PROPOSED SERVICING

Figure 4.0 illustrates the new 250mm diameter water loop that will be constructed as part of the new collector road infrastructure; this looping will improve the overall performance of the water system in the SE corner of SunRidge. It is our opinion that minimal head loss will be observed by connecting to the short section of 200mm diameter stub from SunRidge Blvd West-Stub 1. Water servicing to the R-CM zone of the plan remains unchanged from the original outline plan. Service locations to the proposed parcels will be determined at detailed design.

Table 4 presents a comparison of estimated water demands between the original Outline Plan and Outline Plan Adjustment.

Table 4: Estimated Water Demand Comparison for Outline Plan Adjustment Area Only

Water Demand	Original Outline Plan	Outline Plan Adjustment
Average Day Demand (415L/cap/day)	0.23 ML/day	0.22 ML/day
Maximum Day Demand (2.2 x ADD*)	0.51 ML/day	0.49 ML/day
Peak Hour (3.5 x ADD)	0.81 ML/day	0.78 ML/day

*ADD – Average Day Demand

Note: Water Usage has been based upon estimated populations from **Table 1 and 2**, and the City of Lethbridge has not indicated any concern with water distribution capacity.

4.0 Storm Water Management

4.1 EXISTING SITE SERVICING AND OVERLAND FLOWS

The Outline Plan Amendment Boundary Area is currently serviced by three minor storm sewer stubs as identified on ***Figure 5.0 Storm Water Management***.

4.1.1 Minor Storm Sewer System

Stub 1 is a 675mm diameter pipe extending south from SunRidge Boulevard. Flow in this minor system enters the SunRidge Storm Water Management Facility (SWMF) from Sunburst Way West.

Stub 2 is a 675mm diameter pipe extending east along Mount Sundance Road. Stub 3 is a 450mm diameter pipe extending south along Mount Sundance Manor West. Stubs 2 and 3 discharge their minor flows into the wet lands at the west end of the SunRidge SWMF.

4.1.2 Major Storm Sewer System

As originally planned, all overland flows from the adjustment area would enter the existing SWMF at the intersection of SunRidge Boulevard and Sunburst Way W:

- The neighbourhood commercial site would flow to this location directly.
- The southerly medium density areas would need to flow north along Mt. Sundance Manor W. and then east on SunRidge Boulevard.

Given the large area of the catchment contributing to Mt. Sundance Manor West, the proposed land use and new collector roadway will provide benefit as the impact of overland flows to Mt. Sundance Manor West can be reduced. (Refer to Section 4.2).

4.2 PROPOSED SERVICING AND OVERLAND FLOWS

4.2.1 Minor Storm Sewer System

The Minor Storm Sewer System in the new collector road structure will be tied to the existing sewer stubs as outlined on Figure 5.0. The minor storm system shall be designed in accordance with current City of Lethbridge Design Standards and City Bylaws regarding private developments.

It is recommended that a majority of the minor storm sewer flows from the R-CM zone be directed to the Mount Sundance Minor System as this flow path was identified and accounted for in previous planning and design. This flow path also provides the best treatment path for storm water as the minor flows will enter the wetlands at the west end of the SunRidge SWMF.

It is recommended that minor storm sewer flows from the R-37 and Commercial Zone be directed to the Mount Sunburst Way Minor System based on topography and maximizing serviceability of these parcels.

Table 6 presents the impact of land use rezoning on the existing minor system based upon 2010 design standards for a 1:5 year rainfall event (Rational Method).

Table 6: Impact of Land Use Rezoning on Existing Minor System

Zones	Area (ha)	"C" Value	Manning's Value	TC (min)	1:5 Year Flow (L/s)	Existing Pipe Capacity	Existing Pipe Size and Grade
1	4.39	0.7	.013	20	514	532	675 @ 0.40%
2	3.53	0.6	.013	20	354	376	675 @ 0.20%
3	2.13	0.6	.013	20	214	221	450 @ 0.60%

It should also be noted that The City of Lethbridge has implemented a policy whereby private sites are further evaluated with regard to storm water at the Development Permit Stage. This evaluation will determine any further restrictions that may be placed on private parcels during detailed design. Further restrictions to storm service connections to these sites should be expected, and may result in storm water storage onsite. As a result, existing pipes will have sufficient capacity due to future detailed site designs.

4.2.2 Major Storm Sewer System

The creation of the collector road structure through the adjustment boundary will provide benefit to SunRidge by opening up the possibility of redistributing overland flow. Refer to ***Figure 5.0*** for the proposed overland flow routes. This new flow path is an improvement over the previous plan which concentrated more overland flow towards Mt. Sundance Manor West. Overland flows will continue to spill into the SunRidge SWMF at the intersection of SunRidge Boulevard and Mt. Sunburst Way.

As discussed previously, onsite developers of the private parcels should anticipate accommodating storm water storage due to the potential for having service lateral flows restricted before entering the municipality's minor storm sewer system.

5.0 Sanitary Sewer

5.1 EXISTING SITE SERVICING

The Outline Plan Amendment Boundary Area is currently serviced by three sanitary service stubs as identified on ***Figure 6.0 Sanitary Sewer Collection System***

Stub 1 is a 250mm diameter pipe extending south from SunRidge Boulevard. Stub 2 is a 200mm diameter pipe extending east along Mount Sundance Road. Stub 3 is a 200mm diameter pipe extending south along Mount Sundance Manor West. Sanitary sewage from SunRidge Phases 1, 2, 3A and 3B are directed to a 250mm diameter line at the east end of SunRidge Boulevard which is in turn connected to the University Drive 675mm diameter sewer trunk.

5.1.1 Peak Sewage Flows (Existing Condition)

During our evaluation of the original SunRidge Outline Plan, we noted that an estimated total development population of 783 people and peak flow of 23 L/s was anticipated at Node A. Currently, the 250mm diameter trunk line graded at 0.30% has a full flow capacity of 33 L/s. (SunRidge Outline Plan 2004 Zone B Sanitary Sewer)

A review of the as-built condition for Phases 1, 2 and 3A has yielded the following revised population estimate based upon dwelling units.

Number of Dwelling Units	440 (Approximately)
Average Residents / Dwelling Unit	2.4 [City of Lethbridge Census 2009 (average of low, medium and high density)]
Total Estimated Current Population	1056
Total Current Peak Sewage Flow	26 L/s

Based on the above data and City of Lethbridge Design Standards for sewage generation, the current sewer system is operating at 79% of Pipe Capacity at Node A.

5.1.2 Peak Sewage Flows (Future Condition)

Future peak sewage flows have been based upon an estimated as-built condition coupled with a projected population for the Outline Plan Adjustment area. This future population has been derived from the maximum unit potential of the zoning and a medium density population rate of 1.9 / dwelling unit (**Refer to Table 2**).

Total Estimated Current Population	1056
Outline Plan Adjustment Estimated Population	540
Total SunRidge Population	1596
Total Peak Sewage Flow	39 L/s

Based on the above, the current sewer system would be operating at 118% of pipe capacity at Node A. Therefore, the following servicing strategy is recommended in Section 5.2 Proposed Servicing.

5.2 PROPOSED SERVICING

As noted above, there is a possibility that the existing sanitary sewer at Node A will be functioning over capacity at full build-out of SunRidge based on the projected future population. Therefore, the servicing strategy as outlined on ***Figure 6.0*** should be considered as one potential solution to the downstream constraint. The effects of this servicing strategy are described below.

- R-CM West Population of 151 will be serviced from the existing sewer stub at Node 3 in Mt. Sundance Manor West
- R-37 Population of 128 will be distributed as follows: a population of 64 serviced from Node 4 and a population of 64 to Node 5 and 6.
- Commercial Parcel will be serviced from the existing sewer stub at Node 1
- R-CM East Population of 261 will be serviced from a new sanitary sewer service at Node 6. Installation shall be coordinated with University Drive Construction, and the sewer may extend into the public right of way as shown. Final alignment determination will be made at detailed design. P.U.L. width is to be 9.0m wide as per City of Lethbridge request.
- It is anticipated that the Node 2 sewer stub will be abandoned and not utilized.

The net result of these changes is the removal of a population 325 people from the existing Node A sewer. The reduction in peak flow to Node A is outlined below.

Total Estimated Current Population	1056
Outline Plan Adjustment Estimated Population	215
Total SunRidge Population to Node A	1271
Total Peak Sewage Flow	31 L/s

Based on the above, the current sewer system would be operating at 94% of full pipe capacity at Node A.

A new sewer service to the University Drive Trunk line should be sized to accommodate the R-CM East Zone and a portion of the R-37 Zone (Total Population 325).

6.0 Transportation

6.1 EXISTING PHASE 3B ACCESS

The Outline Plan Amendment Boundary Area is currently serviced by two transportation access points:

- The roundabout located at SunRidge Boulevard and Mt. Sunburst Way
- The intersection of Mt. Sundance Manor and Mt. Sundance Road

The first access was proposed to accommodate traffic to a Phase 3B commercial site, and the second access was proposed to accommodate traffic to the R-50 multi-family zone. Under the original Outline Plan, no secondary transportation link from SunRidge Boulevard to Mt. Sundance Manor was anticipated.

6.2 PROPOSED PHASE 3B ACCESS

The adjustment to the Land Use Layout in SunRidge Phase 3B has created new transportation opportunities with our proposed addition of a central collector and a Right-In Right-Out (RIRO) off of University Drive. Refer to ***Figure 7.0 Transportation.***

The new central collector will provide a secondary access to the south side of SunRidge, and this is seen as a positive development which can reduce traffic pressures to the roundabout identified as intersection #4. This secondary access will also provide an alternative access route for emergency vehicles.

The creation of the RIRO off of University Drive will reduce incoming traffic pressure to the roundabout identified as Intersection #5 due to the fact that traffic from external communities will be able to access the commercial site from University Drive rather than SunRidge Boulevard.

From the standpoint of pedestrians, the creation of a 9.0m wide PUL provides for an additional link to the University Drive Regional Trail from the SunRidge community.

Private site access locations will be determined at detailed design and during future development permit applications.

7.0 Conclusions and Recommendations

To conclude, the SunRidge Phase 3B Outline Plan Adjustment is a refined layout of the original SunRidge Outline Plan that now includes a collector road connection. Land use zoning is still medium density and neighbourhood commercial with a net increase in medium density area and decrease in neighbourhood commercial area. The total number of dwelling units and population is slightly less than the original SunRidge Outline Plan due to the decrease to R-37 Zoning from R-50 Zoning.

As outlined in the preceding sections, the following impacts to the existing infrastructure have been noted, and recommendations have been made where required.

Water Distribution

- Layout Change results in a positive impact by allowing for a new potable water loop from SunRidge Boulevard to Mount Sundance Road. City of Lethbridge Infrastructure has indicated that capacity is not an issue.

Storm Water Management

- New collector roadway provides a more direct route for overland storm water drainage to the SunRidge SWMF

- Existing systems and infrastructure will have capacity for private developments based on City Standards regarding onsite storm water restriction and storage

Sanitary Sewer Collection System

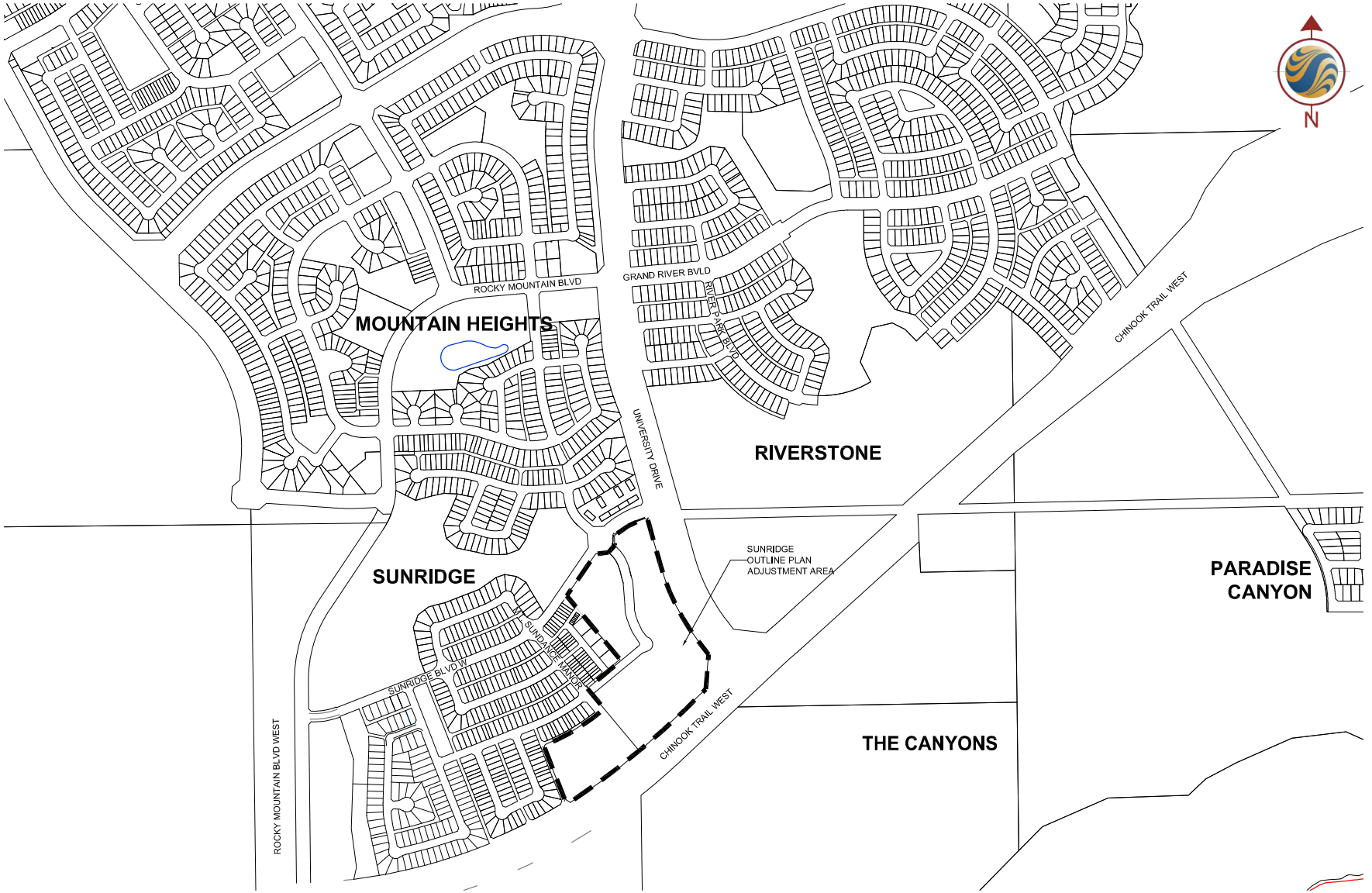
- Evaluation of the existing sanitary sewer located in SunRidge Boulevard indicates that the sewer is approaching capacity; therefore, it is recommended that sewage from the Proposed R-CM West Site and a portion of the R-37 Site be directed to University Drive Sewer Trunk at a location to be determined at detailed design.

Transportation

- The addition of a collector provides a secondary access to Mt. Sundance Manor and will reduce pressure on Intersection #4

- The addition of a RIRO to the Neighbourhood Commercial will reduce external traffic impacts on Intersection #5.

- Overall traffic volumes are similar to the Original Outline Plan Assumptions for the Phase 3B Area



NTS

112944686

Legend

Re-Zoning Boundary

Client/Project

City of Lethbridge RELD

Sundridge Phase 3B
Outline Plan Adjustment

Figure No.

1.0

Title

Area Context Plan

Stantec

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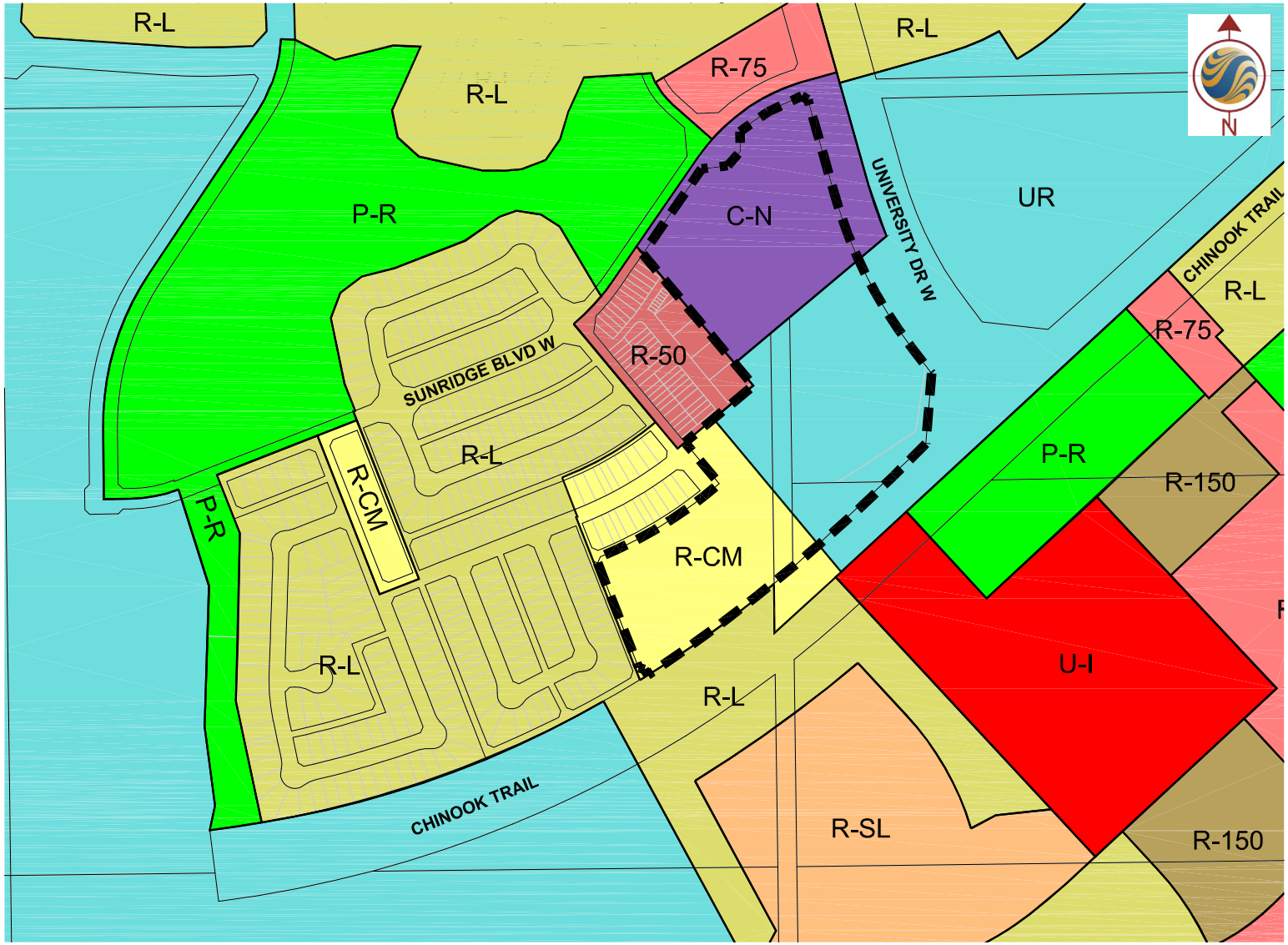

EXISTING LANDUSE STATISTICS

- C-N: 3.44 Ha
- R-CM: 2.78 Ha
- U-R: 3.83 Ha

TOTAL AREA: 10.05 Ha

NTS

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Legend

Re-Zoning Boundary		
C-N	Neighbourhood Commercial	
P-R	Parks and Recreation	
R-L	Low Density Residential	
R-CM	Comprehensively Planned Medium Density Residential	
R-SL	Small Parcel Low Density Residential District	
R-50	Medium Density Residential	
R-75	Medium Density Residential	
R-150	High Density Residential	
UR	Urban Reserve	
U-I	Urban Innovations	

Client/Project

City of Lethbridge RELD

Sundridge Phase 3B
Outline Plan Adjustment

Figure No.

2.0

Title

Existing Land Use

Stantec

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NTS

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Legend

- Re-Zoning Boundary
- C-N Neighbourhood Commercial
- R-37 Medium Density Residential
- R-CM Comprehensively Planned Medium Density Residential

Client/Project

City of Lethbridge RELD

Sundridge Phase 3B
Outline Plan Adjustment

Figure No.

3.0

Title

Proposed Land Use

Stantec

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NOTES:
All pipe sizes Ø200 unless otherwise specified.

NTS

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Legend

- Existing Water Main
- Proposed Water Main
- Parcel Service Location
  To Be Determined @ Detailed Design

Client/Project

City of Lethbridge RELD

Sundridge Phase 3B
Outline Plan Adjustment

Figure No.

4.0

Title

Water Distribution
Site Plan

Stantec

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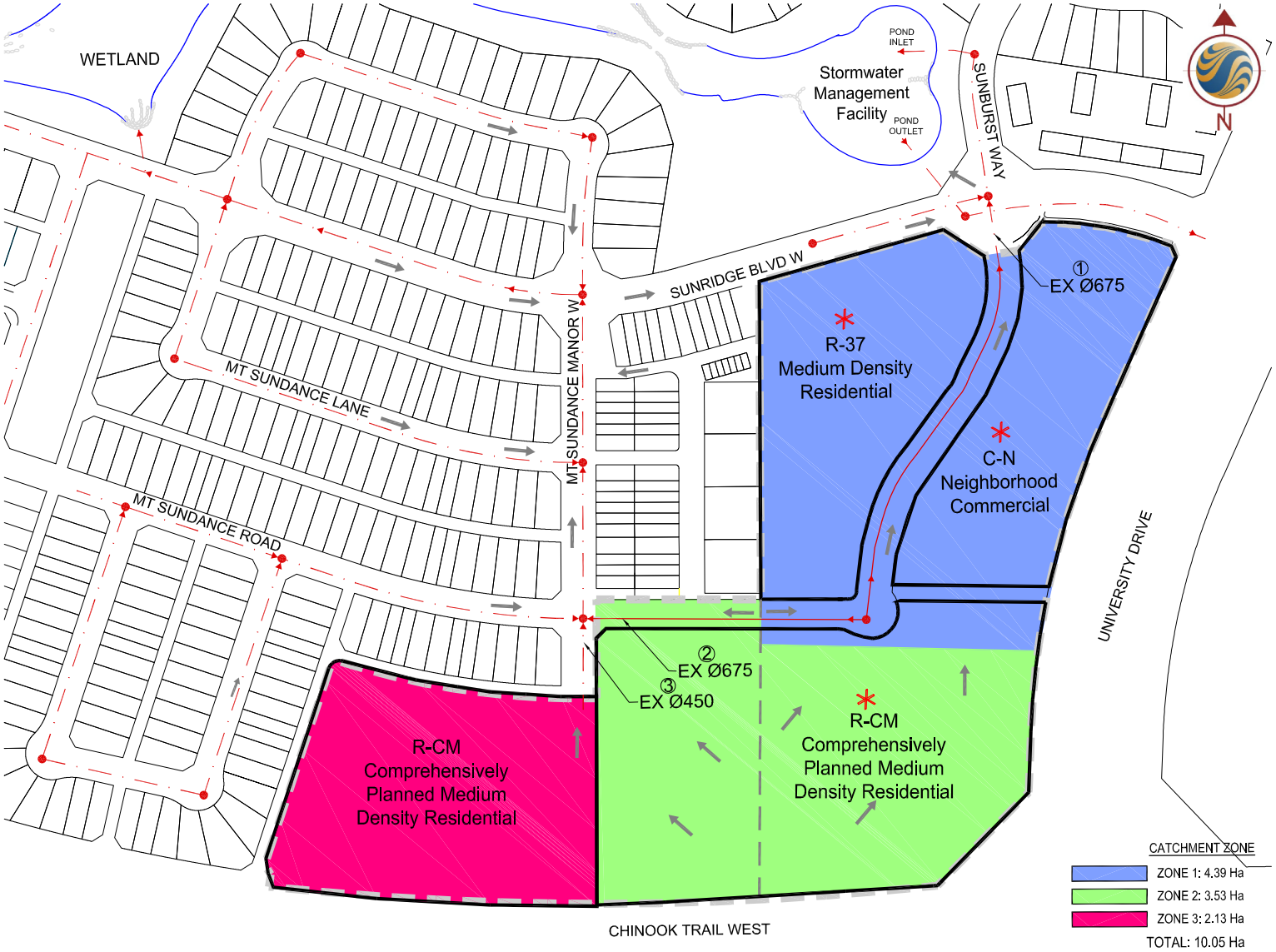

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Legend

- Existing Storm Water Main
- Proposed Storm Water Main
- Parcel Service Location To Be Determined @ Detailed Design
- Overland Flow

Client/Project

City of Lethbridge RELD

Sundridge Phase 3B
Outline Plan Adjustment

Figure No.

5.0

Title

Storm Water Management Site Plan

Stantec

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NOTES:
All pipe sizes Ø200 unless otherwise specified.

NTS

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Legend

- Existing Sanitary Sewer Main
- Proposed Sanitary Sewer Main
- Parcel Service Location
  To Be Determined @ Detailed Design
- Sewershed

Client/Project

City of Lethbridge RELD

Sundridge Phase 3B
Outline Plan Adjustment

Figure No.

6.0

Title

Sanitary Sewer Collection System
Site Plan

Stantec

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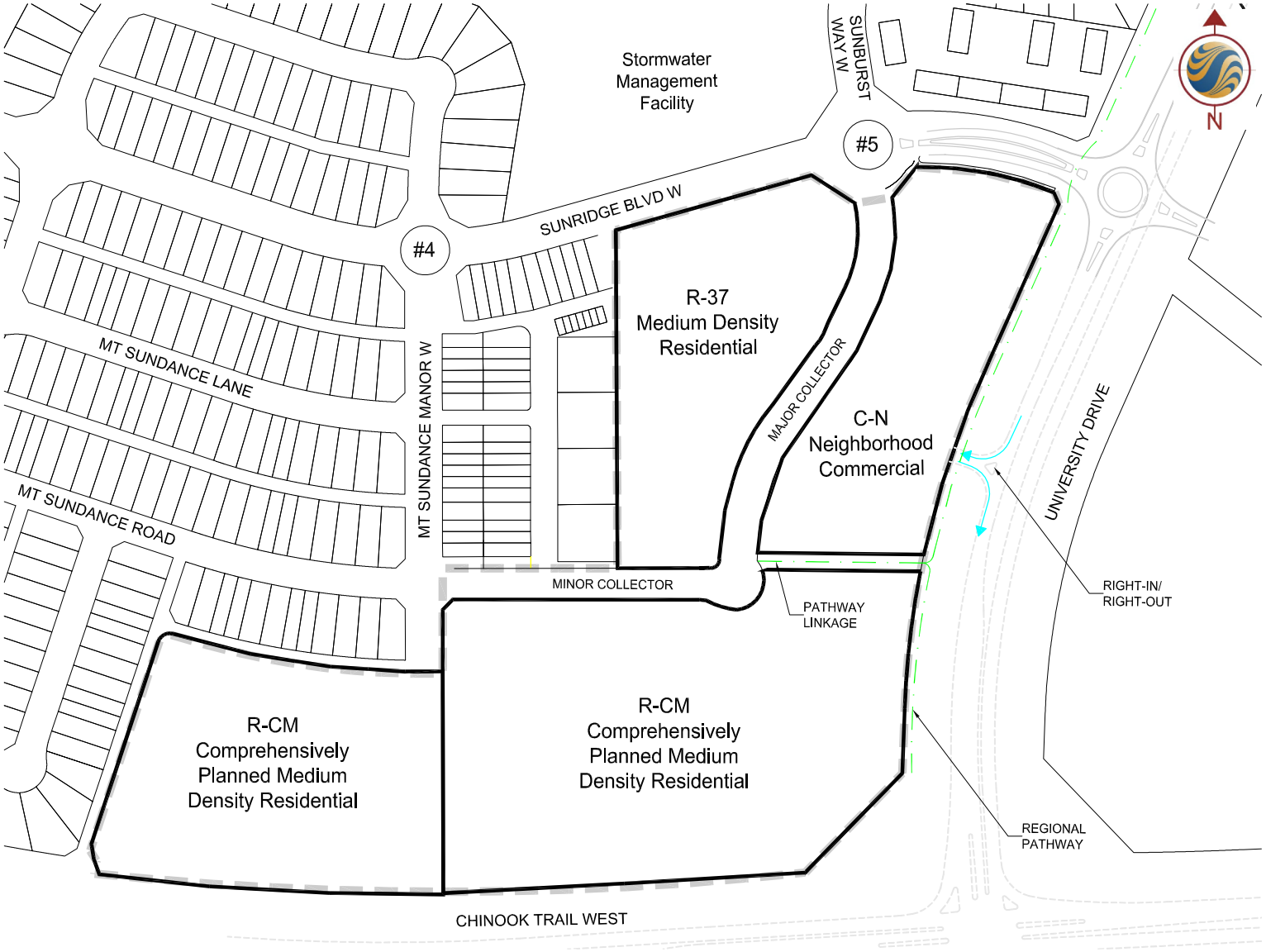

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NOTE: SITE ACCESS POINTS TO BE LOCATED DURING DETAILED DESIGN IN CONJUNCTION WITH DEVELOPMENT PERMITS

Client/Project

City of Lethbridge RELD

Sundridge Phase 3B
Outline Plan Adjustment

Figure No.

7.0

Title

Transportation
Site Plan

Stantec

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