LETHBRIDGE COUNTY
IN THE PROVINCE OF ALBERTA

BYLAW NO. 22-009

A BYLAW OF LETHBRIDGE COUNTY BEING A BYLAW PURSUANT TO SECTION 633(1) OF THE MUNICIPAL GOVERNMENT ACT, REVISED STATUTES OF ALBERTA 2000, CHAPTER M.26

WHEREAS the landowners wish to develop lands within Plan 927LK, Block 1, Lots 1 and 2, and Plan 8010198, Block 2, Lot 1, and portion of NW 28-9-21-W4;

AND WHEREAS the County's Municipal Development Plan and the Lethbridge County and City of Lethbridge Intermunicipal Development Plan requires that developers prepare an Area Structure Plan to ensure sound development occurs within Lethbridge County;

AND WHEREAS the total area considered by the Area Structure Plan is approximately 80 acres (32.3 hectares);

AND WHEREAS the landowner/developer have prepared the "MacLaine Acres Area Structure Plan" which contains engineering, survey, and geotechnical information to support the above conditions.

NOW THEREFORE BE IT RESOLVED, under the Authority and subject to the provisions of the Municipal Government Act, Revised Statutes of Alberta, 2000, Chapter M-26, as amended, the Council of Lethbridge County in the Province of Alberta duly assembled does hereby enact the following:

1. The "MacLaine Acres Area Structure Plan" Bylaw No. 22-009, attached as "Appendix A".

GIVEN first reading this 15th day of September, 2022.

Reeve

CAO

That Bylaw No. 22-009 is deemed an amendment to the Plowman Area Structure Plan Bylaw No. 1231 (2002) and that the intent of Bylaw No. 22-009 adopting the "MacLaine Acres Area Structure Plan" is to provide an update to current municipal standards, revised layout plan, and engineering information to complete and amend the Plowman Area Structure Plan Bylaw No. 1231 (2002) by including text and references to describe the update.

GIVEN second reading, as amended, this 3 day of November, 2022.

Reeve

CAO

GIVEN third reading, as amended, this 3 day of November, 2022.

Reeve

CAO

1st Reading	September 15, 2022
2nd Reading	November 3, 2022
Public Hearing	November 3, 2022
3rd Reading	November 3, 2022

MacLaine Acres

AREA STRUCTURE PLAN

Sec. 28 - 9-21-W4M

ACCEPTED BY LETHBRIDGE COUNTY COUNCIL ON NOVEMBER 3RD, 2022 BY BYLAW No. 22-009

AN AMENDMENT TO BYLAW 1231 WHICH IS THE PLOWMAN AREA STRUCTURE PLAN

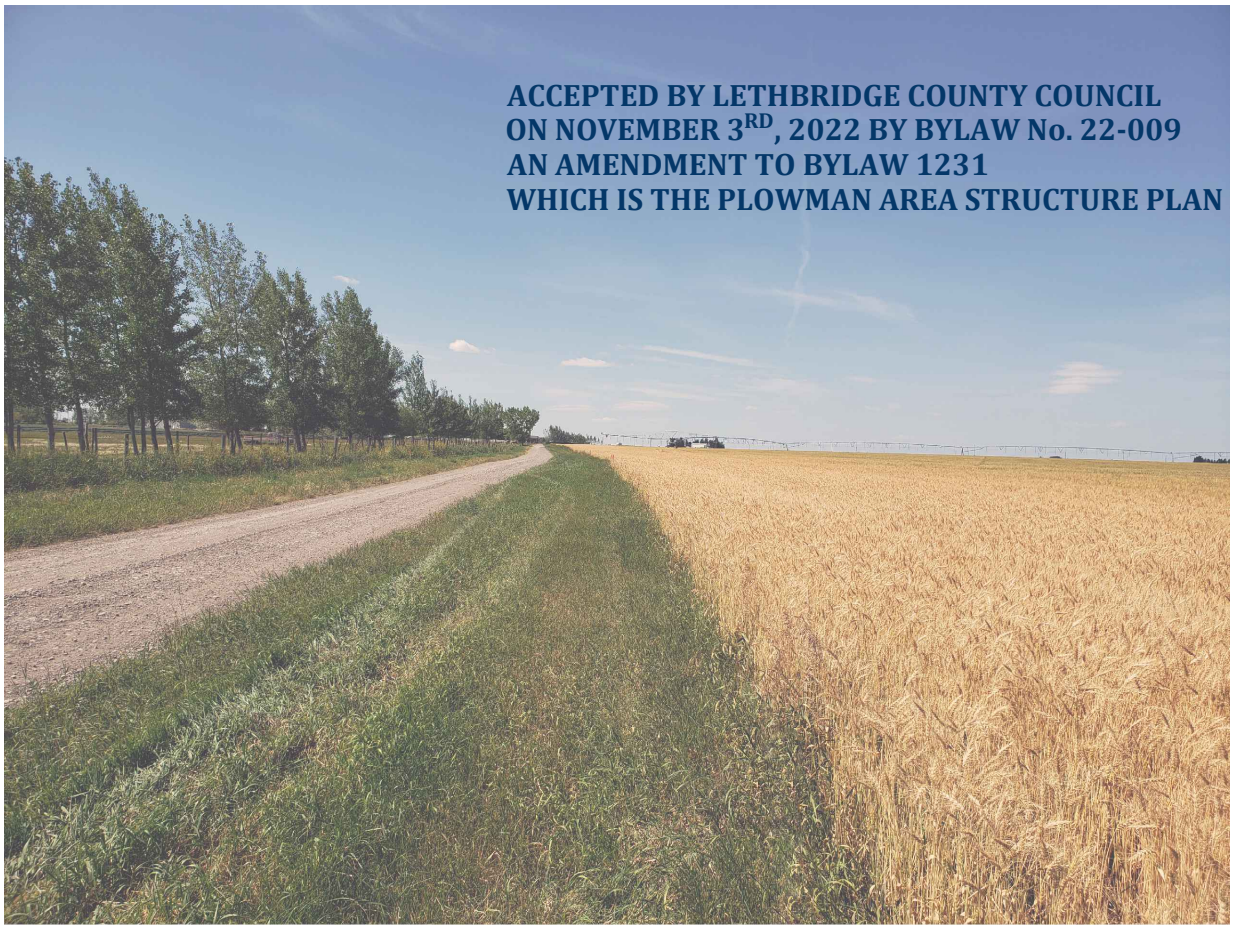
MARTIN
GEOMATIC CONSULTANTS

208645CE

MacLaine Acres

AREA STRUCTURE PLAN

Sec. 28 - 9-21-W4M



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Ryan & Karen Petersman
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File No. 208645CE

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1.0. INTRODUCTION

1.1. PURPOSE OF THE PLAN

The purpose of the MacLaine Acres Area Structure Plan (ASP) is to provide a comprehensive planning framework for development of the land within Sec. 28-9-21-W4. The Plan Area is located in Lethbridge County and is shown on **Figure 1- General Location Plan.** Prior to consideration of subdividing or re-subdividing a property, Lethbridge County requires preparation of an Area Structure Plan to address all planning issues related thereto. The purpose of this area structure plan is thus to provide all pertinent information to the County and its advisors that will enable development of the subject property.

This ASP is submitted as an amendment to Lethbridge County Bylaw No. 1231 being the Plowman Area Structure Plan.

1.2. ASP LAND OWNERSHIP

The properties represented by the MacLaine Acres ASP encompass four separate parcels with the following ownerships. Refer to **Figure 2 – Land Use Concept, Appendix 1 – Property Ownership Titles.**

C of T 161 045 741, 1946291 Alberta Ltd.

C of T 161 154 313, Kenneth Dale Smith

C of T 091 049 136, Ryan Garret Van Eeden Petersman, Karen Virginia Van Eeden Petersman

C of T 911 153 848, Richard Michael Aldoff and Carol Ann Aldoff

1.3. BACKGROUND TO THE AREA STRUCTURE PLAN

The conceptual design for the subject property is part of the Area Structure plan for Sunny View Estates. (Lethbridge County Bylaw No.1231)

The designs presented in the MacLaine Acres ASP generally follow the intent of the Sunny View conceptual design. (See **Appendix 8** – **Sunny View ASP Concept Design**). Changes have been made to reflect the current owner's vision as well it reflects current conditions and standards (particularly the proposed CANAMEX Highway).

The subject property containing approximately 79.36 acres (32.12 ha) more or less is proposed for re-zoning from Lethbridge Urban Fringe (LUF) to Grouped Country Residential (GCR). This will allow the development to proceed with subdivision of the area into smaller parcels with a minimum lot size of 2 acres (0.8 ha).

1.4. INTERPRETATION

This document shall be referred to as "*The MacLaine Acres Area Structure Plan"*.

All terms referred to in this Bylaw shall have the same meaning as in the Municipal Government Act, the Municipal Development Plan or the Land Use Bylaw unless otherwise indicated.

1.5. THE APPROVAL PROCESS

Lethbridge County requires submission of planning documents that are of sufficient detail and clarity to permit comprehensive review by the various agencies, government departments, and utility companies which provide community planning advice to the County.

The plan is submitted for approval according to provincial statutory requirements. This plan will also be used to support a land use reclassification pursuant to Lethbridge County Land Use Bylaw #1404.

The plan should be submitted to the City of Lethbridge for comments and verification that the plan adheres to the relevant Intermunicipal Development plans.

1.6. PLAN PREPARATION

During the preparation of the area structure plan document, Martin Geomatic Consultants Ltd. (MGCL) corresponded with:

- the landowners and some of the neighbors of the proposed plan area,
- Lethbridge County staff,
- County of Lethbridge Rural Water Association,
- Alberta Transportation staff,
- Saint Mary River Irrigation District,
- Fortis Alberta,
- ATCO Gas,
- Shaw Cable,
- Telus Communications.

2.0. LEGISLATIVE FRAMEWORK

2.1. THE MUNICIPAL GOVERNMENT ACT

The MacLaine Acres Area Structure Plan has been produced in accordance with Section 633 of the Municipal Government Act. It is the intention of this plan to create a framework for the development of a portion of 28-9-21-W4 into Grouped Country Residential classified area.

2.2. THE SOUTH SASKATCHEWAN REGIONAL PLAN

The MacLaine Acres ASP aims to follow the Alberta Government South Saskatchewan Regional Plan (SSRP) 2014 – 2024, Amended May 2018.

Strategic Outcomes of the SSRP aligned with the MacLaine Acres ASP include: sustainable development wherein economic development takes into account environmental sustainability and social outcomes, promoting efficient use of land, and strengthening communities.

2.3. LETHBRIDGE COUNTY MUNICIPAL DEVELOPMENT PLAN

The MacLaine Acres ASP aims to follow the Lethbridge County Municipal Development Plan (MDP) Bylaw No. 22-001

The MDP outlines specific requirements with respect to land use and developments. The Maclaine Acres ASP has adhered to the intent of Part 4, Plan Policies. More specifically, this ASP has endeavored to meet the requirements as detailed in Part 4, Section 8 Grouped Country Residential. The ASP meets the specific requirements of Policies 8.0, 8.1, 8.3 and 8.5 of the MDP. With respect to Policy 8.5 Potable Water, the source of potable water has not yet been finalized. The ASP presents three alternatives for the potable water supply and the Developer is endeavoring to obtain water through the water co-op. The water source must be finalized and approved by Lethbridge County prior to subdivision.

The Grouped Country Residential Land Use District (GCR) is intended to provide for a high quality clustered residential development in areas where no conflict to agriculture can be anticipated pursuant to the municipal development plan.

The minimum lot size is 2 acres (0.8 ha) to facilitate on-site sewage disposal systems.

Additional requirements of the Land Use Bylaw will be noted in subsequent sections of the plan where necessary.

2.4. COUNTY LAND USE BYLAW

The Grouped Country Residential Land Use District (GCR) is intended to provide for a high quality clustered residential development in areas where no conflict to agriculture can be anticipated pursuant to the municipal development plan.

The minimum lot size is 2 acres (0.8 ha) to facilitate on-site sewage disposal systems.

Additional requirements of the Land Use Bylaw will be noted in subsequent sections of the plan where necessary

2.5. INTERMUNICIPAL DEVELOPMENT PLAN (CITY & COUNTY)

The plan area is located in Policy Area 3 – North, as shown in the City of Lethbridge & Lethbridge County Intermunicipal Development Plan.

The following Land Use policies may affect the MacLaine Acres ASP, while measures to address each constraint are provided:

2.5.1. POLICIES 3.4.3.14 AND 3.4.3.15

This policy indicates that new grouped country residential should not generally be considered unless it is to complete an existing grouped country residential development and an ASP is prepared. MacLaine Acres falls into this category as what is presented in this ASP is a completion of the existing Sunnyview Estates grouped country residential development. The ASP for Sunny View Estates shows the intent to develop the surrounding land as grouped country residential. This is clearly shown in the concept plan that is part of the Sunny View ASP (see **Appendix 8- Sunny View Concept Plan**).

2.5.2. POLICY 3.4.3.16

This policy requires that the City of Lethbridge provides comments and input to the County for Policy Area 3 – North. As such this ASP should be sent to the City for their review.

2.5.3. POLICY 3.4.3.17

This policy requires that residential development not occur within the provincial setback from landfills. MacLaine Acres is not within the setback distance and therefore adheres to this policy.

2.5.4. POLICY 3.4.3.18 AND 3.4.3.19

These policies suggest that the City, the County and Alberta Transportation work collaboratively on a Functional Design Study and a subsequent Special Study and that future land uses take into consideration these studies.

2.5.5. POLICY 3.4.3.20

This policy states that the ASP's should not be considered within limits of the CANAMEX Development Node until the above noted Special studies is completed. The north easterly portion of the MacLaine ASP falls on the fringe of the CANAMEX Development Node. Although the Special Study has not yet been commenced, Alberta Transportation has addressed the planning needs for the interchange through various consultations during the preparation of the ASP. Their comments have been integrated into the design and planning of this ASP. Their comments include:

- Provide sufficient land in the planning to allow for the future widening of Highway 843 and for the future CANAMEX interchange tapering. This is reflected in the ASP.
- Provide allowance for a future service road within the plan area that runs parallel with and adjacent to the future highway tapering. Also, when the service road is built, there should be only a single connection point to Highway 843. The service road will be constructed when the CANAMEX interchange is built. This ASP makes provisions for the service road and reflects a future single connection point to Highway 843.

2.5.6. POLICY 3.5.1 AND 3.5.2

These policies identify the need to provide and maintain enhanced development and landscaping at highway entrances and along the highways that are indentified in the policy area. The easterly portion of MacLaine Acres falls within an identified highway corridor. The Architectural Controls for MacLaine Acres will address these policies with respect to landscaping that is consistent with the intent of these policies and the Highway Enhance Design Guidelines. The land developer will also address landscaping at the visible points along the highway and at the entrances.

2.6. LETHBRIDGE COUNTY GROUPED COUNTRY RESIDENTIAL LAND USE STRATEGY

2.6.1. SITING

This development meets the following criteria for these preferred locations of GCR developments from the County Municipal Development Plan and the Land Use Strategy.

Poor quality agricultural land with three parcels of less than 20 acres each resulting in difficulty to farm.

- The site consists of cut-off and fragmented parcels.
- The site is made up of existing titles/ parcels.
- The site is the completion of a grouped country residential site that is located adjacent to 2 existing and a building GCR development.
- This development generally correlates with the concept plan prepared in conjunctive with the adjacent Sunnyview Grouped Country Residential Development

2.6.2. LAND USE CONFLICTS

This ASP site has no land use conflicts as outlined in GCR land use strategy.

2.6.3. SERVICING

This site meets the following criteria from the GCR land strategy

- Supply of potable water
- Supply of irrigation water from SMRID
- Suitable soils for multiple private septic field use for treatment of waste water. (refer to **Appendix 6**, **Septic Field Feasibility**)
- A Storm Management Plan has been completed and is attached as **Appendix 7- Stormwater Management Plan.**
- The various shallow utility companies have been contacted and they have verified that gas, electrical and telephone services are available to the site.

2.6.4. ROADS

- Legal and physical access is available to all lots by way of a dedicated municipal road.
- The municipal access roads known as Twp – Rd. 94A and 94B are not paved but have been identified as gravel roads under the provisions of their approval for the developments at the time when these roads were created.
- Highway 843 which is the access road for both Twp-Rd 94A and 95B is not paved. The maintenance and improvements to this road are the responsibility of Alberta Transportation.

2.6.5. FIRE SUPPRESSIONS

- Lots are a minimum of 2 acres in size which will enable the houses to be setback a considerable distance from each other thereby help minimize fire spreading
- The responding fire department is in Coaldale which is about 20 minutes from the site. The Lethbridge fire department in north Lethbridge is 10 minutes away and can provide assistance when deemed necessary.

3.0. THE PLAN AREA AND SITE ANALYSIS

3.1. LOCATION AND DEFINITION OF PLAN AREA

The plan area is located in Lethbridge County within Sec. 28-9-21-W4. The plan area is situated along Highway 843 and approximately 0.9 km north of the City of Lethbridge boundary which is 62 Ave. North. It is bordered on the north by farmland; on the east, by Range Road 213, on the south by a grouped country residential community, and on the west by irrigation canal and farmland *(refer to **Figure 2 - Land Use Concept**)*. The plan area includes four land parcels: (Refer to **Appendix 1 Property Ownership Titles**)

- Lot 1 Block 2 Plan 8010198, 34.843 acres (14.1 ha), owner(s): Richard Michael Aldoff, Carol Ann Aldoff;
- Lot 2 Block 1 Plan 927LK, 20.02 acres (8.1 ha), owner(s): Kenneth Dale Smith;
- Lot 1 Block 1 Plan 927LK, 24.65 acres (9.98 ha), owner(s): 1946291 Alberta Ltd.;
- Title number 091 049 136, owner(s): Ryan Garret Van Eeden Petersman, Karen Virginia Van Eeden Petersman.

3.2. SITE CHARACTERISTICS

The existing site features and contours are shown on **Figure 3.0 Existing Site**.

- Access to the plan area is from Lethbridge County Township Road 94A, Township Road 94B, and Highway 843.
- There are existing potable waterlines owned by the County of Lethbridge Rural Water Association (C.O.L.R.W.A.), which run adjacent to the site along Township Roads 94-A and 94-B, and along the north boundary of the plan area.
- There is an existing Saint Mary River Irrigation District (S.M.R.I.D.) canal along the west boundary of the plan area,
- There is an existing S.M.R.I.D. buried pipeline running along the south and center portions of the plan area. The south portion of this buried pipeline is planned to be re-aligned to accommodate the extension of Township Road 94-A,
- There are two existing dugouts located in the north and east areas of the site, with irrigation water supplied by (S.M.R.I.D.),
- There is an active high pressure gas line owned by ATCO, running north to south along the eastern site boundary,
- There are existing 60 mm and 42 mm gas distribution lines owned by ATCO, which run across the site to service the existing dwellings,
- There is an abandoned gas well located in the northwest part of the site which has been reclaimed. The well was abandoned in 1999 and the reclamation was completed in 2002. The licensee is Husky Oil Operations Limited.
- Overhead power follows the County Roads along Range Road 213, Township Road 94-A, and Township Road 94-B.
- Five existing residential dwellings are located in the plan area which currently use septic field disposal of wastewater.

3.3. SOILS

According to the Alberta Soils Information System, the site soils are characterized as a "Lethbridge (LET) Series" soil - "…Orthic Dark Brown Chernozem on medium textured ([loam], [silt-loam]) sediments deposited by wind and water."

The "Geotechnical Evaluation, MacLaine Acres Area Structure Plan, Section 28 Twp 9 Rge 21 W4M, Lethbridge County, Alberta" report prepared by Tetra Tech Canada Inc., October 2021, (refer to the attached **Appendix 2- Geotechnical Evaluation)** indicates that the soil stratigraphy was found to have topsoil underlain by clay and clay till deposits.

This report provides more information on the soil and ground water candidates with recommendations on the excavations, site grading, dewatering, buried services and trench backfill, concrete, pavement, stormwater management, residential construction, sewage disposal, and testing and inspections.

The report cautions that challenges may be encountered due to soil and ground water conditions. The report further provides recommendations with respect to the groundwater.

3.4. TOPOGRAPHY

The site is relatively flat with ground slopes at 0.5 % to 2 %. A slight ridge splits the site into two general drainage areas as shown in **Figure 3 - Existing Site**:

3.4.1. EAST CATCHMENT AREA

East catchment: drains from west to east across the site and released to the west ditch of Highway 843. The high point of this catchment area is located along the west catchment boundary, at an approximate elevation of 907.2 m. The low point is located at the east end of the site at an approximate elevation of 900.0 m.

3.4.2. WEST CATCHMENT AREA

West catchment: runoff is trapped in a topographical depression located in the western area of the site. The highpoint of this catchment area is along the west boundary at an approximate elevation of 908.6 m. The low point is located near the center of this catchment area at an approximate elevation 905.2 m.

3.5. WATER AND HYDROLOGY

- The above noted Geotechnical Evaluation found that the depth to ground water varied from 0.7 meters to 5.2 meters.
- There are no natural bodies of water within the plan area.
- Two man-made dugouts exist within the plan area and are filled by a pipeline owned by SMRID.

3.6. HABITAT AND VEGETATION

The plan area consists mainly of cultivated mixed grasses that produce a hay crop.

3.7. Environmental, Historical and Archaeological Significance

The "Phase 1 Environmental Site Assessment, MacLaine Acres, Portions of Section 28 Twp 9 Rge 21 W4M, Lethbridge County, Alberta" report prepared by Tetra Tech Canada Inc., September 2021 (refer to the attached **Appendix 3 – Environmental Site Assessment**) indicates:

- The site and surrounding area has historically been used for agriculture,
- A SMRID canal formerly transected the property.
- A large dugout was formerly situated in the property.
- One (1) potential source of on-site contamination has been identified which is a group of old barrels. If soil staining is encountered when the barrels are removed, then it is recommended that further assessment is completed.
- No offsite sources of environmental impairment are apparent.
- A hazardous building material assessment is recommended prior to building demolition.
- No further environmental investigation is required at this time.
- MGCL consulted the Alberta Culture and Tourism's Listing of Historic Resources to determine that the lands within the plan area have not been identified as having a Historic Resource Value. (Refer to the attached **Appendix 4 – Historical Resource Assessment**).

3.8. Existing Land Use

- The plan area is mainly used for agriculture with cultivated crops and horse grazing. The land cover has a mix of natural grasslands and irrigated cropland *(refer to **Figures 3-Existing Site & 4-Aerial Photograph**)*;
- There are five houses within the plan area, four of which are inhabited. These four inhabited houses are intended to remain in place and are incorporated in the development layout *(refer to **Figure 5A&B - Lot Layout - Phases 1&2**)*;
- Township Roads 94-A and 94-B and Highway 843 provide access to the plan area.
- The land use for the site is currently Lethbridge Urban Fringe (LUF).

4.0. SITE FEATURES

4.1. LOCATION

- The site is within the rural agricultural area of Lethbridge County thereby giving residents the rural atmosphere that many people desire.
- The site is within close proximity to the City of Lethbridge where a wide variety of educational, medical, commercial, recreational and community services exist.

4.2. HIGHWAY ACCESS

Provincial Highway 843 provides access to the development area from the city of Lethbridge.

4.3. EASE OF DEVELOPMENT

Basic utilities such as potable and non potable water, storm water drainage channel, gas and electrical are located at or near the site boundary and therefore the servicing and development of the site will be generally simple, efficient and economical.

4.4. SURROUNDING USES OF LAND

The land within and surrounding the ASP area is fragmented with a mix of agriculture and grouped country residential uses. The plan area is comprised of four small land parcels which makes agriculture difficult. The development of the MacLaine Acres Land would complete Sunny View Estates which is an existing clustering of grouped country residential homes. This development would also enhance and complement the existing Sunny View Estates and Myndio Chollak subdivisions. Several other country residences with larger parcel sizes are also in the area surrounding the MacLaine Acres area. There are two existing group country residential developments approximately 2 km west of the plan area which are consistent with the proposed development style. The Edgewood and Deerview Estates communities have approximately 30 or more existing grouped country residential lots.

4.5. LIFESTYLE

The proposed development provides for a type of residential land use that would allow families to build and live in a community offering rural lifestyle and still enjoy urban type utility services.

5.0. PLAN GOALS AND OBJECTIVES

5.1. PLAN GOALS

5.1.1.

The MacLaine Acres Area Structure Plan will respond to the needs, issues and requirements identified by the owners, Lethbridge County as well as those agencies and organizations having an interest in the planning of this area.

5.1.2.

The goals of this Area Structure Plan follow the planning policies outlined through the legislative framework.

5.1.3.

When adopted by Lethbridge County Council, this Area Structure Plan will create the framework for subdividing and developing the subject property.

5.1.4.

This document will function as the required plan and as such will outline:

- proposed land use,
- proposed lot layout,
- the road access and circulation,
- the location of public utilities,
- supply of potable water,
- sanitary sewage disposal,
- drainage and stormwater management,
- supply of community irrigation water,
- other related matters.

5.2. PLAN OBJECTIVES

5.2.1.

The MacLaine Acres Area Structure Plan will adhere to the following objectives:

- create lots with a minimum size of 2 acres (0.8 ha),
- institute a storm water management system for the planned development,
- if available, utilize potable water from the County of Lethbridge Rural Water Association,
- consider road access and circulation for the development,
- investigate the suitability of on-site septic systems for wastewater treatment and disposal,
- allow for a community irrigation system,
- identify electrical, gas, and communications servicing.

6.0. DESIGN AND LAND USE

6.1. PROPOSED LAND USE

A total of approximately 26 residential lots, 3 PUL lots, and 3 non-developable lots will be created. The residential lots will all have a minimum size of 2 acres (0.8 ha). The 3 PUL lots are or storm water management purposes. If any of those PUL lots are determined to be not be required they will be used for residential purposed. Additionally, 3 lots are proposed along Highway 843 to allow for future highway widening and a service road. These lots are non-developable and are numbered 23, 37, and 38. At the time of subdivision, if required by the county, caveats will be placed on these 3 lots that would prevent construction on the lots.

It is proposed to have the Land Use changes to Grouped Country Residential, as shown on **Figure 2 - Land Use Concept**. The 3 non-developable will not be re-zoned.

6.2. DENSITY AND POPULATION

The housing density within the proposed development comprises 26 residential lots plus 3 PUL lots or 0.34 units per acre (0.84 units per ha.) of net area (*refer to* ***Figure 5 - Lot Layout - Phase 1 and Figure 6 - Lot Layout - Phase 2***).

Based on an average occupancy of 3 persons per household, the population within the plan area is estimated to be approximately 78 persons.

The number of lots may vary by plus or minus a few lots during the final design. Additionally there may be minor layout changed resulting from the final design process. Any changes would need to be approved by Lethbridge County, during the subdivision approval process.

6.3. RESERVE REQUIREMENTS

If the County does not want land dedicated as municipal reserve, cash-in-lieu would be provided to achieve the 10% municipal reserve requirement.

7.0. ROADS

7.1. SITE ACCESS AND CIRCULATION

Access into the proposed development area will be via Highway 843. A local road is proposed to extend west from Twp-Rd. 94-A, and extend north and loop back to Hwy 843, to provide access to the proposed community. A cul-de-sac will come off of the loop road to the west *refer to* ***Figure 5 - Lot Layout - Phase 1*** *and* ***Figure 6 - Lot Layout - Phase 2*****).** The type of road surface will be determined at the time of subdivision depending on the status of Highway 843.Future site access will be via a service road from Twp-Rd. 94-A which will be built at the time of the future Hwy 3 / Hwy 843 interchange.

Lands required for Canamex, which includes right of ways for highway widening and services roads will be taken in the future. These lots are number 23, 37, and 38 and are non-developable.

Alberta Transportation has indicated that a TIA is not required prior to ASP approval. Alberta Transportation shall be consulted prior to any subdivision to determine if and when a TIA might be required.

7.2. PHASES OF ROADWAY CONSTRUCTION

There are three phases of construction anticipated for the site:

7.2.1. PHASE 1A

Phase 1A would include seven residential lots located at the center of the site. Access to Phase 1A would be along TWP-94B with no additional land dedicated to road right of way.

7.2.2. PHASE 1B

Phase 1B would include twelve residential lots located at the west portion of the site. Access to Phase 1B would be through a westerly extension of Township Road 94A which would then be extended northerly with two cul-de-sacs. A temporary emergency access would be provided along the north boundary of the site, extending to Hwy 843.

7.2.3. PHASE 2

Phase 2 would include seven residential lots located at the north portion of the site. A County road would be developed, with a connection from Hwy 843, which would extend through Phase 2 and connect to Phase 1B, the cul-de-sac at the end of the Phase 1B road. This would then provide a looped road through the subdivision. The Phase 1B emergency access would be removed upon completion of the looped road.

8.0. SERVICING

8.1. POTABLE WATER SUPPLY AND DISTRIBUTION

It is envisioned that the domestic potable water requirements for the subdivision will be met by one of the following alternatives or by a combination of these alternatives.

8.1.1. POTABLE WATER SUPPLY, ALTERNATIVE 1

The first alternative is to have the water supplied by the County of Lethbridge Rural Water Association via extensions from an existing potable water pipe running through the site. Each lot will be supplied with a trickle system to fill individual cisterns. The Water Co-op is in the process of finalizing their water supply plans for this area.

8.1.2. POTABLE WATER SUPPLY, ALTERNATIVE 2

The second alternative is the provision of ground water well(s) which will supply each lot via a trickle system to fill individual cisterns. Pre-chlorination and/or other treatment may be required prior to distribution to each lot. The feasibility of this alternative will be determined if it is required by Lethbridge County.

8.1.3. POTABLE WATER SUPPLY, ALTERNATIVE 3

The third alternative is use SMRID supplied irrigation water that will be treated as required by each individual lot owner. The feasibility of this alternative will be determined as required by Lethbridge County.

8.1.4. DETERMINATION OF FINAL POTABLE WATER SOURCES

The final method of water supply will be dependent on the Water Co-op's final plans and the costs associated with each of the alternatives. The ultimate method of supply could be by a combination of these alternatives which would be subject to Lethbridge County administrative approval.

The County may consider allowing four lots in Phase 1A to haul potable water pending the final determination of a potable water supply for the balance of the lots.

8.1.5. GOVERNMENT REQUIREMENTS

The water supply and cisterns will be installed in accordance with requirements of the Chinook Health Region, the Safety Codes Council of Alberta and Lethbridge County.

8.1.6. HOME OWNER ASSOCIATION

The potable water and irrigation systems will not be taken over by Lethbridge County. A separate entity will be created to manage these facilities. The entity and management requirements shall be approved by Lethbridge County.

8.2. SEWAGE DISPOSAL

Each lot will have its own on site waste water treatment and dispersal system.

8.2.1. LICENSED DESIGN

The detailed design of each septic system shall be completed by a licensed designer at the time of the house construction.

8.2.2. ALBERTA REGULATIONS

Alberta Regulations AR229/97 and AR196/2015, the *Alberta Private Sewage Systems Standard of Practice 2015* (the "SOP") describes the requirements for the design of on-site wastewater treatment and disposal systems.

8.2.3. SEPTIC FEASIBILITY ASSESSMENT

The "Preliminary Septic Disposal Field Feasibility Assessment, Proposed MacLaine Acres Subdivision, Section 28 Range 9 Township 21 West of the 4th Meridian, Lethbridge County, Alberta" report prepared by Tetra Tech Canada Inc., October 08, 2021 (refer to the attached **Appendix 6- Septic Feasibility Assessment**) indicates:

- Twelve (12) test pits were excavated to a depth of 3 m to observe soil profiles and collect samples which found silty clay loam, silty loam, clay loam, loam, silty loam.
- The soil textures are feasible for soil base treatment, or soil based treatment with treatment mound.
- The majority of soil textures are suitable for septic effluent quality 2 or better with pressure distribution lateral pipe.
- Restrictive soil layers encountered may require further assessment, depending on site grading, location of septic field and efficient loading.

8.2.4. LOCATION OF SEPTIC FIELD

No on-site wastewater management system components shall be installed in areas designated for conveyance or detention of runoff or behind the development setback lines.

8.3. STORM WATER MANAGEMENT

- Stormwater within the development will be managed such that runoff will be stored on-site to attenuate peak discharge and directed to an existing discharge location on a road right-of-way, which is the ditch on the west side of Hwy-843 (*refer to* ***Figure 7 - Stormwater Management***).
- Post-development runoff will be stored and released at controlled rate that is the lower of, the pre-development rate at the discharge point and 2.0 liters per second from developed land. This is better than the Alberta Environment and Parks requirements and the Lethbridge County Engineering Guidelines and Minimum Service Standards. A summary of the existing and proposed drainage systems follows, and a more detailed description of the site drainage is included in the Stormwater Management Plan, which is appended to this document in **Appendix 7- Stormwater Management Plan.**

8.3.1. EXISTING CONDITIONS

- The land is generally flat with ground slopes of 0.5% to 2.0% with majority of the site runoff draining the east into the Highway 843 ditch system. Analysis of the terrain shows the site has six overland catchment areas.
- East sub-catchment - drains from west to east across the site and released to the west ditch of Highway 843. The high point of this catchment area is located on the south end of the west catchment boundary, at an approximate elevation of 907.2 m, and the low point is located at the northeast end of the site at an approximate elevation of 900.0 m.
- Dugout sub-catchment – this is the area of the existing water dugout for farm use, that drains to itself. It does not have a discharge location.
- West-NW sub-catchment drains from south to north and discharges to the property to the north.
- West-SE sub-catchment drains from the NW to the SE and discharges to the Township road 94A ditch.

- West SW sub-catchment drains from south to north and discharges to the property to the south.
- West Central sub-catchment – drains to a topographical depression located in the center of the sub-catchment. The highpoint of this catchment area is along the west boundary at an approximate elevation of 908.6 m. The low point is located near the center of this catchment area at an approximate elevation 905.0 m. Calculations show that this catchment will not spill overland during a major storm event and empties through infiltration and evaporation. This area, if it spills, is to the east the topographical depression.

8.3.2. DRAINAGE CONCEPT

- The stormwater management concept is detailed in the attached Stormwater Management Plan. Refer to **Appendix 7- Stormwater Management Plan**.
- Storm water runoff from the site will be directed into storage pond(s), which will be designed to store runoff up to a 24 hour duration, 1 in 100 year frequency event. Although three ponds are shown in the concept drawings the County wants only one pond. During the design phase only one pond will be considered unless circumstance at the time indicates additional ponds may be necessary. Any changes from one pond will be at the County's discretion. The stormwater ponds will not be used as a source for irrigation purposes.
- The ponds will be drained either by gravity or pumped at the Counties discretion into the west Highway 843 ditch. This ditch currently directs all runoff northerly to ultimately end up in the Oldman River. Flow from this site will be restricted as outlined above and stored. The 2.0 litres per second per ha release rate from developed areas is approximately 43% of the predevelopment release rate to Highway 843 ditch. The maximum release will match existing conditions.
- Lethbridge County has undertaken a master drainage study for the entire area around MacLaine Acres. The Storm Water Management plan for this site can be adjusted in order to be compliant with the County's study.
- All of the designated drainage conveyance routes and storage facilities will either be on public rights-of-way, Public Utility Lots, or be protected by Utility right-of-way in favor of Lethbridge County, or easement or caveat.

8.3.3. SITE GRADING

- The subdivision will be graded to be consistent with the overall Stormwater Management Plan as shown on ***Figure 7 - Stormwater Management***. Individual lots will generally be graded such that surface runoff will be directed to perimeter swales designed to carry the stormwater runoff into the ditches and then into the stormwater detention facilities.

8.4. UTILITIES

8.4.1. ELECTRICITY

Epcor is the electricity provider for Lethbridge County and the distributor is Fortis Alberta. It is planned that electrical service to individual lots will be distributed underground. Internal roadways will be serviced with street lights. All necessary applications for the detailed design and installation of electric utilities will be submitted to Fortis for their approval.

8.4.2. NATURAL GAS

Natural gas is available through ATCO Gas, who have has advised that there are no known capacity issues with servicing the proposed development.

8.4.3. TELECOMMUNICATIONS/CABLE SERVICE

Telus Communications provides telephone and cable service for the area. Cellular phone service is also available.

Shaw Cable does not offer services in this area and does not plan to be servicing the proposed development at this time.

8.4.4. SOLID WASTE MANAGEMENT

Individual solid waste will be disposed of at a local transfer station.

8.5. IRRIGATION SYSTEM

8.5.1. COMMUNITY IRRIGATION

A community irrigation system will provide SMRID supplied non-potable water to each lot for watering lawns and gardens. This irrigation water will be supplied by SMRID to the irrigation water storage pond. This pond is separate from the storm water management pond. The water will be pumped from the pond through a communal pipeline system with lateral connections supplying each lot. The current plan is to have a central irrigation water storage pond. During the final design, the necessity for a central pond may be eliminated and water will be supplied to ponds on each lot directly from the SMRID turnout.

8.5.2. FIRE PROTECTION WATER

Water for fire protection will be available through this central irrigation water storage pond or individual ponds, which will have their level maintained with irrigation water supplied by SMRID.

8.5.3. SMRID APPROVAL

This irrigation water supply system will require approval for SMIRD.

8.5.4. OPERATION OF SYSTEM

A separate entity will be created to own and operate the irrigation system within the development. The irrigation piping will be installed in an easement through the lots in favor this entity. ‘

9.0. PROTECTIVE SERVICES

9.1.1. FIRE PROTECTION

- The Lethbridge Fire Department is the responding station with the north Lethbridge station being about 10 minutes from the ASP site.
- Lots are a minimum of 2 acres in size which will enable the houses to be setback a considerable distance from each other thereby helping to minimize fire spreading/
- Several water sources exist within and surrounding the plan area which may be available for fire protection water use.
-

9.1.2. POLICE PROTECTION

Policing in Lethbridge County is provided by the Royal Canadian Mounted Police (R.C.M.P.) which has a detachment located in the Town of Coaldale, approximately 21 km from the plan area.

10.0. DEVELOPMENT AGREEMENT

The Developer will enter into a Development Agreement with Lethbridge County regarding the following matters:

- Runoff conveyance and detention as per the Stormwater Management Plan,
- Roadway construction,
- Potable water installation,
- Irrigation system,
- Shallow utilities,
- Other services or matters considered necessary by Lethbridge County.

The ownership and management of the potable water system and the irrigation water system will be by a separate entity; and will not be provided by Lethbridge County.

The roadways and stormwater management system will be owned and managed by Lethbridge County.

The ownerships of the shallow utilities will be by the respective provider of each utility (i.e. electric, gas, telephone and telecommunication systems).

Lethbridge County may determine that pre-grading of some lots is required. If a lot is designated for pre-grading by the County the individual lot owner will be required to a clause to the grades as set. Adhere with respect to this requirement will be included in the Architectural Control.

11.0. ARCHITECTURAL CONTROLS

11.1. PURPOSE OF CONTROLS

The developer of MacLaine Acres will establish a set of Architectural Controls in order to achieve standards, an appropriate level of house design compatibility, and development limitations within the plan area.

11.2. TYPICAL CONTROLS THAT WILL BE IN EFFECT WITHIN MACLAINE ACRES INCLUDE THE FOLLOWING:

1. Minimum dwelling unit area and site coverage (building footprint),
2. Diversity in home design,
3. Incorporation of energy efficiency features,
4. Roof pitch & materials,
5. Exterior finishing materials,
6. Fencing materials,
7. Minimum landscaping requirements in which xeriscaping will be considered,
8. Hobby farm animals such as horses,
9. Accessory building and vehicle storage.
10. Building and lot drainage and grading requirements

11.3. DEVELOPER FENCING AND LANDSCAPING

The developer may undertake construction of certain stretches of fencing or installation of certain aspects of landscaping to establish the character of the development.

12.0. IMPLEMENTATION AND DEVELOPMENT CONTROL

- This Area Structure Plan will become a Bylaw of Lethbridge County.
- All subsequent subdivision applications must adhere to provisions of this A.S.P. Bylaw and the Land Use Bylaw.
- Development applications, within the boundaries of the plan area, must comply with the requirements of the respective land use districts for which they are proposed.
- Building permits must be reviewed through a safety codes process approved by Lethbridge County.
- Lethbridge County may utilize other bylaws and policies that will regulate aspects of activity within the boundaries of the Area Structure Plan.
- The Land Use Bylaw must be amended to Grouped Country Residential to reflect this ASP.
- The lot owner or his builder must follow the Architectural Controls.
- There are several references within this ASP that refer to the formation of a Landowners Association. An alternative management and operating entity may be designated instead of the Homeowners Association. Any changes must be approved by the Lethbridge County administration. Formal amendments to the ASP would not be required if this change was to be implemented.

13.0. PHASING

There are three phases of construction anticipated for the site:

- Phase 1A located in the S.E. portion of the ASP would include seven residential lots and a PUL lot.
- Phase 1B located in the west portion of the site, would include twelve residential lots and a PUL lot.
- Phase 2 located in the N.E. portion of the ASP would include seven residential lots and a PUL lot.
- Lots 23, 37 and 38 are non-developable and will be used for highway widening and service road purposes when required by Alberta Transportation.
- Smaller sub-phases may be proposed at the detailed design and subdivision stage of the project. This will be determined based on future consumer demand for lots.

14.0. ADJACENT LANDOWNER CONSULTATION AND OTHER CORRESPONDENCE

14.1. NOTICE SENT TO ADJACENT LAND OWNERS

A letter and drawings were hand delivered to the residences in the immediate vicinity of the ASP. (See **Appendix 5- Adjacent Landowner and Consultation and Other Correspondence**)

14.2. NEIGHBOURHOOD COMMENTS

Two written comment was received and one telephone comment was received.

- The telephone comment expressed the concern that when they built their house they were advised that there would be no future development to impair their views. Additionally, they were concerned about the increased traffic and resulting dust. In particular their concern was regarding the condition of poor maintenance of Highway 843.
- One written comment expressed concern with higher density resulting from the development. They were told when they purchased their lot that no one would build across from their lot. This higher density would also lead to increased traffic, and increased number of dogs. Concern with the effect on the water table was also expressed. (Refer to **Appendix 5 - Adjacent Landowner Consultation and Other Correspondence**)
- The other written comment expressed concern about the lack of water available from the water co-op. They also wanted Hwy 843 to be paved as soon as possible due to the poor maintenance currently being experienced. He also would like to have Twp. Road 94A and 94B paved at the same time construction occurs on this development. . (Refer to **Appendix 5 - Adjacent Landowner Consultation and Other Correspondence**)
-

14.3. OTHER RELATED CORRESPONDENCE

- Map & Letter Sent to neighbors
- Neighborhood Comments
- Map from SMRID
- Map from Fortis
- Map from Alberta Energy Regulator
- Map from ATCO Gas
- Map from County of Lethbridge Rural Water Association
- Lethbridge County Map “Development Consideration”

15.0. MARKET DEMAND

The County's Group Residential strategy requires that a market demand study be included with the ASP. Consultation with land appraisers and realtors has determined that a market demand study in a rural residential development setting is difficult to undertake.

Regardless, it is possible that the lots in this ASP could take anywhere up to 10 or 15 years to be all sold. Estimating the market conditions over that period of time would be impossible. The best measure of market demand is the number of lots that are serviced at one time. Even though the ASP may contain 30 lots, the developers of MacLaine Acres will only service lots that they can foresee will be sold in relatively a short time period.

The ASP provides the framework for how the development is to proceed. Just because the ASP is approved it does not mean servicing all the lots at one time. With respect to this development, the owner of Phase 1A has about 5 buyers that are interested in purchasing now. As such his plan is to service all 7 lots right away. The owner of Phase 1B has indicated he would not be servicing any lots for about 3 years. Even then he will not start servicing until he has purchaser interest in approximately 5 lots. The balance would be serviced based on market demand at that time. The owner of Phase 2 has no plans for servicing the lots. It could be 5 to 10 years before he gets started. The developers will regulate putting lots on the market only when there is purchaser interest and even then the servicing will be done in small phases.

CLOSURE

We are pleased to present to you the MacLaine Acres Area Structure Plan.

This MacLaine Ares Area Structure Plan was approved by Lethbridge County Council, on November 3rd, 2022 as Bylaw No. 22-009.

We trust this meets your requirements. Please contact the undersigned if you have any questions or comments.

Respectfully submitted November 4, 2022

PROFESSIONAL ENGINEER ALBERTA
MARTIN

Prepared by
Ed Martin, P.Eng.

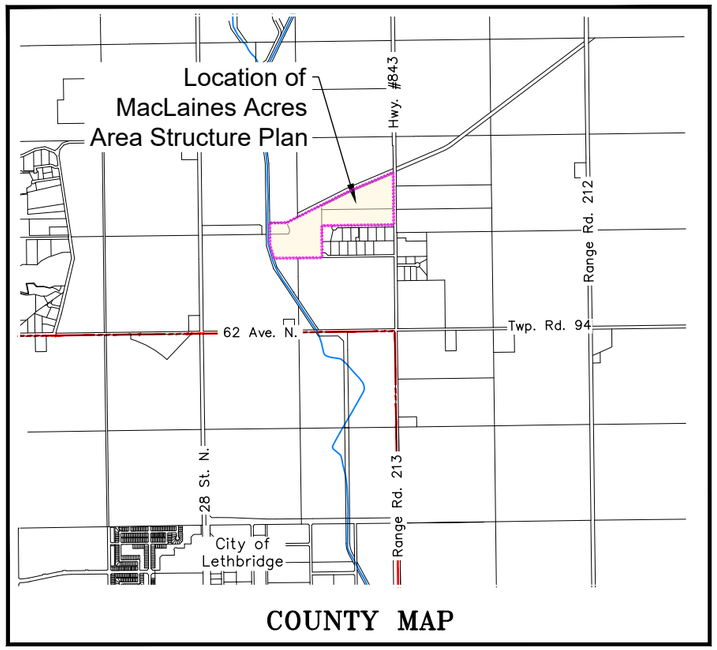
PROFESSIONAL ENGINEER ALBERTA
RAY E. MARTIN
2022-11-07

Reviewed by
Ray Martin, P.Eng.

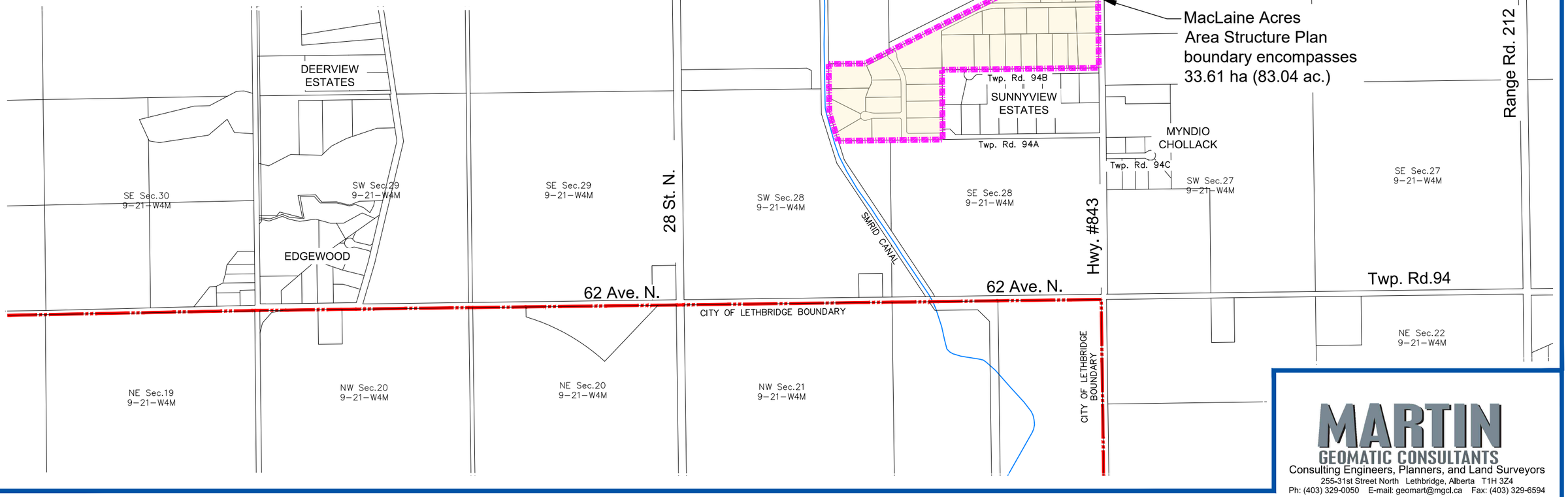
PERMIT TO PRACTICE
Martin Geomatic Consultants Ltd.
Signature:
Date: 2022-11-07
PERMIT NUMBER: P 5852
The Association of Professional Engineers and Geoscientists of Alberta

FIGURES

1. GENERAL LOCATION PLAN
2. LAND USE CONCEPT
3. EXISTING SITE
4. AERIAL PHOTOGRAPH
5. LOT LAYOUT - PHASE 1
6. LOT LAYOUT – PHASE 2
7. STORMWATER MANAGEMENT



COUNTY MAP



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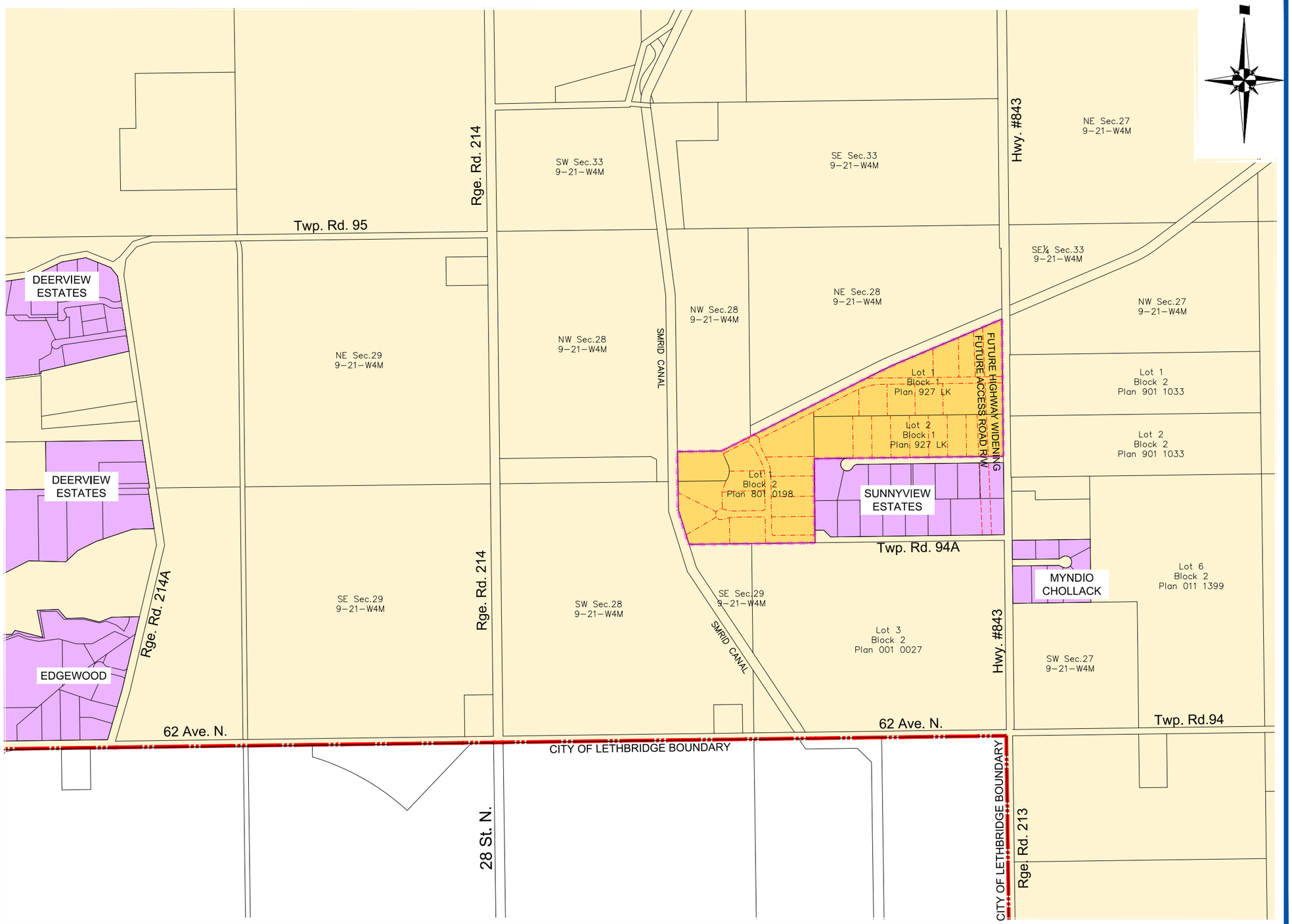
MacLaine Acres

AREA STRUCTURE PLAN

May 11, 2022

GENERAL LOCATION PLAN
FIGURE 1.0

208645CE



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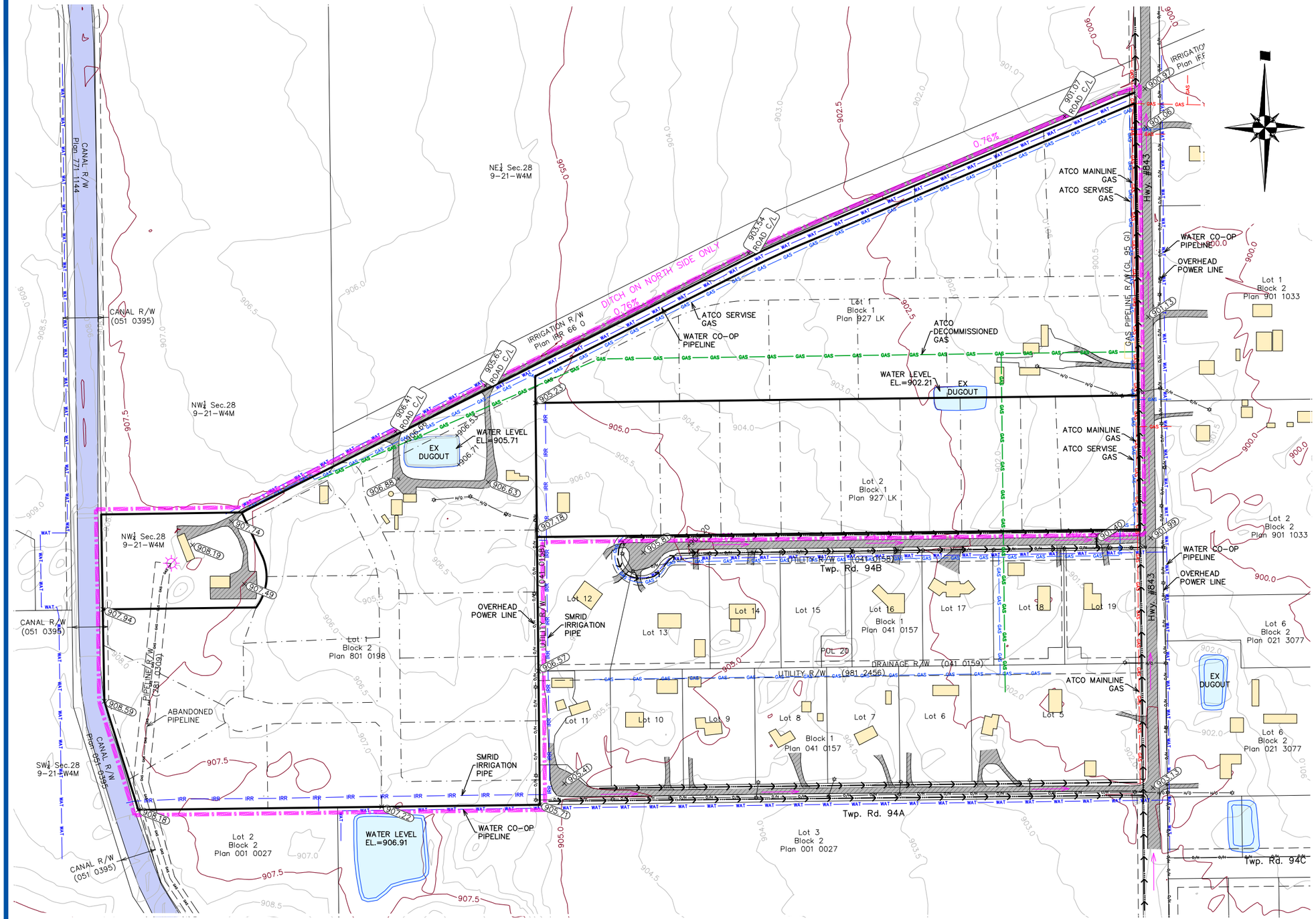
MacLaine Acres

AREA STRUCTURE PLAN

LAND USE CONCEPT
FIGURE 2.0

May 11, 2022

208645CE



LEGEND

- ASP BOUNDARY
- EX. MAJOR CONTOUR LINE
- EX. MAJOR CONTOUR LINE
- WATER CO-OP PIPELINE
- SMRID IRRIGATION PIPE
- GASLINE
- OVERHEAD POWERLINE
- POWERPOLE
- ABANDONED GAS WELL (RECLAIMED)
- EXISTING DITCH DRAINAGE
- SPOT ELEVATION ON SURFACE
- PROPOSED LOT BOUNDARIES
- ATCO SERVICE GAS
- ATCO DECOMMISIONED GAS
- ATCO MAINLINE GAS
- FLOW DIRECTION

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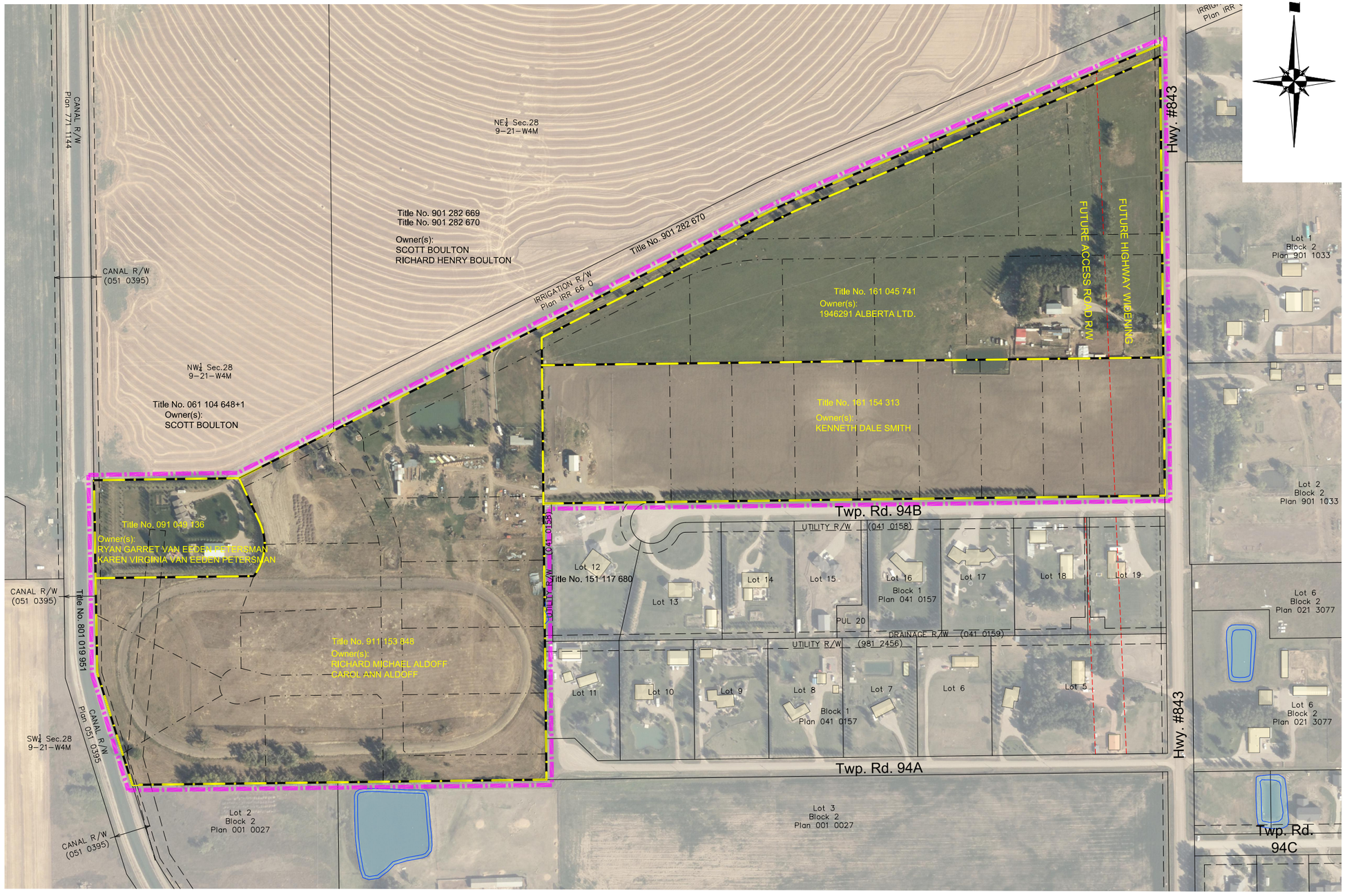
MacLaine Acres

AREA STRUCTURE PLAN

EXISTING SITE
FIGURE 3.0

May 11, 2022

208645CE



LEGEND

ASP BOUNDARY

TITLE BOUNDARY

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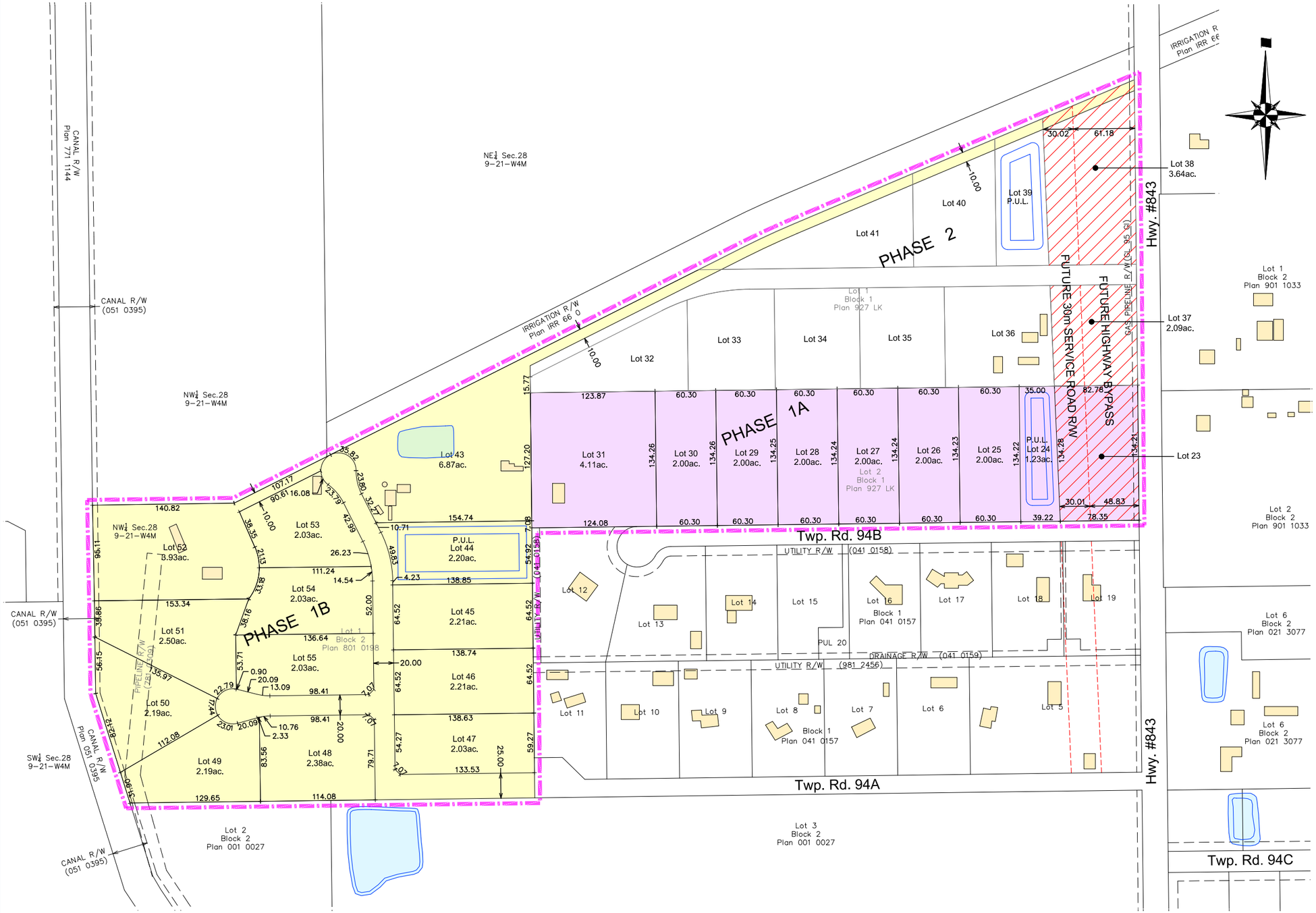
MacLaine Acres

AREA STRUCTURE PLAN

AERIAL PHOTO
FIGURE 4.0

May 11, 2022

208645CE



LEGEND

- ASP BOUNDARY
- PHASE 1A
- PHASE 1B
- PHASE 2
- IF REQUIRED BY COUNTY, CAVEATS TO BE PLACED ON THESE LOTS TO PREVENT CONSTRUCTION

LOTS 23, 37 & 38 ARE NON-DEVELOPABLE

NOTES:

- PHASE 1A, 1B & 2 MAY BE DEVELOPED IN SMALLER SUB PHASES
- LOT SIZES AND CONFIGURATION MAY VARY SLIGHTLY AT THE TIME OF FINAL DESIGN. CHANGES WILL BE SUBJECT TO COUNTY APPROVAL.

NUMBER OF LOTS

	RESIDENTIAL	PUL
PHASE 1A	7	1
PHASE 1B	12	1
PHASE 2	7	1

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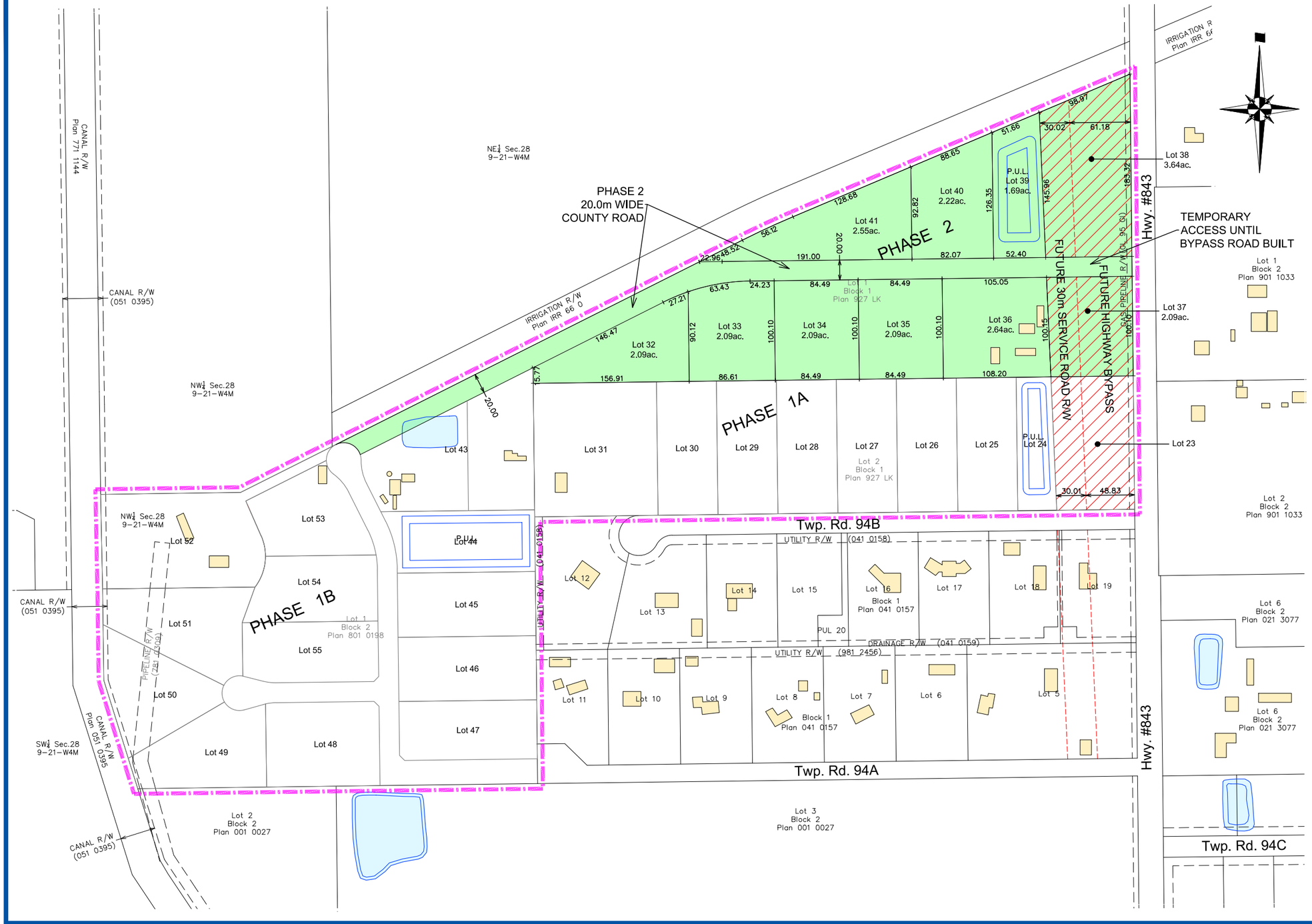
MacLaine Acres

AREA STRUCTURE PLAN

LOT LAYOUT - PHASE 1
FIGURE 5.0

May 11, 2022

208645CE



LEGEND

ASP BOUNDARY

PHASE 2

IF REQUIRED BY COUNTY, CAVEATS TO BE PLACED ON THESE LOTS TO PREVENT CONSTRUCTION

LOTS 23, 37 & 38 ARE NON-DEVELOPABLE

NOTES:

- PHASE 1A, 1B & 2 MAY BE DEVELOPED IN SMALLER SUB PHASES
- LOT SIZES AND CONFIGURATION MAY VARY SLIGHTLY AT THE TIME OF FINAL DESIGN. CHANGES WILL BE SUBJECT TO COUNTY APPROVAL.

NUMBER OF LOTS

	RESIDENTIAL	PUL
PHASE 1A	7	1
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PHASE 2	7	1

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MacLaine Acres

AREA STRUCTURE PLAN

LOT LAYOUT - PHASE 2
FIGURE 6.0

May 11, 2022

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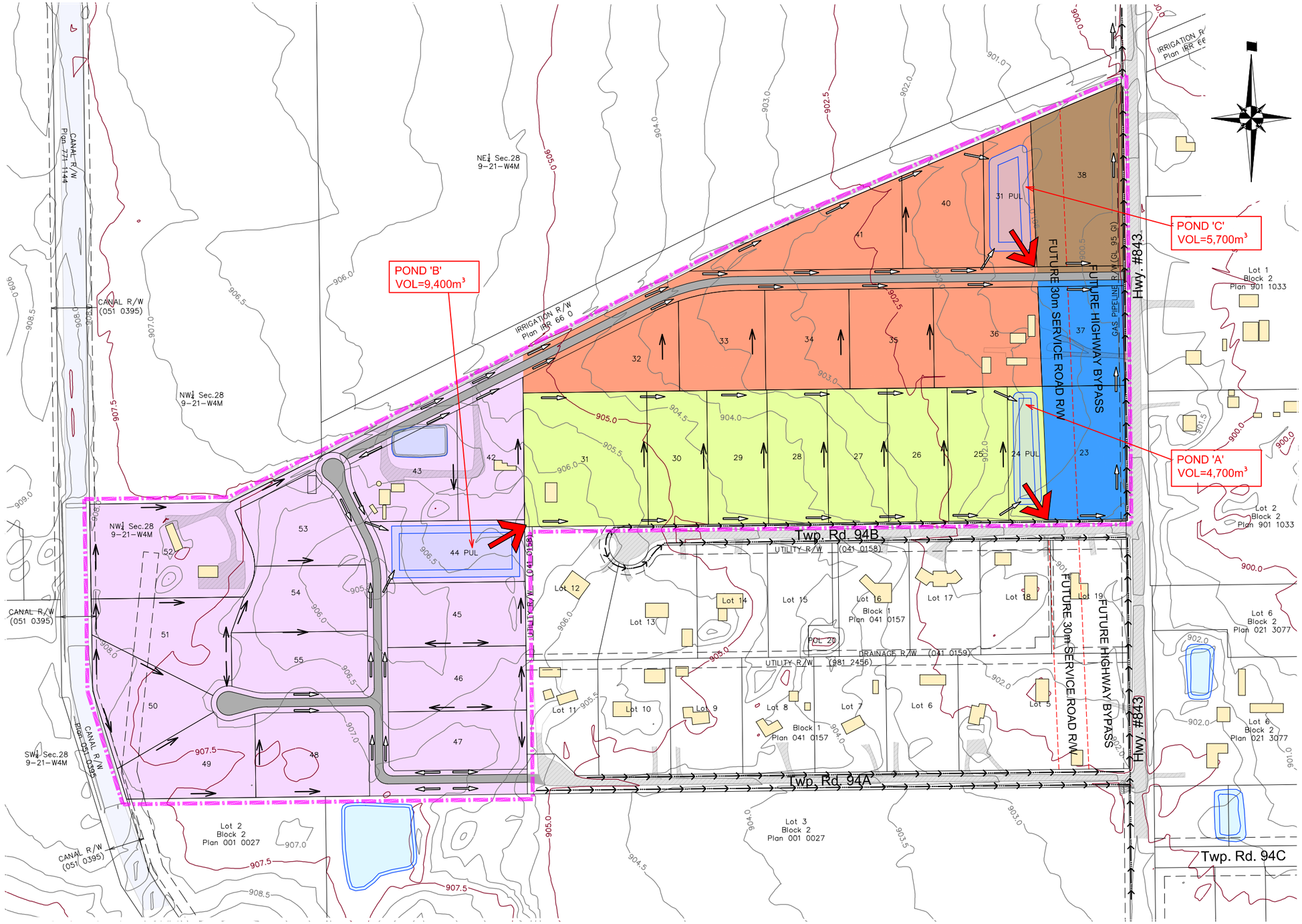

LEGEND

- ASP BOUNDARY
- POND OUTLET
- EXISTING DITCH DRAINAGE
- SURFACE DRAINAGE
- PROPOSED DITCH DRAINAGE

CATCHMENT	'A'	'B'	'C'
AREA (ha)	7.42	14.84	8.97
POND VOLUME (m³)	4,700	9,400	5,700

NOTE:

THREE STORAGE PONDS ARE SHOWN CONCEPTUALLY TO IDENTIFY STORAGE VOLUMES FOR EACH PHASE. IT IS PLANNED THAT THE FINAL DESIGN WILL INCLUDE ONE POND. (IF FEASIBLE)

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MacLaine Acres

AREA STRUCTURE PLAN

STORMWATER MANAGEMENT
FIGURE 7.0

May 11, 2022

208645CE

APPENDIX

1. **PROPERTY OWNERSHIP TITLES**
2. **GEOTECHNICAL EVALUATION** **(PROVIDED UNDER SEPARATE COVER)**
3. **ENVIRONMENTAL SITE ASSESSMENT** **(PROVIDED UNDER SEPARATE COVER)**
4. **HISTORICAL RESOURCE ASSESSMENT**
5. **ADJACENT LANDOWNER CONSULTATION & OTHER CORRESPONDENCE**
   - MAP & LETTER SENT TO NEIGHBORS
   - NEIGHBORHOOD COMMENTS
   - MAP FROM SMRID
   - MAP FROM FORTIS
   - MAP FROM ALBERTA ENERGY REGULATOR
   - MAP FROM ATCO GAS
   - MAP FROM COUNTY OF LETHBRIDGE RURAL WATER ASSOCIATION
   - LETHBRIDGE COUNTY MAP "DEVELOPMENT CONSIDERATION"
6. **SEPTIC FEASIBILITY ASSESSMENT** **(PROVIDED UNDER SEPARATE COVER)**
7. **STORMWATER MANAGEMENT PLAN**
8. **SUNNY VIEW ASP CONCEPT DESIGN**
9. **ALBERTA TRANSPORTATION-PORTION OF FIGURE 5.2.3 (LETHBRIDGE AND AREA NHS & NSTC FUNCTIONAL PLANNING STUDY, MARCH 12, 2004 – STANTEC)**

APPENDIX 1

Property Ownership Titles

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0031 401 425	4;21;9;28;NW	091 049 136

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 28
THAT PORTION OF THE SOUTHERLY 313 FEET IN PERPENDICULAR WIDTH THROUGHOUT OF THE NORTH WEST QUARTER WHICH LIES BETWEEN THE EAST LIMIT OF CANAL RIGHT OF WAY ON PLAN 0510395 AND THE EAST LIMIT OF CANAL RIGHT OF WAY ON PLAN IRR55
EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

ESTATE: FEE SIMPLE

MUNICIPALITY: LETHBRIDGE COUNTY

REFERENCE NUMBER: 061 010 978

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
091 049 136	23/02/2009	TRANSFER OF LAND	$345,000	$345,000

OWNERS

RYAN GARRET VAN EEDEN PETERSMAN

AND
KAREN VIRGINIA VAN EEDEN PETERSMAN
BOTH OF:
R.R. 8, SITE 41, COMP 15
LETHBRIDGE
ALBERTA T1J 4P4
AS JOINT TENANTS

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
7586LJ .	03/11/1972	CAVEAT

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
		CAVEATOR - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED.
731 064 400	22/10/1973	UTILITY RIGHT OF WAY GRANTEE - FORTISALBERTA INC. 320 - 17 AVENUE S.W. CALGARY ALBERTA T2S2Y1 "PORTION DESCRIBED" (DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 001299373) (DATA UPDATED BY: CHANGE OF NAME 051006146)
761 094 355	26/07/1976	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE ST. MARY RIVER IRRIGATION DISTRICT
911 208 327	17/09/1991	CAVEAT RE : EASEMENT CAVEATOR - THE BOARD OF DIRECTORS OF THE ST. MARY RIVER IRRIGATION DISTRICT BOX 278 LETHBRIDGE ALBERTA J1J3Y7
001 070 445	15/03/2000	EASEMENT OVER AND FOR BENEFIT OF: (SEE INSTRUMENT)

TOTAL INSTRUMENTS: 005

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 22 DAY OF JULY, 2020 AT 04:31 P.M.

ORDER NUMBER: 39774534

CUSTOMER FILE NUMBER: 208645

REGISTRAR OF LAND TITLES

END OF CERTIFICATE

THIS ELECTRONICALLY TRANSMITTED LAND TITLES PRODUCT IS INTENDED FOR THE SOLE USE OF THE ORIGINAL PURCHASER, AND NONE OTHER, SUBJECT TO WHAT IS SET OUT IN THE PARAGRAPH BELOW.

THE ABOVE PROVISIONS DO NOT PROHIBIT THE ORIGINAL PURCHASER FROM INCLUDING THIS UNMODIFIED PRODUCT IN ANY REPORT, OPINION, APPRAISAL OR OTHER ADVICE PREPARED BY THE ORIGINAL PURCHASER AS PART OF THE ORIGINAL PURCHASER APPLYING PROFESSIONAL, CONSULTING OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0015 110 463	927LK;1;1	161 045 741

LEGAL DESCRIPTION
PLAN 927LK
BLOCK 1
LOT 1
EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME
AREA: 9.98 HECTARES (24.65 ACRES) MORE OR LESS

ESTATE: FEE SIMPLE
ATS REFERENCE: 4;21;9;28;E

MUNICIPALITY: LETHBRIDGE COUNTY

REFERENCE NUMBER: 121 127 186

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
161 045 741	18/02/2016	TRANSFER OF LAND	$600,000	$600,000

OWNERS

1946291 ALBERTA LTD.
OF 94054 HWY 843
LETHBRIDGE
ALBERTA T1J 5R2
(DATA UPDATED BY: CHANGE OF ADDRESS 171243340)

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
8048GH .	02/01/1952	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. AS TO PORTION OR PLAN:GL95 "16.5 FT. STRIP"
1648LO .	07/07/1972	CAVEAT

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
		RE : EASEMENT CAVEATOR - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED.
851 074 023	08/05/1985	CAVEAT RE : EASEMENT CAVEATOR - THE BOARD OF DIRECTORS OF ST. MARY RIVER IRRIGATION DISTRICT. P.O. BOX 278, LETHBRIDGE ALBERTA T1J3Y7 AGENT - F J BREWIN
111 123 556	19/05/2011	UTILITY RIGHT OF WAY GRANTEE - ATCO GAS AND PIPELINES LTD.
161 045 742	18/02/2016	MORTGAGE MORTGAGEE - SERVUS CREDIT UNION LTD. 151 KARL CLARK RD NW EDMONTON ALBERTA T6N1H5 ORIGINAL PRINCIPAL AMOUNT: $450,000
161 045 743	18/02/2016	CAVEAT RE : ASSIGNMENT OF RENTS AND LEASES CAVEATOR - SERVUS CREDIT UNION LTD. 151 KARL CLARK RD NW EDMONTON ALBERTA T6N1H5 AGENT - SARAH A BAINBRIDGE
171 029 546	01/02/2017	WRIT CREDITOR - FRIEDA SANFORD 1601-25 AVE NORTH LETHBRIDGE ALBERTA T1H4N8 DEBTOR - PATRICK WAGNER RR 8, SITE 41, COMP 18 LETHBRIDGE ALBERTA T1J4P4 AMOUNT: $1,976 AND COSTS IF ANY ACTION NUMBER: 1606 00837

TOTAL INSTRUMENTS: 007

(CONTINUED)

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 1 DAY OF SEPTEMBER, 2020 AT 03:05 P.M.

ORDER NUMBER: 40022907

CUSTOMER FILE NUMBER: 208645LS

END OF CERTIFICATE

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0019 482 926	927LK;1;2	161 154 313

LEGAL DESCRIPTION
PLAN 927LK
BLOCK 1
LOT 2
EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME
AREA: 8.1 HECTARES (20.02 ACRES) MORE OR LESS

ESTATE: FEE SIMPLE
ATS REFERENCE: 4;21;9;28;E

MUNICIPALITY: LETHBRIDGE COUNTY

REFERENCE NUMBER: 121 127 186 +1

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
161 154 313	05/07/2016	TRANSFER OF LAND	$405,000	$405,000

OWNERS

KENNETH DALE SMITH
OF 5710-57 ST
TABER
ALBERTA T1G 1L1

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
8048GH .	02/01/1952	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. AS TO PORTION OR PLAN:GL95 "16.5 FT STRIP"
1648LO .	07/07/1972	CAVEAT

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
		RE : EASEMENT CAVEATOR - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED.
851 073 950	08/05/1985	CAVEAT RE : EASEMENT CAVEATOR - THE BOARD OF DIRECTORS OF ST. MARY RIVER IRRIGATION DISTRICT. P.O. BOX 278, LETHBRIDGE ALBERTA T1J3Y7 AGENT - F J BREWIN
111 123 556	19/05/2011	UTILITY RIGHT OF WAY GRANTEE - ATCO GAS AND PIPELINES LTD.

TOTAL INSTRUMENTS: 004

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 1 DAY OF SEPTEMBER, 2020 AT 03:31 P.M.

ORDER NUMBER: 40023326

CUSTOMER FILE NUMBER: 208645LS

END OF CERTIFICATE

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0016 608 770	8010198;2;1	911 153 848

LEGAL DESCRIPTION
PLAN 8010198
BLOCK 2
LOT 1
EXCEPTING THEREOUT ALL MINES AND MINERALS
AREA: 14.1 HECTARES (34.84 ACRES) MORE OR LESS

ESTATE: FEE SIMPLE
ATS REFERENCE: 4;21;9;28

MUNICIPALITY: LETHBRIDGE COUNTY

REFERENCE NUMBER: 861 107 528

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
911 153 848	16/07/1991	TRANSFER OF LAND	$45,000	SEE INSTRUMENT

OWNERS

RICHARD MICHAEL ALDOFF

AND
CAROL ANN ALDOFF
BOTH OF:
S S 1-2-49
LETHBRIDGE
ALBERTA T1J 4B3
AS JOINT TENANTS

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
741 021 660	08/03/1974	UTILITY RIGHT OF WAY GRANTEE - FORTISALBERTA INC. 320 - 17 AVENUE S.W.

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
		CALGARY ALBERTA T2S2Y1 "30 FT STRIP" (DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 001298059) (DATA UPDATED BY: CHANGE OF NAME 051006321)
761 133 668	29/10/1976	CAVEAT CAVEATOR - CONOCOPHILLIPS CANADA OPERATIONS LTD. P.O. BOX 4365, POSTAL STATION C CALGARY ALBERTA T2T5N2 AGENT - KATHY M TROFIN (DATA UPDATED BY: CHANGE OF ADDRESS 031242905) (DATA UPDATED BY: TRANSFER OF CAVEAT 091085519) (DATA UPDATED BY: TRANSFER OF CAVEAT 091210804)
791 020 979	09/02/1979	UTILITY RIGHT OF WAY GRANTEE - CONOCOPHILLIPS CANADA OPERATIONS LTD. "SW 1/4" (DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 091205485)
791 020 980	09/02/1979	UTILITY RIGHT OF WAY GRANTEE - CONOCOPHILLIPS CANADA OPERATIONS LTD. "SW 1/4 OF SEC 28-9-21-4" (DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 091205451)
791 020 981	09/02/1979	UTILITY RIGHT OF WAY GRANTEE - CONOCOPHILLIPS CANADA OPERATIONS LTD. "SW 1/4 SEC 28-9-21-4" (DATA UPDATED BY: TRANSFER OF UTILITY RIGHT OF WAY 091205485)
971 093 143	05/04/1997	CAVEAT RE : EASEMENT CAVEATOR - THE BOARD OF DIRECTORS OF ST. MARY RIVER IRRIGATION DISTRICT. P.O. BOX 278, LETHBRIDGE ALBERTA T1J3Y7
991 292 262	07/10/1999	MORTGAGE MORTGAGEE - ALBERTA TREASURY BRANCHES. 601 MAYOR MAGRATH DR.S LETHBRIDGE ALBERTA

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
		ORIGINAL PRINCIPAL AMOUNT: $55,000
001 225 359	12/08/2000	AMENDING AGREEMENT AMOUNT: $77,300 AFFECTS INSTRUMENT: 991292262
021 035 034	29/01/2002	UTILITY RIGHT OF WAY GRANTEE - COUNTY OF LETHBRIDGE RURAL WATER ASSOCIATION LIMITED.
021 365 728	18/10/2002	CAVEAT RE : OPTION TO PURCHASE CAVEATOR - ST MARY RIVER IRRIGATION DISTRICT. P.O. BOX 278 LETHBRIDGE ALBERTA T1J3Y7
111 222 936	31/08/2011	UTILITY RIGHT OF WAY GRANTEE - ATCO GAS AND PIPELINES LTD.

TOTAL INSTRUMENTS: 011

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 22 DAY OF JULY, 2020 AT 04:31 P.M.

ORDER NUMBER: 39774534

CUSTOMER FILE NUMBER: 208645

END OF CERTIFICATE

APPENDIX 2

Geotechnical Evaluation

PROVIDED UNDER SEPARATE COVER

APPENDIX 3

Environmental Site Assessment

PROVIDED UNDER SEPARATE COVER

APPENDIX 4

Historical Resource Assessment

Listing of Historic Resources - Historic Resource Values

7/7/2021, 5:45:43 PM

HRV 4

HRV 5

Alberta Township Survey (ATS)

1:18,056

0 0.13 0.25 0.5 mi

0 0.23 0.45 0.9 km

City of Lethbridge, Province of Alberta, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA, AAFC, NRCan

ArcGIS Web AppBuilder

Activities planned for lands not included in the Listing of Historic Resources may still require Historical Resources Act approval. The results of a Listing search MUST be used in conjunction with the information provided in the Instructions for Use of the Listing of Historic Resources.

Alberta Culture and Tourism

Land Use Procedures Bulletin

Historic Resources Management
Old St. Stephen's College
8820 – 112 Street
Edmonton, Alberta
T6G 2P8
www.culture.alberta.ca/hrm

Subdivision *Historical Resources Act* Compliance

PURPOSE: To identify the circumstances under which proposed subdivisions require *Historical Resources Act* approval and to provide guidelines for the submission of applications to obtain approval.

SCOPE: Subdivision applicants, developers, municipalities, and other planning authorities in Alberta.

BACKGROUND: In accordance with Section 5(5) of the Subdivision and Development Regulation, applications for subdivision of areas containing or likely to contain historic resources must be referred to Alberta Culture and Tourism. This applies equally to private and public lands.

PROCEDURES - ROUTINE:

Subdivision

The subdivision authority and/or the owner/developer must consult Alberta Culture and Tourism's *Listing of Historic Resources*[1] to determine if the lands that are subject to subdivision have been flagged as having a **Historic Resource Value (HRV)**.

1. **If the subject lands do not overlap areas identified in the *Listing of Historic Resources*,** *Historical Resources Act* approval is not required, although the provisions of Section 31 of the *Historical Resources Act* still apply.[2]

[1] Alberta Culture and Tourism's *Listing of Historic Resources* is a publically available list of lands that contain, or are likely to contain, significant historic resources. Updated twice yearly, the *Listing* is an information resource for residential, commercial, and industrial developers and can guide the regulatory approval process. The *Listing* and Instructions for Use are available at: https://www.alberta.ca/listing-historic-resources.aspx.

[2] It is important to note that, even if *Historical Resources Act* approval is not required prior to the initiation of land surface disturbance activities, or if *Historical Resources Act* approval has been granted, Section 31 of the *Act* requires that anyone who discovers a historic resource, such as an archaeological, palaeontological, historic structures or Aboriginal Traditional Use site, during the course of development activities must cease work and notify Alberta Culture and Tourism immediately for further direction on the most appropriate action. Details about who to contact can be found in Standard Requirements under the *Historical Resources Act*: Reporting the Discovery of Historic Resources.

2. **If the subject lands wholly or partially overlap areas identified as having an HRV of 1, 2, 3, or 4 in the *Listing of Historic Resources***, *Historical Resources Act* approval is required. A Historic Resources (HR) Application must be submitted to Alberta Culture and Tourism via the Online Permitting and Clearance (OPaC) system.[3] Development activities, including any land disturbance, may not proceed until *Historical Resources Act* approval has been obtained in writing.[4]

3. **If the subject lands wholly or partially overlap areas identified as having an HRV of 5 (and no other value) in the *Listing of Historic Resources***, *Historical Resources Act* approval must be obtained through the submission of an HR Application, with the following exceptions:

    - First parcel out
    - 80-acre split
    - Lot line/boundary adjustment
    - Parcel consolidation

    Subdivisions for these four purposes do not require *Historical Resources Act* approval if situated in lands assigned an HRV of 5 only. Subdivision of HRV 5 lands for all other purposes do require *Historical Resources Act* approval, and development, including any land disturbance, may not proceed until this approval has been obtained in writing.

Lands that contain, or are likely to contain, significant historic resources may require the conduct of a Historic Resources Impact Assessment (HRIA) prior to development. If required, this direction will be communicated in Alberta Culture and Tourism's response to the HR application. An HRIA must be conducted by a qualified heritage consultant on behalf of the developer, at the developer's expense. Results of the HRIA must be reported to Alberta Culture and Tourism and subsequent *Historical Resources Act* approval must be granted before development proceeds.

Where a proposed subdivision includes lands that overlap areas with HRVs on the Listing, a Subdivision Authority may choose to submit the details for review in an HR Application prior to subdivision approval or condition *Historical Resource Act* approval as part of their subdivision approval. In these instances, no development activities are to commence until *Historical Resources Act* approval has been granted.

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[3] Information regarding Historic Resources Applications and the OPaC system can be found at: https://www.alberta.ca/online-permitting-clearance.aspx.

[4] Where *Historical Resources Act* approval is required, the Historic Resources Application must include all lands in the subdivision area, not just those identified as having an HRV.

Area Structure and Redevelopment Plans

Alberta Culture and Tourism recommends that municipalities and/or developers submit for review through the OPaC system, all Area Structure Plans, Area Redevelopment Plans, and other long-term planning documents. The outcome of this review will provide the applicant with information about historic resource concerns in the planning areas and may offer guidance for developing strategies to address these concerns.

PROCEDURES – NON-ROUTINE:

Notwithstanding the instruction provided above, if Alberta Culture and Tourism is made aware of historic resource concerns associated with lands not included in the *Listing of Historic Resources,* direction may be given to submit an HR application. This direction is made under Section 37(2) of the *Historical Resources Act* and can be applied to any type of project.

For further information please contact:

Head, Regulatory Approvals & Information Management
Historic Resources Management Branch
Alberta Culture and Tourism

Approved by: Darryl Bereziuk, Director, Archaeological Survey

Date: January 22, 2019

APPENDIX 5

Adjacent Landowner Consultation and other Correspondence

- Map & Letter Sent To Neighbors
- Neighborhood Comments
- Map from SMRID
- Map from Fortis
- Map from Alberta Energy Regulator
- Map from ATCO Gas
- Map from County of Lethbridge Rural Water Association
- Lethbridge County Map “Development Consideration”

Map & Letter Sent To Neighbors

CONSULTING ENGINEERS, PLANNERS & LAND SURVEYORS
255 – 31st Street North, Lethbridge, Alberta, T1H 3Z4
PH: (403) 329-0050 FAX: (403) 329-6594
Email: geomart@mgcl.ca

May 2nd, 2022 File: 208645CE

Dear Neighbor:

Re: Proposed Subdivision – Area Structure Plan
Lethbridge County, Alberta
Sec. 28-9-21-W4

We are writing to provide notification and to seek feedback regarding a new country residential development being planned in your community. We are preparing an Area Structure Plan report in support of a twenty-seven lot subdivision located at the properties of Rick Aldoff, Ken Smith, and Pat Wagner along Highway 843, Township roads 94-A and 94-B. The development would follow the Lethbridge County Land Use Bylaw for Group Country Residential zoning. The concept drawings are attached for your reference.

A brief description of the planned development follows:

The 27 lot country residential subdivision is located along Highway 843, approximately 1 kilometer north of 62 Avenue North which is the City of Lethbridge boundary. Existing rural residential properties border the development area to the south, the Saint Mary River Irrigation District (SMRID) canal borders the property to the west, and an SMRID pipeline right-of-way borders the north of the property. Each of the 27 lots would be a minimum of 2 acres in area. There would be a graveled public roadway constructed as an extension to Township Road 94A, which would loop through the development and ultimately connect with Highway 843. In order to manage runoff, three storm water ponds would be built within the development. Surrounding the ponds would be landscaped areas to function as public green spaces. Potable water servicing is anticipated to be provided by the County of Lethbridge Rural Water Association or an approved alternate system. Private septic systems will be used to provide on-site wastewater treatment and disposal for each individual lot. Utility servicing would be provided to each lot, including electricity, natural gas, and telecommunications. A community irrigation system is planned to supply untreated irrigation water to each lot for lawn and garden use. Architectural controls are intended to help ensure a high quality development. A phased development plan is anticipated with about 3 phases of construction. The demands of the housing market would influence the timing of each phase.

If you have any comments or concerns about the proposed development, please feel free to contact one of the owners or Martin Geomatic Consultants Ltd. (MGCL) at the contact information listed below. (Please note that if your comment or concerns are technical in nature please contact Matt Redgrave or Ray Martin at MGCL for further assistance)

Owners:

Rick and Carol Aldoff
3601 Redwood Road South,
Lethbridge County, Alberta, T1J 5R2
(403)382-1136
silverspurex@hotmail.com

Ken Smith
3494046 Highway 843
Lethbridge County, Alberta, T1J 5R3
(587)220-4290
Medieval.ken@outlook.com

Pat Wagner
94054 Highway 843,
Lethbridge County, Alberta, T1J 5R2
(403)359-0858
carbonfiberresin@gmail.com

Consultant:

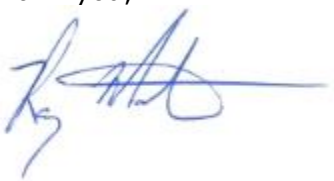
Martin Geomatic Consultants Ltd. (MGCL):

Attention: Ray Martin, P.Eng.,
255 – 31st Street North, Lethbridge, Alberta, T1H 3Z4
(403) 329-0050
raym@mgcl.ca

It would be appreciated if we could receive your comments by May 10th, 2022.We will respond to and address any comments received.

If you do not have any concerns with the proposed development, please read and sign the box below, and provide a copy to one of the contacts above.

Thank you,



Ray Martin, P.Eng
Civil Engineer

I, _____(print names),

of _____(address),

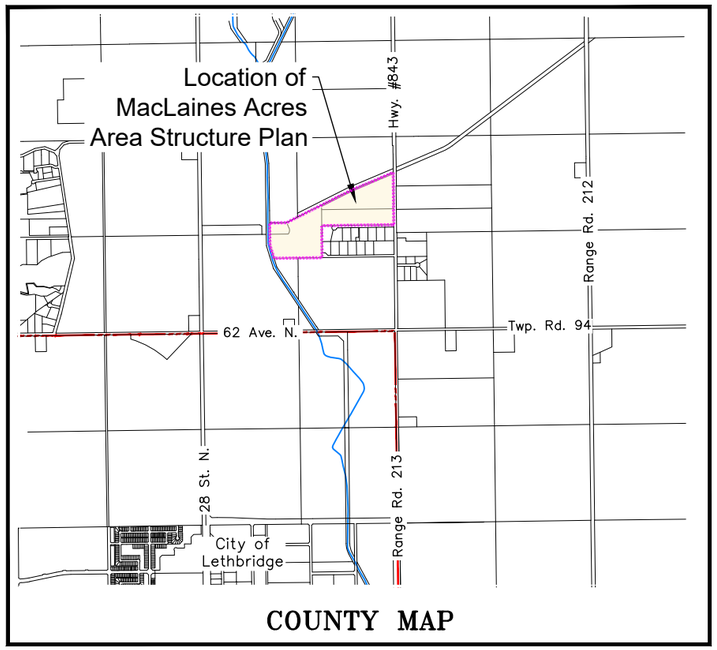
have received the letter and concept drawings from MGCL, dated May 2nd, 2022 outlining the planned 27 lot rural residential development (Aldoff, Smith, Wagner) in Sec-28-9-21 W4M, Lethbridge County.

I have reviewed the letter and concept plans and have no concerns with the proposed development at this time, based on the information received.

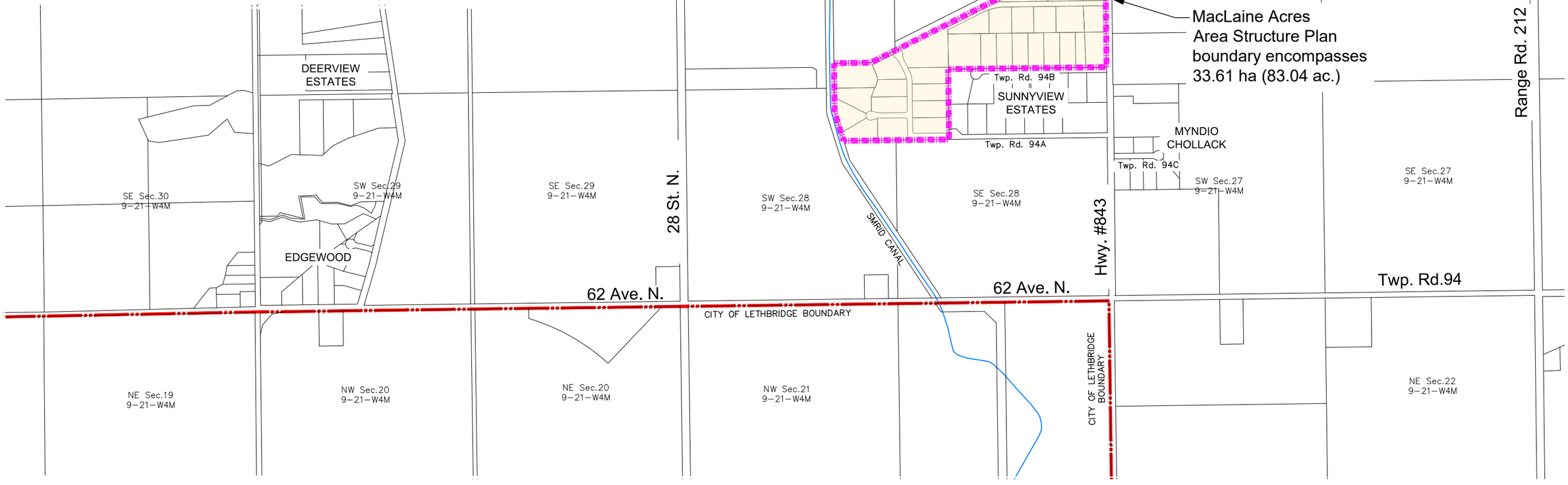
Regards,

_____(sign names)

_____(date)



COUNTY MAP



MacLaine Acres

AREA STRUCTURE PLAN

Nov 30, 2021

MARTIN
GEOMATIC CONSULTANTS
Consulting Engineers, Planners, and Land Surveyors
255-31st Street North Lethbridge, Alberta T1H 3Z4
Ph: (403) 329-0050 E-mail: geomart@mgcl.ca Fax: (403) 329-6594

GENERAL LOCATION PLAN
FIGURE 1.0

208645CE

LEGEND

- ASP BOUNDARY
- PHASE 1A
- PHASE 1B
- IF REQUIRED BY COUNTY, CAVEATS TO BE PLACED ON THESE LOTS TO PREVENT CONSTRUCTION

NOTES:

- PHASE 1A, 1B & 2 MAY BE DEVELOPED IN SMALLER SUB PHASES
- LOT SIZES AND CONFIGURATION MAY VARY SLIGHTLY AT THE TIME OF FINAL DESIGN. CHANGES WILL BE SUBJECT TO COUNTY APPROVAL.

MacLaine Acres

AREA STRUCTURE PLAN

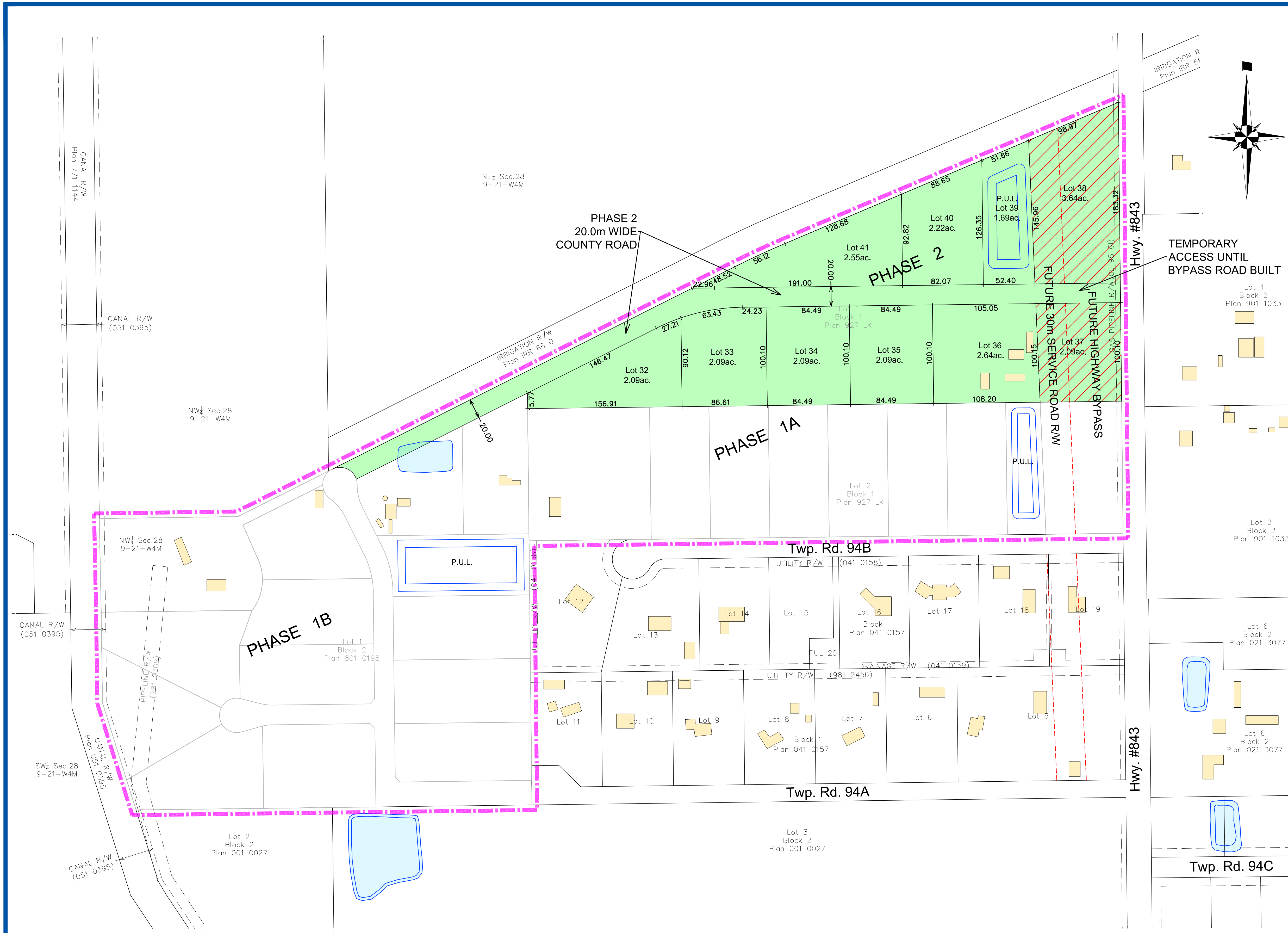
Nov 30, 2021

LOT LAYOUT - PHASE 1

FIGURE 5A

MARTIN GEOMATIC CONSULTANTS
Consulting Engineers, Planners, and Land Surveyors
255-31st Street North Lethbridge, Alberta T1H 3Z4
Ph: (403) 329-0050 E-mail: geomart@mgcl.ca Fax: (403) 329-6594

208645CE



LEGEND

ASP BOUNDARY

PHASE 2

IF REQUIRED BY COUNTY, CAVEATS TO BE PLACED ON THESE LOTS TO PREVENT CONSTRUCTION

NOTES:

- PHASE 1A, 1B & 2 MAY BE DEVELOPED IN SMALLER SUB PHASES
- LOT SIZES AND CONFIGURATION MAY VARY SLIGHTLY AT THE TIME OF FINAL DESIGN. CHANGES WILL BE SUBJECT TO COUNTY APPROVAL.

MacLaine Acres

AREA STRUCTURE PLAN

Nov 30, 2021

LOT LAYOUT - PHASE 2

FIGURE 5B

208645CE

MARTIN
GEOMATIC CONSULTANTS
Consulting Engineers, Planners, and Land Surveyors
255-31st Street North Lethbridge, Alberta T1H 3Z4
Ph: (403) 329-0050 E-mail: geomart@mgcl.ca Fax: (403) 329-6594

Neighborhood Comments

raym@mgcl.ca

From:	bhuizing@xplornet.com
Sent:	Thursday, December 30, 2021 6:48 PM
To:	mattr@mgcl.ca
Cc:	raym@mgcl.ca
Subject:	Proposed Subdivision
Follow Up Flag:	Follow up
Flag Status:	Flagged

1. We are very concerned about the proposed subdivision! We first bought an acreage to get away from the city. Now this will become a high density living area. Not what we had anticipated in our future.

2. The water table in our area is high enough now with the way things are. Our sump pump runs too much now, especially when our neighbor to the north (proposed developer) waters his field endlessly for no apparent reason.

3. The previous owner of the farm assured us that no one will build across from us. As stated previously, we came to the country to get away from people. We do not want more here to add to traffic, dogs and other animals. When we first purchased our acreages, we had to sign off that there were not to be any farm animals allowed. We know there are dogs in the area that wander in packs, and create damage. We don't need to have more dogs running around and defecating in our yards!

Sincerely,

Bernie & Holly Huizing

2B5 - 31st. North

I, Neal DeKens (print names),

of #28-94032 Hwy 843 (address),

have received the letter and concept drawings from MGCL, dated May 2nd, 2022 outlining the planned 27 lot rural residential development (Aldoff, Smith, Wagner) in Sec-28-9-21 W4M, Lethbridge County.

I have reviewed the letter and concept plans and have ~~no~~ * concerns with the proposed development at this time, based on the information received.

Regards,

Neal DeKens (sign names)

May 31/2022 (date)

403-635-5323

(1) You cannot put in any new accesses untill Hwy 843 is Paved, at the present time it can not be maintained as is.

(2) also there isn't enough water Coop permits

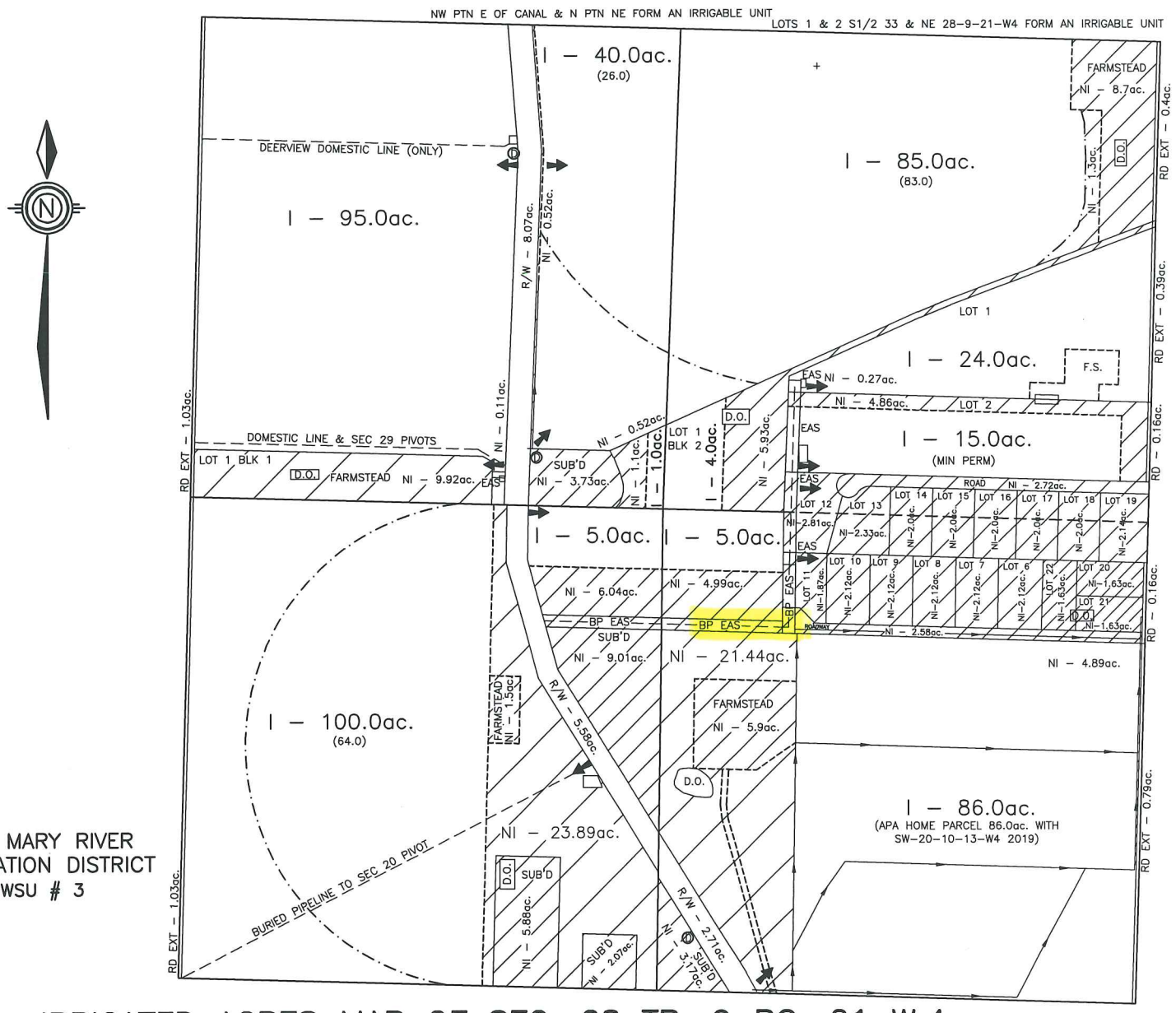
(3) if & when development happens has to ~~be paved~~ be PAved. 94A Twp Rd 94032

(4) IN YOUR Report, it shows 16 should be ~~only~~ 8 parcels, SUNNYVIEW ~~estates~~ MYNDIO's is also - 8 parcels ~~Not~~ ~~Myndio~~ - chollack PARcels is across Hwy 843

(5) it is to close to

MARTIN GEOMATIC CONSULTANTS LTD

Map from SMRID



ST. MARY RIVER
IRRIGATION DISTRICT
WSU # 3

IRRIGATED ACRES MAP OF SEC. 28 TP. 9 RG. 21 W.4

LEGEND

- I – 0.0ac. — IRRIG. AREAS (CLEAR)
- NI – 0.0ac. — NOT IRRIGATED
- APA — ALTERNATE PARCEL AGREEMENT
- POINT OF DELIVERY
- DOMESTIC TURNOUT
- PUMP SITE
- FARM IRRIGATION DITCH
- F.S. — FARMSTEAD
- D.O. — DUGOUT
- DRAINAGE CHANNEL
- FIELD BOUNDARY
- BURIED PIPE
- BP EAS — BURIED PIPELINE EAS
- BOUNDARY OF SPRINKLED AREA

	S.E.	S.W.	N.W.	N.E.
IRR.	91.0	105.0	136.0	128.0
N.I.	65.34	48.39	15.9	31.05
R/W	2.71	5.58	8.07	
RD EXT	0.95	1.03	1.03	0.95
TOTAL	160.0	160.0	161.0	160.0

REPLACING IRRIGATED ACRES MAP DATED DEC, 2018.

JULY 1, 2019.
DATE

Map from Fortis

Overhead Residential Subdivision - 19 Lots

FORTISALBERTA INC. TO SUPPLY/INSTALL:
-Approx. 120m of #1AL underground single phase primary conductor
  -Primary method of installation is road push
-Approx. 1070m of #2ACSR overhead single phase primary conductor
-2 - 15kVA(14/4-120/240V) pole-mount transformers
-7 - 25kVA(14/4-120/240V) pole-mount transformers
-1 - 50kVA(14/4-120/240V) pole-mount transformers
  -Type of Metering - Self contained metering (200A)

CUSTOMER RESPONSIBLE FOR:
-All secondary conductors and work
-Providing meter socket within Fortis' required distance*
  *Please refer to the Service and Metering Guide
-Providing a civic address if available.

Quote contingent to all outside approvals
Cost does not include brushing or easements
Final location of structures to be determined at time of design

Note:
Budgetary Estimate. Cost cannot be accepted
A Site Check will need to be performed
to provide a firm-cost estimate.

*****BUDGETARY ESTIMATE*****
COST CANNOT BE ACCEPTED

25kVA (120/240V)
25kVA (120/240V)
25kVA (120/240V)
15kVA (120/240V)
25kVA (120/240V)
15kVA (120/240V)
50kVA (120/240V)
25kVA (120/240V)
25kVA (120/240V)

Phase 1 to be serviced from lines alone Twp RD 94B

IRRIGATION R/W

CANAL R/W

NW28 9-21-4

FortisAlberta Service and Metering Guide
Please advise your electrical contractor to follow and review FortisAlberta's Customer Service and Metering Guide online before starting your project as this document is occasionally updated.

Failure to adhere may add additional costs and delays to your project.
This document can be located on the website at www.fortisalberta.com. Under the "Customer Service" drop down, select "Meters" and then select "Download the Customer Service & Metering Guide".

Customer responsible for all secondary work
https://www.fortisalberta.com/docs/default-source/default-document-library/service-metering-guide.pdf

Preliminary Not For Construction

NOTES:

Budgetary Print

CONTACT FORTISALBERTA TO CONFIRM ON-SITE ALIGNMENTS AND POWER SOURCE LOCATION

LAND ONLY TO SCALE 1:4,000

Print

FORTIS ALBERTA

LEGEND:
RED — NEW PRIMARY
PURPLE — NEW SECONDARY
BLUE — SALVAGE
GREEN — BRUSHING
BLACK — EXISTING FACILITIES
MAGENTA — POSTED PROPOSED

Designer: Yau, Chris
Date: 9/8/2021
Customer: Maclaine Acres Residential Development
Location: NE28-09-21-W4
WO#/OI#:500096840

Map from Alberta Energy Regulator

Alberta Energy Regulator OneStop

Asset: Well Licences

Description

Well Licence Number: 0056743
Current Licensee Name: Husky Oil Operations Limited

Hyperlinks

Asset Report

Details

Well Licence Number
0056743

Well Name
HUSKY ETAL LETH. 11-28-9-21

Well Type
N/A

Well Symbol
Abandoned Gas

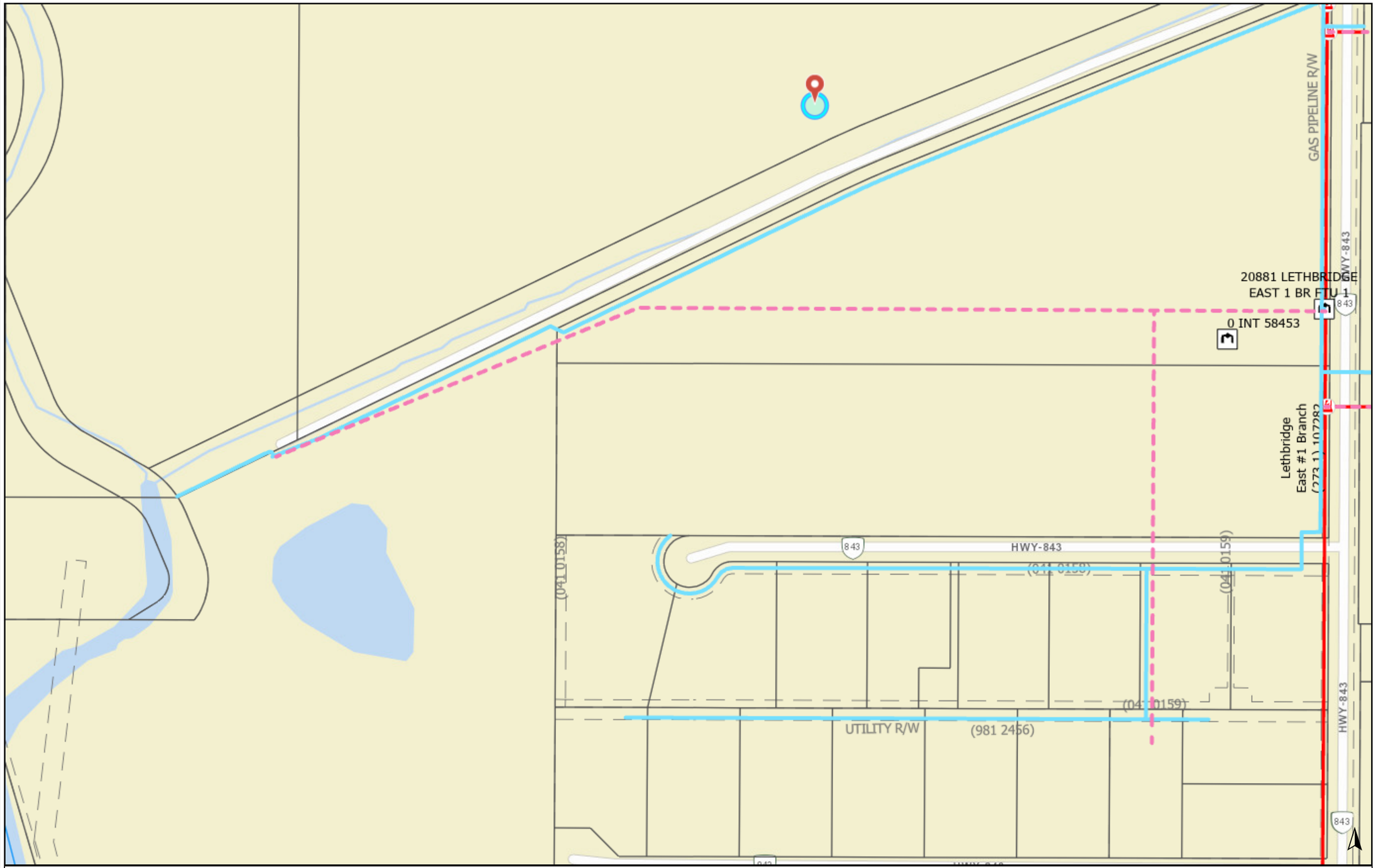
Is Well Sour
N

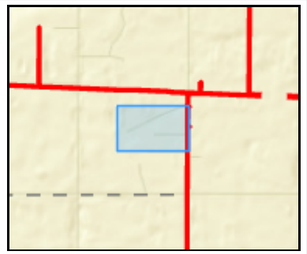
Current Licence Status
RecCertified

Current Licence Status Date

Map from ATCO Gas

MacLaine Acres ATCO Facilities





Legend

Distribution

- AB
- LP
- MP
- M1
- M2
- IP
- IP1
- IP2
- IP3
- IP4
- IP5
- IP6
- HP
- Regulator Station
- Rural Tap
- Controllable Valve
- Distribution Capital Project

Transmission

- Abandoned
- Decommissioned
- Operating
- Transmission Station
- Transmission Capital Project

Notes

0 300 600 m

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Map from County of Lethbridge Rural Water Association

Plan 2 - Hydraulic Analysis of Possible Additional Demand Units

On Jan 15, 2021 COLRWA requested that we complete a hydraulic analysis to check if there is capacity in the existing distribution system to add an 30units to the MacLaine Acres in Sec 28-9-21.

On Jan 26, 2021 we modeled and added the following demands (units) into the existing base model (See Plan 1):
- Total of 30units (15 Imp gpm) in NE28-9-21, 15 units to existing J-189 and 15units to existing J-347. Area immediately north of Lethbridge.

This Hydraulic Scenario:
- Existing water system at Max Demand (refer to Plan 1) plus the proposed additional unit demand noted above.

Results:
- Adding the above 30 unit (15 Igpm) results in approx 3psi pressure drop in the water distribution system north and NE of the City. This results in J-2932 falling below the recommended minimum pressure of 20psi, from 21.7 psi to 19.6psi.

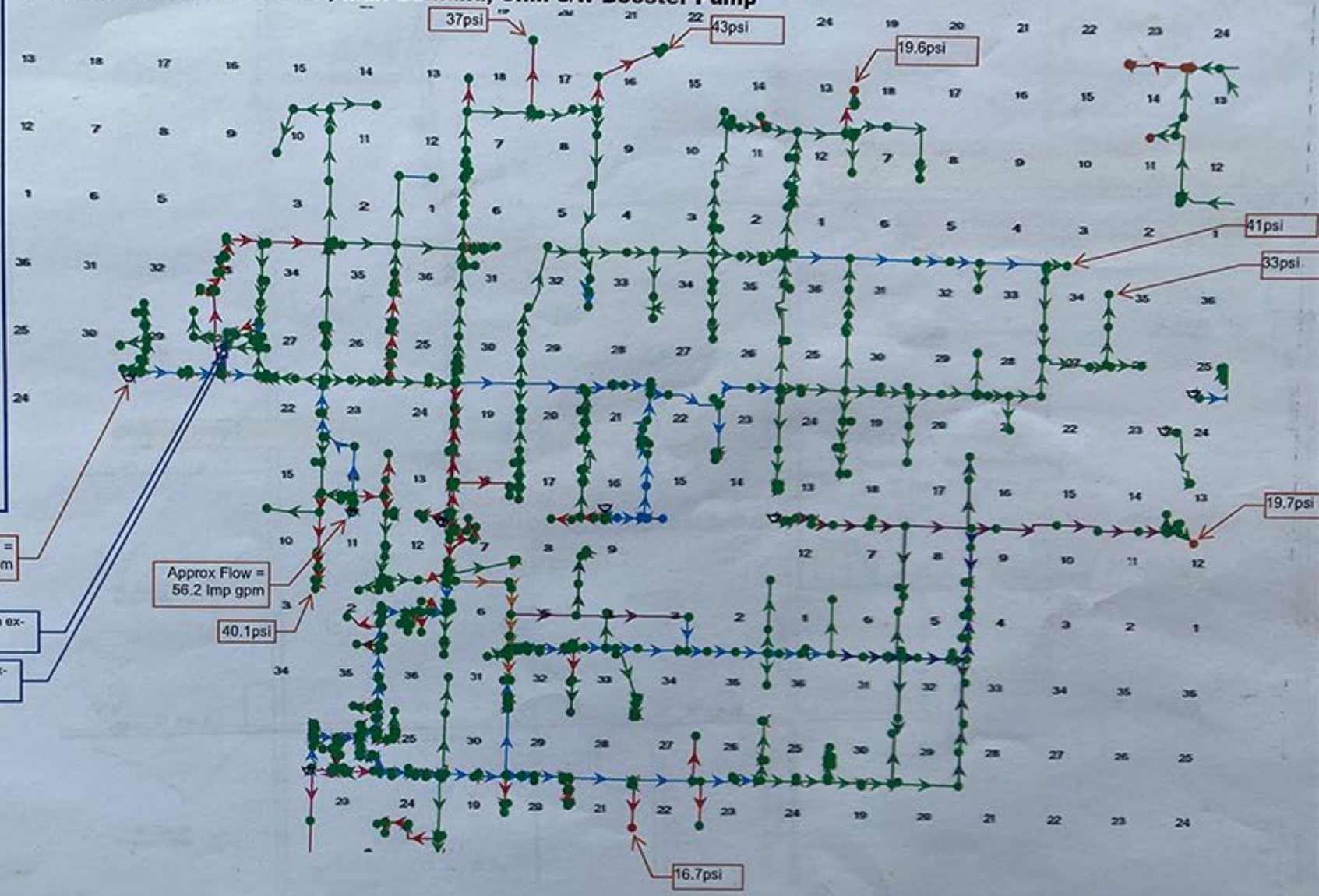
Options to maintain a minimum 20psi in the distribution system:

Option 1 - Reduce the amount of units from 30 to 25 available to the MacLaine Acres Development.

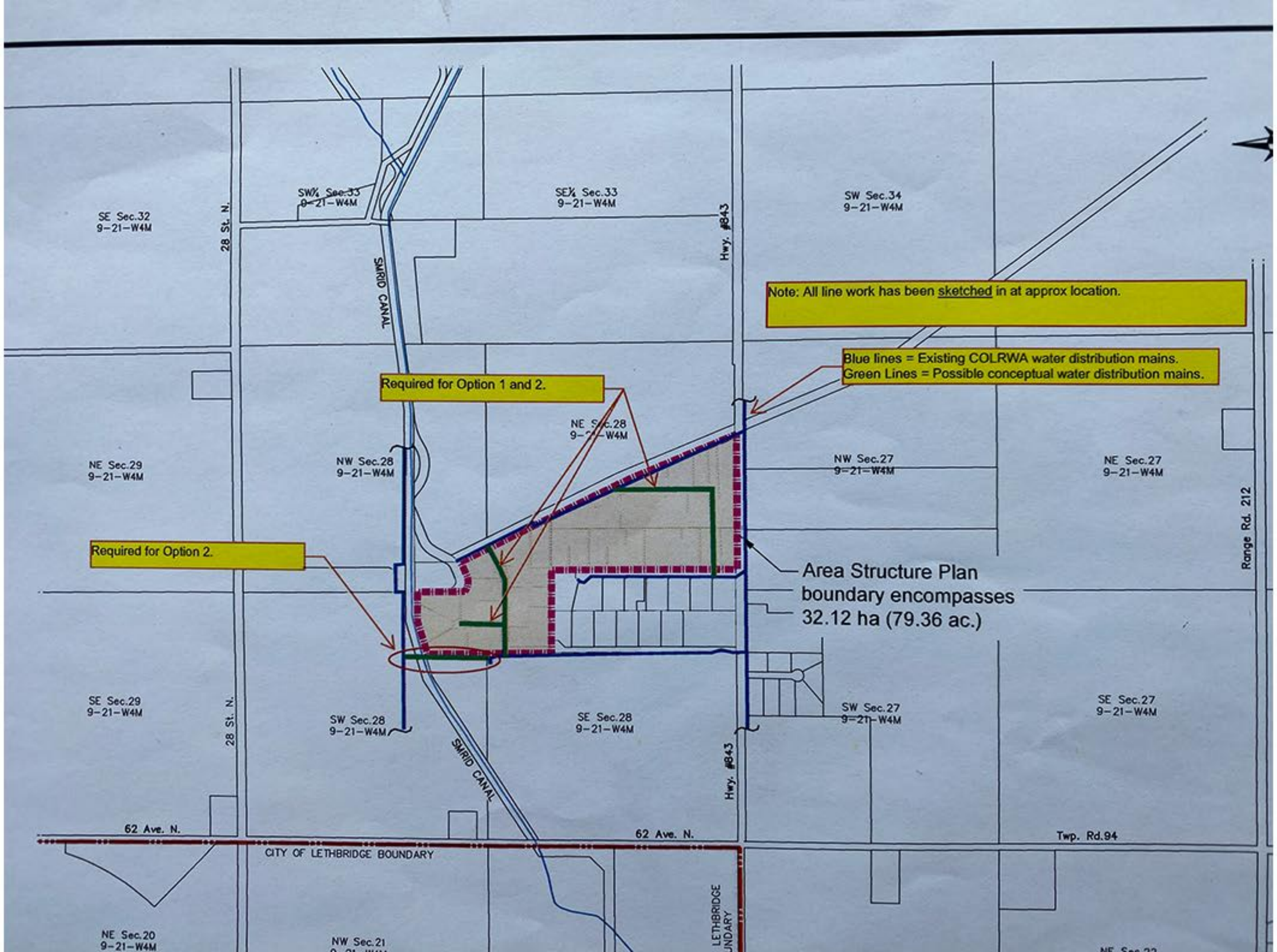
Option 2 - Install piping from 4" distribution main on the west side of canal, under canal, and tie to MacLaine Acres Development water looped main.

Barry Way
Jan 26, 2021

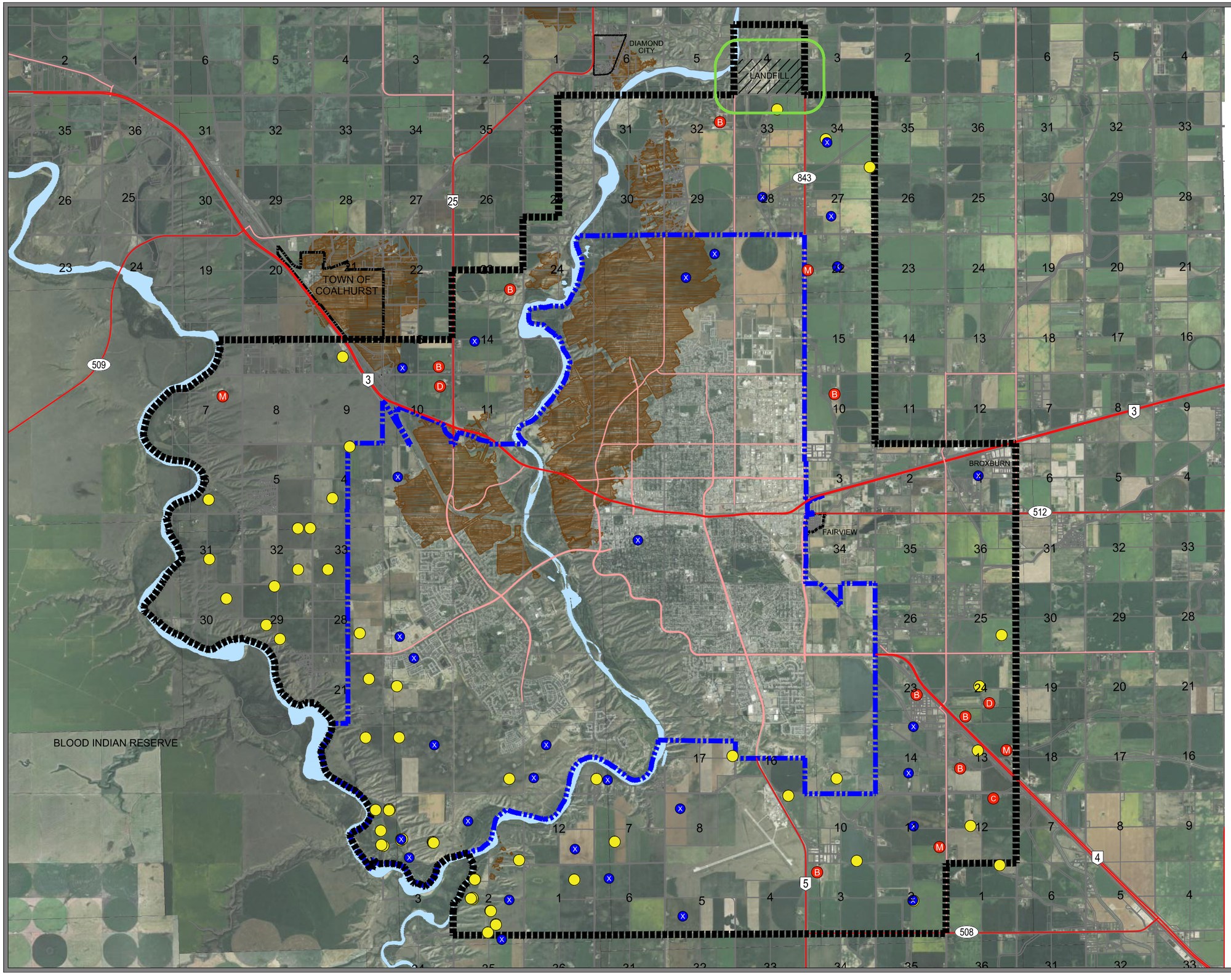
Scenario: CLRWA-Phase 2, Max Demand, Chin c/w Booster Pump



MacLaine Acres


SE Sec.32
9-21-W4M
28 St. N.
SW¼ Sec.33
9-21-W4M
SE¼ Sec.33
9-21-W4M
SMRID CANAL
Hwy. #843
SW Sec.34
9-21-W4M
Note: All line work has been sketched in at approx location.
Blue lines = Existing COLRWA water distribution mains.
Green Lines = Possible conceptual water distribution mains.
Required for Option 1 and 2.
NE Sec.28
9-21-W4M
NE Sec.29
9-21-W4M
NW Sec.28
9-21-W4M
NW Sec.27
9-21-W4M
NE Sec.27
9-21-W4M
Range Rd. 212
Required for Option 2.
Area Structure Plan
boundary encompasses
32.12 ha (79.36 ac.)
SE Sec.29
9-21-W4M
SW Sec.28
9-21-W4M
SE Sec.28
9-21-W4M
SW Sec.27
9-21-W4M
SE Sec.27
9-21-W4M
62 Ave. N.
62 Ave. N.
Twp. Rd.94
CITY OF LETHBRIDGE BOUNDARY
NE Sec.20
9-21-W4M
NW Sec.21

Lethbridge County Map “Development Consideration”



DEVELOPMENT CONSIDERATIONS

LEGEND

- CITY OF LETHBRIDGE
- IDP PLAN AREA
- PROVINCIAL HIGHWAY
- MAJOR ROAD
- LANDFILL
- 450m BUFFER FROM LANDFILL

ALBERTA ENERGY REGULATOR (AER) DATA - APRIL 2016

- UNDERGROUND COAL MINE
- GAS WELL
- GAS WELL - ABANDONED

CONFINED FEEDING OPERATION

- B — BEEF
- C — CHICKEN
- D — DAIRY
- M — MIXED

MAP 17

LETHBRIDGE COUNTY
(BYLAW NO. 1478)
& CITY OF LETHBRIDGE
(BYLAW NO. 6015)
INTERMUNICIPAL DEVELOPMENT PLAN

AERIAL PHOTO DATE: 2015
SCALE 1 : 85,000

N

September 08, 2016
N:\Lethbridge-County\Leth-City Leth-Cty- IDP\
Lethbridge City&County IDP 2016.dwg

APPENDIX 6

Septic Feasibility Assessment

PROVIDED UNDER SEPARATE COVER

APPENDIX 7

Stormwater Management Plan

STORMWATER MANAGEMENT PLAN (SWMP)
MACLAINE ACRES SUBDIVISION
SEC. 28-9-21-W4M
Lethbridge County
Alberta

Prepared for: **Rick Aldoff**
Pat Wagner
Ken Smith

File Number: **208645CE**

Dated: **May 2022**

TABLE OF CONTENTS

LIST OF TABLES (Included in body of report)

LIST OF FIGURES

APPENDIX

I. PROJECT BACKGROUND AND DRAINAGE FEATURES

The MacLaine Acres Subdivision is a proposed group country residential subdivision located along Highway #843 in Lethbridge County, approximately 1 km north of the Lethbridge City Limits. The legal property description is Section 28, Township 9, Range 21 West of the 4th Meridian. The irregularly shaped plan area is bound by an irrigation right of way and cropland to the north, Hwy-843 to the east, group country residential and cropland to the south, and an irrigation canal to the west. The plan location is illustrated in ***Figure 1 – Aerial Photo*** and provides context for the site and the surrounding lands.

This drainage report is being submitted in support of The MacLaine Acres Area Structure Plan (ASP) and rezoning application, for consideration by the Lethbridge County. The ASP plan area is 83.04 acres (33.61 ha). The proposal is to subdivide into 27 residential lots, 3 Public Utility Lots and road rights-of-way and to rezone the land from Lethbridge Urban Fringe (LUF) to Group Country Residential (GCR). The purpose of this report is to provide stormwater management strategies to guide the future development of the MacLaine Acres Subdivision.

A. Existing Site Features

A topographical site survey has been completed by Martin Geomatic Consultants Ltd and an existing surface terrain model has been created.

The area presently includes 4 parcels zoned LUF with four dwellings, multiple accessory buildings and a dugout. The land is generally flat with ground slopes of 0.5% to 2.0% with the majority of the site draining overland to the east and into the Highway 843 ditch system, with the rest of the site draining to the adjacent property on the north and south, draining to the Township road 94A ditch and two areas that do not drain overland.

Existing soil descriptions for the area include Orthic Dark Brown Chernozem on medium textured (L, SiL) sediments deposited by wind and water (LET)[a].

Fourteen boreholes[b] have been completed on site to determine soil conditions for the purpose of geotechnical investigations and general suitability of the proposed development. The fourteen boreholes were drilled to depths of 5.1m to 9.6m and generally found topsoil above clay, with groundwater depths ranging from 0.7m to 5.1m.

B. Existing Drainage Features

Drainage boundaries, storage depressions and flow conveyance routes were interpreted and are shown on ***Figure 2 – Existing Site & Drainage Features.***

C. Predevelopment Sub-Catchments

Table 1 presents the existing site (pre-development) the sub-catchments and sub-catchment parameters assumed in the pre-development model.

---

[a] *Alberta Soil Information Viewer*, Alberta Agriculture and Forestry, http://www4.agric.gov.ab.ca/agrasidviewer

MacLaine Acres Area Structure Plan, "Appendix 2, Geotechnical Evaluation", report prepared by Tetra Tech Canada Inc., October 2021. Which can be found attached to the ASP.

Table 1 - Pre-Development Sub-Catchment Parameters

Name	Area (ha)	Width (m)	Flow Length (m)	Slope (%)	Impervious (%)	Suction Head (mm)	Conductivity (mm/hr)	Initial Deficit (frac.)
Dugout	0.25	50	50	0.5	80	292.2	1	0.229
East	19.93	350	569	0.5	1	292.2	1	0.229
West-Central	10.66	300	355	0.5	10	292.2	1	0.229
West-NW	1.50	100	150	0.5	2	292.2	1	0.229
West-SE	0.68	80	85	0.5	0.5	292.2	1	0.229
West-SW	0.57	150	38	0.5	0.5	292.2	1	0.229
Total	33.58							

A brief description of the pre-development sub-catchment areas follows.

1. East sub-catchment - drains from west to east across the site and discharges to the west ditch of Highway 843. The high point of this catchment area is located on the south end of the west catchment boundary, at an approximate elevation of 907.2 m, and the low point is located at the northeast end of the site at an approximate elevation of 900.0 m. The East sub-catchment has two exiting dwellings and several accessory buildings, a water dugout for farm use, and a gravel access road along the northern boundary.
2. Dugout sub-catchment – this is the area of the existing a water dugout for farm use, that drains to itself. It does not have a discharge location.
3. West-NW sub-catchment drains from south to north and discharges to the property to the north.
4. West-SE sub-catchment drains from the NW to the SE and discharges to the Township road 94A ditch.
5. West SW sub-catchment drains from south to north and discharges to the property to the south.
6. West Central sub-catchment – drains to a topographical depression located in the center of the sub-catchment. The highpoint of this catchment area is along the west boundary at an approximate elevation of 908.6 m. The low point is located near the center of this catchment area at an approximate elevation 905.0 m. The stage storage curve for the depression is presented in Table 2. This sub-catchment spills over a low area to the east approximately where the drainage ROW is located on the properties to the east. Spill elevation is approximately 906.3. Calculations show that this catchment will not spill overland during a major storm event and empties through infiltration and evaporation. The West Central sub-catchment has two existing dwellings and several accessory buildings, a grass field area with a hobby horse track, and a gravel access road along the northern boundary.

Table 2 – Pre-Development West-Trap

Description	Elevation (m)	Depth (m)	Area (m^2)	Volume (m^3)
Bottom	905.0	0.0	0	0
	905.2	0.2	101	7
	905.4	0.4	535	65
	905.6	0.6	3367	414
	905.8	0.8	8015	1519
	906.0	1.0	14276	3718
	906.2	1.2	26001	7688
Spill	906.3	1.3	31539	10560
	906.4	1.4	38436	14054

II. PROPOSED DEVELOPMENT AND DRAINAGE

A. Proposed Development

The proposal is to create 27 Group Country Residential lots ranging from 2.5 to 3 acres (0.8 – 1.2 ha) in area by subdividing the lands.

Drainage patterns, runoff discharge rates and volumes will be affected by development. Development will increase the imperviousness within the plan area due to the addition of hard surfaces including roadways, building roofs, and driveways.

To mitigate increased runoff, the development will include detention storage on site with controlled release. Storage volumes and controlled release rates are to be designed not exceed:

- the pre-development release rate.
- 2.0 lps/ha release rate.

The proposed detention storage areas should be located in natural low areas to minimize material to be moved, area to be disturbed and simplify blending into the existing terrain. Table 3 shows the post - development catchment areas and the proposed stormwater storage pond locations.

Grass swales are planned as the primary conveyance of runoff and carry it away from the buildings and driving surfaces and towards the designated stormwater storage areas. ***Figure 3 – Stormwater Management*** *Plan* shows the location of proposed detention ponds, ditches and swales.

B. Proposed Development Sub-catchments

The proposed post-development sub-catchments and there modeling parameters are presented in Table 3

Table 3 – Post Development Sub-Catchment Parameters

Name	Area (ha)	Width (m)	Flow Length (m)	Slope (%)	Impervious (%)	Suction Head (mm)	Conductivity (mm/hr)	Initial Deficit (frac.)
Phase_1A	7.02	160	439	0.5	40	292.2	1	0.229
Phase_1B	14.86	400	372	0.5	40	292.2	1	0.229
Phase_2	8.33	200	417	0.5	40	292.2	1	0.229
Undeveloped_1	1.92	180	107	0.5	1	292.2	1	0.229
Undeveloped_2	1.47	160	92	0.5	1	292.2	1	0.229
Total	33.60							

A brief description of the proposed post-development sub-catchments is provided below:

Phase 1A includes 7 proposed lots and 1 storm pond and lies east of Phase 1B, west of the undeveloped sub-catchments north of Township Rd. 94B and south of Phase 2. Phase 1A drains to Pond_1A. Current level of detail is insufficient to determine how the pond will be drained.

Phase 1B includes the western area and includes 13 proposed lots and 1 storm pond and lies east and south of Irrigation Right-of-Ways, west of Phase 1A and Phase 2 and north of an agricultural site. Phase 1B drains to Pond_1B. Pond_1B is planned drain by gravity through the ditch network to Pond_1A and or Pond_2.

Phase 2 includes 7 proposed lots and 1 storm pond and lies west of the undeveloped sub-catchments, north of Phase 1A, east of Phase 1B, and south of an Irrigation Right-of-Way.

Undeveloped sub-catchments are two parcels of land that are on the east of the site and are undevelopable due to future highway plans. They discharge directly to the west ditch of Highway 843.

C. Proposed Stormwater Management Plan

The stormwater management plan for the MacLaine Acres Development is to drain all the site to the west ditch of Highway 843. All developed areas are proposed to discharge through a ditch system to stormwater detention ponds prior to release to the Highway 843 ditch. There will be some minor exceptions to this rule due to practical grading considerations which are beyond the detail of an ASP to explore. It is proposed that the release rate to the Highway 843 ditch from the whole development including the undevelopable areas immediately west of Highway 843 be less than existing.

D. Stormwater Storage Ponds

It is proposed to construct 3 stormwater storage ponds for the lands to be developed. These ponds are planned as dry ponds and designed following the Alberta Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems, Part 5, Stormwater Management Guidelines. Release from the ponds will be through a pipe and release rates controlled.

III. METHODOLOGY

Drainage analysis of the proposed development was completed to determine runoff, storage, and discharge rates for pre-development and post-development conditions. The existing site runoff (pre-development) has been analyzed to determine a benchmark for allowable release rates at the post development conditions. A stormwater management model[c] has been utilized for the analysis. The following parameters are included in the modeling:

1. Synthetic Design Storm – Chicago Method: 24-hour duration, 100-year return period, (IDF Parameters A = 1019.20, B = 0, C = 0.731)[d]
2. Rainfall time step = 5 minutes
3. Simulation duration = 24 hrs
4. Routing Method: Dynamic Wave
5. No effect of Evaporation and Groundwater
6. Pre-development Catchment area = 33.61 ha
7. Post-development Catchment area = 33.61 ha
8. Infiltration Method: Green Ampt
9. Manning's N Impervious = 0.015
10. Manning's N Pervious = 0.15 (undeveloped), 0.1 (developed)
11. Depression Storage Pervious = 5mm (undeveloped), 3.8mm (developed)
12. Depression Storage Impervious = $0.77*(S\%)^{-0.49}$

IV. RESULTS

The model results are presented in the following tables. Details of the rainfall runoff modeling are included in ***Appendix B – SWMM Model Results***.

A. Pre-Development Runoff

Table 3 presents the pre-development model results for the sub-catchment runoff generated from a 1 in 100-year storm, 24-hour storm event.

Table 4 – Pre-Development Runoff

Name	Area (ha)	Precipitation (mm)	Runon (mm)	Infiltration (mm)	Runoff Depth (mm)	Runoff Volume (ML)	Peak Runoff (m^3/s)	Peak Runoff Offsite (m^3/s)
Dugout	0.25	120.15	0	14.37	105.13	0.26	0.17	0
East	19.93	120.15	0	65.13	48.88	9.75	0.68	0.68
West-Central	10.66	120.15	0	59.41	56.04	5.97	0.62	0
West-NW	1.50	120.15	0	63.91	54.04	0.81	0.14	0.14
West-SE	0.68	120.15	0	64.66	54.39	0.37	0.1	0.1
West-SW	0.57	120.15	0	64.54	55.46	0.32	0.15	0.15

[c] EPA Storm Water Management Model – Version 5.0 (Build 5.0.22)
[d] *2016 Design Standards*, City of Lethbridge.

A. Existing Storage

Table 6 presents the existing storage in response to the 1:100-year 24-hour storm event as shown on ***Figure 2 – Existing Site & Drainage Features*.**

Table 5 – Existing Storage Unit

Name	Invert Elev. (m)	Rim Elev. (m)	Full Depth (m)	Initial Depth (m)	Initial Volume (m^3)	Max. Depth (m)	Max. Volume (m^3)	Stored Runoff (m^3)
SU1	905	906.5	1.5	0.71	680	0.93	957	277
SU2	905	906.4	1.4	0	0	1.12	5974	5974

B. Post-Development Runoff

As the stormwater management plan is to discharge at one location the pre-development runoff at that location governs the design of the stormwater management system. The total peak release rate off-site is limited to the predevelopment release from the East sub-catchment of 0.69 cubic metres per second.

Table 4 presents the sub-catchment model results for the post-development runoff generated from a 100-year 24-hour storm event. Proposed sub catchment areas are shown in the attached ***Appendix C – SWMM Model Results***.

Table 6 – Post-Development Runoff

Name	Area (ha)	Precipitation (mm)	Runon (mm)	Infiltration (mm)	Runoff Depth (mm)	Runoff Volume (ML)	Peak Runoff* (m^3/s)
Phase_1A	7.02	120.15	0	55.21	65.17	4.58	0.52
Phase_1B	14.86	120.15	0	54.8	65.61	9.75	1.23
Phase_2	8.33	120.15	0	55.07	65.32	5.44	0.64
Undeveloped_1	1.92	120.15	0	67.17	53.17	1.02	0.16
Undeveloped_2	1.47	120.15	0	66.93	53.44	0.79	0.13
Total	33.61					21.58	

* Peak Runoff in this table is the runoff from a sub-catchment area and does not include any reduction in release rate due to the introduction of detention storage.

C. Post Development Release Rates

The post development release rate would be significantly higher than the predevelopment release rate if storage was not introduced.

For the MacLaine Acres Development two unique types of post development catchment areas are identified, first land that is to be developed and second land on the east side that is to remain undeveloped due to future transportation plans. Table 7 - Comparison of Release Rates Presents the various release rate options examined. It is proposed that for the undeveloped lands to not control the release rate, matching the current condition.

Table 7 - Comparison of Release Rates

	Discharge			Percent of Pre-development
1 in 100-year 24-hour Storm Event	Undeveloped (lps)	Developed (lps)	Total (lps)	
Pre-development	680	0	680	100%
2.0 lps/ha from Developed Areas	247	42	289	43%

D. Proposed Storage

Three storage ponds are proposed for the development that correspond to proposed phasing. These ponds are proposed to be constructed as dry ponds. Detailed design, location and sizing of the ponds will be determined at detailed design. There is a possibility that two or all the ponds could be combined into a single pond designed to meet the storage required to meet the desired release rate conditions. The number of ponds to be constructed will depend on timing of development for each of the three owners. All attempts will be made to reduce the number of ponds.

Table 8 presents the required storage volume and release rate for each pond.

Table 8 - Pond Storage Volumes and Release Rates

	Pond_1A		Pond_1B		Pond_2	
1 in 100-year 24-hour Storm Event	Storage Required (m^3)	Pond Release Rate (lps)	Storage Required (m^3)	Pond Release Rate (lps)	Storage Required (m^3)	Pond Release Rate (lps)
2.0 lps/ha from Developed Areas	2418	43*	8415	29	4620	17

* Pond_1A is planned to receive flows from Pond _1B. The release rate for Pond_1A is for the total area draining to Pond1_A.

E. Analysis

Considering the known drainage and flooding issues downstream of the sites release point, it is not recommended to discharge runoff from the site at a release rate that is comparable to the pre-development release rate. It is proposed to limit the release rate from developed areas to match the existing conditions.

If a larger impact on the downstream drainage is desired a greater impact would be realized by providing detention and a controlled release for the undeveloped areas than by moving to a zero release from the developed areas.

V. RECOMMENDATIONS

It is recommended that the MacLaine Acres Development provide approximately **15,500 m³** of active stormwater storage on-site to detain the runoff. Approval drawings including the detailed designs of detention ponds, outlets, swales, and grading plans are recommended prior to construction, which should generally follow the stormwater concepts outlined in this report.

VI. CLOSING

We trust that this report meets the requirements of the Area Structure Plan. Should you require any further information, please contact the undersigned.

Prepared by:

PROFESSIONAL ENGINEER ALBERTA
JAMES A. JOHANSEN

May 31, 2022

James Johansen, P.Eng.
Civil Engineer, Project Manager

Reviewed by:

PROFESSIONAL ENGINEER ALBERTA

May 31/22

Ray Martin, P.Eng
Vice President Engineering

MARTIN GEOMATIC CONSULTANTS LTD.
Association of Professional Engineers and Geoscientists of Alberta
Permit to Practice P05852

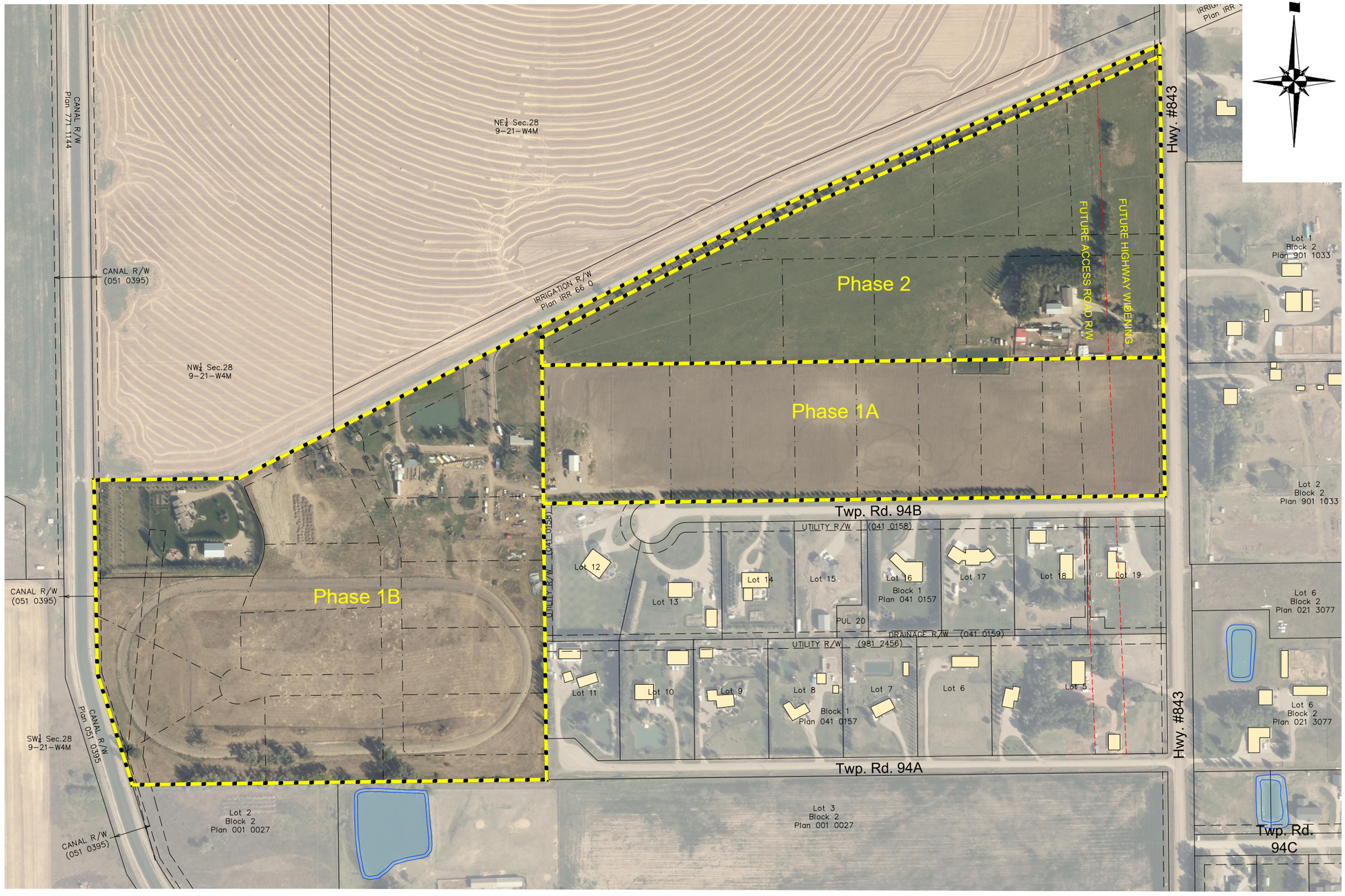
May 31/22

Appendix A

Figure 1 – Aerial Photo

Figure 2 – Existing Site & Drainage Features

Figure 3 – Stormwater Management Plan



LEGEND

PHASE BOUNDARY

MARTIN
GEOMATIC CONSULTANTS
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255-31st Street North Lethbridge, Alberta T1H 3Z4
Ph: (403) 329-0050 E-mail: geomart@mgcl.ca Fax: (403) 329-6594

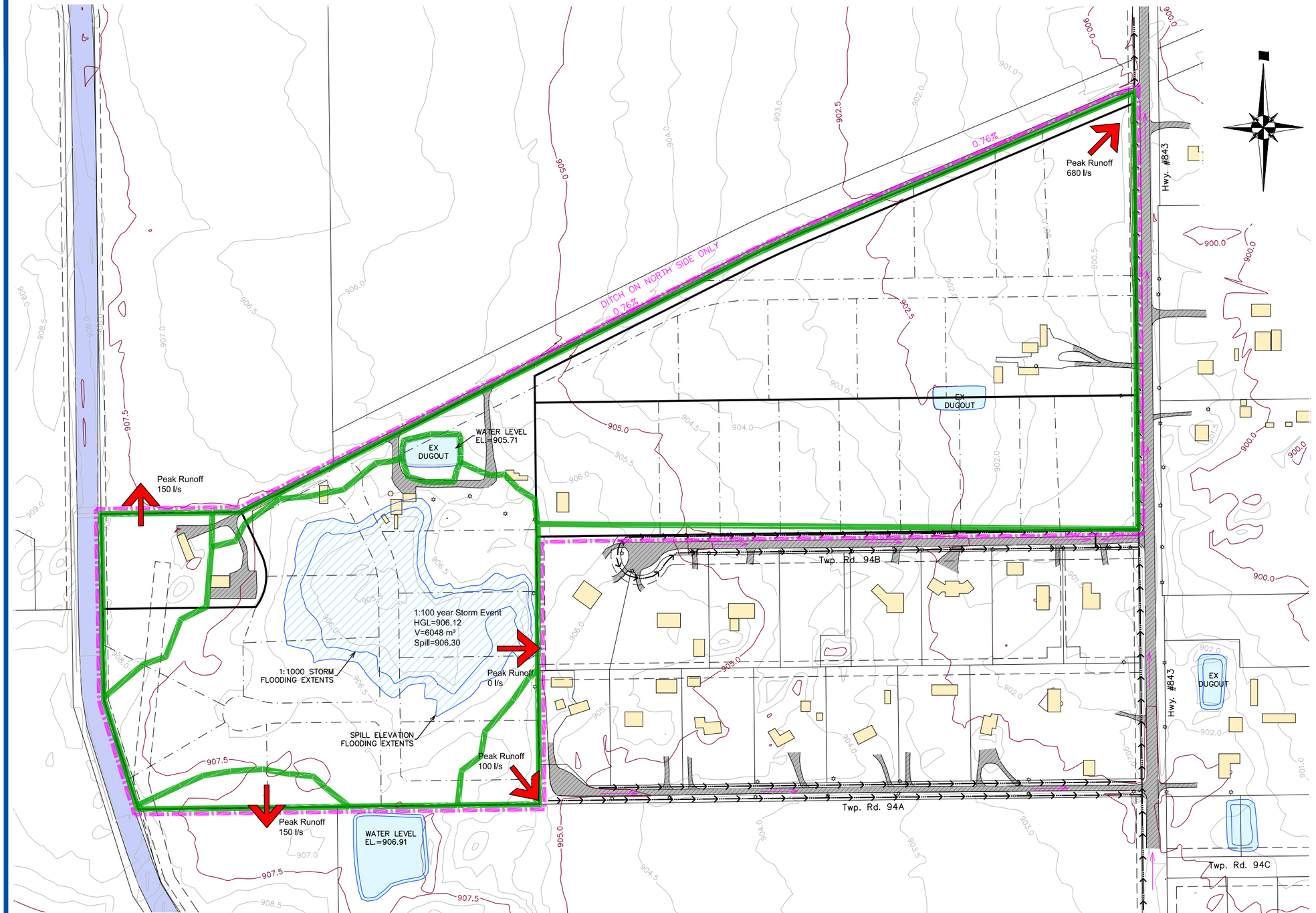
MacLaine Acres

STORMWATER MANAGEMENT PLAN

AERIAL PHOTO
FIGURE 1.0

May 11, 2022

208645CE



LEGEND

- DISCHARGE LOCATION
- 900.00 EX. MAJOR CONTOUR LINE
- 900.00 EX. MAJOR CONTOUR LINE
- WAT WAT WATER CO-OP PIPELINE
- IRR IRR SMRID IRRIGATION PIPE
- GAS GAS GAS GAS GASLINE
- O/H O/H O/H OVERHEAD POWERLINE
  POWERPOLE
- ABANDONED GAS WELL (RECLAIMED)
- EXISTING DITCH DRAINAGE
- x 900.52 SPOT ELEVATION ON SURFACE
- PROPOSED LOT BOUNDARIES
- GAS GAS GAS ATCO SERVICE GAS
- GAS GAS GAS ATCO DECOMMISIONED GAS
- GAS GAS GAS ATCO MAINLINE GAS
- FLOW DIRECTION
- PRE DEVELOPMENT CATCHMENT AREAS

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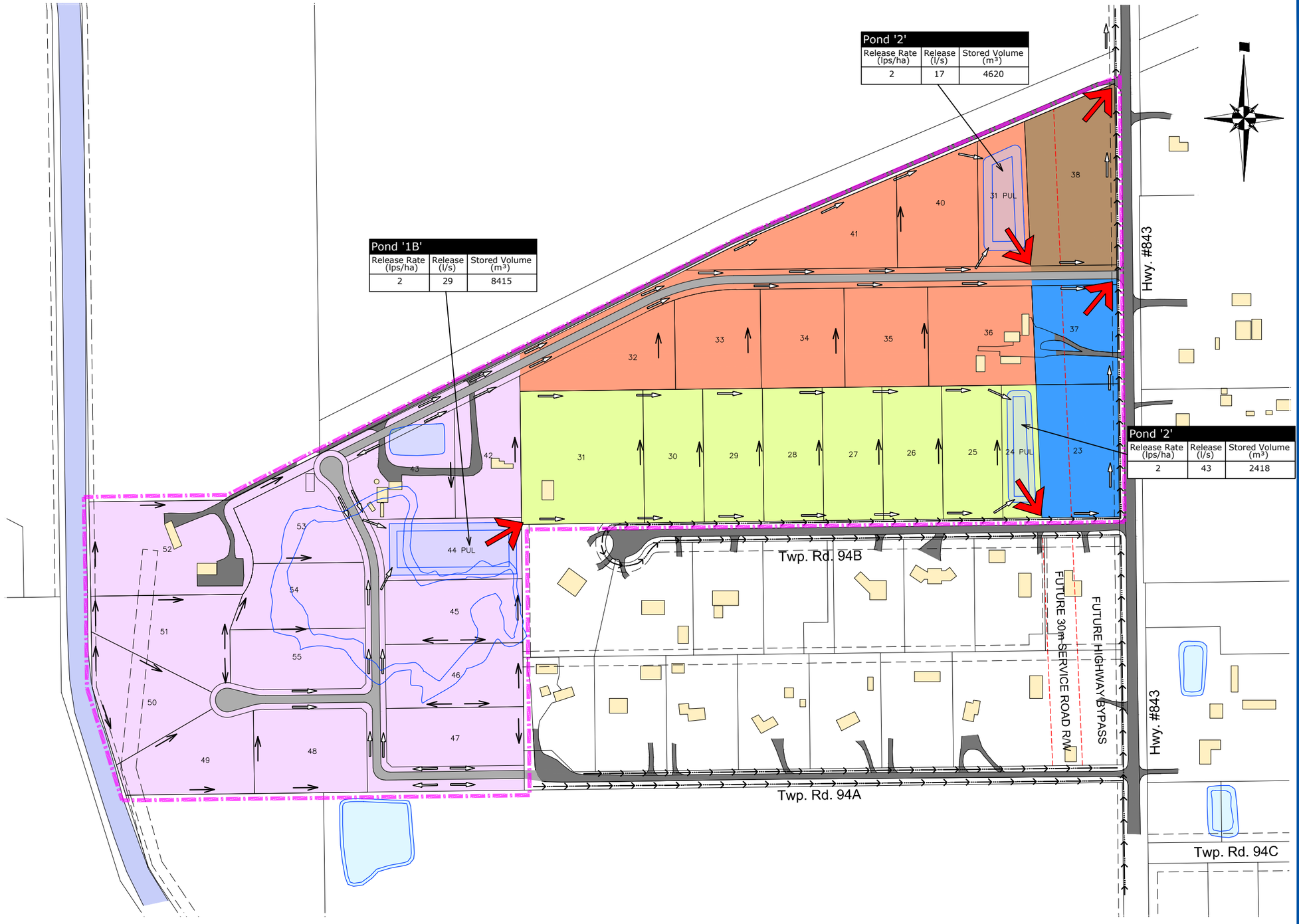
MacLaine Acres

STORMWATER MANAGEMENT PLAN

EXISTING DRAINAGE FEATURES
FIGURE 2.0

May 11, 2022

208645CE



LEGEND

- ASP BOUNDARY
- DISCHARGE LOCATION
- EXISTING DITCH
- SURFACE DRAINAGE
- PROPOSED DITCH DRAINAGE

TOTAL SITE DISCHARGE		
Undeveloped (l/s)	Developed (l/s)	Total (m³)
247	44	291

CATCHMENT	'A'	'B'	'C'	'D'	'E'
AREA (ha)	7.42	14.84	8.97	1.56	2.01
POND VOLUME (m³)	4,700	9,400	5,700	N/A	N/A

NOTE:

THREE STORAGE PONDS ARE SHOWN CONCEPTUALLY TO IDENTIFY STORAGE VOLUMES FOR EACH PHASE. IT IS PLANNED THAT THE FINAL DESIGN WILL INCLUDE ONE POND. (IF FEASIBLE)

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MacLaine Acres

STORMWATER MANAGEMENT PLAN

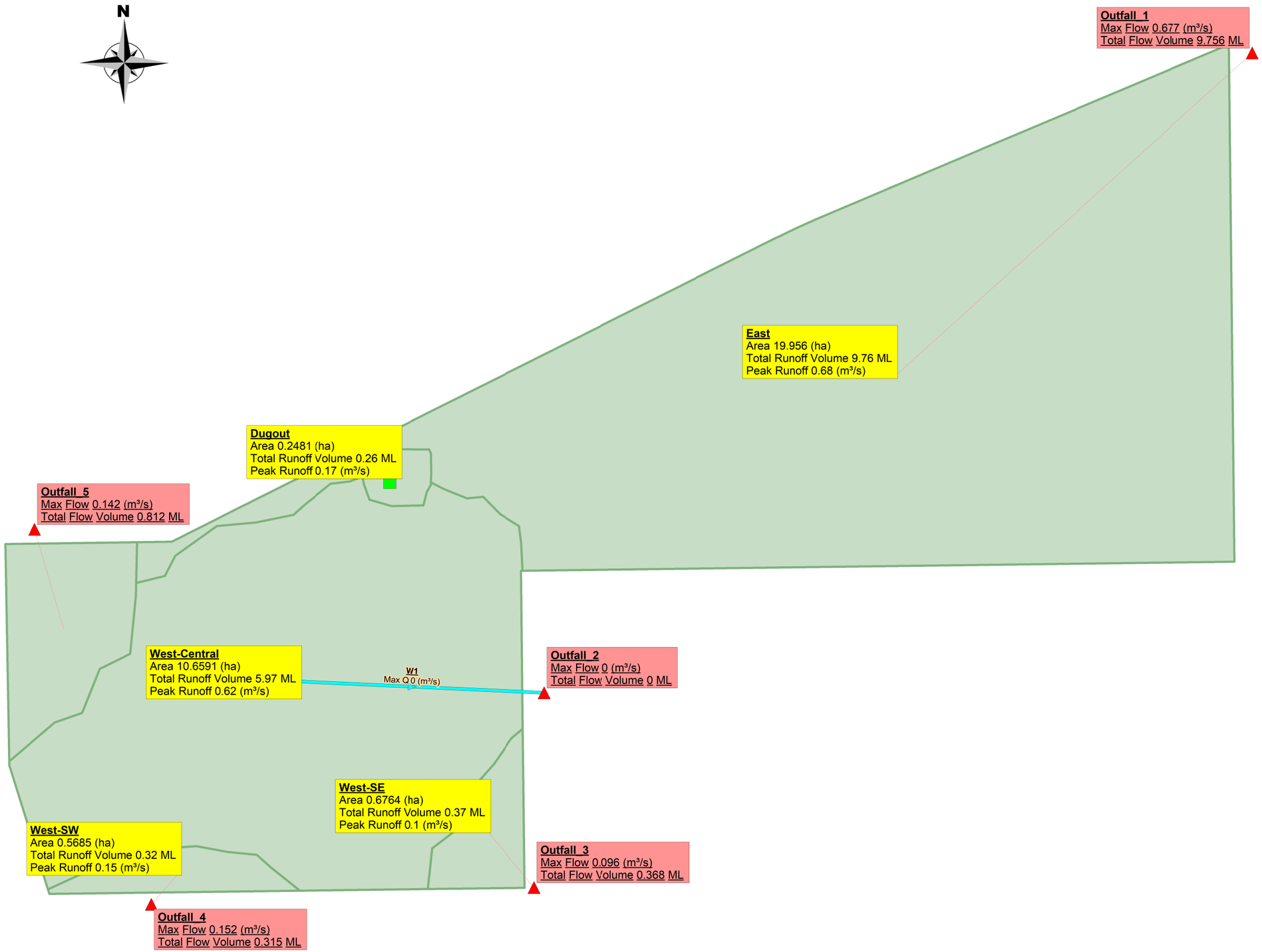
STORMWATER MANAGEMENT PLAN
FIGURE 3.0

May 11, 2022

208645CE

Appendix B

PCSWWM OUTPUT FILES



Legend

- Outfalls
- Storages
- Weirs
- Subcatchments

Stormwater Management Plan

MacLaine Acres Subdivision

Sec. 28-9-21-W4M
Lethbridge County
Alberta

Pre - Development

Lethbridge 1:100 year Chicago 24 hour Rainfall Event

150 m

MARTIN GEOMATIC CONSULTANTS

File Number: 208645CE

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CMS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         DYNWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           05/17/2022
START_TIME           00:00:00
REPORT_START_DATE    05/17/2022
REPORT_START_TIME    00:00:00
END_DATE             05/20/2022
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:05:00
DRY_STEP             00:05:00
ROUTING_STEP         5
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
MAX_TRIALS           8
HEAD_TOLERANCE       0.0015
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              4

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
CONSTANT         0.0
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- -------- -------- ----------
Lethbridge_1:100year_Chicago_24h INTENSITY 0:05     1.0      TIMESERIES Chicago_24h
Lethbridge_1:2year_Chicago_4h INTENSITY 0:05     1.0      TIMESERIES
Lethbridge_1:2year_Chicago_4h
Lethbridge_County_1:100year_24hr INTENSITY 1:00     1.0      TIMESERIES
Lethbridge_County_1:100year_24hr

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slop
```

```
;;-------------- ---------------- ---------------- -------- -------- -------- -----
--- -------- ----------------
Dugout           Lethbridge_1:100year_Chicago_24h SU1 0.2481 80      50       0.5
0
East             Lethbridge_1:100year_Chicago_24h Outfall_1 19.956 1 350      0.5
0
West-Central     Lethbridge_1:100year_Chicago_24h SU2 10.6591 10     300      0.5
0
West-NW          Lethbridge_1:100year_Chicago_24h Outfall_5 1.5023 2 100      0.5
0
West-SE          Lethbridge_1:100year_Chicago_24h Outfall_3 0.6764 0.5 80     0.5
0
West-SW          Lethbridge_1:100year_Chicago_24h Outfall_4 0.5685 0.5 150    0.5
0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ----------
----------
Dugout           0.015      0.15       1          5          25         PERVIOUS
100
East             0.015      0.15       1          5          25         PERVIOUS
100
West-Central     0.015      0.15       1          5          25         PERVIOUS
100
West-NW          0.015      0.15       1          5          25         PERVIOUS
100
West-SE          0.015      0.15       1          5          25         PERVIOUS
100
West-SW          0.015      0.15       1          5          25         PERVIOUS
100

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
Dugout           292.2      1          0.229      0          0
East             292.2      1          0.229      0          0
West-Central     292.2      1          0.229      0          0
West-NW          292.2      1          0.229      0          0
West-SE          292.2      1          0.229      0          0
West-SW          292.2      1          0.229      0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
Outfall_1        0          FREE                        NO
Outfall_2        0          FREE                        NO
Outfall_3        0          FREE                        NO
Outfall_4        0          FREE                        NO
Outfall_5        0          FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params
N/A      Fevap    Psi      Ksat     IMD
;;-------------- -------- ---------- ---------- ---------- ------------------------
---- -------- --------          -------- --------
SU1              905      1.5        0.71       TABULAR    Dugout
0        0
```

```
SU2              905      1.4        0          TABULAR    Predevelopment_west_Trap
0 0

[WEIRS]
;;Name           From Node        To Node          Type         CrestHt    Qcoeff
Gated    EndCon   EndCoeff   Surcharge  RoadWidth  RoadSurf   Coeff. Curve
;;-------------- ---------------- ---------------- ------------ ---------- --------
-- -------- -------- ---------- ---------- ---------- ---------- ----------------
W1               SU2              Outfall_2        TRANSVERSE   1.3        3.33
NO       0        0          YES

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4
Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---
------- ----------
W1               RECT_OPEN    1                10         0          0

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
Dugout           Storage    0          800
Dugout                      1          1306
Dugout                      1.5        1541

Predevelopment_west_Trap Storage    0          0
Predevelopment_west_Trap            0.2        100.739
Predevelopment_west_Trap            0.4        534.763
Predevelopment_west_Trap            0.6        3367.153
Predevelopment_west_Trap            0.8        8014.551
Predevelopment_west_Trap            1          14275.847
Predevelopment_west_Trap            1.2        26000.83
Predevelopment_west_Trap            1.3        31539.26
Predevelopment_west_Trap            1.4        38436.106

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
;Chicago design storm, a = 1019.2, b = 0, c = 0.731, Duration = 1440 minutes, r =
0.3, rain units = mm/hr.
Chicago_24h                 0:00       1.352
Chicago_24h                 0:05       1.364
Chicago_24h                 0:10       1.376
Chicago_24h                 0:15       1.388
Chicago_24h                 0:20       1.4
Chicago_24h                 0:25       1.413
Chicago_24h                 0:30       1.426
Chicago_24h                 0:35       1.439
Chicago_24h                 0:40       1.453
Chicago_24h                 0:45       1.466
Chicago_24h                 0:50       1.48
Chicago_24h                 0:55       1.495
Chicago_24h                 1:00       1.51
Chicago_24h                 1:05       1.525
Chicago_24h                 1:10       1.54
Chicago_24h                 1:15       1.556
Chicago_24h                 1:20       1.572
Chicago_24h                 1:25       1.589
```

Chicago_24h	1:30	1.606
Chicago_24h	1:35	1.624
Chicago_24h	1:40	1.641
Chicago_24h	1:45	1.66
Chicago_24h	1:50	1.679
Chicago_24h	1:55	1.698
Chicago_24h	2:00	1.718
Chicago_24h	2:05	1.739
Chicago_24h	2:10	1.76
Chicago_24h	2:15	1.782
Chicago_24h	2:20	1.804
Chicago_24h	2:25	1.828
Chicago_24h	2:30	1.851
Chicago_24h	2:35	1.876
Chicago_24h	2:40	1.901
Chicago_24h	2:45	1.928
Chicago_24h	2:50	1.955
Chicago_24h	2:55	1.983
Chicago_24h	3:00	2.012
Chicago_24h	3:05	2.042
Chicago_24h	3:10	2.073
Chicago_24h	3:15	2.105
Chicago_24h	3:20	2.138
Chicago_24h	3:25	2.173
Chicago_24h	3:30	2.209
Chicago_24h	3:35	2.247
Chicago_24h	3:40	2.286
Chicago_24h	3:45	2.326
Chicago_24h	3:50	2.369
Chicago_24h	3:55	2.413
Chicago_24h	4:00	2.46
Chicago_24h	4:05	2.508
Chicago_24h	4:10	2.559
Chicago_24h	4:15	2.612
Chicago_24h	4:20	2.669
Chicago_24h	4:25	2.728
Chicago_24h	4:30	2.79
Chicago_24h	4:35	2.856
Chicago_24h	4:40	2.925
Chicago_24h	4:45	2.999
Chicago_24h	4:50	3.077
Chicago_24h	4:55	3.16
Chicago_24h	5:00	3.249
Chicago_24h	5:05	3.344
Chicago_24h	5:10	3.446
Chicago_24h	5:15	3.555
Chicago_24h	5:20	3.673
Chicago_24h	5:25	3.801
Chicago_24h	5:30	3.939
Chicago_24h	5:35	4.091
Chicago_24h	5:40	4.257
Chicago_24h	5:45	4.44
Chicago_24h	5:50	4.642
Chicago_24h	5:55	4.868
Chicago_24h	6:00	5.122
Chicago_24h	6:05	5.409
Chicago_24h	6:10	5.738

Chicago_24h	6:15	6.119
Chicago_24h	6:20	6.565
Chicago_24h	6:25	7.098
Chicago_24h	6:30	7.745
Chicago_24h	6:35	8.553
Chicago_24h	6:40	9.594
Chicago_24h	6:45	10.997
Chicago_24h	6:50	13.01
Chicago_24h	6:55	16.203
Chicago_24h	7:00	22.264
Chicago_24h	7:05	40.822
Chicago_24h	7:10	314.277
Chicago_24h	7:15	62.374
Chicago_24h	7:20	38.336
Chicago_24h	7:25	28.645
Chicago_24h	7:30	23.295
Chicago_24h	7:35	19.837
Chicago_24h	7:40	17.393
Chicago_24h	7:45	15.56
Chicago_24h	7:50	14.128
Chicago_24h	7:55	12.973
Chicago_24h	8:00	12.02
Chicago_24h	8:05	11.217
Chicago_24h	8:10	10.531
Chicago_24h	8:15	9.937
Chicago_24h	8:20	9.416
Chicago_24h	8:25	8.956
Chicago_24h	8:30	8.545
Chicago_24h	8:35	8.177
Chicago_24h	8:40	7.844
Chicago_24h	8:45	7.542
Chicago_24h	8:50	7.265
Chicago_24h	8:55	7.012
Chicago_24h	9:00	6.778
Chicago_24h	9:05	6.563
Chicago_24h	9:10	6.362
Chicago_24h	9:15	6.176
Chicago_24h	9:20	6.002
Chicago_24h	9:25	5.839
Chicago_24h	9:30	5.687
Chicago_24h	9:35	5.543
Chicago_24h	9:40	5.408
Chicago_24h	9:45	5.28
Chicago_24h	9:50	5.159
Chicago_24h	9:55	5.045
Chicago_24h	10:00	4.936
Chicago_24h	10:05	4.833
Chicago_24h	10:10	4.735
Chicago_24h	10:15	4.641
Chicago_24h	10:20	4.552
Chicago_24h	10:25	4.466
Chicago_24h	10:30	4.385
Chicago_24h	10:35	4.307
Chicago_24h	10:40	4.231
Chicago_24h	10:45	4.159
Chicago_24h	10:50	4.09
Chicago_24h	10:55	4.024

Chicago_24h	11:00	3.96
Chicago_24h	11:05	3.898
Chicago_24h	11:10	3.839
Chicago_24h	11:15	3.781
Chicago_24h	11:20	3.726
Chicago_24h	11:25	3.673
Chicago_24h	11:30	3.621
Chicago_24h	11:35	3.571
Chicago_24h	11:40	3.523
Chicago_24h	11:45	3.476
Chicago_24h	11:50	3.43
Chicago_24h	11:55	3.386
Chicago_24h	12:00	3.344
Chicago_24h	12:05	3.302
Chicago_24h	12:10	3.262
Chicago_24h	12:15	3.223
Chicago_24h	12:20	3.185
Chicago_24h	12:25	3.148
Chicago_24h	12:30	3.112
Chicago_24h	12:35	3.077
Chicago_24h	12:40	3.043
Chicago_24h	12:45	3.01
Chicago_24h	12:50	2.977
Chicago_24h	12:55	2.946
Chicago_24h	13:00	2.915
Chicago_24h	13:05	2.885
Chicago_24h	13:10	2.856
Chicago_24h	13:15	2.827
Chicago_24h	13:20	2.799
Chicago_24h	13:25	2.772
Chicago_24h	13:30	2.745
Chicago_24h	13:35	2.719
Chicago_24h	13:40	2.693
Chicago_24h	13:45	2.669
Chicago_24h	13:50	2.644
Chicago_24h	13:55	2.62
Chicago_24h	14:00	2.597
Chicago_24h	14:05	2.574
Chicago_24h	14:10	2.552
Chicago_24h	14:15	2.53
Chicago_24h	14:20	2.508
Chicago_24h	14:25	2.487
Chicago_24h	14:30	2.466
Chicago_24h	14:35	2.446
Chicago_24h	14:40	2.426
Chicago_24h	14:45	2.407
Chicago_24h	14:50	2.388
Chicago_24h	14:55	2.369
Chicago_24h	15:00	2.35
Chicago_24h	15:05	2.332
Chicago_24h	15:10	2.315
Chicago_24h	15:15	2.297
Chicago_24h	15:20	2.28
Chicago_24h	15:25	2.263
Chicago_24h	15:30	2.247
Chicago_24h	15:35	2.23
Chicago_24h	15:40	2.214

Chicago_24h	15:45	2.199
Chicago_24h	15:50	2.183
Chicago_24h	15:55	2.168
Chicago_24h	16:00	2.153
Chicago_24h	16:05	2.138
Chicago_24h	16:10	2.124
Chicago_24h	16:15	2.11
Chicago_24h	16:20	2.095
Chicago_24h	16:25	2.082
Chicago_24h	16:30	2.068
Chicago_24h	16:35	2.055
Chicago_24h	16:40	2.042
Chicago_24h	16:45	2.029
Chicago_24h	16:50	2.016
Chicago_24h	16:55	2.003
Chicago_24h	17:00	1.991
Chicago_24h	17:05	1.979
Chicago_24h	17:10	1.966
Chicago_24h	17:15	1.955
Chicago_24h	17:20	1.943
Chicago_24h	17:25	1.931
Chicago_24h	17:30	1.92
Chicago_24h	17:35	1.909
Chicago_24h	17:40	1.898
Chicago_24h	17:45	1.887
Chicago_24h	17:50	1.876
Chicago_24h	17:55	1.865
Chicago_24h	18:00	1.855
Chicago_24h	18:05	1.844
Chicago_24h	18:10	1.834
Chicago_24h	18:15	1.824
Chicago_24h	18:20	1.814
Chicago_24h	18:25	1.804
Chicago_24h	18:30	1.795
Chicago_24h	18:35	1.785
Chicago_24h	18:40	1.776
Chicago_24h	18:45	1.766
Chicago_24h	18:50	1.757
Chicago_24h	18:55	1.748
Chicago_24h	19:00	1.739
Chicago_24h	19:05	1.73
Chicago_24h	19:10	1.721
Chicago_24h	19:15	1.713
Chicago_24h	19:20	1.704
Chicago_24h	19:25	1.696
Chicago_24h	19:30	1.687
Chicago_24h	19:35	1.679
Chicago_24h	19:40	1.671
Chicago_24h	19:45	1.663
Chicago_24h	19:50	1.655
Chicago_24h	19:55	1.647
Chicago_24h	20:00	1.639
Chicago_24h	20:05	1.631
Chicago_24h	20:10	1.624
Chicago_24h	20:15	1.616
Chicago_24h	20:20	1.608
Chicago_24h	20:25	1.601

```
Chicago_24h                 20:30      1.594
Chicago_24h                 20:35      1.587
Chicago_24h                 20:40      1.579
Chicago_24h                 20:45      1.572
Chicago_24h                 20:50      1.565
Chicago_24h                 20:55      1.558
Chicago_24h                 21:00      1.551
Chicago_24h                 21:05      1.545
Chicago_24h                 21:10      1.538
Chicago_24h                 21:15      1.531
Chicago_24h                 21:20      1.525
Chicago_24h                 21:25      1.518
Chicago_24h                 21:30      1.512
Chicago_24h                 21:35      1.505
Chicago_24h                 21:40      1.499
Chicago_24h                 21:45      1.493
Chicago_24h                 21:50      1.487
Chicago_24h                 21:55      1.48
Chicago_24h                 22:00      1.474
Chicago_24h                 22:05      1.468
Chicago_24h                 22:10      1.462
Chicago_24h                 22:15      1.456
Chicago_24h                 22:20      1.451
Chicago_24h                 22:25      1.445
Chicago_24h                 22:30      1.439
Chicago_24h                 22:35      1.433
Chicago_24h                 22:40      1.428
Chicago_24h                 22:45      1.422
Chicago_24h                 22:50      1.417
Chicago_24h                 22:55      1.411
Chicago_24h                 23:00      1.406
Chicago_24h                 23:05      1.4
Chicago_24h                 23:10      1.395
Chicago_24h                 23:15      1.39
Chicago_24h                 23:20      1.384
Chicago_24h                 23:25      1.379
Chicago_24h                 23:30      1.374
Chicago_24h                 23:35      1.369
Chicago_24h                 23:40      1.364
Chicago_24h                 23:45      1.359
Chicago_24h                 23:50      1.354
Chicago_24h                 23:55      1.349
Chicago_24h                 24:00      0

;Chicago design storm, a = 370.49, b = 4.38, c = 0.736, Duration = 240 minutes, r =
0.3, rain units = mm/hr.
Lethbridge_1:2year_Chicago_4h          0:00       1.845
Lethbridge_1:2year_Chicago_4h          0:05       1.954
Lethbridge_1:2year_Chicago_4h          0:10       2.08
Lethbridge_1:2year_Chicago_4h          0:15       2.227
Lethbridge_1:2year_Chicago_4h          0:20       2.401
Lethbridge_1:2year_Chicago_4h          0:25       2.611
Lethbridge_1:2year_Chicago_4h          0:30       2.869
Lethbridge_1:2year_Chicago_4h          0:35       3.196
Lethbridge_1:2year_Chicago_4h          0:40       3.626
Lethbridge_1:2year_Chicago_4h          0:45       4.219
Lethbridge_1:2year_Chicago_4h          0:50       5.1
```

Lethbridge_1:2year_Chicago_4h	0:55	6.563
Lethbridge_1:2year_Chicago_4h	1:00	9.546
Lethbridge_1:2year_Chicago_4h	1:05	19.693
Lethbridge_1:2year_Chicago_4h	1:10	71.324
Lethbridge_1:2year_Chicago_4h	1:15	31.686
Lethbridge_1:2year_Chicago_4h	1:20	18.267
Lethbridge_1:2year_Chicago_4h	1:25	12.889
Lethbridge_1:2year_Chicago_4h	1:30	10.06
Lethbridge_1:2year_Chicago_4h	1:35	8.312
Lethbridge_1:2year_Chicago_4h	1:40	7.122
Lethbridge_1:2year_Chicago_4h	1:45	6.258
Lethbridge_1:2year_Chicago_4h	1:50	5.6
Lethbridge_1:2year_Chicago_4h	1:55	5.081
Lethbridge_1:2year_Chicago_4h	2:00	4.661
Lethbridge_1:2year_Chicago_4h	2:05	4.313
Lethbridge_1:2year_Chicago_4h	2:10	4.02
Lethbridge_1:2year_Chicago_4h	2:15	3.769
Lethbridge_1:2year_Chicago_4h	2:20	3.551
Lethbridge_1:2year_Chicago_4h	2:25	3.361
Lethbridge_1:2year_Chicago_4h	2:30	3.193
Lethbridge_1:2year_Chicago_4h	2:35	3.043
Lethbridge_1:2year_Chicago_4h	2:40	2.909
Lethbridge_1:2year_Chicago_4h	2:45	2.787
Lethbridge_1:2year_Chicago_4h	2:50	2.677
Lethbridge_1:2year_Chicago_4h	2:55	2.577
Lethbridge_1:2year_Chicago_4h	3:00	2.485
Lethbridge_1:2year_Chicago_4h	3:05	2.4
Lethbridge_1:2year_Chicago_4h	3:10	2.322
Lethbridge_1:2year_Chicago_4h	3:15	2.249
Lethbridge_1:2year_Chicago_4h	3:20	2.182
Lethbridge_1:2year_Chicago_4h	3:25	2.119
Lethbridge_1:2year_Chicago_4h	3:30	2.06
Lethbridge_1:2year_Chicago_4h	3:35	2.005
Lethbridge_1:2year_Chicago_4h	3:40	1.953
Lethbridge_1:2year_Chicago_4h	3:45	1.905
Lethbridge_1:2year_Chicago_4h	3:50	1.859
Lethbridge_1:2year_Chicago_4h	3:55	1.815
Lethbridge_1:2year_Chicago_4h	4:00	0

Lethbridge_County_1:100year_24hr	1	0.1
Lethbridge_County_1:100year_24hr	2	0.2
Lethbridge_County_1:100year_24hr	3	0.3
Lethbridge_County_1:100year_24hr	4	0.4
Lethbridge_County_1:100year_24hr	5	0.6
Lethbridge_County_1:100year_24hr	6	0.8
Lethbridge_County_1:100year_24hr	7	0.9
Lethbridge_County_1:100year_24hr	8	1.1
Lethbridge_County_1:100year_24hr	9	6.2
Lethbridge_County_1:100year_24hr	10	37
Lethbridge_County_1:100year_24hr	11	21.8
Lethbridge_County_1:100year_24hr	12	15.7
Lethbridge_County_1:100year_24hr	13	9
Lethbridge_County_1:100year_24hr	14	5.6
Lethbridge_County_1:100year_24hr	15	4.5
Lethbridge_County_1:100year_24hr	16	3.4
Lethbridge_County_1:100year_24hr	17	2.8
Lethbridge_County_1:100year_24hr	18	1.7

```
Lethbridge_County_1:100year_24hr            19         0
Lethbridge_County_1:100year_24hr            20         0
Lethbridge_County_1:100year_24hr            21         0
Lethbridge_County_1:100year_24hr            22         0
Lethbridge_County_1:100year_24hr            23         0
Lethbridge_County_1:100year_24hr            24         0

[REPORT]
;;Reporting Options
INPUT      YES
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS       9945.1547        16495.9708       11105.4193       17296.0932
UNITS            Meters

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Outfall_1        11052.68           17252.62
Outfall_2        10453.858          16711.232
Outfall_3        10445.385          16546.463
Outfall_4        10121.494          16532.34
Outfall_5        10022.632          16849.639
SU1              10322.984          16889.184
SU2              10229.772          16721.59

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[POLYGONS]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Dugout           10309.728          16912.795
Dugout           10328.019          16917.215
Dugout           10356.632          16917.111
Dugout           10358.167          16913.465
Dugout           10358.407          16895.956
Dugout           10358.051          16887.175
Dugout           10354.593          16881.191
Dugout           10351.788          16869.772
Dugout           10324.561          16869.158
Dugout           10305.843          16874.547
Dugout           10301.39           16887.273
Dugout           10300.1            16893.227
Dugout           10299.837          16903.312
Dugout           10301.861          16910.964
Dugout           10309.728          16912.795
East             10432.533          16986.754
East             10234.451          16887.209
East             10138.696          16839.078
```

East	10109.454	16838.662
East	10108.65	16804.086
East	10132.858	16810.074
East	10141.665	16827.135
East	10176.779	16852.307
East	10209.47	16855.336
East	10241.517	16861.854
East	10250.424	16869.933
East	10273.179	16888.068
East	10289.867	16890.168
East	10300.068	16894.447
East	10299.837	16903.312
East	10301.861	16910.964
East	10309.728	16912.795
East	10328.019	16917.215
East	10356.632	16917.111
East	10358.167	16913.465
East	10358.407	16895.956
East	10358.132	16889.182
East	10367.964	16884.086
East	10375.427	16880.998
East	10388.551	16875.724
East	10402.118	16876.957
East	10416.238	16862.497
East	10432.662	16852.328
East	10434.517	16837.789
East	10435.65	16814.494
East	11037.777	16822.113
East	11033.059	17259.724
East	10694.241	17116.311
East	10691.891	17115.313
East	10689.545	17114.307
East	10687.201	17113.295
East	10684.86	17112.275
East	10682.523	17111.249
East	10680.188	17110.216
East	10677.857	17109.176
East	10675.528	17108.129
East	10673.203	17107.075
East	10670.881	17106.014
East	10668.562	17104.946
East	10666.246	17103.872
East	10663.933	17102.79
East	10661.624	17101.702
East	10659.317	17100.607
East	10657.014	17099.505
East	10654.715	17098.397
East	10652.418	17097.281
East	10650.125	17096.159
East	10647.835	17095.03
East	10645.549	17093.895
East	10643.265	17092.752
East	10643.265	17092.752
East	10432.533	16986.754
West-Central	10033.989	16544.952
West-Central	10077.293	16564.867
West-Central	10100.035	16574.872

West-Central	10128.003	16579.374
West-Central	10159.675	16581.448
West-Central	10186.822	16576.547
West-Central	10210.576	16574.285
West-Central	10223.207	16562.788
West-Central	10246.883	16543.852
West-Central	10355.488	16545.23
West-Central	10359.19	16579.614
West-Central	10378.557	16594.5
West-Central	10382.731	16618.765
West-Central	10411.157	16650.917
West-Central	10426.22	16672.638
West-Central	10435.888	16680.894
West-Central	10434.423	16814.478
West-Central	10435.65	16814.494
West-Central	10434.517	16837.789
West-Central	10432.662	16852.328
West-Central	10416.238	16862.497
West-Central	10402.118	16876.957
West-Central	10388.551	16875.724
West-Central	10375.427	16880.998
West-Central	10367.964	16884.086
West-Central	10358.132	16889.182
West-Central	10358.051	16887.175
West-Central	10354.593	16881.191
West-Central	10351.788	16869.772
West-Central	10324.561	16869.158
West-Central	10305.843	16874.547
West-Central	10301.39	16887.273
West-Central	10300.1	16893.227
West-Central	10300.068	16894.447
West-Central	10289.867	16890.168
West-Central	10273.179	16888.068
West-Central	10250.424	16869.933
West-Central	10241.517	16861.854
West-Central	10209.47	16855.336
West-Central	10176.779	16852.307
West-Central	10141.665	16827.135
West-Central	10132.858	16810.074
West-Central	10108.65	16804.086
West-Central	10108.395	16793.122
West-Central	10103.644	16744.225
West-Central	10077.795	16731.437
West-Central	10062.872	16694.137
West-Central	10039.688	16686.145
West-Central	10001.048	16653.236
West-Central	10001.104	16649.982
West-Central	10033.989	16544.952
West-NW	10109.454	16838.662
West-NW	9997.894	16837.075
West-NW	10001.048	16653.236
West-NW	10039.688	16686.145
West-NW	10062.872	16694.137
West-NW	10077.795	16731.437
West-NW	10103.644	16744.225
West-NW	10108.395	16793.122
West-NW	10109.454	16838.662

```
West-SE          10435.888          16680.894
West-SE          10426.22           16672.638
West-SE          10411.157          16650.917
West-SE          10382.731          16618.765
West-SE          10378.557          16594.5
West-SE          10359.19           16579.614
West-SE          10355.488          16545.23
West-SE          10437.364          16546.269
West-SE          10435.888          16680.894
West-SW          10246.883          16543.852
West-SW          10223.207          16562.788
West-SW          10210.576          16574.285
West-SW          10186.822          16576.547
West-SW          10159.675          16581.448
West-SW          10128.003          16579.374
West-SW          10100.035          16574.872
West-SW          10077.293          16564.867
West-SW          10033.989          16544.952
West-SW          10035.174          16541.165
West-SW          10246.883          16543.852

[SYMBOLS]
;;Gage            X-Coord            Y-Coord
;;--------------- ------------------ ------------------
```

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

****
Element Count
****
Number of rain gages 3
Number of subcatchments ... 6
Number of nodes 7
Number of links 1
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
Lethbridge_1:100year_Chicago_24h	Chicago_24h	INTENSITY	5 min.
Lethbridge_1:2year_Chicago_4h	Lethbridge_1:2year_Chicago_4h	INTENSITY	5 min.
Lethbridge_County_1:100year_24hr	Lethbridge_County_1:100year_24hr	INTENSITY	60 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
Dugout	0.25	50.00	80.00	0.5000	Lethbridge_1:100year_Chicago_24h	SU1
East	19.96	350.00	1.00	0.5000	Lethbridge_1:100year_Chicago_24h	Outfall_1
West-Central	10.66	300.00	10.00	0.5000	Lethbridge_1:100year_Chicago_24h	SU2
West-NW	1.50	100.00	2.00	0.5000	Lethbridge_1:100year_Chicago_24h	Outfall_5
West-SE	0.68	80.00	0.50	0.5000	Lethbridge_1:100year_Chicago_24h	Outfall_3
West-SW	0.57	150.00	0.50	0.5000	Lethbridge_1:100year_Chicago_24h	Outfall_4

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
Outfall_1	OUTFALL	0.00	0.00	0.0	
Outfall_2	OUTFALL	0.00	0.00	0.0	

Outfall_3	OUTFALL	0.00	0.00	0.0
Outfall_4	OUTFALL	0.00	0.00	0.0
Outfall_5	OUTFALL	0.00	0.00	0.0
SU1	STORAGE	905.00	1.50	0.0
SU2	STORAGE	905.00	1.40	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	% Slope	Roughness
W1	SU2	Outfall_2	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CMS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 05/17/2022 00:00:00
Ending Date 05/20/2022 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step ..... 5.00 sec

Variable Time Step ..... YES
Maximum Trials 8
Number of Threads 1
Head Tolerance ..... 0.001500 m

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	4.038	120.146
Evaporation Loss	0.000	0.000
Infiltration Loss	2.294	68.247
Surface Runoff	1.749	52.025
Final Storage	0.001	0.033
Continuity Error (%)	-0.133	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1.749	17.486
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	1.125	11.251
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.070	0.695
Final Stored Volume	0.693	6.930
Continuity Error (%)	0.004	

****
Time-Step Critical Elements
****
None

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****
Minimum Time Step : 4.50 sec
Average Time Step : 5.00 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
Percent Not Converging : 0.00
Time Step Frequencies :
5.000 - 3.155 sec : 100.00 %

```
      3.155 -  1.991 sec      :     0.00 %
      1.991 -  1.256 sec      :     0.00 %
      1.256 -  0.792 sec      :     0.00 %
      0.792 -  0.500 sec      :     0.00 %


  ***************************
  Subcatchment Runoff Summary
  ***************************

  ----------------------------------------------------------------------------------------
-------------------------------------------
                             Total      Total      Total      Total     Imperv
Perv      Total       Total     Peak  Runoff
                          Precip      Runon       Evap      Infil     Runoff
Runoff     Runoff      Runoff   Runoff   Coeff
  Subcatchment                mm         mm         mm         mm         mm
mm         mm    10^6 ltr      CMS
  ----------------------------------------------------------------------------------------
-------------------------------------------
  Dugout                   120.15       0.00       0.00      15.85      96.57
105.44     105.44        0.26     0.17   0.878
  East                     120.15       0.00       0.00      71.32       1.19
48.89      48.89        9.76     0.68   0.407
  West-Central             120.15       0.00       0.00      64.26      12.06
56.04      56.04        5.97     0.62   0.466
  West-NW                  120.15       0.00       0.00      66.33       2.39
54.04      54.04        0.81     0.14   0.450
  West-SE                  120.15       0.00       0.00      66.16       0.60
54.39      54.39        0.37     0.10   0.453
  West-SW                  120.15       0.00       0.00      65.50       0.60
55.46      55.46        0.32     0.15   0.462


  ******************
  Node Depth Summary
  ******************

  ----------------------------------------------------------------------------------------
                               Average  Maximum  Maximum  Time of Max    Reported
                                 Depth    Depth      HGL   Occurrence   Max Depth
  Node                 Type      Meters   Meters   Meters  days hr:min      Meters
  ----------------------------------------------------------------------------------------
  Outfall_1            OUTFALL     0.00     0.00     0.00     0  00:00        0.00
  Outfall_2            OUTFALL     0.00     0.00     0.00     0  00:00        0.00
  Outfall_3            OUTFALL     0.00     0.00     0.00     0  00:00        0.00
  Outfall_4            OUTFALL     0.00     0.00     0.00     0  00:00        0.00
  Outfall_5            OUTFALL     0.00     0.00     0.00     0  00:00        0.00
  SU1                  STORAGE     0.90     0.93   905.93     1  01:05        0.93
  SU2                  STORAGE     0.99     1.12   906.12     1  00:15        1.12


  ******************
  Node Inflow Summary
  ******************

  ----------------------------------------------------------------------------------------
---------------
```

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
Outfall_1	OUTFALL	0.677	0.677	0 07:45	9.76	9.76	0.000
Outfall_2	OUTFALL	0.000	0.000	0 00:00	0	0	0.000 ltr
Outfall_3	OUTFALL	0.096	0.096	0 07:20	0.368	0.368	0.000
Outfall_4	OUTFALL	0.152	0.152	0 07:15	0.315	0.315	0.000
Outfall_5	OUTFALL	0.142	0.142	0 07:25	0.812	0.812	0.000
SU1	STORAGE	0.165	0.165	0 07:20	0.262	0.957	0.003
SU2	STORAGE	0.616	0.616	0 07:30	5.97	5.97	0.012

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
SU1	0.922	52	0	0	0.957	54	1 01:05	0.000
SU2	5.158	36	0	0	5.974	42	1 00:15	0.000

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
Outfall_1	24.30	0.155	0.677	9.756
Outfall_2	0.00	0.000	0.000	0.000
Outfall_3	14.49	0.010	0.096	0.368
Outfall_4	12.64	0.010	0.152	0.315
Outfall_5	17.08	0.018	0.142	0.812
System	13.70	0.193	0.948	11.251

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
W1	WEIR	0.000	0 00:00			0.00

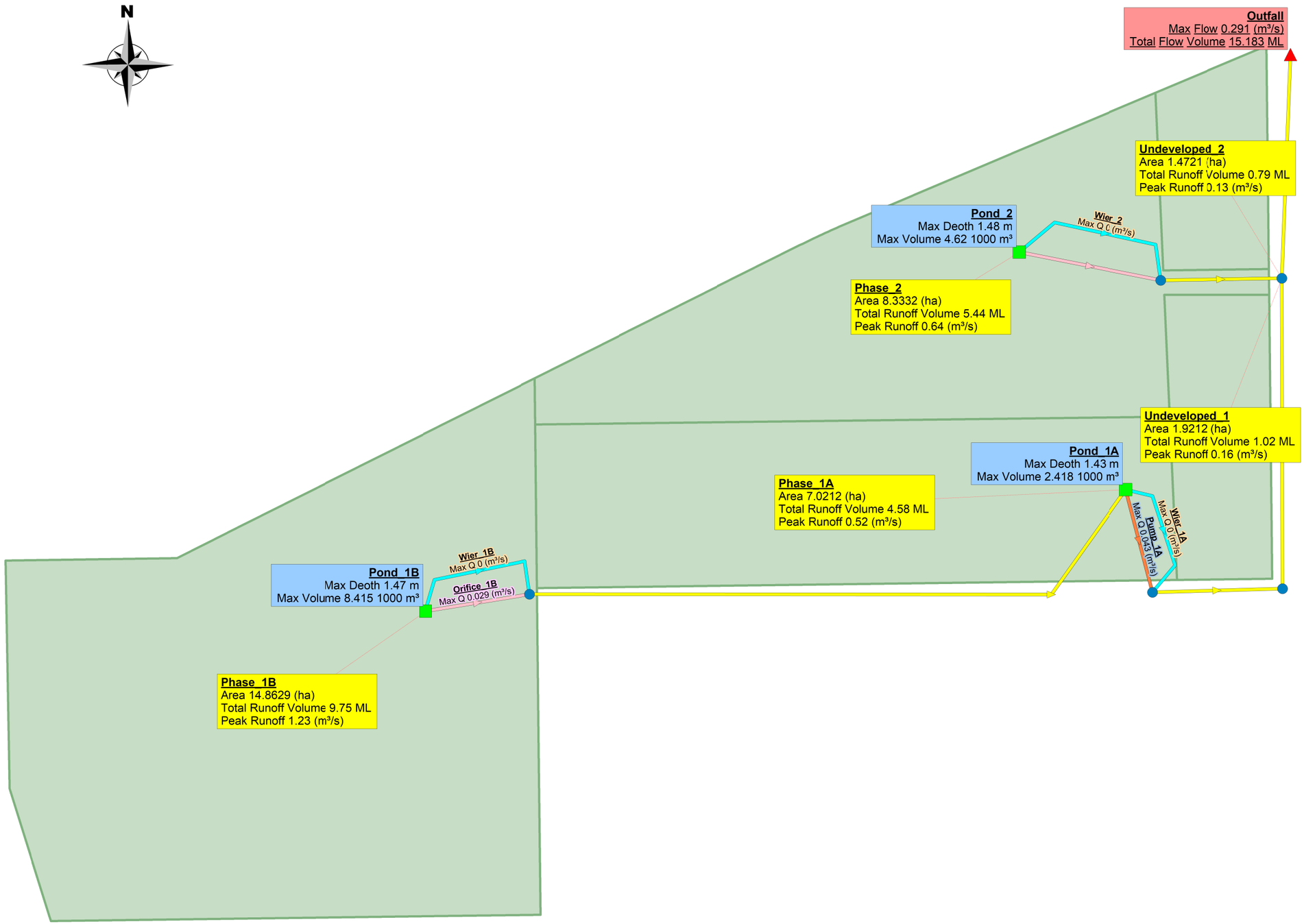
****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Wed May 25 17:12:26 2022
Analysis ended on: Wed May 25 17:12:26 2022
Total elapsed time: < 1 sec



Legend

- Junctions
- Outfalls
- Storages
- Conduits
- Pumps
- Orifices
- Weirs
- Subcatchments

Stormwater Management Plan

MacLaine Acres Subdivision

Sec. 28-9-21-W4M
Lethbridge County
Alberta

Post - Development

Lethbridge 1:100 year Chicago 24 hour Rainfall Event

150 m

MARTIN GEOMATIC CONSULTANTS

File Number: 208645CE

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CMS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         DYNWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           05/17/2022
START_TIME           00:00:00
REPORT_START_DATE    05/17/2022
REPORT_START_TIME    00:00:00
END_DATE             05/20/2022
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:05:00
DRY_STEP             00:05:00
ROUTING_STEP         5
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
MAX_TRIALS           8
HEAD_TOLERANCE       0.0015
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              4

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
CONSTANT         0.0
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- -------- -------- ----------
Lethbridge_1:100year_Chicago_24h INTENSITY 0:05     1.0      TIMESERIES Chicago_24h
Lethbridge_County_1:100year_48hr INTENSITY 1        1.0      TIMESERIES
Lethbridge_County_1:100year_48hr

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %
Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -----
```

```
Phase_1A         Lethbridge_1:100year_Chicago_24h Pond_1A 7.0212 25  160      0.5
0
Phase_1B         Lethbridge_1:100year_Chicago_24h Pond_1B 14.8629 25 400      0.5
0
Phase_2          Lethbridge_1:100year_Chicago_24h Pond_2 8.3332 25   200      0.5
0
Undeveloped_1    Lethbridge_1:100year_Chicago_24h J3 1.9212 1        107      0.5
0
Undeveloped_2    Lethbridge_1:100year_Chicago_24h J3 1.4721 1        92       0.5
0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ----------
----------
Phase_1A         0.015      0.15       1          5          25         PERVIOUS
75
Phase_1B         0.015      0.15       1          5          25         PERVIOUS
75
Phase_2          0.015      0.15       1          5          25         PERVIOUS
75
Undeveloped_1    0.015      0.15       1          5          25         PERVIOUS
100
Undeveloped_2    0.015      0.15       1          5          25         PERVIOUS
100

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
Phase_1A         292.2      1          0.229      0          0
Phase_1B         292.2      1          0.229      0          0
Phase_2          292.2      1          0.229      0          0
Undeveloped_1    292.2      1          0.229      0          0
Undeveloped_2    292.2      1          0.229      0          0

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
J1               903.4      1          0          0          0
J2               900.303    1          0          0          0
J3               899.711    1          0          0          0
J4               900.619    1          0          0          0
J5               901        1          0          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
Outfall          899.5      FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params
N/A      Fevap    Psi      Ksat     IMD
;;-------------- -------- ---------- ---------- ---------- ------------------------
---- -------- --------          -------- --------
Pond_1A          900      2          0          FUNCTIONAL 1000      2         1000
0        0
Pond_1B          903.4    2          0          FUNCTIONAL 1000      2         5000
0        0
```

```
Pond_2           900.5    2          0          FUNCTIONAL 1000      2         2400
0        0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset
OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ----------
---------- ---------- ----------
C1               J1               Pond_1A          533.785    0.035      0
0          0          0
C3               J5               J4               106.708    0.035      0
0          0          0
C4               J4               J3               254.852    0.035      0
0          0          0
C5               J2               J3               99.45      0.035      0
0          0          0
C6               J3               Outfall          183.881    0.035      0
0          0          0

[PUMPS]
;;Name           From Node        To Node          Pump Curve       Status
Startup  Shutoff
;;-------------- ---------------- ---------------- ---------------- -------- ------
-- --------
Pump_1A          Pond_1A          J5               Pump_1A          ON       0
0

[ORIFICES]
;;Name           From Node        To Node          Type         Offset     Qcoeff
Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ---------- --------
-- -------- ----------
Orifice_1B       Pond_1B          J1               SIDE         0          0.65
NO       0
Orifice_2        Pond_2           J2               SIDE         0          0.65
NO       0

[WEIRS]
;;Name           From Node        To Node          Type         CrestHt    Qcoeff
Gated    EndCon   EndCoeff   Surcharge  RoadWidth  RoadSurf   Coeff. Curve
;;-------------- ---------------- ---------------- ------------ ---------- --------
-- -------- -------- ---------- ---------- ---------- ----------------
Wier_1A          Pond_1A          J5               TRANSVERSE   1.5        3.33
NO       0        0          YES
Wier_1B          Pond_1B          J1               TRANSVERSE   1.5        3.33
NO       0        0          YES
Wier_2           Pond_2           J2               TRANSVERSE   1.5        3.33
NO       0        0          YES

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4
Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---
------- ----------
C1               TRIANGULAR   1                6          0          0          1
C3               TRIANGULAR   1                6          0          0          1
C4               TRIANGULAR   1                6          0          0          1
C5               TRIANGULAR   1                6          0          0          1
C6               TRIANGULAR   1                6          0          0          1
Orifice_1B       CIRCULAR     0.105            0          0          0
```

```
Orifice_2        CIRCULAR     0.08            0          0          0
Wier_1A          RECT_OPEN    1               1.2        0          0
Wier_1B          RECT_OPEN    1               1.2        0          0
Wier_2           RECT_OPEN    1               1.2        0          0

[LOSSES]
;;Link           Kentry     Kexit      Kavg       Flap Gate  Seepage
;;-------------- ---------- ---------- ---------- ---------- ----------

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
Pump_1A          Pump3      0          0.043
Pump_1A                     2          0.035
Pump_1A                     3          0.028
Pump_1A                     4          0.01

Dugout           Storage    0          800
Dugout                      1          1306
Dugout                      1.5        1541

Predevelopment_west_Trap Storage    0          0
Predevelopment_west_Trap            0.2        100.739
Predevelopment_west_Trap            0.4        534.763
Predevelopment_west_Trap            0.6        3367.153
Predevelopment_west_Trap            0.8        8014.551
Predevelopment_west_Trap            1          14275.847
Predevelopment_west_Trap            1.2        26000.83
Predevelopment_west_Trap            1.3        31539.26
Predevelopment_west_Trap            1.4        38436.106

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
;Chicago design storm, a = 1019.2, b = 0, c = 0.731, Duration = 1440 minutes, r =
0.3, rain units = mm/hr.
Chicago_24h                 0:00       1.352
Chicago_24h                 0:05       1.364
Chicago_24h                 0:10       1.376
Chicago_24h                 0:15       1.388
Chicago_24h                 0:20       1.4
Chicago_24h                 0:25       1.413
Chicago_24h                 0:30       1.426
Chicago_24h                 0:35       1.439
Chicago_24h                 0:40       1.453
Chicago_24h                 0:45       1.466
Chicago_24h                 0:50       1.48
Chicago_24h                 0:55       1.495
Chicago_24h                 1:00       1.51
Chicago_24h                 1:05       1.525
Chicago_24h                 1:10       1.54
Chicago_24h                 1:15       1.556
Chicago_24h                 1:20       1.572
Chicago_24h                 1:25       1.589
Chicago_24h                 1:30       1.606
Chicago_24h                 1:35       1.624
Chicago_24h                 1:40       1.641
```

Chicago_24h	1:45	1.66
Chicago_24h	1:50	1.679
Chicago_24h	1:55	1.698
Chicago_24h	2:00	1.718
Chicago_24h	2:05	1.739
Chicago_24h	2:10	1.76
Chicago_24h	2:15	1.782
Chicago_24h	2:20	1.804
Chicago_24h	2:25	1.828
Chicago_24h	2:30	1.851
Chicago_24h	2:35	1.876
Chicago_24h	2:40	1.901
Chicago_24h	2:45	1.928
Chicago_24h	2:50	1.955
Chicago_24h	2:55	1.983
Chicago_24h	3:00	2.012
Chicago_24h	3:05	2.042
Chicago_24h	3:10	2.073
Chicago_24h	3:15	2.105
Chicago_24h	3:20	2.138
Chicago_24h	3:25	2.173
Chicago_24h	3:30	2.209
Chicago_24h	3:35	2.247
Chicago_24h	3:40	2.286
Chicago_24h	3:45	2.326
Chicago_24h	3:50	2.369
Chicago_24h	3:55	2.413
Chicago_24h	4:00	2.46
Chicago_24h	4:05	2.508
Chicago_24h	4:10	2.559
Chicago_24h	4:15	2.612
Chicago_24h	4:20	2.669
Chicago_24h	4:25	2.728
Chicago_24h	4:30	2.79
Chicago_24h	4:35	2.856
Chicago_24h	4:40	2.925
Chicago_24h	4:45	2.999
Chicago_24h	4:50	3.077
Chicago_24h	4:55	3.16
Chicago_24h	5:00	3.249
Chicago_24h	5:05	3.344
Chicago_24h	5:10	3.446
Chicago_24h	5:15	3.555
Chicago_24h	5:20	3.673
Chicago_24h	5:25	3.801
Chicago_24h	5:30	3.939
Chicago_24h	5:35	4.091
Chicago_24h	5:40	4.257
Chicago_24h	5:45	4.44
Chicago_24h	5:50	4.642
Chicago_24h	5:55	4.868
Chicago_24h	6:00	5.122
Chicago_24h	6:05	5.409
Chicago_24h	6:10	5.738
Chicago_24h	6:15	6.119
Chicago_24h	6:20	6.565
Chicago_24h	6:25	7.098

Chicago_24h	6:30	7.745
Chicago_24h	6:35	8.553
Chicago_24h	6:40	9.594
Chicago_24h	6:45	10.997
Chicago_24h	6:50	13.01
Chicago_24h	6:55	16.203
Chicago_24h	7:00	22.264
Chicago_24h	7:05	40.822
Chicago_24h	7:10	314.277
Chicago_24h	7:15	62.374
Chicago_24h	7:20	38.336
Chicago_24h	7:25	28.645
Chicago_24h	7:30	23.295
Chicago_24h	7:35	19.837
Chicago_24h	7:40	17.393
Chicago_24h	7:45	15.56
Chicago_24h	7:50	14.128
Chicago_24h	7:55	12.973
Chicago_24h	8:00	12.02
Chicago_24h	8:05	11.217
Chicago_24h	8:10	10.531
Chicago_24h	8:15	9.937
Chicago_24h	8:20	9.416
Chicago_24h	8:25	8.956
Chicago_24h	8:30	8.545
Chicago_24h	8:35	8.177
Chicago_24h	8:40	7.844
Chicago_24h	8:45	7.542
Chicago_24h	8:50	7.265
Chicago_24h	8:55	7.012
Chicago_24h	9:00	6.778
Chicago_24h	9:05	6.563
Chicago_24h	9:10	6.362
Chicago_24h	9:15	6.176
Chicago_24h	9:20	6.002
Chicago_24h	9:25	5.839
Chicago_24h	9:30	5.687
Chicago_24h	9:35	5.543
Chicago_24h	9:40	5.408
Chicago_24h	9:45	5.28
Chicago_24h	9:50	5.159
Chicago_24h	9:55	5.045
Chicago_24h	10:00	4.936
Chicago_24h	10:05	4.833
Chicago_24h	10:10	4.735
Chicago_24h	10:15	4.641
Chicago_24h	10:20	4.552
Chicago_24h	10:25	4.466
Chicago_24h	10:30	4.385
Chicago_24h	10:35	4.307
Chicago_24h	10:40	4.231
Chicago_24h	10:45	4.159
Chicago_24h	10:50	4.09
Chicago_24h	10:55	4.024
Chicago_24h	11:00	3.96
Chicago_24h	11:05	3.898
Chicago_24h	11:10	3.839

Chicago_24h	11:15	3.781
Chicago_24h	11:20	3.726
Chicago_24h	11:25	3.673
Chicago_24h	11:30	3.621
Chicago_24h	11:35	3.571
Chicago_24h	11:40	3.523
Chicago_24h	11:45	3.476
Chicago_24h	11:50	3.43
Chicago_24h	11:55	3.386
Chicago_24h	12:00	3.344
Chicago_24h	12:05	3.302
Chicago_24h	12:10	3.262
Chicago_24h	12:15	3.223
Chicago_24h	12:20	3.185
Chicago_24h	12:25	3.148
Chicago_24h	12:30	3.112
Chicago_24h	12:35	3.077
Chicago_24h	12:40	3.043
Chicago_24h	12:45	3.01
Chicago_24h	12:50	2.977
Chicago_24h	12:55	2.946
Chicago_24h	13:00	2.915
Chicago_24h	13:05	2.885
Chicago_24h	13:10	2.856
Chicago_24h	13:15	2.827
Chicago_24h	13:20	2.799
Chicago_24h	13:25	2.772
Chicago_24h	13:30	2.745
Chicago_24h	13:35	2.719
Chicago_24h	13:40	2.693
Chicago_24h	13:45	2.669
Chicago_24h	13:50	2.644
Chicago_24h	13:55	2.62
Chicago_24h	14:00	2.597
Chicago_24h	14:05	2.574
Chicago_24h	14:10	2.552
Chicago_24h	14:15	2.53
Chicago_24h	14:20	2.508
Chicago_24h	14:25	2.487
Chicago_24h	14:30	2.466
Chicago_24h	14:35	2.446
Chicago_24h	14:40	2.426
Chicago_24h	14:45	2.407
Chicago_24h	14:50	2.388
Chicago_24h	14:55	2.369
Chicago_24h	15:00	2.35
Chicago_24h	15:05	2.332
Chicago_24h	15:10	2.315
Chicago_24h	15:15	2.297
Chicago_24h	15:20	2.28
Chicago_24h	15:25	2.263
Chicago_24h	15:30	2.247
Chicago_24h	15:35	2.23
Chicago_24h	15:40	2.214
Chicago_24h	15:45	2.199
Chicago_24h	15:50	2.183
Chicago_24h	15:55	2.168

Chicago_24h	16:00	2.153
Chicago_24h	16:05	2.138
Chicago_24h	16:10	2.124
Chicago_24h	16:15	2.11
Chicago_24h	16:20	2.095
Chicago_24h	16:25	2.082
Chicago_24h	16:30	2.068
Chicago_24h	16:35	2.055
Chicago_24h	16:40	2.042
Chicago_24h	16:45	2.029
Chicago_24h	16:50	2.016
Chicago_24h	16:55	2.003
Chicago_24h	17:00	1.991
Chicago_24h	17:05	1.979
Chicago_24h	17:10	1.966
Chicago_24h	17:15	1.955
Chicago_24h	17:20	1.943
Chicago_24h	17:25	1.931
Chicago_24h	17:30	1.92
Chicago_24h	17:35	1.909
Chicago_24h	17:40	1.898
Chicago_24h	17:45	1.887
Chicago_24h	17:50	1.876
Chicago_24h	17:55	1.865
Chicago_24h	18:00	1.855
Chicago_24h	18:05	1.844
Chicago_24h	18:10	1.834
Chicago_24h	18:15	1.824
Chicago_24h	18:20	1.814
Chicago_24h	18:25	1.804
Chicago_24h	18:30	1.795
Chicago_24h	18:35	1.785
Chicago_24h	18:40	1.776
Chicago_24h	18:45	1.766
Chicago_24h	18:50	1.757
Chicago_24h	18:55	1.748
Chicago_24h	19:00	1.739
Chicago_24h	19:05	1.73
Chicago_24h	19:10	1.721
Chicago_24h	19:15	1.713
Chicago_24h	19:20	1.704
Chicago_24h	19:25	1.696
Chicago_24h	19:30	1.687
Chicago_24h	19:35	1.679
Chicago_24h	19:40	1.671
Chicago_24h	19:45	1.663
Chicago_24h	19:50	1.655
Chicago_24h	19:55	1.647
Chicago_24h	20:00	1.639
Chicago_24h	20:05	1.631
Chicago_24h	20:10	1.624
Chicago_24h	20:15	1.616
Chicago_24h	20:20	1.608
Chicago_24h	20:25	1.601
Chicago_24h	20:30	1.594
Chicago_24h	20:35	1.587
Chicago_24h	20:40	1.579

Chicago_24h	20:45	1.572
Chicago_24h	20:50	1.565
Chicago_24h	20:55	1.558
Chicago_24h	21:00	1.551
Chicago_24h	21:05	1.545
Chicago_24h	21:10	1.538
Chicago_24h	21:15	1.531
Chicago_24h	21:20	1.525
Chicago_24h	21:25	1.518
Chicago_24h	21:30	1.512
Chicago_24h	21:35	1.505
Chicago_24h	21:40	1.499
Chicago_24h	21:45	1.493
Chicago_24h	21:50	1.487
Chicago_24h	21:55	1.48
Chicago_24h	22:00	1.474
Chicago_24h	22:05	1.468
Chicago_24h	22:10	1.462
Chicago_24h	22:15	1.456
Chicago_24h	22:20	1.451
Chicago_24h	22:25	1.445
Chicago_24h	22:30	1.439
Chicago_24h	22:35	1.433
Chicago_24h	22:40	1.428
Chicago_24h	22:45	1.422
Chicago_24h	22:50	1.417
Chicago_24h	22:55	1.411
Chicago_24h	23:00	1.406
Chicago_24h	23:05	1.4
Chicago_24h	23:10	1.395
Chicago_24h	23:15	1.39
Chicago_24h	23:20	1.384
Chicago_24h	23:25	1.379
Chicago_24h	23:30	1.374
Chicago_24h	23:35	1.369
Chicago_24h	23:40	1.364
Chicago_24h	23:45	1.359
Chicago_24h	23:50	1.354
Chicago_24h	23:55	1.349
Chicago_24h	24:00	0

Lethbridge_County_1:100year_48hr	1	0.1
Lethbridge_County_1:100year_48hr	2	0.1
Lethbridge_County_1:100year_48hr	3	0.1
Lethbridge_County_1:100year_48hr	4	0.1
Lethbridge_County_1:100year_48hr	5	0.4
Lethbridge_County_1:100year_48hr	6	0.9
Lethbridge_County_1:100year_48hr	7	1
Lethbridge_County_1:100year_48hr	8	1.1
Lethbridge_County_1:100year_48hr	9	1.3
Lethbridge_County_1:100year_48hr	10	1.9
Lethbridge_County_1:100year_48hr	11	2.5
Lethbridge_County_1:100year_48hr	12	3.1
Lethbridge_County_1:100year_48hr	13	4.4
Lethbridge_County_1:100year_48hr	14	4.7
Lethbridge_County_1:100year_48hr	15	5
Lethbridge_County_1:100year_48hr	16	5.2

```
Lethbridge_County_1:100year_48hr            17         5.3
Lethbridge_County_1:100year_48hr            18         5.6
Lethbridge_County_1:100year_48hr            19         5.9
Lethbridge_County_1:100year_48hr            20         6.3
Lethbridge_County_1:100year_48hr            21         7.5
Lethbridge_County_1:100year_48hr            22         17.3
Lethbridge_County_1:100year_48hr            23         7.7
Lethbridge_County_1:100year_48hr            24         5
Lethbridge_County_1:100year_48hr            25         4.7
Lethbridge_County_1:100year_48hr            26         4.4
Lethbridge_County_1:100year_48hr            27         3.8
Lethbridge_County_1:100year_48hr            28         3.4
Lethbridge_County_1:100year_48hr            29         3.1
Lethbridge_County_1:100year_48hr            30         2.5
Lethbridge_County_1:100year_48hr            31         2.2
Lethbridge_County_1:100year_48hr            32         1.9
Lethbridge_County_1:100year_48hr            33         1.6
Lethbridge_County_1:100year_48hr            34         1.3
Lethbridge_County_1:100year_48hr            35         0.6
Lethbridge_County_1:100year_48hr            36         0.6
Lethbridge_County_1:100year_48hr            37         0.6
Lethbridge_County_1:100year_48hr            38         0.6
Lethbridge_County_1:100year_48hr            39         0.6
Lethbridge_County_1:100year_48hr            40         0.4
Lethbridge_County_1:100year_48hr            41         0.3
Lethbridge_County_1:100year_48hr            42         0.2
Lethbridge_County_1:100year_48hr            43         0.1
Lethbridge_County_1:100year_48hr            44         0.1
Lethbridge_County_1:100year_48hr            45         0
Lethbridge_County_1:100year_48hr            46         0
Lethbridge_County_1:100year_48hr            47         0
Lethbridge_County_1:100year_48hr            48         0

[REPORT]
;;Reporting Options
INPUT      YES
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS       9944.6547        16505.09225      11115.9193       17298.69275
UNITS            Meters

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
J1               10428.276          16809.562
J2               10946.19           17067.207
J3               11045.615          17068.893
J4               11046.104          16814.066
J5               10939.448          16811.06
Outfall          11052.68           17252.62
Pond_1A          10917.541          16895.318
```

```
Pond_1B          10342.692          16795.507
Pond_2           10830.278          17090.356

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
C1               10856.417          16809.217
Wier_1A          10939.467          16890.051
Wier_1A          10958.011          16833.281
Wier_1B          10350.255          16821.316
Wier_1B          10424.375          16836.687
Wier_2           10859.125          17114.752
Wier_2           10942.09           17096.537

[POLYGONS]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Phase_1A         10432.95           16948.747
Phase_1A         10953.596          16955.277
Phase_1A         10959.492          16821.123
Phase_1A         10434.423          16814.478
Phase_1A         10432.95           16948.747
Phase_1B         10001.048          16653.236
Phase_1B         9997.894           16837.075
Phase_1B         10109.454          16838.662
Phase_1B         10138.696          16839.078
Phase_1B         10234.451          16887.209
Phase_1B         10432.533          16986.754
Phase_1B         10435.888          16680.894
Phase_1B         10437.364          16546.269
Phase_1B         10355.488          16545.23
Phase_1B         10246.883          16543.852
Phase_1B         10035.174          16541.165
Phase_1B         10033.989          16544.952
Phase_1B         10001.104          16649.982
Phase_1B         10001.048          16653.236
Phase_2          10432.533          16986.754
Phase_2          10643.265          17092.752
Phase_2          10645.549          17093.895
Phase_2          10647.835          17095.03
Phase_2          10650.125          17096.159
Phase_2          10652.418          17097.281
Phase_2          10654.715          17098.397
Phase_2          10657.014          17099.505
Phase_2          10659.317          17100.607
Phase_2          10661.624          17101.702
Phase_2          10663.933          17102.79
Phase_2          10666.246          17103.872
Phase_2          10668.562          17104.946
Phase_2          10670.881          17106.014
Phase_2          10673.203          17107.075
Phase_2          10675.528          17108.129
Phase_2          10677.857          17109.176
Phase_2          10680.188          17110.216
Phase_2          10682.523          17111.249
Phase_2          10684.86           17112.275
Phase_2          10687.201          17113.295
```

```
Phase_2          10689.545          17114.307
Phase_2          10691.891          17115.313
Phase_2          10694.241          17116.311
Phase_2          10941.911          17221.144
Phase_2          10948.32           17075.323
Phase_2          11035.035          17076.412
Phase_2          11035.263          17055.329
Phase_2          10949.199          17055.329
Phase_2          10953.596          16955.277
Phase_2          10432.95           16948.747
Phase_2          10432.533          16986.754
Undeveloped_1    10949.199          17055.329
Undeveloped_1    10959.492          16821.123
Undeveloped_1    11037.777          16822.113
Undeveloped_1    11035.263          17055.329
Undeveloped_1    10949.199          17055.329
Undeveloped_2    11035.035          17076.412
Undeveloped_2    11033.059          17259.724
Undeveloped_2    10941.911          17221.144
Undeveloped_2    10948.32           17075.323
Undeveloped_2    11035.035          17076.412

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
```

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

****
Element Count
****
Number of rain gages 2
Number of subcatchments ... 5
Number of nodes 9
Number of links 11
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
Lethbridge_1:100year_Chicago_24h	Chicago_24h	INTENSITY	5 min.
Lethbridge_County_1:100year_48hr	Lethbridge_County_1:100year_48hr	INTENSITY	60 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
Phase_1A	7.02	160.00	25.00	0.5000	Lethbridge_1:100year_Chicago_24h	Pond_1A
Phase_1B	14.86	400.00	25.00	0.5000	Lethbridge_1:100year_Chicago_24h	Pond_1B
Phase_2	8.33	200.00	25.00	0.5000	Lethbridge_1:100year_Chicago_24h	Pond_2
Undeveloped_1	1.92	107.00	1.00	0.5000	Lethbridge_1:100year_Chicago_24h	J3
Undeveloped_2	1.47	92.00	1.00	0.5000	Lethbridge_1:100year_Chicago_24h	J3

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	903.40	1.00	0.0	
J2	JUNCTION	900.30	1.00	0.0	
J3	JUNCTION	899.71	1.00	0.0	
J4	JUNCTION	900.62	1.00	0.0	
J5	JUNCTION	901.00	1.00	0.0	

Outfall	OUTFALL	899.50	1.00	0.0	
Pond_1A	STORAGE	900.00	2.00	0.0	
Pond_1B	STORAGE	903.40	2.00	0.0	
Pond_2	STORAGE	900.50	2.00	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	% Slope	Roughness
C1	J1	Pond_1A	CONDUIT	533.8	0.6370	0.0350
C3	J5	J4	CONDUIT	106.7	0.3571	0.0350
C4	J4	J3	CONDUIT	254.9	0.3563	0.0350
C5	J2	J3	CONDUIT	99.5	0.5953	0.0350
C6	J3	Outfall	CONDUIT	183.9	0.1147	0.0350
Pump_1A	Pond_1A	J5	TYPE3 PUMP			
Orifice_1B	Pond_1B	J1	ORIFICE			
Orifice_2	Pond_2	J2	ORIFICE			
Wier_1A	Pond_1A	J5	WEIR			
Wier_1B	Pond_1B	J1	WEIR			
Wier_2	Pond_2	J2	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRIANGULAR	1.00	3.00	0.47	6.00	1	4.16
C3	TRIANGULAR	1.00	3.00	0.47	6.00	1	3.12
C4	TRIANGULAR	1.00	3.00	0.47	6.00	1	3.11
C5	TRIANGULAR	1.00	3.00	0.47	6.00	1	4.02
C6	TRIANGULAR	1.00	3.00	0.47	6.00	1	1.77

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

```
****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 05/17/2022 00:00:00
Ending Date .............. 05/20/2022 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00
Routing Time Step ........ 5.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m
```

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	4.038	120.146
Evaporation Loss	0.000	0.000
Infiltration Loss	1.889	56.193
Surface Runoff	2.158	64.202
Final Storage	0.006	0.170
Continuity Error (%)	-0.348	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	2.158	21.579
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	1.518	15.183
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.642	6.417
Continuity Error (%)	-0.096	

****
Time-Step Critical Elements
****
None

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary
****
Minimum Time Step   :   4.50 sec
Average Time Step   :   5.00 sec
Maximum Time Step   :   5.00 sec
Percent in Steady State   :   0.00
Average Iterations per Step :   2.00
Percent Not Converging   :   0.00
Time Step Frequencies   :
    5.000 - 3.155 sec   :   100.00 %
    3.155 - 1.991 sec   :   0.00 %
    1.991 - 1.256 sec   :   0.00 %
    1.256 - 0.792 sec   :   0.00 %
    0.792 - 0.500 sec   :   0.00 %

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff 10^6 ltr	Total Runoff CMS	Peak Runoff Coeff
Phase_1A	120.15	0.00	0.00	55.21	30.18	57.63	65.17	4.58	0.52	0.542
Phase_1B	120.15	0.00	0.00	54.80	30.20	58.06	65.61	9.75	1.23	0.546
Phase_2	120.15	0.00	0.00	55.07	30.19	57.77	65.32	5.44	0.64	0.544
Undeveloped_1	120.15	0.00	0.00	67.17	1.19	53.17	53.17	1.02	0.16	0.443
Undeveloped_2	120.15	0.00	0.00	66.93	1.19	53.44	53.44	0.79	0.13	0.445

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
J1	JUNCTION	0.13	0.15	903.55	0 18:11	0.15
J2	JUNCTION	0.11	0.13	900.43	0 17:51	0.13
J3	JUNCTION	0.33	0.59	900.30	0 07:43	0.59
J4	JUNCTION	0.19	0.20	900.82	0 15:13	0.20
J5	JUNCTION	0.19	0.21	901.21	0 07:13	0.21
Outfall	OUTFALL	0.14	0.29	899.79	0 07:43	0.29
Pond_1A	STORAGE	0.95	1.43	901.43	0 18:01	1.43
Pond_1B	STORAGE	1.04	1.47	904.87	0 17:51	1.47
Pond_2	STORAGE	1.04	1.48	901.98	0 17:48	1.48

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
J1	JUNCTION	0.000	0.029	0 17:51	0	5.79	0.534
J2	JUNCTION	0.000	0.017	0 17:48	0	3.55	0.124
J3	JUNCTION	0.288	0.329	0 07:25	1.81	15.3	0.501
J4	JUNCTION	0.000	0.043	0 10:04	0	9.93	0.233
J5	JUNCTION	0.000	0.043	0 09:59	0	9.94	0.057
Outfall	OUTFALL	0.000	0.291	0 07:43	0	15.2	0.000
Pond_1A	STORAGE	0.523	0.523	0 07:15	4.58	10.3	0.580
Pond_1B	STORAGE	1.230	1.230	0 07:15	9.75	9.75	0.004
Pond_2	STORAGE	0.641	0.641	0 07:15	5.44	5.44	0.004

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
Pond_1A	1.402	30	0	0	2.418	52	0 18:01	0.043
Pond_1B	5.696	45	0	0	8.415	66	0 17:51	0.029
Pond_2	3.020	40	0	0	4.620	62	0 17:48	0.017

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
Outfall	97.88	0.060	0.291	15.183
System	97.88	0.060	0.291	15.183

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.029	0 18:11	0.16	0.01	0.58
C3	CONDUIT	0.043	0 10:04	0.36	0.01	0.20
C4	CONDUIT	0.043	0 12:42	0.22	0.01	0.39
C5	CONDUIT	0.017	0 17:51	0.10	0.00	0.34

C6	CONDUIT	0.291	0	07:43	0.51	0.16	0.44
Pump_1A	PUMP	0.043	0	09:59		1.00	
Orifice_1B	ORIFICE	0.029	0	17:51			1.00
Orifice_2	ORIFICE	0.017	0	17:48			1.00
Wier_1A	WEIR	0.000	0	00:00			0.00
Wier_1B	WEIR	0.000	0	00:00			0.00
Wier_2	WEIR	0.000	0	00:00			0.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.90	0.00
C3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.88	0.00
C4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.97	0.00
C5	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.99	0.00
C6	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C1	0.01	0.01	40.23	0.01	0.01

****
Pumping Summary
****

Pump	Percent Utilized	Number of Start-Ups	Min Flow CMS	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr	Power Usage Kw-hr	% Time Off Pump Curve Low	% Time Off Pump Curve High

```
  ------------------------------------------------------------------------------
------------------------
  Pump_1A                 99.81           1      0.00      0.04      0.04      9.938
7.41    0.0    0.0


  Analysis begun on:  Wed May 25 16:37:13 2022
  Analysis ended on:  Wed May 25 16:37:14 2022
  Total elapsed time: 00:00:01
```

APPENDIX 8

Sunny View ASP Concept Design

N

County of Lethbridge No. 26

AREA STRUCTURE PLAN

Surrounding

Lot 3, Block 1, Plan 927 LK

Within

SEC. 28, TWP. 9, RGE. 21, W. 4M.

50 0 50 100 150 200

Scale = 1 : 2000 Metres

Legend:

Distances shown are in metres and decimals thereof
Portion to be registered is outlined thus ———

Abbreviations:

'AC' denotes acres	'Pl.' denotes placed
'E.' denotes East	'PP.' denotes power poles
'Fd.' denotes Found	'Rge.' denotes Range
'ha' denotes hectares	'Re-est.' denotes Re-established
'I.' denotes Statutory Iron Post	'Ref.' denotes Reference
'Mer.' denotes Meridian	'Sec.' denotes Section
'Mk' denotes Mark	'S.' denotes South
'Mtd.' denotes Marked	'Twp.' denotes Township
'N.' denotes North	'W.' denotes West

777 Surveys Ltd. 777, CALGARY, ALBERTA

APPENDIX 9

Alberta Transportation-Portion of Figure 5.2.3 (Lethbridge and Area NHS & NSTC Functional Planning Study, March 12, 2004 – Stantec)

CONSULTANT			
JOB No.	13555020	PLAN No.	13555020.M03

Stantec

SHEET 3

DRAFT
March 12, 2004
For Discussion Purposes Only

FIGURE 5.2.3
HIGHWAY 3 & 4
LETHBRIDGE AND AREA NHS & NSTC
FUNCTIONAL PLANNING STUDY
TECHNICALLY RECOMMENDED ROUTE

REGION	PLAN No.	PROJECT	CONTRACT No.	SHEET
SOUTHERN		HWY 3 & 4		3 of 9

Alberta
INFRASTRUCTURE AND TRANSPORTATION