# AREA STRUCTURE PLAN
# RAMIAS SUBDIVISION
## A RESIDENTIAL SUBDIVISION
## IN
## NE ¼ 21-9-22-W4
## LETHBRIDGE COUNTY, AB



Bylaw 21-010
Approved May 5, 2022

Submitted by:

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# AREA STRUCTURE PLAN
# RAMIAS SUBDIVISION
# NE ¼ 21-9-22-W4

Submitted to
Lethbridge County

**PREPARED FOR:**
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APPENDICES

# 1. VISION

The Ramias residential subdivision Area Structure Plan has been developed through rigorous planning and careful consideration of the needs of the future property owners while considering the potential impact to neighboring existing landowners. The focus in developing this plan was to put forward a development proposal which would minimize the impact on area infrastructure, ensure a good fit with adjacent land uses and ultimately provide Lethbridge County with a cost-effective model for future acreage development.

The proposed Ramias subdivision is a Country Residential Development proposed to be sited to the northeast of Coalhurst, located at NE ¼ of Section 21, Township 9, Range 22, West of the 4th Meridian. The goal of this 5-lot development (3 existing and 2 new is to create an environment where residents can enjoy the peace and quiet of country residential living, but can have easy and convenient access to the municipalities of Coalhurst and Lethbridge. Key to achieving this goal is sizing the lots to a 2-acre minimum to allow for the low density feeling of the area. This lower density also minimizes the environmental impact and gives a feel of integrating into the natural environment.

In addition, the planning of the development was purposely kept at low density to match the existing surrounding properties. Maintaining similar density allows for expansion of development in the area without changing the feel that country residential exudes.

Coalhurst and the surrounding community have deep agricultural roots and there is a strong cultural trend to embrace rural and farm living. However, there is still a desire to access amenities located in Coalhurst and other surrounding communities. As such there is a large demand for the feel of country living while still being able to access the urban areas.

As with any development there are numerous challenges and opportunities. The opportunity is to provide a unique living experience to the residents of the County that is rare in southern Alberta. Key challenges to this development are identified and ultimately addressed in the remainder of this document.

Overall, the development concept acknowledges and seeks to positively integrate with the existing natural and built conditions in the area while successfully offering a diverse range of housing opportunities to satisfy a broad demand for country residency. The proposal and plan have been designed to:

- Offer a new high-quality rural residential area to Lethbridge County residents
- Be compatible and complimentary with existing adjacent country residential acreages which similarly enjoy the enviable location.

# 2. INTRODUCTION

This Area Structure Plan has been prepared by Hasegawa Engineering Ltd. on behalf of Ron Ramias to describe the development concept and municipal servicing strategy to be provided for the proposed country residential development. The site lies at NE-21-9-22-W4 at the intersection of Range Road 223 and Township Road 9-4 and is bordered on the south side by the existing CPR rail line (refer to Figure 1). The Area Structure Plan describes the ultimate development of the subject lands, which are contained within an existing parcel (refer to Figure 3).

As the development is intended to have five lots, an Area Structure Plan is required under Section 6.2 of the Municipal Development Plan of Lethbridge County.

This Area Structure Plan is submitted as support for the application to adopt the Plan as a by-law of Lethbridge County and the subsequent change to the Land Use By-Law. The Area Structure Plan will provide a basis for evaluation of future applications for subdivision of parcels and building development.

# 3. PLANS, DRAWINGS, AND CONCEPT

## 3.1 PLANS AND DRAWINGS

To illustrate the location of the property, site drainage, and the proposed subdivision layout, seven figures have been prepared. The figures are provided in *Appendix A* and are as follows:

- Figure 1 – Area Map
- Figure 2 – Existing Lots and Topography
- Figure 3 – Conceptual Lot Layout
- Figure 4 – Servicing Plan
- Figure 5 – Stormwater Management Plan
- Figure 6 – Lot Access Details
- Figure 7 – Sections & Details

These plans are conceptual in nature and are to be used for planning purposes only. Upon ASP acceptance, detailed design plans will be prepared and submitted with any subdivision application.

## 3.2 EXISTING CONDITIONS

The proposal is designed with the existing conditions of the land in mind. The impact on adjacent landowners and residents was carefully considered in the preparation of the plan.

The lands within the boundaries of the proposed Area Structure Plan are currently used as cultivated land (irrigated and non-irrigated) or lie in a natural state. Adjacent land owners include:

- To the north – agricultural lands under irrigation
- To the east, west, and south – country residential lot acreages.
- To the north and east – developed roads with the road allowances

The boundary of the proposed Area Structure Plan is the boundary of the single parcel containing the lands to be developed.

## 3.3 DEVELOPMENT OBJECTIVES

Preferred Development Concept

The preferred development concept appears in Figure 3. Note that the lot layouts are tentative and may vary slightly due to design considerations. The ultimate development will create approximately 5.47 ha (13.52 acres) of net developable area. The remainder of the land is dedicated to roads, utility lots for stormwater retention ponds, and open areas.

Lot sizes will be a minimum of 0.81 ha (2.0 acres) in size. Some lots will be slightly larger. The result is a proposed 5-lot development (existing plus Lots 4 and 5) in Phase 1 with one lot being designated for pastureland/stormwater drainage retention.

All of the lots will be accessed from Township Road 9-4 (refer to Figure 6).

Land Use Classification

The existing land use classification of the land for the proposed development is RUF (Rural Urban Fringe). The proposed land use classification of the subdivision is Grouped Country Residential as per the Lethbridge County Land Use Bylaw.

Lethbridge County Municipal Development Plan

The Lethbridge County Municipal Development Plan contains directives for residential development. The location of the proposed development meets these directives for the following reasons:

- The site is located adjacent to an existing area of Country Residential Development
- The site does not contain any sensitive environmental, cultural or historical features.

## 3.4 POPULATION ESTIMATES

With 4 residential use lots, and assuming a dwelling on each lot, the estimated population for the development at full build out is 10 additional residents based on an assumed population of 2.5 people per household.

## 3.5 PROPOSED LAND USE AREAS

The distribution of land use within the proposed ASP is shown in *Table 1* below.

Table 1. Land Use Statistics

| | Hectares (Acres) | Percent of Gross Area |
|---|---|---|
| **Net Developable Area** | **5.47 (13.52)** | **47%** |
| Country Residential Lots 1,2,4,5 | 5.47 (13.52) | 47% |
| Utility Lots – Lot 3 | 6.15 (15.20) | 53% |
| **Gross Developable Area** | **11.62 (28.72)** | **100%** |

# 4. SERVICING

In order to determine the viability of this development, preliminary evaluations have been performed with respect to servicing. Key service items include sewer, water, natural gas, telephone, television, and electric. Additional information on services is included in this section.

## 4.1 SANITARY SEWER SYSTEM

Sanitary sewage from each lot will be handled by individual private sewage treatment systems which meet or exceed the Alberta Private Sewage System Standard of Practice (2015). All systems will be approved as meeting these required standards prior to installation.

County development requirements indicate that prior to building on a lot, a soil test is required to determine the suitability of soil for supporting a septic field system. For the purpose of this ASP, two test pits were advanced and soil samples taken to be analyzed to provide a representative indication of soil suitability for septic field. Prior to the development of each parcel, additional soil testing will be required. The soil characteristics, as detailed in this section, verify the suitability of the soil for this type of a disposal system and supply the base design criterion for the required septic fields.

Soil samples were taken from two test holes on the property (refer to Figure 3 for test pit locations). Both samples were taken to Roseke Engineering to be tested for grain size analysis and suitability for septic fields (refer to *Appendix C*). The two test pits were dug to a total depth between 96" and 120" and logged for soil type. No water was observed in either of the test pits. Observed soils consisted mostly of sandy, silty clay till and were massive or blocky in nature (refer to attached soil logs).

The soils were classified using the soil texture classification triangle (Figure 8.1.1.10, Alberta Private Sewage System Standard of Practice 2015) and then that was used to determine Hydraulic Linear loading rates for the area. The results of this analysis are shown in Table 1 below.

Table 2. Soil Classification and Estimated Loading Rates Results

| | Soil Classification | Hydraulic Linear Loading Rate (L/d/m) |
|---|---|---|
| Test Pit #1 (3-4 feet deep) | Silty clay loam (SICL) | 37-50 |
| Test Pit #2 (4 feet deep) | Clay (CL) | 37-50 |

The results of this analysis indicate both locations are able to accept infiltration at a rate facilitating installation and use of septic fields.

Septic fields and septic tanks are to be designed, installed, and operated as per Alberta Private Sewage Systems Standard of Practice latest edition. Figure 4 in *Appendix A* shows approximate septic field sizes and locations on each lot based on estimated population of each lot.

## 4.2 WATER SYSTEMS

### *4.2.1 Potable Water*

Potable water will be the responsibility of each residential lot owner. Each owner will be required to install a cistern and have water trucked to that cistern. Individual wells may also be installed in the future upon gaining water rights and AENV approval.

## 4.3 GAS

Natural gas distribution infrastructure in the area surrounding the site is operated by ATCO Gas. Each landowner will pay for the installation of natural gas distribution infrastructure to their lot. ATCO Gas will distribute natural gas within the development and lot purchasers will be able to select a retailer for natural gas supply. An existing ATCO high pressure natural gas line runs through the east side of the development which is a potential tie in point for servicing of the residential use lots within the subdivision. Refer to Figure 4 in *Appendix A* for high pressure gas line location and potential servicing to each residence.

## 4.4 ELECTRICAL POWER

The existing electrical service for the area is overhead power lines. Fortis Alberta Inc. will provide services to the proposed subdivision and services to each property line off the existing infrastructure (refer to Figure 4).

Electrical services are to be provided by the lot owner, not by the developer.

## 4.5 TELEPHONE

Telus will provide services to the lots, but each individual owner must apply for the service when building.

## 4.6 SOLID WASTE DISPOSAL

Lot purchasers will be responsible for making arrangements for solid waste disposal. The City of Lethbridge Regional Solid waste facility is located approximately 21km driving distance from the development. Alternatively, lot purchasers may contract with a private solid waste hauler.

## 4.7 MAIL DELIVERY

At the time of subdivision an application will be made to Canada Post for mail service to the development. The design of the subdivision will include an appropriate location per Canada Post guidelines. A community mailbox area at the entrance to the development will likely be required.

# 5. ROADS AND TRANSPORTATION

## 5.1 EXTERNAL ROADS

The main access to the development will be from Township Road 9-4 which runs east/west along the north side of the development. Township Road 9-4 is paved in asphalt and maintained by Lethbridge County. Most of the traffic flow to and from the subdivision is anticipated to head east/west from the subdivision along Twp Rd 9-4 to access Highway 3 travelling either north or southbound.

Approaches from Twp Rd 9-4 will be gravel construction to County standards. Lots 4 and 5 already have approaches connected to the paved County roads which will be utilized for the driveways for these lots. Prior to subdivision the developer will work with the County to determine what improvement, if any will be required for road approaches and the access road.

# 6. SITE DRAINAGE AND GRADING

The objective of the stormwater management design is to ensure that there is no impact on the surrounding properties and landowners from changing the drainage pattern within the development.

This analysis was based on creating a total of eight (8) lots. However, the analysis provides conservative results for a 4-lot development. All drainage onsite will conform to Lethbridge County and Alberta Environment and Parks requirements. The intent of stormwater management for the development is to control runoff with the use of stormwater management retention areas such that runoff is contained and released only when permission is granted. A Site Drainage Analysis was completed for the site (*Appendix D*) and is summarized below.

## 6.1 SITE DRAINAGE

Stormwater runoff from the subject lands presently flows from the north side of the development down to the south where there is a natural depression just north of the CPR railway. A combination of swales, berms, and culverts will be used to convey overland storm water from the northern 4 lots, down toward the retention area to the south. Figure 5 shows the topography of the site and proposed grading and infrastructure. The stormwater retention will still occur on the low area on the south side of the property and will continue to capture runoff from existing and proposed country residential lots. We have shown the drainage way as a stormwater easement. A swale system will be used to bypass offsite drainage from the north through the development to lot 3.

## 6.2 DRAINAGE MODELING

To determine the required active storage volume of the pond, a hydrologic model of the site was prepared using the PC SWMM hydrologic modeling software package. The hydrologic model of the site post-development was then analyzed using a 1:100 year 24-hour design storm event.
The stormwater management area was sized to retain runoff volume generated. The hydrologic model will be reviewed during the detailed design stage to confirm the required capacity of the overland drainage system and culverts.

# 7. OPEN SPACES AND RESERVOIR ACCESS

The pastureland/drainage retention area will be left in a natural state as much as possible. The care and maintenance for these areas will be the responsibility of the Lethbridge County. It is not intended for these areas to be manicured parks but to remain or be restored to natural areas.

# 8. MUNICIPAL RESERVE

Due to the small nature of the development and the large lots, we have not included Municipal Reserve. However, there is a large area of the development that is within the flood plain that will remain natural land. The owner will provide a cash equivalent for the land requirement based on current market value of undeveloped land.

# 9. ARCHITECTURAL CONTROLS

Due to the small nature of this development, the developer has elected to not implement any development-specific architectural controls.

# APPENDIX A

## FIGURES


0 500 1,000 1,500 2,000 2,500 5,000

SCALE: 1:50,000

NOTES

| # | DATE (YY.MM.DD) | DRAWING STATUS | DSN | DRW | CHK | APP |
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| 1 | 21.04.27 | FOR APPROVAL | DC | DPB | MH | |
| 0 | 20.12.18 | FOR REVIEW | DC | MO | MH | |

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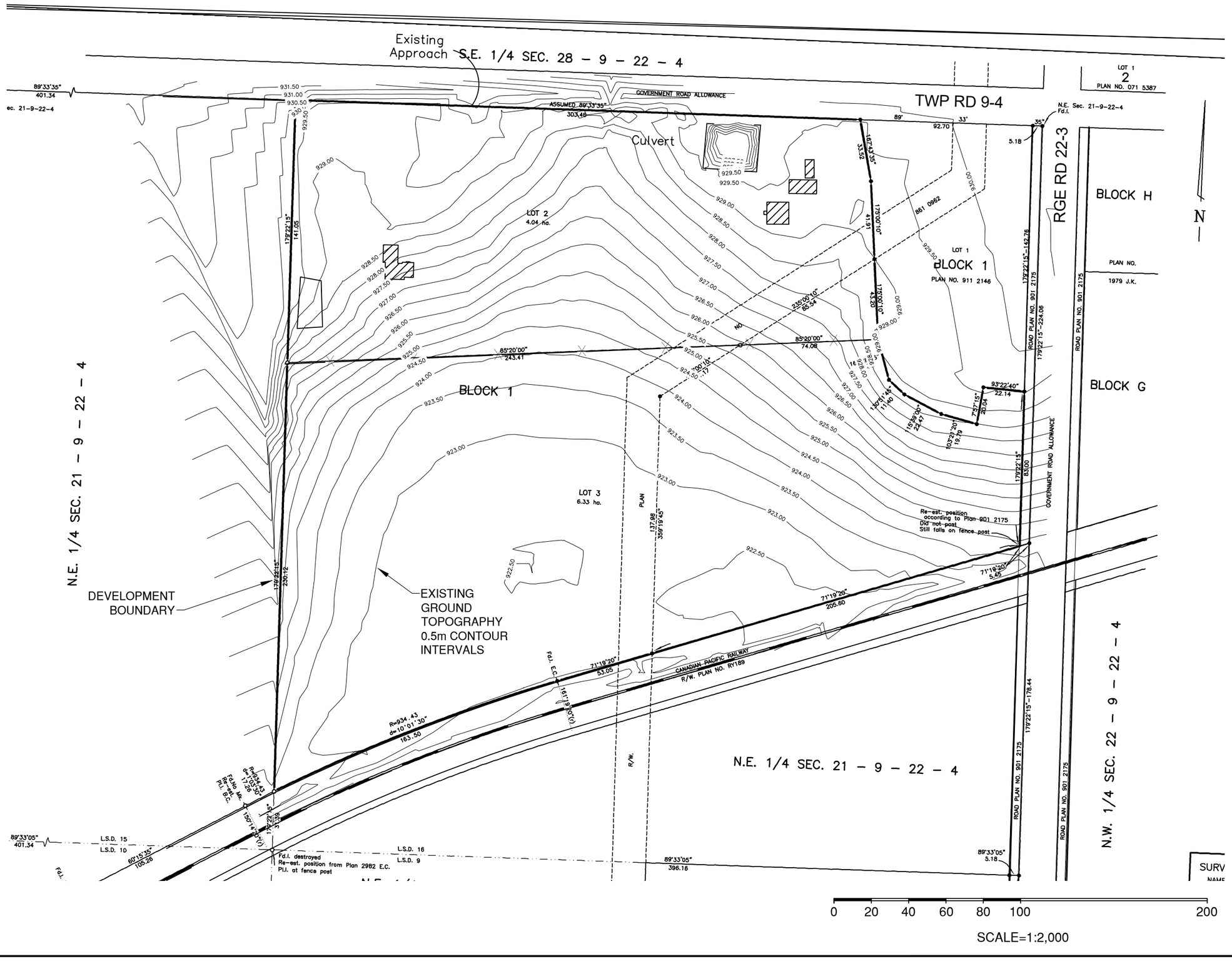
CLIENT
RON RAMIAS

PROJECT TITLE
PROPOSED GROUPED COUNTRY RESIDENTIAL SUBDIVISION

DRAWING TITLE
AREA MAP

PROJECT NUMBER
17-068

SHEET NUMBER
FIG. 1

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| 0 | 20/12/18 | FOR REVIEW | DC | MO | MH | |

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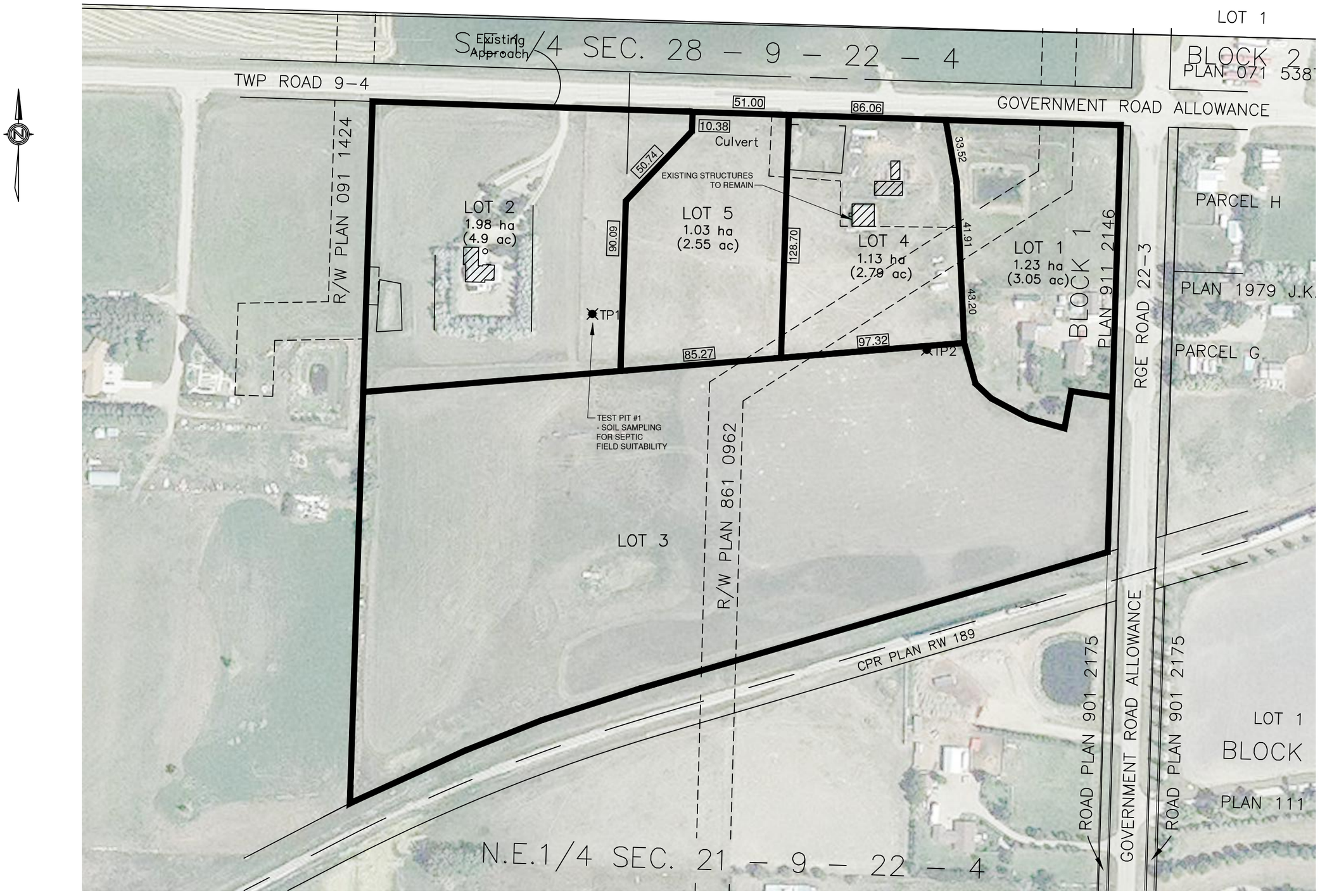
PROJECT TITLE
PROPOSED GROUPED COUNTRY RESIDENTIAL SUBDIVISION

DRAWING TITLE
EXISTING LOTS AND TOPOGRAPHY

PROJECT NUMBER
17-068

SHEET NUMBER
FIG. 2




**LEGEND**

CURRENT PROPOSED LOTS

FUTURE LOTS

54.78 EXISTING LOT DIMENSIONS

54.78 PROPOSED LOT DIMENSIONS

0 20 40 60 80 100 200

SCALE=1:2,000

NOTES

| # | DATE (YY/MM/DD) | DRAWING STATUS | DSN | DRW | CHK | APP |
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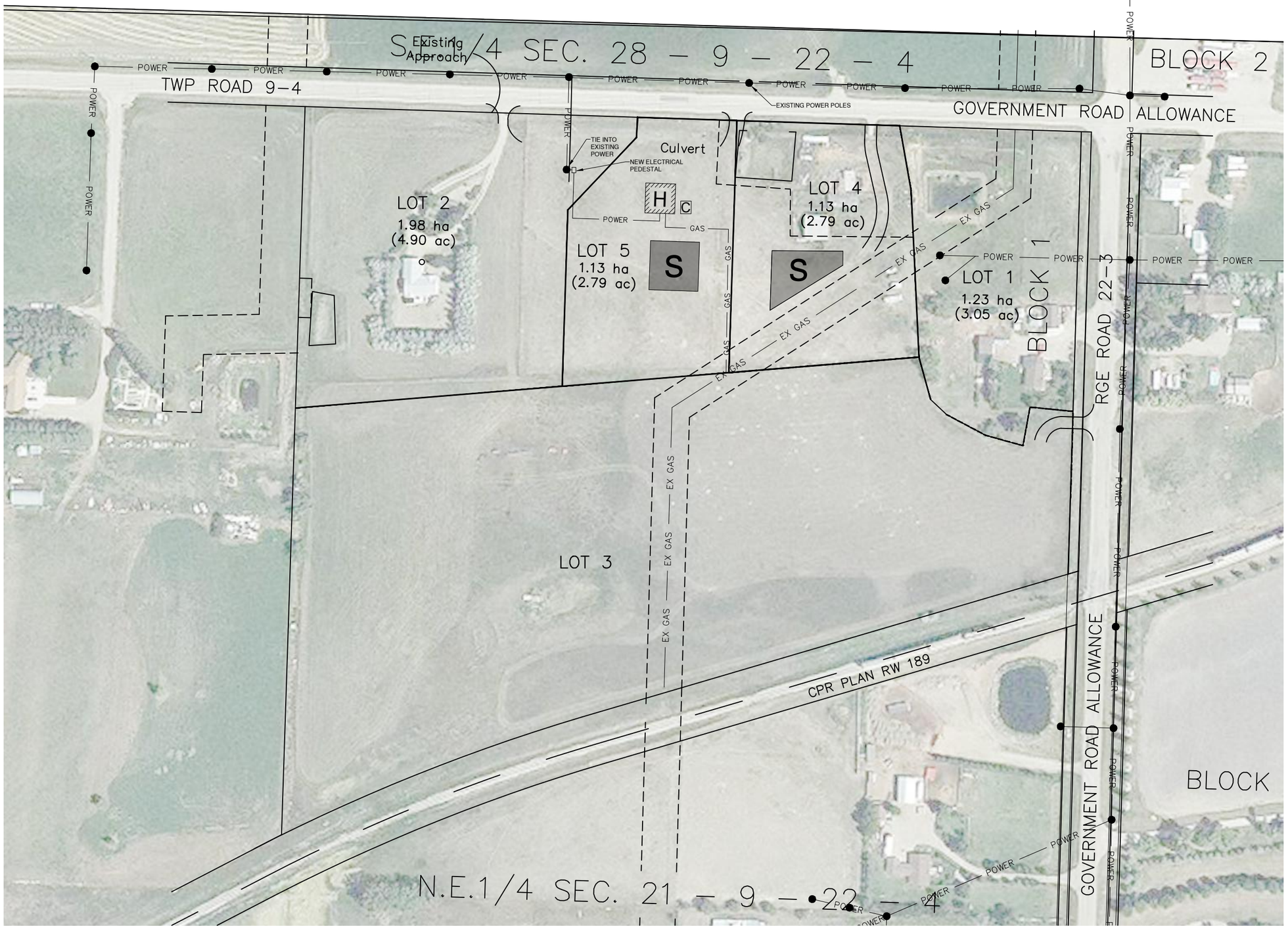
PROJECT TITLE
PROPOSED GROUPED COUNTRY RESIDENTIAL SUBDIVISION

DRAWING TITLE
CONCEPTUAL LOT LAYOUT

PROJECT NUMBER
17-068

SHEET NUMBER
FIG. 3




**LEGEND**

POWER — EXISTING FORTIS ELECTRICAL

POWER — PROPOSED ELECTRICAL SERVICES

EX GAS — EXISTING ATCO HIGH PRESSURE GAS LINE

GAS — PROPOSED ATCO GAS SERVICES

0 20 40 60 80 100 200

SCALE=1:2,000

NOTES

| # | DATE (YY/MM/DD) | DRAWING STATUS | DSN | DRW | CHK | APP |
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| 1 | 21/04/27 | FOR APPROVAL | DC | DPB | MH | |
| 0 | 20/12/18 | FOR REVIEW | DC | MO | MH | |

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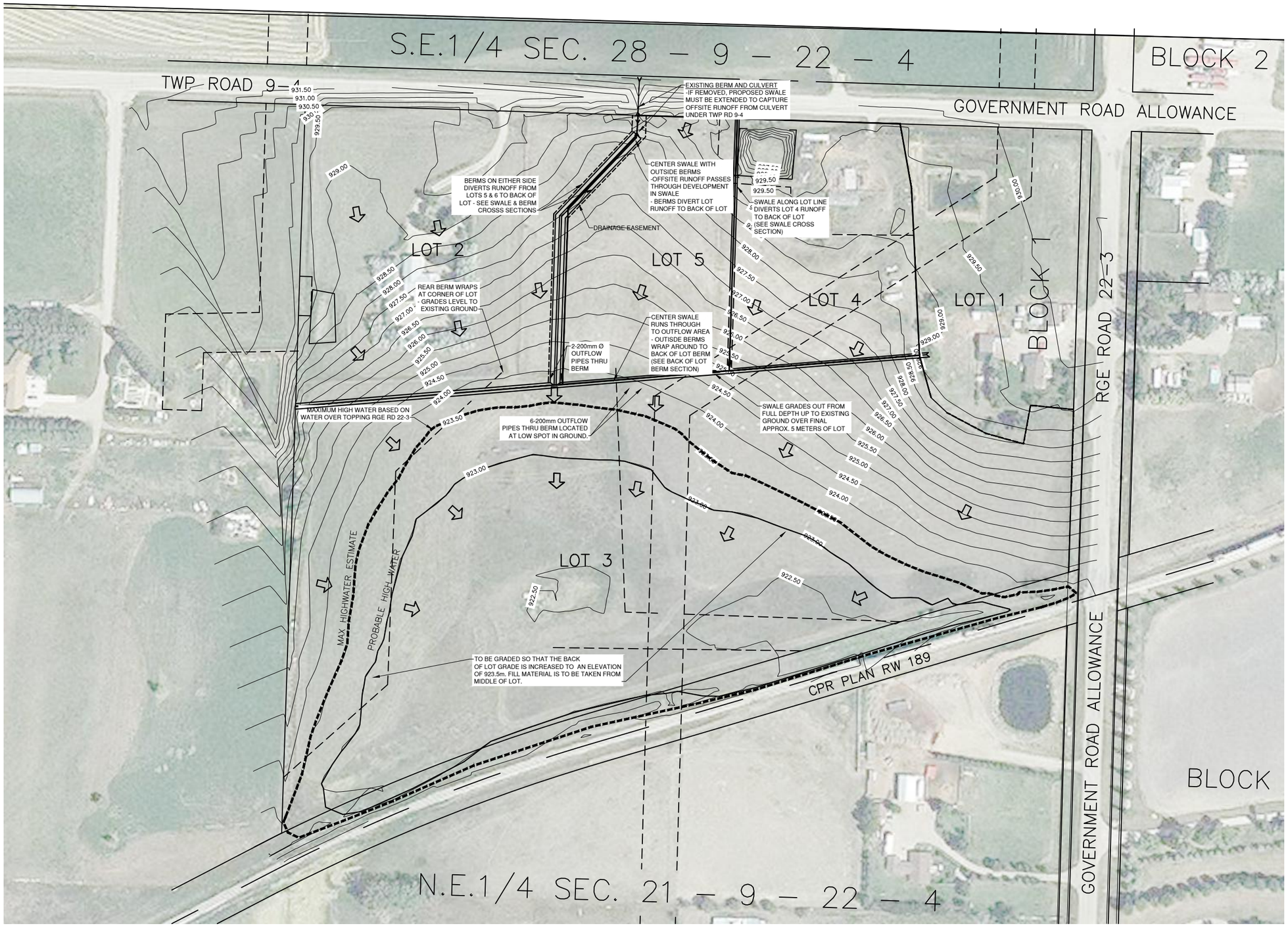
PROJECT TITLE
PROPOSED GROUPED COUNTRY RESIDENTIAL SUBDIVISION

DRAWING TITLE
SERVICING PLAN

PROJECT NUMBER
17-068

SHEET NUMBER
FIG. 4




NOTES:

- LOTS 7 & 8 TO BE GRADED SO THAT THE BACK OF LOT GRADE IS INCREASED TO AN ELEVATION OF 923.5m. MATERIAL FOR FILL IS TO BE TAKEN FROM LOT 9.

**LEGEND**

- CURRENT PROPOSED LOTS
- FUTURE LOTS
- PROPOSED OVERLAND DRAINAGE DIRECTION
- FINISH GRADE TOPOGRAPHY CONTOUR LINE (0.5m INTERVALS)

0 20 40 60 80 100 200

SCALE=1:2,000

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| 1 | 21/04/27 | FOR APPROVAL | DC | DPB | MH | |
| 0 | 20/12/18 | FOR REVIEW | DC | MO | MH | |

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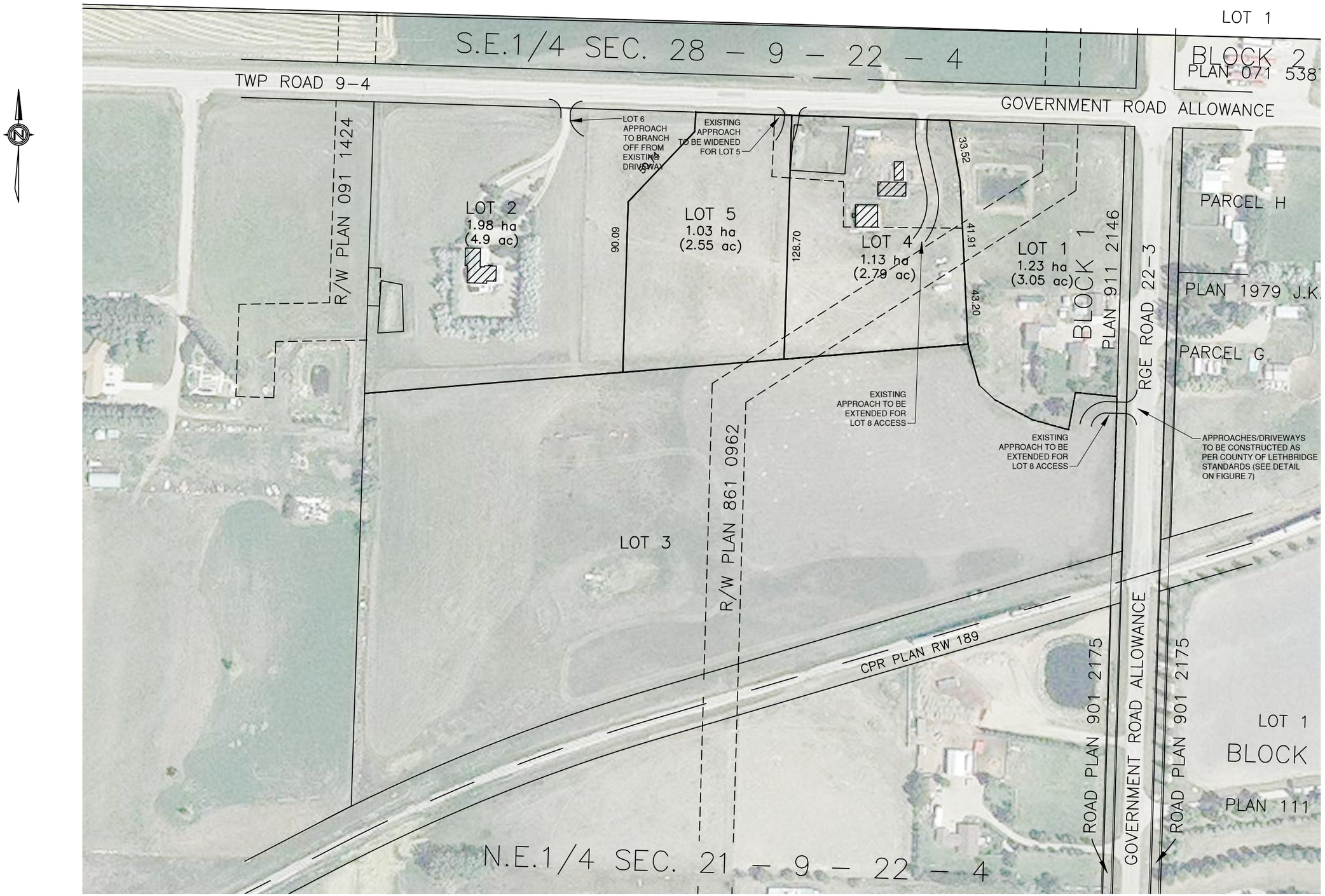
PROJECT TITLE
PROPOSED GROUPED COUNTRY RESIDENTIAL SUBDIVISION

DRAWING TITLE
STORMWATER MANAGEMENT PLAN

PROJECT NUMBER
17-068

SHEET NUMBER
FIG. 5




**LEGEND**

- CURRENT PROPOSED LOTS
- FUTURE LOTS
- 54.78 EXISTING LOT DIMENSIONS
- 54.78 PROPOSED LOT DIMENSIONS

0 20 40 60 80 100 200

SCALE=1:2,000

NOTES

| # | DATE (YY/MM/DD) | DRAWING STATUS | DSN | DRW | CHK | APP |
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| 1 | 21/04/27 | FOR APPROVAL | DC | DPB | MH | |
| 0 | 20/12/18 | FOR REVIEW | DC | MO | MH | |

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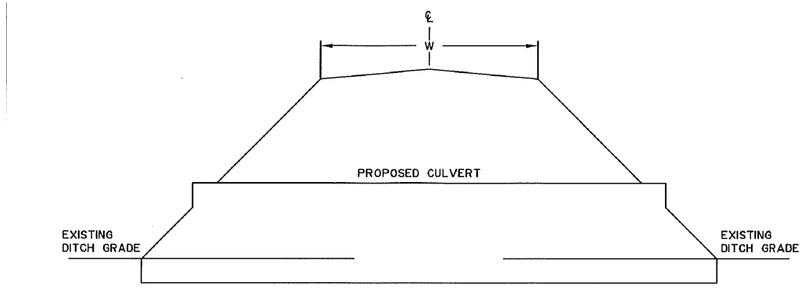
PROJECT TITLE
PROPOSED GROUPED COUNTRY RESIDENTIAL SUBDIVISION

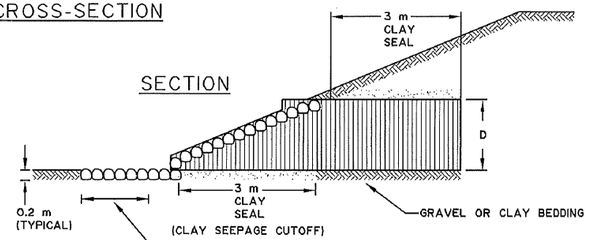
DRAWING TITLE
LOT ACCESS DETAILS

PROJECT NUMBER
17-068

SHEET NUMBER
FIG. 6




APPROACH CROSS-SECTION




SECTION

APRONS TO BE CONSTRUCTED AT INLET AND OUTLET ENDS OF CULVERT WHEN SPECIFIED

NOTES:

1. THE SIDE SLOPES OF THE APPROACH SHALL BE A MINIMUM OF 6:1 ON APPROACHES TO ALL M.D. ROADS.

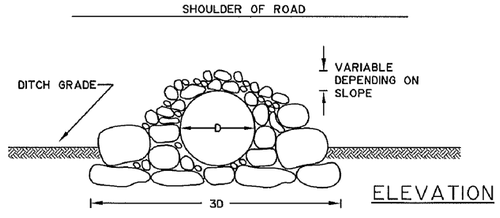
2. THE MINIMUM ALLOWABLE CULVERT DIAMETER IS 600 mm, UNLESS SPECIFIC WRITTEN APPROVAL FROM THE DIRECTOR OF OPERATIONAL SERVICES, OR DESIGNATE.

3. THE CULVERT SHALL BE ALIGNED WITH THE BACK OF THE DITCH BOTTOM. THE CULVERT IS TO BE COUNTERSUNK 15% OF THE PIPE DIAMETER BELOW THE DITCH BOTTOM.

4. THE CULVERT SHALL BE OF SUCH LENTH AS TO PROVIDE A NEAT, FINISHED APPEARANCE, WITHOUT EXCESS EXPOSED PIPE.

5. STRAIGHT END CULVERTS ARE NOT ACCEPTABLE. ALL CULVERTS SHALL HAVE A 3:1 SLOPE END UNLESS SPECIFIC WRITTEN APPROVAL IS OBTAINED FROM THE DIRECTOR OF OPERATIONAL SERVICES, OR DESIGNATE.

6. ROCK RIP-RAP SHALL BE HAND LAID AT BOTH ENDS OF THE CULVERT IN ACCORDANCE WITH THE ACCOMPANYING DRAWING.




ELEVATION

7. THE MUNICIPAL DISTRICT USES THE EXPECTED TRAFFIC TYPE AND VOLUME TO DETERMINE THE MINIMUM WIDTH OF THE DRIVING SURFACE OF THE APPROACH.

8. 300 mm DEPTH OF COVER OVER C.S.P. IS PREFERRED.

9. APPROACH SURFACE TO BE AS DESIGNATED BY THE M.D.

10. RIP-RAP SHALL BE PLACED WITH THEIR BEDS AT RIGHT ANGLES TO THE SLOPE, THE LARGER STONES BEING USED IN THE BOTTOM COURSES AND THE SMALLER STONES AT TOP.

11. RIP-RAP SHALL BE LAID IN CLOSE CONTACT SO AS TO BREAK JOINTS AND IN SUCH A MANNER THAT THE WEIGHT OF THE STONE IS CARRIED BY THE EARTH AND NOT BY THE ADJACENT STONES.

## ACCESS INSTALLATION DETAIL
SCALE: NTS

NOTES

| # | DATE (YY/MM/DD) | DRAWING STATUS | DSN | DRW | CHK | APP |
|---|---|---|---|---|---|---|
| 1 | 21/04/27 | FOR APPROVAL | DC | DPB | MH | |
| 0 | 20/12/18 | FOR REVIEW | DC | MO | MH | |

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CLIENT
RON RAMIAS

PROJECT TITLE
PROPOSED GROUPED COUNTRY RESIDENTIAL SUBDIVISION

DRAWING TITLE
SECTIONS & DETAILS

PROJECT NUMBER
17-068

SHEET NUMBER
FIG. 7

# APPENDIX B

## LAND TITLES

# CERTIFIED COPY OF
# Certificate of Title

S

LINC 0033 880 097 | SHORT LEGAL 0912279;1;2

TITLE NUMBER: 091 110 964
SUBDIVISION PLAN
DATE: 28/04/2009

**AT THE TIME OF THIS CERTIFICATION**

RONALD ERNEST RAMIAS (DRYWALLER)

AND
AARTJE JOHANNE RAMIAS
BOTH OF:
COALHURST
ALBERTA
AS JOINT TENANTS

ARE THE OWNERS OF AN ESTATE IN FEE SIMPLE
OF AND IN

PLAN 0912279
BLOCK 1
LOT 2
EXCEPTING THEREOUT ALL MINES AND MINERALS

SUBJECT TO THE ENCUMBRANCES,LIENS AND INTERESTS NOTIFIED BY MEMORANDUM UNDER-WRITTEN OR ENDORSED HEREON,OR WHICH MAY HEREAFTER BE MADE IN THE REGISTER.

**ENCUMBRANCES, LIENS & INTERESTS**

| REGISTRATION NUMBER | DATE (D/M/Y) | PARTICULARS |
|---|---|---|
| 1259DU . | | AGREEMENT<br>NORTH AMERICAN COLLIERIES LTD.<br>"RE: MINING RIGHTS" |
| 2834EH . | 26/11/1930 | CAVEAT<br>CAVEATOR - PRAIRIE COAL LANDS LTD.. |
| 741 091 031 | 27/09/1974 | IRRIGATION ORDER/NOTICE<br>THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT |
| 851 081 819 | 22/05/1985 | UTILITY RIGHT OF WAY<br>GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED.<br>"DISCHARGED EXCEPT FOR PLAN 8610962 BY #861187937 13/11/86" |
| 881 009 454 | 20/01/1988 | UTILITY RIGHT OF WAY<br>GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. |
| 911 245 275 | 29/10/1991 | EASEMENT<br>(OVER THE NE 1/4-21-9-22-4 FOR THE BENEFIT OF LOT 1 BLOCK 1 PLAN 9112146) |

( CONTINUED )

# CERTIFIED COPY OF
# Certificate of Title

SHORT LEGAL 0912279;1;3
NAME RONALD ERNEST RAMIAS ET AL
NUMBER 091 110 964 +1

**ENCUMBRANCES, LIENS & INTERESTS**

| REGISTRATION NUMBER | DATE (D/M/Y) | PARTICULARS |
|---|---|---|
| 061 136 753 | 06/04/2006 | CAVEAT<br>RE : UTILITY RIGHT OF WAY<br>CAVEATOR - LETHBRIDGE NORTHERN IRRIGATION DISTRICT.<br>334-13TH STREET NORTH, LETHBRIDGE<br>ALBERTA T1H2R8<br>AGENT - PATRICK G SPANOS |
| 081 182 879 | 21/05/2008 | MORTGAGE<br>MORTGAGEE - ROYAL BANK OF CANADA.<br>180 WELLINGTON STREET WEST<br>TORONTO<br>ONTARIO M5J1J1<br>ORIGINAL PRINCIPAL AMOUNT: $360,000 |

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 28 DAY OF APRIL ,2009

REGISTRAR OF LAND TITLES

***SUPPLEMENTARY INFORMATION***

**MUNICIPALITY:** COUNTY OF LETHBRIDGE
**REFERENCE NUMBER:**
921 111 143
**AREA:**
6.33 HECTARES (15.64 ACRES) MORE OR LESS
**ATS REFERENCE:**
4;22;9;21;NE
**TOTAL INSTRUMENTS:** 008

# CERTIFIED COPY OF
# Certificate of Title

S

LINC 0033 880 105 | SHORT LEGAL 0912279;1;3

TITLE NUMBER: 091 110 964 +1
SUBDIVISION PLAN
DATE: 28/04/2009

**AT THE TIME OF THIS CERTIFICATION**

RONALD ERNEST RAMIAS (DRYWALLER)

AND
AARTJE JOHANNE RAMIAS
BOTH OF:
COALHURST
ALBERTA
AS JOINT TENANTS

ARE THE OWNERS OF AN ESTATE IN FEE SIMPLE
OF AND IN

PLAN 0912279
BLOCK 1
LOT 3
EXCEPTING THEREOUT ALL MINES AND MINERALS

SUBJECT TO THE ENCUMBRANCES,LIENS AND INTERESTS NOTIFIED BY MEMORANDUM UNDER-WRITTEN OR ENDORSED HEREON,OR WHICH MAY HEREAFTER BE MADE IN THE REGISTER.

**ENCUMBRANCES, LIENS & INTERESTS**

| REGISTRATION NUMBER | DATE (D/M/Y) | PARTICULARS |
|---|---|---|
| 1259DU . | | AGREEMENT<br>NORTH AMERICAN COLLIERIES LTD.<br>"RE: MINING RIGHTS" |
| 2834EH . | 26/11/1930 | CAVEAT<br>CAVEATOR - PRAIRIE COAL LANDS LTD.. |
| 741 091 031 | 27/09/1974 | IRRIGATION ORDER/NOTICE<br>THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT |
| 851 081 819 | 22/05/1985 | UTILITY RIGHT OF WAY<br>GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED.<br>"DISCHARGED EXCEPT FOR PLAN 8610962 BY #861187937 13/11/86" |
| 881 009 454 | 20/01/1988 | UTILITY RIGHT OF WAY<br>GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. |
| 911 245 275 | 29/10/1991 | EASEMENT<br>(OVER THE NE 1/4-21-9-22-4 FOR THE BENEFIT OF LOT 1 BLOCK 1 PLAN 9112146) |

( CONTINUED )

**CERTIFIED COPY OF**

# Certificate of Title

SHORT LEGAL 0912279;1;2
NAME RONALD ERNEST RAMIAS ET AL
NUMBER 091 110 964

**ENCUMBRANCES, LIENS & INTERESTS**

| REGISTRATION NUMBER | DATE (D/M/Y) | PARTICULARS |
|---|---|---|
| 061 136 753 | 06/04/2006 | CAVEAT<br>RE : UTILITY RIGHT OF WAY<br>CAVEATOR - LETHBRIDGE NORTHERN IRRIGATION DISTRICT.<br>334-13TH STREET NORTH, LETHBRIDGE<br>ALBERTA T1H2R8<br>AGENT - PATRICK G SPANOS |
| 081 182 879 | 21/05/2008 | MORTGAGE<br>MORTGAGEE - ROYAL BANK OF CANADA.<br>180 WELLINGTON STREET WEST<br>TORONTO<br>ONTARIO M5J1J1<br>ORIGINAL PRINCIPAL AMOUNT: $360,000 |

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 28 DAY OF APRIL ,2009

REGISTRAR OF LAND TITLES

***SUPPLEMENTARY INFORMATION***

**MUNICIPALITY:** COUNTY OF LETHBRIDGE
**REFERENCE NUMBER:**
921 111 143
**AREA:**
4.04 HECTARES (9.98 ACRES) MORE OR LESS
**ATS REFERENCE:**
4;22;9;21;NE
**TOTAL INSTRUMENTS:** 008

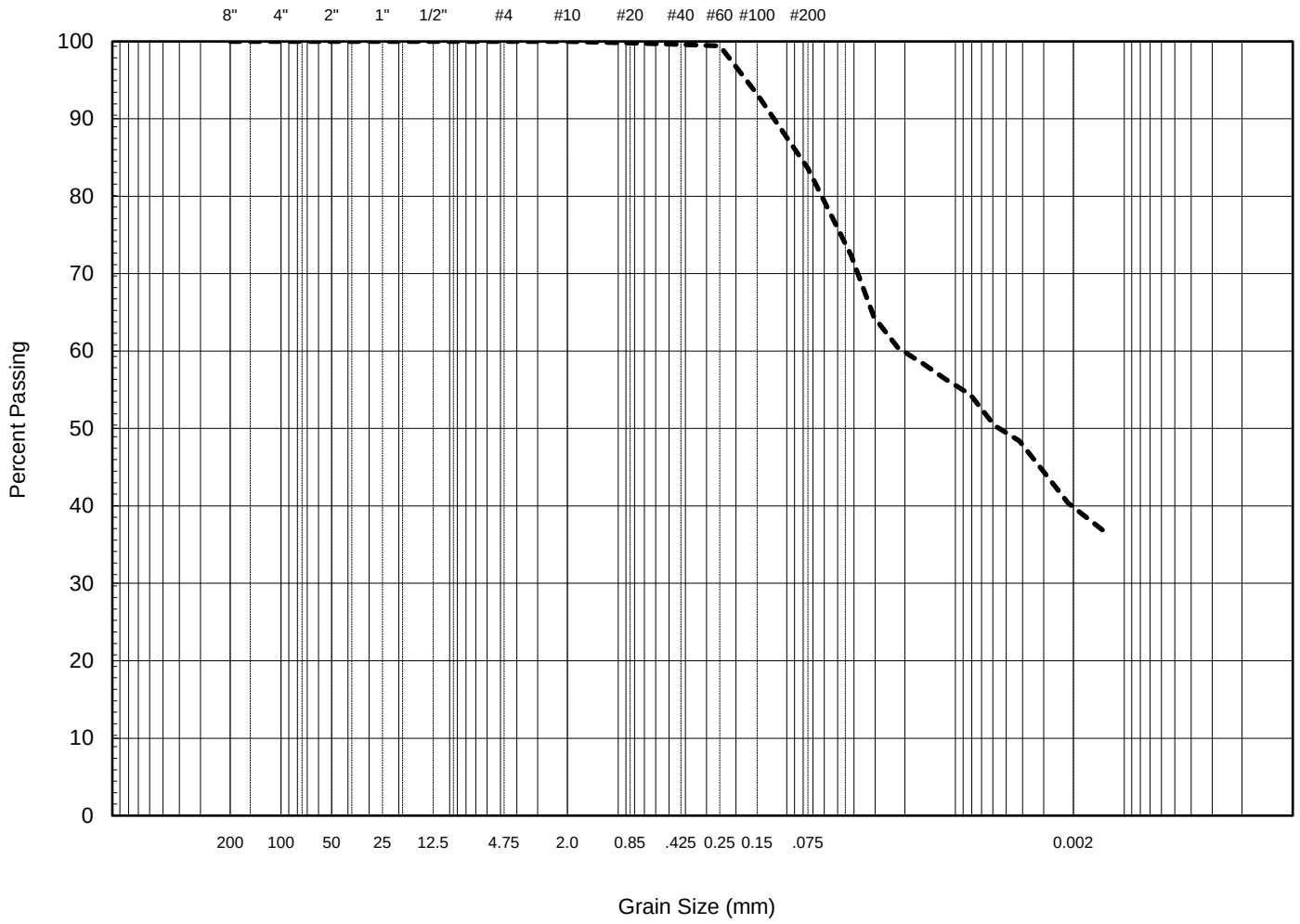
# APPENDIX C

## SOIL ANALYSIS RESULTS

ROSEKE ENGINEERING

# *HYDROMETER TEST*

| COBBLES | GRAVEL | | SAND | | | SILT | CLAY |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | C | M | F | | |




**Client:** **Hasegawa Engineering**
**330, 3120 32nd Street South**
**Lethbridge, AB T1K 7B4**

**Attention:** **Dave Chalmers, C.E.T.**

**Comments:** Client Sample

**Summary**

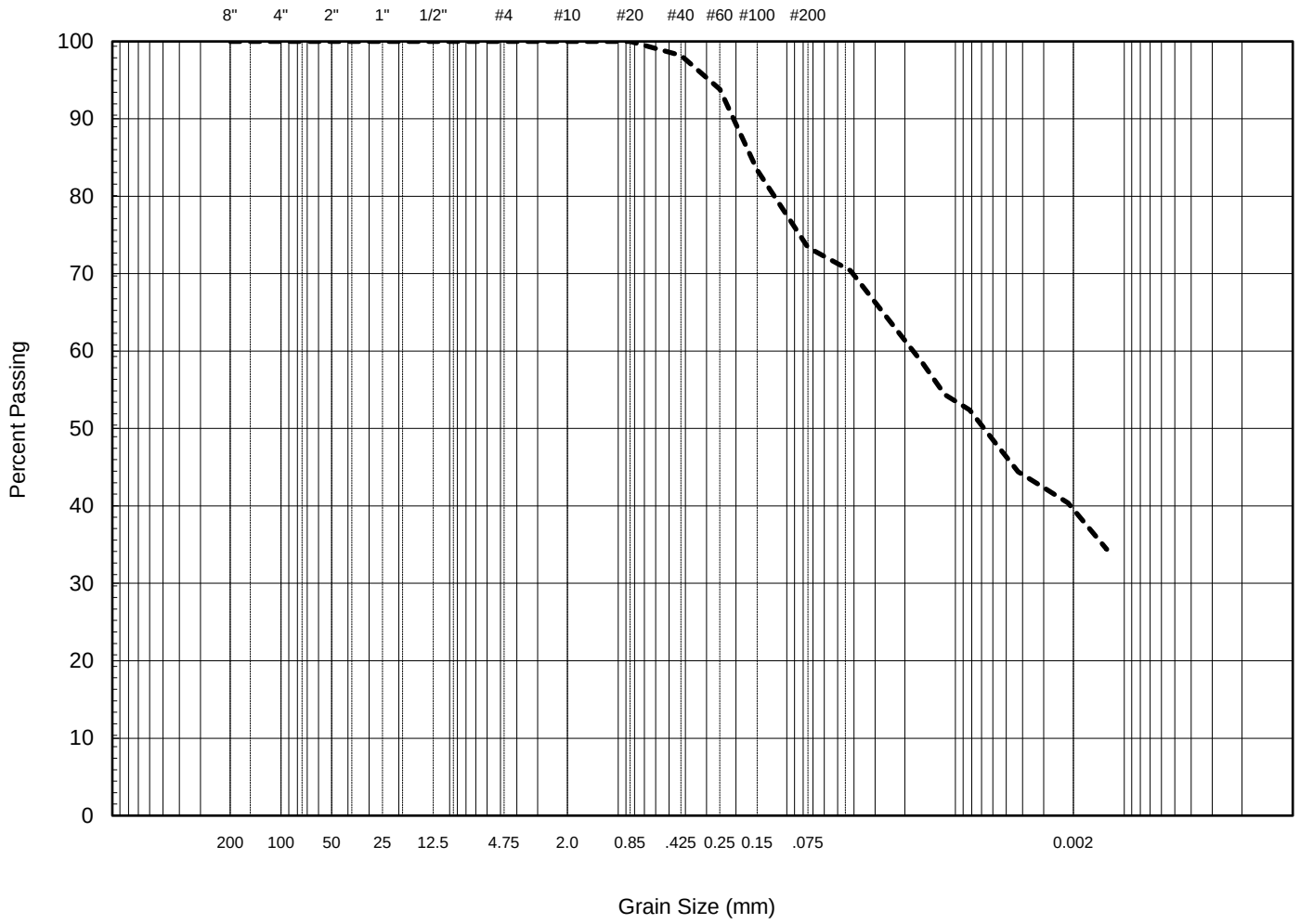
| | | | | | |
|---|---|---|---|---|---|
| D10 = | #N/A | mm | **Gravel** | 0 | **%** |
| D30 = | #N/A | mm | **Sand** | 16 | **%** |
| D60 = | 0.0207 | mm | **Silt** | 44 | **%** |
| Cu = | #N/A | | **Clay** | 40 | **%** |
| Cc = | #N/A | | | | |

**Project No:** REL182016
**Client Project ID:** Project 17-068 (Ramius)
**Sample ID:** Test Pit #1
**Depth (m):** 3 - 4 Ft.
**Date:** September 9, 2018
**REL Tech:** KH

ROSEKE ENGINEERING

# *HYDROMETER TEST*

| COBBLES | GRAVEL | | SAND | | | SILT | CLAY |
|---|---|---|---|---|---|---|---|
| | Coarse | Fine | C | M | F | | |




**Client:** **Hasegawa Engineering**
**330, 3120 32nd Street South**
**Lethbridge, AB T1K 7B4**

**Attention:** **Dave Chalmers, C.E.T.**

**Comments:** Client Sample

**Summary**

| | | | | | |
|---|---|---|---|---|---|
| D10 = | #N/A | mm | **Gravel** | 0 | **%** |
| D30 = | #N/A | mm | **Sand** | 27 | **%** |
| D60 = | 0.0181 | mm | **Silt** | 34 | **%** |
| Cu = | #N/A | | **Clay** | 39 | **%** |
| Cc = | #N/A | | | | |

**Project No:** REL182016
**Sample ID:** Test Pit #2
**Depth (m):** 4 Ft.

**Client Project ID:** Project 17-068 (Ramius)

**Date:** September 9, 2018

**REL Tech:** KH

# SOIL DRILLING REPORT

| | | | |
|---|---|---|---|
| Project Name: | Ramias | Project #: | 17-068 |
| Hole Description: | Test Pit 1 | Bore Hole #: | |
| Drilling Procedure: | Excavated Pit | Hole Size: | 96" deep |
| SPT Procedure: | NA | SPT Size: OD= | ID= |
| Sampling Procedure | NA | Sampler Size OD= | ID= |
| Logged By: | D. Chalmers | Date: | Aug 29, 2018 |

| Depth (FT) | WT | USGS | Soil Sample Description | Moisture Content, w | Plasticity Index, PI | Dry Unit Weight, $\gamma$ (pcf) | Friction Angle, $\Phi$ | Penetro-meter (psf) | SPT Count, N | Compressive Strength, Cu(psf) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-12" | | | Top Soil | | | | | | | |
| 12-18" | | | B Horizon – dry, rootlets | | | | | | | |
| 18-55" | | | Tan Sandy silty clay, Dry, Firm, Med. sub-angular blocky. Rootlets. | | | | | | | |
| 55-62" | | | Drk brn, Silty sandy clay, Dry, Firm to very firm, Fine sub-angular blocky - Not continuous to endwalls of pit | | | | | | | |
| 62-96" | | | Tan, Sandy silty clay, Moist, Firm to very firm, Med sub-angular blocky<br>No sign of water table | | | | | | | |

# SOIL DRILLING REPORT

| | | | |
|---|---|---|---|
| Project Name: | Ramias | Project #: | 17-068 |
| Hole Description: | Test Pit 2 | Bore Hole #: | |
| Drilling Procedure: | Excavated Pit | Hole Size: | 96" deep |
| SPT Procedure: | NA | SPT Size: OD= | ID= |
| Sampling Procedure | NA | Sampler Size OD= | ID= |
| Logged By: | D. Chalmers | Date: | Aug 29, 2018 |

| Depth (FT) | WT | USGS | Soil Sample Description | Moisture Content, w | Plasticity Index, PI | Dry Unit Weight, $\gamma$ (pcf) | Friction Angle, $\Phi$ | Penetro-meter (psf) | SPT Count, N | Compressive Strength, Cu(psf) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-12" | | | Top Soil | | | | | | | |
| 12-20" | | | B Horizon – dry, rootlets | | | | | | | |
| 20-32" | | | Tan Clay w/ sand/gravel, some cobbles, Dry, Hard, Med columnar<br>Rootlets to 40" | | | | | | | |
| 32-66" | | | Tan clay w/ sand, Dry, Hard, Massive | | | | | | | |
| 66-72" | | | Tan clay w/ silty sand, Dry, Hard, Massive | | | | | | | |
| 72-108" | | | Tan, Sandy clay, Moist, Friable, Massive | | | | | | | |
| 108-120" | | | Tan, Silty Sandy Clay, Moist, Friable, Massive<br>No sign of water table | | | | | | | |

# APPENDIX D

## SITE DRAINAGE ANALYSIS

# SITE DRAINAGE ANALYSIS

Ron Ramias Proposed Subdivision
Located in NE 21-9-22-W4 in Lethbridge County


**PREPARED FOR:**
**Ron Ramias**
Box 605
Coalhurst, AB
T0L 0V0

**PREPARED BY:**
**Hasegawa Engineering**
A Division of 993997 Alberta Ltd.
330, 3120 – 32nd Street South
Lethbridge, Alberta T1K 7B4

# TABLE OF CONTENTS



**APPENDICES**

**Note added April 27, 2021**
*This report was completed for a land use higher density and included the use of the land adjacent to the flood area. Since that time, the owner has modified their development to reduce density and remove development adjacent to the flood plain. The drainage bypass canal is unchanged. The developed lots within the development are unaffected by this change. As such, the analysis in this report still protects the landowners and environment from impact and is still valid.*

# 1.0 Introduction

On behalf of Ron Ramias, Hasegawa Engineering (HE) has completed this hydrological analysis of the subject site. The hydrological analysis includes the following major aspects:

1. On site layout, topography and conditions
2. Offsite topography
3. Precipitation and runoff analysis
4. Retention storage size calculations

The site is within NE 21-9-22-W4 north of Coalhurst, AB between the railroad tracks and TWP Road 9-4 just west of RGE Road 22-3 as shown in Sheet 1.1 (Appendix A). The site currently has three lots – the proposed subdivision leaves Lot 1 unchanged, subdivides Lot 2 east of the existing house into three more residential lots (Lots 4, 5 and 6) fronting the County road, splits off a portion of Lot 3 to be combined with the existing house and leaves the residual portion of Lot 3 unchanged. The net effect in terms of land use at the present time is to create three new 2 to 3.2 acre residential lots. Land use for the remainder of Lot 3 is unknown at this time.

# 2.0 Site Conditions

Currently, the site consists mostly of pastureland sloping to the south, with a low spot in the south central portion. There is a home and farm buildings in Lot 1. The land to be subdivided into residential lots also has several hay sheds/out buildings. The surrounding land offsite generally slopes toward the property. There are culverts draining from the north under TWP Road 9-4 – this offsite flow then travels south along a natural swale between proposed residential Lots 5 and 6. There is also a culvert draining from the south under the railroad. The extent of offsite runoff makes modeling water levels in the low area difficult; however, the probable high water level at elevation 923.0 is shown on Sheet 1.1 based on surrounding topography, and the maximum possible high water level shown on the same drawing is elevation 923.60 based on the water overtopping RGE Rd 22-3 near the railroad crossing. This elevation is short of the proposed Lots 4, 5 and 6 but may impact future plans for the residual section of Lot 3.

# 3.0 Runoff Design Criteria

## 3.1 Predevelopment

As the only change in land use is to the proposed residential lots, predevelopment modeling was done on only the area of those lots to determine the effect of residential development. Existing farm outbuildings on proposed Lot 4 were modeled as 100% impervious surface; the remaining two proposed lots were modeled as native pasture using general drainage patterns, average slopes and assuming 100% pervious soil to obtain predevelopment flows. In addition, some modeling of the culvert under TWP Road 9-4 was done. As offsite flow is uncertain, the maximum culvert flow was used to size a swale capable of passing offsite flow through the development separate from Lot 5 and 6 runoff. Modeling used SWMM, a storm runoff software program developed by the United States Environmental Protection Agency and widely accepted for runoff analysis. The storm event used in the model is a 100 year/24 hour Modified Chicago method synthetic storm using rainfall intensity data obtained from the Atmospheric Environment Service of Environment Canada for the City of Lethbridge and accepted by the City of Lethbridge for modeling runoff. This rainfall data modeled in a Modified Chicago storm produces a peak intensity of 255mm/hour and 109mm of total rainfall (see Figure 2 in Appendix A). Infiltration was modeled using Green-Ampt methodology and typical City of Lethbridge values were assigned (suction head 253 mm, conductivity 3.5 mm/hr, initial deficit 0.15) along with 10mm depression storage assumed for pervious surfaces and 0.5mm depression storage for the impervious surfaces in Lot 4.

## 3.2 Post Development

The post development drainage model consists of the same predevelopment catchments updated to reflect residential development. Each lot was modeled as if developed with 625 $m^2$ of residential area (including sidewalk, garage, parking and deck), a 150 $m^2$ outbuilding and 550 $m^2$ total graveled driveways. Catchments use the same slopes and general flow paths as the predevelopment model but include a swale or berm to intercept flow across lot lines. Between Lots 4 and 5 this is a “V” swale 0.25m deep with 4h:1v side slopes. The lot line between Lots 5 and 6 is modeled differently – this lot line runs in a natural drainage swale. In order to pass the offsite runoff through the development, a 0.25m deep swale 1m wide at the bottom is modeled with a 0.25m high berm on either side running down this lot line as shown in Sheet 1.2. The swale ends at the back of the lot but the berms wrap around and continue across the back of all lots as described below. The offsite runoff passes in the swale while the side berms intercept lot runoff on either side and route it to temporary storage at the bottom of the respective lot. Offsite runoff comes from a culvert under TWP Road 9-4 and immediately passes through a second culvert in an existing berm before running down the natural swale – the model shows the swale beginning at the outlet of this second culvert. If the berm and culvert are removed during development, the swale would need to be extended to the outlet of the culvert under TWP Road 9-4. Swale and berm cross sections are detailed on Sheet 1.3. All residential area footprints were modeled as 100% impervious surface and all graveled area was modeled as 70% impervious. Depression storage for pervious surface remained at 10mm, depression storage for impervious surfaces was raised to 1 mm reflecting the new graveled surfaces. The post development drainage model is shown in Figure 1 (Appendix A).

The berms along the back proposed lot lines act as temporary storage to attenuate lot runoff. As runoff from all sources into the natural low spot cannot be accurately modeled, the goal is to attenuate peak flow rates from the proposed residential lots to predevelopment levels and

eliminate any net effect on existing drainage patterns. All berms are an inverted "V" 0.25m high (with 4h:1v side slopes). There are 8 drainage pipes in the berm walls – 2 pipes at the back of Lot 6 and 6 pipes at the back of Lots 5 and 6 spaced out across the lower ground. These drains are 200mm pipe placed at the bottom of the berm and running through the berm wall – outflow is restricted by these pipes to below predevelopment levels but erosion protection will be required at the outflow points. Pipe ends are mitered to prevent damage during yard maintenance. Note that water backing up at the berm makes the back 10-15 m portion of Lots 5 and 6 a temporary storage zone for runoff. Also, the inter-lot swale between Lots 4 and 5 can be graded out to zero depth over this storage zone to allow the swale to drain completely.

# 4.0 Surface Runoff Results

The predevelopment model using the design 100-year storm calculates peak predevelopment flows of 1.121 $m^3$/sec – this has been used as an allowable release for post development modeling.

Post development modeling results are graphed in Figures 2 and 3 of Appendix A and summarized in Table 1 below. Peak system-wide post development runoff from the lots toward the back berm increases to 1.28 $m^3$/sec as shown in Figure 2 - this is attenuated through the berm with peak outflow reduced to significantly below predevelopment levels and calculated as 0.96 $m^3$/sec as shown in Figure 3. The berm fills to a depth of 0.21m and drain down is essentially over 1.5-2 hours (Figure 3). However, storm water release is a point flow, and erosion protection for the outflow will be necessary and should be extended to the point that the outflow is reduced to sheet flow or reaches established channels.

**Table 1 – Predevelopment vs. Post Development System-wide Runoff Summaries & Retention Capacity**

| Catchment | Predevelopment Retention Inflow Vol/ Rate | Post-development Retention Inflow Vol/Rate | Post-development Outflow | Back Lot Berm Maximum Depth |
|---|---|---|---|---|
| Combined Areas | 1270 $m^3$<br>1.12 $m^3$/sec | 1475 $m^3$<br>1.28 $m^3$/sec | 1473 $m^3$<br>0.96 $m^3$/sec | 0.21 m |

**System-wide flows account for timing of individual flows and are not necessarily the sum of individual flows.**

Detailed results of runoff models for SWMM analysis are attached in Appendix B.

# 5.0 Conclusion

Computer modeling was used to estimate a predevelopment runoff and establish an allowable release of 1.12 $m^3$/sec. Post development modeling was then used to determine that lot level swales and berms can be used to flow offsite runoff through the proposed development separate from the lot runoff, and attenuate post development peak lot runoff to below predevelopment levels using back lot berms. Outflow is into established natural drainage swales but it should be noted that although some attenuation is provided in all storm events, there will be release from any significant rainfall and the outflow path will need erosion protection. Offsite flow from existing culverts needs to be directed into the proposed swale between Lots 5 and 6 to prevent flooding the lot retention area at the back berm.

# APPENDICES

# APPENDIX A-FIGURES
# (Figures 1.1-1.3 Revised April 20, 2022)


0 20 40 60 80 100 200

SCALE=1:2,000

NOTES

| # | DATE (YY/MM/DD) | DRAWING STATUS | DSN | DRW | CHK | APP |
|---|---|---|---|---|---|---|
| 1 | 22/04/20 | FOR APPPROVAL | DC | DPB | MH | |
| 0 | 18/05/03 | FOR REVIEW | DC | DC | MH | |

HASEGAWA ENGINEERING PROFESSIONAL ENGINEERS
330, 3120 - 32nd Street South
Lethbridge, Alberta T1K 7B4
Ph: 403-328-2686
Fax: 403-328-2728
Email: office@hasegawa.ca

CLIENT
RON RAMIAS

PROJECT TITLE
PROPOSED SUBDIVISION

DRAWING TITLE
SITE PLAN

PROJECT NUMBER
17-068

SHEET NUMBER
1.1

EXISTING CULVERT

EXISTING BERM AND CULVERT
-IF REMOVED, PROPOSED SWALE MUST BE EXTENDED TO CAPTURE OFFSITE RUNOFF FROM CULVERT UNDER TWP RD 9-4

Culvert

BERMS ON EITHER SIDE DIVERTS RUNOFF FROM LOTS 5 & 6 TO BACK OF LOT - SEE SWALE & BERM CROSSS SECTIONS

CENTER SWALE WITH OUTSIDE BERMS
-OFFSITE RUNOFF PASSES THROUGH DEVELOPMENT IN SWALE
- BERMS DIVERT LOT RUNOFF TO BACK OF LOT

SWALE ALONG LOT LINE DIVERTS LOT 4 RUNOFF TO BACK OF LOT (SEE SWALE CROSS SECTION)

DRAINAGE EASEMENT

LOT 5
1.03 ha
(2.55 ac)

LOT 4
1.13 ha
(2.79 ac)

REAR BERM WRAPS AT CORNER OF LOT - GRADES LEVEL TO EXISTING GROUND

2-200mm Ø OUTFLOW PIPES THRU BERM

CENTER SWALE RUNS THROUGH TO OUTFLOW AREA - OUTISDE BERMS WRAP AROUND TO BACK OF LOT BERM (SEE BACK OF LOT BERM SECTION)

6-200mm OUTFLOW PIPES THRU BERM LOCATED AT LOW SPOT IN GROUND.

SWALE GRADES OUT FROM FULL DEPTH UP TO EXISTING GROUND OVER FINAL APPROX. 5 METERS OF LOT

## NOTES



Drawing shall not be used for construction until approved for construction by engineer

Do not scale the drawing

Contractor to check and verify all dimensions before construction, any errors and omissions shall be reported to the engineer immediately

All construction shall be in accordance with latest codes, may it be construction, mechanical, etc

| # | DATE (YY/MM/DD) | DRAWING STATUS | DSN | DRW | CHK | APP |
|---|---|---|---|---|---|---|
| 1 | 22/04/20 | FOR APPROVAL | DC | DPB | MH | |
| 0 | 18/05/03 | FOR REVIEW | DC | DC | MH | |

HASEGAWA
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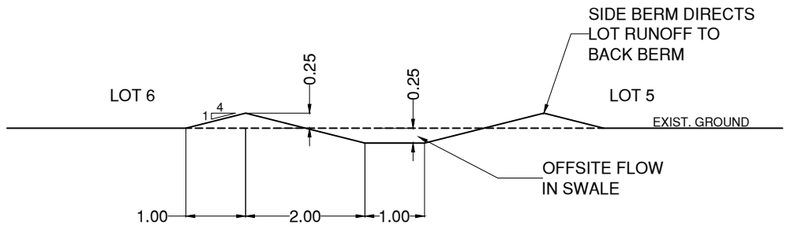
CLIENT
RON RAMIAS

PROJECT TITLE
PROPOSED SUBDIVISION

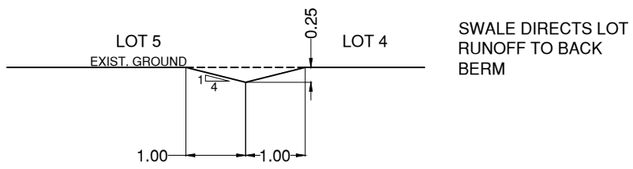
DRAWING TITLE
PROPOSED RESIDENTIAL LOTS

17-068

SHEET NUMBER
1.2

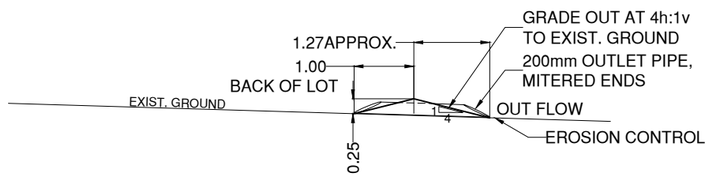



SECTION OF SWALE AND BERM BETWEEN LOTS 5 & 6

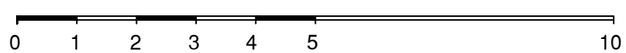



SWALE DIRECTS LOT
RUNOFF TO BACK
BERM

SECTION OF SWALE BETWEEN LOTS 4 & 5




SECTION OF BACK LOT BERM




SCALE=1:100

## NOTES



| # | DATE (YY/MM/DD) | DRAWING STATUS | DSN | DRW | CHK | APP |
|---|---|---|---|---|---|---|
| 1 | 22/04/20 | FOR APPROVAL | DC | DPB | MH | |
| 0 | 18/05/03 | FOR REVIEW | DC | DC | MH | |

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CLIENT
RON RAMIAS

PROJECT TITLE
PROPOSED SUBDIVISION

DRAWING TITLE
LOT SWALE AND BERM SECTIONS

17-068

SHEET NUMBER
1.3

Figure 1 - Post Development Model


**LEGEND**

- Subcatchments
- Conduits
- Outfalls
- Junctions

Figure 2 - 100 Year Rainfall and Post Development Runoff

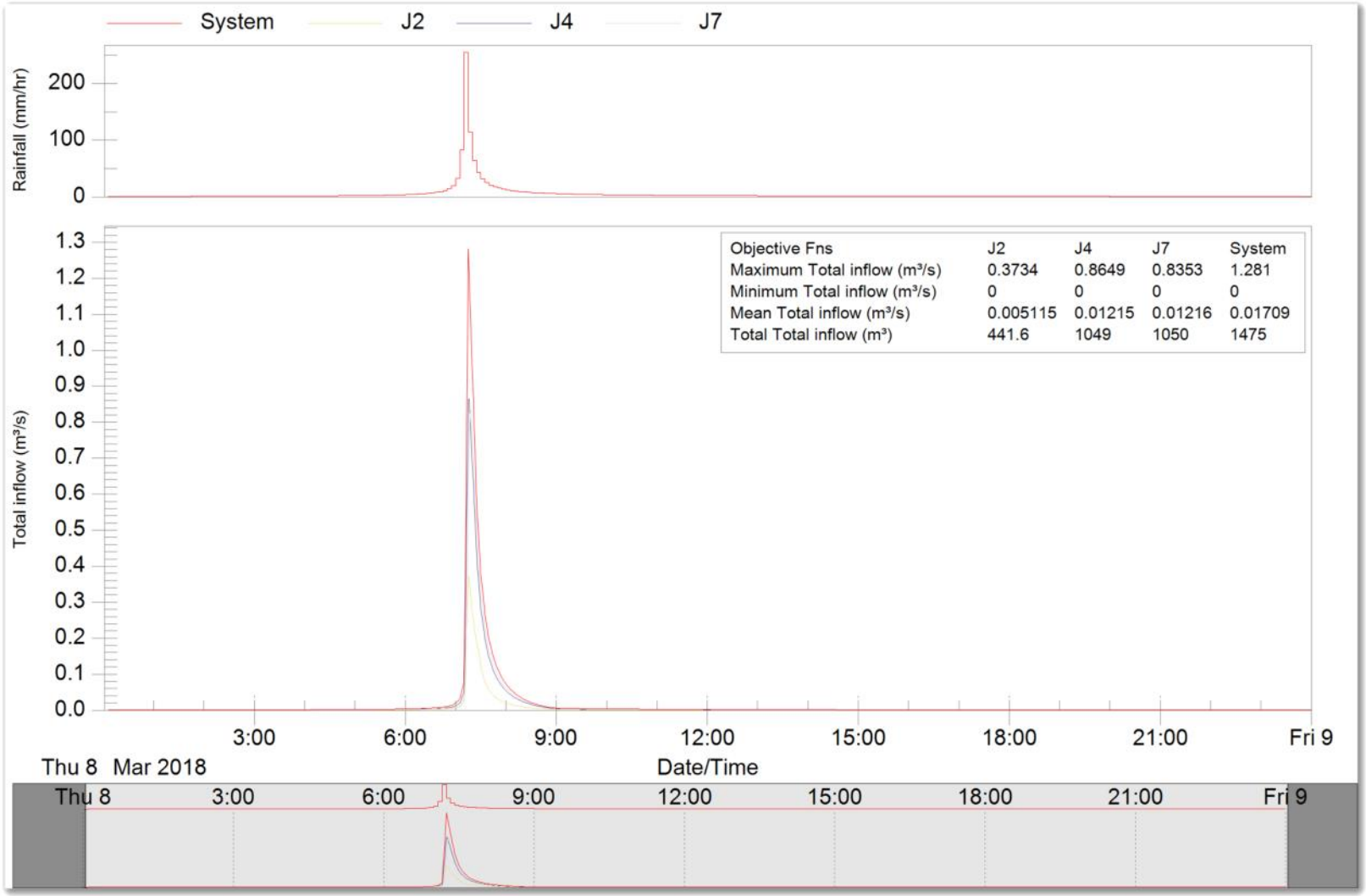
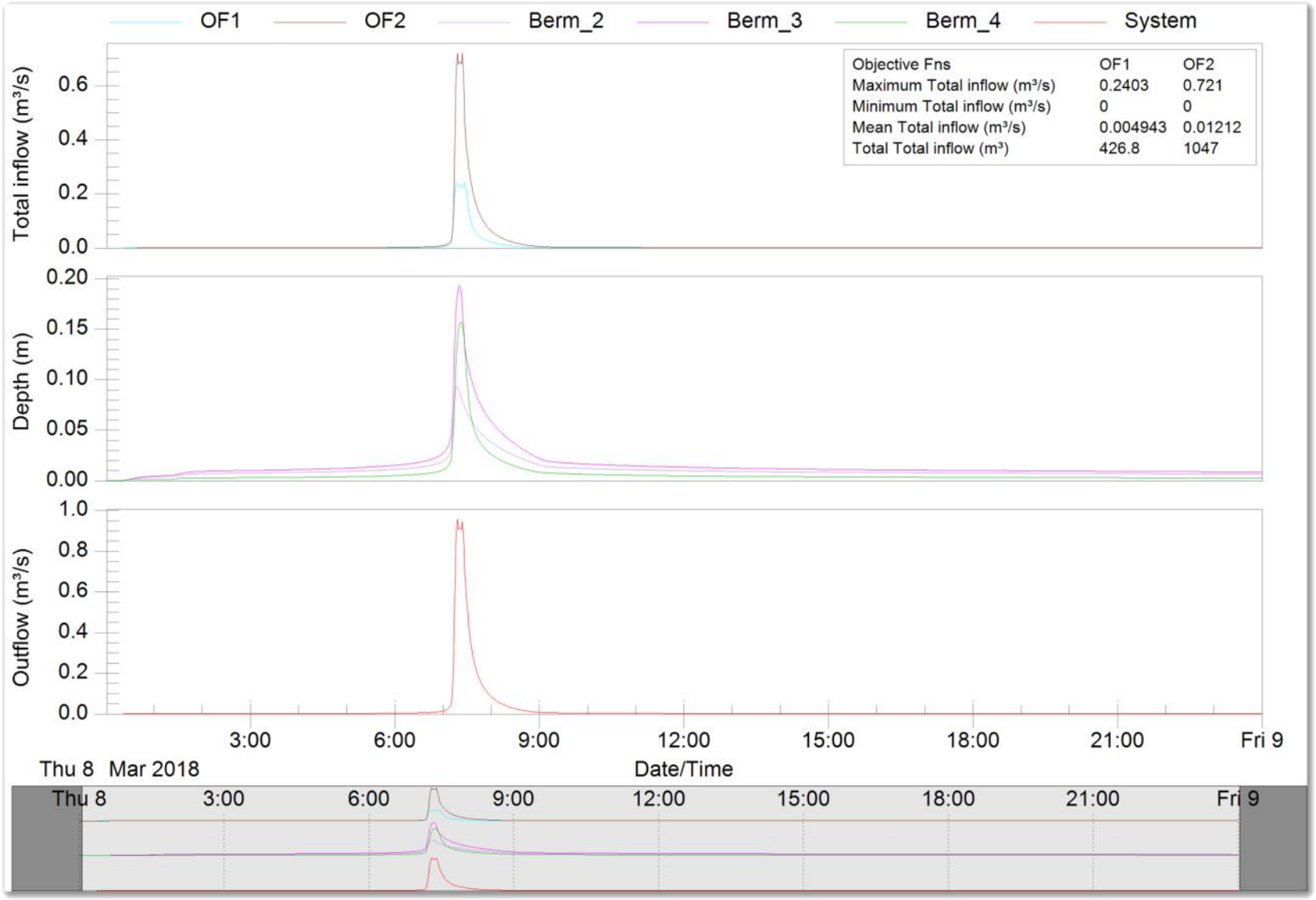


Figure 3 - Post-Development Flow by Outfall and System-wide, Berm Depth



# APPENDIX B-SWMM SUMMARIES

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.021)
--------------------------------------------------------------

17-068 Ramius Subdivision Status report
Allowable Release = 1.121 cu.m/sec

***********************************************************
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
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Flow Routing Method ...... DYNWAVE
Starting Date ............ MAR-08-2018 00:00:00
Ending Date .............. MAR-09-2018 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


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         0.322       109.858
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.179        61.220
Surface Runoff ...........         0.148        50.381
Final Surface Storage ....         0.000         0.101
Continuity Error (%) .....        -1.679
```

| Flow Routing Continuity | Volume hectare-m | Volume 10^6 ltr |
|---|---|---|
| Dry Weather Inflow ..... | 0.000 | 0.000 |
| Wet Weather Inflow ..... | 0.148 | 1.475 |
| Groundwater Inflow ..... | 0.000 | 0.000 |
| RDII Inflow ..... | 0.000 | 0.000 |
| External Inflow ..... | 0.000 | 0.000 |
| External Outflow ..... | 0.147 | 1.474 |
| Internal Outflow ..... | 0.000 | 0.000 |
| Storage Losses ..... | 0.000 | 0.000 |
| Initial Stored Volume .... | 0.000 | 0.000 |
| Final Stored Volume ..... | 0.000 | 0.001 |
| Continuity Error (%) ..... | 0.009 | |

## Time-Step Critical Elements

Link C6 (18.42%)

## Highest Flow Instability Indexes

All links are stable.

## Routing Time Step Summary

| | | |
|---|---|---|
| Minimum Time Step | : | 0.50 sec |
| Average Time Step | : | 4.23 sec |
| Maximum Time Step | : | 5.00 sec |
| Percent in Steady State | : | 0.00 |
| Average Iterations per Step | : | 2.00 |

## Subcatchment Runoff Summary

| Subcatchment | Total Precip mm | Total Runon mm | Total Evap mm | Total Infil mm | Total Runoff mm | Total Runoff 10^6 ltr | Peak Runoff CMS | Runoff Coeff |
|---|---|---|---|---|---|---|---|---|

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Lot_6 | 109.86 | 0.00 | 0.00 | 59.58 | 52.10 | 0.43 | 0.39 | 0.474 |
| Lot_5 | 109.86 | 0.00 | 0.00 | 59.59 | 52.06 | 0.43 | 0.38 | 0.474 |
| Lot_4 | 109.86 | 0.00 | 0.00 | 63.30 | 48.22 | 0.62 | 0.51 | 0.439 |

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

| Node | Type | Average Depth Meters | Maximum Depth Meters | Maximum HGL Meters | Time of Max Occurrence days hr:min |
|---|---|---|---|---|---|
| J1 | JUNCTION | 0.03 | 0.16 | 929.46 | 0 07:15 |
| J2 | JUNCTION | 0.03 | 0.21 | 923.81 | 0 07:21 |
| J3 | JUNCTION | 0.04 | 0.24 | 929.54 | 0 07:15 |
| J4 | JUNCTION | 0.04 | 0.19 | 924.59 | 0 07:16 |
| J5 | JUNCTION | 0.01 | 0.11 | 923.81 | 0 07:22 |
| J6 | JUNCTION | 0.00 | 0.00 | 928.40 | 0 00:00 |
| J7 | JUNCTION | 0.02 | 0.21 | 923.81 | 0 07:21 |
| OF1 | OUTFALL | 0.03 | 0.20 | 923.45 | 0 07:15 |
| OF2 | OUTFALL | 0.02 | 0.20 | 923.45 | 0 07:16 |

**********
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 |
|---|---|---|---|---|---|---|
| J1 | JUNCTION | 0.386 | 0.386 | 0 07:15 | 0.427 | 0.427 |
| J2 | JUNCTION | 0.000 | 0.382 | 0 07:15 | 0.000 | 0.441 |
| J3 | JUNCTION | 0.895 | 0.895 | 0 07:15 | 1.048 | 1.048 |
| J4 | JUNCTION | 0.000 | 0.895 | 0 07:15 | 0.000 | 1.049 |
| J5 | JUNCTION | 0.000 | 0.063 | 0 07:17 | 0.000 | 0.016 |
| J6 | JUNCTION | 0.000 | 0.000 | 0 00:00 | 0.000 | 0.000 |
| J7 | JUNCTION | 0.000 | 0.842 | 0 07:17 | 0.000 | 1.050 |
| OF1 | OUTFALL | 0.000 | 0.246 | 0 07:19 | 0.000 | 0.427 |
| OF2 | OUTFALL | 0.000 | 0.735 | 0 07:19 | 0.000 | 1.047 |

**********
Node Surcharge Summary
**********

No nodes were surcharged.

**********
Node Flooding Summary
**********

No nodes were flooded.

**********
Outfall Loading Summary
**********

| Outfall Node | Flow Freq. Pcnt. | Avg. Flow CMS | Max. Flow CMS | Total Volume 10^6 ltr |
|---|---|---|---|---|
| OF1 | 98.40 | 0.022 | 0.246 | 0.427 |
| OF2 | 97.63 | 0.053 | 0.735 | 1.047 |
| System | 98.01 | 0.075 | 0.964 | 1.474 |

**********
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 |
|---|---|---|---|---|---|---|
| Berm_1 | CHANNEL | 0.382 | 0 07:15 | 3.70 | 0.31 | 0.69 |
| Swale_1 | CHANNEL | 0.895 | 0 07:15 | 5.16 | 0.77 | 0.84 |
| Berm_2 | CHANNEL | 0.000 | 0 00:00 | 0.00 | 0.00 | 0.38 |
| Berm_3 | CHANNEL | 0.842 | 0 07:17 | 0.93 | 0.45 | 0.77 |
| Berm_4 | CHANNEL | 0.063 | 0 07:17 | 0.14 | 0.08 | 0.63 |
| C6 | CONDUIT | 0.246 | 0 07:19 | 4.10 | 1.09 | 1.00 |
| C7 | CONDUIT | 0.735 | 0 07:19 | 4.10 | 1.08 | 1.00 |

**************************
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 | Avg. Froude Number | Avg. Flow Change |
|---|---|---|---|---|---|---|---|---|---|---|
| Berm_1 | 1.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.99 | 0.00 | 0.00 | 4.29 | 0.0000 |
| Swale_1 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.99 | 0.00 | 0.00 | 3.06 | 0.0001 |
| Berm_2 | 1.00 | 0.01 | 0.99 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0000 |
| Berm_3 | 1.00 | 0.01 | 0.00 | 0.00 | 0.05 | 0.94 | 0.00 | 0.00 | 1.05 | 0.0000 |
| Berm_4 | 1.00 | 0.01 | 0.26 | 0.00 | 0.74 | 0.00 | 0.00 | 0.00 | 0.01 | 0.0000 |
| C6 | 1.00 | 0.01 | 0.00 | 0.00 | 0.02 | 0.97 | 0.00 | 0.00 | 3.35 | 0.0003 |
| C7 | 1.00 | 0.02 | 0.00 | 0.00 | 0.01 | 0.97 | 0.00 | 0.00 | 3.32 | 0.0007 |

**************************
Conduit Surcharge Summary
**************************

| Conduit | Hours Full: Both Ends | Upstream | Dnstream | Hours Above Full Normal Flow | Hours Capacity Limited |
|---|---|---|---|---|---|
| C6 | 0.01 | 0.01 | 0.01 | 0.35 | 0.01 |
| C7 | 0.01 | 0.01 | 0.01 | 0.58 | 0.01 |

Analysis begun on:  Mon May 07 13:33:04 2018
Analysis ended on:  Mon May 07 13:33:06 2018
Total elapsed time: 00:00:02

```
[TITLE]
17-068 Ramius Subdivision Details report
Allowable Release = 1.121 cu.m/sec


[OPTIONS]
FLOW_UNITS           CMS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         DYNWAVE
START_DATE           3/8/2018
START_TIME           00:00
REPORT_START_DATE    3/8/2018
REPORT_START_TIME    00:00
END_DATE             3/9/2018
END_TIME             00:00
SWEEP_START          1/1
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
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type          Parameters
;;------------- ----------
CONSTANT     0.0
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
100yr24hr        INTENSITY 0:05   1.0    TIMESERIES 100yr24hr
ZeroRain         INTENSITY 0:05   1.0    TIMESERIES ZeroRain24hr
```

[SUBCATCHMENTS]

| ;;Name | Raingage | Outlet | Total Area | Pcnt. Imperv | Width | Pcnt. Slope | Curb Length | Snow Pack |
|---|---|---|---|---|---|---|---|---|
| Lot_6 | 100yr24hr | J1 | 0.82 | 14.1 | 51.899 | 3.9 | 0 | |
| Lot_5 | 100yr24hr | J3 | 0.8199 | 14.1 | 50.925 | 3.85 | 0 | |
| Lot_4 | 100yr24hr | J3 | 1.2889 | 9 | 75.818 | 2.82 | 0 | |

[SUBAREAS]

| ;;Subcatchment | N-Imperv | N-Perv | S-Imperv | S-Perv | PctZero | RouteTo | PctRouted |
|---|---|---|---|---|---|---|---|
| Lot_6 | 0.01 | 0.025 | 1 | 10 | 25 | OUTLET | |
| Lot_5 | 0.01 | 0.025 | 1 | 10 | 25 | OUTLET | |
| Lot_4 | 0.01 | 0.025 | 1 | 10 | 25 | OUTLET | |

[INFILTRATION]

| ;;Subcatchment | Suction | HydCon | IMDmax |
|---|---|---|---|
| Lot_6 | 253 | 3.5 | 0.15 |
| Lot_5 | 253 | 3.5 | 0.15 |
| Lot_4 | 253 | 3.5 | 0.15 |

[JUNCTIONS]

| ;;Name | Invert Elev. | Max. Depth | Init. Depth | Surcharge Depth | Ponded Area |
|---|---|---|---|---|---|
| J1 | 929.3 | 0.5 | 0 | 0 | 0 |
| J2 | 923.6 | 0.25 | 0 | 0 | 0 |
| J3 | 929.3 | 0.5 | 0 | 0 | 0 |
| J4 | 924.4 | 0.25 | 0 | 0 | 0 |
| J5 | 923.7 | 0.25 | 0 | 0 | 0 |
| J6 | 928.4 | 0.25 | 0 | 0 | 0 |
| J7 | 923.6 | 0.25 | 0 | 0 | 0 |

[OUTFALLS]

| ;;Name | Invert Elev. | Outfall Type | Stage/Table Time Series | Tide Gate |
|---|---|---|---|---|
| OF1 | 923.25 | FREE | | NO |
| OF2 | 923.25 | FREE | | NO |

[CONDUITS]

| ;;Name | Inlet Node | Outlet Node | Length | Manning N | Inlet Offset | Outlet Offset | Init. Flow | Max. Flow |
|---|---|---|---|---|---|---|---|---|
| Berm_1 | J1 | J2 | 137 | 0.01 | 0 | 0 | 0 | 0 |

```
Swale_1          J3               J4               137        0.01       0          0          0          0
Berm_2           J6               J4               101        0.01       0          0          0          0
Berm_3           J4               J7               80         0.01       0          0          0          0
Berm_4           J2               J5               57         0.01       0          0          0          0
C6               J2               OF1              5          0.01       0          0          0          0
C7               J7               OF2              5          0.01       0          0          0          0

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
Berm_1           IRREGULAR    .25m_swale       0          0          0          1
Swale_1          IRREGULAR    .25m_swale       0          0          0          1
Berm_2           IRREGULAR    .25m_berm        0          0          0          1
Berm_3           IRREGULAR    .25m_berm        0          0          0          1
Berm_4           IRREGULAR    .25m_berm        0          0          0          1
C6               CIRCULAR     0.2              0          0          0          2
C7               CIRCULAR     0.2              0          0          0          6

[TRANSECTS]

NC 0.025    0.025    0.025
X1 .25m_berm        3        0.0      0.0      0.0       0.0       0.0      0.0      0.0
GR 0.25     0        0        13       0.25     15

NC 0.01     0.01     0.01
X1 .25m_swale       3        0.0      0.0      0.0       0.0       0.0      0.0      0.0
GR 0.25     0        0        1        0.25     2

[LOSSES]
;;Link           Inlet      Outlet     Average    Flap Gate
;;-------------- ---------- ---------- ---------- ----------

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
100yr24hr                   0:00       0
100yr24hr                   0:05       0.763
100yr24hr                   0:10       0.771
100yr24hr                   0:15       0.779
100yr24hr                   0:20       0.787
100yr24hr                   0:25       0.796
100yr24hr                   0:30       0.804
100yr24hr                   0:35       0.813
100yr24hr                   0:40       0.822
100yr24hr                   0:45       0.831
100yr24hr                   0:50       0.841
```

| | | |
|---|---|---|
| 100yr24hr | 0:55 | 0.851 |
| 100yr24hr | 1:00 | 0.861 |
| 100yr24hr | 1:05 | 0.871 |
| 100yr24hr | 1:10 | 0.881 |
| 100yr24hr | 1:15 | 0.892 |
| 100yr24hr | 1:20 | 0.903 |
| 100yr24hr | 1:25 | 0.914 |
| 100yr24hr | 1:30 | 0.926 |
| 100yr24hr | 1:35 | 0.938 |
| 100yr24hr | 1:40 | 0.95 |
| 100yr24hr | 1:45 | 0.963 |
| 100yr24hr | 1:50 | 0.976 |
| 100yr24hr | 1:55 | 0.99 |
| 100yr24hr | 2:00 | 1.004 |
| 100yr24hr | 2:05 | 1.018 |
| 100yr24hr | 2:10 | 1.033 |
| 100yr24hr | 2:15 | 1.048 |
| 100yr24hr | 2:20 | 1.064 |
| 100yr24hr | 2:25 | 1.08 |
| 100yr24hr | 2:30 | 1.097 |
| 100yr24hr | 2:35 | 1.114 |
| 100yr24hr | 2:40 | 1.132 |
| 100yr24hr | 2:45 | 1.151 |
| 100yr24hr | 2:50 | 1.17 |
| 100yr24hr | 2:55 | 1.191 |
| 100yr24hr | 3:00 | 1.211 |
| 100yr24hr | 3:05 | 1.233 |
| 100yr24hr | 3:10 | 1.256 |
| 100yr24hr | 3:15 | 1.279 |
| 100yr24hr | 3:20 | 1.304 |
| 100yr24hr | 3:25 | 1.329 |
| 100yr24hr | 3:30 | 1.356 |
| 100yr24hr | 3:35 | 1.384 |
| 100yr24hr | 3:40 | 1.413 |
| 100yr24hr | 3:45 | 1.443 |
| 100yr24hr | 3:50 | 1.475 |
| 100yr24hr | 3:55 | 1.509 |
| 100yr24hr | 4:00 | 1.544 |
| 100yr24hr | 4:05 | 1.581 |
| 100yr24hr | 4:10 | 1.62 |
| 100yr24hr | 4:15 | 1.661 |
| 100yr24hr | 4:20 | 1.705 |
| 100yr24hr | 4:25 | 1.751 |
| 100yr24hr | 4:30 | 1.8 |
| 100yr24hr | 4:35 | 1.853 |
| 100yr24hr | 4:40 | 1.908 |

| | | |
|---|---|---|
| 100yr24hr | 4:45 | 1.967 |
| 100yr24hr | 4:50 | 2.031 |
| 100yr24hr | 4:55 | 2.099 |
| 100yr24hr | 5:00 | 2.172 |
| 100yr24hr | 5:05 | 2.251 |
| 100yr24hr | 5:10 | 2.337 |
| 100yr24hr | 5:15 | 2.43 |
| 100yr24hr | 5:20 | 2.532 |
| 100yr24hr | 5:25 | 2.643 |
| 100yr24hr | 5:30 | 2.765 |
| 100yr24hr | 5:35 | 2.9 |
| 100yr24hr | 5:40 | 3.051 |
| 100yr24hr | 5:45 | 3.219 |
| 100yr24hr | 5:50 | 3.409 |
| 100yr24hr | 5:55 | 3.625 |
| 100yr24hr | 6:00 | 3.873 |
| 100yr24hr | 6:05 | 4.159 |
| 100yr24hr | 6:10 | 4.496 |
| 100yr24hr | 6:15 | 4.897 |
| 100yr24hr | 6:20 | 5.383 |
| 100yr24hr | 6:25 | 5.985 |
| 100yr24hr | 6:30 | 6.748 |
| 100yr24hr | 6:35 | 7.75 |
| 100yr24hr | 6:40 | 9.123 |
| 100yr24hr | 6:45 | 11.117 |
| 100yr24hr | 6:50 | 14.266 |
| 100yr24hr | 6:55 | 19.931 |
| 100yr24hr | 7:00 | 32.779 |
| 100yr24hr | 7:05 | 83.515 |
| 100yr24hr | 7:10 | 255.206 |
| 100yr24hr | 7:15 | 114.934 |
| 100yr24hr | 7:20 | 63.946 |
| 100yr24hr | 7:25 | 43.017 |
| 100yr24hr | 7:30 | 31.998 |
| 100yr24hr | 7:35 | 25.321 |
| 100yr24hr | 7:40 | 20.889 |
| 100yr24hr | 7:45 | 17.754 |
| 100yr24hr | 7:50 | 15.429 |
| 100yr24hr | 7:55 | 13.641 |
| 100yr24hr | 8:00 | 12.226 |
| 100yr24hr | 8:05 | 11.08 |
| 100yr24hr | 8:10 | 10.134 |
| 100yr24hr | 8:15 | 9.34 |
| 100yr24hr | 8:20 | 8.665 |
| 100yr24hr | 8:25 | 8.083 |
| 100yr24hr | 8:30 | 7.577 |

| | | |
|---|---|---|
| 100yr24hr | 8:35 | 7.133 |
| 100yr24hr | 8:40 | 6.74 |
| 100yr24hr | 8:45 | 6.39 |
| 100yr24hr | 8:50 | 6.077 |
| 100yr24hr | 8:55 | 5.794 |
| 100yr24hr | 9:00 | 5.538 |
| 100yr24hr | 9:05 | 5.304 |
| 100yr24hr | 9:10 | 5.091 |
| 100yr24hr | 9:15 | 4.895 |
| 100yr24hr | 9:20 | 4.714 |
| 100yr24hr | 9:25 | 4.547 |
| 100yr24hr | 9:30 | 4.392 |
| 100yr24hr | 9:35 | 4.248 |
| 100yr24hr | 9:40 | 4.114 |
| 100yr24hr | 9:45 | 3.989 |
| 100yr24hr | 9:50 | 3.871 |
| 100yr24hr | 9:55 | 3.761 |
| 100yr24hr | 10:00 | 3.657 |
| 100yr24hr | 10:05 | 3.559 |
| 100yr24hr | 10:10 | 3.467 |
| 100yr24hr | 10:15 | 3.38 |
| 100yr24hr | 10:20 | 3.297 |
| 100yr24hr | 10:25 | 3.219 |
| 100yr24hr | 10:30 | 3.144 |
| 100yr24hr | 10:35 | 3.073 |
| 100yr24hr | 10:40 | 3.006 |
| 100yr24hr | 10:45 | 2.941 |
| 100yr24hr | 10:50 | 2.88 |
| 100yr24hr | 10:55 | 2.821 |
| 100yr24hr | 11:00 | 2.765 |
| 100yr24hr | 11:05 | 2.711 |
| 100yr24hr | 11:10 | 2.659 |
| 100yr24hr | 11:15 | 2.61 |
| 100yr24hr | 11:20 | 2.562 |
| 100yr24hr | 11:25 | 2.516 |
| 100yr24hr | 11:30 | 2.472 |
| 100yr24hr | 11:35 | 2.43 |
| 100yr24hr | 11:40 | 2.389 |
| 100yr24hr | 11:45 | 2.35 |
| 100yr24hr | 11:50 | 2.312 |
| 100yr24hr | 11:55 | 2.275 |
| 100yr24hr | 12:00 | 2.24 |
| 100yr24hr | 12:05 | 2.205 |
| 100yr24hr | 12:10 | 2.172 |
| 100yr24hr | 12:15 | 2.14 |
| 100yr24hr | 12:20 | 2.109 |

| | | |
|---|---|---|
| 100yr24hr | 12:25 | 2.079 |
| 100yr24hr | 12:30 | 2.05 |
| 100yr24hr | 12:35 | 2.021 |
| 100yr24hr | 12:40 | 1.994 |
| 100yr24hr | 12:45 | 1.967 |
| 100yr24hr | 12:50 | 1.941 |
| 100yr24hr | 12:55 | 1.916 |
| 100yr24hr | 13:00 | 1.892 |
| 100yr24hr | 13:05 | 1.868 |
| 100yr24hr | 13:10 | 1.845 |
| 100yr24hr | 13:15 | 1.822 |
| 100yr24hr | 13:20 | 1.8 |
| 100yr24hr | 13:25 | 1.779 |
| 100yr24hr | 13:30 | 1.758 |
| 100yr24hr | 13:35 | 1.738 |
| 100yr24hr | 13:40 | 1.718 |
| 100yr24hr | 13:45 | 1.699 |
| 100yr24hr | 13:50 | 1.68 |
| 100yr24hr | 13:55 | 1.661 |
| 100yr24hr | 14:00 | 1.643 |
| 100yr24hr | 14:05 | 1.626 |
| 100yr24hr | 14:10 | 1.609 |
| 100yr24hr | 14:15 | 1.592 |
| 100yr24hr | 14:20 | 1.576 |
| 100yr24hr | 14:25 | 1.56 |
| 100yr24hr | 14:30 | 1.544 |
| 100yr24hr | 14:35 | 1.529 |
| 100yr24hr | 14:40 | 1.514 |
| 100yr24hr | 14:45 | 1.499 |
| 100yr24hr | 14:50 | 1.485 |
| 100yr24hr | 14:55 | 1.47 |
| 100yr24hr | 15:00 | 1.457 |
| 100yr24hr | 15:05 | 1.443 |
| 100yr24hr | 15:10 | 1.43 |
| 100yr24hr | 15:15 | 1.417 |
| 100yr24hr | 15:20 | 1.404 |
| 100yr24hr | 15:25 | 1.392 |
| 100yr24hr | 15:30 | 1.38 |
| 100yr24hr | 15:35 | 1.368 |
| 100yr24hr | 15:40 | 1.356 |
| 100yr24hr | 15:45 | 1.344 |
| 100yr24hr | 15:50 | 1.333 |
| 100yr24hr | 15:55 | 1.322 |
| 100yr24hr | 16:00 | 1.311 |
| 100yr24hr | 16:05 | 1.3 |
| 100yr24hr | 16:10 | 1.289 |

| | | |
|---|---|---|
| 100yr24hr | 16:15 | 1.279 |
| 100yr24hr | 16:20 | 1.269 |
| 100yr24hr | 16:25 | 1.259 |
| 100yr24hr | 16:30 | 1.249 |
| 100yr24hr | 16:35 | 1.239 |
| 100yr24hr | 16:40 | 1.23 |
| 100yr24hr | 16:45 | 1.221 |
| 100yr24hr | 16:50 | 1.211 |
| 100yr24hr | 16:55 | 1.202 |
| 100yr24hr | 17:00 | 1.193 |
| 100yr24hr | 17:05 | 1.185 |
| 100yr24hr | 17:10 | 1.176 |
| 100yr24hr | 17:15 | 1.168 |
| 100yr24hr | 17:20 | 1.159 |
| 100yr24hr | 17:25 | 1.151 |
| 100yr24hr | 17:30 | 1.143 |
| 100yr24hr | 17:35 | 1.135 |
| 100yr24hr | 17:40 | 1.127 |
| 100yr24hr | 17:45 | 1.119 |
| 100yr24hr | 17:50 | 1.112 |
| 100yr24hr | 17:55 | 1.104 |
| 100yr24hr | 18:00 | 1.097 |
| 100yr24hr | 18:05 | 1.089 |
| 100yr24hr | 18:10 | 1.082 |
| 100yr24hr | 18:15 | 1.075 |
| 100yr24hr | 18:20 | 1.068 |
| 100yr24hr | 18:25 | 1.061 |
| 100yr24hr | 18:30 | 1.055 |
| 100yr24hr | 18:35 | 1.048 |
| 100yr24hr | 18:40 | 1.041 |
| 100yr24hr | 18:45 | 1.035 |
| 100yr24hr | 18:50 | 1.028 |
| 100yr24hr | 18:55 | 1.022 |
| 100yr24hr | 19:00 | 1.015 |
| 100yr24hr | 19:05 | 1.01 |
| 100yr24hr | 19:10 | 1.004 |
| 100yr24hr | 19:15 | 0.998 |
| 100yr24hr | 19:20 | 0.992 |
| 100yr24hr | 19:25 | 0.986 |
| 100yr24hr | 19:30 | 0.98 |
| 100yr24hr | 19:35 | 0.974 |
| 100yr24hr | 19:40 | 0.969 |
| 100yr24hr | 19:45 | 0.963 |
| 100yr24hr | 19:50 | 0.958 |
| 100yr24hr | 19:55 | 0.952 |
| 100yr24hr | 20:00 | 0.947 |

| | | |
|---|---|---|
| 100yr24hr | 20:05 | 0.942 |
| 100yr24hr | 20:10 | 0.936 |
| 100yr24hr | 20:15 | 0.931 |
| 100yr24hr | 20:20 | 0.926 |
| 100yr24hr | 20:25 | 0.921 |
| 100yr24hr | 20:30 | 0.916 |
| 100yr24hr | 20:35 | 0.911 |
| 100yr24hr | 20:40 | 0.908 |
| 100yr24hr | 20:45 | 0.901 |
| 100yr24hr | 20:50 | 0.897 |
| 100yr24hr | 20:55 | 0.892 |
| 100yr24hr | 21:00 | 0.887 |
| 100yr24hr | 21:05 | 0.883 |
| 100yr24hr | 21:10 | 0.878 |
| 100yr24hr | 21:15 | 0.874 |
| 100yr24hr | 21:20 | 0.869 |
| 100yr24hr | 21:25 | 0.865 |
| 100yr24hr | 21:30 | 0.861 |
| 100yr24hr | 21:35 | 0.856 |
| 100yr24hr | 21:40 | 0.852 |
| 100yr24hr | 21:45 | 0.848 |
| 100yr24hr | 21:50 | 0.844 |
| 100yr24hr | 21:55 | 0.84 |
| 100yr24hr | 22:00 | 0.835 |
| 100yr24hr | 22:05 | 0.831 |
| 100yr24hr | 22:10 | 0.827 |
| 100yr24hr | 22:15 | 0.823 |
| 100yr24hr | 22:20 | 0.82 |
| 100yr24hr | 22:25 | 0.816 |
| 100yr24hr | 22:30 | 0.812 |
| 100yr24hr | 22:35 | 0.808 |
| 100yr24hr | 22:40 | 0.804 |
| 100yr24hr | 22:45 | 0.801 |
| 100yr24hr | 22:50 | 0.797 |
| 100yr24hr | 22:55 | 0.793 |
| 100yr24hr | 23:00 | 0.79 |
| 100yr24hr | 23:05 | 0.786 |
| 100yr24hr | 23:10 | 0.783 |
| 100yr24hr | 23:15 | 0.779 |
| 100yr24hr | 23:20 | 0.776 |
| 100yr24hr | 23:25 | 0.772 |
| 100yr24hr | 23:30 | 0.769 |
| 100yr24hr | 23:35 | 0.766 |
| 100yr24hr | 23:40 | 0.762 |
| 100yr24hr | 23:45 | 0.759 |
| 100yr24hr | 23:50 | 0.756 |

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|---|---|---|
| 100yr24hr | 23:55 | 0.752 |
| 100yr24hr | 24:00 | 0.749 |
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| ZeroRain24hr | 00:00 | 0 |
| ZeroRain24hr | 00:05 | 0 |
| ZeroRain24hr | 00:10 | 0 |
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| ZeroRain24hr | 00:55 | 0 |
| ZeroRain24hr | 01:00 | 0 |
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ZeroRain24hr                22:45      0
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ZeroRain24hr                23:45      0
ZeroRain24hr                23:50      0
ZeroRain24hr                23:55      0
ZeroRain24hr                24:00:00   0


[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS       0               0               10000           10000
UNITS            None

[COORDINATES]
;;Node           X-Coord         Y-Coord
;;-------------- --------------- ---------------
J1               938.644         -172.487
J2               935.215         -300.33
J3               993.227         -171.336
J4               990.297         -302.528
J5               879.078         -298.544
J6               1087.211        -305.991
J7               940.911         -299.831
OF1              920.421         -390.037
OF2              926.511         -391.135

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

```
;;-------------- ---------------- ----------------

[Polygons]
;;Subcatchment   X-Coord          Y-Coord
;;-------------- ---------------- ----------------
Lot_6            938.815          -170.54
Lot_6            935.182          -300.675
Lot_6            879.024          -298.84
Lot_6            883.291          -169.123
Lot_6            938.815          -170.54
Lot_5            994.219          -172.12
Lot_5            990.138          -302.348
Lot_5            935.33           -300.282
Lot_5            938.597          -170.406
Lot_5            994.219          -172.12
Lot_4            1071.023         -174.024
Lot_4            1077.932         -206.788
Lot_4            1080.45          -266.068
Lot_4            1087.103         -305.879
Lot_4            990.105          -302.28
Lot_4            994.325          -172.014
Lot_4            1071.023         -174.024

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