



OUTLINE PLAN REPORT AMENDMENT  
**JUNE** 2020

Originally Approved by the Municipal Planning Commission  
January 2010  
Amended July 2014  
Adjusted November 2016



Associated  
Engineering

GLOBAL PERSPECTIVE.  
LOCAL FOCUS.





# BlackWolf Outline Plan Amendment

June 2020

*Prepared for:*  
**Avonlea Homes Ltd.**  
Lethbridge, AB

*Prepared by:*  
**Associated Engineering**  
Lethbridge, AB

Project No. **2018-3167**



# Executive Summary

The community of BlackWolf comprises over 47 hectares (ha) of land in north Lethbridge, as shown in **Figure 1 Location Plan**. BlackWolf is situated north of the existing Uplands residential community and west of the Sherring Business and Industrial Park and 28<sup>th</sup> Street North. All the lands are owned by Avonlea Homes Ltd. The lands are subject to the policies of the Hardieville-Legacy Ridge-Uplands Area Structure Plan (ASP).

The Outline Plan concept uses a modified fused grid road layout with the goal of providing a balance between vehicular and pedestrian movement to create safe, sociable streets with easy connectivity to community facilities. The modified fused grid road layout in BlackWolf allows for pedestrian permeability through the integrated open space system while preventing non-local vehicular traffic from short-cutting through the community. The integrated open space system incorporated throughout the development provides community social spaces, passive recreation opportunities, enhances safe and convenient alternative transportation modes, and promotes community interaction. The community design focuses on walkability and the health, safety and well-being of community residents.

Based upon the gross development area, BlackWolf provides a residential density of **15.81** units per hectare (uph) which is in accordance with the ASP. A range of housing types is incorporated throughout the community including low-density single detached, semi-detached, and multi-family units. The plan also incorporates a future school connected to the residential areas by the linear open spaces.

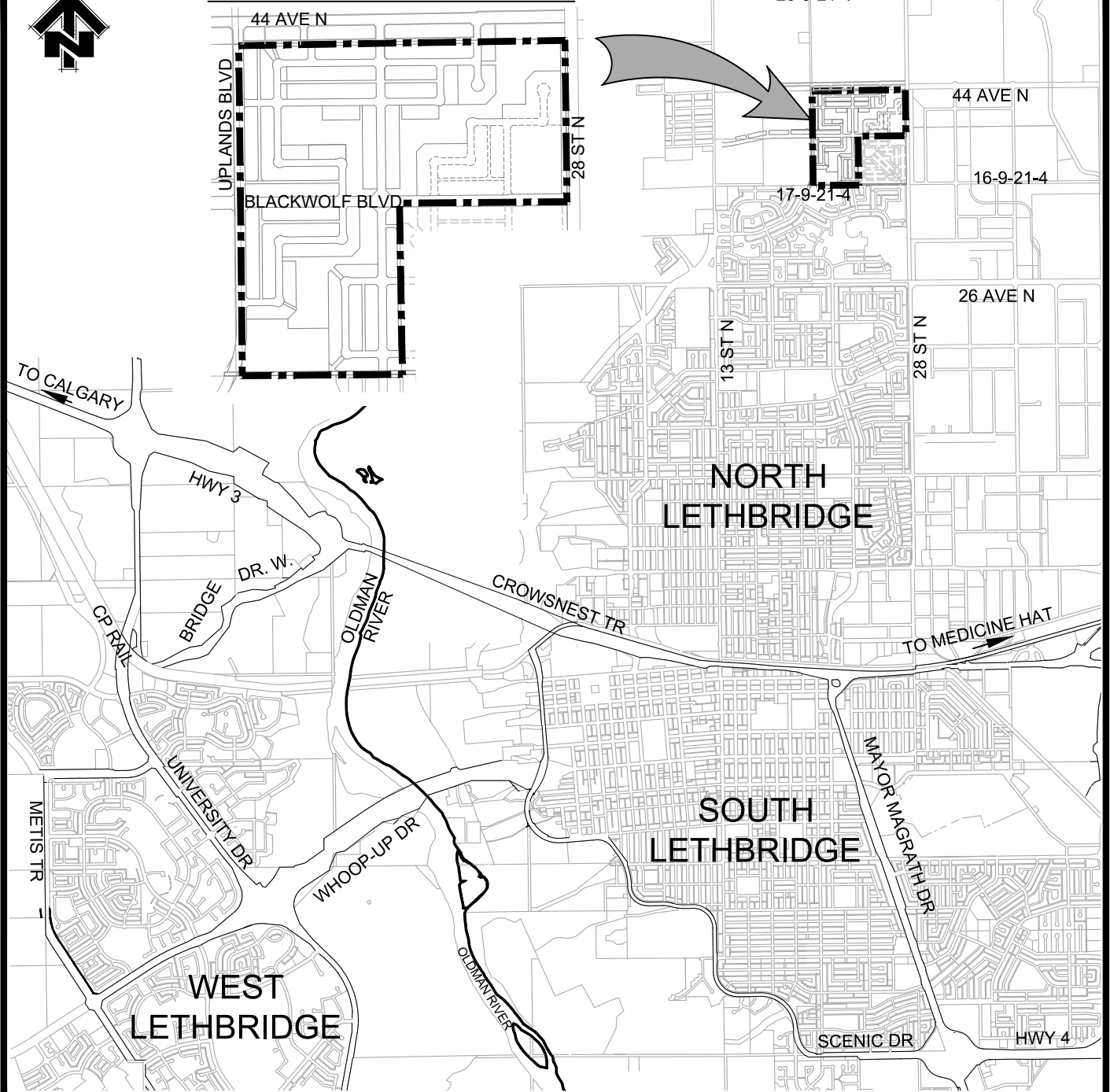
BlackWolf Outline Plan was submitted in January 2010. Since the original submission the following amendments have taken place:

- A land use change from high density multi-family site located in the northwest section to a mix of medium and low density.
- A land use change from the mix of medium and low density in the eastern portion of Blackwolf, adjacent to 28th Street North to include a high density development area.
- Three additional connections to 44<sup>th</sup> Avenue North.
- One additional connection to Uplands Blvd North.


The following sections outline the land use amendment and the impacts to the transportation and municipal servicing concepts shown in the original Outline Plan. This document has been prepared as a **replacement to the approved June 2016** Outline Plan and demonstrates the changes made that have enhanced the BlackWolf community.



# BLACKWOLF COMMUNITY



## LEGEND

 Blackwolf Outline Plan Boundary



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**Fig. 1**  
**Location Plan**

## VISION

### *Fast forward to 2033...*

The community of BlackWolf has developed into an integrated group of three neighbourhoods that are linked via an exceptional open space system. Walking from one neighbourhood to the other only requires a single crossing at the heart of the neighbourhood. Walking, jogging, and cycling have become especially popular since the open spaces are attractively landscaped with native vegetation and are interspersed with naturalized storm ponds. The park system was designed to link the BlackWolf community to the existing Uplands neighbourhood to the south, the employment opportunities to the east, the future residential development to the north, and the regional park facilities to the west.

BlackWolf includes a variety of housing types which address the local needs. There are large single-detached homes backing and fronting onto the linear parks and smaller single detached homes, many with lane access, scattered throughout the neighbourhoods. The variety of housing types is further diversified with fourplexes and street townhouses which provides residents a choice as their needs change. As the future school and associated playing fields are conveniently located in the southwesterly neighbourhood, many families have chosen to live in BlackWolf.

Housing closely linked to the open space system promotes active transportation modes to destinations throughout the neighbourhood and offers spaces for informal and spontaneous social interactions. Roadways have been designed to minimize short-cutting through BlackWolf's three neighbourhoods to maintain quiet and attractive residential enclaves. On Sunday afternoons the park spaces are full of interacting residents making their way about the complete neighbourhood of BlackWolf.

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# 1 Introduction

The BlackWolf Outline Plan (OLP) Amendment has been prepared on behalf of Avonlea Homes Ltd. This Amendment addresses changes to the area shown on **Figure 5**. The purpose of this amendment is to update the land use concept to reflect market demands and to provide unity with the surrounding developments.

This document outlines and illustrates the changes that the updated land use concept has had on the following:

- Proposed Land-Use Concept - **Figure 5**
- Development Staging - **Figure 6**
- Intersection Feature - **Figure 7**
- Projected Build Out Traffic Volumes - **Figure 8 & Figure 8.1**
- Street Names - **Figure 9**
- Water Servicing Concept - **Figure 10**
- Sanitary Servicing Concept - **Figure 11**
- Minor Stormwater Management Concept - **Figure 12**
- Major Stormwater Management Concept - **Figure 13**

The above noted amendments have been reviewed and the necessary changes have been outlined in the following sections.



## 2 Site Context & Existing Conditions

### 2.1 LOCATION AND OWNERSHIP

The community of BlackWolf is located in North Lethbridge. The BlackWolf Outline Plan area includes approximately 47 hectares of land owned by Avonlea Homes Ltd.

BlackWolf comprises the N.E. ¼ Sec. 17-9-21-4 excepting the S.E. 16 hectares of the ¼ section.

Owner	Area (ha)
AVONLEA HOMES LTD.	± 47

### 2.2 CONTEXT

#### 2.2.1 Surrounding Land Uses

As shown in **Figure 2 Surrounding Conditions**, the BlackWolf Outline Plan area is immediately north of the existing Uplands residential subdivision. The lands to the west make up the Legacy Regional Park and residential community, both in varying stages of development. The site is bordered to the north by agricultural land. The land to the east of the subject site is the Sherring Business and Industrial Park, which has an approved subdivision plan in place and is undergoing development. The 16 ha balance of the quarter section is used for crop production and also contains a Canadian Broadcasting Corporation (CBC) communications tower.

The existing residential neighbourhoods of Hardieville and Legacy Ridge lie to the west of the site.

The Oldman River and its significant valley lie approximately two kilometers to the west.

#### 2.2.2 Existing Access & Surrounding Road Network

The major existing arterial road access for BlackWolf is 28<sup>th</sup> Street N to the east of the site. Uplands Blvd will eventually extend north along the west boundary of BlackWolf, and will connect BlackWolf to Scenic Drive N, a major north-south arterial which connects to Highway 3 approximately 5 kilometres to the southwest. The future 44<sup>th</sup> Avenue North is located to the north of BlackWolf in a separate planning area.

### 2.3 SITE DESCRIPTION

The subject area has little topographic relief, sloping very gently from west to east. The elevation ranges from 917m in the centre and on the western edge of the property to 913m in the east. **Figure 3 Existing Site Plan** shows the site topography.



20-9-21-4

21-9-21-4

44 AVE N

HARDIEVILLE

SUBJECT LANDS

REGIONAL PARK

CBC

SHERRING INDUSTRIAL PARK

GIFFEN RD

LEGACY RIDGE

UPLANDS

26 AVE N

SCENIC DR N

16 ST N

WINSTON CHURCHILL


PARK MEADOWS

23 ST N

28 ST N

CHURCHILL INDUSTRIAL PARK

**LEGEND**

 Subject Lands



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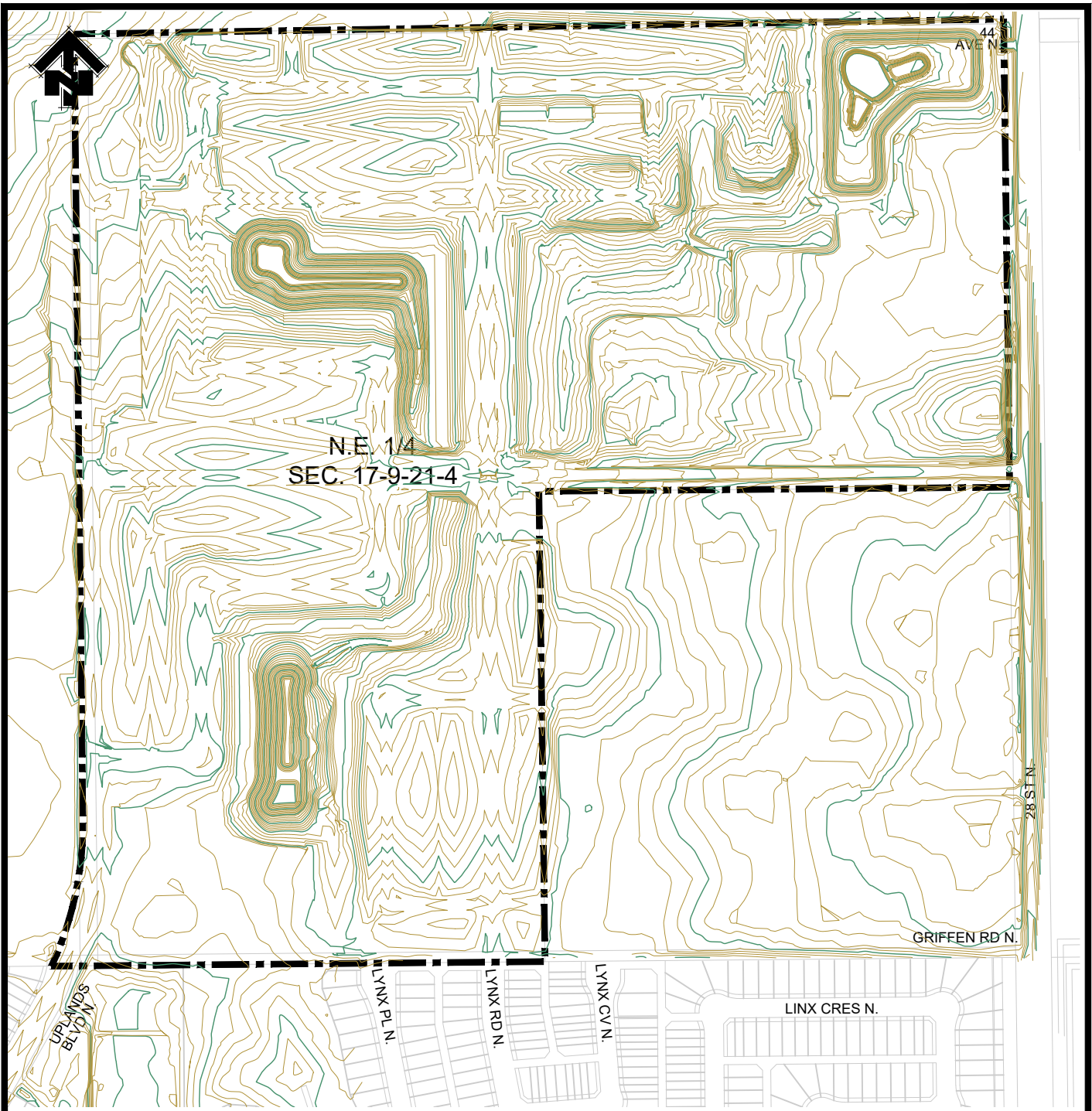
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**Fig. 2**  
**Surrounding**  
**Conditions**

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**LEGEND**

-  Blackwolf Outline Plan Boundary
-  Countour Major 1.0m Interval
-  Countour Minor 0.20m Interval



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**Fig. 3**  
**Existing Site Plan**

## 2.4 BACKGROUND STUDIES

The following studies were prepared and submitted to the City of Lethbridge as part of the BlackWolf Outline Plan.

### 2.4.1 Environmental Site Assessment

A Phase I Environmental Site Assessment was prepared by EBA Engineering Consultants Ltd. The study found that there are no apparent potential on-site sources of environmental impairment relating to the site from historical or current on-site land uses, and that there are no potential apparent off-site sources of environmental impairment relating to the site from historical or current off-site land uses. Based on the present study, EBA recommends that no further action (i.e. Phase II ESA) is required at this time.

### 2.4.2 Geotechnical Evaluation

A geotechnical evaluation was conducted by EBA Engineering Consultants Ltd. The geotechnical evaluation is supplemented by information obtained from the Phase I Environmental Site Assessment (ESA) conducted for this site by EBA in, 2008. All geotechnical work in the plan area will be carried out in accordance with the recommendations in the report.

### 2.4.3 Historical Resources Overview

Arrow Archaeology Limited has completed a Historical Resources Overview and recommended that the plan be approved under Section 31 of the *Historical Resources Act* and that no additional historical resources assessment or examination is necessary. The Historical Resources Overview indicates that the site land has been under active cultivation for at least several decades and the surface area is considered to be disturbed from the point of view of historical resource potential. The surface of the area is level and located on a former glacial lake bed. There are no historically significant topographical or other biogeophysical features within the proposed subdivision area. The area has a Historical Resource Value ranking of 0.

Historical Resources Act Clearance has been received (refer to Appendix 6).

## 3 Policy Context

### 3.1 PROVINCE OF ALBERTA DRAFT LAND-USE FRAMEWORK

The Land-Use Framework the Province of Alberta was adopted in 2012. Under its direction (in Section 5A) the Province will ensure that the following outcomes and principles are reflected in the land-use plans developed for each region:

- Sustainable prosperity supported by our land and natural resources;
- Healthy ecosystems and environment; and
- Livable communities and recreational opportunities.

It is in the interest of municipalities in the Province to keep these outcomes in mind as plans are developed. The BlackWolf Land Use Re-designation and Outline Plan strive to comply with the principles put forth in this draft document such that the land use is forward-thinking and will not conflict with future, adjacent plans, policies and development which are sure to follow.

#### 3.1.1 South Saskatchewan Regional Plan

The South Saskatchewan Regional Plan (SSRP) is the primary tool for implementing the Provincial Land Use Framework prepared by the Government of Alberta. The SSRP takes a holistic approach to the management of land and natural resources, establishing broad-based policies to guide responsible land management for 84,000 square kilometers of land within Southern Alberta over the next 50-year period. The intention of the SSRP is to ensure the many competing interests for limited land and natural resources is balanced and communities continue to work towards a common vision. The following key strategies are established within the SSRP which apply to this outline plan:

- Efficient Land Use
- Watershed Management
- Quality of Life
- Aboriginal Engagement
- Community Needs
- Energy

### 3.2 MUNICIPAL DEVELOPMENT PLAN

The City of Lethbridge Integrated Community Sustainability Plan/ Municipal Development Plan (ICSP/MDP), states the objectives and policies for orderly growth and development of the City. The MDP recommends directing growth into areas that already have approved development concept plans, which includes the BlackWolf community lands under the Hardieville-Legacy Ridge-Uplands Area Structure Plan.

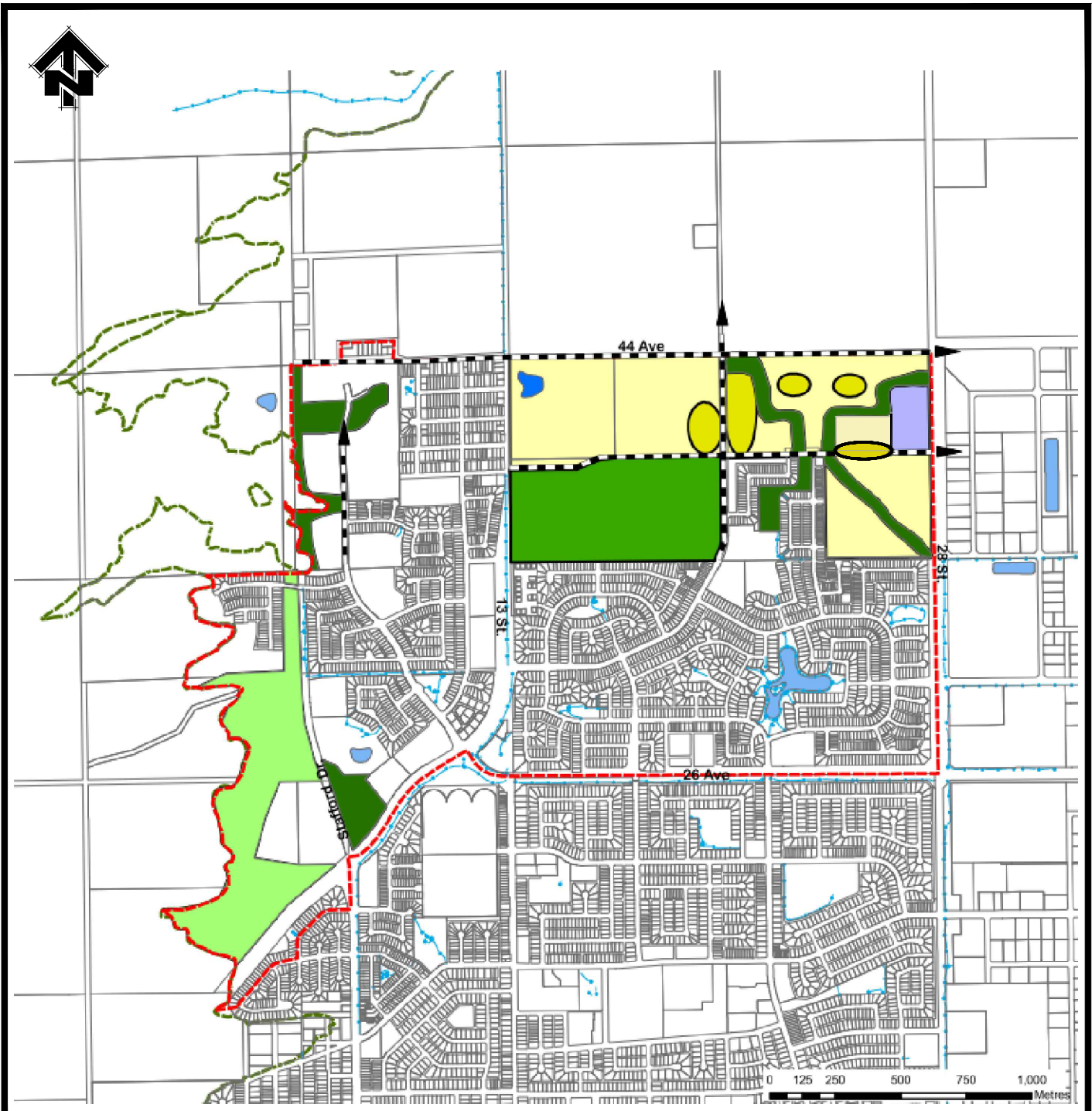
Development in these areas can leverage existing infrastructure investments and provide threshold populations to attract commercial and community services. As well, the MDP indicates North Lethbridge as an attractive development area due to its proximity to the NE Industrial Area employment centre.

### 3.3 HARDIEVILLE-LEGACY RIDGE-UPLANDS AREA STRUCTURE PLAN

The proposed BlackWolf Outline Plan is subject to the policies of the Hardieville-Legacy Ridge-Uplands Area Structure Plan (ASP) as shown in **Figure 4**. The ASP establishes the BlackWolf lands as a residential area. Consistent with the ASP, the BlackWolf Outline Plan provides for:

- low density residential uses,
- medium density residential uses,
- high density residential uses,
- comprehensive pathway system,
- neighborhood parks,
- public elementary school, and
- connection to the regional park.

The following figure demonstrates how the Outline Plan matches the policies of the ASP.



**LEGEND**

- Regional Trail
- Setback Line
- Vehicular Circulation Pattern
- Area Structure Plan Boundary
- Existing Pond
- Proposed Pond
- Low Density Residential (R-L)
- Multi Family Residential (M.F.)
- Natural Area
- Open Space
- Regional Park
- Swing Site, Institutional, Low Density or Multi Family Residential



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**Fig. 4**  
**Area Structure Plan**

## 4 Outline Plan

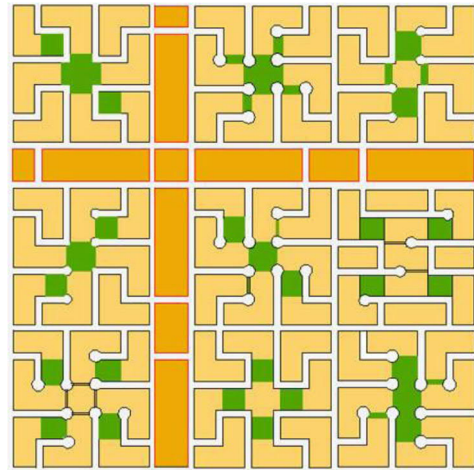
### 4.1 LAND USE AND DEVELOPMENT CONCEPT

#### 4.1.1 Modified Fused Grid

BlackWolf is most readily defined by its use of the modified fused grid road layout, the goal of which is to provide a balance between vehicular and pedestrian movement and to create safe, sociable streets and easy connectivity to community facilities, as indicated in **Figure 5 - Proposed Land Use Concept**. The modified fused grid is designed to implement all of the development concepts and planning principles described in this section, including:

- sustainability
- walkability
- health, safety and well-being
- linked open space.

The Canadian Mortgage and Housing Corporation (CMHC) have conducted extensive research about the modified fused grid concept for community road networks. The research highlights the benefits of conventional loops and cul-de-sacs for efficiency of land use and safety for pedestrians along the street network, as well as the benefits of traditional grid road patterns that provide direct access and permeability for active transportation modes. The modified fused grid road network marries the street pattern with direct open space path systems that accommodate pedestrians and cyclists. The modified fused grid road network promotes safe and accessible pedestrian connections while strategically accommodating the private automobile and efficient land use practices.



The CMHC research promotes a return to the permeability of the grid street network for pedestrian access routes while introducing loops and cul-de-sacs in local streets for safety, sociability and land use efficiency. The modified fused grid road network utilizes open space as a significant component of the transportation system, providing for pedestrian connectivity and permeability throughout the community as the open spaces link the residential areas and local amenities throughout the community. The street network distributes local residential automobile traffic to residences in the community, while the unconnected street network deters non-local traffic from using the internal street network, in turn enhancing the safety and comfort for residents on local roads.

#### 4.1.2 Community Form

In keeping with the prescriptions of the ASP, the community of BlackWolf consists of a balanced density of **single detached, semi-detached as well as higher density multi-family**



units. A system of connected, linear open spaces provides alternative transportation options for the entire community.

The single-detached, semi-detached and townhouse units either back onto lanes or open space. This provides a pleasant walking and cycling environment for both configurations, either on pathways or streets.

The high density use has been strategically located to act as a transition into BlackWolf from 28<sup>th</sup> St N and are nearby two higher classified roads and open space areas.

1. The high density sites are located along the interface between BlackWolf and Sherring Industrial Park. This creates a scale of use from industrial, to high density, to low density residential. Transitions provide visual and functional support for developments through the size and style of buildings and amount of activity occurring on the site.
2. The high density sites are situated along two higher ordered roads including 28<sup>th</sup> St N an arterial road and BlackWolf Boulevard, a major collector road. These roads are anticipated to be equipped with transit services and stops. Transit offers access to an alternate form of transportation and by locating high density sites adjacent to these roads, it creates an opportunity for increased ridership and may reduce the reliance on personal vehicle usage.
3. The high density site is near the linear open space in the northeast area of BlackWolf. This is an important consideration as high density properties tend to have little or no yard space available. The lack of yard space available in a high density site can be offset by situating it near open space.

The modified fused grid road network is designed to create permeable environments for pedestrians while preventing short-cutting of traffic through the community. The system of interconnected open space contains storm ponds and pathways designed to enable pedestrians and cyclists to traverse the entire community with a minimum of interaction with a vehicular environment.

## 4.2 DESIGN ELEMENTS AND PLANNING PRINCIPLES

### 4.2.1 Sustainability

The community of BlackWolf is designed to function as the 'live and play' portion of the complete live-work-play environment when combined with the Sherring Industrial Park, within walking distance of the entire community, across 28 St N to the east. The mix of housing allows individuals, couples and families to remain in the community throughout their lives, even as their housing needs change. BlackWolf will provide its residents a variety of housing types: single detached, semi-detached, fourplexes and townhouses, high density multi-family units, and will provide the ability to accommodate affordable housing.



BlackWolf is located within walking distance of a significant employment centre, reducing the need for automobile dependency and allowing residents a short commute and improved quality of life with less travel time and active transportation options. Creating a green, walkable community with functional open spaces will also form a sense of place for its residents. A road system that will accommodate transit without encumbering the local residential cells will be provided.

The introduction of low impact development techniques (e.g. rain gardens, bio-swales) could reduce the impact of urban development on the existing eco-system as well as add to the aesthetics of the community. The development of land will proceed in an orderly fashion, thus reducing the burden on the City's infrastructure obligations.

#### 4.2.2 Walkability

In BlackWolf connectivity for pedestrians and cyclists is not reliant on the street pattern but rather an integrated open space system that connects to residential streets. This makes residential areas permeable for active transportation modes, while allowing efficient residential layouts and accommodating the private automobile for longer, regional trips.

The continuous pedestrian and cyclist path system in BlackWolf connects streets and provides direct routes to the parks, public transit and institutional amenities for community residents. The direct pathway system enhances active transportation options by decreasing the travel time required while increasing the convenience of these forms of transportation. The pathways system is designed such that a minimum of road crossings are made when traversing the community on foot. A pleasant all-season pedestrian environment will be established, with the goal of encouraging walking as recreation and transportation year-round. All land uses in the plan area will be linked by pathways and sidewalks, enabling easy and direct pedestrian access to public transportation, to adjacent communities and to employment opportunities.

#### 4.2.3 Health, Safety and Well-being

The modified fused grid road network in BlackWolf provides pedestrian access from residences to local amenities with minimal or no street crossings. The open space and road network coverage at a single intersection in the physical centre of the community. The intersection acts as a focal point through unique intersection features (**Figure 7**). In many cases this intersection is the only point where a pedestrian needs to cross a road while navigating the local community. The safety and comfort of pedestrians is improved in relation to conventional community design. Children can walk to school within BlackWolf without crossing many streets, easing the worries of parents and the demands on parents' time and



resources to drop children off at school by car. As well, children benefit from active transportation modes to travel to and from school daily.

Connectivity to significant sites such as the school and parks is provided in BlackWolf. The local open space system also integrates with regional networks to provide direct access to regional destinations like the Regional Park, future developments north, and industrial employment opportunities east of BlackWolf.

#### 4.2.4 Residential Neighbourhood Design

Due to the modified fused grid layout of the community's road network, the community will be separated into three distinct residential enclaves linked by the intersecting X-pattern of the open space system.

The community is designed with a balanced mix of residential dwelling units at an overall anticipated density of 15.81 units per hectare (based on gross development area), as indicated in **Figure 5** and **Table 4-1**.

The mix of housing will consist of single-detached dwellings, semi-detached dwellings, townhouses, and high density multi-dwelling units.

Single-detached dwellings, semi-detached dwellings and townhouses will often offer lane access at the rear, providing a pleasant streetscape ideal for walking and for community interaction.

Those residences not serviced by lanes back onto the green corridors, which provides a quiet, community-oriented pedestrian environment.

#### 4.2.5 Entrance Features

The entrance to the community will provide a sense of arrival, whether this arrival is via car, bicycle, walking or public transit. The main automobile accesses from arterial roadways are on the west and east sides of the community, from 13 St N and 28 St N respectively. Other access is provided via Uplands Boulevard, to the south and 44<sup>th</sup> Avenue to the north.

The non-vehicular (pedestrian and cycling) entranceways are placed at the corners of the development and provide access to the entire site with a minimum of street crossings. This is a safe and pleasant way for people to enter their community.

#### 4.2.6 Public Open Space and Activity Nodes

The aesthetics of the community are enhanced with the integrated open space. The integrated open space provides amenity areas for local residents, enhances natural systems through water management practices, and provides personal pleasure and serenity to local residents that use the open space for visual and social spaces.

#### 4.2.7 Stormwater Management Concept

Stormwater management features will be incorporated into the plan area as amenity features as well as functional infrastructure, such as naturalized storm ponds and drainage channels.

#### 4.3 DENSITY

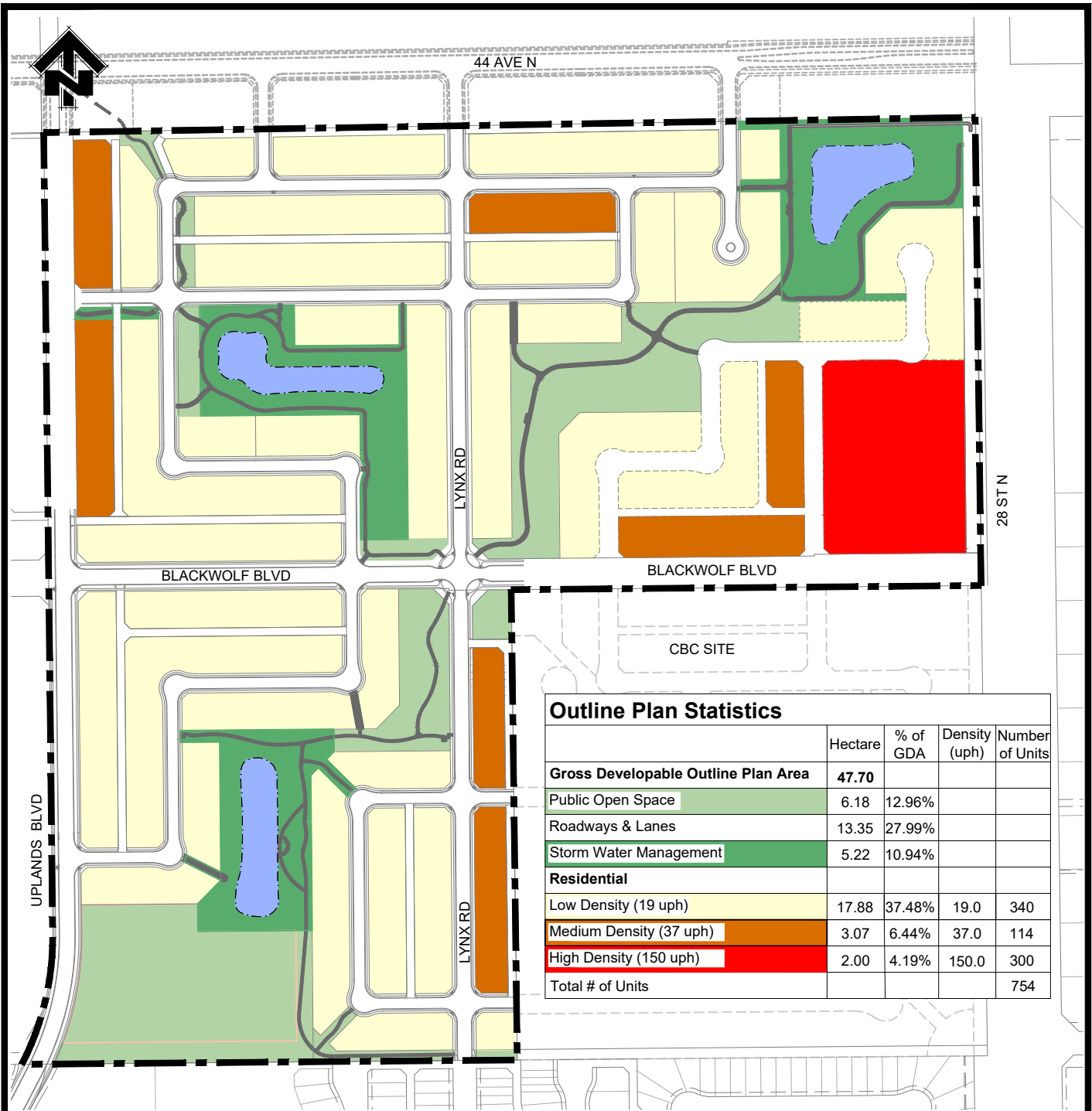
The following changes in land use have been made to the original BlackWolf OLP concept:

The original land use plan included a high density multifamily site (100 uph) located in the northwest and a swing site (with an average density of 37 uph) located in the east portion of BlackWolf. Previously approved amendments reduced the overall density of the site by replacing the high density site and the medium density swing site with a mixture of low (19 uph) and medium (37 uph) density residential units. The amendments as shown on **Figure 5 Land Use Plan** illustrate amending the area to the east (originally the swing site) to include a high density (150 uph) development.

The re-designation of land to increase density does not significantly impact the overall target density which remains in excess of the target established in the ASP. The density of the amended Outline Plan area is 15.81 units per hectare based on gross development area as shown on **Figure 5 Land Use Plan** and summarized in **Table 4-1**.

**Table 4-1  
Outline Plan Statistics**

	Hectare	% of GDA	Density	Number of Units
<b>Gross Developable Outline Plan</b>	<b>47.70</b>			
<b>Public Open Space (including 6.0 ha of Park)</b>	<b>6.18</b>	<b>12.96 %</b>		
<b>Roadways</b>	<b>13.35</b>	<b>27.99 %</b>		
<b>Storm Water Management</b>	<b>5.22</b>	<b>10.94 %</b>		
<b>Residential</b>				
<b>Low Density</b>	<b>17.88</b>	<b>37.48 %</b>	<b>19 uph</b>	<b>340</b>
<b>Medium Density</b>	<b>3.07</b>	<b>6.44 %</b>	<b>37 uph</b>	<b>114</b>
<b>High Density</b>	<b>2.00</b>	<b>4.19 %</b>	<b>150 uph</b>	<b>300</b>
<b>Total # of Units</b>				<b>754</b>
<b>Overall Density (Gross Development Area)</b>			<b>15.81 uph</b>	
<b>Overall Density (Net Development Area)</b>			<b>32.83 uph</b>	



**Outline Plan Statistics**

	Hectare	% of GDA	Density (uph)	Number of Units
<b>Gross Developable Outline Plan Area</b>	<b>47.70</b>			
Public Open Space	6.18	12.96%		
Roadways & Lanes	13.35	27.99%		
Storm Water Management	5.22	10.94%		
<b>Residential</b>				
Low Density (19 uph)	17.88	37.48%	19.0	340
Medium Density (37 uph)	3.07	6.44%	37.0	114
High Density (150 uph)	2.00	4.19%	150.0	300
<b>Total # of Units</b>				<b>754</b>

**LEGEND**

- Residential - Low Density
- Residential - Medium Density
- Residential - High Density
- Public Open Space with Activity Nodes
- Storm Water Management
- Pathways



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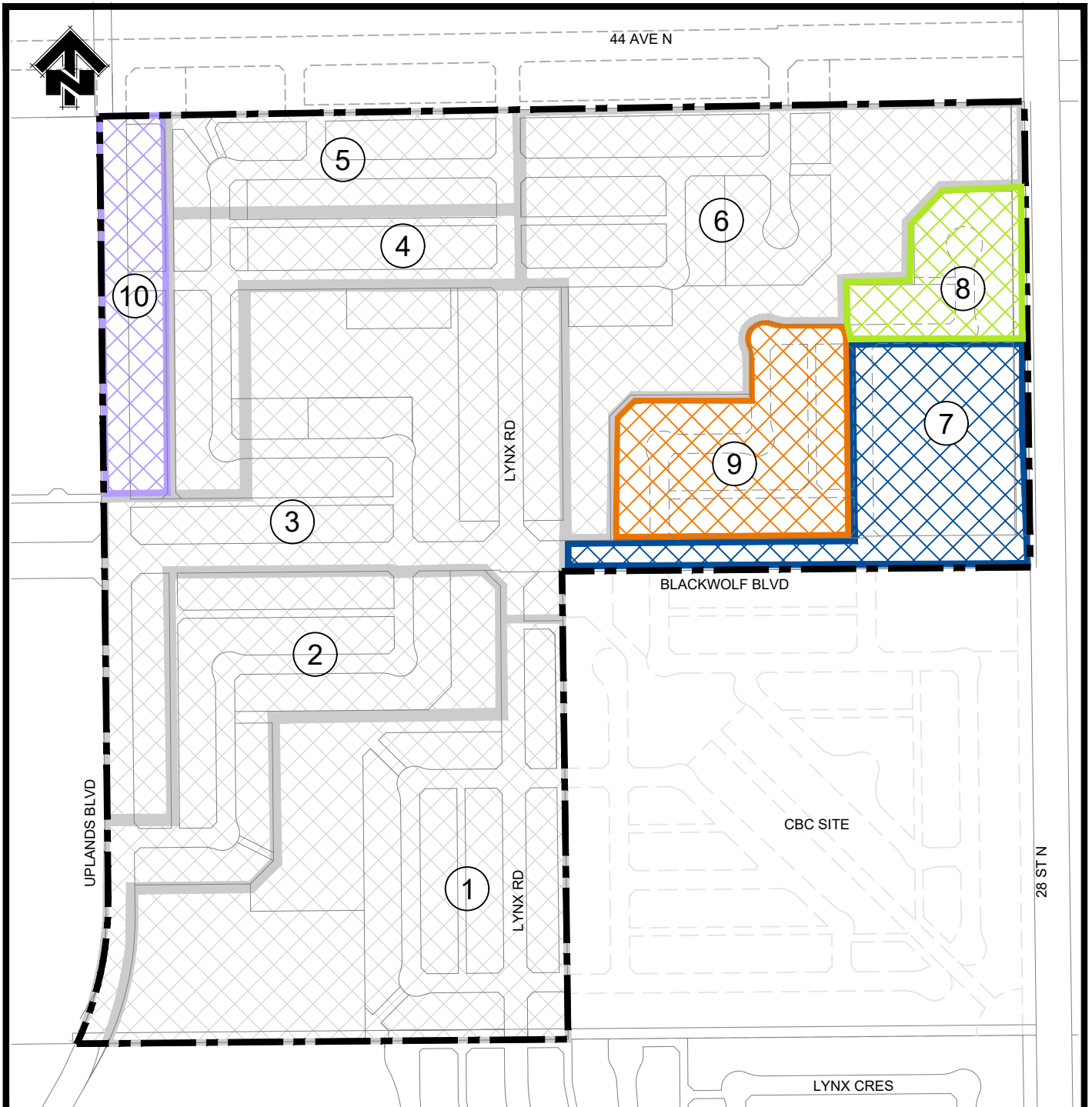
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**Fig. 5**  
**Proposed**  
**Land Use Concept**

#### 4.4 DEVELOPMENT STRATEGY

The development phasing plan is intended to reflect logical development progression. The development strategy progresses through the phasing for the existing and proposed phasing as shown on **Figure 6 – Development Staging**. The development will continue to proceed from the South to the Northeast with logical extension of services.



LEGEND:

-  EXISTING PHASES (1-6)
-  FUTURE PHASES (7-10)



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**Fig. 6**  
**Development**  
**Staging**

## 5 Transportation

### 5.1 ACCESS AND EXTERNAL ROAD SYSTEM

The community of BlackWolf is bound:

- to the east by 28<sup>th</sup> Street North arterial roadway,
- to the north by the future 44<sup>th</sup> Avenue North super/major collector roadway,
- to the west by the future Uplands Boulevard major collector roadway.

Both 28<sup>th</sup> Street North and 44<sup>th</sup> Avenue North are components of the regional road network. One access point is provided to 28<sup>th</sup> Street North, on BlackWolf Blvd. 28<sup>th</sup> Street North connects BlackWolf residents with the employment uses to the east and southeast of the development, as well as leading south into the City core.

Three new connections have been provided to 44<sup>th</sup> Avenue, at Lynx Rd, GreyWolf Lane, and GreyWolf Cove. An additional connection to Uplands Blvd has also been provided at GreyWolf Rd. These new intersections allow for traffic to be evenly distributed through the development.



At the central intersection in BlackWolf, at BlackWolf Blvd. and Lynx Road, a unique landscape entry feature has been designed, and is shown in Figure 7.

Uplands Boulevard will be extended north along the western boundary of BlackWolf. Three access points are provided into BlackWolf from Uplands Boulevard.

### 5.2 INTERNAL ROAD SYSTEM

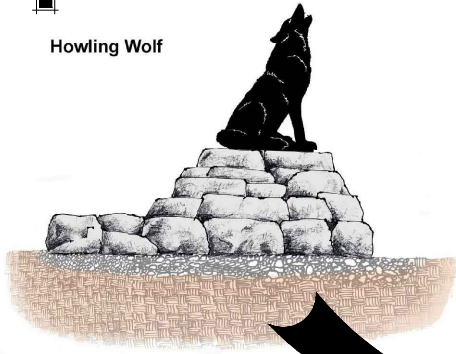
Based on the modified fused grid road network, the internal road system provides access to residential loops and cul-de-sacs. The internal road network design eliminates potential short-cutting. All intersections and site accesses meet City Design Standards in terms of intersection spacing. Figure 8 illustrates Projected Build-out Traffic Volumes.

In addition, consideration was given for an enhanced intersection treatment at BlackWolf Blvd. and BlackWolf Lane, with the increased trip generation from the proposed multi-family site with future development to the south. The updated plan includes property line corner cuts to accommodate a 32m Urban Compact roundabout, as shown in Figure 8.1.

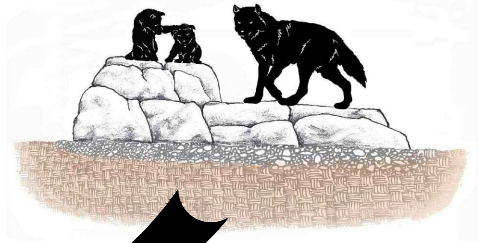




Howling Wolf



Mother and Cubs

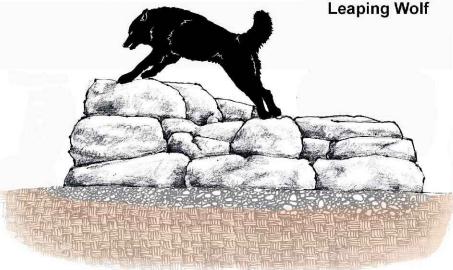


LYNX ROAD

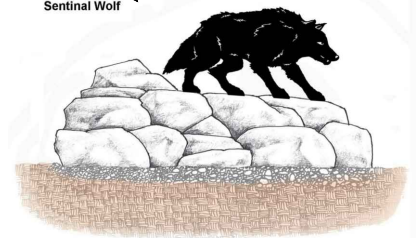
BLACKWOLF BLVD

BLACKWOLF BLVD

Leaping Wolf



Sentinal Wolf



LYNX ROAD



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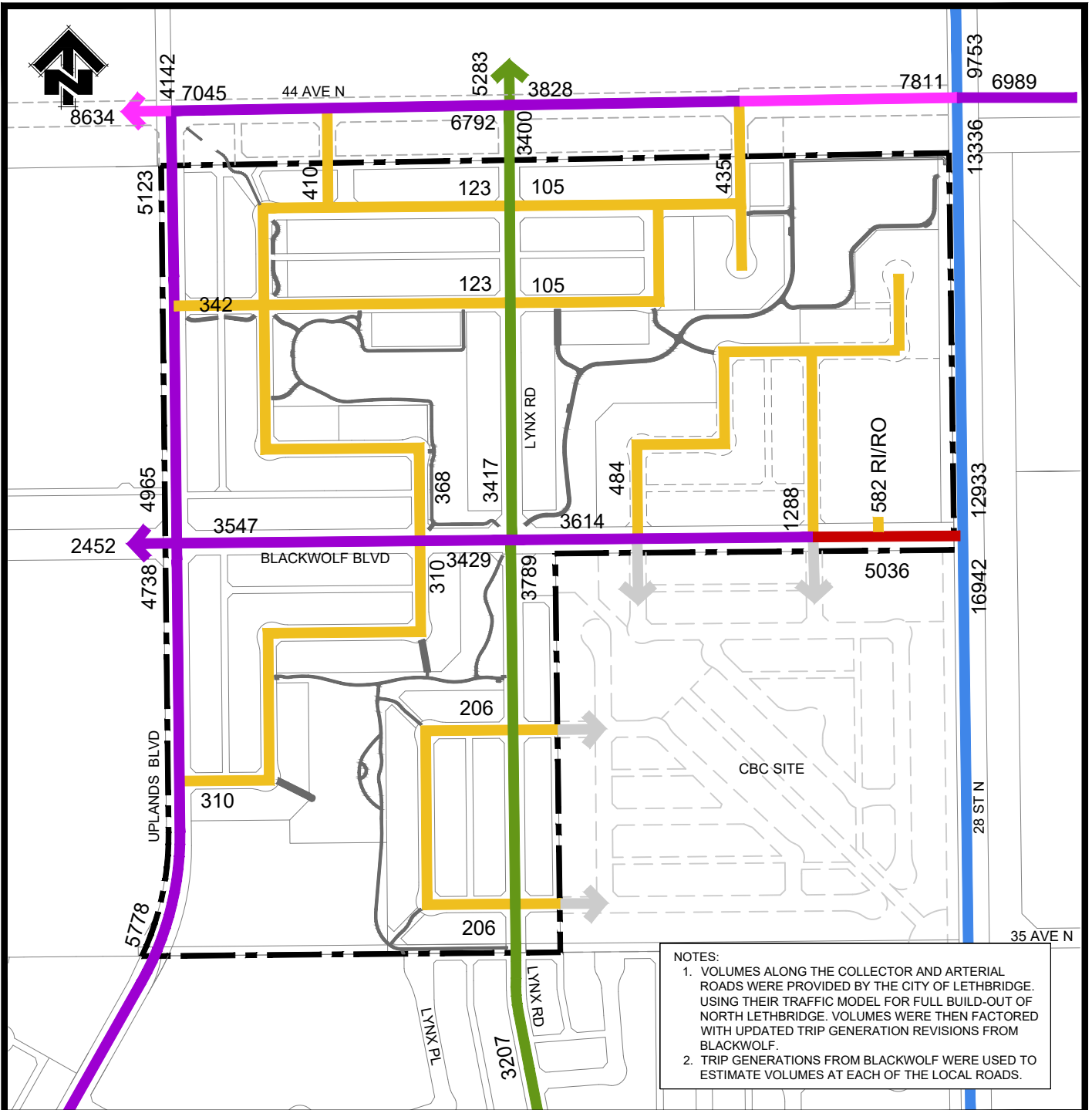
May 15, 2020 - 9:52am



MARCH 2020

**AVONLEA**  
H O M E S

**Fig. 7**  
**Intersection**  
**Feature**



NOTES:  
 1. VOLUMES ALONG THE COLLECTOR AND ARTERIAL ROADS WERE PROVIDED BY THE CITY OF LETHBRIDGE. USING THEIR TRAFFIC MODEL FOR FULL BUILD-OUT OF NORTH LETHBRIDGE. VOLUMES WERE THEN FACTORED WITH UPDATED TRIP GENERATION REVISIONS FROM BLACKWOLF.  
 2. TRIP GENERATIONS FROM BLACKWOLF WERE USED TO ESTIMATE VOLUMES AT EACH OF THE LOCAL ROADS.

**LEGEND**

- Blackwolf Outline Plan Boundary
- Minor Collector
- Major Collector
- Super Collector
- Arterial
- Community Entrance Road
- Local
- Future Connections
- Pathways



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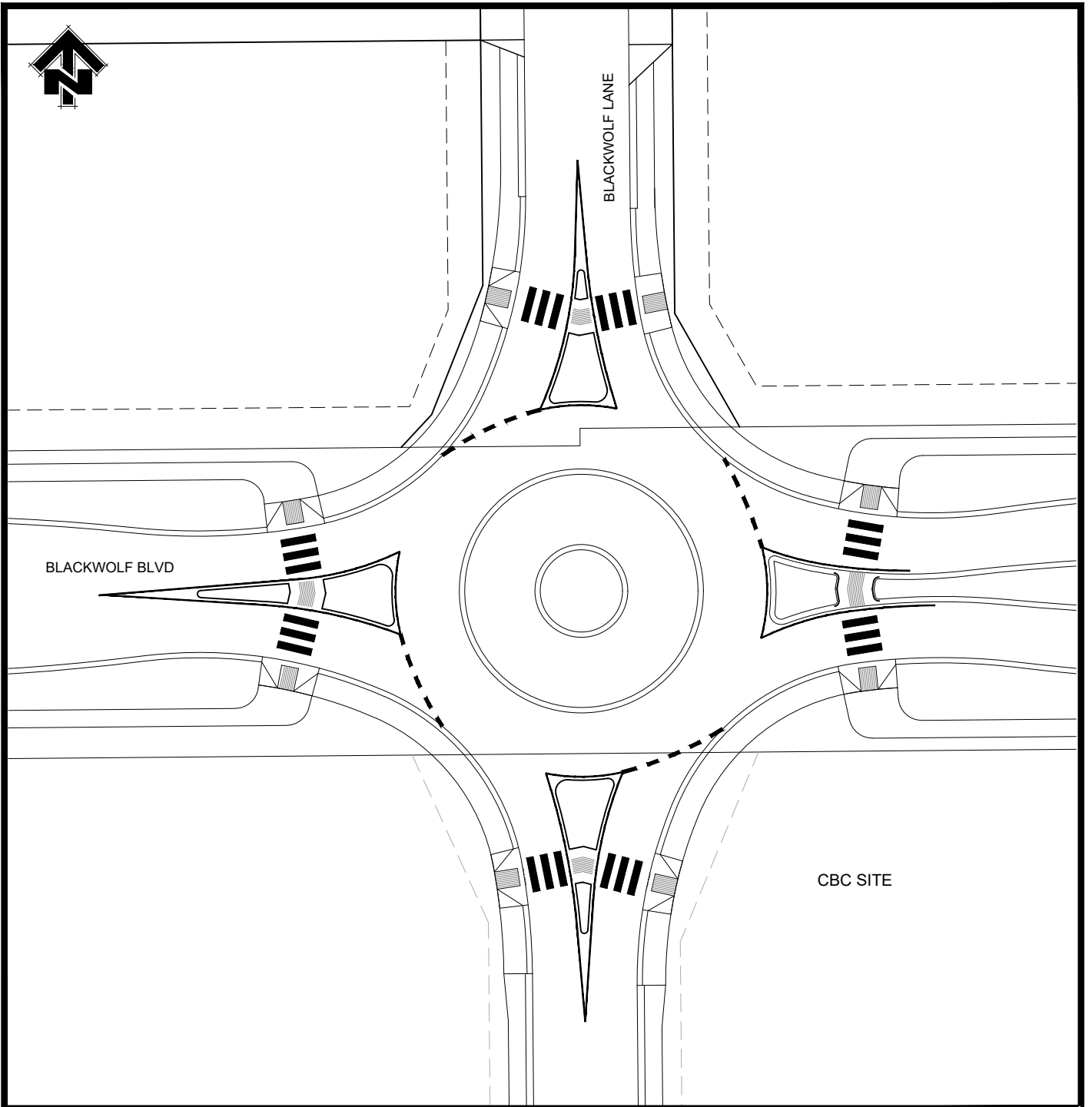
May 15, 2020 - 11:27am



MARCH 2020

**AVONLEA**  
 H O M E S

**Fig. 8**  
**Projected Buildout**  
**Traffic Volumes**



P:\2018\167\00\_01P\_Amendments\Engineering\05.00\_Design\Fig\_8.1\_Roundabout.dwg Layout:FIG 8.1 ()

May 15, 2020 - 12:05pm



MARCH 2020

**AVONLEA**  
H O M E S



**Fig. 8**  
**Roundabout**  
**Intersection**  
**Treatment**

### 5.3 TRAFFIC ANALYSIS

The original land use plan included a high density development which would house approximately 75 uph in the northwest quadrant of the development. This layout has since been modified to include predominantly low-density residential with medium-density residential fronting Uplands Blvd. In this revision, the land use **has been revised to include a high density use expected to house up to 175 uph in the east quadrant, where there was previously planned a mix of low and medium density residential units.**

The original outline plan traffic analysis considered a design horizon of 2018, which assumed full build-out of BlackWolf. At this horizon year the growth within North Lethbridge is anticipated to be low. The City of Lethbridge developed their own update to the traffic model to project volumes at full build-out of the North Lethbridge area, which included the BlackWolf development.

The City of Lethbridge requested that this updated traffic model be used as the basis for the BlackWolf traffic analysis. As such, the City of Lethbridge agreed to add the new roadway links into their traffic model to reflect the revised traffic volumes at full build-out of North Lethbridge.



These revised volumes from the updated traffic model were then adjusted using the proposal revisions to the land use within BlackWolf. Trip generation from each zone within BlackWolf was recalculated from the revised land use. Site generated volumes have been estimated at each roadway link from each of the zones. Traffic make up at each of the intersections was estimated, and revised trip generation was then applied to the new model volumes to determine revisions to the intersection volumes. Where the traffic model indicated no volumes on the new local road links, the volume was estimated using the site generate traffic based on the land use for each zone and the percentage of that zone's traffic at each local road link.

The revised land use and the additional roadway links result in a net **increase** in the traffic volumes at the intersections, when compared with the COL traffic model. The road network, roadway classifications and daily traffic volumes at the roadway links entering and exiting the development **as per the updated traffic analysis** are shown in **Figure 8 - Projected Build out Traffic Volumes**. Calculations for the revised trip distribution and traffic volumes have been included in **Appendix B**.

**The results of the updated traffic analysis confirmed the previously planned intersection treatments and roadway classifications can adequately service the proposed land use changes, and acceptable LOS can still be achieved through the road network.**

#### 5.4 ALTERNATIVE TRANSPORTATION MODES

The integrated open space system which includes multi use pathways gives access for pedestrians and cyclists through the community residential areas to significant local amenities. As well, the pathway network leads to areas extending beyond the local community such as the regional park to the west, employment zones to the east and future developments to the north.

#### 5.5 TRANSIT

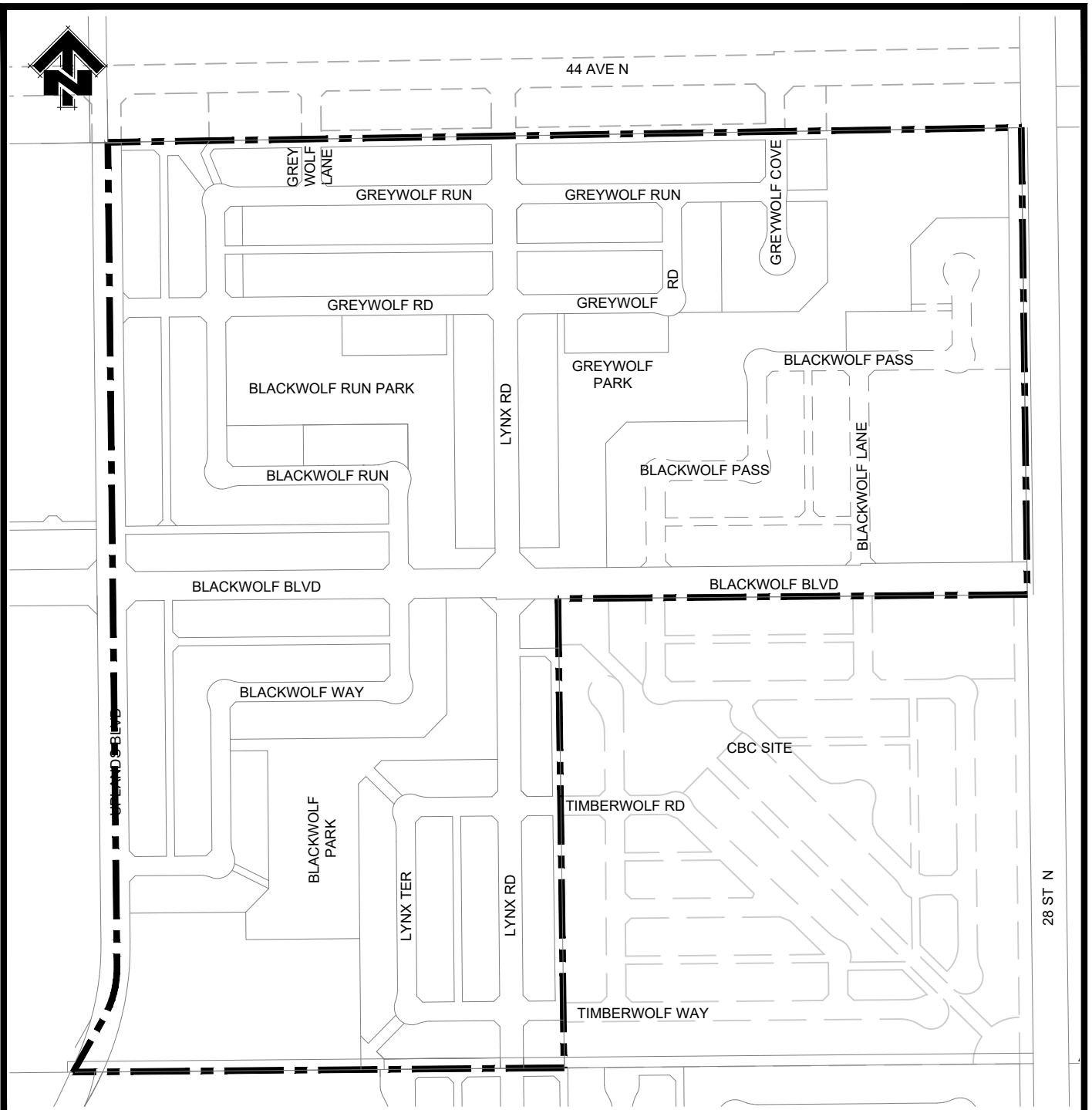
Transit route will utilize the collector network at ultimate build-out. Interim routing will be determined by the City of Lethbridge Transit Department as development proceeds.

#### 5.6 STREET NAMES

With the additional transportation network, a review of the street naming was undertaken. The amended street names have been shown on [Figure 9 - Street Names](#).

#### 5.7 CANADA POST

Canada Post will not provide “door to door” mail delivery to the BlackWolf Subdivision. All mail will be delivered to community mailboxes at locations within the road rights-of-way acceptable to the City of Lethbridge.



**LEGEND**

 Blackwolf Outline Plan Boundary



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May 15, 2020 - 11:26am



MARCH 2020

**AVONLEA**  
H O M E S

**Fig. 9**  
**Street Names**

## 6 Municipal Services

### 6.1 WATER SERVICING

The existing water distribution network near the Outline Plan Area consists of:

- A 200 mm diameter watermain along Lynx Road N to the south of the Outline Plan Area
- A 200 mm diameter watermain along Lynx Place N to the south of the Outline Plan Area
- A 450 mm diameter watermain and a 200 mm diameter watermain along Uplands Boulevard N to the southwest of the Outline Plan Area

An existing 600 mm diameter watermain extends to the Uplands Reservoir and Pumphouse on Uplands Boulevard. The BlackWolf system connects to the existing system north of the reservoir. The proposed water distribution network in the Outline Plan Area is shown on **Figure 11 – Water Servicing Concept**. The network will be sized to satisfy the following City of Lethbridge level of service objectives:

- Minimum acceptable pressures to be no less than 310 kPa during peak hour demand
- Maximum delivered pressures to be no greater than 620 kPa

An additional service objective is that the minimum fire flow be no less than 75 L/s in residential areas, with a minimum residual pressure of 150 kPa, during maximum day demand.

The majority of the watermains in the Outline Plan Area will consist of 200 mm diameter pipe. A 450 mm diameter watermain will extend along Uplands Boulevard N through the Outline Plan Area to service future development to the north. 450 mm diameter watermains will extend east and west, laying the ground work for a wider distribution network servicing all of North Lethbridge.

Ultimately, the water distribution network in the Outline Plan Area will connect to the City's network at eight locations as shown on **Figure 10 – Water Servicing Concept**. Initially, two connections will be made to the existing network along Lynx Place N and Lynx Road N. In the future, the water distribution network in the Outline Plan Area will connect to Uplands Blvd. and the water distribution networks of adjacent developments.

The Outline Plan Area will be developed in 9 phases (see **Section 4.4** for more information of the development phasing). In the initial phase, the water distribution system in the Outline Plan Area was connected to the City's water system at two locations (i.e., Lynx Place N and Lynx Road N). The remainder of the connections to the City's water system will occur as development surrounding BlackWolf progresses.

Total water demands for the average day, maximum day and peak hour demand scenarios are summarized in **Table 6-1**. These demands were developed using water use rates presented in the City of Lethbridge Design Standards (2016).

The amended water demands are summarized in **Table 6-1** below.

**Table 6-1**  
**Total Water Demands**

<b>Demand Scenario</b>	<b>Full Development MLD (L/S)</b>
<b>Average Day Demand</b>	0.71 (8.2)
<b>Maximum Day Demand</b>	1.57 (18.2)
<b>Peak Hour Demand</b>	2.50 (28.9)
<b>Population Equivalent For Design</b>	1,773



44 AVE N



FUTURE WATERMAIN CONNECTION

FUTURE WATERMAIN CONNECTION

FUTURE WATERMAIN CONNECTION

450mm

200mm

200mm

200mm

200mm

450mm

200mm

200mm

200mm

200mm

200mm

450mm

200mm

200mm

200mm

200mm

200mm

200mm

WATERMAIN CONNECTION

450mm

WATERMAIN CONNECTION

450mm

UPLANDS BLVD

200mm

200mm

200mm

200mm

200mm

200mm

200mm

450mm

200mm

200mm

200mm

200mm

450mm

200mm

200mm

200mm

SECOND CONNECTION TO EXISTING WATER DISTRIBUTION SYSTEM

FIRST CONNECTION TO EXISTING WATER DISTRIBUTION SYSTEM

450mm

450mm

600mm

200mm

200mm

200mm

200mm

200mm

200mm

200mm

CBC SITE

BLACKWOLF BLVD

BLACKWOLF BLVD

LYNX RD






LYNX RD

LYNX RD

LYNX CRES

28 ST N

**LEGEND**

-  Blackwolf Outline Plan Boundary
-  Existing Water Main
-  Proposed 200mm Water Main
-  Proposed 250mm Water Main
-  Proposed 450mm Water Main



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May 15, 2020 - 11:25am



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**AVONLEA**  
H O M E S

**Fig. 10**  
**Water Servicing**  
**Concept**

## 6.2 SANITARY SERVICING

The existing sanitary collection system near the Outline Plan Area consists of:

- A 200 mm diameter sewer along Lynx Road N to the south of the Outline Plan Area
- A 675 mm and a 200 mm diameter sewer along Uplands Boulevard N to the southwest of the Outline Plan Area

Future connections that will be required near the Outline Plan Area consist of:

- A 250 mm diameter sewer from the north side of the adjacent (SE) ¼ Section
- A 200 mm diameter sewer from the east side of the adjacent (SE) ¼ Section
- A 450 mm diameter sewer at Uplands Boulevard and 44 Avenue

The proposed sanitary sewer system in the Outline Plan Area is shown on **Figure 11 - Sanitary Servicing Concept**. The network will be sized to satisfy the following City of Lethbridge level of service objectives:

- Meet the dry weather demand with appropriate allowances made for wet weather inflows
- Provide sanitary sewer capacity so that surcharging does not occur for the design peak flows

Sewer diameters shown on **Figure 11** were determined based on the projected flows from the Outline Plan Area and future serviced areas. These projected flows are based on City of Lethbridge design standards and are summarized in **Table 6-2**.

**Table 6-2  
Sanitary Servicing**

Sanitary Servicing	Area (ha)	Cumulative Area (ha)	Population Density (ppha)	Population	Cumulative Population	PF
BlackWolf	48		36.9	1773		3.63
Blackwolf Stage 2 <sup>1</sup>	11		64.4	689		3.90
CBC Site	16		31.5	504		3.97
North of Uplands		74.7			2966	3.45
Uplands <sup>2</sup>	119	193.7	38.8	4613	7579	3.07
	DWF (l/day)	WWF (l/day)	II (l/day)	Total (m <sup>3</sup> )	Total (l/s)	
BlackWolf	709,200	886,500	265,950	3,724	43.1 l/s	
Blackwolf Stage 2	275,600	344,500	103,350	1,522	17.6 l/s	
CBC Site	201,600	252,000	75,600	1,128	13.1 l/s	
North of Uplands	1,186,400	1,483,000	444,900	6,017	69.6 l/s	
Uplands	3,031,600	4,645,927	1,136,850	15,099	174.8 l/s	
<b>Trunk Capacity</b>					205.0 l/s	
<b>Residual Capacity</b>					30.2 l/s	

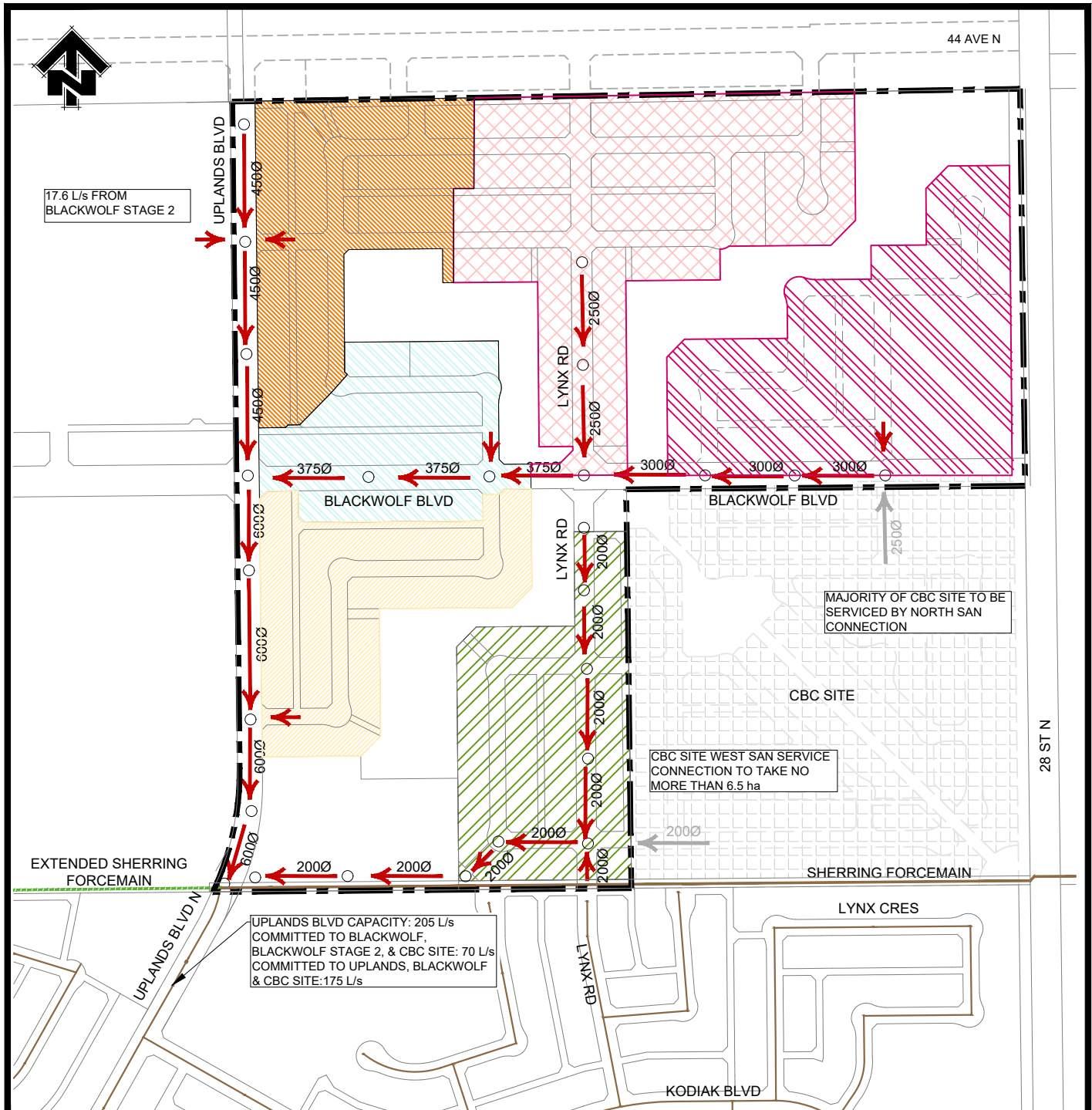
Note 1: Blackwolf Stage 2 populations are based on unapproved changes to the existing outline plan

Note 2: The Uplands population values were updated to reflect the 2019 Municipal Census

With respect to the 675 mm diameter connection on Uplands Boulevard, there is a downstream capacity constraint of 205 L/s in the Uplands Boulevard trunk sewer, east of 13<sup>th</sup> Street. This constraint was previously exceeded, with commitments of 100 L/s of peak wet weather flow from the Uplands area and 110 L/s from the Sherring sanitary lift station. The discharge point of the forcemain from the Sherring sanitary lift station was relocated west, to the trunk sewer on 13<sup>th</sup> Street.

The areas that can **currently** be serviced by the 675mm diameter Uplands Boulevard trunk sewer are:

- Blackwolf Outline Plan Area – 43.1 l/s
- Blackwolf Stage 2 Outline Plan Area – 17.6 l/s
- Future development of the adjacent (SE) ¼ Section (CBC Site) – 13.1 l/s
- Existing Uplands Development
- There is a residual capacity of 30 l/s remaining in the Uplands Trunk Sewer.



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**LEGEND**

- Blackwolf Outline Plan Boundary
- Existing Sanitary Main
- Proposed Sanitary Main
- Sanitary Catchment Boundary
- 3000 Pipe Diameter (millimetres)



MARCH 2020

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H O M E S

**Fig.11**  
**Sanitary Servicing**  
**Concept**

### 6.3 STORM WATER MANAGEMENT

Major and minor systems in the Outline Plan Area have been divided into three catchment areas. Wet ponds in each catchment will provide stormwater quality enhancement and storage for stormwater runoff.

Stormwater runoff from the SW Catchment will be conveyed to the Oldman River via the existing Uplands storm trunk. Stormwater runoff from the NW and NE Catchments will be conveyed to the Oldman River via a future storm trunk situated to the north of the Outline Plan Area.

Design criteria used for the major and minor systems are:

- 1,000 m<sup>3</sup>/ha of detention storage
- Detention storage release rate of 1.6L/s/ha
- 200 L/s/ha for major system flows
- 90 L/s/ha for minor system flows

Characteristics for each of the three catchment areas and associated detention ponds are summarized in **Tables 6-3 and 6-4**.

The proposed stormwater management system in the Outline Plan Area is shown on **Figure 12 - Minor Stormwater Management and Figure 13 - Major Stormwater Management**.

Storm pond make-up water will be available from the St. Mary's Irrigation District.

**Table 6-3  
Storm Drainage**

Storage Facility	Type	Area (ha)	Permanent Pool <sup>1</sup>		Active Storage <sup>2</sup>		Approx. HWL Elevation (m)	Flow <sup>3</sup>		
			Volume (m <sup>3</sup> )	Depth (m)	Volume (m <sup>3</sup> )	Depth (m)		Release Rate (m <sup>3</sup> /s)	Minor (m <sup>3</sup> /s)	Major (m <sup>3</sup> /s)
BlackWolf Park	Wet	11.67	2,918	2.0	11,670	2.0	913.5	0.019	1.1	2.3
BlackWolf Run Park	Wet	12.93	3,233	2.0	12,930	2.0	914.5	0.021	1.2	2.6
Wolfstrong Park	Wet	18.25	4,563	2.0	18,250	2.0	914	0.029	1.6	3.7

<sup>1</sup> Based on storage required for 25mm of rainfall over entire catchment

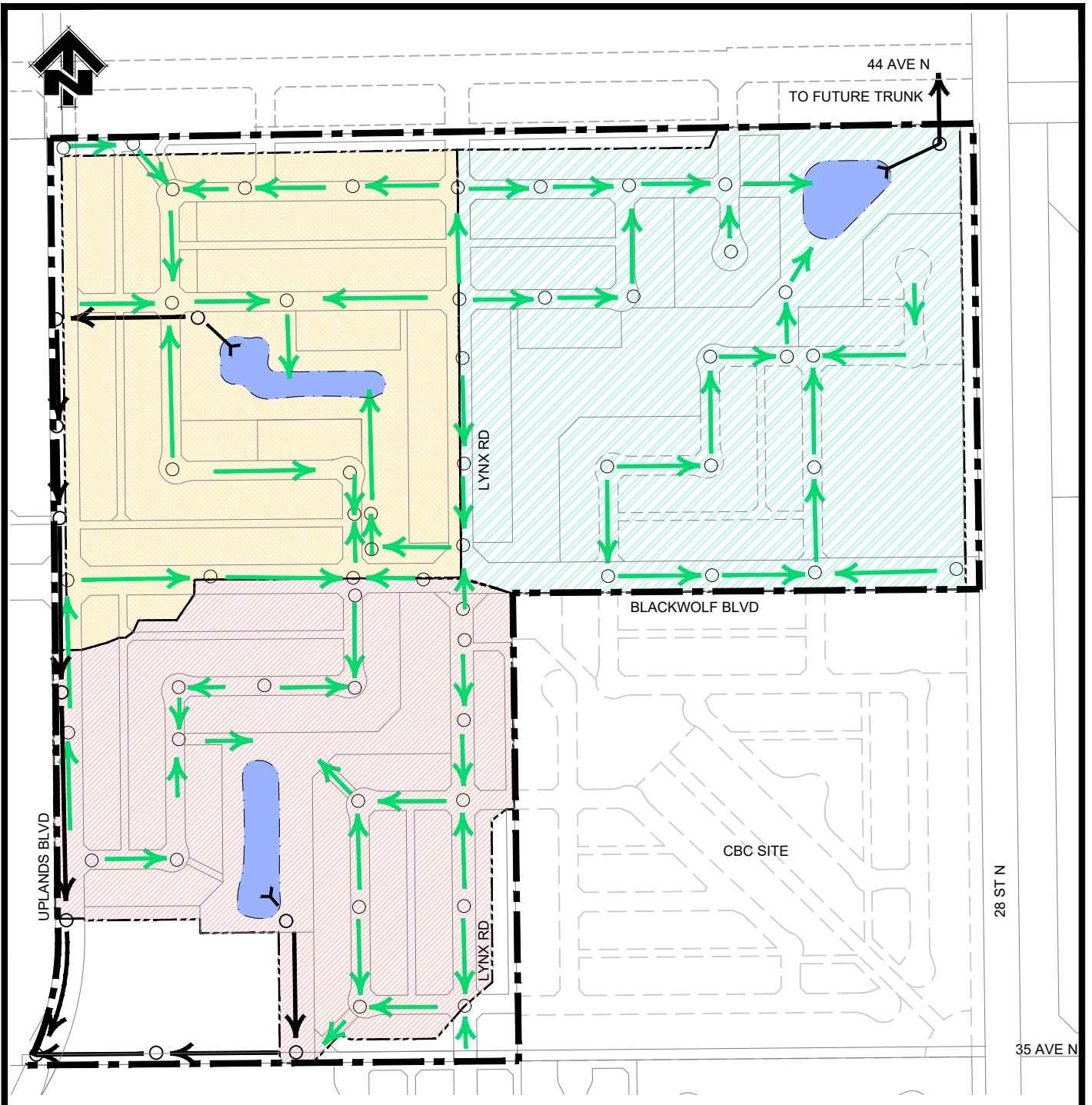
<sup>2</sup> Based on a design basis of 1,000 m<sup>3</sup>/ha

<sup>3</sup> Based on a unit release rate of 1.6 l/s/ha, a minor system design basis of 90 l/s/ha, and a major system design basis of 200 l/s/ha

**Table 6-4  
Pond Information**

Storage Facility	Length (m)	Width (m)	Depth (m)	Side Slope	Area at HWL (m <sup>2</sup> )	Area at NWL (m <sup>2</sup> )	Avg Area (m <sup>2</sup> )	Active Volume (m <sup>3</sup> )	Top of Bank (0.6m Freeboard)		
									Length (m)	Width (m)	Area (m <sup>2</sup> )
BlackWolf Park	95	45	2	5	7,472	4,273	5,873	11,670	121	71	8,588
BlackWolf Run Park	102	47	2	5	8,193	4,812	6,503	12,930	128	73	9,364
Wolfstrong Park	128	56	2	5	11,197	7,128	9,163	18,250	154	82	12,574





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**LEGEND**

- Blackwolf Outline Plan Boundary
- Proposed Storm & Manhole
- Storm Outlet
- Discharge Piping
- Storm Pond
- Catchment Areas



May 15, 2020 - 11:24am

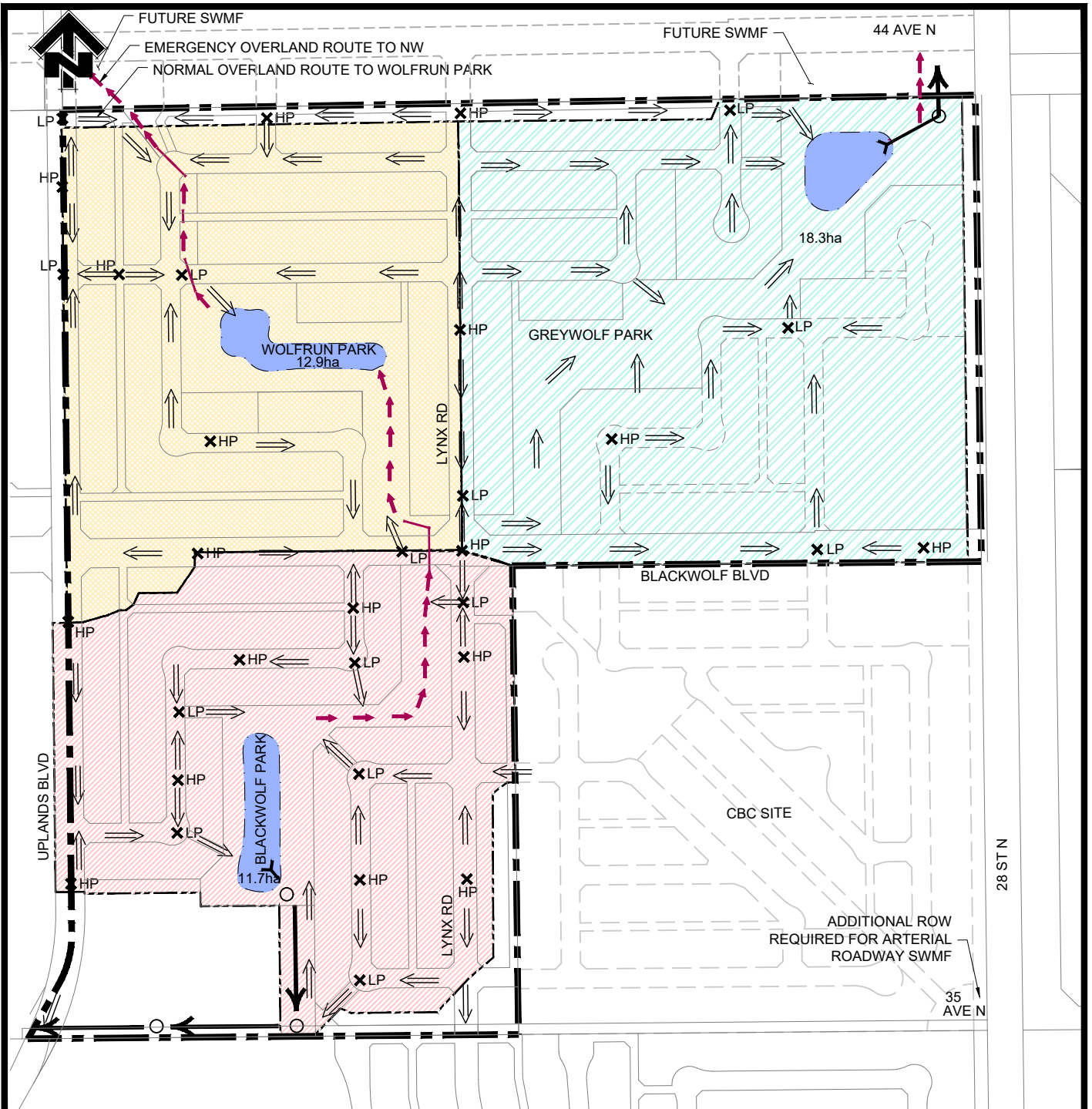


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H O M E S

**Fig. 12**  
**Minor Stormwater**  
**Management Concept**



**LEGEND**

- Blackwolf Outline Plan Boundary
- High Point
- Overland Flow Direction
- Pond Emergency Overflow
- Storm Pond
- Catchment Areas



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**Fig. 13**  
**Major Stormwater**  
**Management**  
**Concept**



## 7 Summary

The amendments as outlined in this document demonstrate an enhancement to the modified fused grid concept in BlackWolf and provide an improved integration with adjacent and future developments. While the proposed land use changes are still greater than the recommendation set in the ASP, they are lower than the density proposed in the original outline plan.

The land use changes with the proposed multi-family site in the NE quadrant, results in only a slight increase in traffic volumes within the development and on the surrounding road network. The proposed roadway classifications and intersection treatments as confirmed in our analysis will support and provide acceptable level of service for this land use change as proposed herein.

The amendments to the outline plan show an increase in population and overall density; however, no changes are required for the existing and future servicing and storm water management plans set forth in this document.

# OUTLINE PLAN AMENDMENT





<b>Issue Date:</b>	May 20, 2020	<b>File:</b>	2018.3167.00.E.05
<b>Previous Issue Date</b>	May 28, 2018		
<b>To:</b>	City of Lethbridge PRT		
<b>From:</b>	Darryl Schalk P.L. (Eng.)		
<b>Client:</b>	Avonlea Homes Ltd.		
<b>Project Name</b>	BlackWolf OLP Amendment		
<b>Project No.</b>	2018-3167		
<b>Subject:</b>	Traffic Analysis		

## TECHNICAL MEMORANDUM

### 1 BACKGROUND

The BlackWolf development is considering a change to the land use in one area of the development site. This area was originally proposed as a mix of low and medium density units. A new high-density area is now proposed as part of the layout, which is expected to lead to an increase in vehicle volumes to/from the area north of BlackWolf Boulevard provide more flexibility within the remaining area of the site to be developed. This memo is presented to summarize the traffic analysis related to the OLP Amendment, for the proposed change in land-use.

With the adjustment to the area in BlackWolf north of BlackWolf Boulevard and west of 28 Street N as part of the update to the BlackWolf land use plan, there is a need to recalculate the daily trip volumes for intersections and road links affected by the change in density. This proposed land use revision and its resulting traffic pattern changes could have an effect along BlackWolf Boulevard, along 28 Street N, and at the intersections along these roads.

The trip generation was recalculated for the area that includes the new high-density area, and distributed trips along the three links from BlackWolf Boulevard into the study area. Figure 1-1 below shows the study area boundary (blue line) including the low (yellow), medium (orange), and high (red) density areas.

We recently received the proposed site layout for the multi-family site from the Developer that indicates a right-in/right-out access along BlackWolf Blvd. Based on the proposed layout and the constraints within the site relative to the required green space and parking, the multi-family site is currently proposed with 157 residential units. For the sake of providing a conservative approach for our analysis, we have assumed the high-density area would have a maximum density of 175 units, while the low and medium density areas within this BlackWolf OLP Amendment will maintain 19 units per hectare, and 37 units per hectare, respectively.

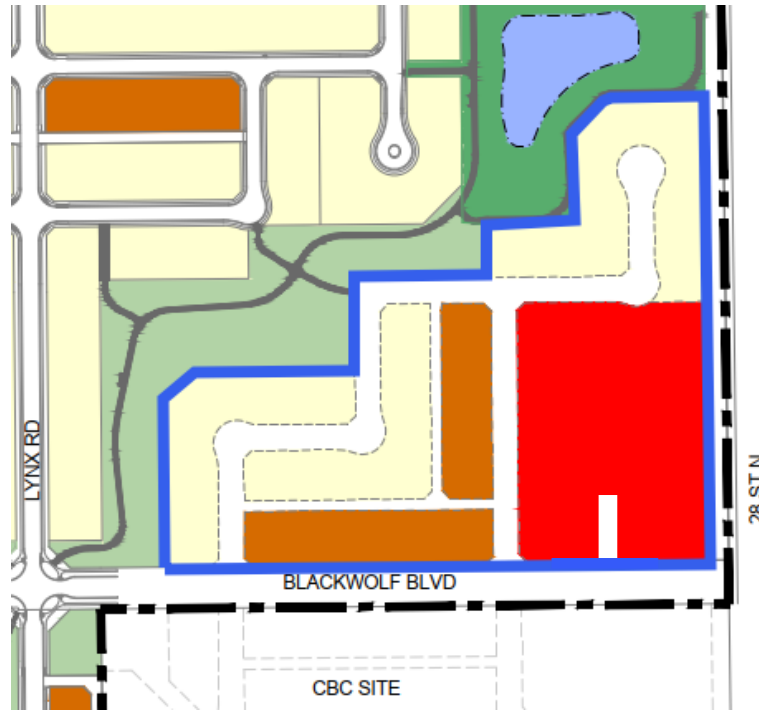


Figure 1-1 Trip Generation Recalculation Area

**2 TRIP GENERATION**

The daily trip generation rates were obtained for peak hour trips using the updated land-use. The updated information is based on the Trip Generation values in the Lethbridge Traffic Impact Study Guidelines. Peak hour trip volumes for each land use in the study area were combined using the City of Lethbridge formula of (AM Peak + PM Peak) x 5.6 to produce a total daily traffic volume.

Table 2-1: Trip Generation of the Study Area

Land Use	Density (uph)	Area (ha)	Units	Peak Hour Trip Rate	Directional Split	Peak Hour Trips
Low Density	19	2.37	45			
AM in				0.77	0.26	9
AM out				0.77	0.74	26
PM in				1.02	0.64	29
PM out				1.02	0.36	17
High Density	88	2.0	175			
AM in				0.75	0.29	38
AM out				0.75	0.71	93



PM in		0.92	0.61	98
PM out		0.92	0.39	63
Medium Density	37	0.95	35	
AM in		0.75	0.29	8
AM out		0.75	0.71	19
PM in		0.92	0.61	19
PM out		0.92	0.39	13
<b>TOTAL ADT (AM+PM)x5.6</b>				<b>2419</b>

A total AADT of 2419 trips per day was calculated for the study area. This represents an additional 1518 trips due to the updated proposed land-use compared to the originally calculated low/medium density area in the first outline plan. Due to the proximity of the multi-family site to 28 Street N, it is assumed that 80% of traffic in the area would use a combination of the RI/RO access or BlackWolf Lane (totalling 1935 trips), while the remaining 20% will use BlackWolf Pass (484 trips).

### 3 UPDATED VOLUMES

Of the additional 1518 trips accessing the study area from BlackWolf Lane, BlackWolf Pass, and the RI/RO that connect to BlackWolf Boulevard, we have assumed that the trip distribution will be split with 80% of the trips travelling east, and 20% travelling west, with the majority of traffic accessing to/from 28 Street N. This additional traffic was added to the previous OLP's daily traffic volumes, and distributed at intersections based on the percentage of trips in each direction. For example, in the previous OLP submission, 43% of traffic at BlackWolf Boulevard and 28 Street N traveled eastbound to northbound (southbound to westbound), and 57% travelled eastbound to southbound (northbound to westbound). The 80% of the additional 1518 trips were split into a ratio of 522 trips eastbound to northbound, and 692 trips eastbound to southbound and these trips were added to the previously calculated volumes at the intersection.

The vehicles generated by the study area will access the area via three accesses. A right-in/right-out (RI/RO) to the high-density site, BlackWolf Lane, and BlackWolf Pass. With the trips generated by the high-density site, 50% of the vehicles accessing the area will use the RI/RO. 30% of the vehicles will use BlackWolf Lane, and the remaining 20% will use BlackWolf Pass. The left-in/left-out (LI/LO) vehicles that would access the high-density site and cannot use the RI/RO site access will be distributed to BlackWolf Lane. This distribution is summarized in Figure 3-1.

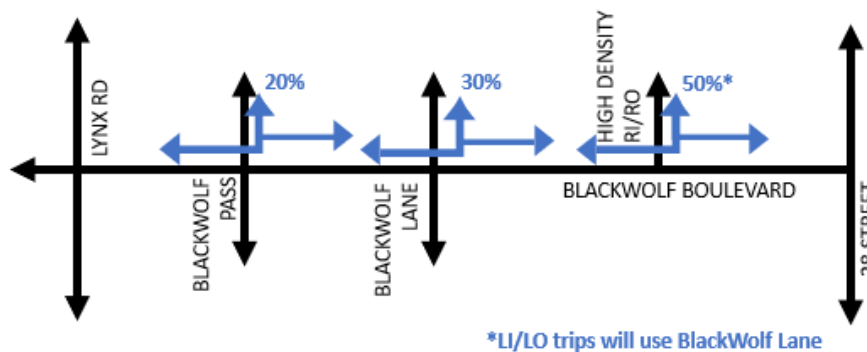


Figure 3-1 Study Area Trip Distribution

The below figures (Figures 3-2, 3-3 and 3-4) illustrate the updated volumes added to the previous traffic volumes along BlackWolf Boulevard and 28 Street N. An analysis of carrying these volumes through the entire site was not conducted, as the effect of the additional traffic volumes are focused only along BlackWolf Boulevard and 28 Street N.

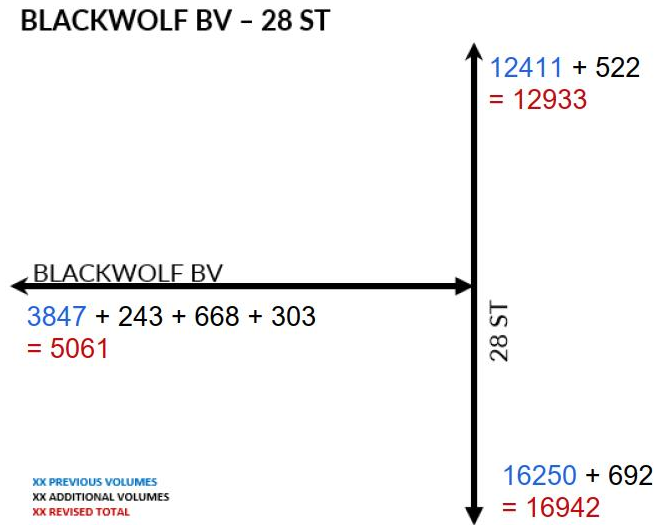


Figure 3-2  
 BlackWolf Boulevard – 28 Street N

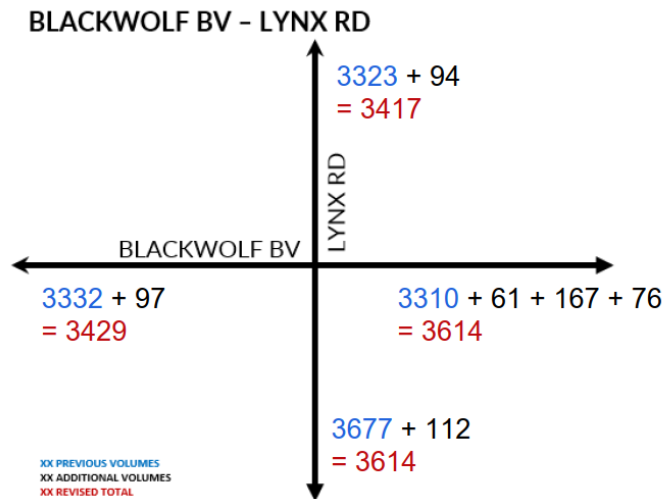


Figure 3-3 BlackWolf Boulevard – Lynx Road

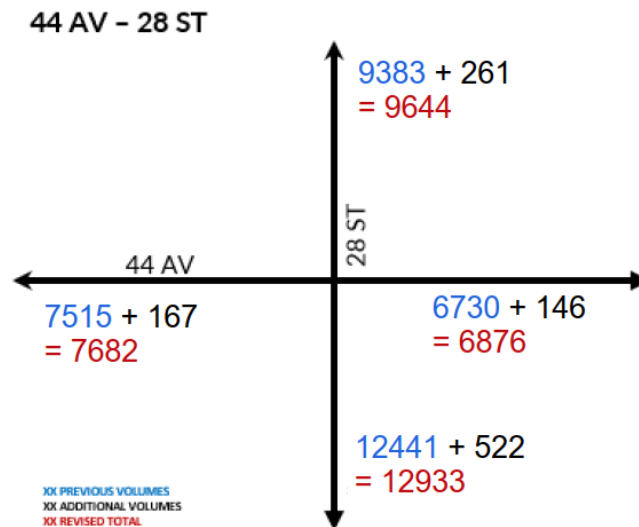


Figure 3-4 44 Avenue – 28 Street N

#### 4 INTERSECTION ANALYSIS

Intersection analysis was conducted at the intersections of BlackWolf Boulevard at Lynx Road, and at BlackWolf Boulevard at 28 Street N to determine if the additional traffic from the new development would have an impact on existing intersection configurations and intersection treatments. Two additional intersections were analyzed, BlackWolf Boulevard at BlackWolf Link, and BlackWolf Boulevard at BlackWolf Pass with volumes from the CBC site to the south (assumed to only have low-density housing), to determine if these 4-legged intersections would have appropriate intersection control in the future.

The Synchro / Sim Traffic 9 traffic analysis program is based on the Transportation Research Board Highway Capacity Manual 2010, 5th Ed. (HCM) and was used to analyze the capacity of the study intersections and determine the need for additional intersection and capacity improvements. This program applies the methodology established by the HCM, as well as Synchro parameters to output a level of service for a study intersection, given the lane designations, vehicular volumes, signal timing, and heavy vehicle percentages. The results of our analysis are summarized in the table below. The volume to capacity ratios shown represent the worst-case scenario for each approach, and each intersection for the AM and PM peaks.

The two-way daily traffic volumes are based on full buildout of the BlackWolf development area and North Lethbridge. The volumes were divided into AM and PM peak volumes, and distributed based on the ratio of traffic movements in the 2009 iTrans Traffic Impact Study (Exhibit 7-1) to determine AM and PM peak hour volumes. BlackWolf Boulevard - Lynx Road was analysed using Synchro with the current planned intersection control as a two-way stop (north and south). BlackWolf Boulevard - 28 Street N was analysed using Synchro with the future planned intersection control as a signalized intersection, as the traffic volumes used reflect full buildout of the area. The results for these two intersections are shown in Table 4-1, below. BlackWolf Boulevard – BlackWolf Pass and BlackWolf Boulevard – BlackWolf Lane intersections were both analyzed as two-way stop control (north and south). For the multi-family site related traffic, the left in/left out

traffic from the proposed access was assigned to BlackWolf Lane, and the right in/right out traffic from the south was assigned to Blackwolf Blvd. The results for these two intersections are shown in Table 4-2, below.

Table 4-1: Intersection Analysis Results for BlackWolf Boulevard at Lynx Road and 28 St N

INTERSECTION	BlackWolf Boulevard – Lynx Road	BlackWolf Boulevard – 28 St N
AM INTERSECTION LOS / V/C	A / 0.33	C / 0.77
NB LOS / V/C	B / 0.33	B / 0.77
SB LOS / V/C	B / 0.24	C / 0.76
EB LOS / V/C	A / 0.03	B / 0.59
WB LOS / V/C	A / 0.01	- / -
PM INTERSECTION LOS / V/C	A / 0.48	C / 0.90
NB LOS / V/C	C / 0.44	C / 0.90
SB LOS / V/C	C / 0.48	D / 0.86
EB LOS / V/C	A / 0.03	C / 0.59
WB LOS / V/C	A / 0.01	- / -

Both intersections have acceptable levels of service in both the AM and PM peak hours. In the PM peak, northbound BlackWolf Boulevard has a higher than acceptable v/c and is nearing capacity. The 28<sup>th</sup> Street signal operations would need to be evaluated at full build-out to confirm signal timing requirements. Overall, the intersection operates well, and acceptable LOS for each approach can still be achieved.

Table 4-2: Two-Way Stop Control (N-S) Intersection Analysis Results for BlackWolf Boulevard at BlackWolf Lane and at BlackWolf Pass (CBC site access on south legs)

INTERSECTION	BlackWolf Boulevard – BlackWolf Lane	BlackWolf Boulevard – BlackWolf Pass
AM INTERSECTION LOS / V/C	A / 0.36	A / 0.07
NB LOS / V/C	B / 0.36	B / 0.07
SB LOS / V/C	C / 0.33	B / 0.16
EB LOS / V/C	A / 0.01	A / 0.01
WB LOS / V/C	A / 0.03	A / 0.01
PM INTERSECTION LOS / V/C	A / 0.38	A / 0.07
NB LOS / V/C	B / 0.09	B / 0.07
SB LOS / V/C	D / 0.38	B / 0.05



EB LOS / V/C	A / 0.02	A / 0.01
WB LOS / V/C	A / 0.04	A / 0.04

When analyzed with traffic from the CBC site to the south of BlackWolf Boulevard (full buildout), BlackWolf Boulevard – BlackWolf Pass operates acceptably during the AM and PM peak hours. The RI/RO access to the proposed development allows for more efficient access of vehicles from 28 Street to the multi-family development. Currently, the analysis shows the intersections function acceptably with the assumed full build-out traffic from the CBC site. Ultimately, the intersection operations depend on the traffic generated by the CBC site south of BlackWolf Boulevard. There are currently no plans to develop this parcel and the actual land use/density is unknown at this time. Without further information of development details of the area to the south, it is difficult to predict if or when the intersection would begin to have operational concerns. If it is determined that development traffic has increased traffic beyond what has been considered in this analysis, the appropriate intersection treatment at these intersections may need to be further reviewed.

## 5 SUMMARY

Based on our analysis, the change in the proposed site to include a high-density residential parcel is expected to have negligible impact on the roads and intersections within the BlackWolf study area. At BlackWolf Boulevard – Lynx Road intersection, there is an increase in daily trips of approximately 1000 vehicles, which quickly disperse within the study area. The performance of BlackWolf Boulevard - Lynx Road intersection is not expected to be impacted by the additional trips created from the high-density residences, as the two-way stop control provides an acceptable level of service. At full buildout, BlackWolf Boulevard - 28 Street N will operate acceptably with a signalized intersection as originally planned. The intersection of BlackWolf Boulevard at BlackWolf Pass is expected to operate acceptably as a two-way stop-controlled intersection. The intersection of BlackWolf Boulevard at BlackWolf Lane is also expected to operate acceptably at full-buildout as a two-way stop-controlled intersection. These results are dependant on the inclusion of the proposed RI/RO access to the site, and the proposed land use of the CBC development area to the south of BlackWolf Boulevard as outlined in this analysis. The BlackWolf Blvd/BlackWolf Lane intersection may have to be reviewed periodically as the area to south develops to ensure that the intersection treatment is meeting the traffic demand and functioning to an acceptable LOS.

At this time, the development of the lands south of BlackWolf Blvd. is dependent on decommissioning of the radio tower and the Developer's demand for more lots within this parcel of land. There are no immediate plans to develop this parcel. As such, it may be prudent to stage the intersection treatment at the BlackWolf Lane and BlackWolf Pass intersections according the traffic demand relative to the extent of land developed within this OLP Amendment. As summarized in the traffic analysis above, these intersections will function acceptably as two-way stop-controlled intersections within the proposed changes to the land uses represented by this OLP Amendment. When there are plans to develop the parcel to the south, it may be prudent at that time to re-evaluate the traffic demand as it's ultimate land use and trip generation may vary from the assumptions used in this analysis. We, therefore, recommend that stop control be implemented at these intersections at this time, and that they be reviewed once development plans and land use density is confirmed to determine if these intersection treatments will continue to function acceptably or if more enhanced intersection treatments will need to be considered.

The traffic volume increase relative to the proposed site change does not cause a change to the road classifications along BlackWolf Boulevard, designated as a major collector, as the volumes are within the acceptable threshold. The greater volume increase is to the east, however, this is over a short distance along BlackWolf Boulevard near 28 Street N. With a capacity of up to 8000vpd, the volume increase is acceptable and an increase in road classification over the proposed community entrance road is not required. As an arterial roadway, 28 Street N can handle the increased traffic volume and there is no need to consider changes to its road classification.

Similarly, the increased traffic volumes along BlackWolf Lane and BlackWolf Pass have negligible impact to these proposed roadways and their respective intersections on BlackWolf Blvd. These intersections can remain as two-way stop-controlled intersections, and the road classifications can remain as Local Roadways with AADT traffic volumes well within acceptable limits.

In summary, the proposed land use change within the BlackWolf development will have negligible impact to the road and intersection capacity. While this change does cause a slight increase to the traffic volumes, this increase results in acceptable LOS being maintained within the intersections reviewed and the roadway links within the study area. The Projected Buildout Traffic Volumes figure in the Outline Plan has been updated with the revised daily traffic volumes. This figure is presented in the OLP Amendment.

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