

# **Wintergreen Forest Estates Conceptual Scheme**

**Bylaw C-7434-2014**

**Adopted March 10, 2015**



**ROCKY VIEW COUNTY**  
Cultivating Communities

**ROCKY VIEW COUNTY  
BYLAW C-7434-2014**

A Bylaw of Rocky View County pursuant to Division 12 of Part 17 of the Municipal Government Act to amend Bylaw C-6260-2006, known as the “Greater Bragg Creek Area Structure Plan” and adopt a Conceptual Scheme known as the “Wintergreen Forest Estates Conceptual Scheme”.

The Council of Rocky View County enacts as follows:

**PART I - TITLE**

This bylaw shall be known as Bylaw C-7434-2014

**PART II - DEFINITIONS**

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

**PART III – EFFECT OF BYLAW**

**THAT** Bylaw C-6260-2006, known as the “Greater Bragg Creek Area Structure Plan”, be amended in accordance with the amendments contained in Schedule ‘A’, attached to and forming part of the Bylaw; and

**THAT** the “Wintergreen Forest Estates Conceptual Scheme” be adopted to provide a policy framework for future redesignation, subdivision and development within Lot 1 and 2, Block 2, Plan 1311147 within NE-24-23-05-W05M and a portion of NE-24-23-05-W05M, consisting of an area of approximately ± 15.60 hectares (± 38.57 acres), as defined in Schedule ‘B’ attached to and forming part of this Bylaw; and

**PART IV – TRANSITIONAL**

Bylaw C-7434-2014 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: 1**

**File: 03924010/09/08 - PL20140003**

*PUBLIC HEARING WAS HELD IN COUNCIL this*

*10 day of March, 2015*

READ A FIRST TIME IN COUNCIL this

10 day of March, 2015

READ A SECOND TIME IN COUNCIL this

10 day of March, 2015

*UNANIMOUS PERMISSION FOR THIRD READING*

*10 day of March, 2015*

READ A THIRD TIME IN COUNCIL this

10 day of March, 2015

\_\_\_\_\_  
Reeve

\_\_\_\_\_  
CAO or Designate

\_\_\_\_\_  
Date Bylaw Signed

**SCHEDULE 'A'**  
**FORMING PART OF BYLAW C-7434-2014**

Schedule of Amendments to Bylaw C-6260-2006:

1. Amend the Table of Contents by adding a reference to Appendix D and numbering accordingly:

14.0 APPENDIX D – ADOPTED CONCEPTUAL SCHEMES

14.2 Wintergreen Forest Estates Conceptual Scheme

2. Attach the Wintergreen Forest Estates Conceptual Scheme as defined in Schedule 'B' attached to and forming part of this Bylaw

**SCHEDULE 'B'**  
**FORMING PART OF BYLAW C-7434-2014**

A Conceptual Scheme affecting the area within Lot 1 and 2, Block 2, Plan 1311147 within NE-24-23-05-W05M and a portion of NE-24-23-05-W05M, consisting of an area of approximately  $\pm 15.60$  hectares ( $\pm 38.57$  acres), herein referred to as the “Wintergreen Forest Estates Conceptual Scheme”



# WINTERGREEN FOREST ESTATES

## CONCEPTUAL SCHEME

### TABLE OF CONTENTS

|   | <b><u>Page</u></b> |
|---|--------------------|
| 1.0 INTRODUCTION  |                    |
| 1.1 Vision  | 3                  |
| 1.2 Purpose of the Conceptual Scheme                              | 3                  |
| 1.3 Conceptual Scheme Objectives                                  | 3                  |
| 2.0 CONCEPTUAL SCHEME STUDY AREA AND<br>ADJACENT LAND USE CONTEXT |                    |
| 2.1 Description of Conceptual Scheme Study Area                   | 5                  |
| 2.2 Description of Current Land Use within the Study Area         | 5                  |
| 2.3 Description of Adjacent Land Uses and Development Proposals   | 6                  |
| 3.0 PHYSICAL SITE FEATURES  |                    |
| 3.1 Topography  | 11                 |
| 3.2 Soils & Vegetation  | 11                 |
| 3.3 Historical Use of Site  | 12                 |
| 3.4 Existing Structures   | 12                 |
| 3.5 Existing Transportation & Utilities Considerations            | 12                 |
| 4.0 LAND USE CONCEPT  |                    |
| 4.1 Transportation Overview                                       | 13                 |
| 4.2 Municipal Reserves, Open Spaces and Pathways                  | 14                 |
| 4.3 Population and Density Projections                            | 15                 |

|            |   |                    |
|------------|---|--------------------|
| <b>5.0</b> | <b>SERVICING STRATEGY</b>   | <b><u>Page</u></b> |
| 5.1        | Water Servicing   | 18                 |
| 5.2        | Sanitary/Wastewater Servicing   | 18                 |
| 5.3        | Stormwater Management   | 19                 |
| 5.4        | Solid Waste Management  | 20                 |
| 5.5        | Protective Services   | 20                 |
| 5.6        | Shallow Utilities   | 20                 |
| <b>6.0</b> | <b>STATUTORY PLAN COMPLIANCE</b>  |                    |
| 6.1        | Municipal Development Plan – County Plan  | 21                 |
| 6.2        | Area Structure Plan– Greater Bragg Creek Area Structure Plan                            | 21                 |
| <b>7.0</b> | <b>IMPLEMENTATION</b>   |                    |
| 7.1        | Proposed Landscaping Guidelines & Architectural Controls                                | 22                 |
| <b>8.0</b> | <b>POLICY SUMMARY</b>   | 23                 |
| <b>9.0</b> | <b>APPENDICES</b>   | 27                 |
| 9.1        | Terrain and Slope Stability Assessment –<br>Rangeland Conservation Service Ltd.         |                    |
| 9.2        | Wildfire Analysis –<br>Montane Forest Management  |                    |
| 9.3        | Private Sewage Treatment System – Level III Assessment –<br>Almor Testing Services Ltd. |                    |
| 9.4        | Confirmation of Water Source –<br>Wintergreen Woods Water Utility                       |                    |
| 9.5        | Summary of Public Consultation  |                    |

## **LIST OF FIGURES**

|          |  |    |
|----------|--|----|
| Figure 1 | Location Within Rocky View County  | 4  |
| Figure 2 | Conceptual Scheme Plan Area  | 7  |
| Figure 3 | Plan Location  | 8  |
| Figure 4 | Land Use Designation   | 9  |
| Figure 5 | Adjacent Land Use Designations   | 10 |
| Figure 6 | Future Residential Development Designation<br>Within Greater Bragg Creek Area Structure Plan | 16 |
| Figure 7 | Lot Dimensions/Connectivity & Access   | 17 |



# WINTERGREEN FOREST ESTATES CONCEPTUAL SCHEME

## 1.0 INTRODUCTION

Wintergreen Forest Estates is located within Rocky View County (Figure 1), in the Greater Bragg Creek Area, with a total area of 15.60 ha ( $\pm$  38.57 acres).

### 1.1 Vision

Following redesignation and subdivision of Lot 1, Block 2, Plan 131114 within NE-24-23-5-W05M, the Wintergreen Forest Estates Conceptual Scheme area will be comprised of five (5) country residential lots of approximately four (4) acres each, with two other residential parcels, Lot 2, Block 2, Plan 1311147 within NE 24-23-05-W5M and portion of NE 24-23-05-W5M with currently no plans for future subdivision.

### 1.2 Purpose of the Conceptual Scheme

The Wintergreen Forest Estates Conceptual Scheme has been prepared as a requirement of the Greater Bragg Creek Area Structure Plan (Bylaw C-6260-2006). This Conceptual Scheme provides guidance and support for the redesignation and future subdivision of the Plan Area.

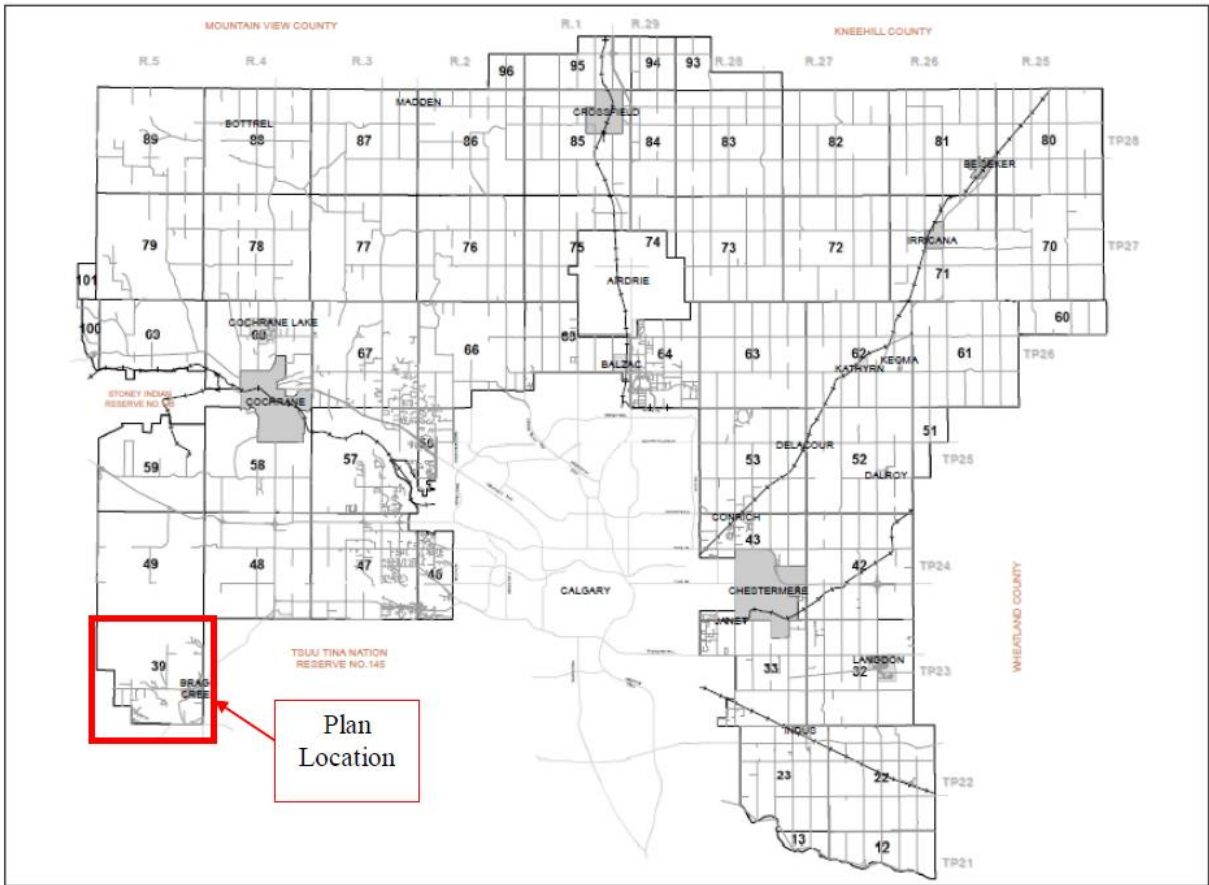
In particular, the Conceptual Scheme is to provide a comprehensive policy framework intended to guide and evaluate the proposed redesignation, subdivision and developments of Lot 1, Block 2, Plan 1311147 within NE 24-23-05-W5M.

### 1.3 Conceptual Scheme Objectives


The objectives of the Wintergreen Forest Estates Conceptual Scheme are:

- To establish the appropriateness of the Plan Area for re-designation and subdivision for residential use.
- To address existing development constraints within the context of the Greater Bragg Creek Area Structure Plan and other municipal statutory plans, policies and procedures.
- To facilitate sustainable subdivision of the Lot 1, Block 2, Plan 1311147 within NE 24-23-05-W5M in the context of the Greater Bragg Creek Area Structure Plan and other municipal statutory plans, policies and procedures.

**FIGURE 1**



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Printed: Jan 03, 2014



PLAN LOCATION  
WITHIN ROCKY VIEW  
COUNTY

## 2.0 CONCEPTUAL SCHEME STUDY AREA and ADJACENT LAND USE CONTEXT

### 2.1 Description of Conceptual Scheme Study Area

The Wintergreen Forest Estates Conceptual Scheme Plan Area is located within Division 1 of Rocky View County (Figure 1 and 2), and comprises three parcels as indicated below, for a total Plan Area of  $\pm 15.60$  hectares ( $\pm 38.57$  acres):

| Parcel Legal Description                               | Parcel Size                           |
|--|---------------------------------------|
| Lot 1, Block 2, Plan 1311147<br>within NE 24-23-05-W5M | $\pm 8.09$ hectares<br>(+20 acres)    |
| Lot 2, Block 2, Plan 1311147<br>within NE 24-23-05-W5M | $\pm 4.68$ hectares<br>(+11.57 acres) |
| Portion of NE 24-23-05-W5M                             | $\pm 2.83$ hectares<br>(+ 7 acres)    |

Policy 2.1.1 Policies contained in the Wintergreen Forest Estates Conceptual Scheme shall apply to the “Plan Area” as identified in Figure 2.

Policy 2.1.2 Redesignation, subdivision, and development of the subject lands shall conform to the policies of the Wintergreen Forest Estates Conceptual Scheme.

### 2.2 Description of Current Land Use within the Study Area

The Wintergreen Forest Estates Conceptual Scheme is located in “North Bragg Creek Area” as identified in the Greater Bragg Area Structure Plan. Subject lands are situated just south of Township Road 234 and immediately across from the gated community on Wintergreen Way and the Wintergreen Golf Course (Figure 2 and 3).

The current land use designations for plan location are as follows (Figure 4):

- Lot 1, Block 2, Plan 1311147 within NE 24-23-05-W5M is designated as Agricultural Holding District (AH);
- Lot 2, Block 2, Plan 1311147 within NE 24-23-05-W5M is designated as Residential Three District (R-3); and
- Portion of NE 24-23-05-W5M is designated as Residential Two District (R-2).

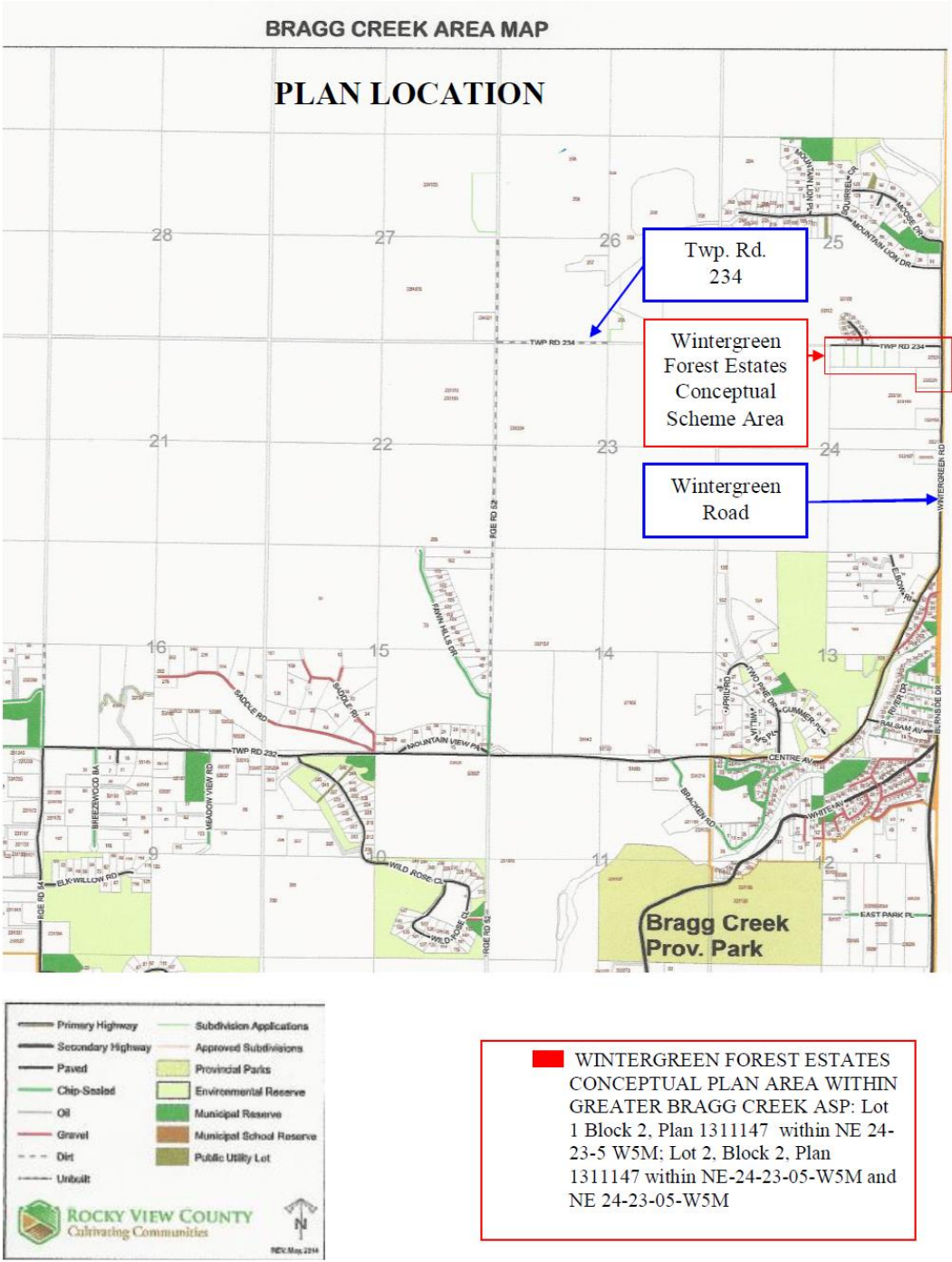
### 2.3 Description of Adjacent Land Uses and Development Proposals

Wintergreen Golf Course is located to the northwest of Township Road 234 and is designated as Business Recreational District (B-4). Wintergreen residential community is directly north of Township Road 234 from the Conceptual Scheme area, and is designated as Direct Control District DC-57 (Figure 5). There is no other development proposal in the adjacent areas at the time of the Conceptual Scheme being prepared.

**FIGURE 2**







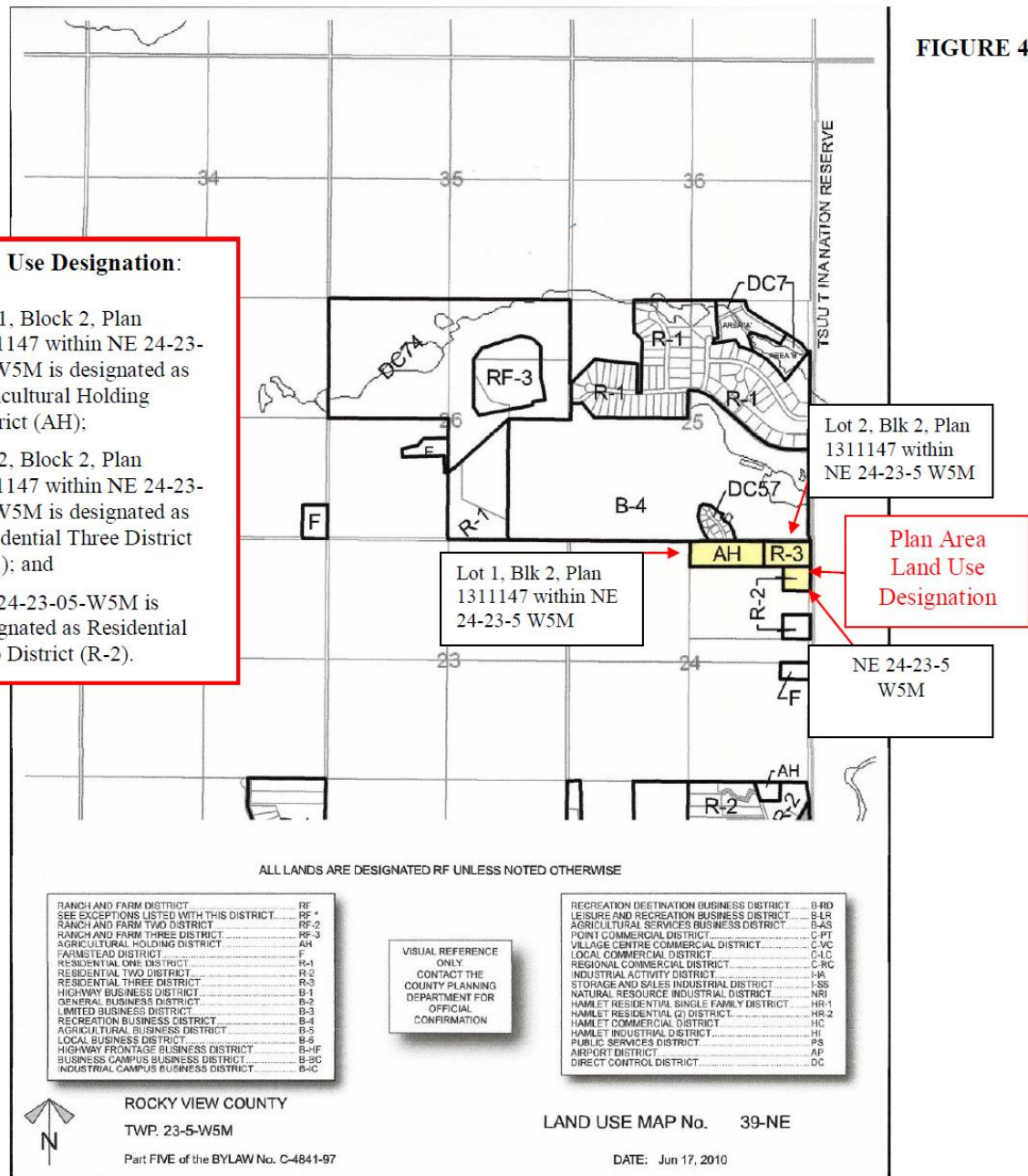
**FIGURE 3**

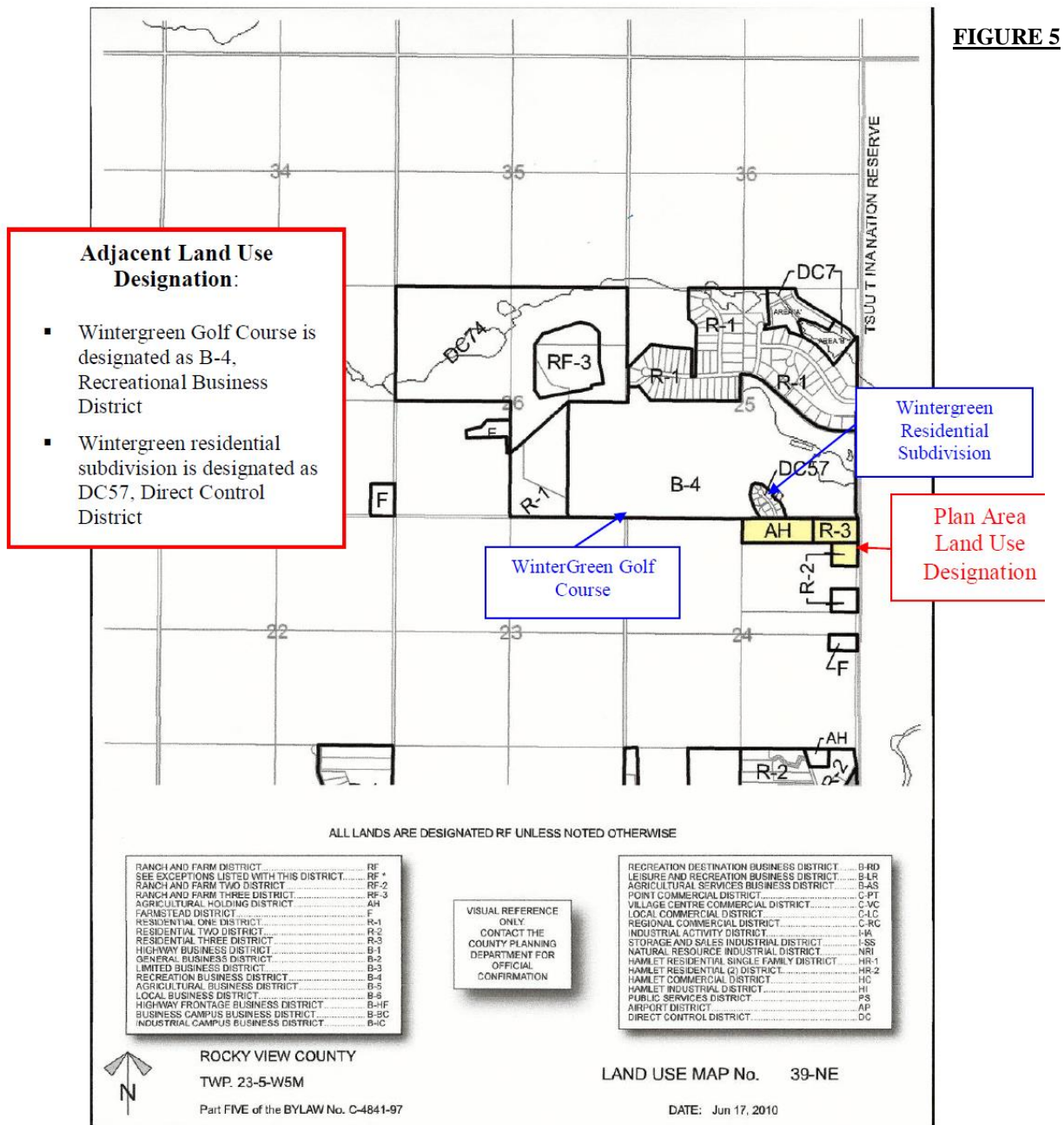


FIGURE 4

**Land Use Designation:**

- Lot 1, Block 2, Plan 1311147 within NE 24-23-05-W5M is designated as Agricultural Holding District (AH);
- Lot 2, Block 2, Plan 1311147 within NE 24-23-05-W5M is designated as Residential Three District (R-3); and
- NE 24-23-05-W5M is designated as Residential Two District (R-2).





## 3.0 PHYSICAL SITE FEATURES

### 3.1 Topography

A slope stability assessment was undertaken by Rangeland Conservation Services Limited on October 7, 2013 (Appendix 1) who concluded that the terrain at the site is very gently to gently sloping (i.e., between 0 and 10 degrees). The land is gradually sloping from south to north, with moderate to locally moderately steep slopes (i.e., 10 to 15 degrees plus) exist in the central portion and towards the south-eastern corner. Overall there are no geotechnical concerns with the overall stability of the site.

Policy 3.1.1 At subdivision stage, an updated Slope Stability Assessment and/or Geotechnical Report prepared by a qualified professional in accordance with County Servicing Standards may be required to evaluate the soil characteristics, existing groundwater conditions, development constraints, and to demonstrate that there is a minimum of one contiguous developable acre for each of the proposed parcels to the satisfaction of the County.

### 3.2 Soils & Vegetation

The Plan area is heavily treed with a variety of spruce and poplar. To preserve the land's natural ability to provide for groundwater recharge, stormwater management and to reduce negative impacts of erosion and siltation within downstream areas, all future development within the Plan area would attempt to minimize disturbance of existing terrain and removal of natural vegetation, while incorporating FireSmart guidelines to prevent risk of wildfire.

Montane Forest Management Ltd. prepared a Wildfire Risk Assessment to evaluate the threat of wildfire to the proposed five (5) lot subdivision development in the Plan Area. The Wildfire Risk Assessment provides FireSmart recommendations for Development standard to reduce wildfire threat (Appendix 2).

Policy 3.2.1 Wherever possible, the disturbance and removal of natural vegetation and significant areas of trees shall be minimized, while incorporating vegetation management as outlined in the Provincial FireSmart guidelines.

Policy 3.2.2 Proposed subdivision layout and vegetation management on site should recognize and mitigate susceptibility to wildfire risks (e.g. appropriate clearing of building sites, and access to all building sites for emergency service apparatus and equipment).

Policy 3.2.3 Vegetation Management recommendations of the Wildfire Risk Assessment report shall be registered as a restrictive covenant on title for future subdivision within the Plan area and shall be considered at the development permit stage.

### 3.3 Historical Use of Site

There is currently no residential or agricultural activity on the Lot 1, Block 2, Plan 1311147 within NE 24-23-05 W5M. Current activity on Lot 2, Block 2, Plan 1311147 within NE 24-23-05 W5M and NE 24-23-05-W5M is residential uses.

### 3.4 Existing Structures

Currently there are no structures on the Lot 1, Block 2, Plan 1311147 within NE 24-23-05-W5M. Current Structures on Lot 2, Block 2, Plan 1311147 within NE 24-23-05-W5M and NE 24-23-05-W5M are for residential uses.

### 3.5 Existing Transportation & Utilities Considerations

The Plan Area is connected to the Hamlet of Bragg Creek via Wintergreen Road. Lot 1, Block 2, Plan 1311147 has access from Township Road 234, whereas Lot 2, Block 2, Plan 1311147 and portion of NE-24-23-05-W5M are accessed through existing approaches onto Wintergreen Road. The Wintergreen Golf Club, where traffic varies seasonally, and the Wintergreen residential development, which consists of fourteen (14) residential parcels are both serviced by Township Road 234 off Wintergreen Road.

Future ATCO Gas lines on the subject property are protected by a way of a Utility Right of Way Agreement. ATCO Gas, FortisAlberta, and TELUS have no objection to the proposed subdivision subject to provided.

Policy 3.5.1 Utilities installations and easement/agreement registrations shall be subject to conditions as set forth by the applicable utility agencies and will be addressed at subdivision stage.

## 4.0 LAND USE CONCEPT

The future land use of the Plan area is defined as Infill Residential Area by the Greater Bragg Creek Area Structure Plan.

The proposed future land use scenario for Lot 1, Block 2, Plan 1311147 within NE 24-23-5-W5M is to be redesignated to Residential Two District in order to facilitate the future subdivision of five (5) approximately four (4) acre parcels (Figure 6).

The proposed future land use scenarios for Lot 2, Block 2, Plan 1311147 within NE-24-23-05-W5M and for NE 24-23-05-W5M are to remain status quo, which is no future plan for redevelopment. Land use designations would remain as Residential Three District for Lot 2, Block 2, Plan 1311147 within NE-24-23-5-W5M and remain as Residential Two District for NE 24-23-5-W5M.

Policy 4.0.1 Minimum lot size of parcels within the Plan area shall be four (4) acres.

Policy 4.0.2 Future development on site shall adhere to FireSmart Guidelines.

Policy 4.0.3 At subdivision stage, the Owner/Developer shall register a restrictive covenant on each new parcel to ensure:

- all buildings, including accessory buildings, are Sprinklered to the appropriate NFPA standard;
- Non-combustible building materials are used on the siding, roof, and eaves area of the building;
- A fire resistance rating/barrier is installed between the siding and the sheathing;
- Special separation between all buildings is increased to reduce the spread of a wildfire; and
- The properties are evaluated by an accredited professional that specializes in wildfire prevention, to ensure that the vegetation and any other hazards are properly mitigated.

### 4.1 Transportation Overview

Wintergreen Road serves approximately 135 homes in the Greater Bragg Creek area, as well as Wintergreen Golf & Country Club. Township Road 234 runs west off of Wintergreen Road and is currently a 25m Right-of-Way with a 7m paved road width. Due to the fact that Wintergreen Road is noted as a Road of Importance, appropriate dedication for future road widening will be required.

Accesses to each lot shall be through mutual approaches off Township Road 234. The mutual approaches shall be protected by Access Right-of Way Plan and associated Easement Agreement. Accesses to the subdivided parcels off Municipal roads will be provided by the Developer (Figure 7).

- Policy 4.1.1 At future Subdivision stage, a five (5) metres strip of land shall be dedicated, by Plan of Survey, as a road Right-of-Way (ROW) along the eastern boundary of the Plan Area, facing Wintergreen Road.
- Policy 4.1.2 The proposed parcels shall be accessed by mutual approaches from Township Road 234, as shown on Figure 7, and shall be protected by Access Right-of-Way Plan and associated Easement Agreement at time of subdivision.
- Policy 4.1.3 The preferred alignment for approaches should minimize environmental impacts and be pursuant to the policies contained in the Greater Bragg Creek Area Structure Plan.
- Policy 4.1.4 Access to Township Road 234 shall comply with engineering requirements for emergency vehicle access.
- Policy 4.1.5 Signage should be in accordance with FireSmart Guideline access standards & Wildfire Risk Assessment Recommendation.
- Policy 4.1.6 At Subdivision stage, the Owner/Developer shall enter into a Development Agreement pursuant to Section 655 of the Municipal Government Act respecting provision of the construction of a temporary cul-de-sac at the west end of Township Road 234, and register any necessary easement agreements, at the Owner's expense in accordance with the County Servicing Standards, as amended.
- Policy 4.1.7 At subdivision stage, the Owner/Developer shall provide payment of the Transportation Offsite Levy, in accordance with applicable levy at the time of subdivision approval, as amended, for the total gross acreage of the lands proposed to be subdivided.

#### 4.2 Municipal Reserves, Open Space and Pathways

The Greater Bragg Creek Area Structure Plan provides for the development of a community open space and trail system that serves to connect areas of residential development with each other, the Hamlet, Bragg Creek Provincial Park and Kananaskis Country lands.

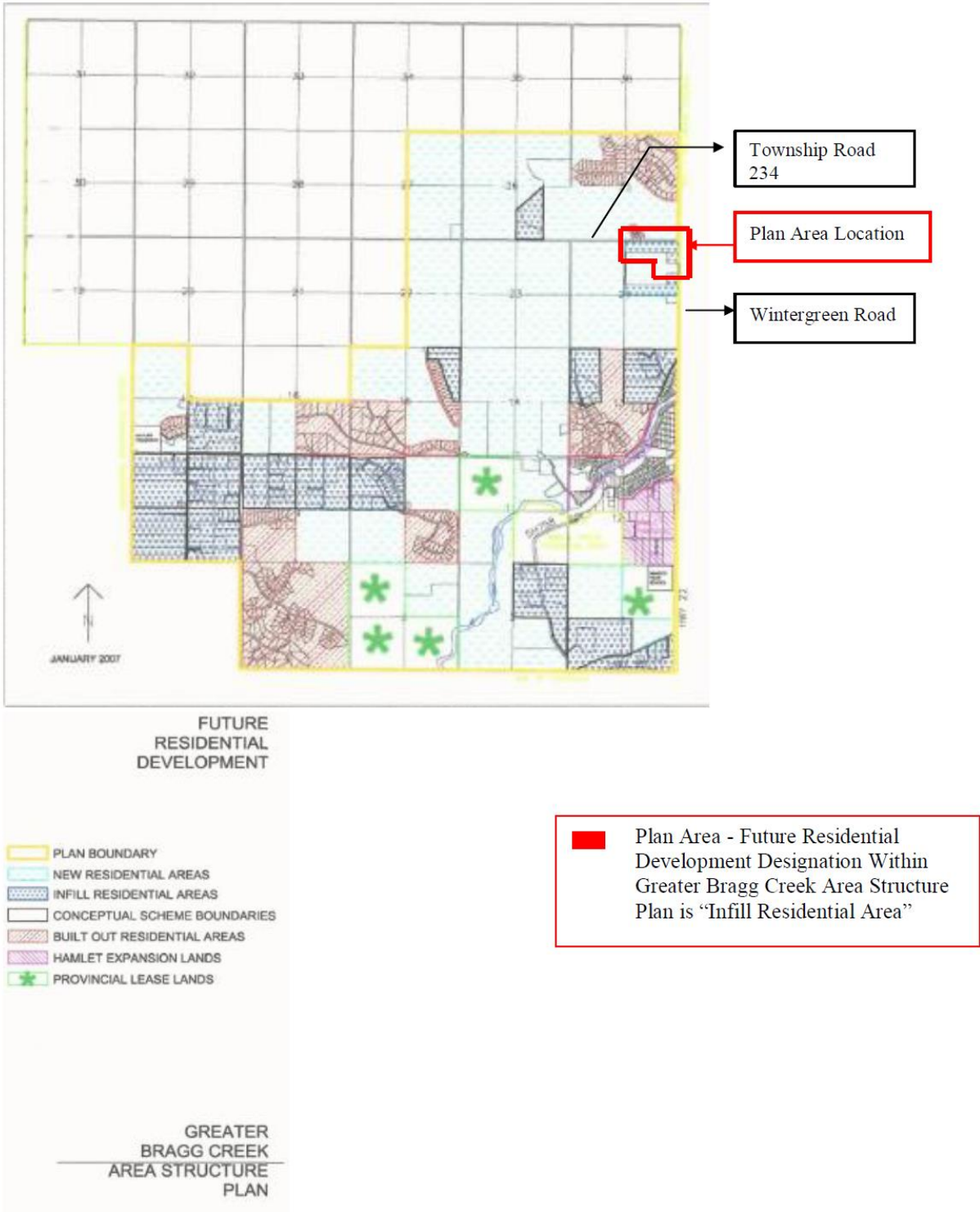
A six (6) metre strip of land will be required along the eastern boundary of the Plan area, fronting Wintergreen Road to accommodate a future regional pathway to connect with the Greater Bragg Creek trail network. All other outstanding reserves would be dedicated through cash-in-lieu.

- Policy 4.2.1.1 A six (6) metre wide linear Municipal Reserve shall be dedicated along the eastern boundary of the Plan Area fronting Wintergreen Road to accommodate a future County pathway. Any remainder Municipal Reserve shall be taken as cash in lieu.
- Policy 4.2.1.2 A six (6) metre wide linear Municipal Reserve shall be dedicated along the northern boundary of the Plan Area fronting Township Road 234 to accommodate a future County pathway. Any remainder Municipal Reserve shall be taken as cash in lieu.

#### 4.3 Population and Density Projections

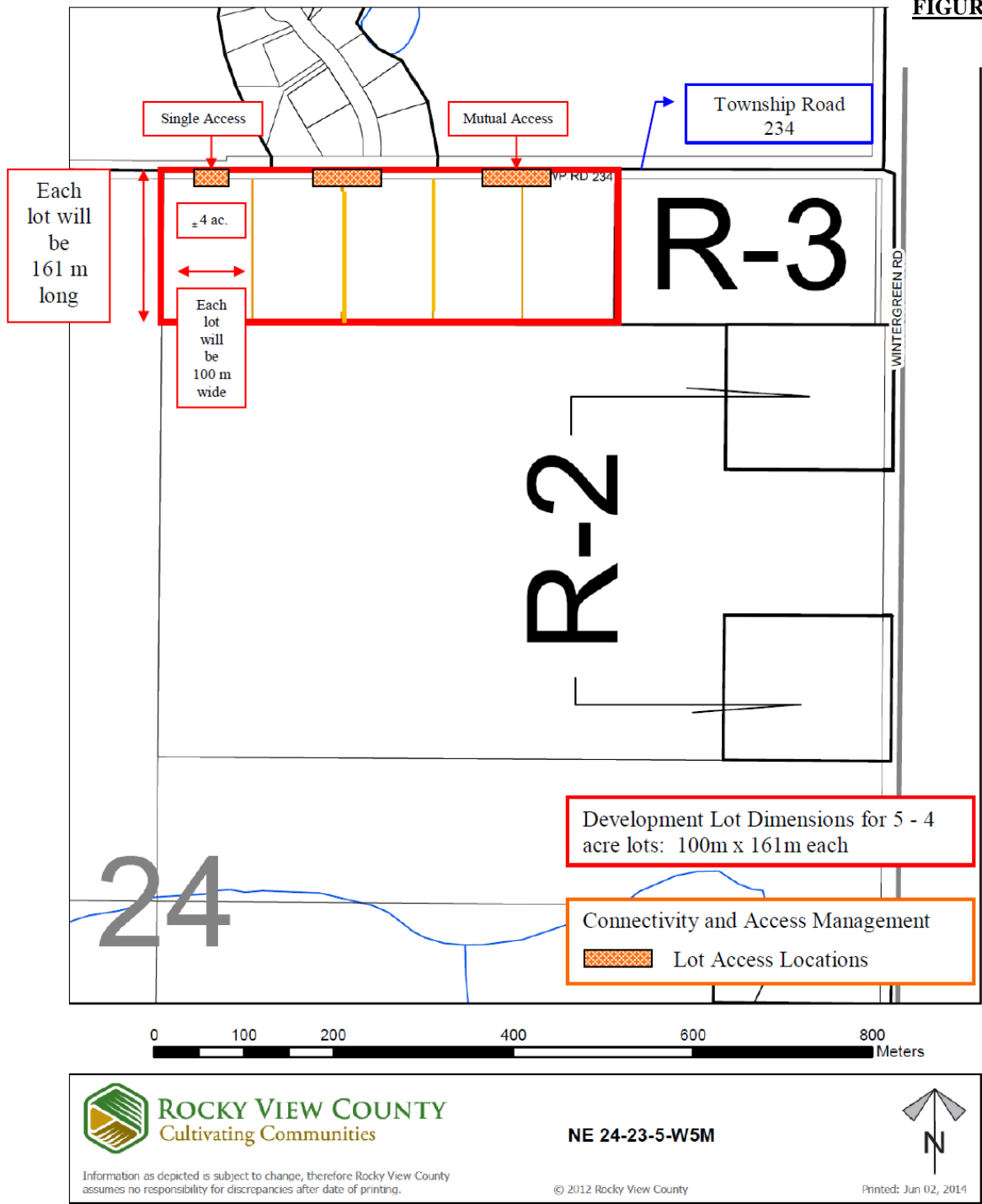
As provided in the Rocky View County Municipal Development Plan, during the past 15 years, the population of the Municipality has been steadily increasing from 1981 as a result of the generally robust Provincial economy, local job opportunities and the projected growth of the City of Calgary. The devastation of many local residences due to the Bragg Creek and area flood of June 2013 necessitates more development opportunities for local Bragg Creek residents to relocate to non-flood activity areas within Bragg Creek. The addition of 5 single family lots through the development of Wintergreen Forest Estates will provide opportunities for local or new families to relocate to the Bragg Creek area (based on an average 2.6 members per family, totalling potential increase of  $\pm 13$  people).

**FIGURE 6**





**FIGURE 7**



## **5.0 SERVICING STRATEGY**

### **5.1 Water Servicing**

An existing raw waterline operated and maintained by WinterGreen Woods Water Utility runs along the north side of Township Road 234 to the Wintergreen residential subdivision. The opportunity exists for connecting this water service to the proposed subdivision on Lot 1, Block 2, Plan 1311147 within NE 24-23-05-W5M. A piped water supply letter of confirmation from Wintergreen Woods Water Utility is attached (Appendix 4), which indicates that tie-in to the Wintergreen Woods Water Utility will be available.

It is assumed that the two other residential parcels, Lot 2, Block 2, Plan 1311147 within NE 24-23-05-W5M and portion of NE 24-23-05-W5M included in the Conceptual Scheme will continue to utilize existing water wells.

Policy 5.1.1 At the subdivision stage, the Developer shall provide confirmation from the Wintergreen Woods Water Utility Ltd. stating that the Applicant has completed all paperwork for water supply request, that the Applicant has paid all necessary fees of said application and that the utility has sufficient capacity at the time of application to supply the needs of this Conceptual Scheme.

Policy 5.1.2 The Developer and/or Utility shall be responsible to construct and install water lines to the proposed subdivision.

Policy 5.1.3 At subdivision stage, a deferred servicing agreement shall be registered against each newly created parcel that is serviced by a communal water system to identify the owner's responsibility to connect to a regional water utility should one become reasonably available.

### **5.2 Sanitary/Wastewater Servicing**

A Sanitary/Wastewater Servicing Assessment (Private Sewage Treatment Systems Level III, "PSTS") was undertaken on Lot 1, Block 2, Plan 1311147 within NE-24-23-05-W5M by Almor Testing Services Ltd. on July 10, 2013 (Appendix 3). As per policy 6.1.3 of the Greater Bragg Creek Area Structure Plan.

Policy 5.2.1 At subdivision stage, the Owner/Developer shall enter into a Development Agreement (Site Services/Improvement Agreement) for the installation of Packaged Private Sewage Treatment System complying with NSF 40 and/or BNQ standards, in accordance with County Servicing Standards.

Policy 5.2.2 At Subdivision Stage, the Owner/Developer shall register a Deferred Services Agreement against each new certificate of title (lot) created, requiring the owner to tie into municipal services when they become available.

Lot 2, Block 2, Plan 1311147 within NE 24-23-05-W5M and portion of NE-25-23-05-W5M both have existing sanitary/wastewater servicing in place. Further investigation is required if infill developments are to occur on these two parcels.

### 5.3 Stormwater Management

Stormwater management shall address sedimentation, erosion controls and runoff for Wintergreen Forest Estates. The goal of managing stormwater within Wintergreen Forest Estates is to maintain as much of the natural drainage characteristics as possible. The concept to manage stormwater within the site proposes to positively maintain the pre-development stormwater characteristics of the site.

- Policy 5.3.1 At the subdivision stage, a Stormwater Management Plan shall be submitted to the satisfaction of the County. The Stormwater Management Plan shall demonstrate how additional runoff arising from the ultimate development of the site will be managed in terms of both quality and quantity. The Stormwater Management Plan should also determine the size of the stormwater facility, if any, and will dictate the size of the Public Utility Lot required for the proposed subdivision and development.
- Policy 5.3.2 At the subdivision stage, a Stormwater Management Report and detailed stormwater servicing design shall be submitted. This includes, but is not limited to, any improvements related to water re-use, Low Impact Development measures, purple pipe systems, and irrigation systems for the proposed development in accordance with the County Servicing Standards and any applicable Provincial regulations, standards, and/or guidelines.
- Policy 5.3.3 All improvements as identified in the Stormwater Management Plan and Report as prescribed in Policy 5.3.1 and 5.3.2, if any, shall be registered on title at the subdivision stage as a Site Improvement/Services Agreement (Development Agreement).
- Policy 5.3.4 Any related provincial licensing and registration requirements shall be the sole responsibility of the Developer.
- Policy 5.3.5 Prior to stripping and grading any portion of the Plan's Stormwater area, excluding the construction of individual lot accesses, the Stormwater Management Plan as required in Policy 5.3.1 and its recommendations, including sedimentation and erosion controls must be implemented by the Developer.
- Policy 5.3.6 All new development shall address the implementation of Best Management Practices for water quality in accordance with the adopted Bragg Creek Master Drainage Plan and in accordance with the County Servicing Standards, to the satisfaction of the County.

### 5.4 Solid Waste Management

The disposal of solid waste will be in accordance with Rocky View County's Solid Waste Management plan, encouraging reducing, reusing, recycling and disposing household solid waste. Rocky View County's Bragg Creek transfer site will be utilized for solid waste materials.

Policy 5.4.1 The disposal of solid waste shall be in accordance with Rocky View County's Solid Waste Management plan, encouraging reducing, reusing, recycling and disposing household solid waste.

## 5.5 Protective Services

Fire station 101 in Elbow Valley and/or Red Wood Meadows will be utilized for emergency fire situations.

Medical emergencies in Rocky View County are served by ground ambulances operated by Alberta Health Services. Medical services can be accessed by calling 9-1-1.

Rocky View County is policed by the RCMP from three detachments: Airdrie, Cochrane and Strathmore. Bylaw services officers in the Bragg Creek area report as required.

Policy 5.5.1 To accommodate emergency vehicles, mutual and single accesses shall be in accordance with County Servicing Standards, as amended.

Policy 5.5.2 Address signage shall meet FireSmart standards, including material, colour and reflectivity.

## 5.6 Shallow Utilities

Shallow utilities include services such as telephone, natural gas, and electrical. A utility easement has been registered on the plan area by ATCO Gas, and TELUS will also have a utility easement on the plan area, both of which will be placed underground. Fortis Alberta Inc., as the distributor/provider of wire service for the plan area has indicated no objection and no easement requirements, with the developer to arrange installation of electrical services for this subdivision with FortisAlberta.

Policy 5.6.1 Shallow utilities including telephone, natural gas and electrical shall be provided to the individual lots in the Plan Area in accordance with provider recommendations and provisions.

## **6.0 STATUTORY PLAN COMPLIANCE**

### **6.1 Municipal Development Plan (MDP) – County Plan**

The Wintergreen Forest Estates proposal complies with County Plan Bylaw C-7280-2013 as a country residential community development conforming to the Greater Bragg Creek Area Structure Plan. The development will be guided by the goals and policies of the Greater Bragg Creek Area Structure Plan, encouraging quality building while maintaining the rural character that is compatible with the surrounding areas.

### **6.2 Area Structure Plan (ASP) – Greater Bragg Creek Area Structure Plan**

The Wintergreen Forest Estates Conceptual Scheme provides information as required by the Greater Bragg Creek Area Structure Plan, including a future land use scenario, compatibility with adjacent land use, population densities and projections, identification of lands to be dedicated including, shallow utilities servicing strategies, municipal reserves, traffic effects, community trail system alignments, and water and/or wastewater systems.

## **7.0 IMPLEMENTATION**

### **7.1 Proposed Landscaping Guidelines and Architectural Controls**

Proposed landscaping will be recommended to follow guidelines as indicated in the Alberta FireSmart Development Standards, relating to structural and vegetation management.

Architectural controls relating to Alberta FireSmart Structural recommendations will be addressed at the Development Permit stage which will include the requirement for use of ULC rated non-combustible roofing materials and fire-resistant siding materials.

Policy 7.1.1 Pursuant to the provisions of the Greater Bragg Creek Area Structure Plan (Greater Bragg Creek ASP), this Conceptual Scheme shall be appended to the Greater Bragg Creek ASP.

Policy 7.1.2 The policies of this Conceptual Scheme shall be implemented through the redesignation and subdivision approval process.

Policy 7.1.3 Alberta FireSmart Structural recommendations will be addressed at the development stages through building permit process.

## 8.0 POLICY SUMMARY

- Policy 2.1.1 Policies contained in the Wintergreen Forest Estates Conceptual Scheme shall apply to the “Plan Area” as identified in Figure 2.
- Policy 2.1.2 Redesignation, subdivision, and development of the subject lands shall conform to the policies of the Wintergreen Forest Estates Conceptual Scheme.
- Policy 3.1.1 At subdivision stage, an updated Slope Stability Assessment and/or Geotechnical Report prepared by a qualified professional in accordance with County Servicing Standards may be required to evaluate the soil characteristics, existing groundwater conditions, development constraints, and to demonstrate that there is a minimum of one contiguous developable acre for each of the proposed parcels to the satisfaction of the County.
- Policy 3.2.1 Wherever possible, the disturbance and removal of natural vegetation and significant areas of trees shall be minimized, while incorporating vegetation management as outlined in the Provincial FireSmart guidelines.
- Policy 3.2.2 Proposed subdivision layout and vegetation management on site should recognize and mitigate susceptibility to wildfire risks (e.g. appropriate clearing of building sites, and access to all building sites for emergency service apparatus and equipment).
- Policy 3.2.3 Vegetation Management recommendations of the Wildfire Risk Assessment report shall be registered as a restrictive covenant on title for future subdivision within the Plan area and shall be considered at the development permit stage.
- Policy 3.5.1 Utilities installations and easement/agreement registrations shall be subject to conditions as set forth by the applicable utility agencies and will be addressed at subdivision stage.
- Policy 4.0.1 The minimum lot size of parcels within the Plan area shall be four (4) acres.
- Policy 4.0.2 Future development on site shall adhere to FireSmart Guidelines.
- Policy 4.0.3 At subdivision stage, the Owner/Developer shall register a restrictive covenant on each new parcel to ensure:
- all buildings, including accessory buildings, are Sprinklered to the appropriate NFPA standard;
  - Non-combustible building materials are used on the siding, roof, and eaves area of the building;
  - A fire resistance rating/barrier is installed between the siding and the sheathing;

- Special separation between all buildings is increased to reduce the spread of a wildfire; and
- The properties are evaluated by an accredited professional that specializes in wildfire prevention, to ensure that the vegetation and any other hazards are properly mitigated.

- Policy 4.1.1 At future Subdivision stage, a five (5) metres strip of land shall be dedicated, by Plan of Survey, as a road Right-of-Way (ROW) along the eastern boundary of the Plan Area, facing Wintergreen Road.
- Policy 4.1.2 The proposed parcels shall be accessed by mutual approaches from Township Road 234, as shown on Figure 7, and shall be protected by Access Right-of-Way Plan and associated Easement Agreement at time of subdivision.
- Policy 4.1.3 The preferred alignment for approaches should minimize environmental impacts and be pursuant to the policies contained in the Greater Bragg Creek Area Structure Plan.
- Policy 4.1.4 Access point to Township Road 234 shall comply with engineering requirements for emergency vehicle access.
- Policy 4.1.5 Signage in accordance with FireSmart Guideline access standards & Wildfire Risk Assessment Recommendation.
- Policy 4.1.6 At Subdivision stage, the Owner/Developer shall enter into a Development Agreement pursuant to Section 655 of the Municipal Government Act respecting provision of the construction of a temporary cul-de-sac at the west end of Township Road 234, and register any necessary easement agreements, at the Owner's expense in accordance with the County Servicing Standards, as amended.
- Policy 4.1.7 At subdivision stage, the Owner/Developer shall provide payment of the Transportation Offsite Levy, in accordance with applicable levy at the time of subdivision approval, as amended, for the total gross acreage of the lands proposed to be subdivided.
- Policy 4.2.1.1A six (6) metre wide linear Municipal Reserve shall be dedicated along the eastern boundary of the Plan Area fronting Wintergreen Road to accommodate a future County pathway. Any remainder Municipal Reserve shall be taken as cash in lieu.
- Policy 4.2.1.2 A six (6) metre wide linear Municipal Reserve shall be dedicated along the northern boundary of the Plan Area fronting Township Road 234 to accommodate a future County pathway. Any remainder Municipal Reserve shall be taken as cash in lieu.
- Policy 5.1.1 At the subdivision stage, the Developer shall provide confirmation from the Wintergreen Woods Water Utility Ltd. stating that the Applicant has completed all paperwork for water supply request, that the Applicant has paid all necessary fees of said application and that the utility has sufficient



capacity at the time of application to supply the needs of this Conceptual Scheme.

- Policy 5.1.2 The Developer and/or Utility shall be responsible to construct and install water lines to the proposed subdivision.
- Policy 5.1.3 At subdivision stage, a deferred servicing agreement shall be registered against each newly created parcel that is serviced by a communal water system to identify the owner's responsibility to connect to a regional water utility should one become reasonably available.
- Policy 5.2.1 At subdivision stage, the Owner/Developer shall enter into a Development Agreement (Site Services/Improvement Agreement) for the installation of Packaged Private Sewage Treatment System complying with NSF 40 and/or BNQ standards, in accordance with County Servicing Standards.
- Policy 5.2.2 At Subdivision Stage, the Owner/Developer shall register a Deferred Services Agreement against each new certificate of title (lot) created, requiring the owner to tie into municipal services when they become available.
- Policy 5.3.1 At the subdivision stage, a Stormwater Management Plan shall be submitted to the satisfaction of the County. The Stormwater Management Plan shall demonstrate how additional runoff arising from the ultimate development of the site will be managed in terms of both quality and quantity. The Stormwater Management Plan should also determine the size of the stormwater facility, if any, and will dictate the size of the Public Utility Lot required for the proposed subdivision and development.
- Policy 5.3.2 At the subdivision stage, a Stormwater Management Report and detailed stormwater servicing design shall be submitted. This includes, but is not limited to, any improvements related to water re-use, Low Impact Development measures, purple pipe systems, and irrigation systems for the proposed development in accordance with the County Servicing Standards and any applicable Provincial regulations, standards, and/or guidelines.
- Policy 5.3.3 All improvements as identified in the Stormwater Management Plan and Report as prescribed in Policy 5.3.1 and 5.3.2, if any, shall be registered on title at the subdivision stage as a Site Improvement/Services Agreement (Development Agreement).
- Policy 5.3.4 Any related provincial licensing and registration requirements shall be the sole responsibility of the Developer.
- Policy 5.3.5 Prior to stripping and grading any portion of the Plan's Stormwater area, excluding the construction of individual lot accesses, the Stormwater Management Plan as required in Policy 5.3.1 and its recommendations, including sedimentation and erosion controls must be implemented by the Developer.

- Policy 5.3.6 All new development shall address the implementation of Best Management Practices for water quality in accordance with the adopted Bragg Creek Master Drainage Plan and in accordance with the County Servicing Standards, to the satisfaction of the County.
- Policy 5.4.1 The disposal of solid waste shall be in accordance with Rocky View County's Solid Waste Management plan, encouraging reducing, reusing, recycling and disposing household solid waste.
- Policy 5.5.1 To accommodate emergency vehicles, mutual and single accesses shall be in accordance with County Servicing Standards, as amended.
- Policy 5.5.2 Address signage shall meet FireSmart standards, including material, colour and reflectivity.
- Policy 5.6.1 Shallow utilities including telephone, natural gas and electrical shall be provided to the individual lots in the Plan Area in accordance with provider recommendations and provisions.
- Policy 7.1.1 Pursuant to the provisions of the Greater Bragg Creek Area Structure Plan (Greater Bragg Creek ASP), this Conceptual Scheme shall be appended to the Greater Bragg Creek ASP.
- Policy 7.1.2 The policies of this Conceptual Scheme shall be implemented through the redesignation and subdivision approval process.
- Policy 7.1.3 Alberta FireSmart Structural recommendations will be addressed at the development stages through building permit process.

## **9.0 APPENDICES**

9.1 Below is a list of appendices:

- Appendix 1 Terrain and Slope Stability Assessment - Rangeland Conservation Service Ltd.
- Appendix 2 Wildfire Analysis - Montane Forest Management
- Appendix 3 Private Sewage Treatment System – Level III Assessment - Almor Testing Services Ltd.
- Appendix 4 Confirmation of Water Source - Wintergreen Woods Water Utility
- Appendix 5 Summary of Public Consultation

Date: October 7, 2013  
Our File: 13-3629  
Via Email

RedQuest Developments Ltd.  
c/o Almor Testing Services Ltd.  
7505 - 40th Street S.E.  
Calgary, Alberta T2C 2H5

Attention: Mr. Jim Montgomery, P.Eng.  
Principal

Dear Sir:

Re: Wintergreen 20 Acre Subdivision, Bragg Creek  
Terrain and Slope Stability Assessment

As requested, Mr. Al Overend, M.Eng., P.Eng., of Rangeland Conservation Service Ltd., inspected the above noted site in your company on October 2, 2013. The purpose of the inspection was to walk the proposed five-lot subdivision and assess the terrain/slope stability aspects. An air photo base plan of the subdivision with apparent existing contours superimposed on is attached.

According to the contours, the steepest slopes, from 18 to 20 degrees or more, are in the northwest corner and along the northernmost portion of the site. The flattest areas are in the southwest corner and along portions of the southern boundary where the slopes are very gentle, less than 5 degrees. Terrain throughout the remainder of the site is gently to moderately sloping, *i.e.*, 5 to 15 degrees.

During the site inspection, it became evident that the contours shown on the plan are not accurate. While they show general trends, *i.e.*, overall the site slopes to the north and to the east, they do not reflect actual conditions. There are no steep slopes along the northernmost portion of the site, rather the terrain is very gently sloping, locally depressional. Moderate to locally moderately steep slopes, *i.e.*, 10 to 15 degrees plus, exist in the central portion and towards the southeastern corner. The terrain along the southern boundary is very gently sloping, excepting the southeastern portion which is moderately sloping. The discrepancy between the contour plan and actual conditions is likely due to the thick forest cover which exists at the site, making it difficult if not impossible to accurately map it from the air.

In summary, much of the terrain at the site is very gently to gently sloping, locally depressional, *i.e.*, between 0 and 10 degrees. As noted, there are some steeper segments, *i.e.*, 10 to 15 degrees. On this basis, there are no geotechnical concerns with respect to the overall stability of the site.



If you have any questions, please contact us at your convenience.

Sincerely,

RANGELAND CONSERVATION SERVICE LTD.

APEGA PERMIT NO. P11142



Al Overend, M.Eng., P.Eng.  
Senior Geotechnical Engineer









**FireSmart Wildfire Risk Assessment  
Rettie Country Residential Subdivision  
NE24-Twp23-Rge5-W5M**



**Prepared for:  
Bob Rettie, Developer**

**Prepared by:  
Stew Walkinshaw  
MONTANE  
Forest Management Ltd.  
Canmore, AB.  
(403)678-7054  
[montane@shaw.ca](mailto:montane@shaw.ca)**

**January 2014**

# 1 Overview

Montane Forest Management Ltd. was requested by Bob Rettie to prepare a Wildfire Risk Assessment to evaluate the threat of wildfire to the proposed multi-lot subdivision development in the NE1/4 Sec24-Twp23-Rge5-W5M (Map 1) and provide FireSmart recommendations to reduce that threat.

This Wildfire Risk Assessment provides the following:

- Wildfire Threat Assessment
- Proposed Development Standards
- Recommended FireSmart Development Standards



**Map 1 – Proposed NE24 Multi-Lot Subdivision**



## 2 Wildfire Threat Assessment

Wildfire threat was assessed for the proposed site and for the surrounding area to determine the threat of wildfire to the development.

### 2.1 Site Assessment

A FireSmart Area Hazard Assessment was conducted on the proposed development site to provide a standardized method of quantifying the wildfire threat. The Area Hazard Assessment evaluates five factors that influence wildfire behavior on the site (Figure 1).

**Forest Vegetation** - Forest vegetation on the site consists of a mixed-wood (M-1) fuel type predominated with coniferous white spruce/lodgepole pine (50-70%) and deciduous trembling aspen/balsam poplar (30-50%) (Photos 1 & 2).

**Surface Vegetation** - Surface vegetation consists of wild grass, shrubs, and scattered to abundant dead and down material (Photos 2 & 3).

**Ladder Fuels** - Ladder fuels are continuous due to heavy spruce limbs and a moderately dense white spruce understory (Photos 1-3).

**Slope & Position on Slope** - Slope is less than 10% on a northeast aspect at valley bottom/lower slope position.



**Photo 1 – Mixed-Wood Fuel Type**

Based on the factors above, the FireSmart Area Hazard Level is rated as **High** (Map 2) with the potential to support intense wildfire behavior.





**Photo 2 – Mixed-Wood Fuel Type on Proposed Development Area**



**Photo 3 – Surface, Ground, and Ladder Fuels on Proposed Development Area**

Figure 1: FireSmart Area Hazard Assessment

| FIRESMART AREA HAZARD ASSESSMENT FORM |                                   |                     |           |                            |         |       |  |
|---------------------------------------|-----------------------------------|---------------------|-----------|----------------------------|---------|-------|--|
| Factor                                | Characteristics and Point Ratings |                     |           |                            |         | Score |  |
| 12. Forest Vegetation (overstory)     | Deciduous                         | Mixedwood           |           | Coniferous                 |         | 15    |  |
|                                       |                                   |                     | Separated | Continuous                 |         |       |  |
|                                       | 0                                 | 15                  | 15        | 30                         |         |       |  |
| 13. Surface Vegetation                | Lawn or non-combustible material  | Wildgrass or shrubs |           | Dead & Down Woody Material |         | 10    |  |
|                                       |                                   |                     | Scattered | Abundant                   |         |       |  |
|                                       | 0                                 | 5                   | 5         | 15                         |         |       |  |
| 14. Ladder Fuels                      | Absent                            | Scattered           |           | Continuous                 |         | 10    |  |
|                                       | 0                                 | 5                   | 10        |                            |         |       |  |
| 15. Slope                             | 0-10%                             | 11-25%              |           | >25%                       |         | 0     |  |
|                                       |                                   | Even                | Gullied   | Even                       | Gullied |       |  |
|                                       | 0                                 | 4                   | 5         | 8                          | 10      |       |  |
| 16. Position on Slope                 | Valley Bottom or lower slope      | Mid-Slope           |           | Upper-Slope                |         | 0     |  |
|                                       | 0                                 | 3                   |           | 5                          |         |       |  |
| Total Score for Factors 12-16         |                                   |                     |           |                            |         | 35    |  |
| Area Hazard Level                     |                                   |                     |           |                            |         | High  |  |

Hazard Levels

Low <21 points

Moderate 21-29 points

High 30-35 points

Extreme >35 points

|   |
|---|
| <b>Remarks:</b><br>Heavier coniferous component 70/30 Spruce/Aspen in central to east end of area, west end is 50/50 Spruce/Aspen<br>Heavy dead & down material throughout the area<br>Ladders fuels are continuous from both Spruce limbs and moderately dense Spruce understory<br>Slope is <10% and will not affect fire behaviour |
|---|

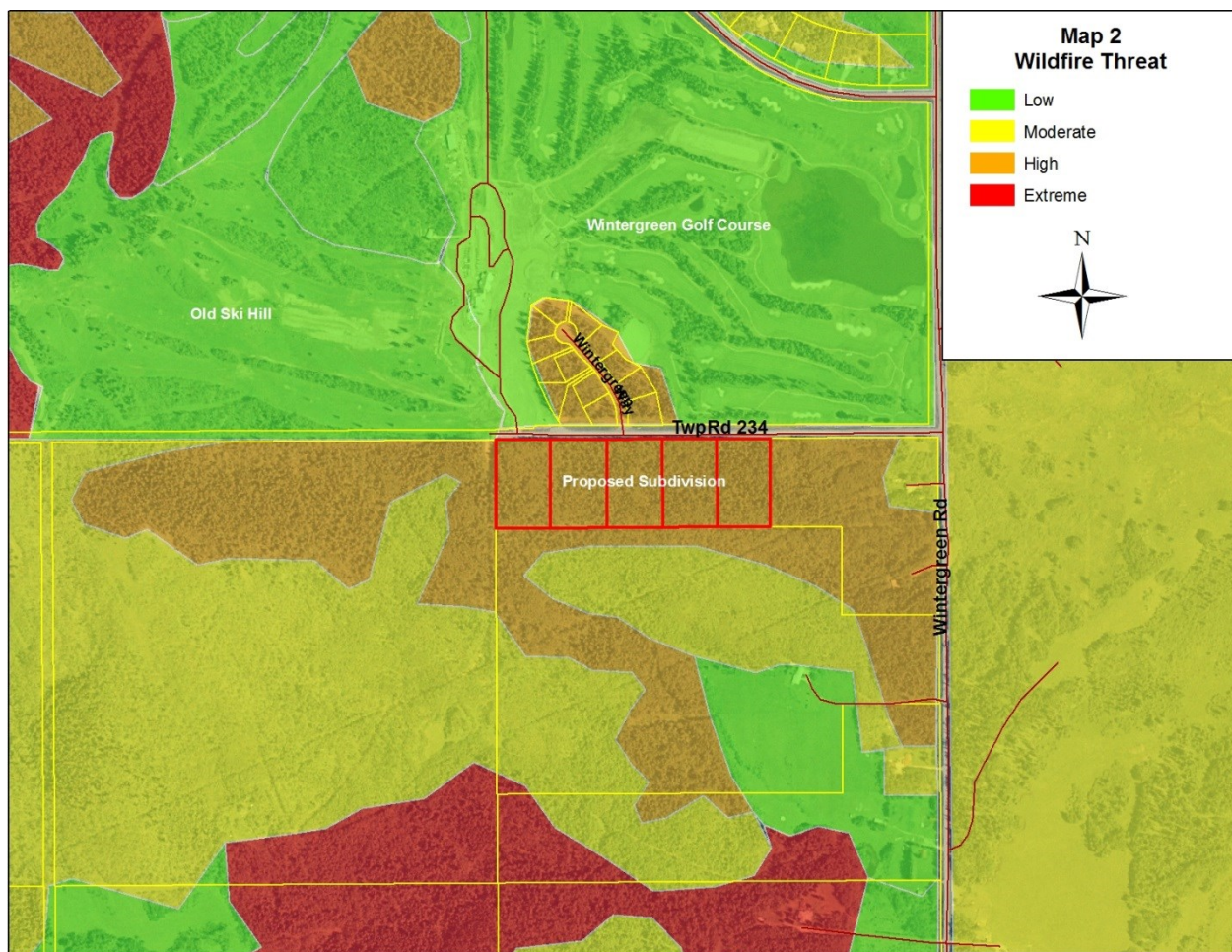


## 2.2 Landscape-Level Assessment

A landscape-level assessment of the area within 1 kilometre of the proposed development was completed using the provincial fire behaviour fuel type grid and Alberta vegetation inventory database. Wildfire potential surrounding the development area is varied based on wildland fuel types.

- The mixed-wood stand immediately west of the proposed development provides a High hazard path for wildfire to enter into the new development.
- The Wintergreen Golf Course and the old ski hill provide an excellent fuelbreak to the north of the proposed development.
- The mixed-wood stands to the south of the proposed development provide Moderate to High hazard, based on percentage of coniferous fuels.
- The brush and cured-grass fuels on the Tsuu T'ina Reserve to the east of the proposed development provide Moderate hazard and were the source of the Wintergreen wildfire in May of 1993 that threatened several homes north of the golf course.

High and Extreme hazard fuel types within one-kilometre of the proposed site present the threat of burning ember transport into the development.



### 3 Proposed Development Standards

The following development standards are currently proposed by the developer.

#### 3.1 Structural

| Feature | Proposed Standard   |
|---------|---|
| Roofing | <ul style="list-style-type: none"><li>• None proposed</li></ul> |
| Siding  | <ul style="list-style-type: none"><li>• None proposed</li></ul> |

#### 3.2 Infrastructure

| Feature                   | Proposed Standard   |
|---------------------------|---|
| Access                    | <p>Access Roads:</p> <ul style="list-style-type: none"><li>• TwpRd 234 will be main access – 9m paved travelled surface width</li></ul> <p>Access Driveways:</p> <ul style="list-style-type: none"><li>• Shared Access – 10m width</li><li>• Single Access – 6m width</li></ul> |
| Power                     | <ul style="list-style-type: none"><li>• Distribution power from existing overhead line on north-side of TwpRd234 – line is tree-free</li><li>• Service lines to each lot are proposed for underground installation</li></ul>  |
| Gas                       | <ul style="list-style-type: none"><li>• Underground natural gas</li></ul>   |
| Fire Service Water Supply | <ul style="list-style-type: none"><li>• None proposed</li><li>• Existing water supply includes:<ul style="list-style-type: none"><li>○ 2 fire hydrants at Wintergreen subdivision – dependability unknown</li><li>○ Water ponds on Wintergreen Golf Course</li></ul></li></ul>  |
| Address Signage           | <ul style="list-style-type: none"><li>• Address signs proposed – standards unknown</li></ul>  |

#### 3.3 Vegetation Management

| Feature                    | Proposed Standard   |
|----------------------------|---|
| Zone 1 Landscaping         | <ul style="list-style-type: none"><li>• None proposed</li></ul> |
| Zone 2-3 Fuel Modification | <ul style="list-style-type: none"><li>• None proposed</li></ul> |

## 4 Recommended FireSmart Development Standards

The following recommendations are offered to reduce the threat of wildfire to the proposed development. Refer to “*FireSmart – Protecting Your Community from Wildfire (PIP, 2003)*” at [www.firesmartcanada.ca](http://www.firesmartcanada.ca) for details.

| Option                | Recommendations  |
|-----------------------|--|
| Structural            | <ul style="list-style-type: none"><li>Require the use of ULC-rated non-combustible roofing materials</li><li>Require the use of fire-resistant siding materials</li></ul>  |
| Infrastructure        | <ul style="list-style-type: none"><li>Require an adequate turn-around for fire apparatus at the terminus of all dead-end driveways greater than 91 metres in length</li><li>Ensure that address signage meets FireSmart standards including material, color, and reflectivity</li><li>Consider the use of the Wintergreen golf course water ponds for fire service water supply during a wildfire incident</li></ul>   |
| Vegetation Management | <ul style="list-style-type: none"><li>Develop and implement a Zone 2-3 FireSmart fuel modification prescription (Photo 4) to reduce flammable wildland fuels on the <u>entire</u> development property through:<ul style="list-style-type: none"><li>Spacing of coniferous advanced-growth understory and regeneration</li><li>Removal of dead and down and dead standing material</li><li>Pruning of limbs on all residual coniferous trees</li></ul></li><li>Require lot owners to establish and maintain FireSmart Zone 1 defensible space standards for a minimum of 10 metres around each structure including but not limited to:<ul style="list-style-type: none"><li>Adequate clearance from flammable coniferous trees</li><li>Establishment of a minimum 1 metre non-combustible surface cover (gravel, rock, concrete) around the footprint of each structure and underneath un-skirted porch/deck areas</li><li>Require the use of only FireSmart landscaping species (Appendix I) within 10 metres of all structures</li></ul></li></ul> |



Photo 4 – Minimum Suggested Zone 2-3 Vegetation Management Standards



## Appendix I – List of Fire-Resistant Plants for Alberta

### Groundcovers and Herbaceous Perennial Plants

| Common Name                       | Genus and Species                  | Comments            |
|-----------------------------------|------------------------------------|---------------------|
| Bergenia                          | <i>Bergenia</i> spp.               | Very hardy          |
| Blanket Flower                    | <i>Gaillardia x grandiflora</i>    | Very hardy          |
| Bluegrass, Kentucky               | <i>Poa pratensis</i>               | Very hardy          |
| Buffalograss                      | <i>Buchloe dactyloides</i>         | Very hardy          |
| Candytuft, Evergreen              | <i>Iberis sempervirens</i>         | Very hardy          |
| Carpet bugle                      | <i>Ajuga reptans</i>               | Very hardy          |
| Cinquefoil, Spring                | <i>Potentilla tabernaemontanii</i> | Very hardy          |
| Columbine                         | <i>Aquilegia</i> spp.              | Very hardy          |
| Coral Bells                       | <i>Heuchera sanguinea</i>          | Very hardy          |
| Coreopsis                         | <i>Coreopsis</i> spp.              | Hardy               |
| Cotoneaster                       | <i>Cotoneaster</i> spp.            | Hardy               |
| Cotoneaster, Rock                 | <i>Cotoneaster horizontalis</i>    | Marginally hardy    |
| Cotoneaster, Bearberry            | <i>Cotoneaster dammerii</i>        | Hardy               |
| Daisy, Shasta                     | <i>Leucanthemum x superbum</i>     | Hardy               |
| Daylily                           | <i>Hemerocallis</i> spp.           | Very hardy          |
| Dusty Miller                      | <i>Artemisa stelleriana</i>        | Very hardy          |
| Fescue                            | <i>Festuca</i> spp.                | Very hardy          |
| Fescue, Blue                      | <i>Festuca cinerea</i>             | Very hardy          |
| Fescue, Tall                      | <i>Festuca arundinacea</i>         | Very hardy          |
| Fescue, Creeping Red              | <i>Festuca rubra</i>               | Very hardy          |
| Flax                              | <i>Linum</i> spp.                  | Very hardy          |
| Fleabane                          | <i>Erigeron</i> hybrids            | Very hardy          |
| Geranium, Hardy                   | <i>Geranium cinereum</i>           | Very hardy          |
| Geranium, Bloodred                | <i>Geranium sanguineum</i>         | Very hardy          |
| Geranium                          | <i>Geranium</i> spp.               | Hardy               |
| Ginger, Wild                      | <i>Asarum caudatum</i>             | Very hardy          |
| Hen and Chicks                    | <i>Sempervivum tectorum</i>        | Very hardy          |
| Iris                              | <i>Iris</i> spp.                   | Hardy               |
| Kinnickinnick                     | <i>Arctostaphylos uva-ursi</i>     | Very hardy          |
| Lambs Ear                         | <i>Stachys byzantina</i>           | Very hardy          |
| Lupine                            | <i>Lupinus</i> spp.                | Hardy               |
| Mahonia, Creeping                 | <i>Mahonia repens</i>              | Hardy               |
| Mock Strawberry                   | <i>Duchesnea indica</i>            | Very hardy          |
| Myrtle, Dwarf Periwinkle          | <i>Vinca minor</i>                 | Very hardy          |
| Penstemon, Rocky Mountain         | <i>Penstemon strictus</i>          | Very hardy          |
| Pinks                             | <i>Dianthus plumarius</i>          | Very hardy          |
| Poppy                             | <i>Papaver</i> spp.                | Very hardy          |
| Potentilla                        | <i>Potentilla</i> spp.             | Hardy               |
| Primrose, Mexican Evening         | <i>Oenothera berlandieri</i>       | Hardy               |
| Primrose                          | <i>Oenothera</i> spp.              | Hardy               |
| Pussytoes                         | <i>Antennaria</i> spp.             | Very hardy          |
| Ryegrass                          | <i>Lolium</i> spp.                 | Very hardy          |
| Sage                              | <i>Salvia</i> spp.                 | Very hardy to hardy |
| Sedum, Goldmoss                   | <i>Sedum acre</i>                  | Very hardy          |
| Snow-in-Summer                    | <i>Cerastium tomentosum</i>        | Very hardy          |
| Stonecrop                         | <i>Sedum spathulifolium</i>        | Hardy               |
| Stonecrop, Green                  | <i>Sedum album</i>                 | Very hardy          |
| Strawberry, Wild                  | <i>Fragaria chiloensis</i>         | Very hardy          |
| Thrift, Common                    | <i>America maritima</i>            | Very hardy          |
| Thyme, Wooly                      | <i>Thymus pseudolanuginosus</i>    | Very hardy          |
| Thyme, Creeping                   | <i>Thymus praecox articus</i>      | Very hardy          |
| Valerian, Red                     | <i>Centranthus ruber</i>           | Hardy               |
| Violet, Canadian                  | <i>Viola canadensis</i>            | Hardy               |
| Virginia Creeper                  | <i>Parthenocissus quinquefolia</i> | Very hardy          |
| Wheatgrass, Western               | <i>Agropyron cristatum</i>         | Very hardy          |
| Wheatgrass, Crested (low-growing) | <i>Agropyron cristatum</i>         | Very hardy          |
| Winterfat                         | <i>Eurotia</i> spp.                | Very hardy          |
| Yarrow                            | <i>Achillea</i> spp.               | Very hardy          |
| Yarrow, White                     | <i>Achillea millefolium white</i>  | Very hardy          |

|                  |   |            |
|------------------|---|------------|
| Yarrow, Fernleaf | <i>Achillea filipendulina</i>                   | Very hardy |
| Yarrow, Wooly    | <i>Achillea tomentosa</i> var. <i>Moonshine</i> | Very hardy |
| Yucca            | <i>Yucca filamentosa</i>                        | Hardy      |

## Trees

| Common Name           | Genus and Species             | Comments |
|-----------------------|-------------------------------|----------|
| Alder, White          | <i>Alnus rhombifolia</i>      | Hardy    |
| Ash                   | <i>Fraxinus spp.</i>          | Hardy    |
| Ash, Green            | <i>Fraxinus pennsylvanica</i> | Hardy    |
| Aspen, Quaking        | <i>Populus tremuloides</i>    | Hardy    |
| Birch                 | <i>Betula spp.</i>            | Hardy    |
| Cottonwood            | <i>Populus spp.</i>           | Hardy    |
| Hackberry             | <i>Celtis occidentalis</i>    | Hardy    |
| Rose family           | <i>Rosaceae</i>               | Hardy    |
| Maple                 | <i>Acer spp.</i>              | Hardy    |
| Maple, Big-toothed    | <i>Acer grandidentatum</i>    | Hardy    |
| Maple, Box Elder      | <i>Acer negundo</i>           | Hardy    |
| Maple, Rocky Mountain | <i>Acer glabrum</i>           | Hardy    |
| Olive, Russian        | <i>Eleagnus angustifolia</i>  | Hardy    |
| Poplar                | <i>Populus spp.</i>           | Hardy    |
| Narrowleaf Cottonwood | <i>Populus angustifolia</i>   | Hardy    |
| Prunus                | <i>Prunus spp.</i>            | Hardy    |

## Shrubs

| Common Name               | Genus and Species                      | Comments |
|---------------------------|--|----------|
| Blueberry                 | <i>Vaccinium</i>                       | Hardy    |
| Buckthorn                 | <i>Rhamnus spp.</i>                    | Hardy    |
| Buffaloberry              | <i>Shepherdia spp.</i>                 | Hardy    |
| Buffaloberry, Russett     | <i>Shepherdia canadensis</i>           | Hardy    |
| Buffaloberry, Silver      | <i>Shepherdia argentea</i>             | Hardy    |
| Cherry                    | <i>Prunus spp.</i>                     | Hardy    |
| Cherry, Sand              | <i>Prunus besseyi</i>                  | Hardy    |
| Cherry, Nanking           | <i>Prunus tomentosa</i>                | Hardy    |
| Chokecherry               | <i>Prunus virginiana</i>               | Hardy    |
| Cinquefoil, Shrubby       | <i>Potentilla fruticosa</i>            | Hardy    |
| Deerbrush (Buckbrush)     | <i>Ceanothus spp.</i>                  | Hardy    |
| Dogwood, Red-osier        | <i>Cornus sericea (C. stolonifera)</i> | Hardy    |
| Gooseberries and Currants | <i>Ribes spp.</i>                      | Hardy    |
| Honeysuckle               | <i>Lonicera spp.</i>                   | Hardy    |
| Lilac, Common             | <i>Syringa vulgaris</i>                | Hardy    |
| Mockorange                | <i>Philadelphus spp.</i>               | Hardy    |
| Plum, Native              | <i>Prunus americana</i>                | Hardy    |
| Raspberry                 | <i>Rubus spp.</i>                      | Hardy    |
| Roses                     | <i>Rosaceae</i>                        | Hardy    |
| Saltbush                  | <i>Atriplex spp.</i>                   | Hardy    |
| Sumac, Skunkbush          | <i>Rhus trilobata</i>                  | Hardy    |





## ALMOR TESTING SERVICES LTD.

7505 - 40 STREET S.E., CALGARY, AB T2C 2H5    PHONE (403) 236-8880 • FAX (430) 236-1707

2013 07 10

100-06-13

RedQuest Developments Ltd.  
Box 11, Site 6, RR 1  
Okotoks, Alberta  
T1S 1A1

Re:    Level III PSTS Assessment  
       Bob & Margaret Rettie Residence  
       Lot 1, Block 2, Plan 1311473, NE 24-23-5-W5  
       Wintergreen, Bragg Creek, Alberta

### 1.0    INTRODUCTION

Almor Testing Services Ltd. was retained to complete a Level III PSTS Assessment and Site Investigation, in accordance with Alberta Municipal Affairs Model Process (2011), Rocky View County and Alberta Private Sewage Systems Standard of Practice 2009, at the above referenced project. No consideration has been given to foundation soil conditions, within the building envelopes and does not include potential environmental factors, throughout the developmental area. An original preliminary report was completed in March, 2013 for this site, in the northwest portion.

The overall development consists of 20 acres, which has been subdivided into five 4 acre lots. (Figures 1 and 2). This subdivision is sloping downward in a south to north and west to east directions. All five lots consist of heavily forested areas. There are residences some 330m east and some 260m southeast. There is a subdivision to the north of Wintergreen Road. The subdivision consists of 12 residences backing on to the golf course. Overall, the total residences are at 14 lots per quarter section, which is considered low to moderate residential development. Figure 5 illustrates the 19 lots within a 600m radius, which is still moderate at less than 30 lots. Since the lots in the new subdivision are less than 4 acres in area, they do require a packaged Sewer Treatment system meeting BNQ standards (NQ3890-910, Class III and Class V).

These lots are to be serviced by water wells, which one was tested to have a low SAR value of less than 6, therefore Sodium Absorption Ratio is not an issue with these developments and septic fields and an existing water well in Lot 5, is some 122m north of the south property line. A well is present at 680m northwest of this site and three at a minimum 241m to the south of this site (Figure 4).

Surface water adjacent to the lots consists of fluctuating water ponds, within the golf course, north of Wintergreen Road, located some 280m northeast of Lot 1 and another water pond some 275m north of the septic field of Lot 3 (Figure 1). There is a lake some 440m northeast of the septic field of Lot 1.

.../2

We expect the proposed residences to be constructed may be 4 bedrooms, with a daily sewage volume of approximately 2040 L/day (450 gal/day).

The topographic relief of the lots is as follows: Lot 1 has a slope of 7-10%, 8% at Test Pit 2 and a 4% slope at Test Pit 1. Lot 2 test pit has a 6% slope in a south to north direction. Lots 3, 4 and 5 have slopes of less than 4% (Figure 3).

The clearances for a Shallow Treatment Field proposed are:

- 1.5m to a property line
- 15m from a water source
- 15m from a water course
- 5m from a septic tank or packaged sewage treatment plant
- 10m from a basement, cellar or crawl space
- 1m from a building with no basement, cellar or crawl space

These lots are suitable for these conditions from a site observations review.

The test pits were advanced on June 11, 2013, by a backhoe. These pits were advanced, within proposed septic tile field locations to obtain soil texture analyses. Refer to Plates 1 to 10 attached for the Test Pit Logs. The Site Contours and Air Photo Plans for the locations in each lot are on Figures 1, 2 and 3.

## **2.0 SUBSURFACE CONDITIONS**

### **2.1 Soil Conditions**

The soil conditions, within the field locations tested (excluding the surficial topsoil and lesser "browns" horizon), consisted mainly of granular silty clay loam, clay loam and clay soils. Heavy clay and silty clay were encountered in Test Pits 7, 8, 9 and 10. The soils were in a damp to moist condition. Natural moisture contents ranged from 10% to 35%. The soils were considered to be well drained.

### **2.2 Groundwater Conditions**

Monitoring of the groundwater conditions was conducted, during excavation of the test pits. No water intrusion was observed, as well as no limiting layer.

Typically, highest groundwater conditions are experienced, during the months of June to August, as they are periods of groundwater table recharge and therefore seasonal fluctuation is then taken into consideration, if water is encountered. It is apparent, the near surface water table is presently below a vertical distance of 1.5m from the weeping lateral trench bottom, as specified by Alberta Environmental Protection guidelines for location of disposal fields, in this time period. Water table is not a consideration, with the well drained subsoils.



### 3.0 LABORATORY TESTING

A Grain Size Analysis laboratory testing program, meeting applicable ASTM and/or CSA standards was undertaken on the samples secured in the field. The results of the testing are presented in the following tables:

**Table 1: Soil Classification**

| Test Pit | Depth (m) | Moisture Content (%) | Grain Size Distribution |      |      |      | Soil Classification | Loading Rate (l/day/m <sup>2</sup> ) |
|----------|-----------|----------------------|-------------------------|------|------|------|---------------------|--------------------------------------|
|          |           |                      | Gravel                  | Sand | Silt | Clay |                     |                                      |
| 1        | 0.9       | 18                   | 1.8                     | 20.8 | 41.5 | 35.9 | Clay Loam           | 8.9                                  |
| 2        | 0.9       | 15.4                 | 6.5                     | 23.9 | 39.5 | 30.1 | Clay Loam           | 13.2                                 |
| 3        | 0.9       | 16.1                 | 10.1                    | 17.7 | 40.1 | 32.1 | Silty Clay Loam     | 13.2                                 |
| 4        | 0.9       | 18.5                 | 6.7                     | 4.1  | 34.6 | 54.6 | Silty Clay          | 0.0                                  |
| 5        | 0.9       | 14.1                 | 1.4                     | 24.4 | 37.0 | 37.2 | Clay Loam           | 8.8                                  |
| 6        | 0.9       | 18.7                 | 12.8                    | 6.5  | 28.3 | 52.4 | Silty Clay          | 0.0                                  |
| 7        | 0.9       | 14.1                 | 0.0                     | 3.9  | 32.4 | 63.7 | Heavy Clay          | 0.0                                  |
| 8        | 0.9       | 23.4                 | 10.9                    | 1.3  | 22.1 | 65.7 | Heavy Clay          | 0.0                                  |
| 9        | 0.9       | 18.8                 | 8.0                     | 12.4 | 31.6 | 48.0 | Silty Clay          | 0.0                                  |
| 10       | 0.9       | 23.0                 | 0.0                     | 0.7  | 27.6 | 71.7 | Heavy Clay          | 0.0                                  |

Attached are copies of the Grain Size Analyses completed on soil samples obtained at 0.9m in the test pits. The analyses are to be utilized for review of potential percolation rates of the proposed septic field subsoils. The results indicate, from Table 8.1.1.10, Alberta Private Sewage Systems Standard of Practice, June 2009, that the granular silty clay loam soils exhibit drainage rates of 13.2 litres/day/m<sup>2</sup>. The clay loam soils are suitable for 8.8 litres/day/m<sup>2</sup>. The clay soils in Lots 4 and 5 indicate no flow. Our initial report of March 1, 2013, indicated suitable soil conditions of 8.8 to 14.2 litres/day/m<sup>2</sup> in the north portion of Lots 4 and 5 and therefore should be located on the north portion. The subsoils are considered to be well drained, with no limiting layers to below 2.8m from grade. Perched groundwater is also not a consideration. Packaged Sewage Treatment systems are required, for the two acre lots.

### 4.0 CLOSURE

In review, the gradation texture of the soils from Lots 1 to 3, recorded at a depth of approximately 0.9m below existing grade, indicate an effluent loading rate of 8.8 to 13.2 litres/day/m<sup>2</sup>. The water table is below a minimum 2.4m from grade, in this time period. Therefore, we recommend the locations of the Test Pits in these locations are suitable for sewage treatment field systems and the site is considered Type I, well suited. We recommend field sizes of 232 m<sup>2</sup> (2500 ft<sup>2</sup>), for a four bedroom house, based on the soil gradation analyses and allowable loading rates. Other locations, with the minimum clearances noted, would also be suitable for PSTS systems in Lots 4 and 5 at the north portion.

However, review of gradation texture of soil from Test Pits 7 to 10 indicates high to very high consistency of clay, which makes the test locations unsuitable for sewage treatment field systems. Therefore, it is recommended an alternate system be required or the fields must be located in the north portions of these lots.

Information presented herein is based on the findings in the test pits advanced, our preliminary investigation in March and at the site and recognized professional engineering principles and practice. This report has been prepared for the exclusive use of Bob and Margaret Rettie and its agents for specific application to the proposed development described, within this report. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Almor accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

We trust this meets with your present requirements.

Respectfully submitted,  
ALMOR TESTING SERVICES LTD.

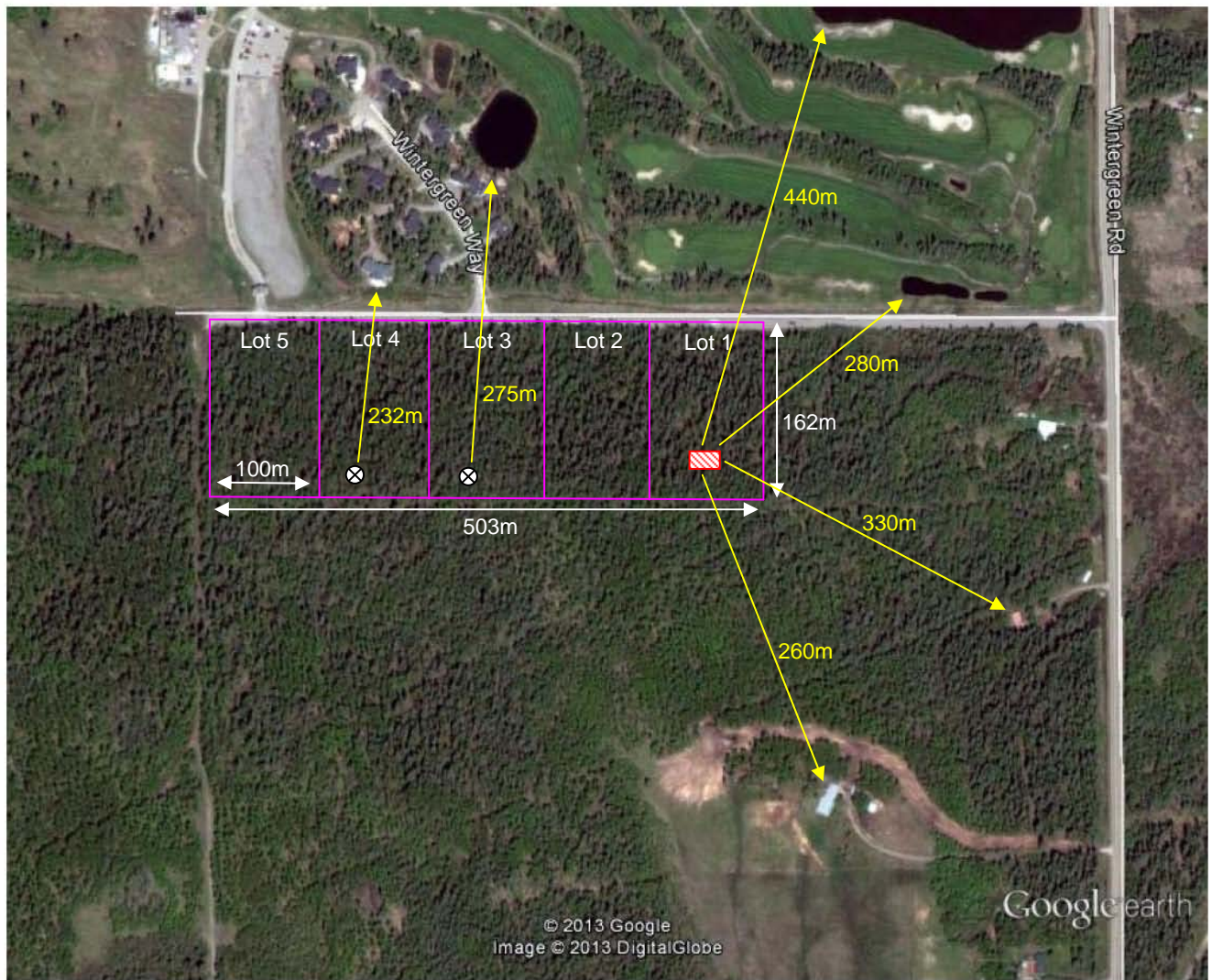


J.B. Montgomery, P.Eng.  
JBM:ms:A04136

\*APEGA Permit to Practice #P2260


Attachments







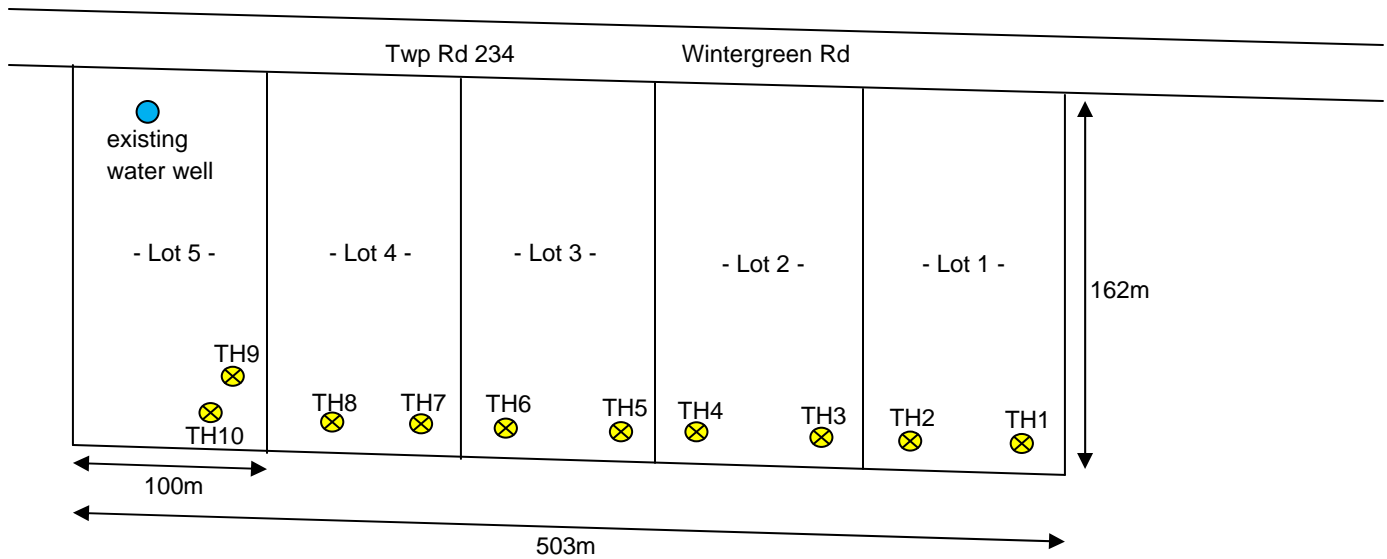
Google earth



 Supposed septic field

 Test Holes


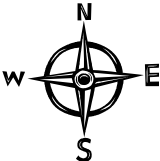
|   |   |   |
|---|---|---|
|  |  | Bob & Margaret Rettie Residence<br>Wintergreen, Bragg Creek |
|   |   | Job: 100-06-13  |
|   |   | Figure: 1   |



#### Approximate Test Hole Locations:

TH1: 25-30m E of WPL, 25-30m N of SPL  
 TH2: 10m E of WPL, 15-20m N of SPL  
 TH3: 20-25m W of EPL, 25-30m N of SPL  
 TH4: 30-35m E of WPL, 15-20m N of SPL  
 TH5: 25-30m W of EPL, 15m N of SPL  
 TH6: 50-55m E of WPL, 15-20m N of SPL  
 TH7: 45-50m E of WPL, 20-25m N of SPL  
 TH8: 25-30m E of WPL, 25-30m N of SPL  
 TH9: 10-15m W of EPL, 50-55m N of SPL  
 TH10: 25-30m W of EPL, 25-30m N of SPL

Water Well in Lot 5: 122m N of SPL, 40m E of WPL



|   |   |   |
|---|---|---|
|  |  | Bob & Margaret Rettie Residence<br>Wintergreen, Bragg Creek |
|   |   | Job: 100-06-13  |
|   |   | Figure: 2   |









|   |  |   |
|---|--|---|
|  |  | Bob & Margaret Rettie Residence<br>Wintergreen, Bragg Creek |
|   |  | Job: 100-06-13  |
|   |  | Figure: 4   |







Google earth

feet 3000  
km 1



|   |   |   |
|---|---|---|
|  |  | Bob & Margaret Rettie Residence<br>Wintergreen, Bragg Creek |
|   |   | Job: 100-06-13  |
|   |   | Figure: 5   |

Alberta Private Sewage Treatment System Soil Profile Log Form

|  |                    |               |                                   |              |                      |  |          |                          |                        |             |                        |                       |
|--|--------------------|---------------|-----------------------------------|--------------|----------------------|--|----------|--------------------------|------------------------|-------------|------------------------|-----------------------|
| Owner Name or Job ID.     Bob & Margaret Rettie – Wintergreen, Bragg Creek |                    |               |                                   |              |                      |  |          |                          |                        |             |                        |                       |
| Legal Land Location  |                    |               |                                   |              |                      |  |          | Test Pit GPS Coordinates |                        |             |                        |                       |
| LSD-1/4  | Sec                | Twp           | Rg                                | Mer          | Lot                  | Block  | Plan     | Easting                  |                        | Northing    |                        |                       |
| NE   | 24                 | 23            | 5                                 | W5           | 1                    | 2  | 131147   |                          |                        |             |                        |                       |
| Vegetation notes:<br>Grass Covered   |                    | Heavily treed |                                   |              |                      | Overall site slope %                               |          | Gentle Slopes – Class 4  |                        |             |                        |                       |
|  |                    |               |                                   |              |                      | Slope position of test pit:                        |          | Upper - mid              |                        |             |                        |                       |
|  |                    |               |                                   |              |                      |  |          |                          |                        |             |                        |                       |
| Test Pit No.   |                    | Soil Subgroup |                                   |              | Parent Material      |  | Drainage |                          | Depth of Lab sample #1 |             | Depth of Lab sample #2 |                       |
| 1  |                    |               |                                   |              |                      |  | Rapidly  |                          | 0.9m                   |             |                        |                       |
| Hori-<br>zon   | Depth<br>(cm) (in) |               | Texture                           | Lab or<br>HT | Colour               | Gleying  | Mottling | Structure                | Grade                  | Consistence | Moisture               | % Coarse<br>Fragments |
| A  | 0 – 11cm           |               | LVFS                              |              | Dark Brown,<br>Black | None   | None     | MA                       | Weak                   | Loose       | Moist                  |                       |
| B  | 11cm – 50cm        |               | SICL                              |              | Medium brown         | None   | Few      | MA                       | Weak                   | Friable     | Moist                  |                       |
| C  | 50cm – 240cm       |               | CL                                |              | Olive grey           | Minor  | Common   | FABK                     | Moderate               | Firm        | Moist                  |                       |
|  |                    |               |                                   |              |                      |  |          |                          |                        |             |                        |                       |
| Depth to Groundwater   |                    |               | None                              |              |                      | Restricting Soil Layer Characteristic              |          |                          | None                   |             |                        |                       |
| Depth to Seasonally Saturated Soil   |                    |               | None                              |              |                      | Depth to restrictive Soil Layer                    |          |                          | None                   |             |                        |                       |
| Site Topography  |                    |               | Slopes generally to the N<br>& NE |              |                      | Depth to Highly Permeable Layer Limiting<br>Design |          |                          | None                   |             |                        |                       |
| Weather Condition notes:    showers – max 14 degrees                       |                    |               |                                   |              |                      |  |          |                          |                        |             |                        |                       |
| Comments:  |                    |               |                                   |              |                      |  |          |                          |                        |             |                        |                       |
|  |                    |               |                                   |              |                      |  |          |                          |                        |             |                        |                       |
|  |                    |               |                                   |              |                      |  |          |                          |                        |             |                        |                       |



Alberta Private Sewage Treatment System Soil Profile Log Form

|   |                    |               |                                   |              |                      |  |          |                          |          |                        |          |                       |
|---|--------------------|---------------|-----------------------------------|--------------|----------------------|--|----------|--------------------------|----------|------------------------|----------|-----------------------|
| Owner Name or Job ID.    Bob & Margaret Rettie – Wintergreen, Bragg Creek |                    |               |                                   |              |                      |  |          |                          |          |                        |          |                       |
| Legal Land Location   |                    |               |                                   |              |                      |  |          | Test Pit GPS Coordinates |          |                        |          |                       |
| LSD-1/4   | Sec                | Twp           | Rg                                | Mer          | Lot                  | Block  | Plan     | Easting                  | Northing |                        |          |                       |
| NE  | 24                 | 23            | 5                                 | W5           | 1                    | 2  | 131147   |                          |          |                        |          |                       |
| Vegetation notes:<br>Grass Covered  |                    | Heavily treed |                                   |              |                      | Overall site slope %                               |          | Gentle Slopes – Class 4  |          |                        |          |                       |
|   |                    |               |                                   |              |                      | Slope position of test pit:                        |          | Upper - mid              |          |                        |          |                       |
|   |                    |               |                                   |              |                      |  |          |                          |          |                        |          |                       |
| Test Pit No.  |                    | Soil Subgroup |                                   |              | Parent Material      |  | Drainage | Depth of Lab sample #1   |          | Depth of Lab sample #2 |          |                       |
| 2   |                    |               |                                   |              |                      |  | Rapidly  | 0.9m                     |          |                        |          |                       |
| Hori-<br>zon  | Depth<br>(cm) (in) |               | Texture                           | Lab or<br>HT | Colour               | Gleying  | Mottling | Structure                | Grade    | Consistence            | Moisture | % Coarse<br>Fragments |
| A   | 0 – 12cm           |               | LVFS                              |              | Dark Brown,<br>Black | None   | None     | MA                       | Weak     | Loose                  | Moist    |                       |
| B   | 12cm – 50cm        |               | SICL                              |              | Medium brown         | None   | Few      | MA                       | Weak     | Friable                | Moist    |                       |
| C   | 50cm – 240cm       |               | CI                                |              | Olive grey           | Minor  | Common   | FABK                     | Moderate | Firm                   | Moist    |                       |
|   |                    |               |                                   |              |                      |  |          |                          |          |                        |          |                       |
| Depth to Groundwater  |                    |               | None                              |              |                      | Restricting Soil Layer Characteristic              |          |                          | None     |                        |          |                       |
| Depth to Seasonally Saturated Soil  |                    |               | None                              |              |                      | Depth to restrictive Soil Layer                    |          |                          | None     |                        |          |                       |
| Site Topography   |                    |               | Slopes generally to the N<br>& NE |              |                      | Depth to Highly Permeable Layer Limiting<br>Design |          |                          | None     |                        |          |                       |
| Weather Condition notes:    showers – max 14 degrees                      |                    |               |                                   |              |                      |  |          |                          |          |                        |          |                       |
| Comments:   |                    |               |                                   |              |                      |  |          |                          |          |                        |          |                       |
|   |                    |               |                                   |              |                      |  |          |                          |          |                        |          |                       |
|   |                    |               |                                   |              |                      |  |          |                          |          |                        |          |                       |

Alberta Private Sewage Treatment System Soil Profile Log Form

|  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
|--|-----------------|---------------|--------------------------------|-----------|-------------------|---|----------|-----------------------------|------------------------|-------------|------------------------|--------------------|
| Owner Name or Job ID.     Bob & Margaret Rettie – Wintergreen, Bragg Creek |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
| Legal Land Location  |                 |               |                                |           |                   |   |          | Test Pit GPS Coordinates    |                        |             |                        |                    |
| LSD-1/4  | Sec             | Twp           | Rg                             | Mer       | Lot               | Block   | Plan     | Easting                     |                        | Northing    |                        |                    |
| NE   | 24              | 23            | 5                              | W5        | 1                 | 2   | 131147   |                             |                        |             |                        |                    |
| Vegetation notes:<br>Grass Covered   |                 | Heavily treed |                                |           |                   | Overall site slope %                            |          | Very gentle slope – Class 3 |                        |             |                        |                    |
|  |                 |               |                                |           |                   | Slope position of test pit:                     |          | mid - upper                 |                        |             |                        |                    |
|  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
| Test Pit No.   |                 | Soil Subgroup |                                |           | Parent Material   |   | Drainage |                             | Depth of Lab sample #1 |             | Depth of Lab sample #2 |                    |
| 3  |                 |               |                                |           |                   |   | Rapidly  |                             | 0.9m                   |             |                        |                    |
| Horizon  | Depth (cm) (in) |               | Texture                        | Lab or HT | Colour            | Gleying   | Mottling | Structure                   | Grade                  | Consistence | Moisture               | % Coarse Fragments |
| A  | 0 – 10cm        |               | LVFS                           |           | Dark Brown, Black | None  | None     | MA                          | Weak                   | Loose       | Moist                  |                    |
| B  | 10cm – 60cm     |               | SICL                           |           | Medium brown      | None  | Few      | MA                          | Weak                   | Friable     | Very moist             |                    |
| C  | 60cm – 240cm    |               | SICL                           |           | Olive grey        | Minor   | Common   | MABK                        | Moderate               | Firm        | Moist                  |                    |
|  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
| Depth to Groundwater   |                 |               | None                           |           |                   | Restricting Soil Layer Characteristic           |          |                             | None                   |             |                        |                    |
| Depth to Seasonally Saturated Soil   |                 |               | None                           |           |                   | Depth to restrictive Soil Layer                 |          |                             | None                   |             |                        |                    |
| Site Topography  |                 |               | Slopes generally to the N & NE |           |                   | Depth to Highly Permeable Layer Limiting Design |          |                             | None                   |             |                        |                    |
| Weather Condition notes:    showers – max 14 degrees                       |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
| Comments:  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
|  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
|  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |

Alberta Private Sewage Treatment System Soil Profile Log Form

|   |                    |               |                                |           |                                       |                             |          |   |                        |             |                        |                    |
|---|--------------------|---------------|--------------------------------|-----------|---------------------------------------|-----------------------------|----------|---|------------------------|-------------|------------------------|--------------------|
| Owner Name or Job ID.    Bob & Margaret Rettie – Wintergreen, Bragg Creek |                    |               |                                |           |                                       |                             |          |   |                        |             |                        |                    |
| Legal Land Location   |                    |               |                                |           |                                       |                             |          | Test Pit GPS Coordinates                        |                        |             |                        |                    |
| LSD-1/4   | Sec                | Twp           | Rg                             | Mer       | Lot                                   | Block                       | Plan     | Easting   |                        | Northing    |                        |                    |
| NE  | 24                 | 23            | 5                              | W5        | 1                                     | 2                           | 131147   |   |                        |             |                        |                    |
| Vegetation notes:<br>Grass Covered  |                    | Heavily treed |                                |           |                                       | Overall site slope %        |          | Very gentle slope – Class 3                     |                        |             |                        |                    |
|   |                    |               |                                |           |                                       | Slope position of test pit: |          | mid - upper                                     |                        |             |                        |                    |
|   |                    |               |                                |           |                                       |                             |          |   |                        |             |                        |                    |
| Test Pit No.  |                    | Soil Subgroup |                                |           | Parent Material                       |                             | Drainage |   | Depth of Lab sample #1 |             | Depth of Lab sample #2 |                    |
| 4   |                    |               |                                |           |                                       |                             | Rapidly  |   | 0.9m                   |             |                        |                    |
| Horizon   | Depth<br>(cm) (in) |               | Texture                        | Lab or HT | Colour                                | Gleying                     | Mottling | Structure                                       | Grade                  | Consistence | Moisture               | % Coarse Fragments |
| A   | 0 – 12cm           |               | LVFS                           |           | Dark Brown, Black                     | None                        | None     | MA  | Weak                   | Loose       | Very moist             |                    |
| B   | 12cm – 50cm        |               | SICL                           |           | Medium brown                          | None                        | Few      | MA  | Weak                   | Friable     | Very moist             |                    |
| C   | 50cm – 240cm       |               | SIC                            |           | Olive grey                            | Minor                       | Common   | FABK  | Moderate               | Firm        | Moist                  |                    |
|   |                    |               |                                |           |                                       |                             |          |   |                        |             |                        |                    |
| Depth to Groundwater  |                    |               | None                           |           | Restricting Soil Layer Characteristic |                             |          | None  |                        |             |                        |                    |
| Depth to Seasonally Saturated Soil  |                    |               | None                           |           |                                       |                             |          | Depth to restrictive Soil Layer                 |                        |             | None                   |                    |
| Site Topography   |                    |               | Slopes generally to the N & NE |           |                                       |                             |          | Depth to Highly Permeable Layer Limiting Design |                        |             | None                   |                    |
| Weather Condition notes:    showers – max 14 degrees                      |                    |               |                                |           |                                       |                             |          |   |                        |             |                        |                    |
| Comments:   |                    |               |                                |           |                                       |                             |          |   |                        |             |                        |                    |
|   |                    |               |                                |           |                                       |                             |          |   |                        |             |                        |                    |
|   |                    |               |                                |           |                                       |                             |          |   |                        |             |                        |                    |



Alberta Private Sewage Treatment System Soil Profile Log Form

|  |                 |               |                                |           |                   |   |                             |           |                          |                             |                        |                    |
|--|-----------------|---------------|--------------------------------|-----------|-------------------|---|-----------------------------|-----------|--------------------------|-----------------------------|------------------------|--------------------|
| Owner Name or Job ID.     Bob & Margaret Rettie – Wintergreen, Bragg Creek |                 |               |                                |           |                   |   |                             |           |                          |                             |                        |                    |
| Legal Land Location  |                 |               |                                |           |                   |   |                             |           | Test Pit GPS Coordinates |                             |                        |                    |
| LSD-1/4  | Sec             | Twp           | Rg                             | Mer       | Lot               | Block   | Plan                        |           | Easting                  |                             | Northing               |                    |
| NE   | 24              | 23            | 5                              | W5        | 1                 | 2   | 131147                      |           |                          |                             |                        |                    |
| Vegetation notes:<br>Grass Covered   |                 |               | Heavily treed                  |           |                   |   | Overall site slope %        |           |                          | Very gentle slope – Class 3 |                        |                    |
|  |                 |               |                                |           |                   |   | Slope position of test pit: |           |                          | upper                       |                        |                    |
|  |                 |               |                                |           |                   |   |                             |           |                          |                             |                        |                    |
| Test Pit No.   |                 | Soil Subgroup |                                |           | Parent Material   |   | Drainage                    |           | Depth of Lab sample #1   |                             | Depth of Lab sample #2 |                    |
| 5  |                 |               |                                |           |                   |   | Rapidly                     |           | 0.9m                     |                             |                        |                    |
| Horizon  | Depth (cm) (in) |               | Texture                        | Lab or HT | Colour            | Gleying   | Mottling                    | Structure | Grade                    | Consistence                 | Moisture               | % Coarse Fragments |
| A  | 0 – 13cm        |               | LVFS                           |           | Dark Brown, Black | None  | None                        | MA        | Weak                     | Loose                       | Very moist             |                    |
| B  | 13cm – 35cm     |               | SICL                           |           | Medium brown      | None  | Few                         | MA        | Weak                     | Friable                     | Moist                  |                    |
| C  | 35cm – 1.0m     |               | CL                             |           | Olive grey        | Minor   | Common                      | FABK      | Moderate                 | Firm                        | Moist                  |                    |
| D  | 1.0 – 1.8m      |               | SIC Shale                      |           | Dark grey         | None  | None                        | MABK      | Moderate                 | Firm                        | Moist                  |                    |
| Depth to Groundwater   |                 |               | None                           |           |                   | Restricting Soil Layer Characteristic           |                             |           | None                     |                             |                        |                    |
| Depth to Seasonally Saturated Soil   |                 |               | None                           |           |                   | Depth to restrictive Soil Layer                 |                             |           | None                     |                             |                        |                    |
| Site Topography  |                 |               | Slopes generally to the N & NE |           |                   | Depth to Highly Permeable Layer Limiting Design |                             |           | None                     |                             |                        |                    |
| Weather Condition notes:    showers – max 14 degrees                       |                 |               |                                |           |                   |   |                             |           |                          |                             |                        |                    |
| Comments:  |                 |               |                                |           |                   |   |                             |           |                          |                             |                        |                    |
|  |                 |               |                                |           |                   |   |                             |           |                          |                             |                        |                    |
|  |                 |               |                                |           |                   |   |                             |           |                          |                             |                        |                    |

Alberta Private Sewage Treatment System Soil Profile Log Form

|  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
|--|-----------------|---------------|--------------------------------|-----------|-------------------|---|----------|-----------------------------|------------------------|-------------|------------------------|--------------------|
| Owner Name or Job ID.     Bob & Margaret Rettie – Wintergreen, Bragg Creek |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
| Legal Land Location  |                 |               |                                |           |                   |   |          | Test Pit GPS Coordinates    |                        |             |                        |                    |
| LSD-1/4  | Sec             | Twp           | Rg                             | Mer       | Lot               | Block   | Plan     | Easting                     |                        | Northing    |                        |                    |
| NE   | 24              | 23            | 5                              | W5        | 1                 | 2   | 131147   |                             |                        |             |                        |                    |
| Vegetation notes:<br>Grass Covered   |                 | Heavily treed |                                |           |                   | Overall site slope %                            |          | Very gentle slope – Class 3 |                        |             |                        |                    |
|  |                 |               |                                |           |                   | Slope position of test pit:                     |          | upper                       |                        |             |                        |                    |
|  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
| Test Pit No.   |                 | Soil Subgroup |                                |           | Parent Material   |   | Drainage |                             | Depth of Lab sample #1 |             | Depth of Lab sample #2 |                    |
| 6  |                 |               |                                |           |                   |   | Rapidly  |                             | 0.9m                   |             |                        |                    |
| Horizon  | Depth (cm) (in) |               | Texture                        | Lab or HT | Colour            | Gleying   | Mottling | Structure                   | Grade                  | Consistence | Moisture               | % Coarse Fragments |
| A  | 0 – 10cm        |               | LVFS                           |           | Dark Brown, Black | None  | None     | MA                          | Weak                   | Loose       | Very moist             |                    |
| B  | 10cm – 50cm     |               | SICL                           |           | Medium brown      | None  | Few      | MA                          | Weak                   | Friable     | Very moist             |                    |
| C  | 50cm – 200cm    |               | SIC                            |           | Olive grey        | Minor   | Common   | FABK                        | Moderate               | Firm        | Moist                  |                    |
| D  | 200cm – 220cm   |               | SIC Shale                      |           | Dark grey         | None  | Few      | MABK                        | Moderate               | Firm        | Moist                  |                    |
| Depth to Groundwater   |                 |               | None                           |           |                   | Restricting Soil Layer Characteristic           |          |                             | None                   |             |                        |                    |
| Depth to Seasonally Saturated Soil   |                 |               | None                           |           |                   | Depth to restrictive Soil Layer                 |          |                             | None                   |             |                        |                    |
| Site Topography  |                 |               | Slopes generally to the N & NE |           |                   | Depth to Highly Permeable Layer Limiting Design |          |                             | None                   |             |                        |                    |
| Weather Condition notes:    showers – max 14 degrees                       |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
| Comments:  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
|  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
|  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |

Alberta Private Sewage Treatment System Soil Profile Log Form

|   |                    |               |                                   |              |                      |  |          |                             |                        |             |                        |                       |
|---|--------------------|---------------|-----------------------------------|--------------|----------------------|--|----------|-----------------------------|------------------------|-------------|------------------------|-----------------------|
| Owner Name or Job ID.    Bob & Margaret Rettie – Wintergreen, Bragg Creek |                    |               |                                   |              |                      |  |          |                             |                        |             |                        |                       |
| Legal Land Location   |                    |               |                                   |              |                      |  |          | Test Pit GPS Coordinates    |                        |             |                        |                       |
| LSD-1/4   | Sec                | Twp           | Rg                                | Mer          | Lot                  | Block  | Plan     | Easting                     |                        | Northing    |                        |                       |
| NE  | 24                 | 23            | 5                                 | W5           | 1                    | 2  | 131147   |                             |                        |             |                        |                       |
| Vegetation notes:<br>Grass Covered  |                    | Heavily treed |                                   |              |                      | Overall site slope %                               |          | Very gentle slope – Class 3 |                        |             |                        |                       |
|   |                    |               |                                   |              |                      | Slope position of test pit:                        |          | mid slope                   |                        |             |                        |                       |
|   |                    |               |                                   |              |                      |  |          |                             |                        |             |                        |                       |
| Test Pit No.  |                    | Soil Subgroup |                                   |              | Parent Material      |  | Drainage |                             | Depth of Lab sample #1 |             | Depth of Lab sample #2 |                       |
| 7   |                    |               |                                   |              |                      |  | Rapidly  |                             | 0.9m                   |             |                        |                       |
| Hori-<br>zon  | Depth<br>(cm) (in) |               | Texture                           | Lab or<br>HT | Colour               | Gleying  | Mottling | Structure                   | Grade                  | Consistence | Moisture               | % Coarse<br>Fragments |
| A   | 0 – 17cm           |               | LVFS                              |              | Dark Brown,<br>Black | None   | None     | MA                          | Weak                   | Loose       | Very moist             |                       |
| B   | 17cm – 40cm        |               | SICL                              |              | Medium brown         | None   | Few      | MA                          | Weak                   | Friable     | Very moist             |                       |
| C   | 40cm – 240cm       |               | HC                                |              | Olive grey           | Minor  | Common   | MABK                        | Moderate               | Firm        | Moist                  |                       |
|   |                    |               |                                   |              |                      |  |          |                             |                        |             |                        |                       |
| Depth to Groundwater  |                    |               | None                              |              |                      | Restricting Soil Layer Characteristic              |          |                             | None                   |             |                        |                       |
| Depth to Seasonally Saturated Soil  |                    |               | None                              |              |                      | Depth to restrictive Soil Layer                    |          |                             | None                   |             |                        |                       |
| Site Topography   |                    |               | Slopes generally to the N<br>& NE |              |                      | Depth to Highly Permeable Layer Limiting<br>Design |          |                             | None                   |             |                        |                       |
| Weather Condition notes:    showers – max 14 degrees                      |                    |               |                                   |              |                      |  |          |                             |                        |             |                        |                       |
| Comments:   |                    |               |                                   |              |                      |  |          |                             |                        |             |                        |                       |
|   |                    |               |                                   |              |                      |  |          |                             |                        |             |                        |                       |



Alberta Private Sewage Treatment System Soil Profile Log Form

|  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
|--|-----------------|---------------|--------------------------------|-----------|-------------------|---|----------|-----------------------------|------------------------|-------------|------------------------|--------------------|
| Owner Name or Job ID.     Bob & Margaret Rettie – Wintergreen, Bragg Creek |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
| Legal Land Location  |                 |               |                                |           |                   |   |          | Test Pit GPS Coordinates    |                        |             |                        |                    |
| LSD-1/4  | Sec             | Twp           | Rg                             | Mer       | Lot               | Block   | Plan     | Easting                     |                        | Northing    |                        |                    |
| NE   | 24              | 23            | 5                              | W5        | 1                 | 2   | 131147   |                             |                        |             |                        |                    |
| Vegetation notes:<br>Grass Covered   |                 | Heavily treed |                                |           |                   | Overall site slope %                            |          | Very gentle slope – Class 3 |                        |             |                        |                    |
|  |                 |               |                                |           |                   | Slope position of test pit:                     |          | mid slope                   |                        |             |                        |                    |
|  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
|  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
| Test Pit No.   |                 | Soil Subgroup |                                |           | Parent Material   |   | Drainage |                             | Depth of Lab sample #1 |             | Depth of Lab sample #2 |                    |
| 8  |                 |               |                                |           |                   |   | Rapidly  |                             | 0.9m                   |             |                        |                    |
| Horizon  | Depth (cm) (in) |               | Texture                        | Lab or HT | Colour            | Gleying   | Mottling | Structure                   | Grade                  | Consistence | Moisture               | % Coarse Fragments |
| A  | 0 – 10cm        |               | LVFS                           |           | Dark Brown, Black | None  | None     | MA                          | Weak                   | Loose       | Very moist             |                    |
| B  | 10cm – 45cm     |               | SICL                           |           | Medium brown      | None  | Few      | MA                          | Weak                   | Friable     | Very moist             |                    |
| C  | 45cm – 240cm    |               | HC                             |           | Olive grey        | Minor   | Common   | FABK                        | Moderate               | Firm        | Moist                  |                    |
|  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
| Depth to Groundwater   |                 |               | None                           |           |                   | Restricting Soil Layer Characteristic           |          |                             | None                   |             |                        |                    |
| Depth to Seasonally Saturated Soil   |                 |               | None                           |           |                   | Depth to restrictive Soil Layer                 |          |                             | None                   |             |                        |                    |
| Site Topography  |                 |               | Slopes generally to the N & NE |           |                   | Depth to Highly Permeable Layer Limiting Design |          |                             | None                   |             |                        |                    |
| Weather Condition notes:    showers – max 14 degrees                       |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
| Comments:  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
|  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |
|  |                 |               |                                |           |                   |   |          |                             |                        |             |                        |                    |

# Alberta Private Sewage Treatment System Soil Profile Log Form

Owner Name or Job ID.     Bob & Margaret Rettie – Wintergreen, Bragg Creek

| Legal Land Location |     |     |    |     |     |       |        | Test Pit GPS Coordinates |          |
|---------------------|-----|-----|----|-----|-----|-------|--------|--------------------------|----------|
| LSD-1/4             | Sec | Twp | Rg | Mer | Lot | Block | Plan   | Easting                  | Northing |
| NE                  | 24  | 23  | 5  | W5  | 1   | 2     | 131147 |                          |          |

|                                    |               |                             |                             |
|------------------------------------|---------------|-----------------------------|-----------------------------|
| Vegetation notes:<br>Grass Covered | Heavily treed | Overall site slope %        | Very gentle slope – Class 3 |
|                                    |               | Slope position of test pit: | mid slope                   |
|                                    |               |                             |                             |

| Test Pit No. | Soil Subgroup | Parent Material | Drainage | Depth of Lab sample #1 | Depth of Lab sample #2 |
|--------------|---------------|-----------------|----------|------------------------|------------------------|
| 9            |               |                 | Rapidly  | 0.9m                   |                        |

| Hori-<br>zon | Depth<br>(cm) (in) | Texture | Lab or<br>HT | Colour               | Gleying | Mottling | Structure | Grade    | Consistence | Moisture   | % Coarse<br>Fragments |
|--------------|--------------------|---------|--------------|----------------------|---------|----------|-----------|----------|-------------|------------|-----------------------|
| A            | 0 – 12cm           | LVFS    |              | Dark Brown,<br>Black | None    | None     | MA        | Weak     | Loose       | Very moist |                       |
| B            | 12cm – 50cm        | SICL    |              | Medium brown         | None    | Few      | MA        | Weak     | Friable     | Very moist |                       |
| C            | 50cm – 240cm       | SIC     |              | Olive grey           | Minor   | Common   | MABK      | Moderate | Firm        | Moist      |                       |
|              |                    |         |              |                      |         |          |           |          |             |            |                       |

|                                    |                                |                                       |   |      |
|------------------------------------|--------------------------------|---------------------------------------|---|------|
| Depth to Groundwater               | None                           | Restricting Soil Layer Characteristic | None  |      |
| Depth to Seasonally Saturated Soil | None                           |                                       | Depth to restrictive Soil Layer                 | None |
| Site Topography                    | Slopes generally to the N & NE |                                       | Depth to Highly Permeable Layer Limiting Design | None |

Weather Condition notes:    showers – max 14 degrees

Comments:

Alberta Private Sewage Treatment System Soil Profile Log Form

|  |                 |               |                                |           |                   |   |                             |                          |                             |             |                        |                    |
|--|-----------------|---------------|--------------------------------|-----------|-------------------|---|-----------------------------|--------------------------|-----------------------------|-------------|------------------------|--------------------|
| Owner Name or Job ID.     Bob & Margaret Rettie – Wintergreen, Bragg Creek |                 |               |                                |           |                   |   |                             |                          |                             |             |                        |                    |
| Legal Land Location  |                 |               |                                |           |                   |   |                             | Test Pit GPS Coordinates |                             |             |                        |                    |
| LSD-1/4  | Sec             | Twp           | Rg                             | Mer       | Lot               | Block   | Plan                        | Easting                  |                             | Northing    |                        |                    |
| NE   | 24              | 23            | 5                              | W5        | 1                 | 2   | 131147                      |                          |                             |             |                        |                    |
| Vegetation notes:<br>Grass Covered   |                 |               | Heavily treed                  |           |                   |   | Overall site slope %        |                          | Very gentle slope – Class 3 |             |                        |                    |
|  |                 |               |                                |           |                   |   | Slope position of test pit: |                          | upper - mid slope           |             |                        |                    |
|  |                 |               |                                |           |                   |   |                             |                          |                             |             |                        |                    |
|  |                 |               |                                |           |                   |   |                             |                          |                             |             |                        |                    |
| Test Pit No.   |                 | Soil Subgroup |                                |           | Parent Material   |   | Drainage                    |                          | Depth of Lab sample #1      |             | Depth of Lab sample #2 |                    |
| 10   |                 |               |                                |           |                   |   | Rapidly                     |                          | 0.9m                        |             |                        |                    |
| Horizon  | Depth (cm) (in) |               | Texture                        | Lab or HT | Colour            | Gleying   | Mottling                    | Structure                | Grade                       | Consistence | Moisture               | % Coarse Fragments |
| A  | 0 – 8cm         |               | LVFS                           |           | Dark Brown, Black | None  | None                        | MA                       | Weak                        | Loose       | Very moist             |                    |
| B  | 8cm – 35cm      |               | SICL                           |           | Medium brown      | None  | Few                         | MA                       | Weak                        | Friable     | Very moist             |                    |
| C  | 35cm – 240cm    |               | HC                             |           | Olive grey        | Minor   | Common                      | FABK                     | Moderate                    | Firm        | Moist                  |                    |
|  |                 |               |                                |           |                   |   |                             |                          |                             |             |                        |                    |
| Depth to Groundwater   |                 |               | None                           |           |                   | Restricting Soil Layer Characteristic           |                             |                          | None                        |             |                        |                    |
| Depth to Seasonally Saturated Soil   |                 |               | None                           |           |                   | Depth to restrictive Soil Layer                 |                             |                          | None                        |             |                        |                    |
| Site Topography  |                 |               | Slopes generally to the N & NE |           |                   | Depth to Highly Permeable Layer Limiting Design |                             |                          | None                        |             |                        |                    |
| Weather Condition notes:    showers – max 14 degrees                       |                 |               |                                |           |                   |   |                             |                          |                             |             |                        |                    |
| Comments:  |                 |               |                                |           |                   |   |                             |                          |                             |             |                        |                    |
|  |                 |               |                                |           |                   |   |                             |                          |                             |             |                        |                    |
|  |                 |               |                                |           |                   |   |                             |                          |                             |             |                        |                    |





7505 - 40 Street SE  
Calgary, Alberta T2C 2H5  
Telephone: (403) 236-8880

# Grain Size Distribution

ASTM D-422

Project Wintergreen Development NE24-23-5-W5M

Client Robert Rettie

Almor Job #

Date Recieved June 11/13

Date Tested June 17/13

Test Hole # T.P. # 1

Depth 0.9m

Technician CBL

## Soil Classification

Gravel 1.8%  
Sand 20.8%  
Silt 41.5%  
Clay 35.9%

## Soil Description

Sandy SILT & CLAY, trace gravel

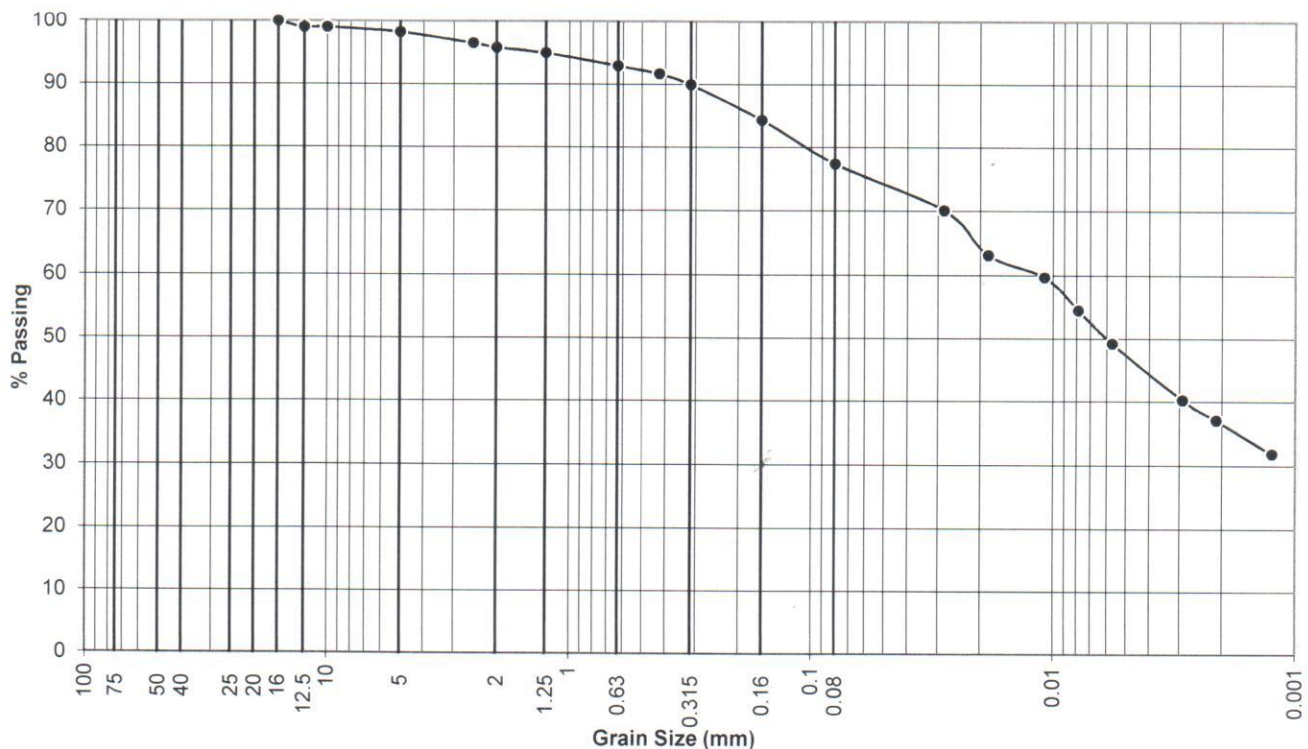
## Soil Properties

Natural Moisture Content 18.0 %  
Liquid Limit %  
Plastic Limit %  
Plasticity Index %  
Specific Gravity 2.65

## Comments

| Sieve Size (mm) | % Passing |
|-----------------|-----------|
| 150             | 100.0     |
| 100             | 100.0     |
| 80              | 100.0     |
| 50              | 100.0     |
| 40              | 100.0     |
| 25              | 100.0     |
| 20              | 100.0     |
| 10              | 99.0      |
| 5               | 98.2      |
| 2               | 95.8      |
| 0.425           | 91.6      |
| 0.080           | 77.4      |
| 0.005           | 47.0      |
| 0.002           | 35.9      |

| Gravel |      | Sand   |        |      | Silt | Clay |
|--------|------|--------|--------|------|------|------|
| Coarse | Fine | Coarse | Medium | Fine |      |      |



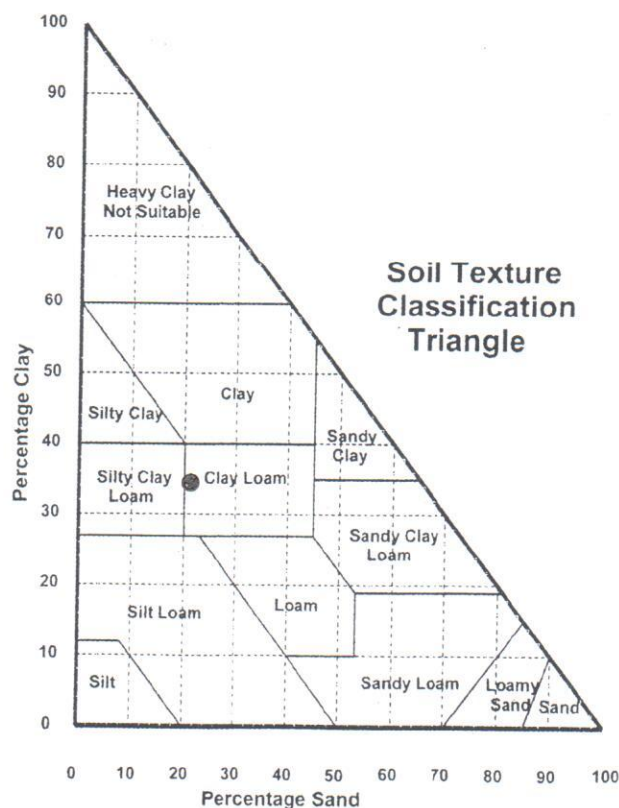
|                          |                             |                        |
|--------------------------|-----------------------------|------------------------|
| COS – Coarse Sand        | LVFS – Loamy Very Fine Sand | SI – Silt              |
| MS – Medium Sand         | COSL – Coarse Sandy Loam    | SCL – Sandy Clay Loam  |
| LCOS – Loamy Coarse Sand | MSL – Medium Sandy Loam     | CL – Clay Loam         |
| LMS – Loamy Medium Sand  | FSL – Fine Sandy Loam       | SICL – Silty Clay Loam |
| FS – Fine Sand           | VFSL – Very Fine Sandy Loam | SC – Sandy Clay        |
| LFS – Loamy Fine Sand    | L – Loam                    | SIC – Silty Clay       |
| VFS – Very Fine Sand     | SIL – Silt Loam             | C – Clay               |
|                          |                             | HC – Heavy Clay        |
| PL – Platy               | PR – Prismatic              | BK – Blocky            |
|                          |                             | GR – Granular          |
|                          |                             | M – Massive            |
|                          |                             | SG – Single Grain      |
| 0 – Structureless        | 1 – Weak                    | 2 – Moderate           |
|                          |                             | 3 – Strong             |

Note: Infiltration distance is the depth as suitable soil below the in situ soil infiltration surface effluent is applied to.

Table 8.1.1.10. Infiltration rates in  $L/d/m^2$  for wastewater of  $>30 \text{ mg/L BOD}_5$  or wastewater of  $<30 \text{ mg/L BOD}_5$  and hydraulic linear loading rates in  $L/d/m$  for soil characteristics of texture and structure and site conditions of slope and infiltration depth to limiting soil layers. Values assume daily wastewater volume estimates used in the design are based on the values set out in Subsection 2.2.2. or include the same factor of safety. If horizon consistency is stronger than firm or any cemented class or the clay mineralogy is smectitic, the horizon is limiting regardless of other soil characteristics (adapted from 2000 E. Jerry Tyler).

Note: The application of effluent to Coarse Sand is not allowed except where the requirements of Sentence 8.1.1.3. (2) are met.

Figure 8.1.1.10. Soil Texture Classification Triangle



Note: Plotting the percentage of sand and clay provides the remaining percentage of silt.



**Table 8.1.1.10. (Metric) Effluent Soil Loading Rates and Linear Loading Rates (Litres)**

| Soil Characteristics   |           |         |                  |          | Hydraulic Linear Loading Rate, L/day/m |         |         |                                       |         |         |                                       |         |         |
|--|-----------|---------|------------------|----------|--|---------|---------|---------------------------------------|---------|---------|---------------------------------------|---------|---------|
|  |           |         |                  |          | Slope of land                          |         |         |                                       |         |         |                                       |         |         |
|  |           |         |                  |          | 0 – 4%                                 |         |         | 5 – 9%                                |         |         | >10%                                  |         |         |
| Texture  | Structure |         | Effluent Quality |          | Infiltration distance, m <sup>1</sup>  |         |         | Infiltration distance, m <sup>1</sup> |         |         | Infiltration distance, m <sup>1</sup> |         |         |
|  | Shape     | Grade   | 30-150 mg/L      | <30 mg/L | 0.2-0.3                                | 0.3-0.6 | 0.6-1.2 | 0.2-0.3                               | 0.3-0.6 | 0.6-1.2 | 0.2-0.3                               | 0.3-0.6 | 0.6-1.2 |
| COS <sup>2</sup> , MS, LCOS, LMS<br>Requires pressure distribution | —         | OSG     | 14.7             | 14.7     | 59.7                                   | 74.6    | 89.5    | 74.6                                  | 89.5    | 104.4   | 89.5                                  | 104.4   | 119.3   |
| FS,VFS,LFS,LVFS<br>Requires pressure distribution                  | —         | OSG     | 19.6             | 24.5     | 52.2                                   | 67.1    | 82.0    | 59.7                                  | 74.6    | 89.5    | 74.6                                  | 89.5    | 104.4   |
| COSL, MSL<br>Requires pressure distribution                        | —         | OM      | 9.8              | 29.4     | 44.7                                   | 52.2    | 59.7    | 53.7                                  | 61.2    | 68.6    | 74.6                                  | 89.5    | 104.4   |
|  | PL        | 1       | 9.8              | 24.5     | 44.7                                   | 52.2    | 59.7    | 53.7                                  | 61.2    | 68.6    | 59.7                                  | 74.6    | 89.5    |
|  |           | 2, 3    | 0.0              | 9.8      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|  | PR/BK     | 1       | 19.6             | 29.4     | 52.2                                   | 67.1    | 82.0    | 59.7                                  | 74.6    | 89.5    | 74.6                                  | 89.5    | 104.4   |
|  | /GR       | 2, 3    | 29.4             | 29.4     | 52.2                                   | 67.1    | 82.0    | 59.7                                  | 74.6    | 89.5    | 74.6                                  | 89.5    | 104.4   |
| FSL,VFSL   | —         | OM      | 8.8              | 17.6     | 29.8                                   | 34.3    | 38.8    | 35.8                                  | 40.3    | 44.7    | 40.3                                  | 47.7    | 55.2    |
|  | PL        | 1       | 8.8              | 17.6     | 29.8                                   | 34.3    | 38.8    | 35.8                                  | 40.3    | 44.7    | 40.3                                  | 47.7    | 55.2    |
|  |           | 2, 3    | 0.0              | 7.3      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|  | PR/BK     | 1       | 8.8              | 22.0     | 44.7                                   | 52.2    | 59.7    | 49.2                                  | 56.7    | 64.1    | 53.7                                  | 61.2    | 68.6    |
|  | /GR       | 2, 3    | 15.7             | 30.8     | 49.2                                   | 56.7    | 64.1    | 53.7                                  | 61.2    | 68.6    | 58.2                                  | 65.6    | 73.1 *  |
| L  | —         | OM      | 8.8              | 22.0     | 29.8                                   | 34.3    | 38.8    | 35.8                                  | 40.3    | 44.7    | 40.3                                  | 47.7    | 55.2    |
|  | PL        | 1       | 14.7             | 22.0     | 44.7                                   | 52.2    | 59.7    | 49.2                                  | 56.7    | 64.1    | 53.7                                  | 61.2    | 68.6    |
|  |           | 2, 3    | 0.0              | 7.3      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|  | PR/BK     | 1       | 14.7             | 22.0     | 44.7                                   | 52.2    | 59.7    | 49.2                                  | 56.7    | 64.1    | 53.7                                  | 61.2    | 68.6    |
|  | /GR       | 2, 3    | 22.0             | 30.8     | 49.2                                   | 56.7    | 64.1    | 53.7                                  | 61.2    | 68.6    | 58.2                                  | 65.6    | 73.1    |
| SIL  | —         | OM      | 0.0              | 8.8      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|  | PL        | 1       | 0.0              | 7.3      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|  |           | 2, 3    | 0.0              | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | PR/BK     | 1       | 14.7             | 22.0     | 35.8                                   | 40.3    | 44.7    | 40.3                                  | 44.7    | 49.2    | 44.7                                  | 52.2    | 59.7    |
|  | /GR       | 2, 3    | 22.0             | 30.8     | 40.3                                   | 47.7    | 55.2    | 44.7                                  | 52.2    | 59.7    | 49.2                                  | 56.7    | 64.1    |
| SCL, CL, SICL, SI  | —         | OM      | 0.0              | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | PL        | 1       | 0.0              | 7.3      | 17.9                                   | 25.4    | 32.8    | 20.9                                  | 28.3    | 35.8    | 23.9                                  | 31.3    | 38.8    |
|  |           | 2, 3    | 0.0              | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | PR/BK     | 1       | 8.8              | 13.2     | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|  | /GR       | 2, 3    | 13.2             | 22.0     | 35.8                                   | 43.3    | 50.7    | 40.3                                  | 47.7    | 55.2    | 44.7                                  | 52.2    | 59.7    |
| SC, C, SIC   | —         | OM      | 0.0              | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | PL        | 1, 2, 3 | 0.0              | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | PR/BK     | 1       | 0.0              | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | /GR       | 2, 3    | 6.9              | 9.8      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
| HC   | —         | OM      | 0.0              | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | PL        | 1, 2, 3 | 0.0              | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | PR/BK     | 1       | 0.0              | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | /GR       | 2, 3    | 4.4              | 7.8      | 23.9                                   | 31.3    | 38.8    | 26.8                                  | 34.3    | 41.8    | 29.8                                  | 37.3    | 44.7    |



# A.1.E.1. Effluent Soil Loading Rates and Linear Loading Rates (Imp. gal.)

**Table A.1.E.1. Effluent Soil Loading Rates and Linear Loading Rates (Imperial Gallons)**

|  |           |       |  |          | Hydraulic Linear Loading Rate, gal/day/ft |         |         |   |         |         |   |         |         |
|--|-----------|-------|--|----------|---|---------|---------|---|---------|---------|---|---------|---------|
|  |           |       |  |          | Slope of land                             |         |         |   |         |         |   |         |         |
| Soil characteristics   |           |       | Infiltration loading rate: gal/day/ft <sup>2</sup> |          | 0 – 4%                                    |         |         | 5 – 9%                                  |         |         | >10%                                    |         |         |
| Texture  | Structure |       | Effluent Quality                                   |          | Infiltration distance, in. <sup>1</sup>   |         |         | Infiltration distance, in. <sup>1</sup> |         |         | Infiltration distance, in. <sup>1</sup> |         |         |
|  | Shape     | Grade | 30 – 150 mg/L                                      | <30 mg/L | 8 – 12                                    | 12 – 24 | 24 – 48 | 8 – 12                                  | 12 – 24 | 24 – 48 | 8 – 12                                  | 12 – 24 | 24 – 48 |
| COS <sup>2</sup> , MS, LCOS, LMS<br>Requires pressure distribution | —         | OSG   | 0.3  | 0.3      | 4.0                                       | 5.0     | 6.0     | 5.0                                     | 6.0     | 7.0     | 6.0                                     | 7.0     | 8.0     |
| FS,VFS,LFS,LVFS<br>Requires pressure distribution                  | —         | OSG   | 0.4  | 0.5      | 3.5                                       | 4.5     | 5.5     | 4.0                                     | 5.0     | 6.0     | 5.0                                     | 6.0     | 7.0     |
| COSL, MSL<br>Requires pressure distribution                        | —         | OM    | 0.2  | 0.6      | 3.0                                       | 3.5     | 4.0     | 3.6                                     | 4.1     | 4.6     | 5.0                                     | 6.0     | 7.0     |
|  | PL        | 1     | 0.2  | 0.5      | 3.0                                       | 3.5     | 4.0     | 3.6                                     | 4.1     | 4.6     | 4.0                                     | 5.0     | 6.0     |
|  |           | 2,3   | 0.0  | 0.2      | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4     |
|  | PR/BK /GR | 1     | 0.4  | 0.6      | 3.5                                       | 4.5     | 5.5     | 4.0                                     | 5.0     | 6.0     | 5.0                                     | 6.0     | 7.0     |
|  |           | 2,3   | 0.6  | 0.6      | 3.5                                       | 4.5     | 5.5     | 4.0                                     | 5.0     | 6.0     | 5.0                                     | 6.0     | 7.0     |
| FSL,VFSL   | —         | OM    | 0.18   | 0.36     | 2.0                                       | 2.3     | 2.6     | 2.4                                     | 2.7     | 3.0     | 2.7                                     | 3.2     | 3.7     |
|  | PL        | 1     | 0.18   | 0.36     | 2.0                                       | 2.3     | 2.6     | 2.4                                     | 2.7     | 3.0     | 2.7                                     | 3.2     | 3.7     |
|  |           | 2,3   | 0.0  | 0.15     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4     |
|  | PR/BK /GR | 1     | 0.18   | 0.45     | 3.0                                       | 3.5     | 4.0     | 3.3                                     | 3.8     | 4.3     | 3.6                                     | 4.1     | 4.6 *   |
|  |           | 2,3   | 0.32   | 0.63     | 3.3                                       | 3.8     | 4.3     | 3.6                                     | 4.1     | 4.6     | 3.9                                     | 4.4     | 4.9     |
| L  | —         | OM    | 0.18   | 0.45     | 2.0                                       | 2.3     | 2.6     | 2.4                                     | 2.7     | 3.0     | 2.7                                     | 3.2     | 3.7     |
|  | PL        | 1     | 0.3  | 0.45     | 3.0                                       | 3.5     | 4.0     | 3.3                                     | 3.8     | 4.3     | 3.6                                     | 4.1     | 4.6     |
|  |           | 2,3   | 0.0  | 0.15     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4     |
|  | PR/BK /GR | 1     | 0.3  | 0.45     | 3.0                                       | 3.5     | 4.0     | 3.3                                     | 3.8     | 4.3     | 3.6                                     | 4.1     | 4.6     |
|  |           | 2,3   | 0.45   | 0.63     | 3.3                                       | 3.8     | 4.3     | 3.6                                     | 4.1     | 4.6     | 3.9                                     | 4.4     | 4.9     |
| SIL  | —         | OM    | 0.0  | 0.18     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4     |
|  | PL        | 1     | 0.0  | 0.15     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4     |
|  |           | 2,3   | 0.0  | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  | PR/BK /GR | 1     | 0.3  | 0.45     | 2.4                                       | 2.7     | 3.0     | 2.7                                     | 3.0     | 3.3     | 3.0                                     | 3.5     | 4.0     |
|  |           | 2,3   | 0.45   | 0.63     | 2.7                                       | 3.2     | 3.7     | 3.0                                     | 3.5     | 4.0     | 3.3                                     | 3.8     | 4.3     |
| SCL, CL, SICL, SI  | —         | OM    | 0.0  | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  | PL        | 1     | 0.0  | 0.15     | 1.2                                       | 1.7     | 2.2     | 1.4                                     | 1.9     | 2.4     | 1.6                                     | 2.1     | 2.6     |
|  |           | 2,3   | 0.0  | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  | PR/BK /GR | 1     | 0.18   | 0.27     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4     |
|  |           | 2,3   | 0.27   | 0.45     | 2.4                                       | 2.9     | 3.4     | 2.7                                     | 3.2     | 3.7     | 3.0                                     | 3.5     | 4.0     |
| SC, C, SIC   | —         | OM    | 0.0  | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  | PL        | 1,2,3 | 0.0  | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  | PR/BK /GR | 1     | 0.0  | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  |           | 2,3   | 0.14   | 0.20     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4     |
| HC   | —         | OM    | 0.0  | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  | PL        | 1,2,3 | 0.0  | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  | PR/BK /GR | 1     | 0.0  | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  |           | 2,3   | 0.09   | 0.16     | 1.6                                       | 2.1     | 2.6     | 1.8                                     | 2.3     | 2.8     | 2.0                                     | 2.5     | 3.0     |





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## Grain Size Distribution

ASTM D-422

Project Wintergreen Development NE24-23-5-W5M

Client Robert Rettie

Almor Job #

Date Received June 11/13

Date Tested June 20/13

Test Hole # T.P. # 2

Depth 0.9m

Technician CBL

### Soil Classification

Gravel 6.5%  
Sand 23.9%  
Silt 39.5%  
Clay 30.1%

### Soil Description

Sandy SILT & CLAY, trace gravel

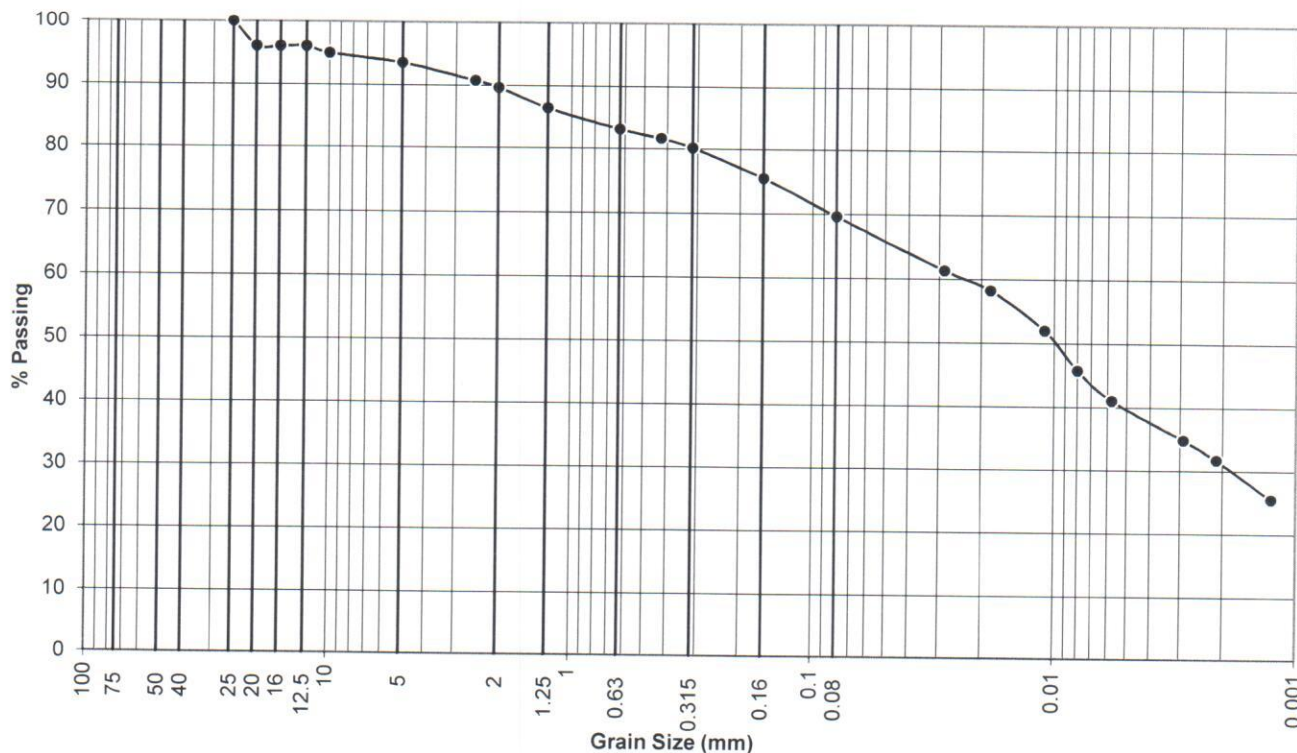
### Soil Properties

Natural Moisture Content 15.4 %  
Liquid Limit %  
Plastic Limit %  
Plasticity Index %  
Specific Gravity 2.65

### Comments

| Sieve Size (mm) | % Passing |
|-----------------|-----------|
| 150             | 100.0     |
| 100             | 100.0     |
| 80              | 100.0     |
| 50              | 100.0     |
| 40              | 100.0     |
| 25              | 100.0     |
| 20              | 96.0      |
| 10              | 95.0      |
| 5               | 93.5      |
| 2               | 89.7      |
| 0.425           | 81.7      |
| 0.080           | 69.7      |
| 0.005           | 39.4      |
| 0.002           | 30.1      |

| Gravel |      | Sand   |        |      | Silt | Clay |
|--------|------|--------|--------|------|------|------|
| Coarse | Fine | Coarse | Medium | Fine |      |      |



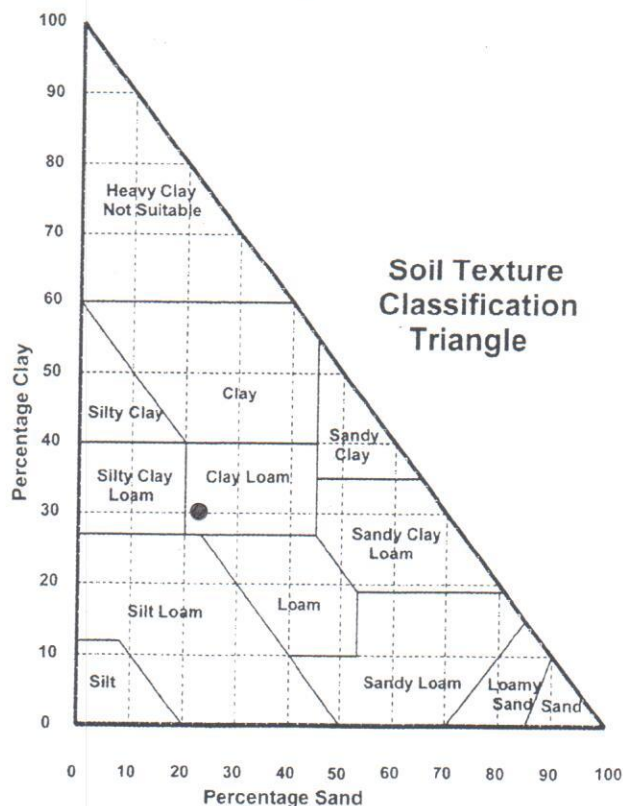
|                          |                             |              |               |                        |                   |
|--------------------------|-----------------------------|--------------|---------------|------------------------|-------------------|
| COS – Coarse Sand        | LVFS – Loamy Very Fine Sand |              |               | SI – Silt              |                   |
| MS – Medium Sand         | COSL – Coarse Sandy Loam    |              |               | SCL – Sandy Clay Loam  |                   |
| LCOS – Loamy Coarse Sand | MSL – Medium Sandy Loam     |              |               | CL – Clay Loam         |                   |
| LMS – Loamy Medium Sand  | FSL – Fine Sandy Loam       |              |               | SICL – Silty Clay Loam |                   |
| FS – Fine Sand           | VFSL – Very Fine Sandy Loam |              |               | SC – Sandy Clay        |                   |
| LFS – Loamy Fine Sand    | L – Loam                    |              |               | SIC – Silty Clay       |                   |
| VFS – Very Fine Sand     | SIL – Silt Loam             |              |               | C – Clay               | HC – Heavy Clay   |
| PL – Platy               | PR – Prismatic              | BK – Blocky  | GR – Granular | M – Massive            | SG – Single Grain |
| 0 – Structureless        | 1 – Weak                    | 2 – Moderate | 3 – Strong    |                        |                   |

Note: Infiltration distance is the depth as suitable soil below the in situ soil infiltration surface effluent is applied to.

Table 8.1.1.10. Infiltration rates in L/d/m<sup>2</sup> for wastewater of >30 mg/L BOD<sub>5</sub> or wastewater of <30 mg/L BOD<sub>5</sub> and hydraulic linear loading rates in L/d/m for soil characteristics of texture and structure and site conditions of slope and infiltration depth to limiting soil layers. Values assume daily wastewater volume estimates used in the design are based on the values set out in Subsection 2.2.2. or include the same factor of safety. If horizon consistence is stronger than firm or any cemented class or the clay mineralogy is smectitic, the horizon is limiting regardless of other soil characteristics (adapted from 2000 E. Jerry Tyler).

Note: The application of effluent to Coarse Sand is not allowed except where the requirements of Sentence 8.1.1.3. (2) are met.

Figure 8.1.1.10. Soil Texture Classification Triangle



Note: Plotting the percentage of sand and clay provides the remaining percentage of silt.



**Table 8.1.1.10. (Metric) Effluent Soil Loading Rates and Linear Loading Rates (Litres)**

|   |           |         |   |          | Hydraulic Linear Loading Rate, L/day/m |         |         |                                       |         |         |                                       |         |         |
|---|-----------|---------|---|----------|--|---------|---------|---------------------------------------|---------|---------|---------------------------------------|---------|---------|
| Soil Characteristics  |           |         | Effluent loading rate:<br>L/day/sq. metre |          | Slope of land                          |         |         |                                       |         |         |                                       |         |         |
|   |           |         |   |          | 0 – 4%                                 |         |         | 5 – 9%                                |         |         | >10%                                  |         |         |
| Texture   | Structure |         | Effluent Quality                          |          | Infiltration distance, m <sup>1</sup>  |         |         | Infiltration distance, m <sup>1</sup> |         |         | Infiltration distance, m <sup>1</sup> |         |         |
|   | Shape     | Grade   | 30-150 mg/L                               | <30 mg/L | 0.2-0.3                                | 0.3-0.6 | 0.6-1.2 | 0.2-0.3                               | 0.3-0.6 | 0.6-1.2 | 0.2-0.3                               | 0.3-0.6 | 0.6-1.2 |
| COS <sup>2</sup> , MS, LCOS, LMS<br><i>Requires pressure distribution</i> | —         | OSG     | 14.7                                      | 14.7     | 59.7                                   | 74.6    | 89.5    | 74.6                                  | 89.5    | 104.4   | 89.5                                  | 104.4   | 119.3   |
| FS,VFS,LFS,LVFS<br><i>Requires pressure distribution</i>                  | —         | OSG     | 19.6                                      | 24.5     | 52.2                                   | 67.1    | 82.0    | 59.7                                  | 74.6    | 89.5    | 74.6                                  | 89.5    | 104.4   |
| COSL, MSL<br><i>Requires pressure distribution</i>                        | —         | OM      | 9.8                                       | 29.4     | 44.7                                   | 52.2    | 59.7    | 53.7                                  | 61.2    | 68.6    | 74.6                                  | 89.5    | 104.4   |
|   | PL        | 1       | 9.8                                       | 24.5     | 44.7                                   | 52.2    | 59.7    | 53.7                                  | 61.2    | 68.6    | 59.7                                  | 74.6    | 89.5    |
|   |           | 2, 3    | 0.0                                       | 9.8      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|   | PR/BK     | 1       | 19.6                                      | 29.4     | 52.2                                   | 67.1    | 82.0    | 59.7                                  | 74.6    | 89.5    | 74.6                                  | 89.5    | 104.4   |
|   | /GR       | 2, 3    | 29.4                                      | 29.4     | 52.2                                   | 67.1    | 82.0    | 59.7                                  | 74.6    | 89.5    | 74.6                                  | 89.5    | 104.4   |
| FSL,VFSL  | —         | OM      | 8.8                                       | 17.6     | 29.8                                   | 34.3    | 38.8    | 35.8                                  | 40.3    | 44.7    | 40.3                                  | 47.7    | 55.2    |
|   | PL        | 1       | 8.8                                       | 17.6     | 29.8                                   | 34.3    | 38.8    | 35.8                                  | 40.3    | 44.7    | 40.3                                  | 47.7    | 55.2    |
|   |           | 2, 3    | 0.0                                       | 7.3      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|   | PR/BK     | 1       | 8.8                                       | 22.0     | 44.7                                   | 52.2    | 59.7    | 49.2                                  | 56.7    | 64.1    | 53.7                                  | 61.2    | 68.6    |
|   | /GR       | 2, 3    | 15.7                                      | 30.8     | 49.2                                   | 56.7    | 64.1    | 53.7                                  | 61.2    | 68.6    | 58.2                                  | 65.6    | 73.1 *  |
| L   | —         | OM      | 8.8                                       | 22.0     | 29.8                                   | 34.3    | 38.8    | 35.8                                  | 40.3    | 44.7    | 40.3                                  | 47.7    | 55.2    |
|   | PL        | 1       | 14.7                                      | 22.0     | 44.7                                   | 52.2    | 59.7    | 49.2                                  | 56.7    | 64.1    | 53.7                                  | 61.2    | 68.6    |
|   |           | 2, 3    | 0.0                                       | 7.3      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|   | PR/BK     | 1       | 14.7                                      | 22.0     | 44.7                                   | 52.2    | 59.7    | 49.2                                  | 56.7    | 64.1    | 53.7                                  | 61.2    | 68.6    |
|   | /GR       | 2, 3    | 22.0                                      | 30.8     | 49.2                                   | 56.7    | 64.1    | 53.7                                  | 61.2    | 68.6    | 58.2                                  | 65.6    | 73.1    |
| SIL   | —         | OM      | 0.0                                       | 8.8      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|   | PL        | 1       | 0.0                                       | 7.3      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|   |           | 2, 3    | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|   | PR/BK     | 1       | 14.7                                      | 22.0     | 35.8                                   | 40.3    | 44.7    | 40.3                                  | 44.7    | 49.2    | 44.7                                  | 52.2    | 59.7    |
|   | /GR       | 2, 3    | 22.0                                      | 30.8     | 40.3                                   | 47.7    | 55.2    | 44.7                                  | 52.2    | 59.7    | 49.2                                  | 56.7    | 64.1    |
| SCL, CL, SICL, SI   | —         | OM      | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|   | PL        | 1       | 0.0                                       | 7.3      | 17.9                                   | 25.4    | 32.8    | 20.9                                  | 28.3    | 35.8    | 23.9                                  | 31.3    | 38.8    |
|   |           | 2, 3    | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|   | PR/BK     | 1       | 8.8                                       | 13.2     | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|   | /GR       | 2, 3    | 13.2                                      | 22.0     | 35.8                                   | 43.3    | 50.7    | 40.3                                  | 47.7    | 55.2    | 44.7                                  | 52.2    | 59.7    |
| SC, C, SIC  | —         | OM      | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|   | PL        | 1, 2, 3 | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|   | PR/BK     | 1       | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|   | /GR       | 2, 3    | 6.9                                       | 9.8      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
| HC  | —         | OM      | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|   | PL        | 1, 2, 3 | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|   | PR/BK     | 1       | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|   | /GR       | 2, 3    | 4.4                                       | 7.8      | 23.9                                   | 31.3    | 38.8    | 26.8                                  | 34.3    | 41.8    | 29.8                                  | 37.3    | 44.7    |



# A.1.E.1. Effluent Soil Loading Rates and Linear Loading Rates (Imp. gal.)

**Table A.1.E.1. Effluent Soil Loading Rates and Linear Loading Rates (Imperial Gallons)**

| Soil characteristics   |           |       |                  |          | Hydraulic Linear Loading Rate, gal/day/ft |         |         |   |         |         |   |         |         |
|--|-----------|-------|------------------|----------|---|---------|---------|---|---------|---------|---|---------|---------|
|  |           |       |                  |          | Slope of land                             |         |         |   |         |         |   |         |         |
|  |           |       |                  |          | 0 – 4%                                    |         |         | 5 – 9%                                  |         |         | >10%                                    |         |         |
| Texture  | Structure |       | Effluent Quality |          | Infiltration distance, in. <sup>1</sup>   |         |         | Infiltration distance, in. <sup>1</sup> |         |         | Infiltration distance, in. <sup>1</sup> |         |         |
|  | Shape     | Grade | 30 – 150 mg/L    | <30 mg/L | 8 – 12                                    | 12 – 24 | 24 – 48 | 8 – 12                                  | 12 – 24 | 24 – 48 | 8 – 12                                  | 12 – 24 | 24 – 48 |
| COS <sup>2</sup> , MS, LCOS, LMS<br>Requires pressure distribution | —         | OSG   | 0.3              | 0.3      | 4.0                                       | 5.0     | 6.0     | 5.0                                     | 6.0     | 7.0     | 6.0                                     | 7.0     | 8.0     |
| FS,VFS,LFS,LVFS<br>Requires pressure distribution                  | —         | OSG   | 0.4              | 0.5      | 3.5                                       | 4.5     | 5.5     | 4.0                                     | 5.0     | 6.0     | 5.0                                     | 6.0     | 7.0     |
| COSL, MSL<br>Requires pressure distribution                        | —         | OM    | 0.2              | 0.6      | 3.0                                       | 3.5     | 4.0     | 3.6                                     | 4.1     | 4.6     | 5.0                                     | 6.0     | 7.0     |
|  | PL        | 1     | 0.2              | 0.5      | 3.0                                       | 3.5     | 4.0     | 3.6                                     | 4.1     | 4.6     | 4.0                                     | 5.0     | 6.0     |
|  |           | 2,3   | 0.0              | 0.2      | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4     |
|  | PR/BK /GR | 1     | 0.4              | 0.6      | 3.5                                       | 4.5     | 5.5     | 4.0                                     | 5.0     | 6.0     | 5.0                                     | 6.0     | 7.0     |
|  |           | 2,3   | 0.6              | 0.6      | 3.5                                       | 4.5     | 5.5     | 4.0                                     | 5.0     | 6.0     | 5.0                                     | 6.0     | 7.0     |
| FSL,VFSL   | —         | OM    | 0.18             | 0.36     | 2.0                                       | 2.3     | 2.6     | 2.4                                     | 2.7     | 3.0     | 2.7                                     | 3.2     | 3.7     |
|  | PL        | 1     | 0.18             | 0.36     | 2.0                                       | 2.3     | 2.6     | 2.4                                     | 2.7     | 3.0     | 2.7                                     | 3.2     | 3.7     |
|  |           | 2,3   | 0.0              | 0.15     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4     |
|  | PR/BK /GR | 1     | 0.18             | 0.45     | 3.0                                       | 3.5     | 4.0     | 3.3                                     | 3.8     | 4.3     | 3.6                                     | 4.1     | 4.6*    |
|  |           | 2,3   | 0.32             | 0.63     | 3.3                                       | 3.8     | 4.3     | 3.6                                     | 4.1     | 4.6     | 3.9                                     | 4.4     | 4.9     |
| L  | —         | OM    | 0.18             | 0.45     | 2.0                                       | 2.3     | 2.6     | 2.4                                     | 2.7     | 3.0     | 2.7                                     | 3.2     | 3.7     |
|  | PL        | 1     | 0.3              | 0.45     | 3.0                                       | 3.5     | 4.0     | 3.3                                     | 3.8     | 4.3     | 3.6                                     | 4.1     | 4.6     |
|  |           | 2,3   | 0.0              | 0.15     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4     |
|  | PR/BK /GR | 1     | 0.3              | 0.45     | 3.0                                       | 3.5     | 4.0     | 3.3                                     | 3.8     | 4.3     | 3.6                                     | 4.1     | 4.6     |
|  |           | 2,3   | 0.45             | 0.63     | 3.3                                       | 3.8     | 4.3     | 3.6                                     | 4.1     | 4.6     | 3.9                                     | 4.4     | 4.9     |
| SIL  | —         | OM    | 0.0              | 0.18     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4     |
|  | PL        | 1     | 0.0              | 0.15     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4     |
|  |           | 2,3   | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  | PR/BK /GR | 1     | 0.3              | 0.45     | 2.4                                       | 2.7     | 3.0     | 2.7                                     | 3.0     | 3.3     | 3.0                                     | 3.5     | 4.0     |
|  |           | 2,3   | 0.45             | 0.63     | 2.7                                       | 3.2     | 3.7     | 3.0                                     | 3.5     | 4.0     | 3.3                                     | 3.8     | 4.3     |
| SCL, CL, SICL, SI  | —         | OM    | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  | PL        | 1     | 0.0              | 0.15     | 1.2                                       | 1.7     | 2.2     | 1.4                                     | 1.9     | 2.4     | 1.6                                     | 2.1     | 2.6     |
|  |           | 2,3   | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  | PR/BK /GR | 1     | 0.18             | 0.27     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4     |
|  |           | 2,3   | 0.27             | 0.45     | 2.4                                       | 2.9     | 3.4     | 2.7                                     | 3.2     | 3.7     | 3.0                                     | 3.5     | 4.0     |
| SC, C, SIC   | —         | OM    | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  | PL        | 1,2,3 | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  |           | 1     | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  | PR/BK /GR | 2,3   | 0.14             | 0.20     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4     |
| HC   | —         | OM    | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  | PL        | 1,2,3 | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  |           | 1     | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —       |
|  | PR/BK /GR | 2,3   | 0.09             | 0.16     | 1.6                                       | 2.1     | 2.6     | 1.8                                     | 2.3     | 2.8     | 2.0                                     | 2.5     | 3.0     |



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## Grain Size Distribution

ASTM D-422

Project Wintergreen Development NE24-23-5-W5M

Client Robert Rettie

Almor Job #

Date Received June 11/13

Date Tested June 17/13

Test Hole # T.P. # 3

Depth 0.9m

Technician CBL

### Soil Classification

Gravel 10.1%  
Sand 17.7%  
Silt 40.1%  
Clay 32.1%

### Soil Description

SILT & CLAY, some sand, some gravel

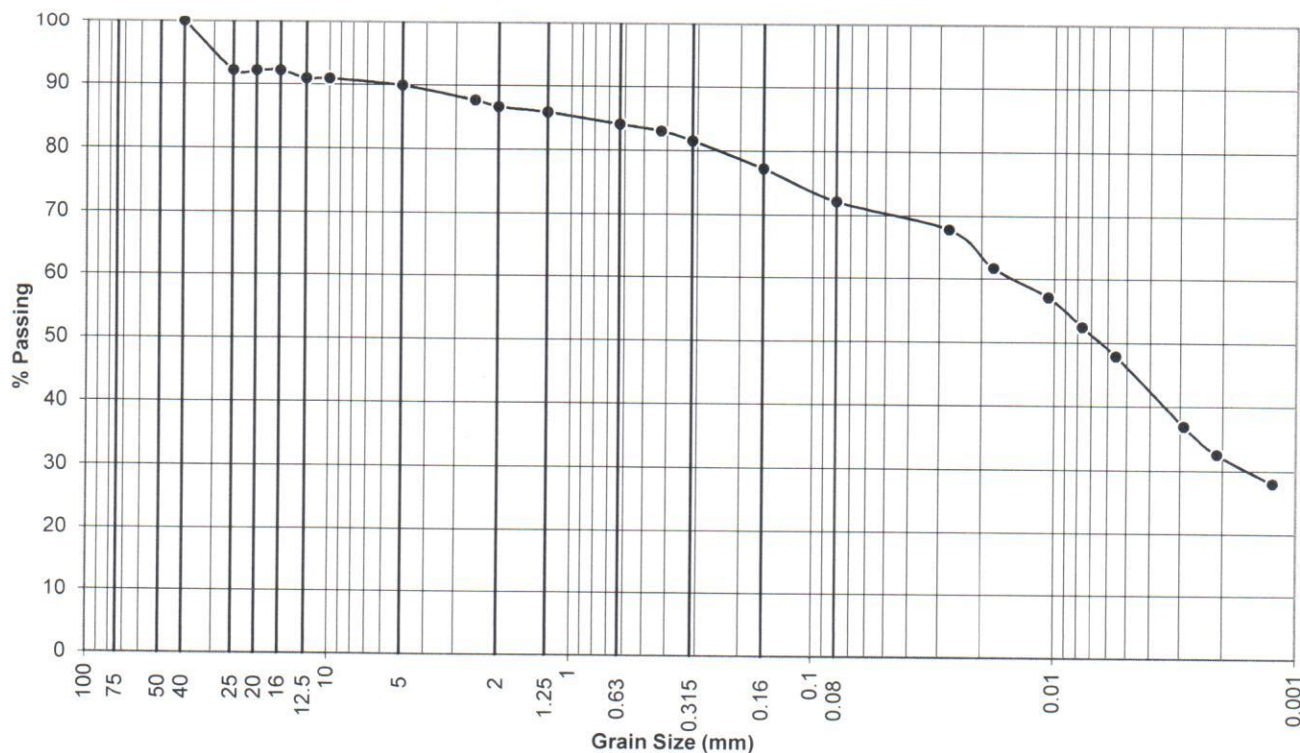
### Soil Properties

Natural Moisture Content 16.1 %  
Liquid Limit %  
Plastic Limit %  
Plasticity Index %  
Specific Gravity 2.65

### Comments

| Sieve Size (mm) | % Passing |
|-----------------|-----------|
| 150             | 100.0     |
| 100             | 100.0     |
| 80              | 100.0     |
| 50              | 100.0     |
| 40              | 100.0     |
| 25              | 92.2      |
| 20              | 92.2      |
| 10              | 90.9      |
| 5               | 89.9      |
| 2               | 86.7      |
| 0.425           | 83.0      |
| 0.080           | 72.2      |
| 0.005           | 45.6      |
| 0.002           | 32.1      |

| Gravel |      | Sand   |        |      | Silt | Clay |
|--------|------|--------|--------|------|------|------|
| Coarse | Fine | Coarse | Medium | Fine |      |      |





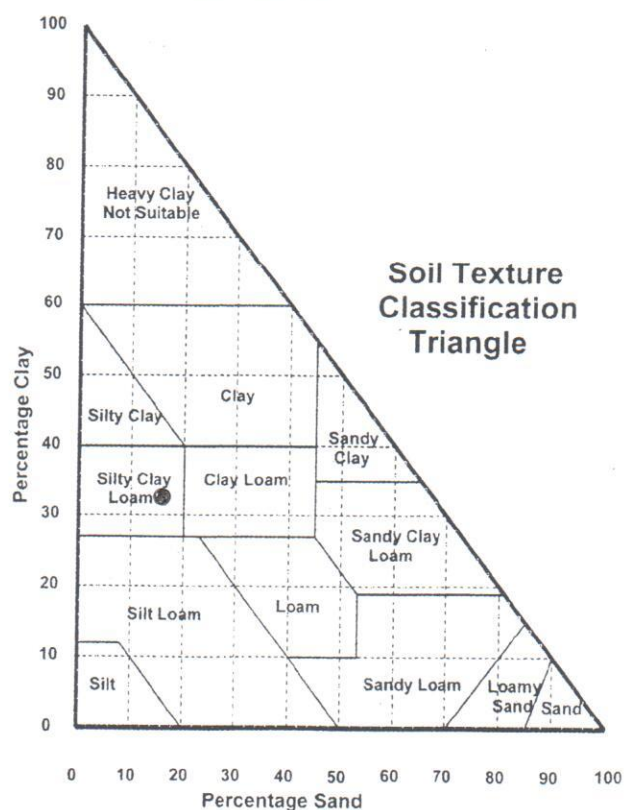
|                          |                |                             |              |                        |                   |
|--------------------------|----------------|-----------------------------|--------------|------------------------|-------------------|
| COS – Coarse Sand        |                | LVFS – Loamy Very Fine Sand |              | SI – Silt              |                   |
| MS –Medium Sand          |                | COSL – Coarse Sandy Loam    |              | SCL – Sandy Clay Loam  |                   |
| LCOS – Loamy Coarse Sand |                | MSL – Medium Sandy Loam     |              | CL – Clay Loam         |                   |
| LMS – Loamy Medium Sand  |                | FSL – Fine Sandy Loam       |              | SICL – Silty Clay Loam |                   |
| FS – Fine Sand           |                | VFSL – Very Fine Sandy Loam |              | SC – Sandy Clay        |                   |
| LFS – Loamy Fine Sand    |                | L – Loam                    |              | SIC – Silty Clay       |                   |
| VFS – Very Fine Sand     |                | SIL – Silt Loam             |              | C – Clay               | HC – Heavy Clay   |
| PL – Platy               | PR – Prismatic | BK – Blocky                 | GR -Granular | M - Massive            | SG - Single Grain |
| 0 – Structureless        | 1 – Weak       | 2 – Moderate                | 3– Strong    |                        |                   |

Note: Infiltration distance is the depth as suitable soil below the in situ soil infiltration surface effluent is applied to.

Table 8.1.1.10. Infiltration rates in L/d/m<sup>2</sup> for wastewater of >30 mg/L BOD<sub>5</sub> or wastewater of <30 mg/L BOD<sub>5</sub> and hydraulic linear loading rates in L/d/m for soil characteristics of texture and structure and site conditions of slope and infiltration depth to limiting soil layers. Values assume daily wastewater volume estimates used in the design are based on the values set out in Subsection 2.2.2. or include the same factor of safety. If horizon consistency is stronger than firm or any cemented class or the clay mineralogy is smectitic, the horizon is limiting regardless of other soil characteristics (adapted from 2000 E. Jerry Tyler).

Note: The application of effluent to Coarse Sand is not allowed except where the requirements of Sentence 8.1.1.3. (2) are met.

Figure 8.1.1.10. Soil Texture Classification Triangle



Note: Plotting the percentage of sand and clay provides the remaining percentage of silt.



Table 8.1.1.10. (Metric) Effluent Soil Loading Rates and Linear Loading Rates (Litres)

|  |           |         |   |          | Hydraulic Linear Loading Rate, L/day/m |         |         |                                       |         |         |                                       |         |         |
|--|-----------|---------|---|----------|--|---------|---------|---------------------------------------|---------|---------|---------------------------------------|---------|---------|
| Soil Characteristics   |           |         | Effluent loading rate:<br>L/day/sq. metre |          | Slope of land                          |         |         |                                       |         |         |                                       |         |         |
|  |           |         |   |          | 0 – 4%                                 |         |         | 5 – 9%                                |         |         | >10%                                  |         |         |
| Texture  | Structure |         | Effluent Quality                          |          | Infiltration distance, m <sup>1</sup>  |         |         | Infiltration distance, m <sup>1</sup> |         |         | Infiltration distance, m <sup>1</sup> |         |         |
|  | Shape     | Grade   | 30-150 mg/L                               | <30 mg/L | 0.2-0.3                                | 0.3-0.6 | 0.6-1.2 | 0.2-0.3                               | 0.3-0.6 | 0.6-1.2 | 0.2-0.3                               | 0.3-0.6 | 0.6-1.2 |
| COS <sup>1</sup> , MS, LCOS, LMS<br>Requires pressure distribution | —         | OSG     | 14.7                                      | 14.7     | 59.7                                   | 74.6    | 89.5    | 74.6                                  | 89.5    | 104.4   | 89.5                                  | 104.4   | 119.3   |
| FS,VFS,LFS,LVFS<br>Requires pressure distribution                  | —         | OSG     | 19.6                                      | 24.5     | 52.2                                   | 67.1    | 82.0    | 59.7                                  | 74.6    | 89.5    | 74.6                                  | 89.5    | 104.4   |
| COSL, MSL<br>Requires pressure distribution                        | —         | OM      | 9.8                                       | 29.4     | 44.7                                   | 52.2    | 59.7    | 53.7                                  | 61.2    | 68.6    | 74.6                                  | 89.5    | 104.4   |
|  | PL        | 1       | 9.8                                       | 24.5     | 44.7                                   | 52.2    | 59.7    | 53.7                                  | 61.2    | 68.6    | 59.7                                  | 74.6    | 89.5    |
|  |           | 2, 3    | 0.0                                       | 9.8      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|  | PR/BK     | 1       | 19.6                                      | 29.4     | 52.2                                   | 67.1    | 82.0    | 59.7                                  | 74.6    | 89.5    | 74.6                                  | 89.5    | 104.4   |
|  | /GR       | 2, 3    | 29.4                                      | 29.4     | 52.2                                   | 67.1    | 82.0    | 59.7                                  | 74.6    | 89.5    | 74.6                                  | 89.5    | 104.4   |
| FSL,VFSL   | —         | OM      | 8.8                                       | 17.6     | 29.8                                   | 34.3    | 38.8    | 35.8                                  | 40.3    | 44.7    | 40.3                                  | 47.7    | 55.2    |
|  | PL        | 1       | 8.8                                       | 17.6     | 29.8                                   | 34.3    | 38.8    | 35.8                                  | 40.3    | 44.7    | 40.3                                  | 47.7    | 55.2    |
|  |           | 2, 3    | 0.0                                       | 7.3      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|  | PR/BK     | 1       | 8.8                                       | 22.0     | 44.7                                   | 52.2    | 59.7    | 49.2                                  | 56.7    | 64.1    | 53.7                                  | 61.2    | 68.6    |
|  | /GR       | 2, 3    | 15.7                                      | 30.8     | 49.2                                   | 56.7    | 64.1    | 53.7                                  | 61.2    | 68.6    | 58.2                                  | 65.6    | 73.1 *  |
| L  | —         | OM      | 8.8                                       | 22.0     | 29.8                                   | 34.3    | 38.8    | 35.8                                  | 40.3    | 44.7    | 40.3                                  | 47.7    | 55.2    |
|  | PL        | 1       | 14.7                                      | 22.0     | 44.7                                   | 52.2    | 59.7    | 49.2                                  | 56.7    | 64.1    | 53.7                                  | 61.2    | 68.6    |
|  |           | 2, 3    | 0.0                                       | 7.3      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|  | PR/BK     | 1       | 14.7                                      | 22.0     | 44.7                                   | 52.2    | 59.7    | 49.2                                  | 56.7    | 64.1    | 53.7                                  | 61.2    | 68.6    |
|  | /GR       | 2, 3    | 22.0                                      | 30.8     | 49.2                                   | 56.7    | 64.1    | 53.7                                  | 61.2    | 68.6    | 58.2                                  | 65.6    | 73.1    |
| SIL  | —         | OM      | 0.0                                       | 8.8      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|  | PL        | 1       | 0.0                                       | 7.3      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|  |           | 2, 3    | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | PR/BK     | 1       | 14.7                                      | 22.0     | 35.8                                   | 40.3    | 44.7    | 40.3                                  | 44.7    | 49.2    | 44.7                                  | 52.2    | 59.7    |
|  | /GR       | 2, 3    | 22.0                                      | 30.8     | 40.3                                   | 47.7    | 55.2    | 44.7                                  | 52.2    | 59.7    | 49.2                                  | 56.7    | 64.1    |
| SCL, CL, SICL, SI  | —         | OM      | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | PL        | 1       | 0.0                                       | 7.3      | 17.9                                   | 25.4    | 32.8    | 20.9                                  | 28.3    | 35.8    | 23.9                                  | 31.3    | 38.8    |
|  |           | 2, 3    | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | PR/BK     | 1       | 8.8                                       | 13.2     | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
|  | /GR       | 2, 3    | 13.2                                      | 22.0     | 35.8                                   | 43.3    | 50.7    | 40.3                                  | 47.7    | 55.2    | 44.7                                  | 52.2    | 59.7    |
| SC, C, SIC   | —         | OM      | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | PL        | 1, 2, 3 | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | PR/BK     | 1       | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | /GR       | 2, 3    | 6.9                                       | 9.8      | 29.8                                   | 37.3    | 44.7    | 32.8                                  | 40.3    | 47.7    | 35.8                                  | 43.3    | 50.7    |
| HC   | —         | OM      | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | PL        | 1, 2, 3 | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | PR/BK     | 1       | 0.0                                       | 0.0      | —                                      | —       | —       | —                                     | —       | —       | —                                     | —       | —       |
|  | /GR       | 2, 3    | 4.4                                       | 7.8      | 23.9                                   | 31.3    | 38.8    | 26.8                                  | 34.3    | 41.8    | 29.8                                  | 37.3    | 44.7    |



# A.1.E.1. Effluent Soil Loading Rates and Linear Loading Rates (Imp. gal.)

**Table A.1.E.1. Effluent Soil Loading Rates and Linear Loading Rates (Imperial Gallons)**

| Soil characteristics   |           |        |                  |          | Hydraulic Linear Loading Rate, gal/day/ft |         |         |   |         |         |   |         |                  |
|--|-----------|--------|------------------|----------|---|---------|---------|---|---------|---------|---|---------|------------------|
|  |           |        |                  |          | Slope of land                             |         |         |   |         |         |   |         |                  |
|  |           |        |                  |          | 0 – 4%                                    |         |         | 5 – 9%                                  |         |         | >10%                                    |         |                  |
| Texture  | Structure |        | Effluent Quality |          | Infiltration distance, in. <sup>1</sup>   |         |         | Infiltration distance, in. <sup>1</sup> |         |         | Infiltration distance, in. <sup>1</sup> |         |                  |
|  | Shape     | Grade  | 30 – 150 mg/L    | <30 mg/L | 8 – 12                                    | 12 – 24 | 24 – 48 | 8 – 12                                  | 12 – 24 | 24 – 48 | 8 – 12                                  | 12 – 24 | 24 – 48          |
| COS <sup>2</sup> , MS, LCOS, LMS<br>Requires pressure distribution | —         | OSG    | 0.3              | 0.3      | 4.0                                       | 5.0     | 6.0     | 5.0                                     | 6.0     | 7.0     | 6.0                                     | 7.0     | 8.0              |
| FS,VFS,LFS,LVFS<br>Requires pressure distribution                  | —         | OSG    | 0.4              | 0.5      | 3.5                                       | 4.5     | 5.5     | 4.0                                     | 5.0     | 6.0     | 5.0                                     | 6.0     | 7.0              |
| COSL, MSL<br>Requires pressure distribution                        | —         | OM     | 0.2              | 0.6      | 3.0                                       | 3.5     | 4.0     | 3.6                                     | 4.1     | 4.6     | 5.0                                     | 6.0     | 7.0              |
|  | PL        | 1      | 0.2              | 0.5      | 3.0                                       | 3.5     | 4.0     | 3.6                                     | 4.1     | 4.6     | 4.0                                     | 5.0     | 6.0              |
|  |           | 2,3    | 0.0              | 0.2      | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4              |
|  | PR/BK /GR | 1      | 0.4              | 0.6      | 3.5                                       | 4.5     | 5.5     | 4.0                                     | 5.0     | 6.0     | 5.0                                     | 6.0     | 7.0              |
|  |           | 2,3    | 0.6              | 0.6      | 3.5                                       | 4.5     | 5.5     | 4.0                                     | 5.0     | 6.0     | 5.0                                     | 6.0     | 7.0              |
| FSL,VFSL   | —         | OM     | 0.18             | 0.36     | 2.0                                       | 2.3     | 2.6     | 2.4                                     | 2.7     | 3.0     | 2.7                                     | 3.2     | 3.7              |
|  | PL        | 1      | 0.18             | 0.36     | 2.0                                       | 2.3     | 2.6     | 2.4                                     | 2.7     | 3.0     | 2.7                                     | 3.2     | 3.7              |
|  |           | 2,3    | 0.0              | 0.15     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4              |
|  | PR/BK /GR | 1      | 0.18             | 0.45     | 3.0                                       | 3.5     | 4.0     | 3.3                                     | 3.8     | 4.3     | 3.6                                     | 4.1     | 4.6 <sup>*</sup> |
|  |           | 2,3    | 0.32             | 0.63     | 3.3                                       | 3.8     | 4.3     | 3.6                                     | 4.1     | 4.6     | 3.9                                     | 4.4     | 4.9              |
| L  | —         | OM     | 0.18             | 0.45     | 2.0                                       | 2.3     | 2.6     | 2.4                                     | 2.7     | 3.0     | 2.7                                     | 3.2     | 3.7              |
|  | PL        | 1      | 0.3              | 0.45     | 3.0                                       | 3.5     | 4.0     | 3.3                                     | 3.8     | 4.3     | 3.6                                     | 4.1     | 4.6              |
|  |           | 2,3    | 0.0              | 0.15     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4              |
|  | PR/BK /GR | 1      | 0.3              | 0.45     | 3.0                                       | 3.5     | 4.0     | 3.3                                     | 3.8     | 4.3     | 3.6                                     | 4.1     | 4.6              |
|  |           | 2,3    | 0.45             | 0.63     | 3.3                                       | 3.8     | 4.3     | 3.6                                     | 4.1     | 4.6     | 3.9                                     | 4.4     | 4.9              |
| SIL  | —         | OM     | 0.0              | 0.18     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4              |
|  | PL        | 1      | 0.0              | 0.15     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4              |
|  |           | 2,3    | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —                |
|  | PR/BK /GR | 1      | 0.3              | 0.45     | 2.4                                       | 2.7     | 3.0     | 2.7                                     | 3.0     | 3.3     | 3.0                                     | 3.5     | 4.0              |
|  |           | 2,3    | 0.45             | 0.63     | 2.7                                       | 3.2     | 3.7     | 3.0                                     | 3.5     | 4.0     | 3.3                                     | 3.8     | 4.3              |
| SCL, CL, SICL, SI  | —         | OM     | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —                |
|  | PL        | 1      | 0.0              | 0.15     | 1.2                                       | 1.7     | 2.2     | 1.4                                     | 1.9     | 2.4     | 1.6                                     | 2.1     | 2.6              |
|  |           | 2,3    | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —                |
|  | PR/BK /GR | 1      | 0.18             | 0.27     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4              |
|  |           | 2,3    | 0.27             | 0.45     | 2.4                                       | 2.9     | 3.4     | 2.7                                     | 3.2     | 3.7     | 3.0                                     | 3.5     | 4.0              |
| SC, C, SIC   | —         | OM     | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —                |
|  | PL        | 1,2,3, | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —                |
|  |           | 1      | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —                |
|  | PR/BK /GR | 2,3    | 0.14             | 0.20     | 2.0                                       | 2.5     | 3.0     | 2.2                                     | 2.7     | 3.2     | 2.4                                     | 2.9     | 3.4              |
| HC   | —         | OM     | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —                |
|  | PL        | 1,2,3, | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —                |
|  |           | 1      | 0.0              | 0.0      | —   | —       | —       | —                                       | —       | —       | —                                       | —       | —                |
|  | PR/BK /GR | 2,3    | 0.09             | 0.16     | 1.6                                       | 2.1     | 2.6     | 1.8                                     | 2.3     | 2.8     | 2.0                                     | 2.5     | 3.0              |



## ALMOR TESTING SERVICES LTD.

7505 - 40 STREET S.E., CALGARY, AB T2C 2H5    PHONE (403) 236-8880 • FAX (403) 236-1707

2014 11 10

100-06-13.14

RedQuest Developments Ltd.  
Box 11, Site 6, RR 1  
Okotoks, Alberta  
T1S 1A1

Attention: Mr. Bob Rettie  
*brettie@platinum.ca*

Re: Level III PSTS Assessment  
Bob & Margaret Rettie Residence  
Lot 1, Block 2, Plan 1311473, NE 24-23-5-W5  
Wintergreen, Bragg Creek, Alberta

Further to our Level III PSTS Assessment completed July 10, 2013 and an initial Test Pit program completed March 1, 2013, at the subject site, we provide further clarification of the locations of the Test Pits. The results of initial testing in the north portion of Lots 5 and 4 indicated suitable conditions for a septic field, however the Test Pits in the south portion contained high clay contents.

The attached site plan indicates the location of the initial pits and a recommended location of the fields in the north portions of these lots.

We trust this meets with your present requirements.

Respectfully submitted,  
ALMOR TESTING SERVICES LTD.

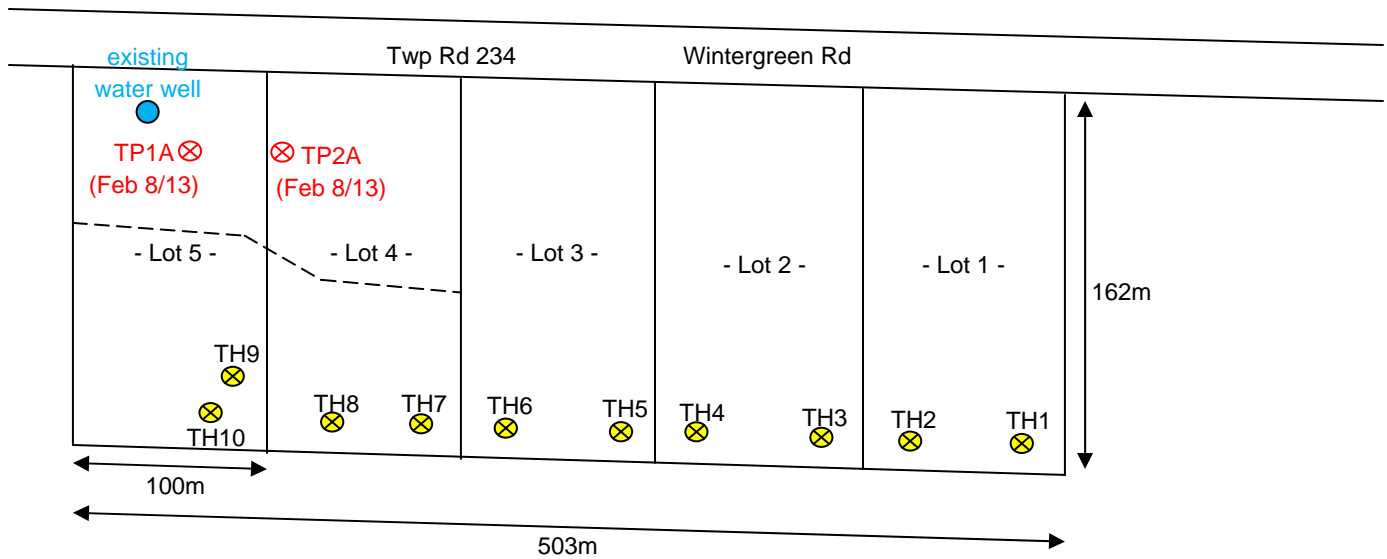


J.B. Montgomery, P.Eng.  
JBM:rn:A04777

\*APEGA Permit to Practice #P2260

Attachment


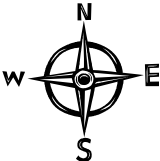
cc: Ms. Michele Habrylo, Rocky View County (*mhabrylo@rockyview.ca*)



#### Approximate Test Hole Locations:

TH1: 25-30m E of WPL, 25-30m N of SPL  
 TH2: 10m E of WPL, 15-20m N of SPL  
 TH3: 20-25m W of EPL, 25-30m N of SPL  
 TH4: 30-35m E of WPL, 15-20m N of SPL  
 TH5: 25-30m W of EPL, 15m N of SPL  
 TH6: 50-55m E of WPL, 15-20m N of SPL  
 TH7: 45-50m E of WPL, 20-25m N of SPL  
 TH8: 25-30m E of WPL, 25-30m N of SPL  
 TH9: 10-15m W of EPL, 50-55m N of SPL  
 TH10: 25-30m W of EPL, 25-30m N of SPL

Water Well in Lot 5: 122m N of SPL, 40m E of WPL

|   |   |   |
|---|---|---|
|  |  | Bob & Margaret Rettie Residence<br>Wintergreen, Bragg Creek |
|   |   | Job: 100-06-13.14   |
|   |   | Figure: 1   |





## ALMOR TESTING SERVICES LTD.

7505 - 40 STREET S.E., CALGARY, AB T2C 2H5    PHONE (403) 236-8880 • FAX (403) 236-1707

2014 12 17

100-06-13.14

RedQuest Developments Ltd.  
Box 11, Site 6, RR 1  
Okotoks, Alberta  
T1S 1A1

Attention: Mr. Bob Rettie ([brettie@platinum.ca](mailto:brettie@platinum.ca))

Re:    Lot 1, Block 2, Plan 1311473, NE 24-23-5-W5M  
         Wintergreen, Bragg Creek, Alberta

Further to our Level III PSTS Assessment report dated July 10, 2013, we provide an amendment to the size of the lots. The area is 21 acres, divided into 5 lots. Therefore, each lot is to be 4.0 acres plus and since they are greater than 4.0 acres, a packaged sewage treatment system meeting BNQ standards is not a requirement for these lots.

We trust this meets with your present requirements.

Respectfully submitted,  
ALMOR TESTING SERVICES LTD.

A handwritten signature in blue ink, reading "J.B. Montgomery". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

J.B. Montgomery, P.Eng.  
JBM:ms:A04844

Wintergreen Woods Water Utility  
PO Box 666, Bragg Creek, AB  
TOL OKO

November 30, 2014

Mr. Bob Rettie  
RedQuest Developments

**RE: Provisioning water for five lots along Township Rd 234**

Dear Bob

The Wintergreen Woods Water Utility (WWWU) is a private water utility that supplies potable water to the residents of the Wintergreen community as well as the Wintergreen Golf Course operated by the Resorts of the Canadian Rockies (RCR).

The WWWU would be pleased to provide potable water for the proposed five single family residential lots along Township Rd 234 just south of the Wintergreen Golf Course. We can confirm that WWWU has sufficient capacity in both our water license as well as our plant to service the proposed five single family residences.

The WWWU will reserve the water without restriction pending subdivision approval for the five single family residences. RedQuest must pay the WWWU membership fees (all final payments made) as well as develop the infrastructure before subdivision receives final endorsement.

Further,

- RedQuest will bear the costs to engineer and construct the distribution system for these five lots and tie into the existing WWWU potable water distribution network
- The WWWU must approve your engineering specifications for the extension to our distribution system
- The WWWU must approve the construction for the extension to our distribution system before we will agree to maintain it


The current costs for WWWU membership are as follows:

- \$25,000 tie-in fee (one time only - paid when the lot is sold)
- \$450 / year for an un-serviced lot (fees are updated annually)
- \$1600 / year for a serviced lot (fees are updated annually)

These fees are re-assessed each year at the WWWU Annual General Meeting.

We look forward to providing water to our new neighbours.

Sincerely



---

J. Mark Chidwick  
Chairman, Wintergreen Woods Water Utility



---

Pat Majer  
Resorts of the Canadian Rockies

## **APPENDIX 9.5**

### **9.5 Summary of Public Consultation**

Following Rocky View County's initial circulation of the proposed redesignation and subdivision plan for Wintergreen Forest Estates, we were advised that the County received only one letter of opposition from a Bragg Creek area resident (Appendix 5), to which we will respond to Council. We had preliminary discussions with a number of immediate neighbours prior to undertaking this Conceptual Scheme, who we made aware of our plans for redesignation and subdivision. We did not receive a negative response during conversations in this regard.



**From:** [Bart Carswell](#)  
**To:** [Johnson Kwan](#)  
**Subject:** FW: file 03924010 applicants Robert and Margaret Rettie  
**Date:** September-20-13 12:12:59 PM

---

-----Original Message-----

From: [REDACTED]  
Sent: Tuesday, September 03, 2013 1:09 PM  
To: Bart Carswell  
Subject: file 03924010 applicants Robert and Margaret Rettie

Bart Carswell and Johnson Kwan,

I am totally opposed to the development proposed.

File 03924010

Application: 2013-RV-079 (Redesignation) and 2013-RV-080 (Subdivision)

Division 1

Legal Lot 1, Block 2, Plan 1311147 with-in NE-24-23-5-W5M

The maximum of five, four acre parcels is not compatible with this quarter section or the surrounding lands west, south west. the smallest on this quarter are two seven (7) acre parcels. This development would be invading lands which are mainly farm and ranch lands. Two tens would be more fitting and less impact on the Wintergreen Rd. (Range Rd. 50).

This site requires a storm water drainage study. ( Bragg Creek ASP) This site sits on the bottom slope of Last Break Ridge, which is the last of the foothills before the grasslands start. It is a watershed on the eastern slopes of the Rockies. The wetlands can be seen at the intersection of Range Rd. 50 and TWP Rd. 234. This site is fed by springs from the neighboring quarter and run off from the old Wintergreen ski hill. This is also effecting the lands and homes on and around the golf resort. Rockyview has responded many times to two locations on the Wintergreen Rd. fearing the road would wash out. An extensive STORM WATER DRAINAGE Study must be conducted.

This site is also the home of OLD GROWTH FOREST and a site by site design should be required so as these trees are not removed providing a building site, but be worked around and incorporated into the the general design for future development. (B.C. ASP) There is NO M.R. shown. During the 60's when this quarter was subdivided into 5-32 acre parcels. I recall in lieu of cash we all gave land, which was to run along the back fence line (west property line). This would be used most likely only if a road was ever required to service land locked quarters as Range Rd. 51 will never be built due to the terrain. And no plans to continue TWP Rd. 234 past its present state.

With the applicant not shown this M.R. the quarter to the south-west will always be land locked.

There should be limited development on this side of the Elbow River until the County has put in an EGRESS for those of us living on the North side. Every time the roads flood or we have a fire the bridge is closed to local traffic. This is so responders have access. This was also pointed out during our flood when we made the News. More than 1000 people Trapped separated from family by the river, with no way out. And sad to say but that's the truth!

As for the ability to prove water on four new parcels this is 50/50.

Please take this information into consideration when you make a decision.

Judie Norman  
[REDACTED]