



PREPARED BY: LANCE  
INCORPORATED

# BUCKLEY CONCEPTUAL SCHEME

## BYLAW C-8036-2020

### A Bylaw of Rocky View County known as the Buckley Conceptual Scheme.

The Council of Rocky View County enacts as follows:

#### PART 1 – TITLE

This Bylaw shall be known as Bylaw C-8036-2020.

#### PART 2 – DEFINITIONS

In this Bylaw the definitions and terms shall have the meanings given to them in Land Use Bylaw ~~C-8000-2020 4841-97~~ and the *Municipal Government Act*.

#### PART 3 – EFFECT OF BYLAW

**THAT** Bylaw C-8036-2020, being the “Buckley Conceptual Scheme”, affecting Lots 8 and 9, Block 1, Plan 1910511 within NW-23-24-03-W05M, be adopted as defined in Schedule ‘A’, which is attached to, and forms part of, this Bylaw; and,

**THAT** The Central Springbank Area Structure Plan be amended to list the “Buckley Conceptual Scheme” thereunder, as shown in Schedule ‘B’.

#### PART 4 – TRANSITIONAL

Bylaw C-8036-2020 is passed when it receives third reading, and is signed by the Reeve/Deputy Reeve and the Municipal Clerk, as per Section 189 of the *Municipal Government Act*.

Division: 2

File: 04723003/198/ PL20200004

READ A FIRST TIME IN COUNCIL this

9<sup>th</sup> day of June, 2020

PUBLIC HEARING WAS HELD IN COUNCIL this

1<sup>st</sup> day of September, 2020

READ A SECOND TIME IN COUNCIL this

1<sup>st</sup> day of September, 2020

READ A THIRD TIME IN COUNCIL this

1<sup>st</sup> day of September, 2020

  
Reeve

  
Charlotte Hocking  
CAO or Designate

  
Date Bylaw Signed

## Description of the Use or Uses of the Proposed Development

A conceptual Scheme affecting the area NW ¼ section, 23 township, range 3 west of the 5<sup>th</sup> meridian (Lot 9 Block 1 Plan Number 1919511 and Lot 8 Block 1 Plan Number 1919511).  
Municipal Address 243206 Range Road 32 Calgary, AB T3Z 2E3.

This document is provided in accordance with Central Springbank Area Structure Plan Policy 2.3.2.2.

### **For Submission To:**

Rocky View County  
911 - 32 Avenue NE  
Calgary, AB T2E 6X6

### **Prepared By:**

Lance Incorporated

### **Prepared For:**

Ryan and Sharon Buckley  
243206 Range Road 32  
Calgary, AB T3Z 2E3

### **In Association With:**

Groundwater Information Technologies Ltd  
Aquaclear Drilling  
Osprey Engineering  
ARC Surveys Ltd  
Titan Water Services

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## 1.0 Introduction

The Central Springbank Area Structure Plan was implemented in 2007. Since that time Rocky View County requires Conceptual Schemes to be prepared in areas throughout Central Springbank. This Conceptual Scheme for 243206 Range Road 32 has been prepared to meet that requirement.

*The proposed conceptual scheme area for this document is approximately 10 acres and the boundaries were predetermined by Rocky View County.*

The subject property is currently designated Residential Two District (R2), requesting approval to be re-designated Residential One District(R1), for residential use on a small parcel of land that does not include agriculture.

This Conceptual Scheme will demonstrate the plan to maintain the current native landscape and views. This proposed amendment to Residential One District, if subdivided, would have each potential lot integrated into the current rural character of the property and surrounding area. The Special Planning Areas Policies will be incorporated. Furthermore, the property will promote sufficient access for public service and safety including, but not limited to fire, EMS, and RCMP.

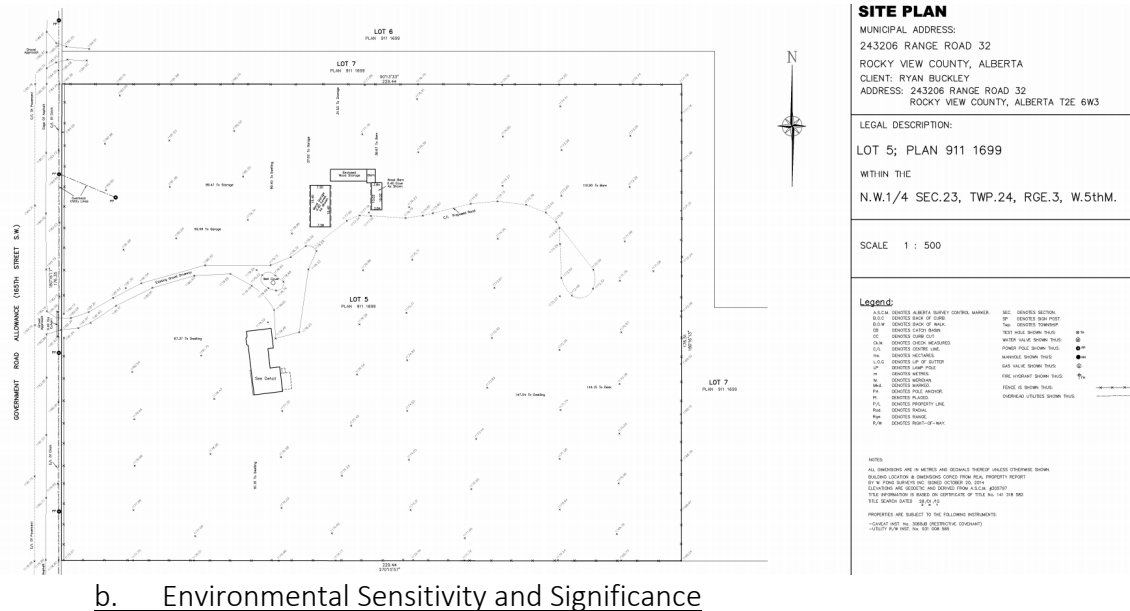
Site analysis will present an understanding of the site topography, soils, hydrology and climate. An evaluation of the site's environmental sensitivity is also included. Current sight lines and views will be demonstrated as they are and as proposed, should subdivision occur. Compatibility with the adjacent land uses will be both evaluated and presented. A mock up of the site and building design, will demonstrate compatibility with the land and adjacent land uses. Said mock up will include approximate impervious surface coverage per lot, building height and profile, proposed building materials (local origin, character and colour), building and site development envelope, site plan and landscape plan.

## 2.0 Description and Evaluation of the Existing Plan Area

### a. Topography and Drainage, Soils, Vegetation, Geotechnical Considerations

The overall topography is described as rolling with a gentle slope to the southeast. The slope in the area is approximately 4%. There are no ravines or drainage courses on the parcel. Strata immediately underlying the site consists of clays of the Lochend unit and the presence of the Lochend unit is favourable as it serves as a confining layer which can prevent contaminants (i.e.: septic field effluents) from moving down into underlying aquifers. Further underlying these unconsolidated units are siltstones, sandstones and shales of the Paskapoo Formation.

**FIGURE 1: TOPOGRAPHICAL SURVEY-SITE PLAN**



## Geotechnical Investigation

The property has an average slope of approximately 4%. There are no concerns regarding erosion, flooding or subsidence. Rocky View County Engineering Services has no expressed concerns.

## Flood Hazard

The parcel underwent a site investigation by Ken Hugo, P. Geol., on behalf of Groundwater Information Technologies Ltd. Said parcel was deemed to be very well suited with no risk of floods. The drainage study is also attached from Osprey Engineering.

A riparian zone is present in the parcels to the East and SE of the subject property. Both the Topographical Survey and the Drainage Study confirm that all risk associated with a riparian zone are entirely contained in the adjacent properties, thereby precluding the two Easterly properties from further subdivision. The property to the SE of the subject has the riparian zone running through the Eastern 10 acres of the parcel.

**FIGURE 2: EXISTING PARCELS AREA MAP SHOWING INFILL PARCELS, EXISTING RESIDENCES SURROUNDING THE SUBJECT AND THE RIPARIAN ZONE**



c. Agricultural Capability and Natural Resources

**Biophysical Assessment**

Section 2.5 of the CSASP refers to the natural environment. The parcel does not contain lands that are deemed to be suitable for permanent protection as natural areas.

**Vegetation**

Vegetation on the site consists of a mixture of poplar trees, aspens, spruce and pasture. There are no areas contained within the parcel that require permanent protection as natural areas. The current vegetation will be largely preserved as per the architectural guidelines that will govern the landscaping of each future home site.

**Wildlife**

The property is believed to contain no environmentally significant wildlife communities.

**Waterfowl**

The property is believed to contain no environmentally significant waterfowl communities.

#### **Fisheries**

The property is believed to contain no environmentally significant fisheries.

#### **Wetlands**

The property is believed to contain no environmentally significant wetlands. There is no indication of wetland plants on this parcel.

#### **Environmental Site Assessment**

There is no evidence of any hazardous substances on the subject property. No history of any leaks or spills. Historically the site is residential and agricultural.

##### d. Existing Land Use, Ownership, Development and Adjacent Land Uses

The properties surrounding the subject are residential in nature, with zoning including both R2 and R1 and parcel sizes ranging from 1.98 acres to 20 acres in size.

#### **Land Use and Adjacent Land Use**

The 10.01-acre parcel will be Residential One (R-1). This re-designation will not result any conflict with the existing land uses. There are approximately 20 other residences within 500 meters of the site. All other residences within this range are either R1 or R2. The implementation of architectural design guidelines and landscaping guidelines will enhance not only this property, but the Springbank Community as a whole.

#### **View Plan Impact Analysis**

Long range views of the East face of the Rocky Mountains are available from the property. These views are currently screened by the natural stands of trees present throughout the parcel. These views will be maintained post development.

##### e. Archaeological and Historical Considerations

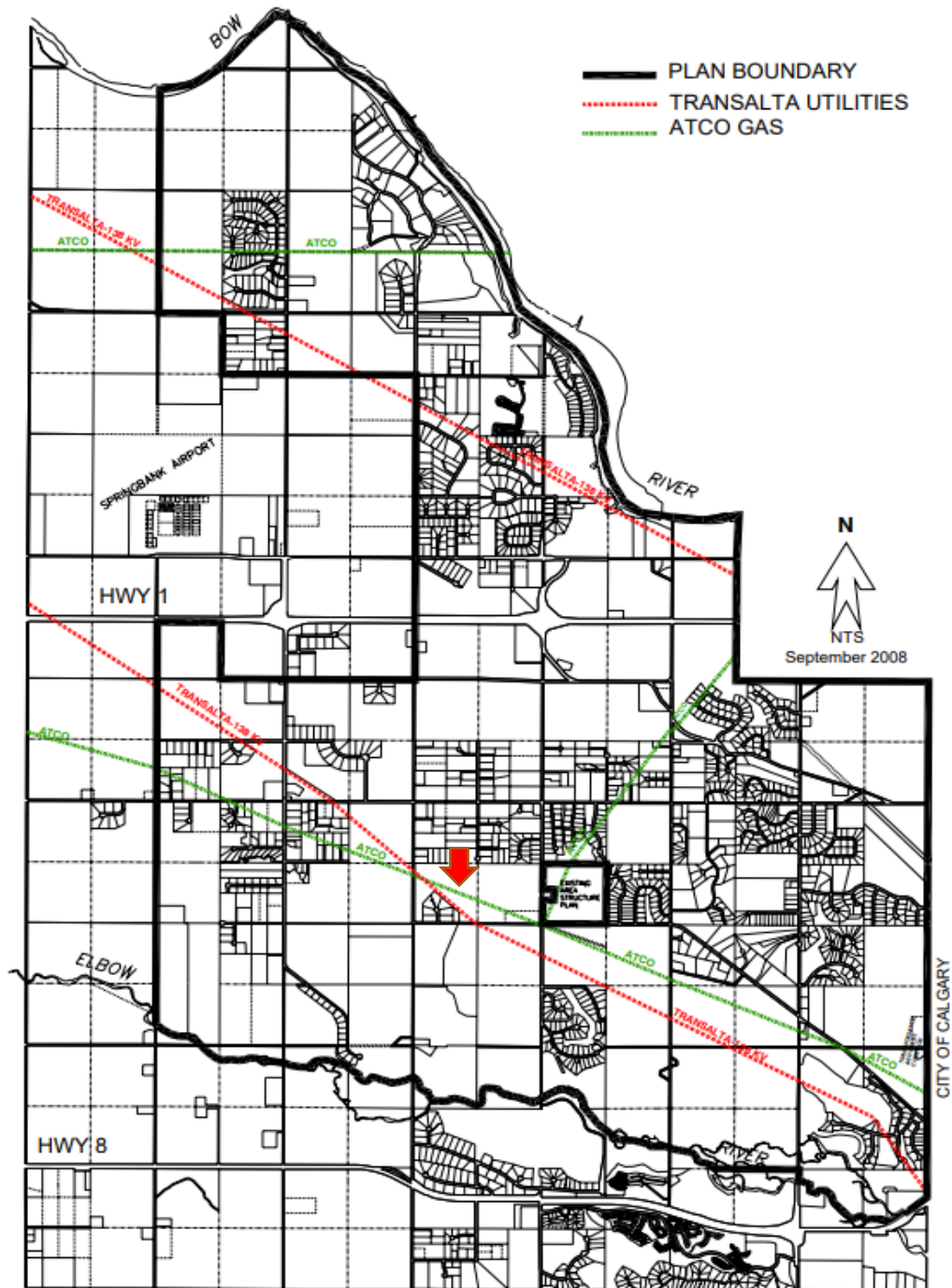
#### **Archeological and Historical Assessments**

The subject parcel contains no important historical or archaeological resources. Notwithstanding, where sites of historical importance are identified during development of individual lots within the parcel, these sites will be identified and removed, preserved or avoided prior to development, as per POLICY 4.5.1 of the Central Springbank Area Structure Plan.

See Appendix 3 for confirmation letter from.

##### f. Existing Utilities and Transportation Routes

FIGURE 3: EXISTING NATUREAL GAS/ELECTRICAL UTILITIES

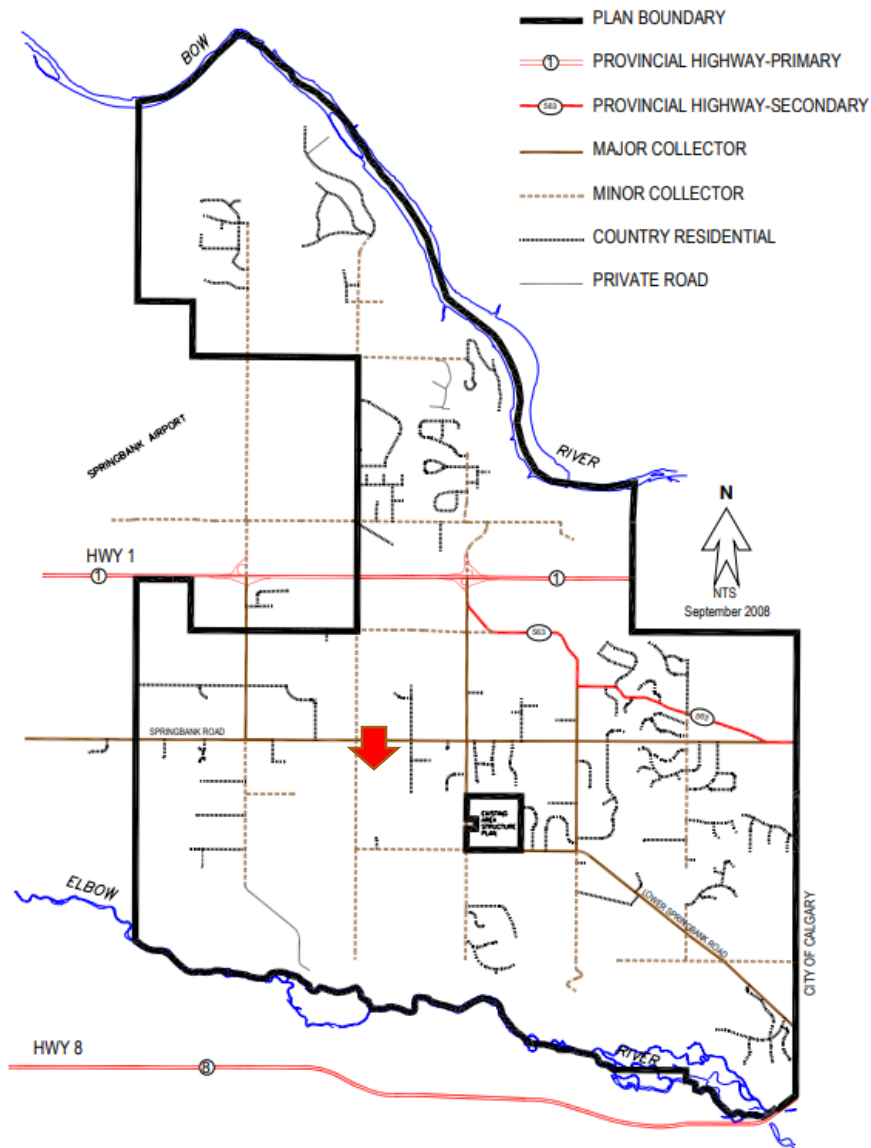


### Shallow Utilities

The appropriate utility service providers will service the parcel, including but not limited to Fortis Alverta and Atco Gas.

FIGURE 4: EXISTING ROAD SYSTEM





### Roadway Connections

The existing residence has access via an approach from Range Road 32 and the intersection for this internal road will continue to be used in addition to the new access road. The access point for the East end of the property is via an approach from Range Road 32 that will provide both physical and legal access to the property. The owner will enter into an Access Easement Agreement.



### 3.0 Land Use Concept

#### a. Future Land Use Scenario

This Conceptual Scheme proposes the land use and re-designation for the approximately 10-acre parcel located 243206 Range Road 32 (NW ¼ section, 23 township, range 3 west of the 5th meridian. The subject is South of Springbank Road, North of Lower Springbank Road, adjacent to and East of Range Road 32. The property is owned by Ryan and Sharon Buckley and includes 2 parcels of land (Lot 9 Block 1 Plan Number 1919511 (6 acres) and Lot 8 Block 1 Plan Number 1919511 (4 acres)). The Conceptual Scheme will show the possible evolution of the property, if the designation is amended from R2 to R1.

#### b. Demonstration of Consistency with a Higher Order Plan

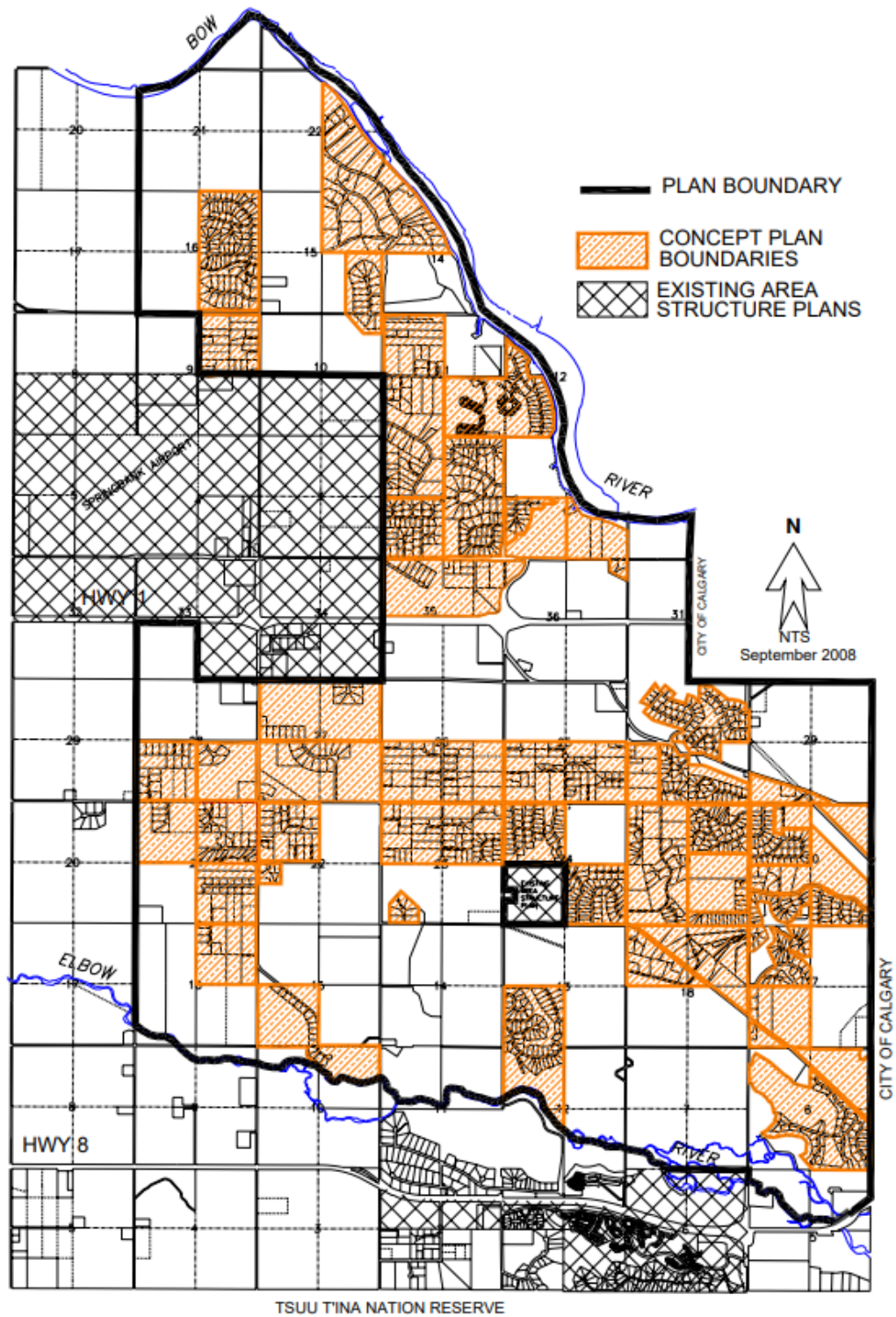
#### **Compliance with Central Springbank Area Structure Plan (CSASP)**

This Conceptual Scheme complies with the Central Springbank Area Structure Plan (CSASP) which was adopted by Rocky View County October 2, 2001 with Bylaw C-5354-2001.

The Central Area Structure Plan identifies the Plan Area as “Infill Residential Area” (See Figure 5) which means that this property is subject to the CSASP Policy 2.9.3 Infill Residential Areas Policies which indicates:

*“A) LANDS IDENTIFIED ON MAP 11 WILL NOT BE ELIGIBLE FOR FURTHER SUBDIVISION UNLESS A CONCEPTUAL SCHEME IS PREPARED IN ACCORDANCE WITH THE PROVISIONS OF THIS PLAN, IS APPROVED BY THE MUNICIPALITY, AND IS APPENDED TO THE CENTRAL SPRINGBANK AREA STRUCTURE PLAN.”*

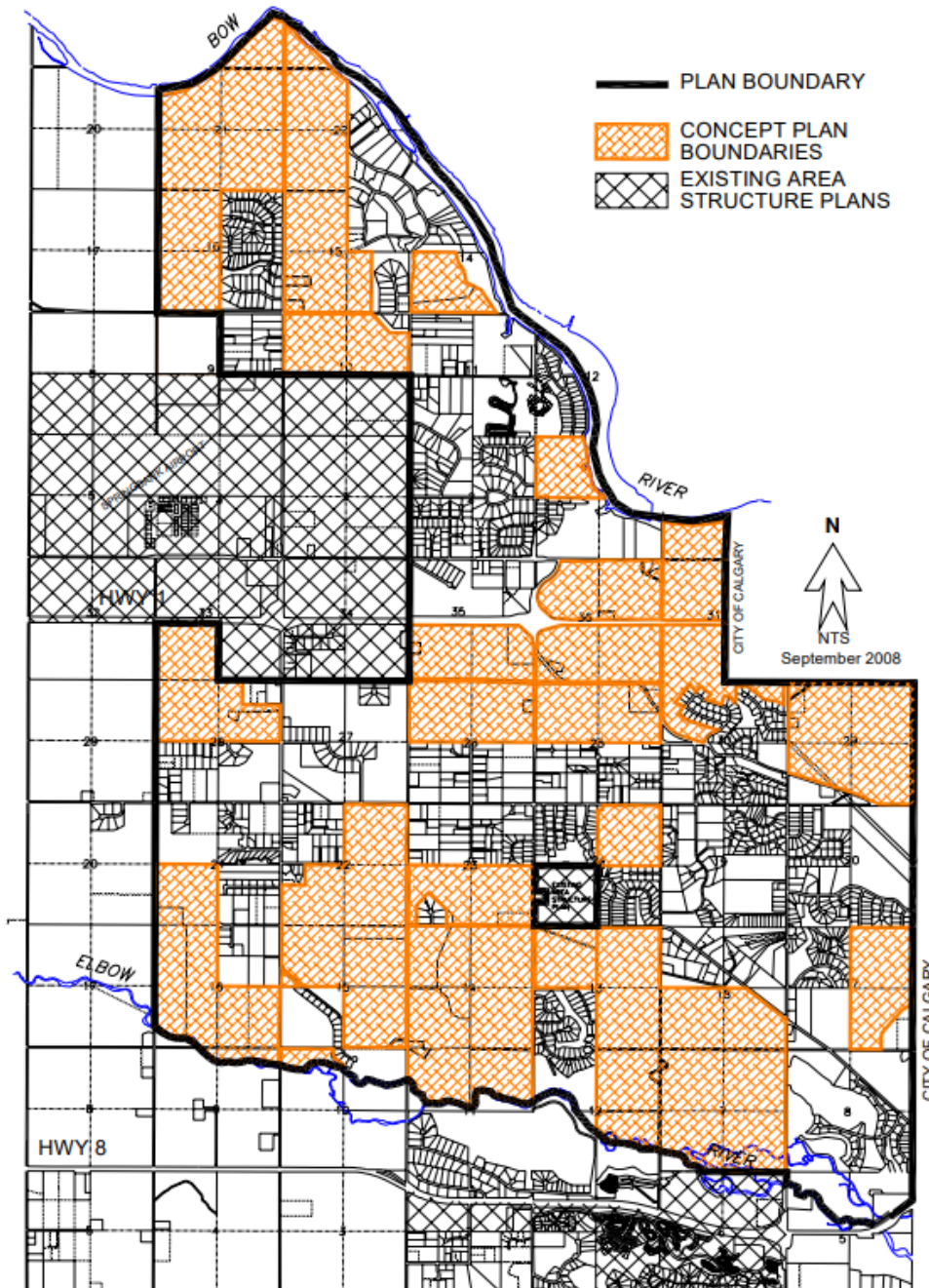
## Map 11 - Infill Residential



This Conceptual Scheme is provided as per Section 2.3.2.2 of the CSASP, which indicates:

*“IN ORDER TO PROVIDE HOLISTIC, EFFICIENT AND THOROUGH APPROACH TO COMMUNITY DEVELOPMENT IN CENTRAL SPRINGBANK, CONCEPTUAL SCHEMES WILL BE REQUIRED TO GUIDE FUTURE LAND USE CHANGES AND SUBDIVISION WITH PREDETERMINED CONCEPTUAL SCHEME BOUNDARIES SHOWN ON MAP 11 AND MAP 12”*

## Map 12 - New Residential Areas

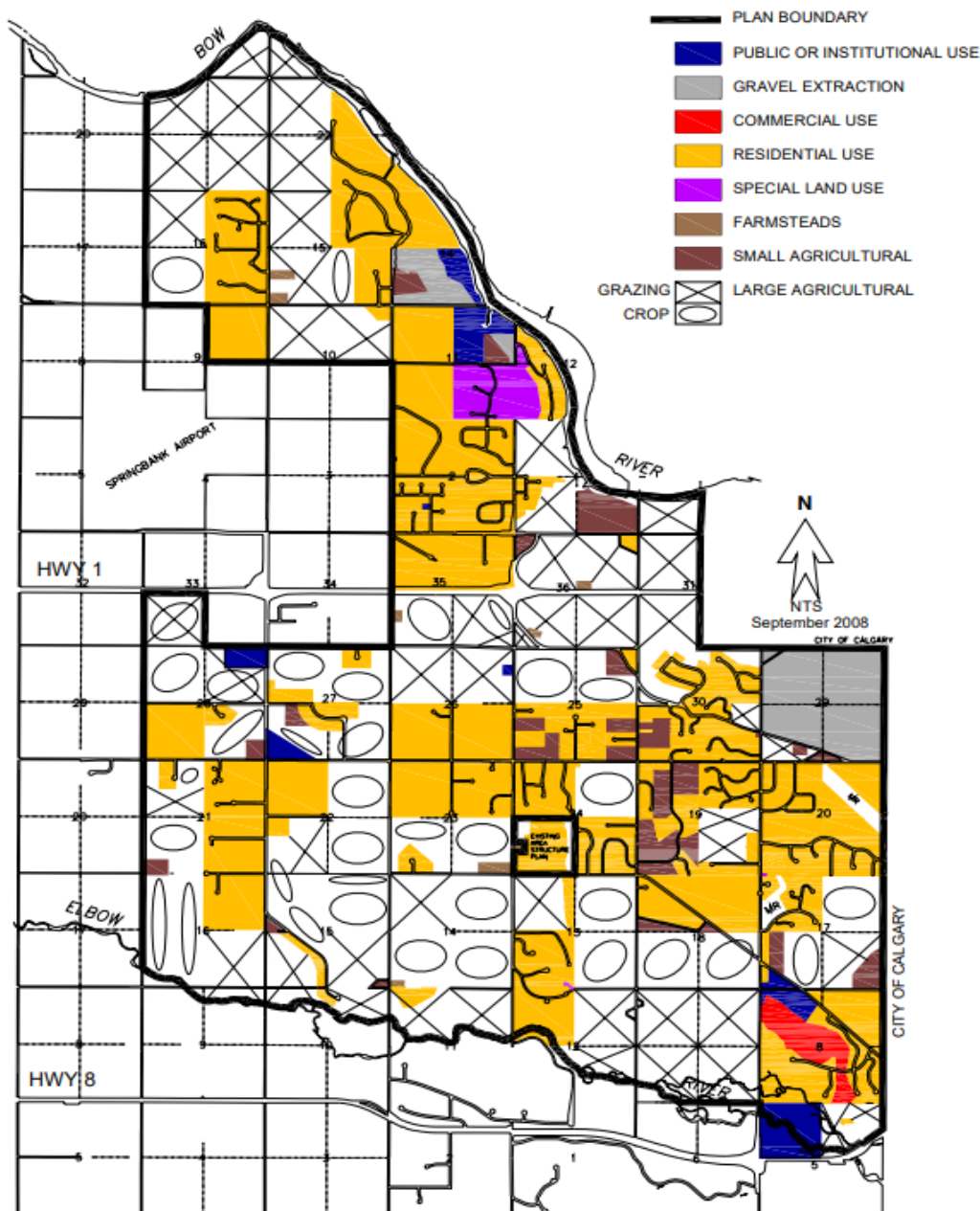




## Land Use and Adjacent Land Use

The 10.01-acre parcel will be Residential One (R-1). This re-designation will not result any conflict with the existing land uses. There are approximately 20 other residences within 500 meters of the site. All other residences within this range are 1.98 acres in size or larger, with the exception of a proposed development located to the immediate West of the property. The implementation of architectural design guidelines and landscaping guidelines will enhance not only this property, but the Springbank Community as a whole.

**FIGURE 5: CURRENT LAND USE INFILL PARCELS**



### Density and Lot Size

The current 10.01-acre parcel is to be re-designated from its current Residential Two to Residential One, to allow for subdivision into parcels with a minimum allowable parcel size of 1.98 acres and a maximum density of 5 residential units on the parcel.

**Policy 3.1**     *The proposed layout shall be revised as required to ensure each proposed parcel has adequate frontage onto a developed County road in accordance with the County Servicing Standards. Final subdivision design and access provisions shall be determined at subdivision stage.*

FIGURE 6: SITE PLAN ARIAL

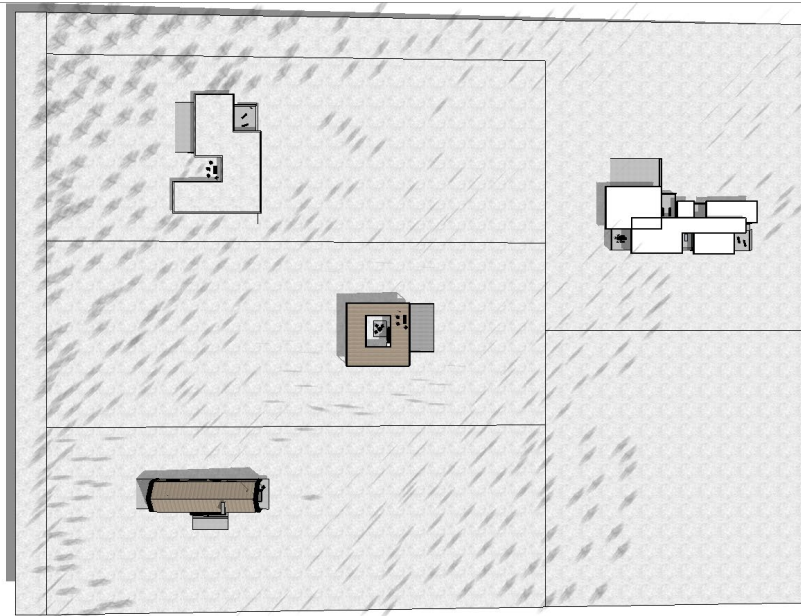


FIGURE 7: SITE PLAN NORTH FACING VIEW



### c. Design Controls/Guidelines

#### **Architectural Guidelines**

The property is located within Central Springbank, in the County of Rocky View. It is a short drive to downtown Calgary, with convenient access to both Highway 1 and Highway 8 as well as both Glenmore and Bow Trail. The surrounding topography and vegetation will enhance your homes style, providing privacy and mountain views. To preserve this natural beauty, all purchasers must commit to maintaining the natural drainage patterns and take the utmost care to avoid unnecessary tree removal. To further enhance the community, homes must display a high level of architectural design.

The intent of these controls is to create a community that is integrated within the surrounding area and will benefit all future owners. The approved home styles will be Contemporary, with elements that lend themselves to nature and the prairies.

#### **Setbacks**

The setbacks and building heights are listed below, compliance with the Architectural Guidelines does not preclude compliance with the requirements of the County of Rocky View. A plot plan showing required set backs will be provided by the “Purchaser”.

- Front yard set back minimum 45 meters from any county roadway, minimum 60 meters from any highway, minimum 15 meters from any internal subdivision or service road.
- Rear yard set back minimum 30 meters from all roads, minimum 7 meters from all other.
- Side yard set back minimum 45 meters from any county roadway, minimum 60 meters from any highway, minimum 15 meters from any internal subdivision or service road, minimum 3 meters from all other. The maximum allowable side yard will be at the discretion of Lance Incorporated.

#### **Building Height**

Building height must conform the to County of Rocky View Land Use Bylaw for the district, current maximum height of a residential building is 10 meters.

#### **Lot Coverage**

All buildings, including accessory buildings must fall entirely within the aforementioned setbacks and the units building envelope.

#### **Minimum Habitable Floor Area, Excluding Basements**

- Two-storey: Minimum 1250 square feet in ground area, total 1800 square feet, excluding garage and decking.
- Bungalow: Minimum 1500 square feet, excluding garage and decking.

#### **Garages**

- All proposed developments will require a minimum triple attached garage.

- Garage configurations should be architectural and unique.
- Extra treatment may be required on the side wall of the garage.
- Garage locations must follow the approved building grade plan.
- The garage will complement the overall proportion of the home and not dominate the elevation of the home.

#### Driveways

- The driveway is an essential element of design and must be included as part of the house plan.
- Each driveway design will be reviewed and approved, as part of the overall project. No approval shall set precedence for other driveway designs.

#### Address Monuments

All address monuments are to be approved by Lance Incorporated and must comply with the County of Rocky View Bylaw.

#### House Types

- Two-storey
- Bungalow

#### Wall Materials

- Exterior cladding shall consist of smooth finish stucco; stucco battens are not acceptable. Any alternative exterior cladding material will require the prior approval of Lance Incorporated.
- All elevations are to be accented with material that is consistent with contemporary nature of the development. All proposed selections for masonry, natural wood trim or other materials will require the prior approval of Lance Incorporated.

#### Roof Materials

- The approved roofing material will be 30-year architectural asphalt shingles in black or charcoal, flat concrete roof tiles. All upgrades and colours will require the prior approval of Lance Incorporated.
- All roof hardware (flashing, vents, stacks, etc.) must match the roofing material and must be inconspicuous. Flashing must blend with the roof.

#### Exterior Colours

Colours on the exterior of the home will need to compliment the architectural theme of the area. Colour schemes must be natural, generally soft earth tones and will require the prior approval of Lance Incorporated.

#### Entry

All homes need to have a thoughtfully designed entryway.

- Entries must be consistent with the architectural style of the home.
- The entry will be the primary feature of the front elevation.

#### Doors



Front entry doors are to coordinate with the style of the home.

- Double and single front doors are allowed, but all doors will require the prior approval of Lance Incorporated.
- Wood and glass doors are preferred, all other proposals will be reviewed on a case by case basis and all door designs will require the prior approval of Lance Incorporated.

#### Garage Doors

Garage doors are to coordinate with the style of the home.

- Doors must be contemporary in style and must not exceed 20 feet in width or 8 feet in height. All doors will require the approval of Lance Incorporated.
- Space above the garage door must serve as an architectural feature, if it is to exceed 2 feet in height.
- Garages must compliment the overall design of the home. Doors must blend with the overall style of the home and should be treated as an architectural feature.

#### Railings

Railings will be required, according to the Alberta Building Code. All railings are to match the architectural style of the home and will need to be either glass or metal. All selections must be approved by Lance Incorporated.

#### Trim and Soffit

All homes are to be designed to ensure all trim is chosen in accordance with the architectural style. Trim detail is extremely important and must be incorporated into the original plan details and is required to cover all exposed openings.

- Trim details should be a minimum of 4" wide.
- All trim must sit proud of the wall material, by at least ½".
- Soffit may be pre-finished aluminum.
- All fascia must be a minimum of 8" and must compliment the elevation of the home.
- Pre-finished aluminum fascia will be allowed.
- Any eaves trough, fascia and soffit must match and be approved by Lance Incorporated.

#### Windows

- Metal clad windows are required.
- Windows need to be set up in good proportion and relation.
- Adequate window dressings are required on all front elevations.
- Window style and shapes are to be consistent on all elevations of the home.
- Window coverage will be thoughtfully reviewed on all applications to consider privacy and architectural style. No approval shall set a precedent for future approvals.

#### Additional Requirements

- All homes will require some rear elevation treatment.
- All exposed elevations will require the same level of detail as the front elevation. Lance Incorporated will ensure that the architectural design and detail is carried throughout all elevations.

- Decks and patios are to be included in the plan approval.
- Decks must be built at the time of the initial construction.
- The underside of all decks, if visible, must be finished and the main beam must be hidden or clad.

### Landscaping Guidelines

- Driveways should be the width of the garage and should taper to reduce the impact on natural landscape.
- All decks and patio designs must respect the privacy of neighbouring properties and must fit within the architectural style of the home.
- Dog runs must be proposed in the planning stage. All runs must comply with the County of Rocky View Bylaws.
- All ancillary structures will be reviewed according to the nature of their design, the sight path of neighbouring properties and the County of Rocky View.
- Lot grading is to follow the natural slope of the land.
- Attention must be given to drainage patterns to ensure surface water is channeled away from homes on all sides and into storm water drainage systems.
- All corner grade points and survey pins of each home site must be maintained exactly as specified. Damaged pins will be replaced immediately by the “Purchaser” at the “Purchaser’s” expense.
- “Purchaser” is responsible for maintaining grades at home site corners, property lines, garage slabs and house corners.
- Surveyors are to check the corner lot grades when staking the home.
- Engineering approval of the drainage plan must be established prior to commencing construction and maintained throughout the construction period.
- Individual lot grading must be approved by the County of Rocky View and must be completed within the individual lot property lines.
- Retaining walls will be reviewed on a case by case basis and are required to have the approval of the County of Rocky View, where applicable.
- No garbage refuse or non-natural materials may be kept or stored on a unit unless kept or stored in a closed container or building, and no such garbage, refuse or non-natural materials shall be allowed to accumulate upon a unit.
- Site damage (roadways, curbs, vegetation, fencing, etc.) will be fixed by the “Purchaser”, at their expense.
- Vehicle tread is to be limited on home sites.
- Vegetation material, top soil, or similar materials may not be dumped on site at any time.
- No living trees shall be cut down or removed from the unit, without prior written consent of Lance Incorporated. Any tree that is cut down without such written consent will result in a fine equal to \$1000 per tree, this fine will be paid in full by the “Purchaser” within 10 days or payment request.
- Erosion control will be the responsibility of the builder during construction.

- Construction crews, “Purchasers” and builders are to ensure that all sites are accessed using only the provided entries.

d. Reserve Area Dedication and Strategy

**Municipal Reserve/Environmental Reserve**

Municipal reserves were previously provided for this parcel, by a cash-in-lieu payment on Plan 9111699.

e. Transportation Network and Pedestrian Network

**Roadway Connections**

The existing residence has access via an approach from Range Road 32 and the intersection for this internal road will continue to be used in addition to the new access road. The access point for the East end of the property is via an approach from Range Road 32 that will provide both physical and legal access to the property. The owner will enter into an Access Easement Agreement. The Buckley’s have already contributed to Rocky View County’s Transportation Off-Site Levy in accordance with bylaw C-7356-2014.

**Connection to future pedestrian network**

The Buckley’s welcome the opportunity to tie into any future pedestrian network in the area.

f. Stormwater Management Plan

**Storm Water Management**

The Springbank Master Drainage Study requires a site-specific stormwater management plan, prepared by a qualified professional, assessing the stormwater management post development, to determine if any infrastructure, drainage easements or planning is required. The proposed report will adhere to the guidance presented in “A Report on Drainage Strategies for Springbank” by Westhoff Engineering Resources Inc. 2004.

See Appendix 4 for Site Specific Stormwater Management Plan.

g. Servicing Strategy

**Waste Management**

At the time of submission, only 38 parcels fall within a 600-meter radius of property. Sewage treatment for the proposed five lots is to be provided by septic tanks and dispersal fields, which will be designed and installed in accordance with the Alberta Sewage System Treatment Standard of Practice and Rocky View County Servicing Standards and will meet the Bureau de

Normalisation du Quebec (BNQ) standard for treatment and NFS/ANSI Standard 40 specifications. A Site Improvement/Site Services Agreement will be registered by caveat against each of the proposed lots to ensure any improvements are made in accordance with these standards. In addition, a Deferred Servicing Agreement will be registered by caveat against the proposed lots in order to facilitate the future connection to a Springbank Regional Utility System at such time as the system becomes available.

There is a precedent set for the approval of both rezoning of small parcels from R2 to R1. An application was originally heard September 25, 2018 and was put on hold by counsel and subsequently approved to rezone and subdivide a 5-acre parcel of land into 2 parcels. The approval acknowledged that the smaller lots would move forward as 2 lots with enough space to approve a home, well and septic on each newly subdivided parcel.

POLICY 6.2.1 A PSTS LEVEL 4 ASSESSMENT IS REQUIRED TO BE SUBMITTED TO THE COUNTY TO VERIFY THE SUITABILITY OF THE SOIL TO ACCOMMODATE “PACKAGE SEWAGE TREATMENT PLANTS”. THE COUNTY REQUIRES THIS TESTING PRIOR TO SUBDIVISION APPROVAL.

POLICY 6.2.2 THE OWNER SHALL ENTER INTO A SITE IMPROVEMENTS/SERVICES AGREEMENT TO BE REGISTERED ON EACH NEW LOT TO ENSURE THAT AN ADVANCED “PACKAGE SEWAGE TREATMENT PLANT” IS CONSTRUCTED IN ACCORDANCE WITH ROCKY VIEW COUNTY SERVICING STANDARDS.

POLICY 6.2.3 THE OWNER SHALL REGISTER A CAVEAT ON EACH NEW LOT REGARDING A DEFERRED SERVICES AGREEMENT AND NOTIFYING EACH FUTURE LOT OWNER OF THE REQUIREMENT TO CONNECT TO COUNTY PIPED WASTEWATER SYSTEMS AT THEIR COST WHEN SUCH SERVICES BECOMES AVAILABLE.

k. Landscaping and Aesthetic Details that will Enhance the Development

The subject property will stay true to its current state and will align all development to minimize the impact on all of the surrounding trees and vegetation. Sight lines in around the development will be offset to maintain the privacy of both current and prospective homeowners.

4.0 A Summary of Community Consultation

Input from all directly and indirectly affected landowners within and adjacent to the conceptual scheme boundary was sought throughout the preparation of the conceptual scheme.

Consultation with the property owners directly and indirectly affected will continue to occur. A large 4-foot by 8-foot conceptual rendering has been present on the proposed area, for over a year, providing telephone and email contact information. This rendering was installed to both provide information and to encourage residents to respond and forward comments. The neighbours were also advised of development plans and invited to submit letters and emails.

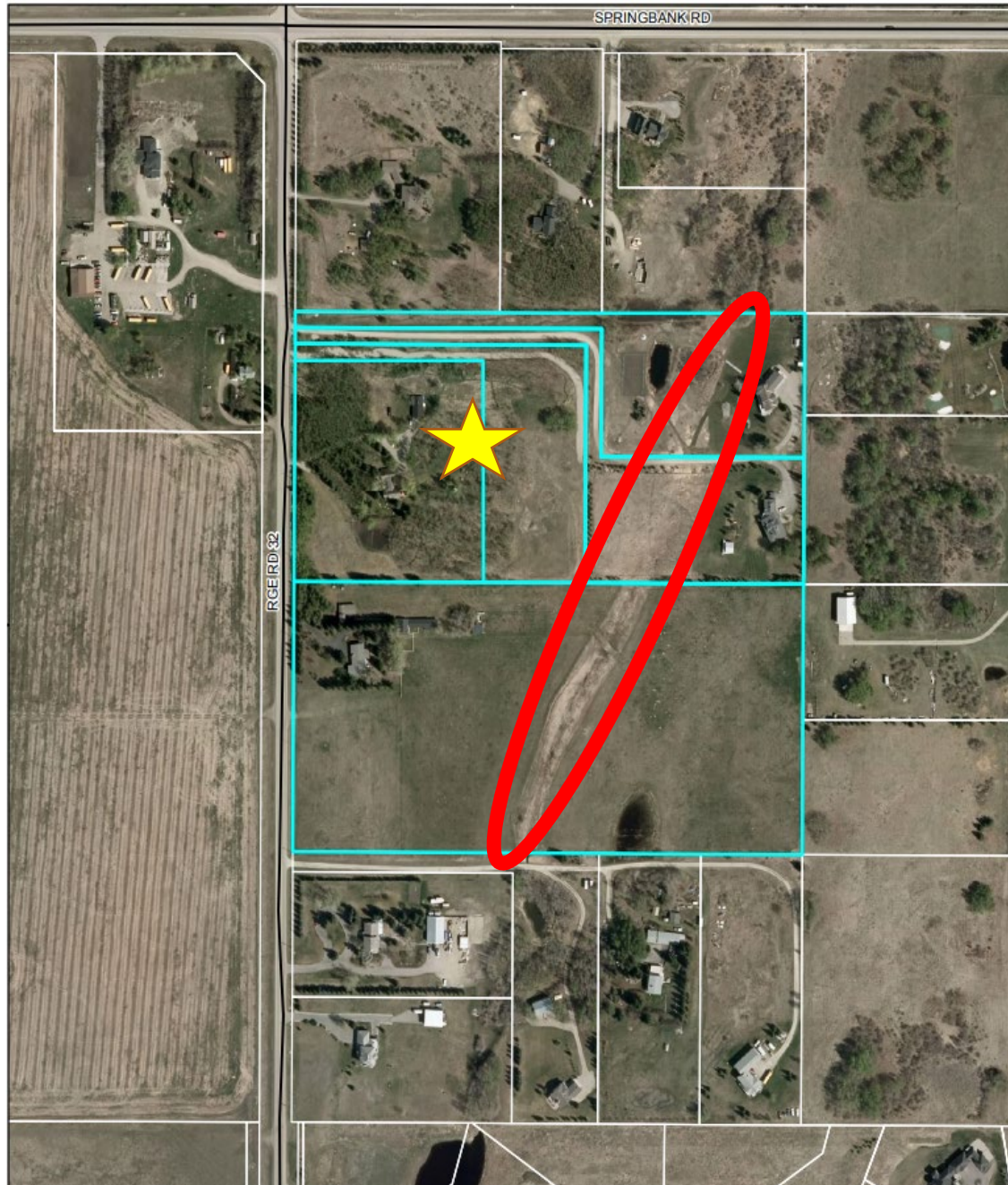
FIGURE 8: CONCEPTUAL RENDING FOR REDESIGNATION





Buckley Conceptual Scheme Smaller Area Rationale

FIGURE 9: CONCEPTUAL SCHEME SMALLER AREA RATIONALE



The Buckley Conceptual Scheme proposes a smaller area bounded by Range Road 32 on the west and the parcel boundaries for NW ¼ section, 23 township, range 3 west of the 5<sup>th</sup> meridian. Section 2.9.2 of the ASP states the following: “Notwithstanding the defined conceptual scheme boundaries as defined on Maps 11 and 12, future conceptual scheme boundaries may be altered without amendment to this Plan, at the discretion of Council; provided the alternate conceptual scheme area is comprehensive in nature; the implications of development proceeding within an alternate conceptual

scheme boundary have been examined; and the Municipality determines that any on-site planning issues have been resolved pursuant to the provisions of this Plan.” Section 2.9.3 of the ASP states that: “Lots in Infill Residential Areas as shown on Map 11 are found in quarter sections that have been previously subdivided or have been developed to their current potential as 2 to 4-acre communities. Through the conceptual scheme process, the re-development of larger parcels into 2 - 4 acre lots is envisioned provided the interface considerations between existing and new residential lots have been comprehensively addressed.” a) Lands identified on Map 11 will not be eligible for further subdivision unless a conceptual scheme is prepared in accordance with the provisions of this plan, is approved by the Municipality, and is appended to the Central Springbank Area Structure Plan.” In the Buckley Conceptual Scheme, residential lots in the Infill Residential Area as defined on Map 11 will 2 acres in size, this lot size is prevalent in the immediate area.” Figure 2 - Existing Parcels Area Map shows the existing infill parcels and existing residences around the subject lands. The Buckley Conceptual Scheme 4.0 a). Buckley Conceptual Scheme Smaller Area Rationale Regional Development Constraints Regional Development Constraints (Figure 2) identifies the constraints within the Conceptual Scheme area identified in the Central Springbank ASP. The Existing Development Fragmentation Constraints: The lands outside the proposed Buckley Conceptual Scheme Plan Area are already developed into 3 parcels in such a way that it is impractical to overlay a new plan that would satisfy the varied interests of owners that may or may not want further development of their land. The two parcels to the east are approximately 5 acres in size and are configured so that additional subdivision is not possible due to size, location, the presence of a riparian zone and the topography of the parcels. The parcel to the South is 20 acres in total. The owner of the property to the South has owned it for over 50 years and has no intention of amending the property usage beyond its current scope and use. The property also has the riparian zone cutting through the SE portion of the property. Access to these parcels is only from Range Road. The Buckley Conceptual Scheme is the only land that is not fragmented by development in a way that precludes logical planning. It consists of two parcels containing approximately 10 acres. These two parcels will be consolidated into one to facilitate subdivision of lots for the proposed development. Figure 2 -Aerial Photo of subject lands shows the riparian zone and to the south and east of the Buckley Land. The Buckley Conceptual Scheme Figure 8 -Conceptual Scheme Smaller Area Rationale further demonstrates the Regional Traffic Access Constraints the Conceptual Scheme area identified. The two parcels to the east, currently share a panhandle access off of Range Road 32, the configuration of both lots further impedes access to these parcels if further subdivision was proposed. Access to the proposed Buckley development will be from RR 32.



## Appendix 1: Aquifer Analysis

Alberta		Water Well Drilling Report		View in Metric																												
GOWN ID		The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.		GIC Well ID 9546365 GoA Well Tag No. Drilling Company Well ID Date Report Received 2019/02/26																												
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Owner Name BUCKLEY RYAN		Address P.O. BOX 96061 PRO WEST SPRINGS		Town CALGARY	Province ALBERTA																											
				Country CANADA	Postal Code T3H 0L3																											
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<b>Contractor Certification</b>																																
Name of Journeyman responsible for drilling/construction of well LEWIS PARKHOUSE Company Name AQUACLEAR DRILLING INC.			Certification No 4161Q Copy of Well report provided to owner Yes																													
			Date approval holder signed 2019/02/26																													

# BUCKLEY CONCEPTUAL SCHEME



## Water Well Drilling Report

[View in Metric](#)

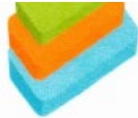
The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GIC Well ID 9546365  
GoA Well Tag No.  
Drilling Company Well ID  
Date Report Received 2019/02/26

GOWN ID

Well Identification and Location										Measurement in Imperial	
Owner Name BUCKLEY RYAN		Address P.O. BOX 96061 PRO WEST SPRINGS			Town CALGARY		Province ALBERTA		Country CANADA		Postal Code T3H 0L3
Location	1/4 or LSD NW	SEC 23	TWP 24	RGE 3	W of MER 5	Lot	Block	Plan	Additional Description		
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)					Elevation	
ft from					Latitude 51.063251 Longitude -114.321444					ft	
ft from					How Location Obtained					How Elevation Obtained	
					Not Verified					Not Obtained	
Additional Information										Measurement in Imperial	
Distance From Top of Casing to Ground Level										24.00 in	
Is Artesian Flow										Is Flow Control Installed	
Rate										igpm	
Recommended Pump Rate										6.00 igpm	
Recommended Pump Intake Depth (From TOC)										70.00 ft	
Pump Installed										Depth	
Type										H.P.	
										Model (Output Rating)	
Did you Encounter Saline Water (>4000 ppm TDS)										Depth	
Gas										ft	
										Well Disinfected Upon Completion	
										Yes	
										Geophysical Log Taken	
										Submitted to ESRD	
Additional Comments on Well										Sample Collected for Potability	
NO PUMPTEST DONE. Q 20 TO BE DONE AT ANOTHER DATE										Submitted to ESRD	
Yield Test										Taken From Ground Level	
Test Date										Start Time	
										Static Water Level	
										ft	
Method of Water Removal											
Type											
Removal Rate											
igpm											
Depth Withdrawn From											
ft											
If water removal period was < 2 hours, explain why											
Water Diverted for Drilling											
Water Source											
ALDERSIDE WATER STATION											
Amount Taken											
500.00											
ig											
Diversion Date & Time											
2019/01/10 7:00 AM											

Contractor Certification			
Name of Journeyman responsible for drilling/construction of well		Certification No	
LEWIS PARKHOUSE		4161Q	
Company Name		Copy of Well report provided to owner	
AQUACLEAR DRILLING INC.		Date approval holder signed	
		2019/02/26	



**Groundwater Information**  
Technologies Ltd.

## **Phase I Aquifer Analysis**

**NW ¼ - 23 - 24 - 3W5**

**Rockyview County**

Prepared For:

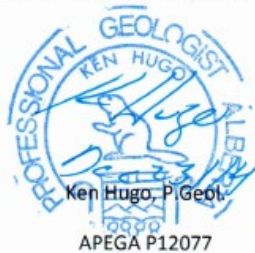
Ryan Buckley

243206 Range Road 32

County of Rockyview

Prepared By:

Groundwater Information Technologies Ltd.



December 23 2014

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#44, 2110 - 41 Avenue NE, Calgary, Alberta T2E 8Z7

### Executive Summary

A review of available data was undertaken for a proposed country residential subdivision in NW – 23 – 24 – 3W5 to determine expected water well yield and aquifer zones. Previously published geological and hydrogeological studies were examined along with an examination of water well drillers reports and groundwater quality analysis reports for the area.

Aquifers underlying the site consist of sandstone deposits of the Lacombe member of the Paskapoo Formation. Good aquifers are usually found at depths of less 60 m and aquifers may be found at depths in excess of 75 m. Groundwater use is moderate in the area consisting of a combination of individual wells to supply country residential lots and licensed wells for subdivisions. Approximately 100 groundwater users are present within a 1 km radius of the site.

Water yields from the aquifers are relatively high with safe yields ranging from 1033 m<sup>3</sup>/day to 14.9 m<sup>3</sup>/day (158 – 2.3 imperial gallons per minute) with an average rate of 346 m<sup>3</sup>/day (53 gallons per minute). This is in excess of the 1250 m<sup>3</sup>/year of water required by the Water Act for a residential subdivision and the calculations indicate that the average well in the area is capable of supplying the necessary water for the proposed subdivision.

A survey of static water levels in nearby wells when first installed show no decrease of water levels with time and indications of aquifer dewatering is not present. Adverse effects to existing users on aquifer supplies will not result due to pumping from the well at the proposed subdivision.

The water quality in the area is marginally acceptable with a total dissolved solids concentration of around 1000 mg/L and many users may prefer to treat the water by reverse osmosis or distillation to lower the salinity. High iron content may also be found which may require treatment.

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Table 1 - Licenses and Registrations.....	4
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Table 3 - Water Quality Analysis .....	6

Appendix 1 – Reconnaissance well report and pump test interpretations

Appendix 2 – Water quality analysis report

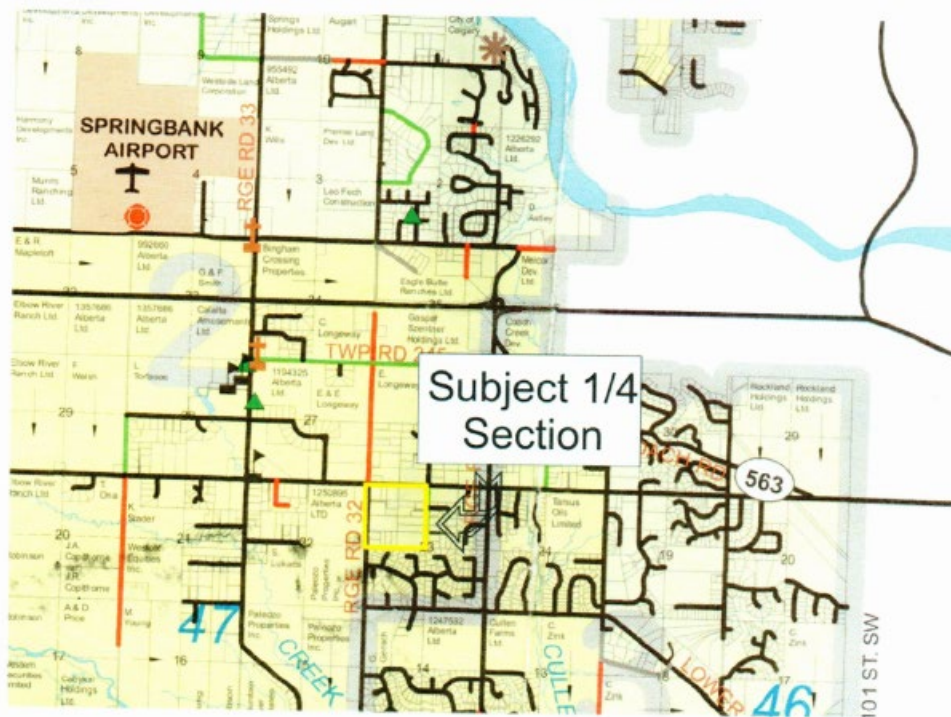
## Introduction

At the request of Ryan Buckley an aquifer analysis was undertaken at a parcel of land located within the SW ¼ - Section 27 – Twp 24 – Rge 3W5M within Rockyview County. The purpose of the analysis was to determine whether the aquifers underlying the site can supply water for a proposed subdivision of an existing parcel with legal title of Lot 5 Plan 911 1699 into two parcels for residential use. Water needs for each parcel, according to the Water Act, are to be supplied at a rate of 1250 m<sup>3</sup>/year without causing an adverse effect to existing users.

This review consists of an examination of currently available information and should provide an estimate into depths, yields and quality of water from the aquifer(s) underlying the site. As no drilling or pumping tests were performed as part of the investigation, the review provides a representative analysis but no guarantees are provided as to actual water quantity or quality that may be obtained by a well on site.

The site is located within the Springbank area west of the City of Calgary. A portion of the County of Rockyview map showing the subject site is as follows:

*Figure 1 - Key plan showing subject location*

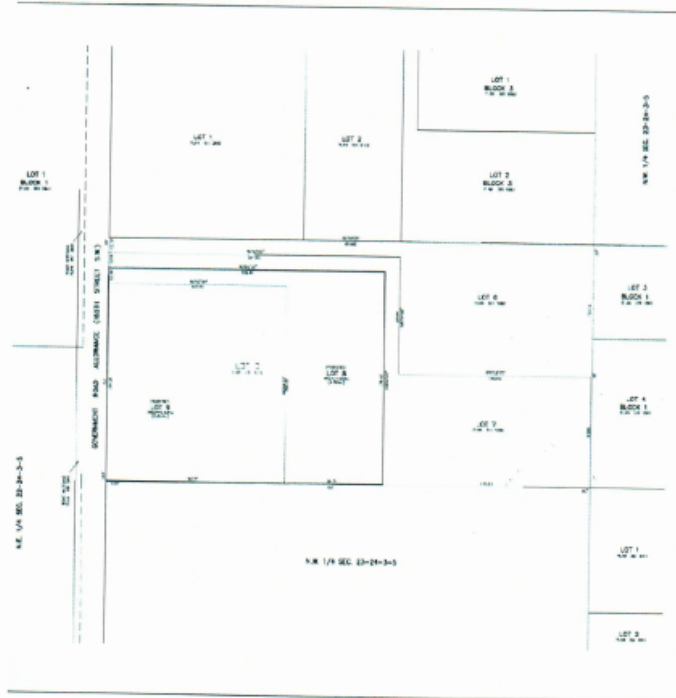




### Site and Geological Description

The subject site consists of a 10 acre that is to be subdivided into two parcels with a 4 acre parcel and 6 acre parcel. Access to the 4 acre parcel is from a pan handle road from 165<sup>th</sup> Street. A single family residence is currently located on the west portion of the parcel. A surveyed tentative subdivision plan showing the proposed subdivision (Lots 8 & 9) is as follows:

*Figure 2 – Portion of Real Property Report of Site*



According to the Surface Materials of the Calgary Urban Sheet: Calgary Sheet (Moran, ARC, 1986), strata immediately underlying the site consists of clays of the Lochend unit that were deposited under lake conditions. According to water well records in the area this unit is approximately 10 m thick. No aquifers are believed to be present in this unit and the presence of this unit is favourable as it serves as a confining layer which can prevent contaminants (such as septic field effluents) from moving down into underlying aquifers.

Underlying these unconsolidated units are sandstones, siltstones and shales of the Paskapoo Formation. This formation has recently been described in the ERCB/AGS Bulletin 66 (Geostatistical Rendering of the Architecture of the Hydrostratigraphic Units within the Paskapoo Formation, Central Alberta, August



2012). The Paskapoo Formation is approximately 250 m thick in the area and serves as the aquifer supply to water wells.

Aquifers within this formation are generally found with sandstone bodies. These sandstone bodies consist of river channel fill deposits, or overbank flood deposits. Frequently several channel fill deposits can be stacked on top of each other, forming thick sandstones. Many of the wells obtain water from individual sandstone channels that are separated by shale intervals.

In the area the Paskapoo Formation consists of a unit called the Lacombe Aquitard, which generally contains less sandstone channels than parts of the Paskapoo Formation in other areas, although locally the sandstone bodies appear to be quite well developed. Fracturing may be present in some of the sandstones that aid in the productivity of the aquifer.

A report entitled Regional Groundwater Assessment for Rockyview County, prepared for Agriculture and Agri-Food Canada, has split the Lacombe Aquitard into several units with the uppermost unit consisting of the Dalehurst Aquifer which is underlain by the upper Lacombe and lower Lacombe aquifers. Yields within these units in the area are usually relatively good, on the order of 1.5 – 10.5 imperial gallons per minute with several wells in the area capable of supplying water in excess of 15 imperial gallons per minute.

According to the Regional Groundwater Assessment, the water quality is moderate with a total dissolved solids concentration ranging around 1000 mg/L. High iron content may be found and should be tested and evaluated within each well.

### **Water Wells and Groundwater Usage in Area**

The Alberta Environment water well database shows that approximately 100 wells have been installed within 1 km of the site indicating a relatively high amount of groundwater usage. Well depths range from 25 – 100 m, but most wells are less than 60 m deep. Over 95% of the wells are used for domestic purposes with some wells used domestic and stock usage.

Initial well yields range from 3.5 – 60 imperial gallons per minute, but most wells yields are within the range of 3 – 15 gallons per minute, indicating that moderate aquifers are generally encountered. No dry holes are located in the area, showing that a relatively high chance of obtaining a groundwater supply is assured.

A review of Alberta Environments water license and registration database was undertaken to determine large users of groundwater. A search of license and registrations of the subject section and 8 adjoining sections was undertaken. The following table summarizes licenses and registrations:

Table 1 - Licenses and Registrations

Section	Registrations	Licenses
13 – 24 – 3W5	1	Springshire 9 acre-feet – municipal Springgate 7 acre-feet – municipal
14 – 24 – 3W5	1	--
15 – 24 – 3W5	--	--
22 – 24 – 3W5	--	--
23 – 24 – 3W5	--	Potts 2 acre-feet – municipal Hyhill Land 3 acre feet – municipal
24 – 24 – 3W5	--	Culleen Creek 5 acre-feet – municipal Poplar View 8 acre feet – municipal
25 – 24 – 3W5	1	--
26 – 24 – 3W5	2	Mountain View Lutheran 0.8 acre-feet – institutional
27 – 24 – 3W5	--	Springview Water Coop 2 acre-feet – municipal

The registrations are for a maximum amount of 6250 m<sup>3</sup>/year and are not specified to be from surface water or groundwater. The water licenses are generally for small subdivisions residential water supply. Moderate amount of groundwater use in the area is indicated based on the water well and water license records.

### Water Well Testing

More detailed determination of aquifer capability was undertaken by examining the water well drillers reports in the area. Well records that had pumping test records (as opposed to an air test) were utilized to determine aquifer parameters such as transmissivity and available head.

Seventeen water well drilling reports were found with suitable pumping test records. The pumping test data was analyzed with the aid of the AQTESOLV computer program developed by Hydrosoft Inc. A confined radial flow model was used to represent aquifer conditions. These values were used to calculate the 20 year safe yield of the well by utilizing the Cooper and Jacob non-equilibrium equation:

$$Q_{20} = \frac{TH}{0.183} / \log(2.25 T \times t / r_w^2 \times S) \times 0.7$$

Where

$Q_{20}$	=	20 year safe yield
$H$	=	Available Head (- from well measurements)
$T$	=	Transmissivity (calculated from pump test)
$S$	=	Aquifer Storativity ( $5 \times 10^{-5}$ , estimated)
$t$	=	Time (20 years or 7305 days)
$r_w$	=	Well bore radius (0.0825 m)

0.7 = Safety factor

A summary of the results is as follows:

**Table 2 - Aquifer parameters**

Section / Owner	Location	Well ID	Aquifer Zone - feet	Available Head - m	Hydraulic Conductivity – m <sup>2</sup> /day	Q20 m <sup>3</sup> /day
Longway	SW - 26	349841	57 - 86	4.6	398	527
Moddle	4 - 24	386023	75 - 80	12.8	277	1033
Davis	6 - 25	386048	76 - 100	4.9	1803	994
Davis	6 - 25	386086	94 - 120	11	180.3	586
Springside	NW - 24	389039	40 - 48	8.5	426	1040
Grimshaw	SE - 26	469213	111 - 140	15.5	7	36
Pasternak	SW - 26	1020661	77 - 79	11	4	14.9
Edwards	NE - 23	1021015	153 - 189	19.2	42	251
Huchman	SE - 27	10212185	171 - 215	22.2	44.8	308
Huchman	SE - 27	1021206	175 - 194	21.6	16.1	112
Huchman	SE - 27	1021207	43 - 68	6.1	13.3	26.3
Clark	5 - 25	1021894	92 - 110	11.6	6.2	24
Longway	4 - 26	1022267	65 - 70	10.4	12.7	42.9
Branacaccio	15 - 23	1022423	61 - 87	4.3	57.5	19.0
Doan	SE - 27	1240029	182 - 196	23.8	14.4	111
Kiddel	6 - 26	1725010	71 - 92	15.2	6.5	32.9

Flow rates range from 1033 m<sup>3</sup>/day to 14.9 m<sup>3</sup>/day (158 – 2.3 imperial gallons per minute) with an average rate of 346 m<sup>3</sup>/day (53 gallons per minute). These are relatively high values and show that generally wells in the area are capable of supplying necessary water needs for both individual subdivisions and licensed community supplies.

It is observed that generally the shallower aquifers (depths less than 100 feet) are more productive. This is frequently observed as shallower sandstones can be quite permeable than lower ones, likely due to a combination of fracturing, compaction and cementation effects. However if shallow aquifers are not encountered a high chance of encountering a suitable aquifer at moderate depths (100 – 200 feet) still exists.

### Water Level Trends

The static water level at the time of drilling of each well was examined to determine whether indications of aquifer dewatering are occurring. Due to the range of well depths, three intervals were examined (less than 100 feet, 100 – 200 feet, greater than 200 feet). A table illustrating the changes are as follows:

**Table 2 Water level changes with time**

Decade / Depth	Less than 100 feet	100 – 200 feet	Greater than 200 Feet
<b>1960's</b>	33 N = 2	47.5 N = 2	200 N = 1
<b>1970's</b>	47 N = 9	79 N = 10	157 N = 3
<b>1980's</b>	34 N = 2	72 N = 11	99 N = 7
<b>1990's</b>	44 N = 11	61 N = 8	--
<b>2000's</b>	36 N = 4	74 N = 3	104 N = 3
<b>2010's</b>	42 N = 2	27 N = 3	--

As expected deeper wells generally show deeper average static water levels. No trends in the data with time is observed and indications of aquifer dewatering do not appear to be occurring.

### Water Quality

A water quality analysis report was collected from the Alberta Environment database for a well in 13 – 22 – 24 – 3W5. This analysis should be representative of the general groundwater quality in the area. A copy of the chemical analysis report is attached in Appendix 2. A summary of the results is as follows:

**Table 3 - Water Quality Analysis**

Parameter	Result	Drinking Water Quality
Lab pH	7.90	6.5 – 8.5
Lab Electrical Conductivity	1820	
Calcium	84	
Magnesium	35	
Sodium	305	200



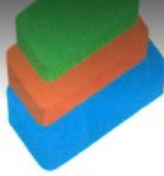
Potassium	4.7	
Iron	3	0.3
Manganese	-	0.05
Chloride	2	250
Fluoride	0.19	1.5
Nitrate	< 0.05	10
Sulfate	575	500
Bicarbonate	500	
Total Dissolved Solids	1252	500
Total Coliforms	N.A.	< 1
E. coli bacteria	N.A.	< 1

All results in mg/L except conductivity in  $\mu\text{S}/\text{cm}$  coliform in CFU/100 ml and pH in pH units. N.A. = Not Analyzed

The results show that the groundwater is a sodium sulphate type water of moderate Total Dissolved Solids concentration. Treatment for iron may be required. Lowering of the total dissolved solids concentration by reverse osmosis or distillation will likely be required by many users.

It would be expected that water quality from a well in the subdivision would be somewhat different, and it is recommended that water quality samples be collected from each supply well and analyzed for treatment that may be required.





# Groundwater Information Technologies Ltd.

## Phase II – Groundwater Supply Evaluation

### Residential Subdivision Development

**NW – 23 – 24 – 3W5**

**Well ID 9546362**

Prepared For:

Ryan Buckley

243206 Range Road 32

County of Rocky View

Prepared By:

Groundwater Information Technologies Ltd.

Ken Hugo, P.Geol.

APEGA P 12077



Alanna Felske, MSc, GIT

January 24<sup>th</sup>, 2019

File No: 19 – 1612

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#44, 2110 – 41 Avenue NE, Calgary, Alberta T2E 8Z7  
403-250-3518



## Executive Summary

A pumping test was undertaken on a newly installed water well within a proposed subdivision in NW – 23 – 24 – 3W5 to determine if the aquifer underlying the site can provide water at a sustained rate of at least 3.5 m<sup>3</sup>/day, for an annual volume as defined in the Water Act, of 1,250 m<sup>3</sup>.

The well obtains its water from a bedrock sandstone aquifer at depths of 9.5 – 16.2 meters below ground. No direct connection with surface water is believed to be present and clays and shales overlying the aquifer should aid in preventing surface water contaminants, such as septic field effluents, from migrating to the aquifer, however due to the relatively shallow nature of the well all setbacks from septic fields should be observed in future development.

A pumping test was conducted on the well in January of 2019 by personnel from TITAN Water Systems. The supply well was pumped at a rate of 5 imperial gallons per minute or 22.7 liters per minute for a period of 1459 minutes. Water levels were measured for an additional 1441 minutes following pumping cessation.

A 20-year safe yield of 156.7 m<sup>3</sup>/day (23.9 imperial gallons per minute or 57,218 m<sup>3</sup>/year) was calculated. This value is in excess of the 1,250 m<sup>3</sup> per year as required by the Water Act and shows the well can supply the necessary amount of water.

No adverse effects to existing domestic, licensed or traditional agricultural groundwater users should result due to production of water from this well for domestic purposes.

The groundwater from the well is a calcium bicarbonate type of moderate salinity (TDS = 735 mg/L). The analysis of water from the well indicates the supply is suitable for human consumption and use without treatment.

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**List of Appendices**

Appendix A – Subdivision Map

Appendix B – Water Well Drilling Report

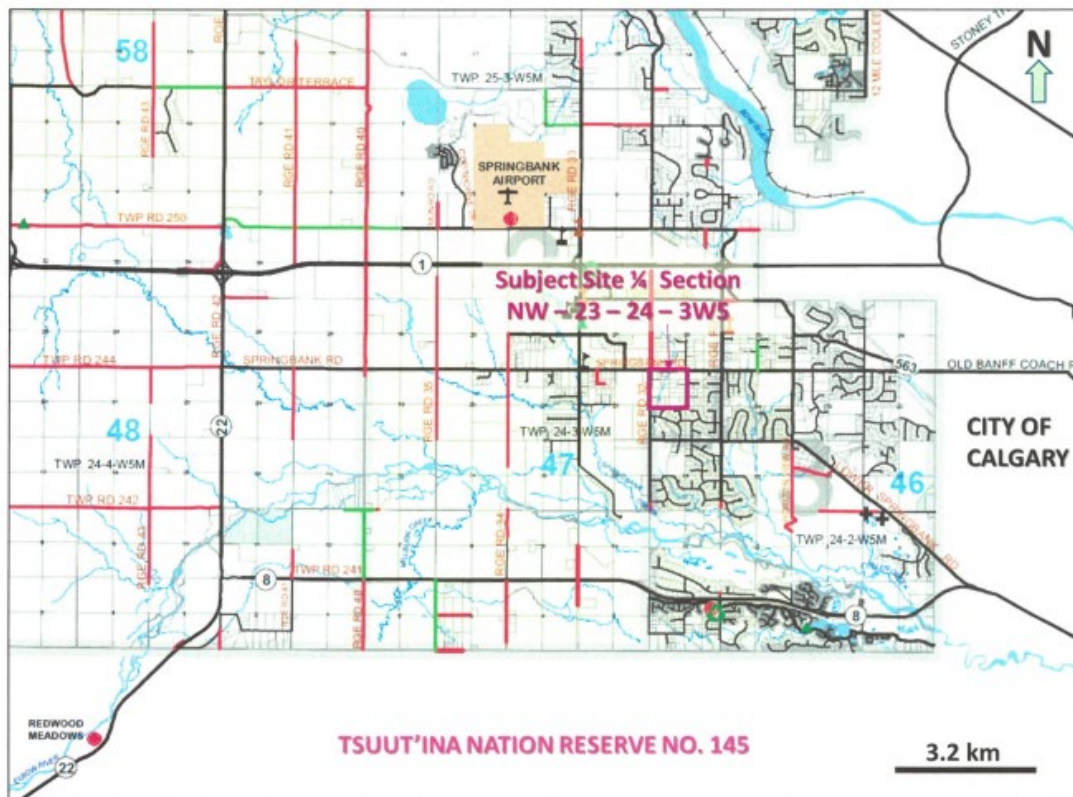
Appendix C – Water Chemistry Report



### [1.0] Introduction

An aquifer analysis was undertaken for a residential supply well located on a proposed 4.0-acre parcel subdivision in the NW quarter section of 23 – 24 – 3W5 to determine if the well could provide water at a rate of 1,250 m<sup>3</sup>/year without causing adverse effects to existing groundwater users. The site is located within Rocky View County, Alberta. A portion of the Rocky View County land map showing the site ¼ section location is as follows:

Figure 1: Rocky View County land map and quarter section location



The new proposed 4.0-acre subdivision will be supplied by an individual well located on the proposed parcel. This report is to determine whether a newly installed well (GIC well ID # 9546362) on the proposed subdivision is capable of supplying water for a residence.

The location of the well was measured by personnel from Groundwater Information Technologies Ltd. using a handheld Garmin 64s GPS device and is at: 51.064461° N, -114.324642° E.

A site plan of the proposed subdivision showing the well location is as follows:





Figure 2: Air photo with well location



Additional subdivision boundary information is included in Appendix A.

## [2.0] Water Well Supply Needs

The well is proposed to be for a single lot residential use. According to the Water Act each residential lot is entitled to water at a rate of 1,250 m<sup>3</sup> annually.

## [3.0] Site Description

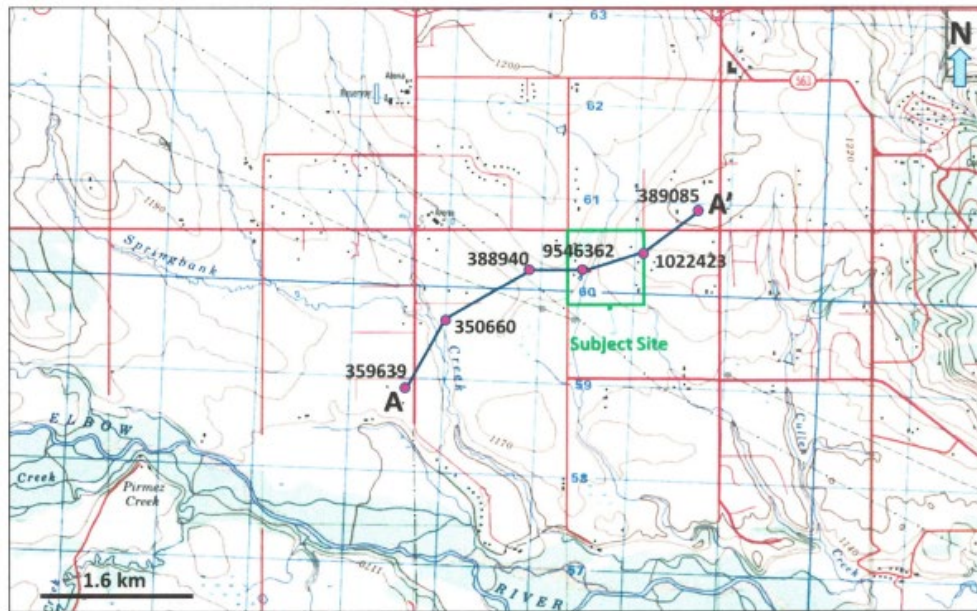
### [3.1] Topography

The site is located 5.6 km west of the City of Calgary and is in a predominantly residential area with a moderate to high density of residential acreages scattered around the site and within the subject site quarter section.



The site is located at an approximate elevation of 1,170 meters above sea level. The site is close to several surface waterways. The Bow River is located 5 km to the northeast of the site and is at an approximate elevation of 1,091 m asl or 79 m below the site. Springbank Creek is located 2.4 km to the south of the site and is at an elevation of 1,055 m asl or 115 meters below the site. The Elbow River is located 2.6 km to the south of the site and is at an elevation of 1,137 m asl or 33 meters below the site. An unnamed coulee is located 100 meters southeast of the site and is at an approximate elevation of 1,167 meters or 3 meters below the site. A topographic map with the subject site quarter section is shown as follows:

**Figure 3: Topographic map with quarter section and geologic cross section location**



An additional map with detailed site topography is included in Appendix A.

### [3.2] Surficial geology

According to the Alberta Research Council Map 204 entitled "Surface Materials of the Calgary Urban Area: Calgary Sheet NTS 82-O/1" (S.R. Moran, 1986) the area is interpreted to be silts and clays of the Lochend drift which was deposited in an offshore lacustrine (lake) environment. Local topography is characterized by low to moderate-relief hummocky terrain as a result of original deposition on stagnant ice followed by subsequent ice melting.

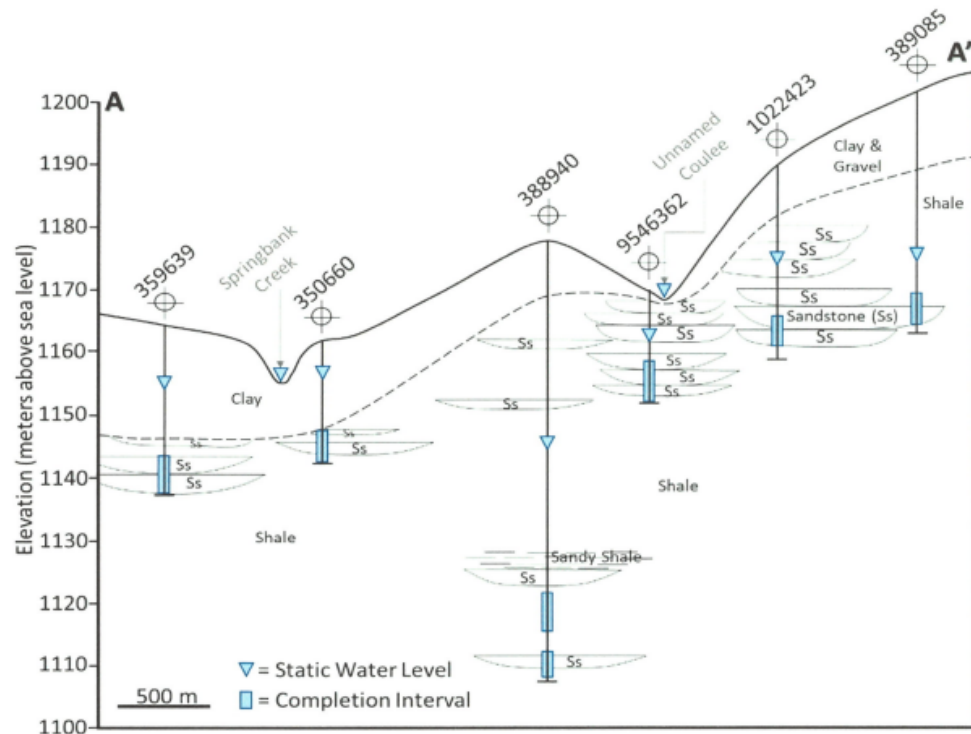
According to area Water Well Drillers Reports the surficial sediments, consisting of clay and gravel till, are approximately 7 to 17 meters thick and underlain by sandstone and shale bedrock. No useable aquifers are believed to exist within these upper deposits. The presence of the shale and clays is favourable in preventing contamination from surface source (such as septic field effluent) from entering lower aquifers.

### [3.3] Bedrock Geology

Wells in the area are likely completed within strata belonging to the Dalehurst Member of the Paskapoo Formation. The Dalehurst Member is comprised mostly of shale and siltstone with lesser interbedded sandstone, bentonite and coal seams. The target aquifers are sandstone channel deposits or silty-sand deposits from along the margin of fluvial settings. When several channels are stacked on top of each other then an exceptional aquifer can be found, but often sufficient water is obtained from individual sandstone aquifers separated by shale units.

A cross section was constructed in Figure 4 using water well records from the area to show relative thickness of surficial quaternary deposits and depth to bedrock, as follows:

**Figure 4. Geologic Cross Section A – A'**



Much of the Dalehurst Member consists of shale with less prolific fluvial sandstone channel aquifers that are relatively isolated from each other by the shale overbank deposits. Water levels generally follow surface topography and most do not correlate with each other, indicating wells are producing from aquifer units which are not hydraulically connected to one another. The water level in the wells also do not correspond to the surface water levels found in Springbank Creek or the unnamed coulee near the site, suggesting the wells produce from confined aquifers which are not in hydraulic connection to these surface water bodies.





#### [4.0] Area groundwater users

The Alberta Environment and Parks (AEP) water well database lists 126 wells within a 1.6 km (1 mile) radius of the pumping well. The majority of these wells are for domestic purposes, with 7 wells also dedicated to stock watering. Well depths range from 14 – 122 meters with most wells on the order of 20 – 35 m deep. Initial static water levels in the area range from 5 – 34 metres below the top of casing.

A search of AEP water licence database was undertaken for the subject section and adjoining 8 sections to determine if any water licences are present in the area. A summary of ground water licences and registrations in the area is as follows:

**Table 1: Groundwater licenses and registrations**

Location	Registrations	Licenses	Volume (m <sup>3</sup> /year)	Production Zone	Licensee
SW – 13 – 24 – 3W5	1	2	10,911 8,638	25.9 – 31.1 25.9 – 28.3	Springshire Water Supply Ltd. Springate Water Co-op Ltd.
14 – 24 – 3W5	1	-	-	-	Glenview Stables Ltd.
SW – 15 – 24 – 3W5	-	1	66,608	1.5 – 3.7 2.4 – 4.0 1.8 – 3.4 2.4 – 4.0	Calalta Waterworks Ltd.
16 – 23 – 24 – 3W5	-	1	2,273	106.7 – 117.0	Donald A. Potts
4 – 23 – 24 – 3W5	-	1	4,546	21.3 – 27.4 11.6 – 13.7	Murray Acres Estates Ltd.
7 – 24 – 24 – 3W5	-	1	6,819	12.8 – 16.8	Cullen Creek Estates Utility Co. Ltd.
11 – 24 – 24 – 3W5	-	1	9,092	12.2 – 16.5	Poplar View Utilities Ltd.
25 – 24 – 3W5	1	-	-	-	M. Gordon Bryan
16 – 26 – 24 – 3W5	2	1	909	67.1 – 79.2	Mountain View Lutheran Church
11 – 27 – 24 – 3W5	-	1	2,273	21.3 – 26.5	Springview Water Co-op Ltd.

Licences for surface waters withdrawals were not included in the Table 2 summary. Nine groundwater licenses were found in the area for a maximum extraction of 112,069 m<sup>3</sup> per year. Note that the italicized groundwater license, for Calalta Waterworks Ltd., produces from very shallow wells and essentially directly divert surface water from the Bow River so they would not be in direct competition for the bedrock groundwater resources targeted by other users. The total licensed diversion for bedrock groundwater resources is 45,461 m<sup>3</sup>/year. The groundwater use in the area can be described as moderate, consisting largely of subdivision water supply co-operatives.



## [5.0] Pump Test

### [5.1] Supply well details

The production well was installed on site January 11, 2019 by personnel from Aquaclear Drilling Inc. The supply well location is shown in Figure 2, and the well's details are summarized in Table 2. The Water Well Drilling Report is attached in Appendix B.

**Table 2: Supply well details**

Well	Production Well
GIC Well ID	9546362
GPS Location	51.064461° N, -114.324642° E
Well depth (m)	16.8
Aquifer zone(m)	9.5 – 16.2
Screened Interval (m)	10.7 – 16.8
Surface Casing (m)	+0.6 – 5.5
Static water level after installation (m)	8.03

### [5.2] Details of the pumping test

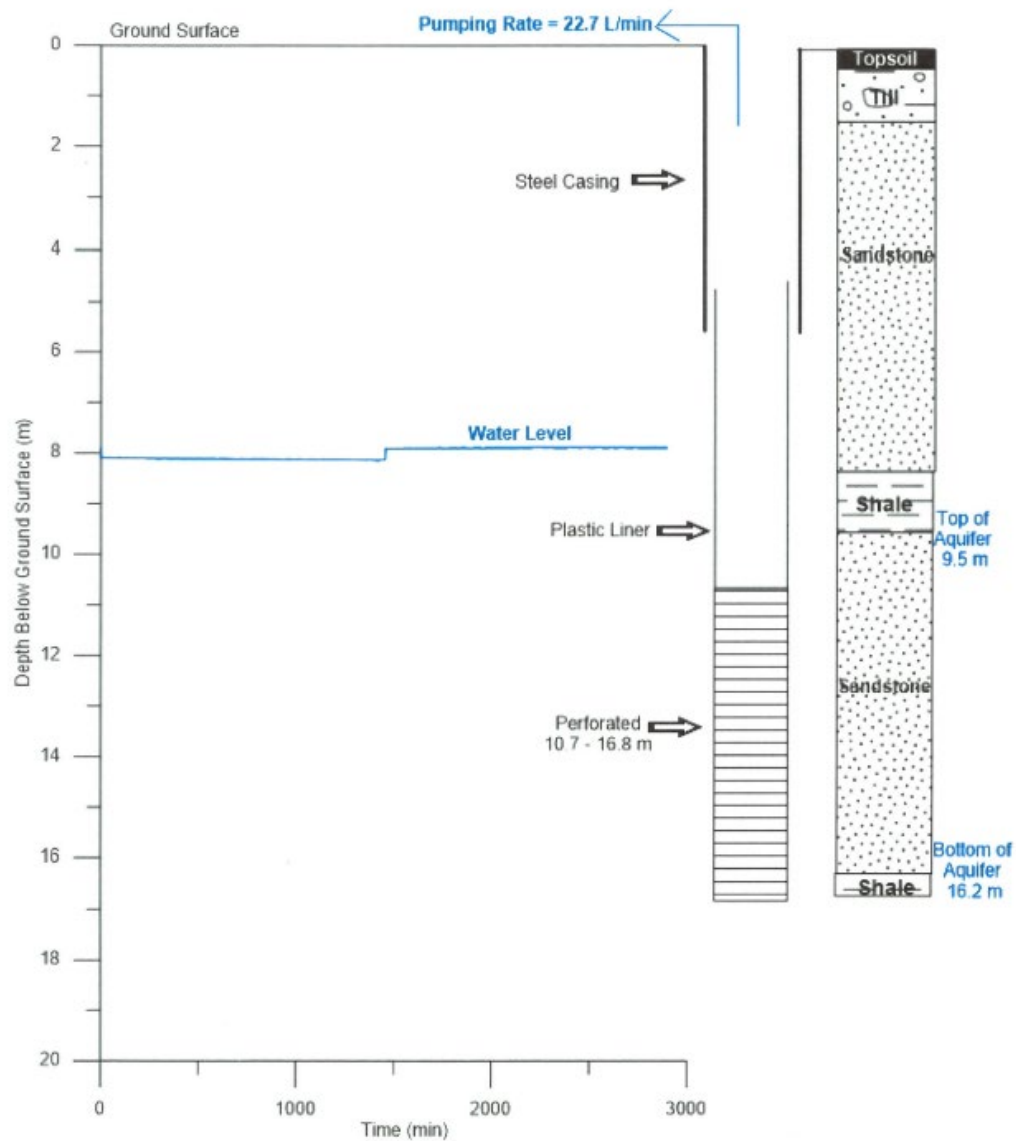
The pumping test was conducted January 14 – 16, 2019 by personnel from TITAN Water Systems Inc. The supply well was pumped at a rate of 5 imperial gallons per minute (igpm) or 22.7 liters per minute (L/min) for a period of 1459 minutes. Water levels were measured for an additional 1441 minutes following pumping cessation.

A graph showing water levels with time and a schematic of the well construction and strata of the supply well is as follows:





Figure 5: Pumping well schematic and water levels



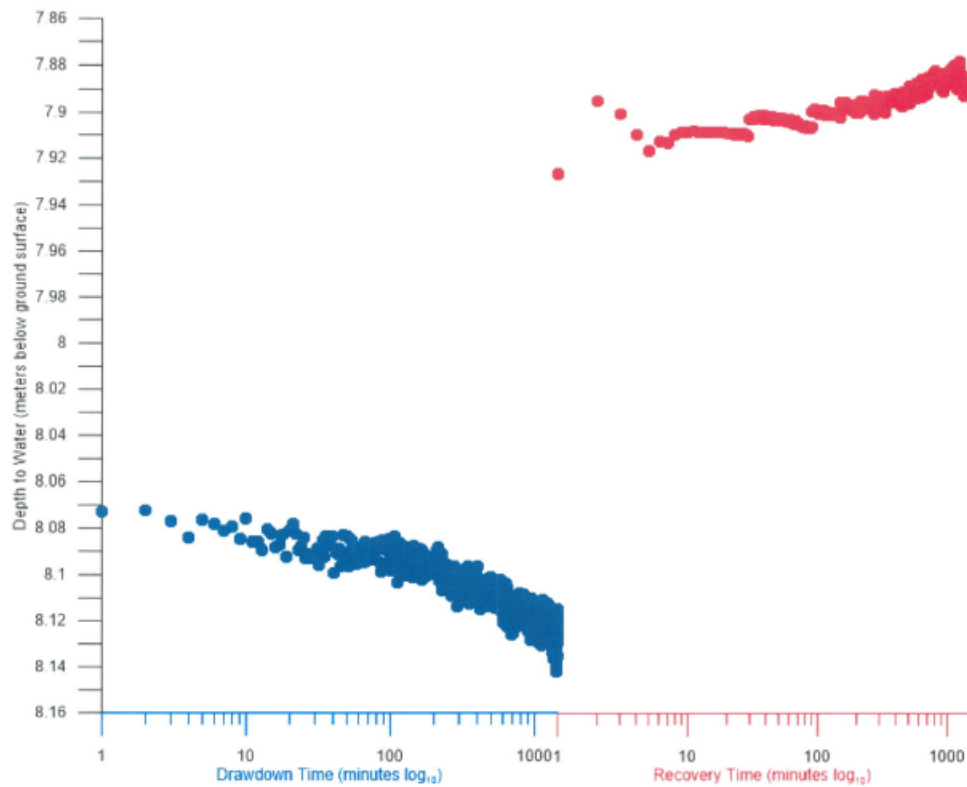
The well had an initial static water level 7.91 metres below the top of the well casing (btoc) prior to pumping and drew down 0.22 metres to 8.13 metres btoc by the end of the pumping period. Water levels built up to 7.89 metres at the end of the buildup period for a recovery of 91%.

**[5.3] Pumping Test Interpretation**

A productive well is indicated by the low amount of drawdown given the moderate pumping rate.

A dual semi-log graph of the pumping test data is shown in Figure 6 to illustrate the water level data during the pumping test more clearly.

**Figure 6: Dual semi-log graph of drawdown and recovery in the pumping well**

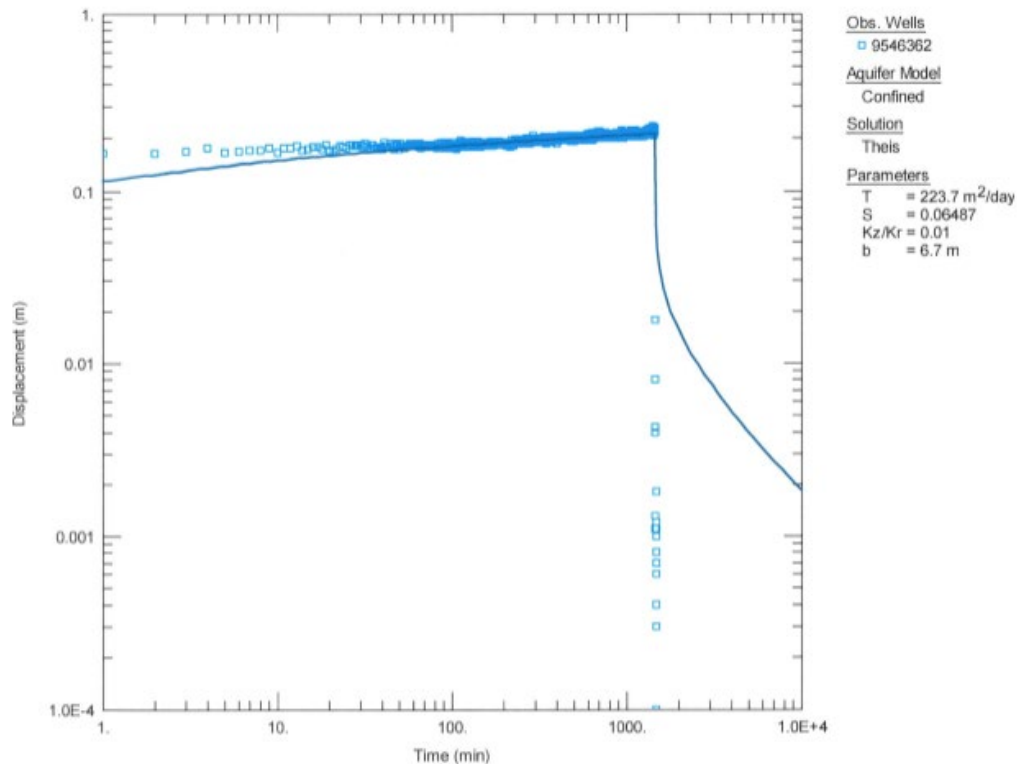


The rate of drawdown starts to stabilize after approximately 100 minutes of pumping and the slope of the drawdown curve is relatively shallow. The recovery curve shows the water level in the well returns rapidly to near static conditions once the pump is turned off. Both these curve forms indicate the aquifer is highly conductive and that the current well is likely placed near the center of the aquifer and not near the edges, where flow could be impacted by aquifer thinning and/or a reduction in aquifer quality.

The thickness of the data curve, especially the drawdown (blue) curve, reflects the resolution of the data logger with the variation observed due to data logger noise over this relatively short reading interval.

The pumping test data was interpreted with the aid of the AQTESOLV program developed by Hydrosoft Inc. The Theis solution method was used for a confined aquifer with radial groundwater flow. A graph showing water level displacement with time and a fitted curve is as follows:

**Figure 7: Theis solution fit to pumping test data**



A relatively good fit to the curve is observed, with some deviation at early time, likely due to wellbore storage. A transmissivity of 223.7 m<sup>2</sup>/day is calculated indicating a highly productive well.

#### [5.4] Well yield

The twenty-year safe yield of the well ( $Q_{20}$ ) can be calculated using the modified Moell method as suggested in Alberta Environments Guide to Groundwater Authorization (March 2011) as follows:

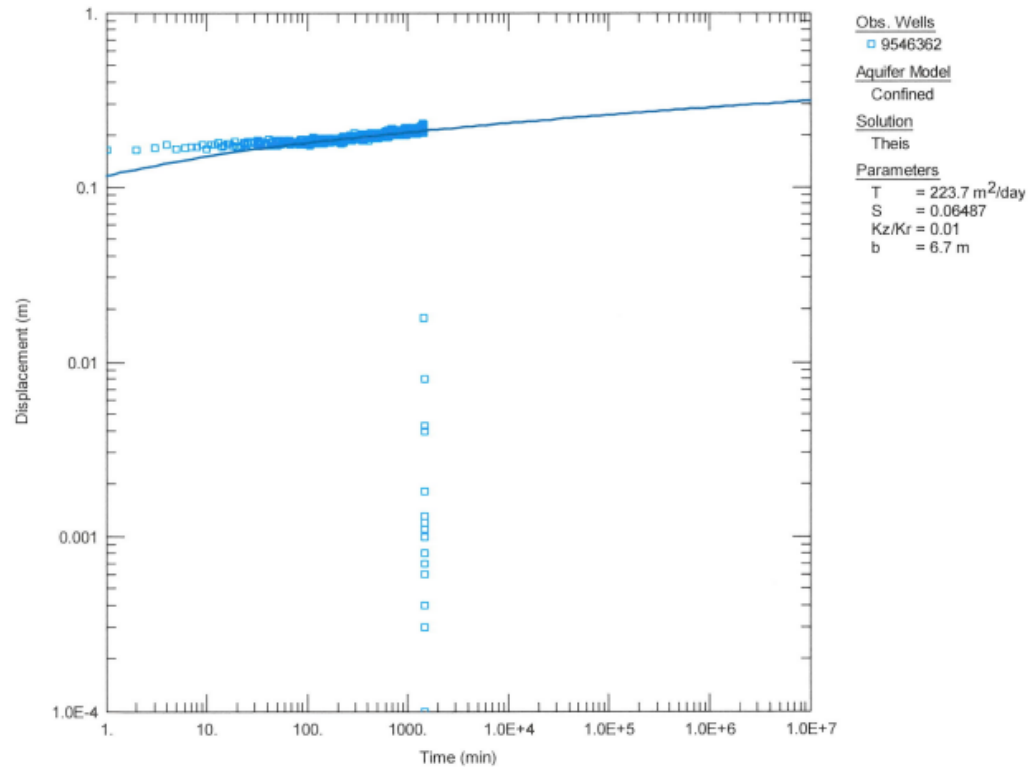
$$Q_{20} = \frac{(0.7 * Q * H_a)}{S_{100min} + (S_{20yrs} - S_{100th})}$$

Where

Q	-	Pump test flow rate 32.7 m <sup>3</sup> /day (22.7 litres/min)
H <sub>a</sub>	-	Available Head = 2.19 m
S <sub>100 min</sub>	-	Observed drawdown at 100 minutes (0.19 m)
(S <sub>20yrs</sub> – S <sub>100 th</sub> )	-	Difference between drawdown at 20 years and 100 min (0.32 – 0.19 m = 0.13 m)
0.7	-	Safety factor

The theoretical 20-year drawdown is determined by extrapolating the Theis solution curve as follows:

Figure 8: Theis solution modeled to 20 years of pumping



Substituting in the above values a 20-year safe yield ( $Q_{20}$ ) of 156.7 m<sup>3</sup>/day (23.9 imperial gallons per minute or 57,218 m<sup>3</sup>/year) is calculated. This safe yield value is in excess of the 1,250 m<sup>3</sup>/year diversion required for the residential acreage and shows that the well is capable of supplying the necessary amount of water.

**[6.0] Effect on water levels****[6.1] Existing users**

Using the Cooper-Jacob equation the expected drawdown in the aquifer at various time and distances due to pumping of the well can be calculated by the following formula:

$$s = \frac{(0.183 * Q)}{T} \times \text{Log} \left( \frac{2.25 * T * t}{r^2 S} \right)$$

Where

s	-	Drawdown (m)
S	-	Storativity ( $5.0 \times 10^{-5}$ )
Q	-	Licensed Pump Rate ( $3.5 \text{ m}^3/\text{day}$ )
T	-	Transmissivity ( $223.7 \text{ m}^2/\text{day}$ )
t	-	Time (days)
r	-	Radial distance from pumping well (m)

A table showing water level drawdown with distance as a function of time and distance is as follows:

**Table 3: Cooper-Jacob distance drawdown matrix**

Distance (m)/ Time (days)	Well	100	300	500	1000	1600	3000
1	0.03	0.01	0.01	0.00	0.00	0.00	0.00
7	0.03	0.01	0.01	0.01	0.01	0.00	0.00
30	0.03	0.01	0.01	0.01	0.01	0.01	0.00
365	0.03	0.02	0.01	0.01	0.01	0.01	0.01
1826	0.04	0.02	0.02	0.01	0.01	0.01	0.01
3652	0.04	0.02	0.02	0.01	0.01	0.01	0.01
7305	0.04	0.02	0.02	0.02	0.01	0.01	0.01

The following assumptions were included in the above calculation: No recharge is occurring, and all wells are screened over the same aquifer. From this table, we can infer that the most a neighboring well (< 300 m) in the same aquifer will experience in additional drawdown will be less than 1 meter over a 20-year pumping period.

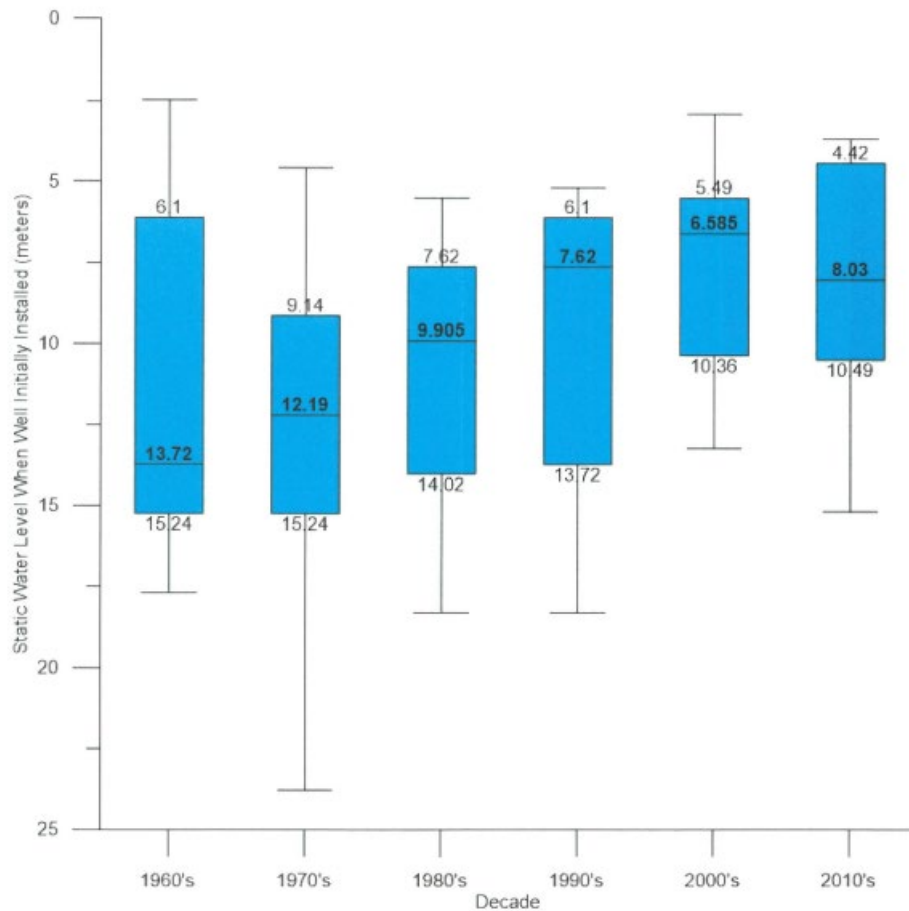
The available head in the pumping well is 2.19 meters. The additional drawdown in the well of less than 1 meter after 20 years of pumping would not hinder the wells performance.



**[6.2] Changes in Water Levels versus time**

Water level data from when the wells were installed was collected from the water well database to illustrate trends in water level and determine if declining water levels are apparent. Wells within 1.6 km of the site that had water levels and were completed to depths of 14 – 35 m were examined.

A box plot showing average depth to water and range of values with time is illustrated as follows:

**Figure 9: Water levels with time**

Average static water levels in groundwater wells appear to increase from the 1960's through to the 2000's. Average water levels decreased slightly into the 2010's, but in general water levels in the area appear to be relatively constant with few major shifts. In the 1970's and 1990's, 24 wells were drilled in each decade, but it does not seem to have resulted in noticeable impacts on groundwater levels.



### [7.0] Water Quality

Water samples were obtained for water quality assessment from the supply well by personnel from TITAN Water Systems on January 14, 2019. The samples were collected into the appropriate containers and delivered to Kaizen Lab on January 18, 2019 for analysis. The water analysis report from Kaizen Lab is attached in Appendix C and a summary of the results, with a comparison to drinking water quality standards is as follows:

**Table 4: Water chemistry summary**

Parameter	Well ID 9546362	Drinking Water Limits
Lab pH	7.7	7.0 – 10.5
Lab EC	1240	
<b>Analyte/Parameter</b>		
Total Alkalinity	446.7	
Bromide	<0.1	
Calcium	102.9	
Magnesium	59.4	
Manganese	0.0035	0.05 (AO)
Sodium	68.5	200 (AO)
Potassium	8.8	
Phosphate	<0.1	
Chloride	75.4	250 (AO)
Nitrate	5.654	10 (MAC)
Sulfate	122.7	500 (AO)
Fluoride	<0.1	1.5 (MAC)
Iron	0.042	0.3 (AO)
Bicarbonate	544.7	
Total Dissolved Solids	735	500 (AO)

All results in mg/L (ppm) except pH in pH units, electrical conductivity in  $\mu\text{S}/\text{cm}$ .

The water is a calcium bicarbonate type with a moderate concentration of salts (TDS = 735 mg/L). The aesthetic objective for TDS is exceeded so the water may taste slightly off to the consumer but most users would likely find the taste acceptable. The water analysis shows that water produced from this aquifer is suitable for the intended use.



**Appendix A**  
**Subdivision Map**  
**Topographic Map**

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Information as depicted is  
subject to change, therefore  
Rocky View County assumes  
no responsibility for discrepancies  
after date of printing.



Printed: Feb 24, 2015







## **Appendix B**

### **Water Well Drilling Report**

# BUCKLEY CONCEPTUAL SCHEME



## Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GIC Well ID 9546362  
GoA Well Tag No.  
Drilling Company Well ID  
Date Report Received 2019/01/18

GOWN ID

Well Identification and Location										Measurement in Metric	
Owner Name RYAN BUCKLEY		Address P.O. BOX 96061 PRO WEST SPRINGS			Town CALGARY		Province ALBERTA	Country CANADA	Postal Code T3H 0L3		
Location	1/4 or LSD NW	SEC 23	TWP 24	RGE 3	W of MER 5	Lot 8	Block	Plan	Additional Description		
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)					Elevation _____ m	
					Latitude 51.063251 Longitude -114.321444					How Elevation Obtained	
					Not Verified 51.0637348, -114.3247172					Not Obtained	

Drilling Information	
Method of Drilling Rotary - Air	Type of Work New Well
Proposed Well Use Domestic	

Formation Log			Measurement in Metric	Yield Test Summary			Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description		Recommended Pump Rate	36.37 L/min		
0.30		Topsoil		Test Date	Water Removal Rate (L/min)	Static Water Level (m)	
1.52		Till		2019/01/11	68.19	8.03	
8.23		Brown Sandstone					
9.45		Gray Shale					
16.15	Yes	Gray Sandstone					
16.76		Gray Shale					

Well Completion				Measurement in Metric
Total Depth Drilled	Finished Well Depth	Start Date	End Date	
16.76 m	16.76 m	2019/01/11	2019/01/11	
<b>Borehole</b>				
Diameter (cm)	From (m)	To (m)		
19.76	0.00	5.49		
15.70	5.49	16.76		
<b>Surface Casing (if applicable)</b>				
Steel	Well Casing/Liner		Plastic	
Size OD: 16.81 cm	Size OD: 12.67 cm			
Wall Thickness: 0.478 cm	Wall Thickness: 0.318 cm			
Bottom at: 5.49 m	Top at: 4.57 m			
Bottom at: 16.76 m				
<b>Perforations</b>				
From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval (cm)
10.67	16.76	0.318	15.24	30.48
Perforated by: Saw				
<b>Annular Seal</b> Bentonite Chips				
Placed from 0.00 m to 5.49 m				
Amount 1.00 Bags				
Other Seals				
Type		At (m)		
<b>Screen Type</b>				
Size OD: _____ cm				
From (m)	To (m)	Slot Size (cm)		
Attachment				
Top Fittings		Bottom Fittings		
<b>Pack</b>				
Type		Grain Size		
Amount				

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well LEWIS PARKHOUSE	Certification No 4161Q

# BUCKLEY CONCEPTUAL SCHEME



## Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GIC Well ID 9546362  
GoA Well Tag No.  
Drilling Company Well ID  
Date Report Received 2019/01/18

GOWN ID

<b>Well Identification and Location</b>										<b>Measurement in Metric</b>	
Owner Name RYAN BUCKLEY		Address P.O. BOX 96061 PRO WEST SPRINGS			Town CALGARY		Province ALBERTA		Country CANADA		Postal Code T3H 0L3
Location	1/4 or LSD NW	SEC 23	TWP 24	RGE 3	W of MER 5	Lot	Block	Plan	Additional Description		
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)					Elevation	
_____ m from _____					Latitude 51.063251 Longitude -114.321444					_____ m	
_____ m from _____					How Location Obtained					How Elevation Obtained	
					Not Verified					Not Obtained	
<b>Additional Information</b>											
Distance From Top of Casing to Ground Level 60.96 cm											
Is Artesian Flow _____ Is Flow Control Installed _____											
Rate _____ L/min Describe _____											
Recommended Pump Rate 36.37 L/min Pump Installed _____ Depth _____ m											
Recommended Pump Intake Depth (From TOC) 15.24 m Type _____ Make _____ H.P. _____											
Model (Output Rating) _____											
Did you Encounter Saline Water (>4000 ppm TDS) _____ Depth _____ m Well Disinfected Upon Completion Yes											
Gas _____ Depth _____ m Geophysical Log Taken _____											
Submitted to ESRD _____											
Sample Collected for Potability _____ Submitted to ESRD _____											
Additional Comments on Well _____											

<b>Yield Test</b>			<b>Taken From Top of Casing</b>		<b>Measurement in Metric</b>	
Test Date 2019/01/11	Start Time 11:00 AM	Static Water Level 8.03 m	Depth to water level			
			Pumping (m)	Elapsed Time Minutes:Sec	Recovery (m)	
<b>Method of Water Removal</b>				0:00	15.24	
Type AIR				1:00	12.29	
Removal Rate 68.19 L/min				2:00	8.87	
Depth Withdrawn From 15.24 m				3:00	8.17	
				4:00	8.06	
				5:00	8.04	
If water removal period was < 2 hours, explain why _____						

<b>Water Diverted for Drilling</b>		
Water Source ALDERSIDE WATER STATION	Amount Taken 1136.52 L	Diversion Date & Time 2019/01/11 7:00 AM

<b>Contractor Certification</b>	
Name of Journeyman responsible for drilling/construction of well LEWIS PARKHOUSE	Certification No 4161Q



## **Appendix C**

### **Kaizen Lab Water Chemistry Report**

333 50th Ave. S.E.  
 Calgary, AB, T2G 2B3  
 Phone (403) 297-0868  
 Fax: (403) 297-0869



### ANALYTICAL REPORT

**TITAN Water Systems**  
 Complete Pumping & Filtration Solutions  
 www.titanwater.ca

Contact: Troy Niemans  
 Phone: (403) 601-0811  
 Email: troy@titanwater.ca

KaizenLAB #:	197629_001
SAMPLE INFO:	R. Buckley #9905 North Well
DATE SAMPLED:	14-Jan-2019
DATE RECEIVED:	18-Jan-2019
DATE REPORTED:	23-Jan-2019
LOCATION:	

Parameter Description	Units	Result	Canadian Drinking Water Quality Guidelines*
<b>Routine Water Potability Analysis for Titan Water Systems</b>			
pH		7.7	7.0-10.5 (AO)
Electrical Conductivity (EC)	uS/cm	1240	
Dissolved Calcium	mg/L	102.9	
Dissolved Magnesium	mg/L	59.4	
Dissolved Potassium	mg/L	8.8	
Dissolved Sodium	mg/L	68.5	200 (AO)
Chloride	mg/L	75.40	250 (AO)
Fluoride	mg/L	<0.10	1.5 (MAC)
Nitrate-N	mg/L	5.654	10 (MAC)
Nitrite-N	mg/L	<0.005	1 (MAC)
Nitrite-N + Nitrate-N	mg/L	5.654	
Phosphate	mg/L	<0.10	
Sulphate	mg/L	122.7	500 (AO)
Bicarbonate (as HCO <sub>3</sub> )	mg/L	544.7	
Carbonate (as CO <sub>3</sub> )	mg/L	<1.5	
Hydroxide (as OH)	mg/L	<0.5	
Alkalinity (total, as CaCO <sub>3</sub> )	mg/L	446.7	
Alkalinity (phenolphthalein, as CaCO <sub>3</sub> )	mg/L	<2.0	
Total Iron	mg/L	0.042	0.3 (AO)
Total Manganese	mg/L	0.0035	0.05 (AO)
Hardness (calculated, as CaCO <sub>3</sub> )	mg/L	501.3	
Sodium Adsorption Ratio		1.33	
Total Dissolved Solids (calculated)	mg/L	735	500 (AO)
Bromide	mg/L	<0.10	
Ion Balance	%	105.96	

\*CDWQG = Canadian Drinking Water Quality Guidelines, Health Canada 2008; MAC = Maximum Acceptable Concentration (affects health); AO = Aesthetic Objective (does not affect health but affects odor, taste, etc.).

< refers to less than the detection limit.  
 MPN = Most Probable Number of coliform bacteria

Note: The results in this report relate only to the items tested. Information is available for any items in 5.10.2 of ISO/IEC 17025 that cannot be put on a test report.

Final Review by:

Daniella Matthews



Appendix 2: Drainage Study



Groundwater Information  
Technologies Ltd.

Level Three PSTS Site Assessment  
Plan 911 1699, Lot 5  
NW – 23 – 24 – 3W5

Prepared For:

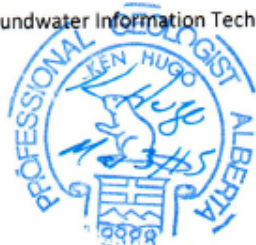
Ryan Buckley

243206 Range Road 32

County of Rockyview

Prepared By:

Groundwater Information Technologies Ltd.



Ken Hugo, P.Geol.

APEGA P12577

March 3, 2015

---

#44, 2110 - 41 Avenue NE, Calgary, Alberta T2E 8Z7

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## 2 EXECUTIVE SUMMARY

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A site investigation was undertaken at a proposed residential parcel located in NW – 23 – 24 – 3W5 to determine if the soil and groundwater conditions underlying the site are suitable for receiving effluent from a septic system. The investigation followed the Alberta Model Process for Septic Fields and consisted of a Level Three Assessment.

Two test pits were dug on the site to characterize the soil, collect soil samples for grain size analyses, and observe for groundwater levels in the pits.

The area is located in a relatively high uplands area with a slight (4%) gradient towards an intermittent creek drainage 50 m east of the parcel. There is currently one water well on the parent parcel, and none on the proposed subdivision parcel, and approximately 20 other residences with water wells and septic fields are located within 500 m of the site. No encumbrances were identified that would restrict the septic field site.

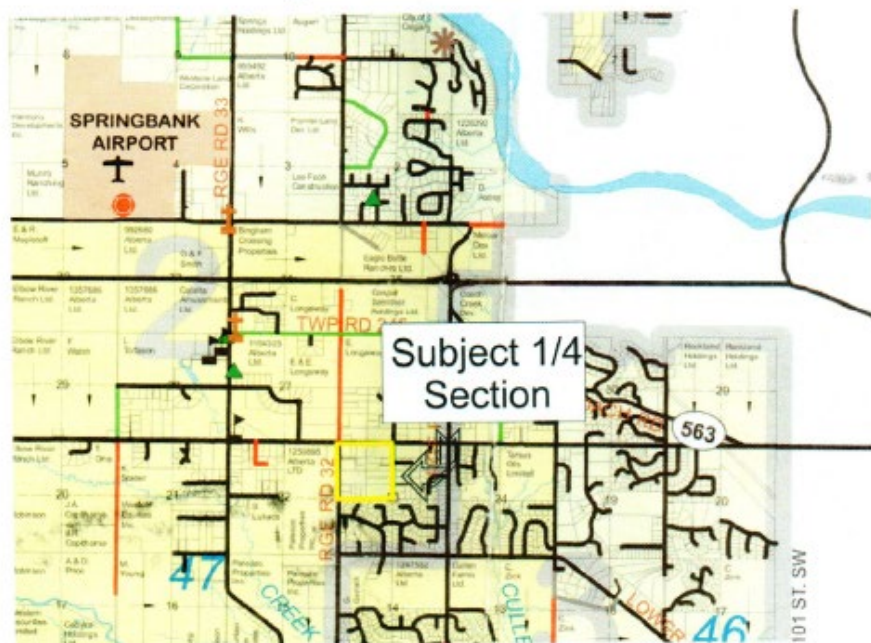
The area is underlain by a silty clay soil. The depth of this soil above bedrock is at least 4 m and likely on the order of 5 – 6 m in depth. Groundwater was observed at a depth of approximately 4 m in one test pit. The soil underlying the site consists of a silty clay that is interpreted to be a glacial lake deposit and shows a strong small blocky structure.

The site is suitable for treatment of effluent from septic systems by subsurface treatment. For effluent with a Biochemical Oxygen Demand (BOD) of 30 – 150 mg/L a loading rate of 6.9 litres per square meter per day is recommended. For secondary treated effluent with a BOD of less than 30 mg/L a loading rate of 9.8 litres per day per square meter is recommended.

### 3 INTRODUCTION

At the request of Ryan Buckley, a Level Three Private Septic Treatment System (PSTS) assessment was undertaken for a portion of land within the NW ¼ - Section 23 – 24 – 3W5 within Rocky View County. The purpose of the assessment is to determine if native subsurface conditions are suitable for a PSTS in the vicinity of the residence proposed for the subdivision. A portion of the Rocky View County map highlighting the subject quarter section is shown below.

Figure 1 – Rocky View County map



This report follows the format as described in the "Model Process for Subdivision Approval and Private Sewage (February 2001)". A site investigation, consisting of a review of existing information and a subsurface examination was conducted to evaluate the site. The subsurface investigation consisted of digging two pits in the proposed septic field area and examining the soil for strata characteristics and collecting soil samples for grain size analysis. Groundwater conditions were also observed in the soil strata and test pits.



## 4 SITE DESCRIPTION

### 4.1 SITE DRAWINGS

An air photo of the area indicating the site of the proposed septic field is as follows:

*Figure 2 - Air photo of area showing proposed septic field area and 2 m contours*



The site is part of an existing 10 acre parcel with a proposed 4 acre subdivision on the east side with a panhandle road accessing the site from Range Road 32.

No water wells are currently within the proposed lot. Water wells are present at the existing residence near the residence on the west parcel and other residences in the area obtain water from water wells. The closest well is in the parent parcel approximately 60 m from the proposed septic field site. Other wells are present in the area located at a distance of greater than 100 m from the septic field site.



#### 4.2 SITE CONDITIONS

According to Alberta Environment's and Sustainable Resource Developments (AESRD) water well database, approximately 24 wells are located within 1000 m of the site. These wells range in depth from 60 - 230 feet and obtain water from bedrock sandstones. The reconnaissance report from the water well database is attached as Appendix A. None of the wells obtain water from shallow sources and the water supply is not considered a GWUDI (groundwater under the direct influence) of surface water source.

The overall topography can be described as rolling with immediate drainage in the area towards the north. A hand held clinometer was used to determine that the slope in the area is approximately 4%. An unnamed intermittent creek drainage is located approximately 75 m east of the site with the creek flowing in a southward direction towards the Elbow River.

Vegetation at the site consists of a mixture of pasture, spruce and poplar trees. No indications of wetland plants were observed.

#### 4.3 DENSITY

One additional lot is proposed for the quarter section which currently consists of 20 residential subdivisions. All lots are 4 acres in size or larger and sufficient setbacks of the septic fields to residential houses or water wells should be able to be maintained.

No restriction of placement of a septic field were noted due to density considerations, water wells or underground utilities.

### 5 ON-SITE SYSTEM

A below grade or septic field mound system would be suitable for the site. The proposed residence planned for the site consists of a three or four bedroom residence. A sewage treatment consisting of primary septic treatment in a tank with disposal to a field is recommended.

Sewage volumes for a three bedroom house would be 1530 litres per day and 2040 litres for a four bedroom house. Additional volumes may be produced should additional plumbing fixture units be installed.

### 6 SOIL CONDITIONS

According to the Soil Survey of the Calgary Urban Perimeter (MacMillan, 1987) the topsoil in the region consists of black chernozemic soils of the Lloyd Lake Series. This soil is a silty clay topsoil with little to no coarse fragments. The soils are well drained to rapidly drained, likely reflective of good soil structure.

According to the map entitled "Quaternary Geology, Southern Alberta (Shetsen, ARC, 1994) the underlying glacial material consist or lacustrine offshore sediments, which typically consist of silt or clay loam type soils with little to no coarse fragments. According to the water well records in the area these unconsolidated sediments typically around 6 m thick.

Both maps indicate that the soil underlying the site should be suitable for treatment of septic effluent by a field or mound type system.

Two test pits were dug on the site in February of 2015 in the vicinity of the proposed septic field. Soil in the test pits were logged to determine thickness of various horizons, soil structure, grain size and moisture conditions. The test pit logs are attached in the appendix.

The test pits were dug with the aid of a rubber tired hoe – one to a depth of approximately 2 metres, the other to a depth of approximately 5 m. Soil conditions were measured to 1.5 m and visually estimated below. The test pits were open for approximately one week prior to measurement to allow for determination of whether groundwater is present at the depth of the test pits. A soil sample was collected from each test pit for analysis of grain size characteristics. The soil colours were compared to Munsell charts to standardize soil colour description. A summary of the soil description is as follows:

**Table 1 - Test Pit #1 – 114°19.460'E, 51°03.853'N**

Horizon	Depth (cm)	Texture	Colour	Gleying	Mottling	Structure	Consistence	Moisture	% Coarse Fragments
H	0 – 3	Pasture Grass							
A	3 – 20	Silty Clay	Black	None	None	Small Blocky	Frozen	Damp	0
B	20 – 45	Silty Clay	Olive Brown	None	None	Small Blocky	Frozen	Damp	0
C	45 - 300	Silty Clay	Light Olive Brown	None	None	Small Blocky	Moist Friable	Slightly Damp	0

**Table 2 - Test Pit #2 – 114°19.457'E, 51°03.850'N**

Horizon	Depth	Texture	Colour	Gleying	Mottling	Structure	Consistence	Moisture	% Coarse Fragments
H	0 – 3	Pasture Grass							
A	3 – 20	Silty Clay	Black	None	None	Small Blocky	Frozen	Damp	0
B	20 – 40	Silty Clay	Olive Brown	None	None	Small Blocky	Frozen	Damp	0
C	40 - 300	Clayey Silt	Light Olive Brown	None	None	Small Blocky	Moist Friable	Slightly Damp	0

Similar strata was encountered in both test pits consisting of a silty clayey soil with a small blocky soil structure to a depth of 40 – 45 cm followed by a more clayey horizon to a depth of approximately 2 metres. Rafted bedrock was visible in the deeper test pit from about 1.9 – 2.4 m. Two samples were submitted for grain size analysis to E2K Engineering of Calgary. The lab report is attached in the appendices. A summary of the results is as follows:

**Table 3 – Grain size analysis**

Pit #	Depth	% sand	% silt	% clay	Texture Class
1	1 m	15	35	50	Clay
2	1 m	15	38	47	Silty clay

A silty clay soil is consistently found throughout the site. The structure of this soil can be considered to be moderate blocky at the depth of the septic field. The fine grained nature of the soil was the only limiting characteristic of the suitability of the site for disposal of effluent.

## 7 TOPOGRAPHY AND SURFACE DRAINAGE

Slope conditions were measured with a hand held clinometer. The topographic position for both pits is mid slope in an area of slightly rolling hills with slopes of approximately 4% towards the southeast, which is the direction of the regional drainage in the area.

No restrictions on operation or placement of a septic field exist due to site drainage and depth to water table conditions.

## 8 PARCEL SUITABILITY

A summary of the site conditions with comments on the suitability of the various factors for treatment of effluent is as follows:

**Table 4 - Parcel Suitability Summary**

<b>Soil Texture</b>	Moderate – the soil consists of a silty clay
<b>Structure</b>	Moderate – strong soil structure is observed near the top grading to moderate below 1 m
<b>Depth of Suitable Soil</b>	Very well suited – greater than 3 m of acceptable soil
<b>Hydraulic Capability</b>	Moderate – soils are well drained with moderate permeability
<b>Soil Horizons</b>	Very well suited – no limiting layers were noted
<b>Depth to Water Table</b>	Very well suited – the water table was observed at a depth of greater than 3 m (approximately 4 m)
<b>Topography</b>	Very well suited – the slopes are planar with 4% slope towards the east

5



<b>Flooding</b>	Very well suited – no risk of floods
<b>Density</b>	Very well suited – no other developments within 50 m of the site
<b>Encumbrances</b>	Very well suited - No development currently on site including water wells
<b>Parcel Size</b>	Very well suited – parcel size 4 acre
<b>Surface Water</b>	Very well suited – no surface water bodies within 60 m of site

In summary the site is suitable for subsurface treatment of effluent waste. Loading rates should be based on a clay loam soil with weak blocky structure. For effluent with a Biochemical Oxygen Demand (BOD) of 30 – 150 mg/L a loading rate of 6.9 litres per square meter per day is recommended. For secondary treated effluent with a BOD of less than 30 mg/L a loading rate of 9.8 litres per day per square meter is recommended.

It was reported that the existing septic field systems in the area are operating properly. With the parcel subdivision size and density in the area a municipal wastewater collection system does not appear to be required.

For a three bedroom house with an effluent volume of 1530 litres per day a treatment area of 221 square meters is required for effluent that has undergone primary treatment. Assuming that the trenches are 0.9 m wide and 15 m long with 0.9 m between trenches a septic field size of 15 m X 28 m is required. A treatment size of 15 m X 22 m is required for effluent that has undergone secondary treatment.

For a four bedroom house a treatment field 15 m X 45 m is required for disposal of primary treated effluent. A treatment field of 15 m X 29 m is required for secondary treated effluent. This dimensions may be reduced if a chamber system is utilized.

## **APPENDIX 1**

### **WATER WELL RECONNAISSANCE REPORT**



# Government of Alberta

## Groundwater Wells

## Reconnaissance Report

[View in Metric](#)  
[Export to Excel](#)

Please click the water Well ID to generate the Water Well Drilling Report.

Well ID	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (ft)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL (ft)	TEST RATE (gpm)
349300	NW 23	024	03	5	5	AARON DRILLING INC.	1993-02-01	105.00	New Well	Domestic		11		MACINTOSH, GARY #2054	56.00	20.00
349381	NW 23	024	03	5	5	AARON DRILLING INC.	1987-11-24	100.00	New Well	Domestic		6		HAVESLEW, ROD	51.00	20.00
349601	NW 23	024	03	5	5	AARON DRILLING INC.	1987-11-20	100.00	New Well	Domestic		5		SENEZ, FRANK	60.00	20.00
353474	NW 23	024	03	5	5	BAKER WATER WELLS	1990-09-04	80.00	New Well	Domestic		10		WILLIAMS, CLIFF	22.00	30.00
358139	NW 23	024	03	5	5	AARON DRILLING INC.	1991-06-26	80.00	New Well	Domestic		7		BANNISTER, BILL #1628	45.00	15.00
358140	NW 23	024	03	5	5	AARON DRILLING INC.	1991-06-26	80.00	New Well	Domestic		6		BANNISTER, BILL #1629	45.00	10.00
359264	NW 23	024	03	5	5	DOLOMITE DRILLING	1991-07-26	90.00	New Well	Domestic		5		PATRICO CORP C/OPATRICIA SMART	40.00	10.00
359265	NW 23	024	03	5	5	DOLOMITE DRILLING	1991-07-30	80.00	New Well	Domestic		5		PATRICO CORP	40.00	10.00
359540	NW 23	024	03	5	5	AARON DRILLING INC.	1991-07-30	100.00	New Well	Domestic		5		MACINTOSH, GARY #1654	60.00	4.00
361450	NW 23	024	03	5	5	UNKNOWN DRILLER		80.00	Chemistry	Domestic				HOUD, BERT		
365343	NW 23	024	03	5	5	ELGIN EXPLORATION COMPANY LIMITED	1992-06-30	80.00	New Well	Domestic		4		HOUD, A.R.	38.00	12.00
365344	NW 23	024	03	5	5	ELGIN EXPLORATION COMPANY LIMITED	1992-07-02	100.00	New Well	Domestic		4		HOUD, A.R.	44.00	40.00
370155	NW 23	24	3	5	5	ELGIN EXPLORATION COMPANY LIMITED	1993-07-20	140.00	New Well	Domestic		8		MENICKS, GREG	85.00	10.00
370155	NW 23	24	3	5	5	AARON DRILLING INC.			Old Well - Abandoned	Domestic				BRANCACCIO, CHRIS		
388947	NW 23	024	03	5	5	UNKNOWN DRILLER		90.00	Chemistry	Domestic				PRITCHARD, STU		
388948	NW 23	024	03	5	5	DOERING DRILLING LTD.	1968-06-20	90.00	New Well	Domestic		7		BRUCE, B.C.	58.00	15.00
388949	NW 23	024	03	5	5	INTERPROVINCIAL DRILLING CONTRACTORS	1969-09-15	120.00	New Well	Domestic		12		DUTOIT	50.00	
388950	NW 23	024	03	5	5	WEBSTER DRILLING	1971-04-30	181.00	New Well	Domestic		17		NELSON, G.H.	100.00	9.00
388951	NW 23	024	03	5	5	INTERPROVINCIAL DRILLING CONTRACTORS	1970-12-01	230.00	New Well	Domestic		11		ZANGER, HERB	190.00	8.00
388952	NW 23	024	03	5	5	UNKNOWN DRILLER		120.00	Chemistry	Domestic		3		CHUDEK, PAUL	49.00	

## Reconnaissance Report

[View in Metric](#)  
[Export to Excel](#)

Well ID	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (ft)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL (ft)	TEST RATE (gpm)
388953	NW	23	024	03	5	UNKNOWN DRILLER		96.00	Chemistry	Domestic	1			LANGERFELD, R.		
388954	NW	23	024	03	5	UNKNOWN DRILLER		100.00	Chemistry	Domestic	1			ASCHENBROUCH, H.K.		
388955	NW	23	024	03	5	TURNER VALLEY WW	1979-04-03	124.00	New Well	Domestic		12		SMART, W.	48.00	18.00
388956	NW	23	024	03	5	INTERPROVINCIAL DRILLING CONTRACTORS	1979-07-31	180.00	Deepened	Unknown		6		BANNISTER, W.E.	70.00	7.00
388957	NW	23	024	03	5	UNKNOWN DRILLER		110.00	Chemistry	Domestic				MENZIES		
388958	NW	23	024	03	5	PARSONS DRLG	1967-04-18	115.00	New Well	Domestic		10		SMART, W.J.	45.00	4.50
388959	NW	23	024	03	5	BAKER WATER WELLS	1986-10-28	75.00	New Well	Domestic		3		WILLIAMS, C.L. CONSTR	21.00	30.00
388960	NW	23	024	03	5	DIVERSIFIED DRILLING & EXPLORATION CO.	1988-05-17	101.00	New Well	Domestic		7		MACINTOSH, G.	78.00	7.00
388961	14	23	024	03	5	UNKNOWN DRILLER		90.00	Chemistry	Domestic	1			BRUCE, B.C. PROPERTY		
1022423	15	23	24	3	5	AARON DRILLING INC.	2014-02-11	95.00	New Well	Domestic		11	13	BRANCACCIO, CHRIS	49.80	12.00
1140400	13	23	24	3	5	BLACKWOOD DRILLING LTD.	2009-04-16	60.00	New Well	Domestic		7	15	BOROS, ANDY	9.44	12.00
2085369	11	23	24	3	5	BLACK DOG DRILLING & ENW SERV. LTD.	2012-05-02	120.00	New Well	Domestic		4	13	VINGE, PAM	12.00	40.00

## **APPENDIX 2**

### **TEST PIT LOGS**

#### **E2K GRAIN SIZE ANALYSES REPORT**





## 2 Soils Log Form

### Private Sewage Treatment System Soil Log Form

Owner Name or Job ID:	Ryan Buckley
-----------------------	--------------

Legal Land Location					Plan	Block	Lot	GPS Coordinates
LSD-1/4	Sec	Twp	Rg	Mer	91116 99		5	N 51° 03.850' W 114° 19.457'
NW	23	24	3	WS				

Aerial Photos		Topography	slightly rolling
General Vegetation	Mixed Poplar/pasture	Overall Site Slope %	4% WSE
		Slope Position of System	mid slope

Test Hole #	Soil Subgroup	Parent Material	Drainage Class	Sample 1 Depth	Sample 2 Depth
2				1m	

Horizon	Depth (cm)	Texture	Colour	Gleyed	Mottled	Structure	Consistence	Moisture	%CF
H	0-3	pasture grass							
A	3-20	silty clay	Black	No	NO	small blocky	frozen	Damp	0
B	20-40	silty clay	ol.v. brn	No	NO	small blocky	frozen	Damp	0
C	40-190	slightly silty	lt. oliv. brn	No	NO	small blocky	moist friable	sl damp	0
Rooted bedrock	190-240								
	240								

Depth to Groundwater	2.8m	Limiting Soil Layer Char. (describe)	rooted bedrock @ 190
Depth to Seasonally Saturated Soil	N/O	Depth to Limiting Soil Layer	
Limiting Topography	NONE	Depth to Highly Permeable Layer	

Key Limiting System Design Characteristic	
---	--

Comments	Rooted to 1m
----------	--------------

Note: Use soil names, description and particle size limits found in the Canadian System of Soil Classification (CSCS)



## 2 Soils Log Form

### Private Sewage Treatment System Soil Log Form

Owner Name or Job ID:	Ryan Buckley Lot
-----------------------	------------------

Legal Land Location					Plan	Block	Lot	GPS Coordinates
LSD-1/4	Sec	Twp	Rg	Mer	911/1695		5	N 51° 03.853' W 114° 19.460'
26	23	24	3	WS				

Aerial Photos		Topography	515874 Rd/ly
General Vegetation	Mixed Poplar/Pasture	Overall Site Slope %	4% NW SE
		Slope Position of System	Mid Slope

Test Hole #	Soil Subgroup	Parent Material	Drainage Class	Sample 1 Depth	Sample 2 Depth
1				1m	

Horizon	Depth (cm)	Texture	Colour	Gleyed	Mottled	Structure	Consistence	Moisture	%CF
H	0-3	Pasture grass							
A	3-20	silty clay	Black	NO	NO	small blocky	Frozen	Damp	0
	20-45	silty clay	oliv. brn. 2.5Y 4/3	NO	NO	small blocky	Frozen	Damp	0
	45-200	clayey silt	lt. oliv. brn. 2.5Y 5/4	NO	NO	small blocky	moist friable	sl. damp	0

Depth to Groundwater	> 2m	Limiting Soil Layer Char. (describe)	NO
Depth to Seasonally Saturated Soil	N/O	Dept to Limiting Soil Layer	
Limiting Topography	none	Depth to Highly Permeable Layer	

Key Limiting System Design Characteristic	
---	--

Comments

Note: Use soil names, description and particle size limits found in the Canadian System of Soil Classification (CSSC)



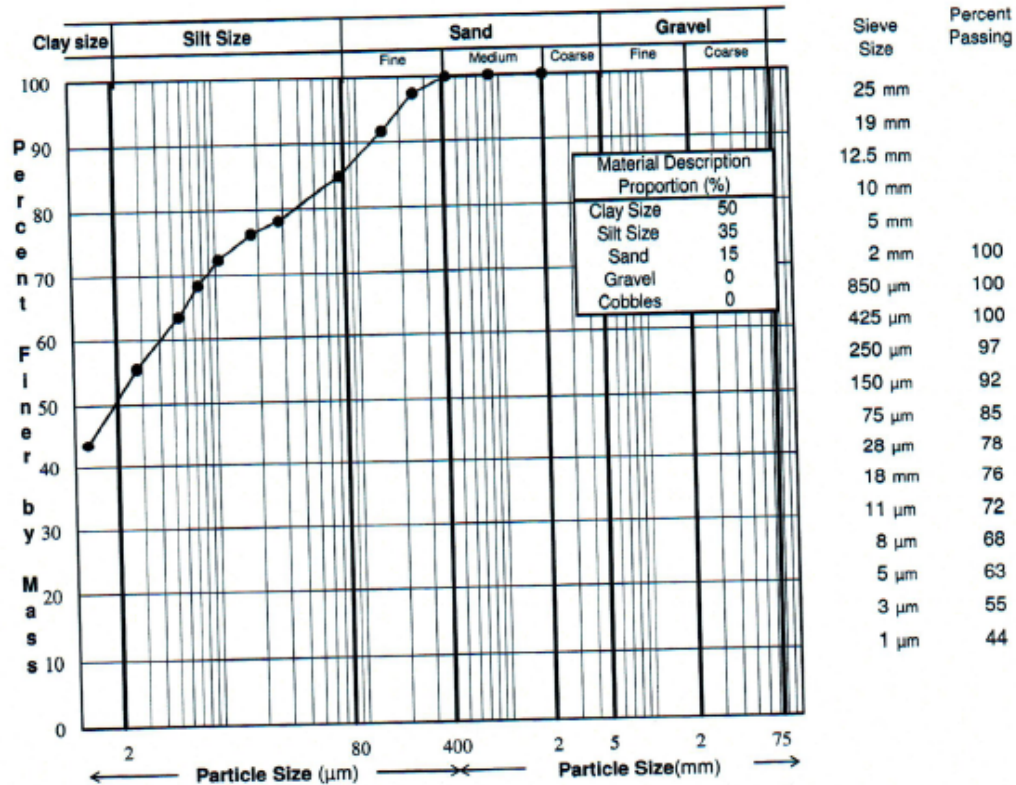
## Hydrometer Analysis Report

**E2K ENGINEERING LTD.**  
 Suite 190, 5005-71 Ave SE.  
 CALGARY, ALBERTA. T2H 0S6  
 (o) 403-450-9600 (f) 403-450-9601

To: GRIT Ltd.

Project: Buckley Test Pits

Project Number: 2015-1823  
 Report Number: 1  
 Report Date: February 27, 2015  
 Copies To: Ken Hugo  
 Authorized By: 0  
 Sampled By: Client  
 Tested By: JG  
 Source: Test pit # 1, 1m  
 Date Received: February 24, 2015  
 Date Tested: February 26, 2015



Per \_\_\_\_\_

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

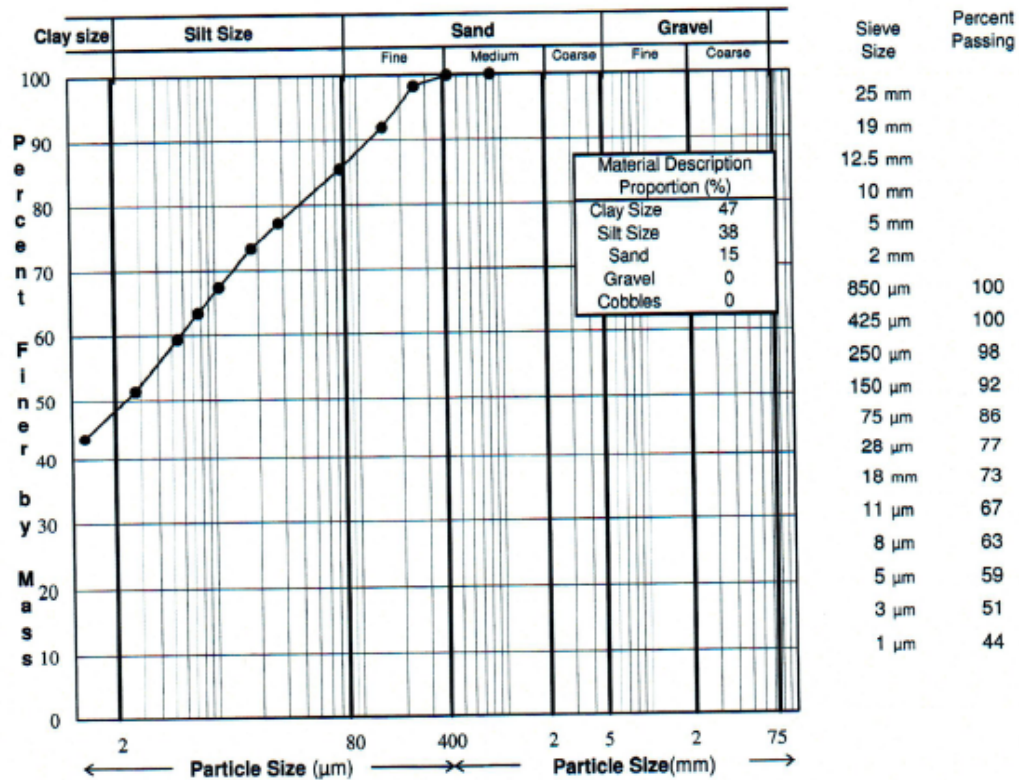
**E2K ENGINEERING LTD.**  
 Suite 190, 5005-71 Ave SE.  
 CALGARY, ALBERTA, T2H 0S6  
 (o) 403-450-9600 (f) 403-450-9601

## Hydrometer Analysis Report

To: GRIT Ltd.

Project: Buckley Test Pits


Project Number: 2015-1823  
 Report Number: 1  
 Report Date: February 27, 2015  
 Copies To: Ken Hugo  
 Authorized By: 0  
 Sampled By: Client  
 Tested By: JG  
 Source: Test pit # 2, 1m  
 Date Received: February 24, 2015  
 Date Tested: February 26, 2015



Per \_\_\_\_\_

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided as a separate report.

## Appendix 3: Archeological Assessment

 Culture and Tourism	HRA Number: 4835-19-0017-001 March 14, 2019
---	--

### Historical Resources Act Approval

---

**Proponent:** Owner  
 243206 range road 32, Calgary, AB T3Z 2E3

**Contact:** Ryan Buckley

**Agent:** Owner  
**Contact:** Ryan Buckley


**Project Name:** Lance Inc subdivision of Lot 5 block1 plan 911 1699

**Project Components:** Country Residential Subdivision  
 Residential Development

**Application Purpose:** Requesting HRA Approval / Requirements

---

*Historical Resources Act approval is granted for the activities described in this application and its attached plan(s)/sketch(es) subject to Section 31, "a person who discovers an historic resource in the course of making an excavation for a purpose other than for the purpose of seeking historic resources shall forthwith notify the Minister of the discovery." The chance discovery of historical resources is to be reported to the contacts identified within [Standard Requirements under the Historical Resources Act: Reporting the Discovery of Historic Resources](#).*

  
 \_\_\_\_\_  
 Martina Purdon  
 Head, Regulatory Approvals &  
 Information Management

---

**Lands Affected:** All New Lands

**Proposed Development Area:**

MER	RGE	TWP	SEC	LSD List
5	3	24	23	13

**Documents Attached:**

Document Name	Document Type
Survey	Illustrative Material

## Appendix 4: Stormwater Management Plan

## Appendix 5: Letters from Neighbours