Scheffer Andrew Ltd.
Planners & Engineers

APPROVED JUNE 6, 2017

Irvine Creek

Outline Plan

within Part of the NE of 31-50-24-W4

East Vistas Local Area Structure Plan
Leduc County

March 29, 2017

File #13400100

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1 Background Information

1.1 Introduction

The *Irvine Creek Outline Plan* (Irvine Creek OP) is prepared to support staged single family residential development within the *East Vistas Local Area Structure Plan* (East Vistas LASP) in Leduc County. The East Vistas area is a prescribed growth area for Leduc County which will contain urban residential, commercial and town center development that will provide local employment and commercial opportunities to residents. It is strategically situated between the Town of Beaumont and the Nisku Business Industrial Park.

1.2 Purpose

The Outline Plan has been prepared to provide a detailed framework for the future residential development within part of the North East ¼ of 31-50-24-4 (NE 31). It will provide an overview of the land use concept and describe the subject area, services, transportation and detailed servicing requirements needed to support the proposed development.

This Plan supports redistricting application for the subject lands and to provide guidance for future subdivision applications. All boundaries and parcel sizes need to be verified at the time of subdivision.

1.3 Plan Area and Location

The subject lands are located west of Range Road 245 and south of Township Road 510 and are all of the lands east of Irvine Creek within the NE ¼ of 31-50-27-4 (NE 31). The plan boundary is in the northwest portion of the *East Vistas Local Area Structure Plan* (EV LASP) and located within Capital Region Board Priority Growth Area "C_E". The location of the OP area relative to the East Vistas plan boundary and in context to the region is depicted in ***Figure 1 Location Plan***.

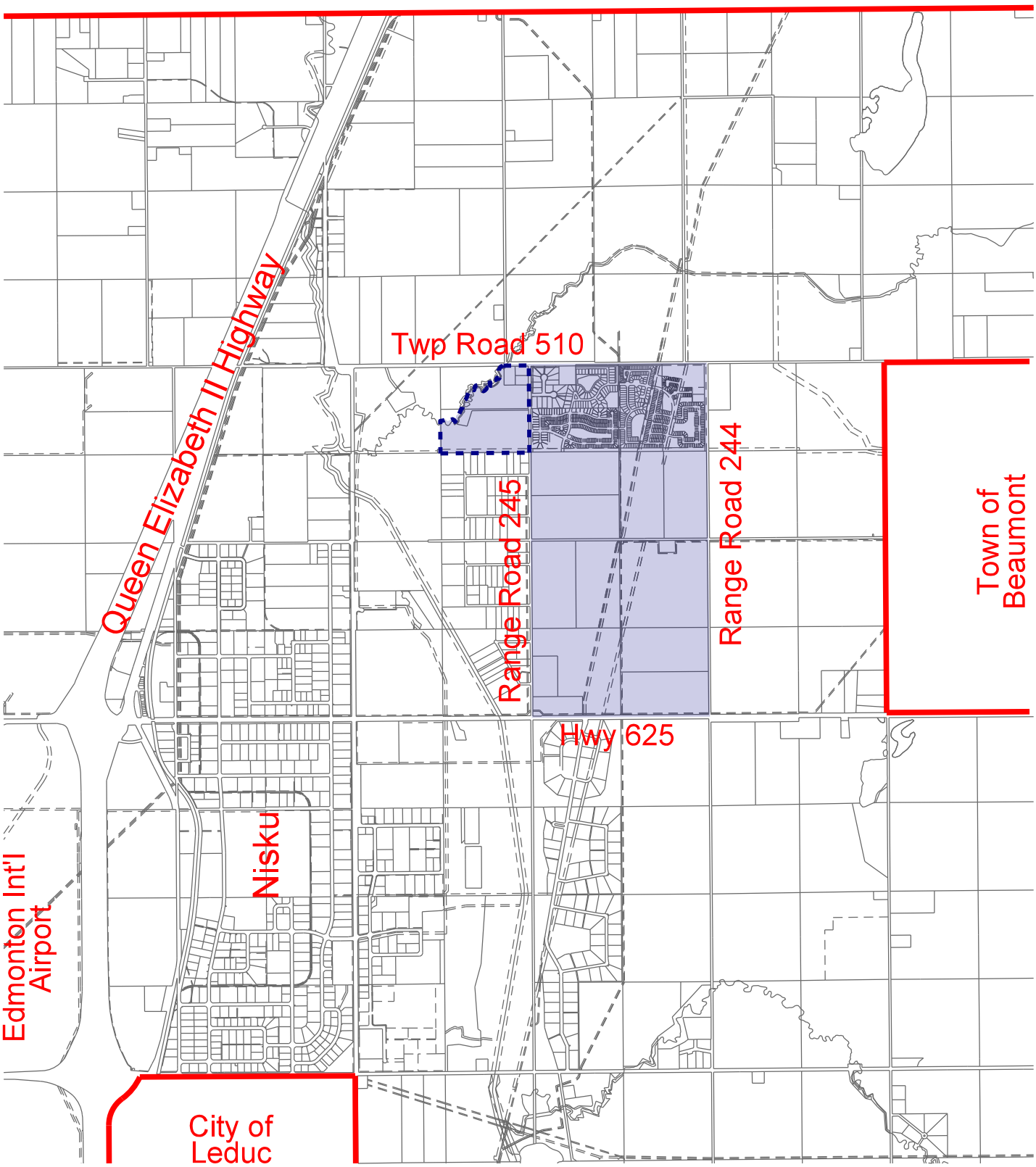
1.4 Ownership

The total titled area is 48.4 ha with all of these parcels east of Irvine Creek included in the Irvine Creek OP. Private ownership is divided between five owners with a total of six parcels. The proponents of the Outline Plan are the two majority land owners, 1811835 Alberta Ltd and 1820028 Alberta Ltd. The remaining three parcels are in private ownership with an area of 3.8 ha (9.4 acres) and are located in the northeast corner of the plan area.

Leduc County holds title for the Municipal Reserve lot on the west side of Irvine Creek and an Environmental Reserve lot for Irvine Creek in the north half of the plan area. This area was dedicated in 2006 when Lot 6 to the east of the creek was created. The total area is Leduc County ownership is 3.14 ha (7.8 acres). ***Table 1*** provides a breakdown of ownership, legal and total titled area and area within the outline plan area.

Table 1: Ownership

Legal Description	Legal	Owner	Titled Area (ha)	Area within outline plan (ha)
Within NE 31	Lot 6 Block 1 Plan 062-2076	1811835 Alberta Ltd.	11.4	11.4
	Lot C Plan 1470 NY	1820028 Alberta Ltd.	29.9	28.1
	Lot 1 Plan 902-2899	1820028 Alberta Ltd.	2.0	2.0
	Lot 1 Plan 932-0163	Private	1.74	1.74
	Lot 2 Plan 932-0163	Private	1.03	1.03
	Lot 3 Plan 932-0163	Private	1.03	1.03
	Lot 8ER Block 1 Plan 062-2076	Leduc County	1.43	1.43
	Lot 7MR Block 1 Plan 062-2076	Leduc County	1.71	1.71
		TOTAL	50.24 ha	48.4 ha



IRVINE CREEK Outline Plan Boundary
East Vistas Local Area Structure Plan

Figure 1

LOCATION PLAN

IRVINE CREEK OUTLINE PLAN

Part of NE 1/4 31-50-24-W4
Leduc County

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2 Policy Context

2.1 Municipal Development Plan

The proposed Outline Plan is consistent with *Leduc County Municipal Development Plan Bylaw 35-99* (MDP*)* which was adopted by Council in October 1999. The MDP recognizes that urban growth areas in the Leduc-Beaumont-Devon sub-region are a major growth driver in the Edmonton capital region. These growth areas will occur where ready access to municipal servicing and high order transportation corridors exist and be developed utilizing Smart Growth principles. The intensification of use on the NE 31 of the Outline Plan is consistent with Urban Growth Areas planning policies.

2.2 North Major Area Structure Plan

The *North Major Area Structure Plan (ASP) Bylaw No. 25-05* was adopted by Council in November 2006 and further amended to support the adoption of the *East Vistas Local Area Structure Plan* and its plan area as an Urban Service area. Intensification of residential density within the NE 31 does not require an amendment to this ASP as the use is consistent with the plan.

2.3 East Vistas Local Area Structure Plan

The *Irvine Creek Outline Plan* is located in the northwest portion of the *East Vistas Local Area Structure Plan Bylaw No. 15-09 (East Vistas LASP)*, which was adopted by Council in September 2010. The EV LASP has been amended in 2017 to include the area within the NW 31 south of Irvine Creek and to increase density within the interior portions of the NE 31 again south and east of Irvine Creek.

The proposed densities, uses, servicing and development concept of the Outline Plan is consistent with the principles of the East Vistas LASP. This Outline Plan is being prepared as a requirement for redistricting and subdivision as per the East Vistas LASP. The proposed plan will meet the design requirements articulated in this plan including a walkable community, green space and municipal servicing.

2.4 Land Use Bylaw

This Outline Plan has been prepared to support future amendments to the *Leduc County Land Use Bylaw No. 7-08* for redistricting of the subject parcels into districts. The proposed delineation of the proposed districts is consistent in principle with the proposed *Development Concept* in the East Vistas LASP. The land is currently designated A - Agricultural. Applications will be submitted to Leduc County by the respective landowners to support the redistricting that is reasonably concurrent with the approved Outline Plan to designate the lands to RU1 - Residential Urban 1 District and RU2 – Residential Urban 2 District for residential uses.

2.5 Capital Region Growth Plan

The Irvine Creek Outline Plan area is within the Priority Growth Area C_e of the Capital Region Plan. Compliance with the Capital Region Growth Plan (CRGP) is a mandated requirement of the *Municipal Government Act*. Target densities for this growth area are between 25 to 35 units/net hectare. The overall EV LASP is targeted to have a density of 27.7 units/net ha which will be met at the time of full development of the East Vistas plan.

3 Site Features

3.1 Site Description

The majority of the plan area is pasture and is generally flat to gently rolling, with drainage directed towards the Irvine Creek environs which defines the westerly boundary of the plan area. There is an elevation change of approximately 10 metres from east to west. The lowest area of the plan area is in the southwest corner. An aerial view of the site dated September 29, 2015 is shown in ***Figure 2 Aerial Photo*** and the contours of the land are depicted in ***Figure 3 Topography***

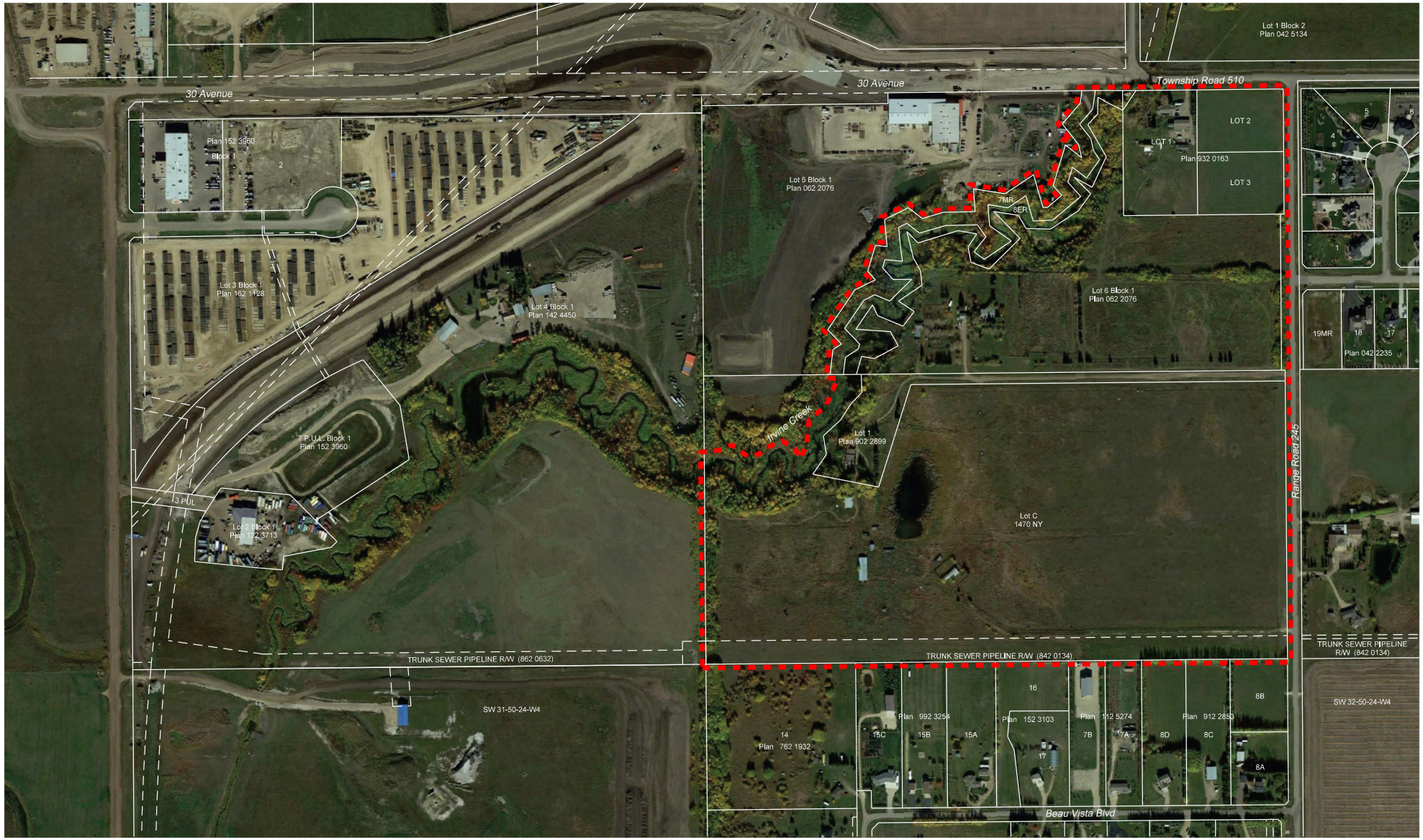
Irvine Creek is a meandering creek which is contained within a stream cut valley with forested walls. The valley depth varies from 4.5m to 7m and the valley width varies from 45 to 317m. The creek channel itself is 2 to 3m wide with an average depth of 1 to 1.5m and flows from the NE to the SW. Approximately 400 m from the southwest corner of the plan area is the confluence of Irvine Creek with Blackmud Creek.

The north portion of the plan area adjacent to Township Road 510 contains an acreage home site with associated buildings. The two acreage lots east of this parcel are undeveloped. In the central plan area adjacent to the creek valley there are two home sites containing residences and accessory buildings and planted shelter belts. Southeast of the manmade dugout in the central area of the plan is another home site.

3.2 Adjacent Land Use

Northwest, north and northeast of the plan area across Township Road 510 are lands in agricultural production with the Nisku Spine Road on the westerly side of the quarter section. East of Range Road 245 in the north half of the adjoining quarter section is the existing fully developed *Lukas Estates* municipally serviced residential subdivision and the south half of the quarter section is currently in agricultural production with abandoned outbuildings. This area is designated under the approved *Churchill Meadow Outline Plan* to be a mix of urban serviced low and medium density development with one multi dwelling residential complex, and associated open space including a storm water management facility. Kitty corner to the southeast are lands in agriculture production with a future use as urban development as per the East Vistas LASP.

The *Beau Vistas*, an existing country residential acreage subdivision is south of the easterly portion of the plan with lots ranging in size from 0.8 to 4 hectares. County owned land with the water reservoir is south of the NW 31. Directly west of the north portion of the plan area is a proposed business park and west of the south portion is light industrial.



Plan Boundary

Figure 2
AERIAL PHOTO

IRVINE CREEK
OUTLINE PLAN

Part of NE 1/4 31-50-24-W4
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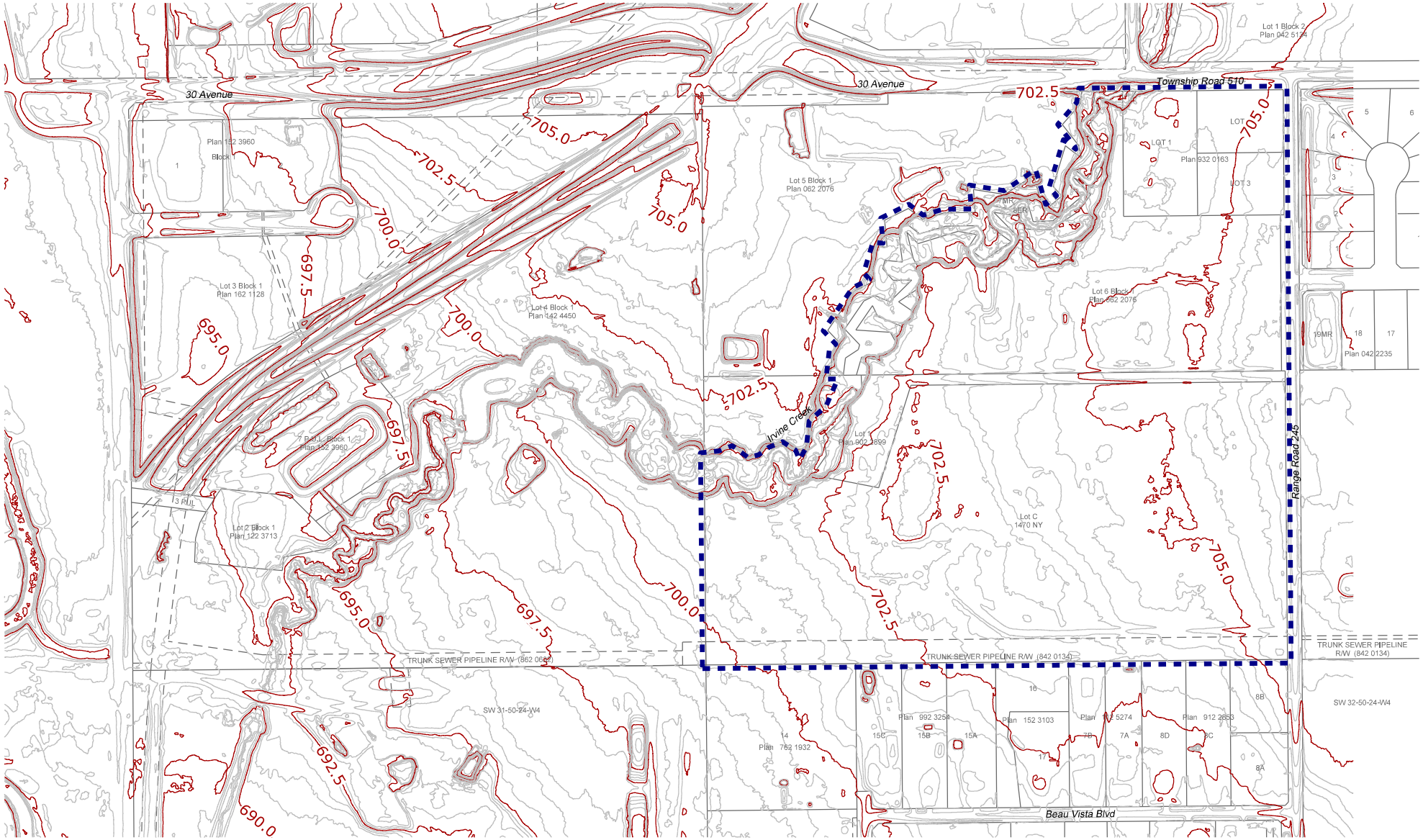
* Image Source : Google Earth



Plan Boundary

Note: Contour Interval is 0.5m

Figure 3
TOPOGRAPHY

IRVINE CREEK OUTLINE PLAN

Part of NE 1/4 31-50-24-W4
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3.3 Historical Resources Impact Assessment

The *Historic Resources Act Clearance* letter from *Government of Alberta Historic Resources Management* was received May 4, 2007 indicating that clearance for the East Vistas LASP was granted and that a Historical Resources Impact Assessment is not required for any development within the plan area subject to Section 31, whereby, if a chance discovery of a historic resource is made in the course of development that the Minister shall be notified of the discovery. This document is also included in the Appendices of the East Vistas LASP. This clearance included all of the NE 31 quarter section.

3.4 Biophysical Assessment

A ***Biophysical Assessment*** was prepared for the East Vistas LASP by *Bruce Thompson and Associates Inc.* in September 2007 and updated in October 2012. A copy of this report has been submitted to the County under separate cover. This report covers the lands in the NE 31.

No recognized key vegetation areas within the NE 31 area were identified outside of the Irvine Creek valley, however, one Class 2 and four Class 3 wetlands were delineated (Stewart and Kantrud classification system). The Class 2 wetland with an area of 0.2 ha contains marsh reed grass and dries out in summer. The four Class 3 wetlands have a total area of 0.9 ha and are predominantly sedges in the centre with slough grass and other grasses on the periphery. Approval must be granted by *Alberta Environment and Sustainable Resource Development*, under the *Water Act* to infill these wetlands for development.

A manmade dugout was identified as a "Natural Feature" in the 2007 Biophysical Assessment by the consultant on the south half of the east quarter section and is recommended for conservation. The area of this feature is approximately 1.22 ha. In correspondence dated July 6, 2016 Alberta Environment and Parks stated that there will be no bed and shore claims on wetlands. This includes no claim on the manmade dugout which had been identified as a Class 5 wetland in the biophysical assessment.

3.5 Environmental Site Assessment

A Phase I Environmental Site Assessment (ESA) will be required to support a redistricting application for parcels or portions thereof for any proposed developed within the outline plan area. If there are concerns with contamination, remediation is to be completed prior to County approval of the redistricting application.

The main proponents of the outline plan have prepared assessments for their respective parcels. The Phase I ESA reviewed the current and historic lands uses of the site and surrounding area to determine if there was any contamination to the Plan area. There were no concerns noted that would warrant a Phase II Environmental Site Assessment. These reports will be submitted under separate cover to support the respective redistricting applications.

3.6 Geotechnical Assessment

Geotechnical assessments were conducted on the majority of the plan area. The three northerly acreage parcels being excluded as the owners were not participating in the plan preparation. At the time of subdivision application, geotechnical assessments to support on-site

development for those lands must be completed including setback from the top of bank which is to be defined by a legal surveyor and the engineer. Top of bank determination will also have to be completed where incomplete for the balance of the plan area for the majority owners.

Slope Stability Assessment dated September 2016 were prepared by *Hoggan Engineering & Testing (1980) Ltd*. on the east bank of Irvine Creek for the majority of the proponent's parcels. The top of bank was determined in conjunction with a Legal Surveyor (Pals Geomatics). Based on the geotechnical testing for slope stability and areas of potential erosion, a drawing indicating the Urban Development Setback line was generated which must be respected at the time of development. As well, additional conditions to maintain slope stability are stated in the report for site development and fill treatment for the adjacent lands. Caveats may be registered on the title to enforce the design and construction recommendations.

Geotechnical Investigations for on-site conditions prepared by *Hoggan Engineering and Testing (1980) Ltd* and *J.R. Paine & Associates Ltd.* for the two large parcels on the NE 31. These reports provide detailed recommendations for house foundations, underground and surface utilities, cement and the storm water management facilities and outfalls.

3.7 Floodplain Assessment

To ensure that the floodplain of Irvine Creek would not impede development within the southwesterly portion of the plan area, *River Engineering Consulting Ltd.* was engaged to review the reach of Irvine Creek adjacent to this area added to the EV LASP. The report, ***East Vistas ASP Amendment Irvine Creek 100-Year Flood Pain Study*** dated August 25, 2016 concludes that the 100-year flood plain along these lands is contained within the valley walls surrounding the Irvine Creek channel.

3.8 Constraints to Development

Manmade

On the south boundary of the plan area, there is the regional sanitary sewer utility right of way (SERTS URW). The right of way is 32.0m in width on the east quarter section and narrows to 20.0 m on the westerly portion of the plan area. This is a regional right of way that extends easterly to the Town of Beaumont and provides a corridor for underground infrastructure and open space for walkability between adjoining communities. It will be protected in a public utility lot (PUL).

Immediately north of the SERTS line on the easterly portion of the plan area is a sanitary line not protected in a right of way. This is a sanitary line providing a sewer connection to the regional sewer line for the Lukas subdivision east of the plan area. It is also recognized that a second 600mm trunk water line is required for the servicing of the East Vistas plan area. The future alignment of this trunk line is proposed to be paralleling the SERTS line from the Leduc County water reservoir and pump station west of the plan area to Range Road 245. A public utility lot is proposed that will encompass the Lukas sanitary line and the trunk water line (6.0m width) and narrowing to 3.5m west of the connection of the sanitary line to the trunk to the west boundary of the quarter section with an alternate option of this infrastructure being replaced by new infrastructure within the development area. The trunk water line will then

switch from the north side to the south side of the SERTs URW and continue to the reservoir connection point.

Low pressure gas lines to service existing dwellings will be relocated as necessary as development progress. It is anticipated that all existing improvements from previous uses will be removed at the time of development of those areas. No additional setbacks above and beyond Leduc County standards from the boundary of the rights of way are required to development.

According to the Alberta Energy Regulator (previously the Energy Resources Conservation Board (ERCB)), there are no activities by the oil and gas sector including sour gas facilities on or near the parcel that would constrain the proposed development. As well, an online assessment via the abandoned wells viewer site indicates that there are no abandoned wells in close proximity to the plan area that will affect the proposed development. A copy of the ***Alberta Abandoned Well Locations Map*** dated June 8, 2016 is included in ***Appendix A***.

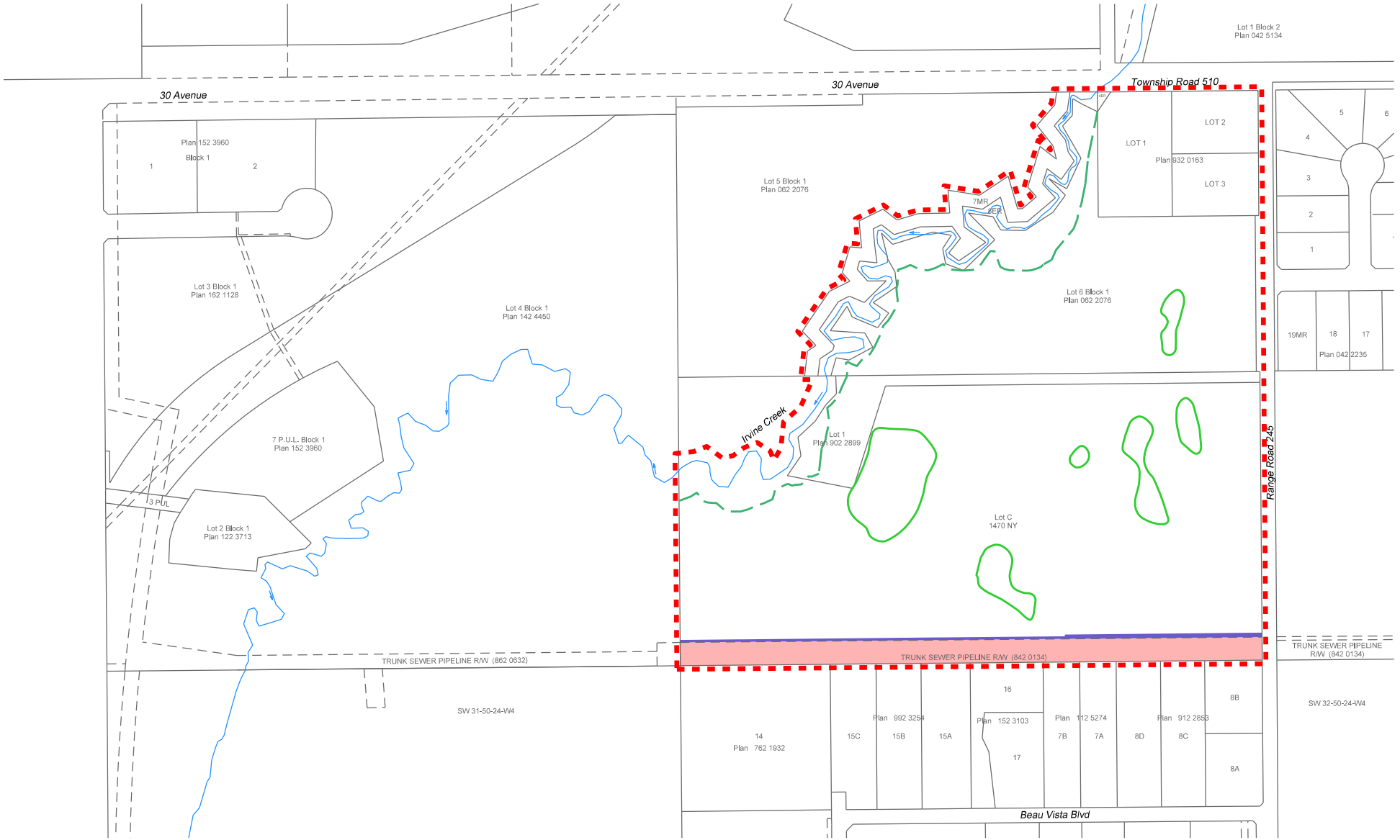
A Class 5 wetland, as identified by the Biophysical investigation for the EV LASP, exists on the western portion of the south half of the east quarter east of the creek. As per the East Vistas LASP, the option of utilizing this wetland as part of a storm water management facility was proposed as an option. This wetland, over time, has been modified by agricultural development into a seasonal stock watering dugout.

Naturally Occurring

The Irvine Creek and its environs are a significant environmental feature that defines the plan area and provides a visual focus for the trail system behind the top of bank for area residents. The creek valley is a forested valley and wild life habitat that warrants protection. It acts as a wild life corridor and the creek itself is a fish-bearing water body. Setbacks from the creek valley for development will be determined by experts and will constrain future development. The floodplain of the creek have been determined not to be a constraint to development.

Four naturally occurring seasonal wetlands have been identified on the NE 31 in additional to the anthropogenic impacted wetland previously noted in the above section. *Green Plan Ltd.* were engaged to evaluate if the wetlands within the plan area would be viable if development occurred in closed proximity. In their report dated October 2017, they stated that the sustainability of the wetlands would be compromised by the requirement to regrade the site to facilitate overland drainage towards the stormwater management pond.

Figure 4 depicts the ***Constraints*** to the plan area.



Plan Boundary
Regional Sewer Line
Existing Utility Lines
Top of Bank
Wetlands

Figure 4

CONSTRAINTS

IRVINE CREEK OUTLINE PLAN

Part of NE 1/4 31-50-24-W4
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4 Development Concept

4.1 Parcel Usage

The proposed development concept for the *Irvine Creek Outline Plan* is depicted in ***Figure 5 Development Concept.*** The plan area is essentially triangular in shape and is bounded on the south boundary by the SERTS URW, Range Road 245 on the east boundary, and by Irvine Creek on the angle closing the triangle. The Range Road provides the two access points for the plan area to connect to existing County road infrastructure. An emergency access is proposed to be being provided via a walkway in the north portion of the plan area to Township Road 510.

Low Density Residential (RU1 district) development is proposed adjacent to the existing country residential in the *Beau Vistas*, and estate residential development in Lukas Estates on the perimeter of the plan area. Additional buffers between the existing and proposed uses are provided by the Range Road and the large swath of URW's along the south boundary. Medium Density Residential (RU2 district) development is proposed in the interior portion of the plan area. The percentage of low density lots is approximately 36% to the medium density lots at 64% of the net developable area.

The development patterns parallels linear open space where possible to enable as many homes as possible to back onto open space whether it is the Irvine Creek valley, storm water management facilities, pocket park or the southern PUL corridor containing regional infrastructure. The placement of open space will be discussed in Section 4.2.

The Irvine Creek top of bank has been determined in the field by the proponents' legal surveyor (Pals Geomatics) in conjunction with the geotechnical engineers (Hoggan Engineering & Testing (1980) Ltd) for the majority of the plan area. An Urban Development Setback Line was generated from the top of bank by the engineers. Areas of concern for potential erosion were also identified by the engineers and a Structural Development Setback Line was determined. When the Structural Development Setback is greater from the top of bank then the Urban Development Setback, the structural setback governs the future back of lots. Please note that an additional 2.5m was then added to this minimum setback to allow for the construction for a trail which is a use supported by the geotechnical engineers in this area. The development concept for the majority of the plan area reflects the recommended setbacks from top of bank plus a minimum of an additional 2.5m to allow for a trail.

At the time of future subdivision for the non-participating landowners, the top of bank and required setbacks will have to be determined by a legal surveyor in conjunction with a geotechnical engineer in the northern portion of the plan area and in areas on the balance of the plan area where it is missing such as on the west bank. The future development applications in this area will then be refined with the additional technical information.

A storm water management facility is proposed on the south ½ of the quarter section which will receive overland flows from the plan area. A trail will partially circumscribe the perimeter of the public utility lot providing linkages with other trail networks. Maintaining the viability and potential retention of the five wetlands within the plan area was investigated by the

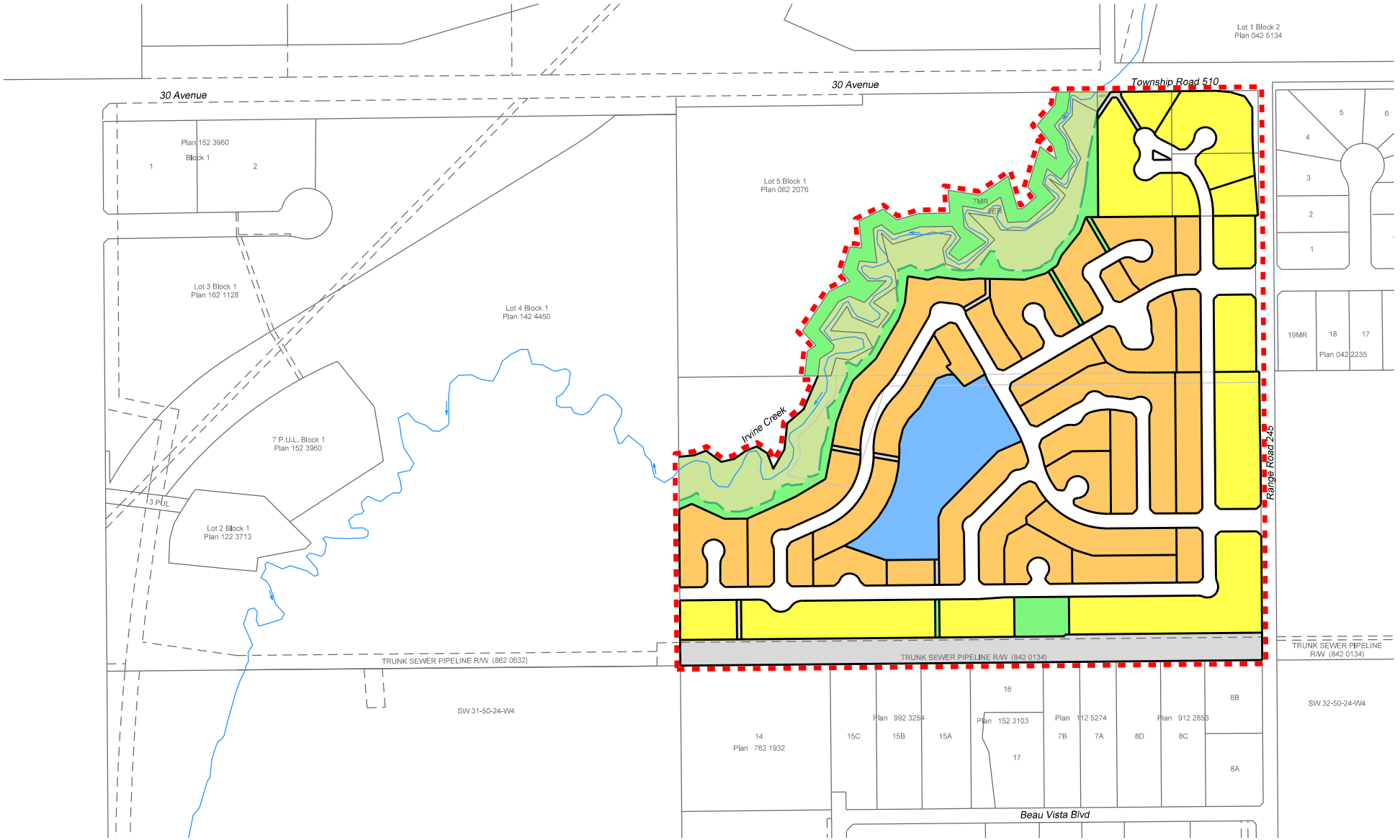
environmental consultant, however given the necessity of grading the site to direct overland drainage to the proposed stormwater management facility, the ability to maintain the required catchment areas and interconnection for the wetlands was not possible. The design of the proposed storm water management facility will give consideration to wetland function. Features included in the pond design include a 2.0m wide flat marsh strip around the perimeter of the pond and a reduced average depth of pond to approximately 0.5m which will result in vegetation growth. To enhance this growth, the pond is proposed to be lined with topsoil. It is noted that the Province will not be claiming bed and shore as per correspondence dated July 6, 2016 on any of the wetlands within the plan area. A Water Act Clearance for the removal of wetlands within the plan area is being proposed. Required compensation will be determined by Alberta Environment.

The East Vistas LASP targets a density of *27.7 units/net residential ha* for the total local area structure plan area. It is recognized that each parcel/outline plan may not meet the targeted density dependent upon its spatial location within the plan area and proposed land use. We note that the overall density of the full buildout of the East Vistas LASP will need to meet this target to fulfill the requirements of this Priority Growth Area. Densification of residential development is a goal of the region as implemented by the Capital Region Board. The intensification of the central portion of this plan area by increasing density from the original 5 units to 9.5 units per net ha maintains the intent of the original ASP while supporting CRB policies.

The Outline Plan statistics for capacity projections for the proposed land use concept in the Outline Plan area are shown in the below table, ***Table 2: Land Use Statistics.*** This table also indicates population generation based upon the current County Land Use Bylaw. The proposed density for the Irvine Creek Outline Plan is 9.5 units/net residential ha.

Table 2: Proposed Land Use Statistics

Land Use Distribution in Outline Plan						
	Area (ha)	**% of Total**				
Total Plan area	**48.4**					
Environmental Reserve	**5.6**	**11.6**				
Gross Developable Area	**42.8**	**88.4**				
		Net Area (ha)	**%GDA**			
Municipal Reserve		2.7	6.3%			
Public Utility Lots		5.9	13.8%			
Circulation		8.1	18.9%			
Infrastructure and Parks Area		**16.7**				
Low Density Residential (RU1)		9.5	22.2%			
Medium Density Residential (RU2)		16.6	38.8%			
Residential Developable Area		**26.1**				
Total		**42.8**	**100.0%**			
Land Use – As proposed in Outline Plan Area (OP)	**Area (ha)**	**%**	**DU/ ha**	**DU**	**PPDU**	**Proposed Pop'n**
Low Density Residential (RU1)	9.5	36.4%	5.0	48	2.6	125
Medium Density Residential (RU2)	16.6	63.6%	12.0	199	2.6	518
Total	**26.1**	**100%**		**247**		**643**
Proposed Density		**9.5**	**units / net residential ha**			



- Plan Boundary
- Low Density Residential - RU1 District
- Medium Density Residential - RU2 District
- Municipal Reserve
- Storm Water Management Facility (Public Utility Lot)
- Environmental Reserve
- Public Utility Lot

Figure 5

DEVELOPMENT CONCEPT

IRVINE CREEK OUTLINE PLAN

Part of NE 1/4 31-50-24-W4
Leduc County

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4.2 **Open Space**

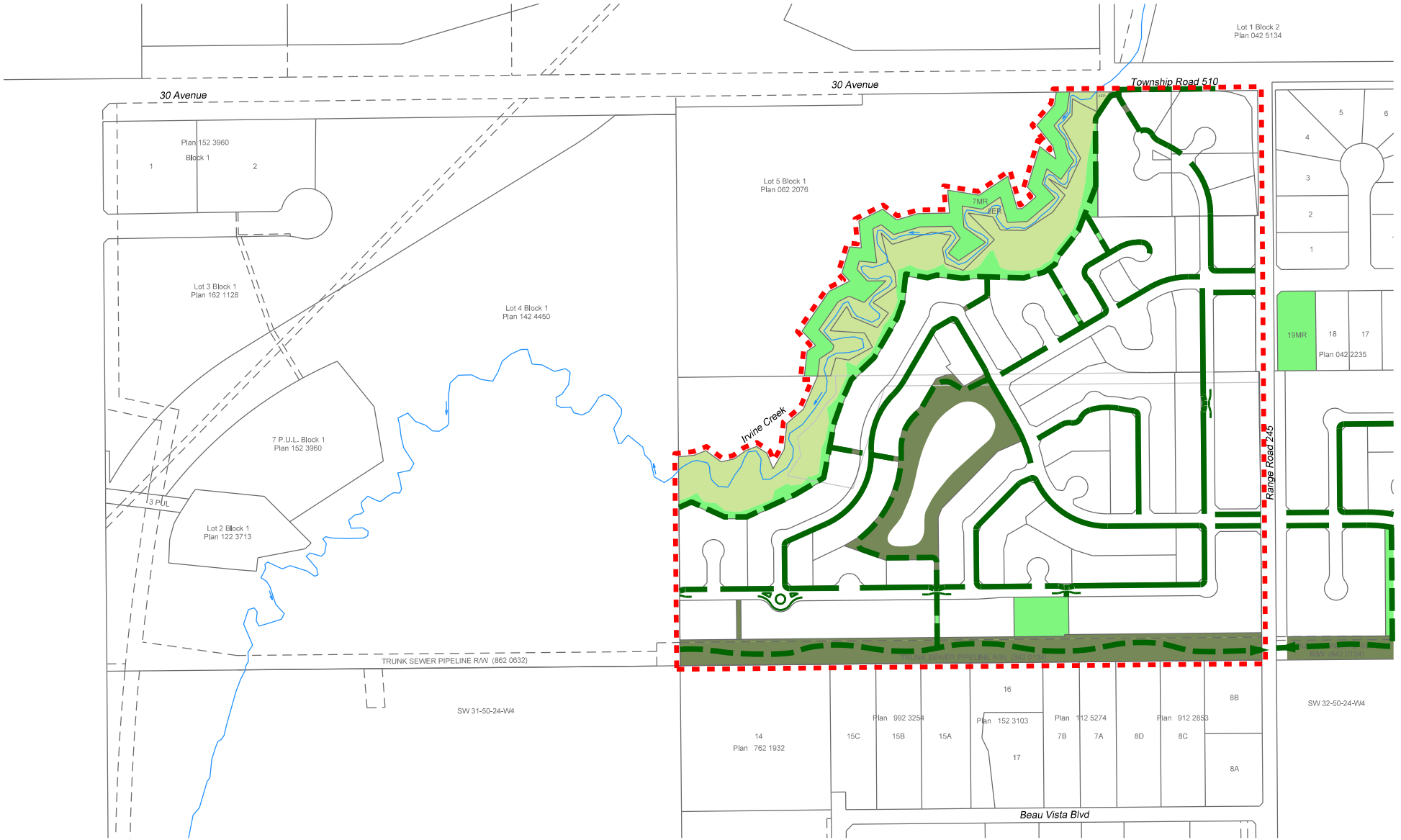
Figure 6 depicts the **Parks & Open Space Concept** for the plan area. The physical constraints of the plan area provide the basis of the open space configuration - Irvine Creek and its valley, the utility right of way corridor along the south boundary and the north-south gas right of way in the west central plan area. The placement of the proposed storm water management (SWM) facilities are driven in part by both ownership and topography. The SWM facility is sized to contain the balance of the runoff from the plan area.

Open space will be a combination of Municipal Reserve, Environmental Reserve and Public Utility Lots. The proposed plan has approximately 15.3 ha of the total area of 50.2 ha (30.5%) as open space. Open space will be developed in accordance with Leduc County Park Development standards with the Landscaping Plan submitted in the detailed engineering drawing set providing details on development.

All Municipal Reserve owing shall be in accordance with the East Vistas LASP and the Municipal Government Act. A pocket park with an approximate size of 0.4 ha is proposed in the southeast portion of the plan area. It is placed adjacent to the south Public Utility Lot to connect directly to the proposed east-west trail so that it is readily accessible by the community as a whole. Municipal reserve shall also be provided as linear green space between the Urban Development Setback Line and the back of private lots for the development of a top of bank trail where said trail cannot be developed safely below the Urban Development Setback Line. Any further balance owing would then be taken according to the Municipal Government Act, likely as cash in lieu.

Environmental Reserve will be dedicated for all lands along Irvine Creek up to the Urban Development Setback Line (UDSL). As such, the UDSL will be required to be delineated by a qualified profession prior to subdivision occurring for both the east and west banks of Irvine Creek.

Pedestrian connectivity and linkages via trail and sidewalks on internal roads is the focus of the Irvine Creek OP whether it is a destination internal to the plan, to a bus stop or an alternative destination such as the future recreational area on County lands south of the NW 31. A trail is proposed in the southerly east west orientated PUL which will connect to future trails to the east and link into the trail network along the top of the bank of Irvine Creek which is anticipated to the focal point of the trail network. Internal shortcuts on and off the perimeter trails will be provided which will also link to the trail partially circumscribing the SWM facility. Sidewalks on the internal roads will complete the pedestrian connectivity and provide walkability also to future bus stops internally and on the perimeter arterial/collector roads.



Plan Boundary
Environmental Reserve
Municipal Reserve
Public Utility Lot
Trail Network
Sidewalks
Traffic Calming Measures

Figure 6

PARKS & OPEN SPACE CONCEPT

IRVINE CREEK OUTLINE PLAN

Part of NE 1/4 31-50-24-W4
Leduc County

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5 Public Input

Non-participating landowners within the Irvine Creek Plan area were notified via mail in early May 2016 regarding the preparation of the Outline Plan that included their lands. One of the three landowners contacted Scheffer Andrew Ltd. with questions.

The June 15, 2016 open house was held at the *Nisku Recreation Center* to garner feedback from adjacent landowners and interested parties with respect to the proposed East Vistas LASP amendment and proposed Irvine Creek Outline Plan being prepared. ***Appendix B Open House Summary*** summarizes the feedback from the open house. Nine people attended the open house and eight surveys were returned. Additional traffic calming measure are being proposed along with additional walkway connections to the Irvine Creek further to the open house feedback. Notification of the open house was via advertising for two weeks in the ***County Market*** prior to the meeting date.

6 Implementation

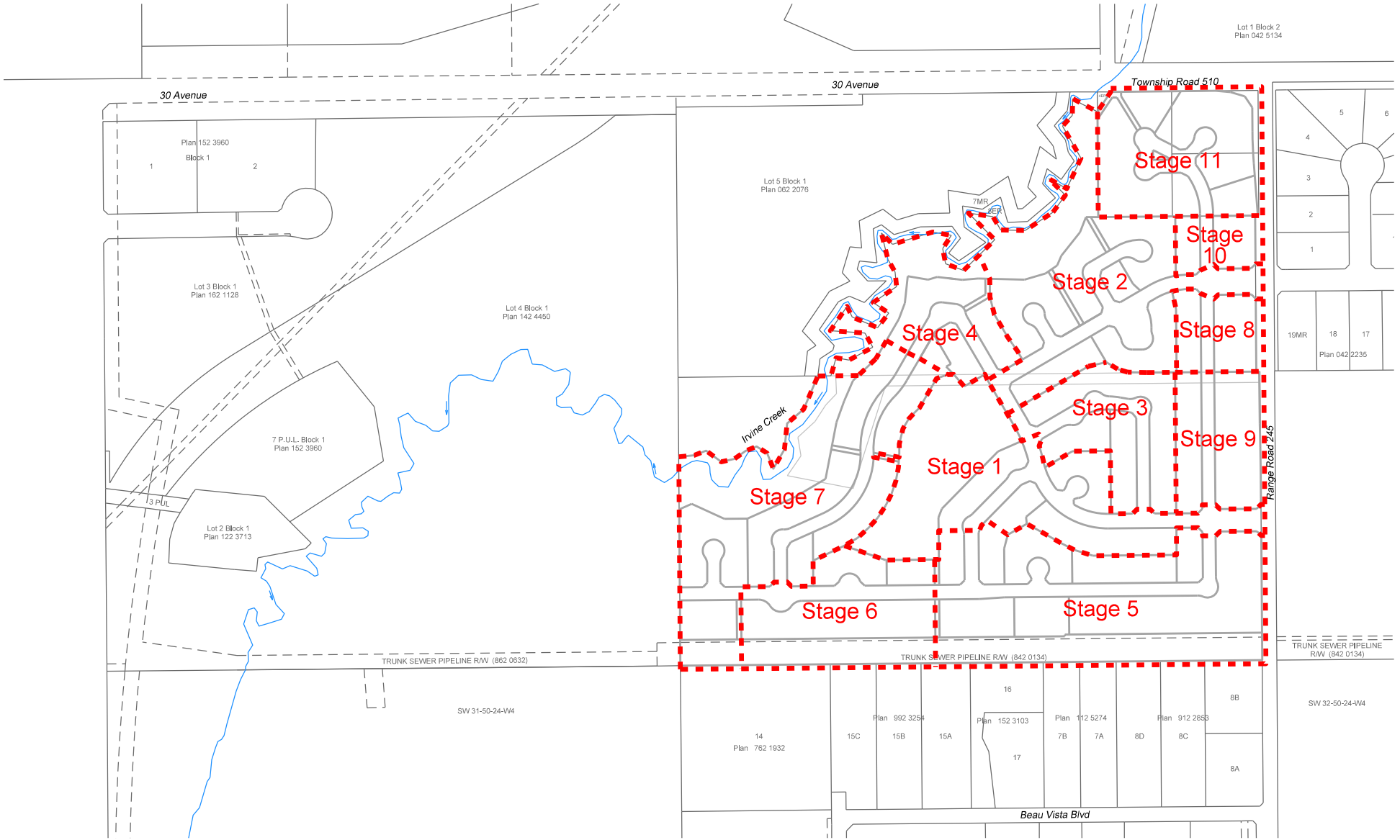
6.1 Development Sequence

Proposed staging is indicated in **Figure 7 *Development Sequence.*** All stages may be developed concurrently, singular, plural or out of sequence as the market demands. It is anticipated that development will proceed from the east to the west.

A conditional subdivision approval may contain multiple phases. Legal road access must be provided to each stage in order to proceed along with the extension of required utility services.

6.2 Approval Process

Amendments to the *Irvine Creek Outline Plan* may be brought forward to Leduc County by developers for Leduc County's consideration.



Stage Boundary

Note:
Proposed staging is representive only and staging may occur out of sequence if servicing and market needs warrant.

Figure 7

DEVELOPMENT SEQUENCE

IRVINE CREEK OUTLINE PLAN

Part of NE 1/4 31-50-24-W4
Leduc County

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7 Infrastructure

7.1 Circulation and Access

The ***Transportation Network*** plan is shown on **Figure 8**.

Irvine Creek is proposed to have two collector roadway connections to Range Road 245, and one emergency access which will connect to Township Road 510.

Within Irvine Creek, the major local roadway featuring a 13.0m carriageway within a 20.0m right-of-way has been proposed as an alternate to the typical collector roadway cross-section which features a 24.0m right-of-way with a 14.5m carriage way. The major local cross section will allow for front driveway access, while still accommodating a bus route. A cross section of the major local roadway is shown on **Figure 8.1**. The typical 10.0m local residential roadway cross-section proposes a 10.0 meter carriageway within an 18.0 meter right of way. The typical collector road way cross section will be utilized at the intersection with the range road.

Range Road 245 is proposed to be developed as a four lane undivided collector roadway at full build-out. The cross-section proposes a 14.0m carriageway within a 26.3m right of way, with separate walks provided along both the east and west sides of the roadway. Full illumination is proposed along Range Road 245 at full build-out. Prior to the time of conditional subdivision approval for ultimate development, additional roadway dedication for Range Road 245 and Township Road 510 beyond what is currently dedicated/proposed within the Outline Plan may need to be ascertained.

A transit route has been proposed for Irvine Creek, with the potential future route illustrated in **Figure 8**. The 13.0m carriageway proposed for the major local roadway will allow for parking along both sides of the street while still accommodating two driving lanes and snow management, as required. The proposed transit route will provide service to 100% of residential units within a 400m walking distance and connect to the existing bus service that has been implemented in the East Vistas plan area.

The southernmost east-west oriented roadway within Irvine Creek extends for 725 meters. To avoid speeding along this roadway, several traffic calming measures have been proposed at a number of locations. A roundabout which will provide a turnaround location for the future transit route has been proposed. Midblock curb extensions, placed at two walkways, will also act to slow traffic while increasing the safety of the pedestrian crossings. The north south local road on the east portion of the plan will also have traffic calming measures in place.

A ***Traffic Impact Assessment (TIA)*** (January 2017) report which addressed both Irvine Creek and the East Vistas LASP Amendment was prepared by Scheffer Andrew Ltd. and has been submitted to the County under separate cover.

Based on the findings of the TIA, the following roadway improvements and mitigations are expected to be necessary in the future based on projected background traffic growth and development in the East Vistas neighbourhood:

Mid Term (2020 Year Operating Horizon)

It is assumed that by 2020, roughly 37% or 91 units will be developed within Irvine Creek.

- Both intersections of Range Road 245 with the Irvine Creek collectors will be operating at a good level of service. Signalization is not warranted prior to 2020. As there are no identified problems in the operation of the considered intersections, their current layout and traffic control system ensure safe and reliable operation when accommodating post development traffic projected in 2020.

- The intersection of Township Road 510 and Range Road 245 will be operating at a good level of service, with all movements operating at LOS C or better. Signalization of this intersection is not warranted prior to 2020.

- Projected peak volumes on Highway 625 indicate the need for two through lanes in both the east and west bound directions at the intersection of Range Road 245. The capacity analysis indicates that signalization is not required prior to 2020.

- It is recommended to illuminate all intersections along Range Road 245 once it is widened to a four lane collector.

- All internal roadways within the Irvine Creek development are recommended to be constructed as urban roadways ensuring pedestrian connectivity within the development and at the future connection to the pathway network built along Range Road 245.

Long Term (2030 Year Operating Horizon)

Full development of Irvine Creek is assumed at 2030. The ultimate build out of Township Road 510 to a divided four lane arterial and Range Road 245 to an undivided four lane collector, with the realignment of Range Road 244N with Range Road 245, is also assumed. These ultimate build out assumptions are based on details provided in the Township Road 510 Functional Planning Study, and the Range Road 245 Functional Planning Study.

- The intersection of Range Road 245 with Irvine Creek Collector A will be operating at a good level of service. Signalization is not warranted prior to 2030. As there are no identified problems in the operation of this intersection, their current layout and traffic

control system ensure safe and reliable operation when accommodating post development traffic projected in 2030.

- Based on the analyses, installation of traffic signals will be warranted at the following intersections prior to 2030:

  - Township Road 510 & Range Road 245;
  - Range Road 245 & Collector B and;
  - Range Road 245 & Highway 625.

- The following intersections improvements are recommended to ensure their operation at an expected level of service:
  - Intersection of Township Road 510 & Range Road 245:
    - Installation of traffic signals (recommended after Twp. Rd. 510 widening);
    - Eastbound, westbound and northbound right turn channelization;
    - Introduction of a dedicated westbound left turn lane;
    - Introduction of both a dedicated and a shared northbound left turn lane.
  - Intersection of Range Road 245 & Collector B:
    - Installation of traffic signals (recommended after Range Road 245 widening);
    - Introduction of a westbound right turn lane;
  - Intersection of Range Road 245 & Highway 625:
    - Installation of traffic signals (recommended after Highway 625 widening);
    - Introduction of a third westbound through lane;
    - Introduction of dual eastbound left turn lanes;

  It is recommended to re-visit traffic volumes and patterns at all intersections and conduct traffic counts (at least 12 hours) at full built out (prior to 2030) to confirm if any intersection improvement works are required.

- As mentioned above, it is recommended to illuminate all intersections along Range Road 245 once it is widened to a four lane collector.

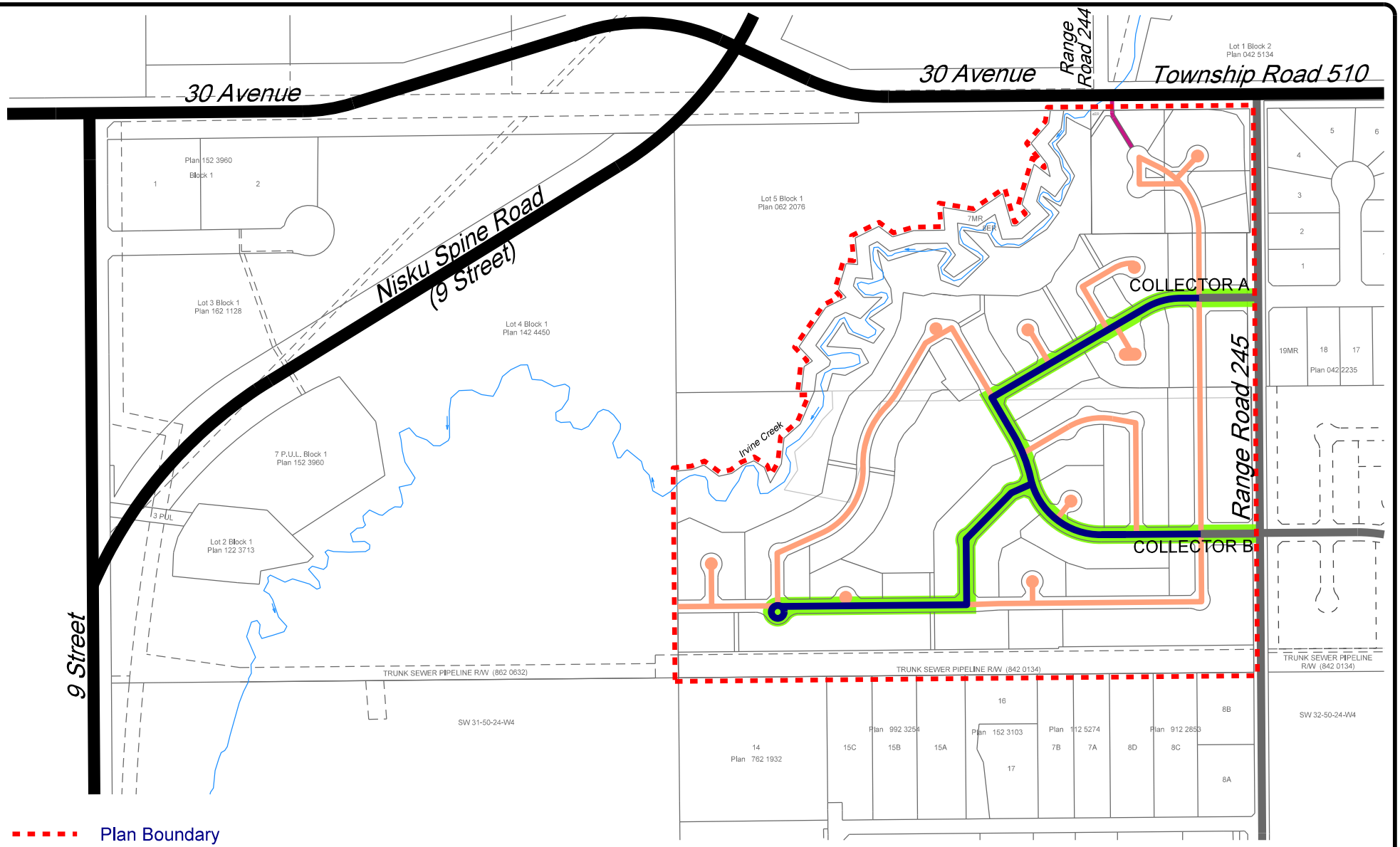
- As mentioned above, it is recommended to ensure pedestrian connectivity within all new developments to eventually connect with the pathway network built along Range Road 245.

7.2 Noise Impact Assessment

A ***Noise Impact Assessment (NIA)*** (January 2017) report for the Irvine Creek Outline Plan was prepared by Scheffer Andrew Ltd. and has been submitted to the County under separate cover. Based on the findings of the NIA, the following improvements and mitigations are expected to be necessary into the future:

- A new standard noise barrier (1.80m high noise attenuation fence) on top of a 1.0m high berm along the north Irvine Creek plan property line should be constructed. This approach is similar to the mitigation measures proposed for other residential sites within the East Vistas LASP and should provide adequate noise attenuation from Township Road 510.

- A new standard noise barrier (1.80m high noise attenuation fence) along the east Irvine Creek plan property line should be constructed. This fence should be constructed prior to the Range Road 245 upgrade, and will provide adequate noise attenuation from Range Road 245. A berm underneath the fence is not needed.



- Plan Boundary
- Arterial Roadway
- Collector Roadway (14.5m Wide)
- Major Local Roadway (13.0m Wide)
- Local Roadway (10.0m Wide)
- Bus Route
- Emergency Access Route

Figure 8

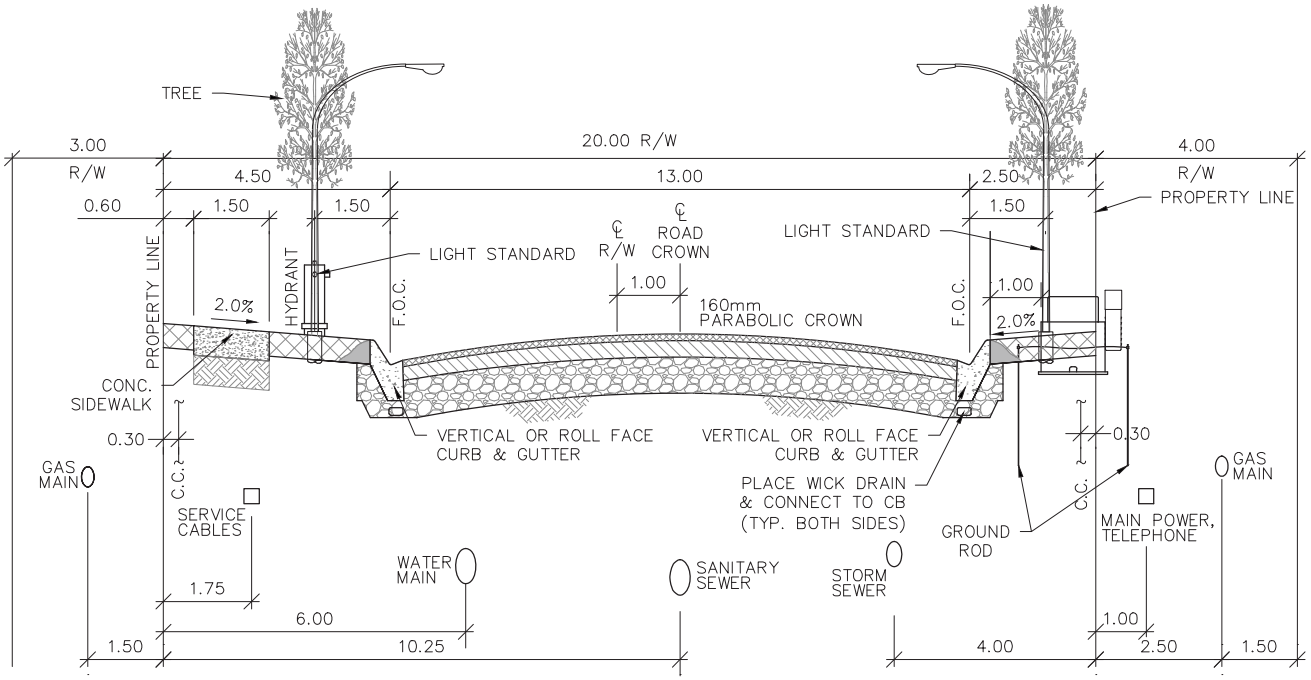
TRANSPORTATION NETWORK

IRVINE CREEK OUTLINE PLAN

Part of NE 1/4 31-50-24-W4
Leduc County

1:7500
March 29, 2017
134001000op2.dgn

Scheffer Andrew Ltd.
Planners & Engineers



UTILITIES LOCATION PLAN (20.0m R/W)
13.0m TYPICAL MAJOR LOCAL ROAD

N.T.S.

NOTES:
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.
2. PIPE SIZES AND DEPTH VARY.
3. ROAD CROWN IS MEASURED FROM LIP OF GUTTER.
4. PLACE CLAY PLUG IF LANDSCAPING NOT UNDERTAKEN BY ROAD CONTRACTOR.
5. ANY DEVELOPER CONSTRUCTED FENCE SHALL BE LOCATED INSIDE PRIVATE PROPERTY.

FIGURE 8.1
PROPOSED 13.0m MAJOR LOCAL ROAD - CROSS SECTIOM

IRVINE CREEK - OUTLINE PLAN

LEDUC COUNTY

Scheffer Andrew Ltd.
Planners & Engineers

SCALE = N.T.S.
2017-01-13
134001

J:\DGN\134001 EAST VISTAS OUTLINE PLAN\01 PRELIM\OUTLINE FIGURES\Fig 8.1 CROSS SECTION.DWG PLOTTED: 1/10/2017 BY: BURTON, CHERI

7.3 Water Servicing

The proposed water distribution network is shown on **Figure 9** ***Proposed Ultimate Water Distribution Network***.

Initial stages of development in the plan area are planned to obtain potable water supply from the existing 300mm municipal water main located at Township Road 510 to the north and existing 200mm watermain at Range Road 245. A new 300mm watermain will be constructed and connected to the existing water line at the intersection of Township Road 510 and Range Road 245 and extended south to Collector A, across from the entrance to the Lukas Estates subdivision. A connection will also be made to the 200mm watermain at Lukas Estates for water quality and network redundancy purposes. A second connection to the plan area will be made at Collector B via the existing 200mm watermain located along Range Road 245.

The Range Road 245 watermain should be installed through the local roadways within the subdivisions, if possible, instead of RR245 right-of-way to keep it away from the major traffic area. The watermain can then connect through the northernmost part of the plan area to Township Road 510 watermain. This would improve the looping and the water quality in the neighbourhood and might potentially reduce the development costs. However, we note that at this time the northernmost properties in the plan area are non-participating and expected to develop last, but the watermain connection to Twp Road 510 is expected to be needed early on in the development sequence. Therefore, determination of the Range Road 245 watermain alignment should be deferred to subdivision design stage that triggers the watermain.

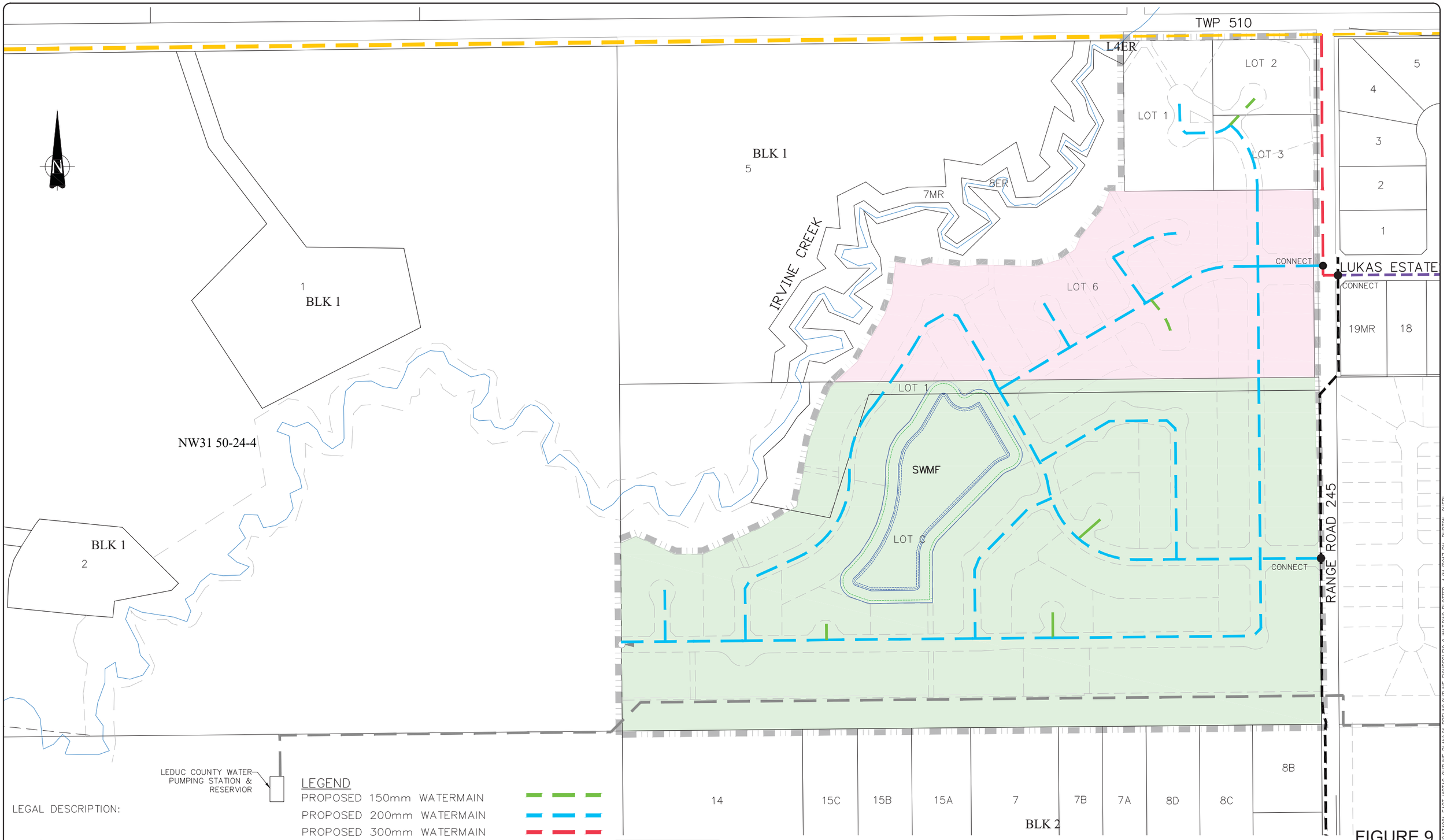
A network of 150-200 mm water mains will service the initial stages of the proposed residential development.

Preliminary Water Network Analysis (WNA) conducted by the County's Engineer (Opus Stewart Weir) in early 2016 indicated that single-family residential development in the Irvine Creek plan area can be serviced from the first two watermain connections described above, including provision of 100 L/s fire flow, without requiring the construction of the 600mm watermain. However, a more detailed WNA will be required prior to approval of the detailed engineering drawings for the first stage of subdivision in the plan area. The detailed WNA will also determine at what stage of development the second connection is required in order to provide the necessary network redundancy, pressures, and fire flow service of 100 L/s.

A third connection will ultimately be made to the future 600mm watermain that will extend from the existing Leduc County East Pump House to service the East Vistas Local Area Structure Plan areas east of Range Road 245. The 600mm watermain is needed for water and fire flow servicing of the greater East Vistas neighbourhood as described in the *East Vistas Municipal Servicing Study* prepared by Challenger Engineering dated January 2010. However, construction of the 600mm off-site watermain is expected to be triggered by the higher density multi-family sites and/or commercial sites in the Royal Oaks/Royal Woods plan area to the east that require over 180 L/s fire flows which the current infrastructure cannot supply without the ultimate 600mm waterline.

The timing of the third connection will have to be verified via interim WNA at future stages of subdivision based on then current boundary conditions and the need for network redundancy, pressures, and fire flow service of 100 L/s. The timing of the third connection will depend on the results of the interim WNA(s).

At detailed engineering design, fire hydrants shall be strategically positioned at access points to Irvine Creek natural area with maximum distance of 400 m between accesses.



LEGAL DESCRIPTION:

LOT C PLAN 1470 NY &
LOT 1 PLAN 902–2899

LOT 6 BLOCK 1 PLAN 062–2076

LEGEND

- PROPOSED 150mm WATERMAIN
- PROPOSED 200mm WATERMAIN
- PROPOSED 300mm WATERMAIN
- EXISTING 150mm WATERMAIN
- EXISTING 200mm WATERMAIN
- EXISTING 300mm HDPE WATERMAIN
- FUTURE 600mm HDPE WATERMAIN
- STUDY AREA BOUNDARY

NOTE
PROPOSED PIPE SIZES SUBJECT TO DETAILED DESIGN.

Scheffer Andrew Ltd.
Planners & Engineers

FIGURE 9

PROPOSED ULTIMATE WATER DISTRIBUTION NETWORK

IRVINE CREEK - OUTLINE PLAN

Scale = 1:4000
2017-01-13
134001

7.4 Sanitary Servicing

7.4.1 Overall Sanitary Design

All residential development within the Irvine Creek Outline plan area will be serviced by gravity flow sewers. The overall sanitary basin (approx. 35.0ha) is proposed to discharge sewage flows directly to the existing 525/600mm Beaumont sewer trunk operated by the Alberta Capital Region Wastewater Commission (ACRWC). The trunk runs within R/W Plan 862 0632/842 0634 and has been designed by ACRWC to accommodate the proposed flows from the plan area.

The proposed tie-in location and the calculated design flows are shown on **Figure 10 Proposed Sanitary Basin Plan**. The preliminary location of sanitary system catchments, pipe alignments and pipe sizes are illustrated on **Figure 11** ***Proposed Sanitary System***. Supporting detailed sanitary sewer design calculations are enclosed in **Appendix C.** Sanitary sewer calculations will have to be verified at each subdivision stage and adjusted as necessary.

7.4.2 Tie-in for Overall Irvine Creek Development

The tie-in location is proposed at the southwest corner of the plan area to existing manhole MH2. This tie-in location was chosen based on depth requirements for the neighbourhood, including pipe cover and earth cut/fill balance. Should the northern portion of NE 31 lands develop prior to the lands to the south, the northern developers will be responsible for the installation of sanitary pipe through the south land to the temporary tie-in location. This installation would be subject to a cost recovery from downstream owners when they develop.

7.4.3 Ultimate Tie-in for Overall East Vistas Development

We note that the ultimate sanitary tie-in in the southwest corner of the NW 31 lands is not triggered by any technical requirements or servicing capacities identified in our analysis. However, current ACRWC's connection guidelines do not allow for more than one connection to the ACRWC's sewer trunk per ¼ Section of land and our correspondence on this issue with ACRWC confirmed this. Currently, there is already an existing connection to ACRWC's truck in the NE ¼ lands, which is expected to remain. Therefore, a temporary connection is proposed to MH2, which will later be abandoned to comply with ACRWC's connection guidelines. **Figure 11** shows the future extension of the sanitary sewer to the ultimate tie-in to west of the plan area.

TWP 510

L4ER

LOT 2

LOT 1

LOT 3

4

3

2

1

BLK 1

5

7MR

8ER

IRVINE CREEK

LOT 6

LUKAS ESTATES

EX. 200mm

EX. 375mm

19MR

18

EX. 375mm

LOT 1

EX. 450mm

SWMF

245

RANGE ROAD

LOT C

EX. 450mm

EX. 450mm

1

BLK 1

NW31 50-24-4

BLK 1

2

ULTIMATE
PEAK WWF
Q = 33.9 L/s

PEAK WWF
Q = 27.7 L/s

TO SERTS
STAGE 5 SAN
TRUNK

EX. CM-4

EX. MH2

EX. 600mm

EX. 600mm

EX. 600mm

EX. 600mm

EX. 525mm

EX. 525mm

EX. 525mm

EX. 525mm

EX. 525mm

EX. 525mm

EX. 525mm

EX. 525mm

EX. 525mm

EX. 525mm

PROPOSED ULTIMATE TIE IN TO
EX. 600mm ACRWC SAN TRUNK

PROPOSED TEMP. TIE IN TO EX.
525mm ACRWC SAN TRUNK
(PRIOR TO ULTIMATE CONNECTION
TO ACRWC CM-4 MANHOLE)

8B

LEGEND

OVERALL SANITARY BASIN AREA (SEE FIG 11 FOR DETAILED CATCHMENT AREAS) — 34.57 ha

STUDY AREA BOUNDARY

LEGAL DESCRIPTION:

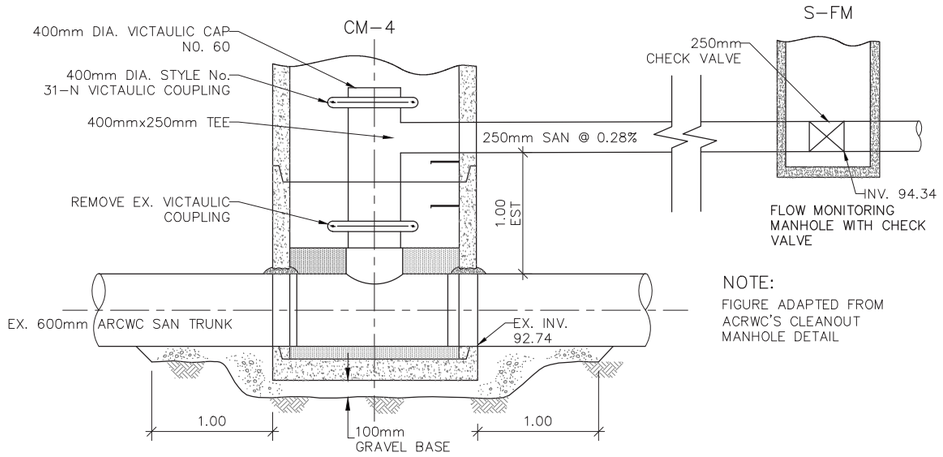
LOT C PLAN 1470 NY &
LOT 1 PLAN 902-2899

LOT 6 BLOCK 1 PLAN 062-2076

Scheffer Andrew Ltd.
Planners & Engineers

FIGURE 10
PROPOSED SANITARY BASIN PLAN
IRVINE CREEK - OUTLINE PLAN

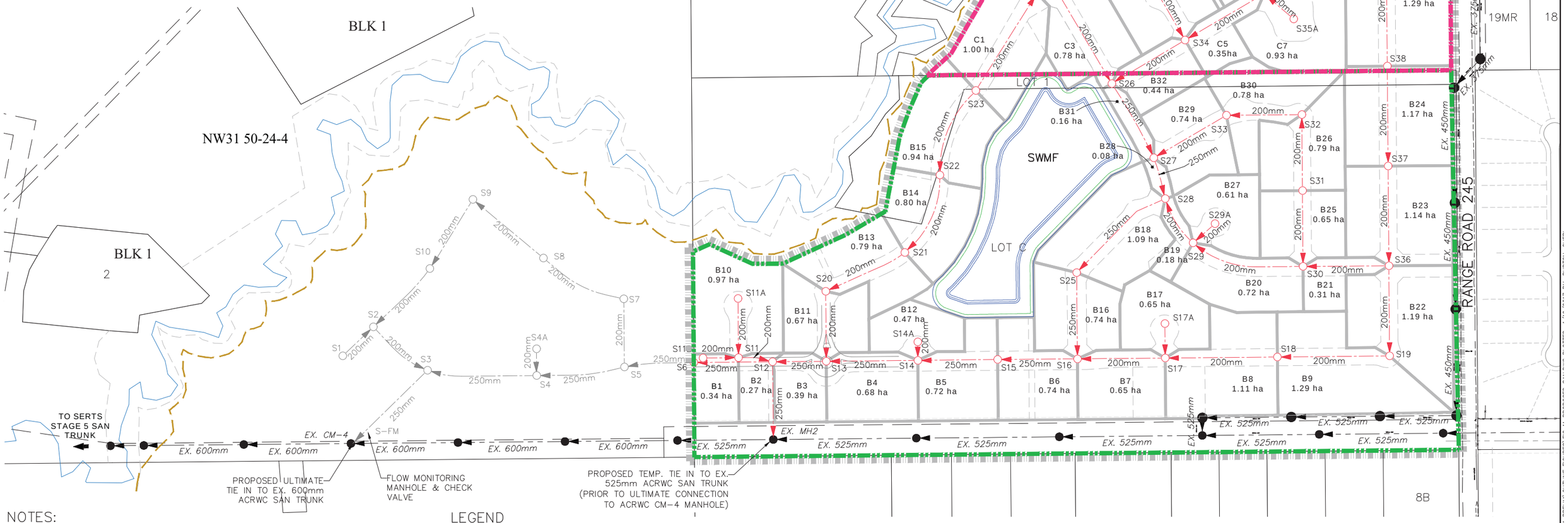
Scale = 1:4000
2017-01-19
134001



NOTE:
FIGURE ADAPTED FROM ACRWC'S CLEANOUT MANHOLE DETAIL

SAN CONNECTION TO ARCWC TRUNK AT MANHOLE CM-4 – PRELIMINARY DESIGN

SCALE: 1:50



NOTES:

1. PROPOSED PIPE SIZES SUBJECT TO DETAILED DESIGN.
2. TEMP. CONNECTION FROM S12 TO EX. ACRWC MH2 TO BE DECOMMISSIONED WHEN ULTIMATE SAN LINE IS BUILD FROM S12 TO EX. ACRWC CM-4.
3. BUILD S12 TO S6 SAN LINE AND LEAVE DRY (TEMP. PLUG) UNTIL ULTIMATE SAN LINE IS BUILD FROM S12 TO EX. ACRWC CM-4.
4. TEMP. FLOW MONITORING DEVICE TO BE INSTALLED AT S12.

LEGEND

- EXISTING SAN SEWER & MANHOLE — S01
- PROPOSED SAN SEWER & MANHOLE — S01
- FUTURE SAN SEWER & MANHOLE — S01
- SANITARY CATCHMENT BOUNDARY
- CATCHMENT NO. & AREA — B 1.50ha
- STUDY AREA BOUNDARY

LEGAL DESCRIPTION:

LOT C PLAN 1470 NY &
LOT 1 PLAN 902-2899

LOT 6 BLOCK 1 PLAN 062-2076

Scheffer Andrew Ltd.
Planners & Engineers

FIGURE 11

PROPOSED SANITARY SYSTEM

IRVINE CREEK - OUTLINE PLAN

Scale = 1:4000
2017-01-19
134001

7.5 Storm water Management

The proposed drainage system for the plan area consists of storm pipes, catch basins, ditches, roadside gutters, and a constructed storm water management facility (SWMF). The SWMF is located near the centre of the plan area. The proposed SWMF is designed to store the post-development runoff from the plan area during critical storm events with a controlled discharge into the downstream system (Irvine Creek). The approximate basin area for the SWMF is 38.3 ha. The proposed SWMF will provide the necessary water storage and flood control measures for the plan area. **Figure 12** ***Proposed Storm Basin Plan*** shows the locations of the proposed SWMF and its basin area.

During a 1-in-5 year storm, the storm pipes will collect and direct the flows to the SWMF. The proposed post-development catchment areas are shown on **Figure 13** ***Proposed Storm System***. Storm pipes have been sized to accommodate minor flows from all residential lots. Supporting calculations are attached in **Appendix D**.

Major storm flows exceeding the 1-in-5 year intensity will, for the most part, be drained by the roadway system to the ponds. **Figure 14** ***Proposed Grading Plan*** shows the major drainage flow routing. However, due to grading constraints, the major flow accumulating in the PUL at the south edge of the plan area cannot discharge to the roadway system. Therefore, the underground infrastructure from the ditch Inlet to manhole D12 has been upsized in order to accommodate a 1-in-100 year storm.

The SWMF is proposed to discharge storm water at a controlled flow rate to Irvine Creek located along the west edge of the plan area via a piped outlet. The discharge of the pond will be via 600mm storm outfall pipes which will outlet to Irvine Creek. A detailed storm modeling report will be required prior to construction of the SWMF to confirm the final design elevations, design volumes, discharge rates, and other design parameters and considerations related to the proposed discharge and flow through of storm water to Irvine Creek.

The proposed SWMF has been designed to accommodate the 1-in-100 year storm event in accordance with the Leduc County Design Guidelines and Construction Standards for Developments dated May 2005 and Alberta Environment regulations. The 1-in-100 year SWMF storage requirements are summarized in the **Table 2** below. A controlled maximum release rate of 1.8 L/s/ha was used for Irvine Creek as per Leduc County's request. This number is based on the anticipated outcome of the inter-municipal stormwater management study of Blackmud Creek currently underway (scheduled to be completed in May of 2017).

Table 2: Stormwater Management Requirements for 1-in-100 Year, 24-Hour Storm Event

Facility	Storage Function	Allotted Pond PUL Area (ha)	Freeboard Elev. (m)	HWL Elev. (m)	NWL Elev. (m)	Bottom Elev. (m)	Approx. Active Storage Vol. (m^3)	Max. Controlled Release Rate (L/s)
SWMF	Retention	2.73	701.60	700.99	698.50	698.00	46,600	Max. 68.69 to Irvine Creek (1.8 L/s/ha)

7.5.1 Emergency Overflows

An emergency spillway system has been designed in the event that successive significant storms occur. The emergency spillway system design is preliminary and subject to detailed design.

Ponds

If a storm event greater than 1-in-100 year occurs and the SWMF is at capacity, water will spill over a weir in the control structure, which will be set at the HWL elevation. This water will then flow through the outlet and into Irvine Creek.

SERTS PUL

Stormwater that collects in the ditch within the south PUL will drain into the ditch inlet shown on Figure 5 and be conveyed through the pipe system to the SWMF. This section of pipe system has been designed to handle flows from a 1:100yr storm event. However, should the SWMF/pipe system be at capacity while another storm event is occurring, stormwater will pond at the ditch inlet and drain to the SWMF once it has drawn down. In the event that the ditch inlet is clogged and the water ponding in the PUL cannot flow to the SWMF, an emergency spillway is proposed. The PUL will be regraded such that flood waters will spill over a spill point (set at the designated FB level of 701.60) at the west end of the PUL and be directed west to Irvine Creek. This will prevent the risk of flooding on the private subdivision lots to the south.

7.5.2 SWMF Cost Recovery

The Irvine Creek development will be serviced via the SWMF. Therefore, cost recoveries will be required (amounts will be determined/calculated with the applicable Development Agreements). The SWMF is located entirely on the south portion of the plan area under one ownership and will be taken into account when calculating recoveries.

7.5.3 **Block Grading Plan**

Preliminary roadway elevations and block-by-block lot grades are shown on **Figure 14** ***Proposed Grading Plan*****.** The grading plan has been designed to provide frost cover for utilities and to minimize the volume of earthworks. Using the grading plan, a preliminary cut/fill analysis was conducted. The analysis showed that most of the cut generated on site is within the south half of the NE 31, while most of the fill requirements are on the north portion of the quarter and on the NW 31 lands. Most of the development for the plan area can proceed without the need for import fill. However, it is expected that some import fill will be needed for the final stages of development. Detailed lot grading plans will be required with each subdivision stage.

Major storm water flow conveyance routes are indicated on the grading plan. As per best engineering practices, the proposed roadway grades prevent ponding in the roadway in excess of 0.35m during a major storm event.

Clay shale/bedrock and high-swelling materials are generally present throughout the plan area. This material is somewhat difficult and costly to excavate and use/dispose of. Therefore, pond bottom depths have been designed to be shallow (0.5m) to minimize challenges during excavation except for the pipe entry points where deep pools will be built.

7.6 **Shallow Utilities**

Underground natural gas in the plan area will be supplied by AltaGas. Gas is available to the plan area.

Telephone, cable TV, internet service is provided by both Telus and Shaw. These services are available to the plan area.

Electricity and roadway lighting is provided by Battle River REA and Fortis.

TWP 510

RANGE ROAD 245

BLK 1
1

BLK 1
2

BLK 1
5

NW31 50-24-4

L4ER

7MR

5ER

IRVINE CREEK

LOT 1

LOT 2

LOT 3

LOT 6

LOT C

LUKAS ESTATES

19MR

18

SWMF

OUTLET

OUTLET/MAJOR OVERFLOW

INLET 1

INLET 2

INLET 3

BTM 698.00
NWL 698.50
HWL 700.99
FB 701.60

CB

DITCH INLET

D6 D11 D11A D12 D13 D14 D14A D14B D15 D15A D16 D17 D17A D18 D19 D20 D21 D22 D23 D24 D24A D24B D25 D26 D27 D28 D29 D29A D30 D31 D32 D33 D34 D34A D35 D35A D36 D37 D37A D38 D39 D40 D41 D42 D43 D43A D44 D45 D50 D51

38.3 ha

LEGEND

STORM WATER MANAGEMENT FACILITY (SWMF) BASIN BOUNDARY

OVERALL STORM BASIN AREA (SEE FIG 13 FOR DETAILED CATCHMENT AREAS)

PROPOSED STORM SEWER OR FOUNDATION DRAIN & MANHOLE — D2

EXISTING STORM SEWER & MANHOLE — D2

STUDY AREA BOUNDARY

LEGAL DESCRIPTION:

LOT C PLAN 1470 NY &
LOT 1 PLAN 902-2899

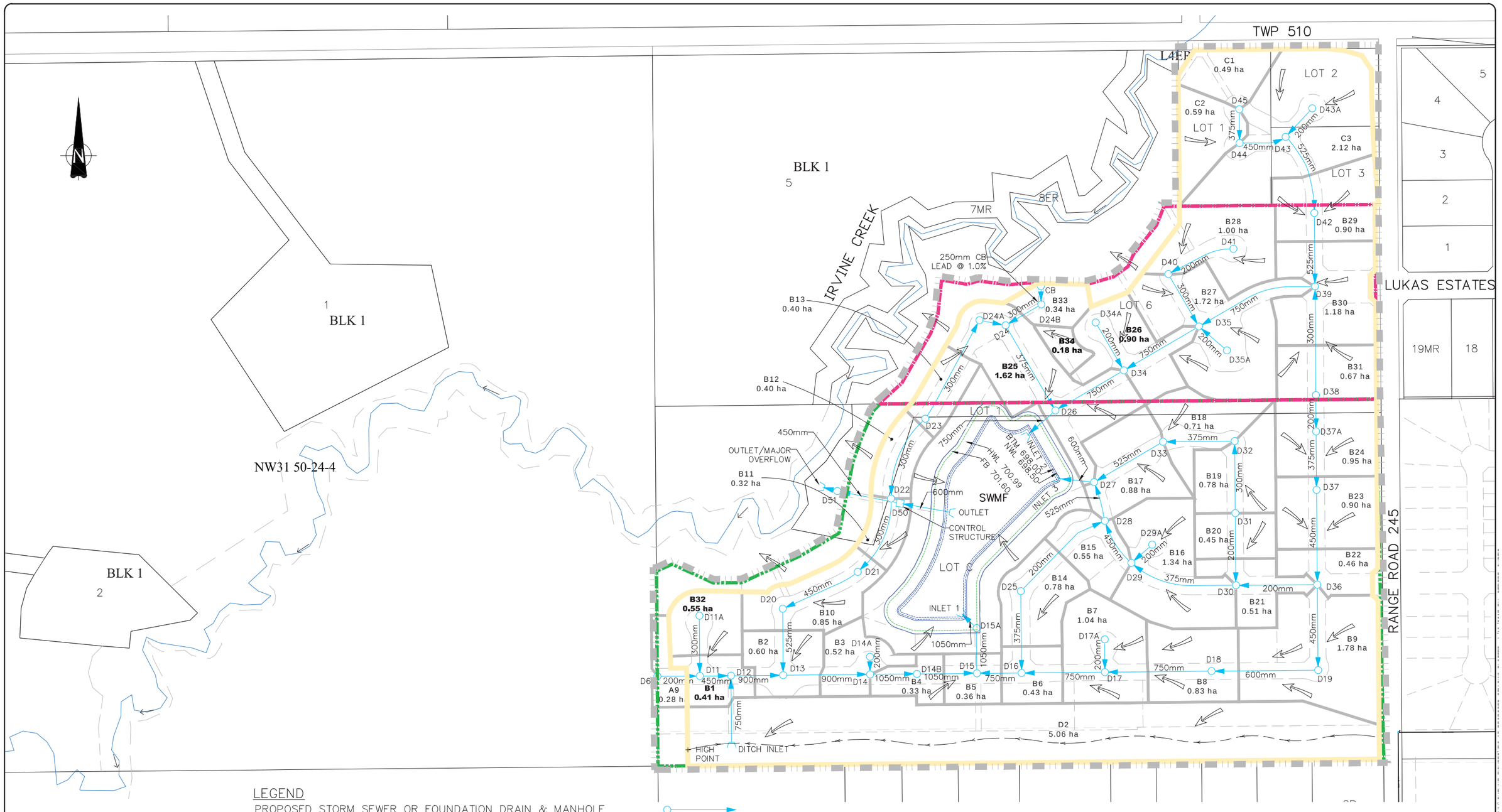
LOT 6 BLOCK 1 PLAN 062-2076

FIGURE 12
PROPOSED STORM BASIN PLAN
IRVINE CREEK - OUTLINE PLAN

Scale = 1:4000
2017-03-30
134001

Scheffer Andrew Ltd.
Planners & Engineers

J:\DGN\134001 EAST VISTAS OUTLINE PLAN\01 PRELIM OUTLINE FIGURES\FIG 12 STM BASIN.DWG PLOTTED: 3/30/2017 BY: BURTON, CHERI



LEGEND

- PROPOSED STORM SEWER OR FOUNDATION DRAIN & MANHOLE
- STORM CATCHMENT BOUNDARY
- STUDY AREA BOUNDARY
- MAJOR FLOW DIRECTION
- OVERLAND FLOW DIRECTION
- CATCHMENT NO. & AREA
- STORM WATER MANAGEMENT FACILITY (SWMF) BASIN BOUNDARY

D2

B
1.92ha

LEGAL DESCRIPTION:

LOT C PLAN 1470 NY &
LOT 1 PLAN 902-2899

LOT 6 BLOCK 1 PLAN 062-2076

Scheffer Andrew Ltd.
Planners & Engineers

FIGURE 13

PROPOSED STORM SYSTEM

IRVINE CREEK - OUTLINE PLAN

Scale = 1:4000
2017-01-13
134001

LEGAL DESCRIPTION:

LOT C PLAN 1470 NY &
LOT 1 PLAN 902–2899

LOT 6 BLOCK 1 PLAN 062–2076

LEGEND

- PREDEVELOPMENT CONTOURS — 709.50
- STUDY AREA BOUNDARY
- PRELIMINARY DESIGN ROAD & PROPERTY LINE GRADE — + 10.60
- PRELIMINARY DRAINAGE SWALE GRADE — + <10.60>
- DRAINAGE DITCH
- DIRECTION OF FLOW
- DIRECTION OF MAJOR DRAINAGE FLOW
- BOREHOLE (JR PAINE AUG. 2016) 1
- BOREHOLE (JR PAINE AUG. 2007) 1
- BOREHOLE (CTA MAY 2014) 1

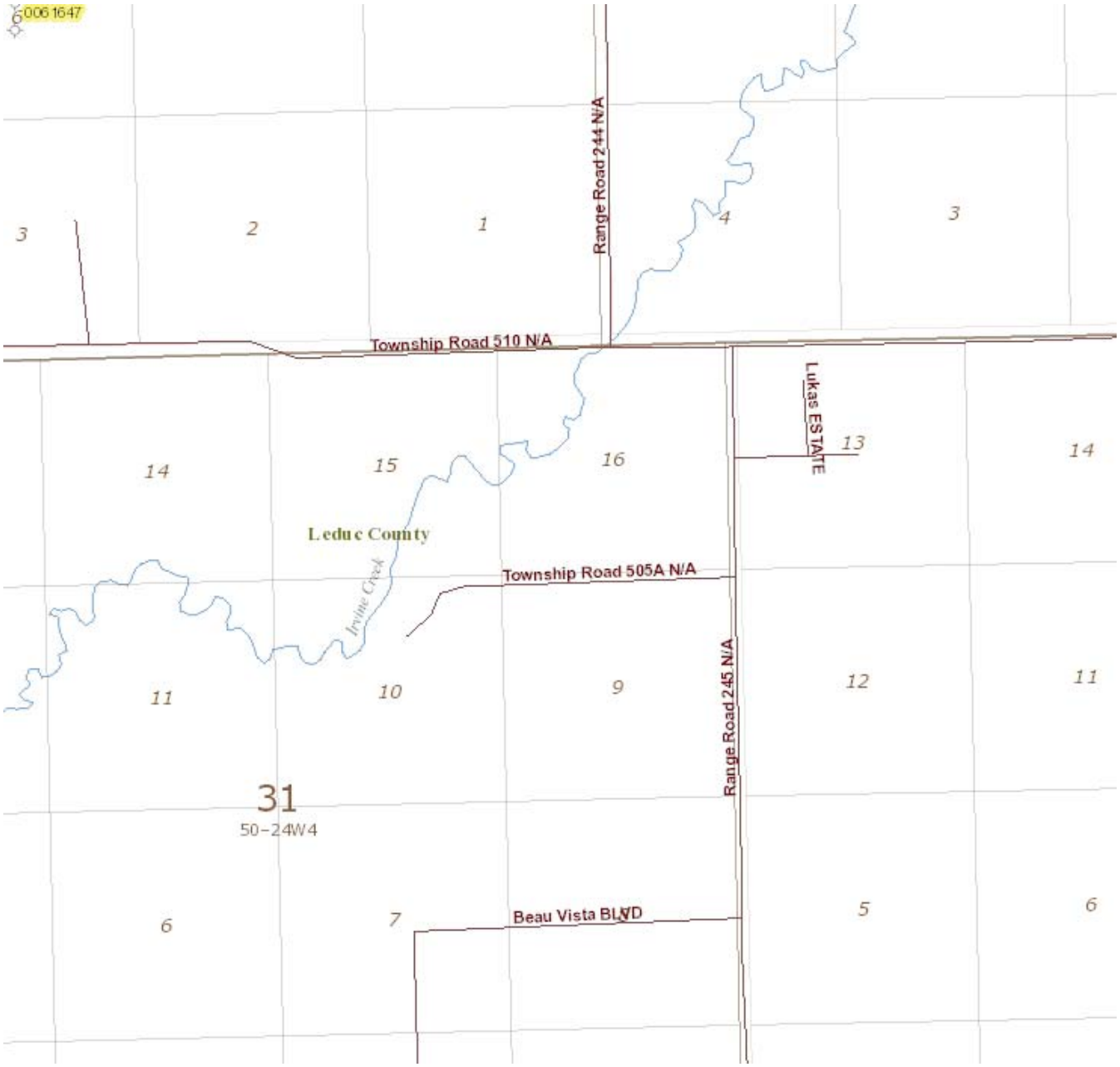
Scheffer Andrew Ltd.
Planners & Engineers

FIGURE 14
PROPOSED GRADING PLAN
IRVINE CREEK - OUTLINE PLAN

Scale = 1:4000
2017-01-13
134001

Appendix A

Abandoned Well Map



AER Abandoned Well Map

Base Data provided by Spatial Data Warehouse Ltd

Author Scheffer Andrew Ltd.

Printing Date: 8/26/2016

Date Date (if applicable)

Scale: 10,000.00

0.15 Kilometers 0

Projection and Datum:

10TM AEP Forest, NAD83

Legend

- Abandoned Wells (large scale)

Railways

- Mutiple Track Rail Line
- DoubleTrack Rail Line
- Single Track Rail Line
- Rail Line Spur
- Abandoned Rail Line
- Former Rail Line

Detailed Roads

- <all other values>
- Trans-Canada Highway

Alberta Energy Regulator

Appendix B

Open House Summary

Scheffer Andrew Ltd.
Planners & Engineers
EDMONTON • CALGARY • MEDICINE HAT • COLD LAKE

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East Vistas Local Area Structure Plan Proposed Amendments & Outline Plan Open House

June 15, 2016 Open House

Summary of Comments and Responses

Number of Persons in Attendance (according to the sign-in sheet): 9

Number of Survey Responses: 8

Amendment #1 – Inclusion of additional lands into the East Vistas Local Structure Plan area

1. The additional land being added to the East Vistas Local Area Structure Plan area is a natural and contiguous extension of development on the south side of Irvine Creek.

Agree	Neither Agree or Disagree	Disagree
√√√√√	√√√	

If disagree, please explain why:

2. Contiguous residential development in the proposed area south of the Irvine Creek Ravine is the best usage of this land in consideration of the approved East Vistas Local Area Structure Plan and the existing acreages to the south of the plan area.

Agree	Neither Agree or Disagree	Disagree
√√√√√	√√√	

If disagree, please explain why:

Amendment #2 – Change of density in internal portions of amendment area to Medium Density Residential

3. The development concept has been prepared in response to current and anticipated residential market demands as well as regional growth strategies for densification in the Capital Region. An analysis of these demands and an assessment of their implications help shape the plan with respect to the type, size and location of various land uses and amenity preferences of the anticipated residents. The proposed amendment to the East Vistas Local Area Structure Plan increases the density from Low Density to Medium Density Residential while preserving the intent of the plan to protect the existing character of existing country and estate residential through appropriate urban design (ex. Transitional land use, site planning, landscaping, fencing and design).

Agree	Neither Agree or Disagree	Disagree
√√√√√√√		

If disagree, please explain why:

"This question is not clear. It is informative, but not useful in asking my opinion."

4. The proposed plan provides a logical, safe and efficient transportation system within the plan area and creates a pedestrian trail system connecting and providing access to the Irvine Creek Ravine and the east-west Multi-use Corridor along the south portion of the plan area. The proposed plan addresses pedestrian, bicycle and vehicular transportation needs of residents moving to, from and within the proposed plan area.

Agree	Neither Agree or Disagree	Disagree
√√√√√√	√√	

If disagree, please explain why:

5. Top-of-bank development objectives are twofold. First, to ensure the provision of open space between the Irvine Creek Ravine and, secondly, to provide public access to the Irvine Creek Ravine system. The Irvine Creek Ravine top-of-bank development provides a valuable amenity for the neighbourhood by providing a variety of passive and active recreational opportunities for the neighbourhood's residents.

Agree	Neither Agree or Disagree	Disagree
√√√√√√√	√	

If disagree, please explain why:

6. The proposed plan preserves and integrates natural areas through the use of municipal reserve, environmental reserve, and integrated storm water management facilities.

Agree	Neither Agree or Disagree	Disagree
√√√√√√√	√	

If disagree, please explain why:

7. <u>Please indicate which one of the following most closely applies to you:</u>

a) Resident landowner within East Vistas LASP area	√√√
b) Non-resident landowner within East Vistas LASP area	
c) Developer/Consultant representing lands in the East Vistas LASP area	√√√
d) Local Resident outside of East Vistas LASP area	√

e) Other:

√ **Edmonton Resident**

8. Please provide any additional comments that you have regarding this Proposed Amendment and Development Concept.

- *"I think more pedestrian connections to the ravine area should be added; and that an attempt to break up the long road straight-aways should be made."*
- *"Looking forward to this development. It will help in getting the area more approachable, especially the Irvine Creek accessibility. Walking trails are something I would definitely look forward to, somehow there is history* [hard to decipher handwriting] *in the area.*

Appendix C

Detailed Sanitary Sewer Calculations

PRELIMINARY SANITARY SEWER DESIGN CALCULATION

PROJECT: **Irvine Creek Outline Plan**
JOB # : 134001
DATE: 23-Dec-16
DESIGN BY: C.S.
CHECKED BY: A.L.
REVISED BY: C.S.
REVISED DATE: 19-Jan-17

Per Capita Flow =	320	L/c/d			
Low Density Residential (LD) =	5	DU/ha	3.5	P/DU	18 P/ha
Medium Density Residential (MD) =	12	DU/ha	3.5	P/DU	42 P/ha
Higher Density Residential (HD) =	24	DU/ha	3.5	P/DU	84 P/ha
Multi Dwelling Residential(MDR)=	95	DU/ha	3.5	P/DU	333 P/ha

Peaking Factor = 2.6[(P/1000)^(-0.1(minimum 3.0)
Inflow/Infiltration Allowance = 0.28 L/s/ha
Sag Manhole Allowance = 0.40 L/s/MH
Manning's "n" = 0.013

Non-Residential Flows: (Commercial/Industrial&Institutional)
Sewage Generation= 0.79 L/s/ha (68 m³/ha/day)
Peaking Factor = 10*(Q)^(-0.45) (Min=2.5, Max=25)

Densities are taken from the East Vistas Local Area Structure Plan (September 2, 2010)
All data/calculations subject to change, and is subject to detailed design and review at the time of engineering drawing submission(s) to Leduc County

Notes	From	To	Area	Added Res.	Total Res.	Added Non-Res.	Total Non-Res.	Res. Lots Added	Land Use	Population Added	Population Total	Residential Average	Residential Peaking	Non-Residential Average	Non-Residential Peaking	Total Peak Flow	Inflow/ Infilt.	Added Sag	Total Sag	Sag MH Inflow	Design Flow	Pipe Length	Pipe Size	Pipe Slope	**Req'd Cap.**	**Pipe Cap.**	**Partial Velocity**	Full Vel.	U/S Inv	D/S Inv	U/S Road	U/S Road Depth to Inv
	MH	MH	#	Area (ha)	Area (ha)	Area (ha)	Area (ha)	(if known)				Flow (L/s)	Factor	Flow (L/s)	Factor	(L/s)	(L/s)	MH	MH	(L/s)	(L/s)	(m)	(mm)	(%)	**(L/s)**	**(L/s)**	**(m/s)**	(m/s)	Elev	Elev	Elev (LOG)	(m)
	S43A	S43	D3	1.31	1.31	0.00	0.00		LD	24	24	0.09	3.78	0.00	0.00	0.3	0.4	0	0	0.0	0.70	43.000	200	1.00	**0.8**	**32.7**	0.42	1.04	702.450	702.020	705.42	2.97
	S45	S44	D2	1.08	1.08	0.00	0.00		LD	19	19	0.07	3.86	0.00	0.00	0.3	0.3	0	0	0.0	0.60	37.000	200	0.80	**0.7**	**29.2**	0.37	0.93	702.888	702.592	705.83	2.94
	S44	S43	D1	0.52	1.60	0.00	0.00		LD	9	28	0.10	3.72	0.00	0.00	0.4	0.4	0	0	0.0	0.80	128.000	200	0.40	**0.9**	**20.7**	0.32	0.66	702.532	702.020	705.47	2.94
	S43	S42	D4	0.63	3.54	0.00	0.00		LD	11	63	0.23	3.43	0.00	0.00	0.8	1.0	1	1	0.4	2.20	93.000	200	0.40	**2.6**	**20.7**	0.43	0.66	701.960	701.588	704.98	3.02
	S42	S39	C11	1.01	4.55	0.00	0.00		LD/MD	30	93	0.34	3.30	0.00	0.00	1.1	1.3	1	2	0.8	3.20	81.000	200	0.40	**3.7**	**20.7**	0.48	0.66	701.558	701.234	704.93	3.37
	S38	S39	C9	1.29	1.29	0.00	0.00		LD / MD	39	39	0.14	3.60	0.00	0.00	0.5	0.4	0	0	0.0	0.90	120.000	200	0.80	**1.0**	**29.2**	0.42	0.93	702.194	701.234	705.31	3.12
	S39	S35	C8	0.22	6.06	0.00	0.00		MD	9	141	0.52	3.16	0.00	0.00	1.6	1.7	0	2	0.8	4.10	109.000	200	0.40	**4.8**	**20.7**	0.51	0.66	701.174	700.738	704.83	3.66
	S41	S40	C10	1.05	1.05	0.00	0.00		MD	44	44	0.16	3.55	0.00	0.00	0.6	0.3	0	0	0.0	0.90	79.000	200	1.00	**1.0**	**32.7**	0.46	1.04	703.293	702.503	706.24	2.95
	S40	S35	C6	0.65	1.70	0.00	0.00		MD	27	71	0.26	3.39	0.00	0.00	0.9	0.5	0	0	0.0	1.40	67.000	200	2.50	**1.6**	**51.8**	0.72	1.65	702.443	700.768	706.28	3.84
	S35A	S35	C7	0.93	0.93	0.00	0.00		MD	39	39	0.14	3.60	0.00	0.00	0.5	0.3	0	0	0.0	0.80	41.000	200	2.00	**0.9**	**46.5**	0.56	1.48	701.788	700.968	704.88	3.09
	S35	S34	C5	0.35	9.04	0.00	0.00		MD	15	266	0.99	3.00	0.00	0.00	3.0	2.5	0	2	0.8	6.30	109.000	200	0.40	**7.3**	**20.7**	0.58	0.66	700.708	700.272	704.61	3.90
	S34A	S34	C4	0.94	0.94	0.00	0.00		MD	39	39	0.14	3.60	0.00	0.00	0.5	0.3	0	0	0.0	0.80	61.000	200	3.00	**0.9**	**56.9**	0.65	1.81	702.132	700.302	705.82	3.69
	S34	S26	B32	0.44	10.42	0.00	0.00		MD	18	323	1.20	3.00	0.00	0.00	3.6	2.9	0	2	0.8	7.30	96.000	200	0.40	**8.5**	**20.7**	0.60	0.66	700.242	699.858	704.00	3.76
	S31	S32	B26	0.79	0.79	0.00	0.00		MD	33	33	0.12	3.66	0.00	0.00	0.4	0.2	0	0	0.0	0.60	80.000	200	0.80	**0.7**	**29.2**	0.37	0.93	701.007	700.367	703.93	2.92
	S32	S33	B30	0.78	1.57	0.00	0.00		MD	33	66	0.24	3.41	0.00	0.00	0.8	0.4	1	1	0.4	1.60	79.000	200	0.40	**1.9**	**20.7**	0.39	0.66	700.307	699.991	703.35	3.04
	S33	S27	B29	0.74	2.31	0.00	0.00		MD	31	97	0.36	3.28	0.00	0.00	1.2	0.6	0	1	0.4	2.20	88.000	200	0.40	**2.6**	**20.7**	0.43	0.66	699.931	699.579	703.30	3.37
	S31	S30	B25	0.65	0.65	0.00	0.00		MD	27	27	0.10	3.73	0.00	0.00	0.4	0.2	0	0	0.0	0.60	80.000	200	0.80	**0.7**	**29.2**	0.37	0.93	700.837	700.197	703.93	3.09
	S36	S30	B21	0.31	0.31	0.00	0.00		MD	13	13	0.05	4.01	0.00	0.00	0.2	0.1	0	0	0.0	0.30	90.000	200	2.00	**0.3**	**46.5**	0.42	1.48	701.967	700.167	704.93	2.96
	S30	S29	B20	0.72	1.68	0.00	0.00		MD	30	70	0.26	3.39	0.00	0.00	0.9	0.5	0	0	0.0	1.40	122.000	200	0.40	**1.6**	**20.7**	0.38	0.66	700.137	699.649	703.90	3.76
	S29A	S29	B27	0.61	0.61	0.00	0.00		MD	26	26	0.10	3.75	0.00	0.00	0.4	0.2	0	0	0.0	0.60	31.000	200	2.00	**0.7**	**46.5**	0.51	1.48	700.299	699.679	703.71	3.41
	S29	S28	B19	0.18	2.47	0.00	0.00		MD	8	104	0.39	3.26	0.00	0.00	1.3	0.7	0	0	0.0	2.00	56.000	200	0.40	**2.3**	**20.7**	0.42	0.66	699.619	699.395	703.54	3.92
	S23	S24A	C1	1.00	1.00	0.00	0.00		MD	42	42	0.16	3.57	0.00	0.00	0.6	0.3	0	0	0.0	0.90	120.000	200	0.85	**1.0**	**30.2**	0.43	0.96	701.702	700.682	704.71	3.01
	S24A	S24	C2	0.39	1.39	0.00	0.00		MD	16	58	0.21	3.46	0.00	0.00	0.7	0.4	0	0	0.0	1.10	24.000	200	0.40	**1.3**	**20.7**	0.35	0.66	700.382	700.286	704.35	3.97
	S24	S26	C3	0.78	2.17	0.00	0.00		MD	33	91	0.34	3.30	0.00	0.00	1.1	0.6	0	0	0.0	1.70	107.000	200	0.40	**2.0**	**20.7**	0.40	0.66	700.256	699.828	704.20	3.94
	S26	S27	B31	0.16	12.75	0.00	0.00		MD	7	421	1.56	3.00	0.00	0.00	4.7	3.6	1	3	1.2	9.50	89.000	**250**	0.28	**11.0**	**31.4**	0.56	0.64	699.798	699.549	702.70	2.90
	S27	S28	B28	0.08	15.14	0.00	0.00		MD	3	521	1.93	3.00	0.00	0.00	5.8	4.2	0	4	1.6	11.60	44.000	**250**	0.28	**13.5**	**31.4**	0.59	0.64	699.519	699.395	703.25	3.73
	S28	S25	B18	1.09	18.70	0.00	0.00		MD	46	671	2.49	3.00	0.00	0.00	7.5	5.2	1	5	2.0	14.70	123.000	**250**	0.28	**17.1**	**31.4**	0.63	0.64	699.335	698.991	702.98	3.64
	S25	S16	B16	0.74	19.44	0.00	0.00		MD	31	702	2.60	3.00	0.00	0.00	7.8	5.4	0	5	2.0	15.20	90.000	**250**	0.28	**17.7**	**31.4**	0.64	0.64	698.931	698.679	703.85	4.92
	S38	S37	B24	1.17	1.17	0.00	0.00		LD / MD	35	35	0.13	3.64	0.00	0.00	0.5	0.3	0	0	0.0	0.80	105.000	200	1.00	**0.9**	**32.7**	0.44	1.04	701.987	700.937	705.31	3.32
	S37	S36	B23	1.14	2.31	0.00	0.00		LD / MD	34	69	0.26	3.40	0.00	0.00	0.9	0.6	1	1	0.4	1.90	105.000	200	0.40	**2.2**	**20.7**	0.41	0.66	700.907	700.487	705.29	4.38
	S36	S19	B22	1.19	3.50	0.00	0.00		LD / MD	36	105	0.39	3.26	0.00	0.00	1.3	1.0	0	1	0.4	2.70	94.000	200	0.40	**3.1**	**20.7**	0.46	0.66	700.457	700.081	704.93	4.47
	S19	S18	B9	1.29	4.79	0.00	0.00		LD / MD	39	144	0.53	3.16	0.00	0.00	1.7	1.3	0	1	0.4	3.40	118.000	200	0.40	**4.0**	**20.7**	0.49	0.66	700.021	699.549	704.09	4.07
	S18	S17	B8	1.11	5.90	0.00	0.00		LD / MD	33	177	0.66	3.09	0.00	0.00	2.0	1.7	0	1	0.4	4.10	118.000	200	0.40	**4.8**	**20.7**	0.51	0.66	699.519	699.047	703.85	4.33
	S17A	S17	B17	0.65	0.65	0.00	0.00		MD	27	27	0.10	3.73	0.00	0.00	0.4	0.2	0	0	0.0	0.60	39.000	200	3.00	**0.7**	**56.9**	0.59	1.81	700.247	699.077	703.88	3.63
	S17	S16	B7	0.65	7.20	0.00	0.00		LD / MD	20	224	0.83	3.02	0.00	0.00	2.5	2.0	1	2	0.8	5.30	92.000	200	0.40	**6.2**	**20.7**	0.55	0.66	699.017	698.649	703.65	4.63
	S16	S15	B6	0.74	27.38	0.00	0.00		LD / MD	22	948	3.51	3.00	0.00	0.00	10.5	7.7	1	8	3.2	21.40	84.000	**250**	0.28	**24.9**	**31.4**	0.69	0.64	698.619	698.384	703.62	5.00
	S15	S14	B5	0.72	28.10	0.00	0.00		MD	30	978	3.62	3.00	0.00	0.00	10.9	7.9	0	8	3.2	22.00	84.000	**250**	0.28	**25.6**	**31.4**	0.69	0.64	698.354	698.119	703.57	5.22
	S14A	S14	B12	0.47	0.47	0.00	0.00		MD	20	20	0.07	3.84	0.00	0.00	0.3	0.1	0	0	0.0	0.40	25.000	200	4.00	**0.5**	**65.7**	0.58	2.09	699.149	698.149	703.95	4.80
	S14	S13	B4	0.68	29.25	0.00	0.00		LD	12	1010	3.74	3.00	0.00	0.00	11.2	8.2	0	8	3.2	22.60	96.000	**250**	0.28	**26.3**	**31.4**	0.70	0.64	698.089	697.820	703.80	5.71
	S23	S22	B15	0.94	0.94	0.00	0.00		MD	39	39	0.14	3.60	0.00	0.00	0.5	0.3	0	0	0.0	0.80	99.000	200	0.40	**0.9**	**20.7**	0.32	0.66	699.398	699.002	704.37	4.97
	S22	S21	B14	0.80	1.74	0.00	0.00		MD	34	73	0.27	3.38	0.00	0.00	0.9	0.5	0	0	0.0	1.40	92.000	200	0.40	**1.6**	**20.7**	0.38	0.66	698.972	698.604	704.61	5.64
	S21	S20	B13	0.79	2.53	0.00	0.00		MD	33	106	0.39	3.25	0.00	0.00	1.3	0.7	0	0	0.0	2.00	93.000	200	0.40	**2.3**	**20.7**	0.42	0.66	698.574	698.202	704.45	5.88
	S20	S13	B11	0.67	3.20	0.00	0.00		MD	28	134	0.50	3.18	0.00	0.00	1.6	0.9	1	1	0.4	2.90	73.000	200	0.40	**3.4**	**20.7**	0.47	0.66	698.142	697.850	703.90	5.76
	S13	S12	B3	0.39	32.84	0.00	0.00		MD	16	1160	4.30	3.00	0.00	0.00	12.9	9.2	1	10	4.0	26.10	56.000	**250**	0.28	**30.3**	**31.4**	0.72	0.64	697.790	697.633	703.74	5.95
	S11B	S11	B1	0.34	0.34	0.00	0.00		LD	6	6	0.02	4.34	0.00	0.00	0.1	0.1	0	0	0.0	0.20	37.000	200	1.00	**0.2**	**32.7**	0.29	1.04	698.753	698.383	703.28	4.53

PRELIMINARY SANITARY SEWER DESIGN CALCULATION

PROJECT: **Irvine Creek Outline Plan**
JOB # : 134001
DATE: 23-Dec-16
DESIGN BY: C.S.
CHECKED BY: A.L.
REVISED BY: C.S.
REVISED DATE: 19-Jan-17

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Multi Dwelling Residential(MDR)=	95	DU/ha	3.5	P/DU	333 P/ha

Peaking Factor = 2.6[(P/1000)^(-0.1(minimum 3.0)
Inflow/Infiltration Allowance = 0.28 L/s/ha
Sag Manhole Allowance = 0.40 L/s/MH
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Sewage Generation= 0.79 L/s/ha (68 m³/ha/day)
Peaking Factor = 10*(Q)^(-0.45) (Min=2.5, Max=25)

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All data/calculations subject to change, and is subject to detailed design and review at the time of engineering drawing submission(s) to Leduc County

Notes	From MH	To MH	Area #	Added Res. Area (ha)	Total Res. Area (ha)	Added Non-Res. Area (ha)	Total Non-Res. Area (ha)	Res. Lots Added (if known)	Land Use	Population Added	Population Total	Residential Average Flow (L/s)	Residential Peaking Factor	Non-Residential Average Flow (L/s)	Non-Residential Peaking Factor	Total Peak Flow (L/s)	Inflow/ Infilt. (L/s)	Added Sag MH	Total Sag MH	Sag MH Inflow (L/s)	Design Flow (L/s)	Pipe Length (m)	Pipe Size (mm)	Pipe Slope (%)	**Req'd Cap. (L/s)**	**Pipe Cap. (L/s)**	**Partial Velocity (m/s)**	Full Vel. (m/s)	U/S Inv Elev	D/S Inv Elev	U/S Road Elev (LOG)	U/S Road Depth to Inv (m)
	S11A	S11	B10	0.97	0.97	0.00	0.00		MD	41	41	0.15	3.58	0.00	0.00	0.5	0.3	0	0	0.0	0.80	65.000	200	2.00	**0.9**	**46.5**	0.56	1.48	699.713	698.413	704.16	4.45
	S11	S12	B2	0.27	1.58	0.00	0.00		-	11	58	0.21	3.46	0.00	0.00	0.7	0.4	0	0	0.0	1.10	36.000	200	2.00	**1.3**	**46.5**	0.62	1.48	698.353	697.633	703.99	5.64
	S12	ACRWC MH2	-	0.00	34.42	0.00	0.00		-	0	1218	4.51	3.00	0.00	0.00	13.5	9.6	1	11	4.4	27.50	81.000	**250**	0.30	**32.0**	**32.4**	0.74	0.66	697.573	697.330	703.78	6.21

Appendix D

Detailed Storm Sewer Calculations

PRELIMINARY ON-SITE STORM SEWER DESIGN SHEET FOR 1:5 YEAR EVENT

PROJECT: **Irvine Creek Outline Plan**
JOB # : 134001
DATE: 23-Dec-16
DESIGN BY: C.S.
CHECKED BY: A.L
REVISED BY: C.S.
REVISED DATE: 19-Jan-17

LAND USE	"C"
Medium Density	0.50
High Density	0.65
Multi-Family	0.65
Commercial	0.90
Landscape	0.20

(County min. = 0.35)

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Mannings' 'n' = 0.013

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Location of Line	From MH	To MH	Incr. Area #	Added Area (ha)	Total Area Added (ha)	Runoff Factor "C"	Equiv. Area (ha)	Total Eq. Area (ha)	Conc. Time,Tc (min)	5 yr I (mm/h)	Calculated Flow,Q (L/s)	Trunk Safety Factor	**Design Flow (L/s)**	Slope (%)	Actual Dia. (mm)	**Nominal Dia. (mm)**	**Vel. (m/s)**	Length (m)	Flow Time (min)	**Pipe Capacity (L/s)**	U/S Inv Elev	D/S Inv Elev	U/S Grnd Elev	U/S Cover To OBV (m)
	D43A	D43	FD	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					0.000			0.000	8.0	72.0	0	1.00	**0**	0.40	200	200	**0.66**	70.000	1.8	21	702.591	702.311	705.47	2.68
	D45	D44	C1	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.49	0.490	0.650	0.319	0.319																
				0.00	0.000	0.900	0.000	0.000																
					0.490			0.319	8.0	72.0	64	1.00	**64**	0.40	365	375	**0.99**	84.000	1.4	103	702.757	702.421	705.83	2.70
	D44	D43	C2	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.59	1.080	0.650	0.384	0.702																
				0.00	0.000	0.900	0.000	0.000																
					1.080			0.702	9.4	67.0	131	1.00	**131**	0.50	448	450	**1.26**	117.000	1.5	199	702.346	701.761	705.47	2.67
	D43	D42	C3	0.00	0.000	0.200	0.000	0.000																
				2.12	2.120	0.500	1.060	1.060																
				0.00	1.080	0.650	0.000	0.702																
				0.00	0.000	0.900	0.000	0.000																
					3.200			1.762	10.9	63.0	309	1.00	**309**	0.60	527	525	**1.54**	117.000	1.3	337	701.686	700.984	705.01	2.80
	D42	D39	B29	0.00	0.000	0.200	0.000	0.000																
				0.92	3.040	0.500	0.460	1.520																
				0.00	1.080	0.650	0.000	0.702																
				0.00	0.000	0.900	0.000	0.000																
					4.120			2.222	12.2	59.0	364	1.00	**364**	0.80	527	525	**1.78**	95.000	0.9	388	700.984	700.224	705.08	3.57
	D38	D39	B31	0.00	0.000	0.200	0.000	0.000																
				0.67	0.670	0.500	0.335	0.335																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					0.670			0.335	8.0	72.0	67	1.00	**67**	1.00	298	300	**1.36**	122.000	1.5	95	701.669	700.449	705.31	3.34
	D39	D35	B30	0.00	0.000	0.200	0.000	0.000																
				1.18	4.890	0.500	0.590	2.445																
				0.00	1.080	0.650	0.000	0.702																
				0.00	0.000	0.900	0.000	0.000																
					5.970			3.147	13.1	57.0	499	1.00	**499**	0.25	762	750	**1.27**	104.000	1.4	581	699.999	699.739	704.83	4.08
	D35A	D35	FD	0.00	0.000	0.200	0.000	0.000																

PRELIMINARY ON-SITE STORM SEWER DESIGN SHEET FOR 1:5 YEAR EVENT

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				0.00	0.000	0.500	0.000	0.000																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					0.000			0.000	8.0	72.0	0	1.00	**0**	2.00	200	200	**1.48**	41.000	0.5	46	701.109	700.289	704.88	3.57
	D41	D40	FD	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					0.000			0.000	8.0	72.0	0	1.00	**0**	0.80	200	200	**0.93**	78.000	1.4	29	703.153	702.529	706.42	3.07
	D40	D35	B28	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				1.00	1.000	0.650	0.650	0.650																
				0.00	0.000	0.900	0.000	0.000																
					1.000			0.650	9.4	67.0	121	1.00	**121**	2.00	298	300	**1.93**	67.000	0.6	134	702.429	701.089	706.28	3.55
	D35	D34	B27	0.00	0.000	0.200	0.000	0.000																
				0.00	4.890	0.500	0.000	2.445																
				1.72	3.800	0.650	1.118	2.470																
				0.00	0.000	0.900	0.000	0.000																
					8.690			4.915	14.5	54.0	738	1.00	**738**	0.65	762	750	**2.05**	102.000	0.8	936	699.739	699.076	704.61	4.12
	D34A	D34	FD	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					0.000			0.000	8.0	72.0	0	1.00	**0**	3.00	200	200	**1.81**	61.000	0.6	57	701.456	699.626	705.82	4.16
	D34	D26	B26	0.00	0.000	0.200	0.000	0.000																
				0.00	4.890	0.500	0.000	2.445																
				0.90	4.700	0.650	0.585	3.055																
				0.00	0.000	0.900	0.000	0.000																
					9.590			5.500	15.3	53.0	810	1.00	**810**	0.60	762	750	**1.97**	96.000	0.8	900	699.076	698.500	704.00	4.17
	D23	D24A	B13	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.40	0.400	0.650	0.260	0.260																
				0.00	0.000	0.900	0.000	0.000																
					0.400			0.260	8.0	72.0	52	1.00	**52**	0.50	298	300	**0.96**	124.000	2.1	67	701.345	700.725	704.71	3.07
	D24A	D24	-	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.00	0.400	0.650	0.000	0.260																

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				0.00	0.000	0.900	0.000	0.000																
					0.400			0.260	8.0	72.0	52	1.00	**52**	2.50	298	300	**2.15**	29.000	0.2	150	700.665	699.940	704.35	3.39
	CB	D24B	B33	0.34	0.340	0.200	0.068	0.068																
		CBMH		0.00	0.000	0.500	0.000	0.000																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					0.340			0.068	8.0	72.0	14	1.00	**14**	1.00	251	250	**1.22**	45.000	0.6	60	700.920	700.470	703.50	2.33
	D24B	D24	B34	0.18	0.520	0.200	0.036	0.104																
	CBMH			0.00	0.000	0.500	0.000	0.000																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					0.520			0.104	8.6	70.0	20	1.00	**20**	1.00	298	300	**1.36**	48.000	0.6	95	700.420	699.940	704.18	3.46
	D24	D26	-	0.00	0.520	0.200	0.000	0.104																
				0.00	0.000	0.500	0.000	0.000																
				0.00	0.400	0.650	0.000	0.260																
				0.00	0.000	0.900	0.000	0.000																
					0.920			0.364	10.1	65.0	66	1.00	**66**	1.00	365	375	**1.56**	99.000	1.1	163	699.865	698.875	704.20	3.96
	D26	SWMF 1	B25	0.00	0.520	0.200	0.000	0.104																
		INLET 2		0.00	4.890	0.500	0.000	2.445																
				1.62	6.720	0.650	1.053	4.368																
				0.00	0.000	0.900	0.000	0.000																
					12.130			6.917	16.1	51.0	981	1.00	**981**	1.20	762	750		25.000		1272	698.500	698.200	702.70	3.45
	D31	D32	B20	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.45	0.450	0.650	0.293	0.293																
				0.00	0.000	0.900	0.000	0.000																
					0.450			0.293	8.0	72.0	59	1.00	**59**	0.60	298	300	**1.06**	80.000	1.3	74	699.865	699.385	703.82	3.66
	D32	D33	B19	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.78	1.230	0.650	0.507	0.800																
				0.00	0.000	0.900	0.000	0.000																
					1.230			0.800	9.3	68.0	151	1.00	**151**	0.35	448	450	**1.06**	79.000	1.2	167	699.235	698.958	703.21	3.52
	D33	D27	B18	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.71	1.940	0.650	0.462	1.261																
				0.00	0.000	0.900	0.000	0.000																

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					1.940			1.261	10.5	64.0	224	1.00	**224**	0.35	527	525	**1.18**	88.000	1.2	257	698.883	698.575	703.00	3.59
	D31	D30	FD	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					0.000			0.000	9.3	68.0	0	1.00	**0**	0.40	200	200	**0.66**	80.000	2.0	21	700.912	700.592	703.82	2.71
	D36	D30		0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					0.000			0.000	8.0	72.0	0	1.00	**0**	1.00	298	300	**1.36**	90.000	1.1	95	701.092	700.192	704.93	3.54
	D30	D29	B21	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.51	0.510	0.650	0.332	0.332																
				0.00	0.000	0.900	0.000	0.000																
					0.510			0.332	11.3	62.0	57	1.00	**57**	0.60	365	375	**1.21**	122.000	1.7	126	700.117	699.385	703.90	3.41
	D29A	D29	FD	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					0.000			0.000	8.0	72.0	0	1.00	**0**	2.00	200	200	**1.48**	31.000	0.4	46	700.670	700.050	703.71	2.84
	D29	D28	B16	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				1.34	1.850	0.650	0.871	1.203																
				0.00	0.000	0.900	0.000	0.000																
					1.850			1.203	13.0	57.0	191	1.00	**191**	0.60	448	450	**1.38**	56.000	0.7	218	699.250	698.914	703.54	3.84
	D25	D28	FD	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					0.000			0.000	8.0	72.0	0	1.00	**0**	1.00	200	200	**1.04**	123.000	2.0	33	701.044	699.814	703.85	2.61
	D28	D27	B15	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.55	2.400	0.650	0.358	1.560																
				0.00	0.000	0.900	0.000	0.000																
					2.400			1.560	13.7	56.0	243	1.00	**243**	0.60	527	525	**1.54**	44.000	0.5	337	698.839	698.575	702.98	3.62

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	D27	SWMF 1	B17	0.00	0.000	0.200	0.000	0.000																
		INLET 3		0.00	0.000	0.500	0.000	0.000																
				0.88	5.220	0.650	0.572	3.393																
				0.00	0.000	0.900	0.000	0.000																
					5.220			3.393	14.2	55.0	519	1.00	**519**	0.75	597	600	**1.87**	40.000	0.4	525	698.500	698.200	703.25	4.15
	D38	D37A	FD	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					0.000			0.000	8.0	72.0	0	1.00	**0**	0.45	200	200	**0.70**	40.000	1.0	22	702.416	702.236	705.43	2.81
	D37A	D37	B24	0.00	0.000	0.200	0.000	0.000																
				0.95	0.950	0.500	0.475	0.475																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					0.950			0.475	9.0	69.0	91	1.00	**91**	0.45	365	375	**1.05**	67.000	1.1	109	702.061	701.759	704.96	2.52
	D37	D36	B23	0.00	0.000	0.200	0.000	0.000																
				0.90	1.850	0.500	0.450	0.925																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					1.850			0.925	10.1	65.0	167	1.00	**167**	0.45	448	450	**1.20**	105.000	1.5	189	701.684	701.211	705.29	3.16
	D36	D19	B22	0.00	0.000	0.200	0.000	0.000																
				0.46	2.310	0.500	0.230	1.155																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					2.310			1.155	11.6	61.0	196	1.00	**196**	0.60	448	450	**1.38**	94.000	1.1	218	701.181	700.617	704.93	3.30
	D19	D18	B9	0.00	0.000	0.200	0.000	0.000																
				1.78	4.090	0.500	0.890	2.045																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					4.090			2.045	12.7	58.0	330	1.00	**330**	0.40	597	600	**1.37**	118.000	1.4	383	700.467	699.995	704.09	3.02
	D18	D17	B8	0.00	0.000	0.200	0.000	0.000																
				0.83	4.920	0.500	0.415	2.460																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					4.920			2.460	14.1	55.0	376	1.00	**376**	0.20	762	750	**1.14**	118.000	1.7	519	699.845	699.609	703.85	3.26
	D17A	D17	FD	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																

PRELIMINARY ON-SITE STORM SEWER DESIGN SHEET FOR 1:5 YEAR EVENT

PROJECT: **Irvine Creek Outline Plan**
JOB # : 134001
DATE: 23-Dec-16
DESIGN BY: C.S.
CHECKED BY: A.L
REVISED BY: C.S.
REVISED DATE: 19-Jan-17

LAND USE	"C"	
Medium Density	0.50	
High Density	0.65	
Multi-Family	0.65	(County min. = 0.35)
Commercial	0.90	
Landscape	0.20	

Initial Time of Concentration = 8.0 min
Mannings' 'n' = 0.013

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Location of Line	From MH	To MH	Incr. Area #	Added Area (ha)	Total Area Added (ha)	Runoff Factor "C"	Equiv. Area (ha)	Total Eq. Area (ha)	Conc. Time,Tc (min)	5 yr I (mm/h)	Calculated Flow,Q (L/s)	Trunk Safety Factor	**Design Flow (L/s)**	Slope (%)	Actual Dia. (mm)	**Nominal Dia. (mm)**	**Vel. (m/s)**	Length (m)	Flow Time (min)	**Pipe Capacity (L/s)**	U/S Inv Elev	D/S Inv Elev	U/S Grnd Elev	U/S Cover To OBV (m)
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					0.000			0.000	8.0	72.0	0	1.00	**0**	1.00	200	200	**1.04**	39.000	0.6	33	700.519	700.129	703.88	3.16
	D17	D16	B7	0.00	0.000	0.200	0.000	0.000																
				1.05	5.970	0.500	0.525	2.985																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					5.970			2.985	15.8	52.0	432	1.00	**432**	0.20	762	750	**1.14**	92.000	1.3	519	699.579	699.395	703.65	3.32
	D25	D16	B14	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.77	0.770	0.650	0.501	0.501																
				0.00	0.000	0.900	0.000	0.000																
					0.770			0.501	8.0	72.0	100	1.00	**100**	0.80	365	375	**1.40**	90.000	1.1	146	700.040	699.320	703.85	3.44
	D16	D15	B6	0.00	0.000	0.200	0.000	0.000																
				0.43	6.400	0.500	0.215	3.200																
				0.00	0.770	0.650	0.000	0.501																
				0.00	0.000	0.900	0.000	0.000																
					7.170			3.701	17.1	50.0	514	1.00	**514**	0.20	762	750	**1.14**	49.000	0.7	519	698.945	698.847	703.62	3.92
	D23	D22		0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					0.000			0.000	8.0	72.0	0	1.00	**0**	0.40	298	300	**0.86**	99.000	1.9	60	700.928	700.532	704.37	3.14
	D22	D21	B12	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.30	0.300	0.650	0.195	0.195																
				0.00	0.000	0.900	0.000	0.000																
					0.300			0.195	9.9	66.0	36	1.00	**36**	0.30	298	300	**0.75**	92.000	2.1	52	700.502	700.226	704.61	3.81
	D21	D20	B11	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.32	0.620	0.650	0.208	0.403																
				0.00	0.000	0.900	0.000	0.000																
					0.620			0.403	12.0	60.0	67	1.00	**67**	0.20	448	450	**0.80**	93.000	1.9	126	700.016	699.830	704.45	3.98
	D20	D13	B10	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.85	1.470	0.650	0.553	0.956																
				0.00	0.000	0.900	0.000	0.000																

PRELIMINARY ON-SITE STORM SEWER DESIGN SHEET FOR 1:5 YEAR EVENT

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Landscape	0.20

(County min. = 0.35)

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					1.470			0.956	13.9	55.0	146	1.00	**146**	0.20	527	525	**0.89**	73.000	1.4	194	699.695	699.549	703.90	3.68
	D11A	D11	B32	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.55	0.550	0.650	0.358	0.358																
				0.00	0.000	0.900	0.000	0.000																
					0.550			0.358	8.0	72.0	72	1.00	**72**	1.00	298	300	**1.36**	69.000	0.8	95	700.618	699.928	704.16	3.24
	D6	D11	FD	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					0.000			0.000	8.0	72.0	0	1.00	**0**	0.40	200	200	**0.66**	47.000	1.2	21	700.216	700.028	703.28	2.86
	D11	D12	-	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.00	0.550	0.650	0.000	0.358																
				0.00	0.000	0.900	0.000	0.000																
					0.550			0.358	9.2	68.0	68	1.00	**68**	0.20	448	450	**0.80**	34.000	0.7	126	699.778	699.710	703.99	3.76
	Ditch Inlet 1	D12	D2	5.06	5.060	0.200	1.012	1.012																
				0.00	0.000	0.500	0.000	0.000																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					5.060			1.012	8.0	72.0	203	1.00	**203**	2.20	762	750	**3.78**	75.000	0.3	1722	701.060	699.410	701.81	
	D12	D13	B1	0.00	5.060	0.200	0.000	1.012																
				0.00	0.000	0.500	0.000	0.000																
				0.41	0.960	0.650	0.267	0.624																
				0.00	0.000	0.900	0.000	0.000																
					6.020			1.636	9.9	66.0	300	1.00	**300**	0.20	914	900	**1.29**	58.000	0.8	844	699.260	699.144	703.99	3.83
	D13	D14	B2	0.00	5.060	0.200	0.000	1.012																
				0.60	0.600	0.500	0.300	0.300																
				0.00	2.430	0.650	0.000	1.580																
				0.00	0.000	0.900	0.000	0.000																
					8.090			2.892	15.3	53.0	426	1.00	**426**	0.25	914	900	**1.44**	96.000	1.1	943	699.114	698.874	703.74	3.73
	D14A	D14	FD	0.00	0.000	0.200	0.000	0.000																
				0.00	0.000	0.500	0.000	0.000																
				0.00	0.000	0.650	0.000	0.000																
				0.00	0.000	0.900	0.000	0.000																
					0.000			0.000	8.0	72.0	0	1.00	**0**	2.00	200	200	**1.48**	25.000	0.3	46	700.074	699.574	703.95	3.68

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	D14	D14B	B3	0.00	5.060	0.200	0.000	1.012																
				0.00	0.600	0.500	0.000	0.300																
				0.52	2.950	0.650	0.338	1.918																
				0.00	0.000	0.900	0.000	0.000																
					8.610			3.230	16.4	51.0	458	1.00	**458**	0.15	1067	1050	**1.24**	50.000	0.7	1104	698.724	698.649	703.80	4.03
	D14B	D15	B4	0.00	5.060	0.200	0.000	1.012																
				0.33	0.930	0.500	0.165	0.465																
				0.00	2.950	0.650	0.000	1.918																
				0.00	0.000	0.900	0.000	0.000																
					8.940			3.395	17.1	50.0	472	1.00	**472**	0.15	1067	1050	**1.24**	68.000	0.9	1104	698.619	698.517	703.62	3.95
	D15	D15A	B5	0.00	5.060	0.200	0.000	1.012																
				0.36	7.690	0.500	0.180	3.845																
				0.00	3.720	0.650	0.000	2.418																
				0.00	0.000	0.900	0.000	0.000																
					16.470			7.275	17.8	49.0	991	1.00	**991**	0.15	1067	1050	**1.24**	118.000	1.6	1104	698.487	698.310	703.57	4.03
	D15A	SWMF 1	-	0.00	5.060	0.200	0.000	1.012																
		INLET 1		0.00	7.690	0.500	0.000	3.845																
				0.00	3.720	0.650	0.000	2.418																
				0.00	0.000	0.900	0.000	0.000																
					16.470			7.275	17.8	49.0	991	1.00	**991**	0.25	1067	1050		20.000		1425	698.250	698.200	701.60	2.30