

## 4.30

# SITE SPECIFIC LAND APPLICATION PLAN FOR ROSMAN FARMS UNIT

---

**This Plan is a component of Fire Mountain Farms, Inc. Application for Coverage Under the General Permit for Biosolids Management Permit No. BT9902**

**Location:**

Site Address (General Locations):	32529 Level Road N. and Unaddressed Olson Hills Road E. Davenport, WA 99122
GPS Coordinates of Site Entrances:	Lat 47° 44' 30.66" N, Long 118° 05' 14.95" W Lat 47° 42' 30.48" N, Long 118° 07' 47.94" W
Sec, Twp, Rge:	Sec 12, 13, 23, 24 & 34, Twp 26N, Rge 37W, WM Sec 18 & 19 Twp 26N, Rge 38W, WM
Water Resource Inventory Area:	53
County:	Lincoln

## Table of Contents

Introduction .....	3
1.0 Ownership, Management, and Landowner Agreements .....	4
2.0 Past Biosolids Use .....	4
3.0 Maps .....	4
3.1 General Location Maps .....	5
3.2 Site Map or Field Maps .....	5
3.3 Soils Maps .....	5
4.0 Seasonal and Daily Timing of Biosolids Applications .....	5
5.0 Biosolids Staging and Storage .....	5
6.0 Cropping Practices and Livestock Management .....	6
7.0 Other Nutrient Sources and Soil Amendments .....	7
8.0 Methods of Application .....	7
9.0 Determining and Validating Application Rates .....	9
9.1 Determining the Plant Available Nitrogen Requirement .....	9
9.2 Calculating the Application Rate .....	10
9.3 Verifying the Application Rate .....	10
10.0 Sampling Plan .....	11
10.1 Soil Sampling .....	11
10.2 Biosolids Sampling and Analysis .....	11
10.3 Pathogen Reduction .....	12
10.4 Trace Elements .....	12
10.5 Vector Attraction Reduction Standard .....	12
11.0 Groundwater Protection Plan .....	13
12.0 Erosion Control Plan .....	13
13.0 Noxious Weed Plan .....	13
14.0 Restricting Site Access .....	13
15.0 Recordkeeping .....	14
16.0 Additional Information .....	14
Appendices .....	15

## Introduction

This introduction is intended to give the reviewer a quick and general overview of this site and related items. Many elements of this introduction are more completely addressed later in this Site Specific Land Application Plan.

The goals of this plan include the following:

- Establish procedures to best manage biosolids storage and land application on the site.
- Ensure that consistent and uniform land application practices are performed and observed.
- Provide improved site soil characteristics through sound agronomic management.
- Establish procedures to meet the beneficial use of biosolids as defined in WAC 173-308.

This is a new site to Fire Mountain Farms' current permit. This farm is currently used for grain and timber production. This farm is owned by Gary Rosman. This is an upland site with gently rolling hills throughout the wheat fields and timber on steeper slopes. The Rosman residence is on site.

The fields off of Olson Hills Road E. are permitted now for septage and Fire Mountain Farms would give the hauler rights to use what land they need for septage disposal. The fields off Level Road have not had any biosolids (or septage) applied to them in the past.

**Leaseholder Arrangements:** Gary Rosman owns and manages this farm. There are no leaseholder arrangements.

**General Site Description:** The site is dry land that consists of wheat fields and pine forests on steeper land. This is a low rainfall area. Fields are rolling hills. None of these properties lie in either the 100 or 500-year flood zone. There have been no observations of threatened or endangered species on the site. The site is in current agricultural production. It is not expected that the application of biosolids will impact threatened or endangered species or critical habitat for such species. A list of threatened, endangered and species of concern as listed by the Department of Fish and Wildlife for Lincoln County may be found in Appendix 7.D of this plan.

**General Biosolids Handling:** Fire Mountain Farms does not have a biosolids source identified for this site at this time. If a supply of dewatered biosolids can be found, staging areas accessible to Class 8 trucks and trailers would be developed. Biosolids would then be loaded into spreaders and land applied. This site is also being considered for liquid biosolids from lagoon clean outs in the

area. In that case, the biosolids would be hauled in tankers to fields where our preferred method would be to pump to a tractor pulled drag hose system.

### 1.0 Ownership, Management, and Landowner Agreements

Owners are as listed below.

Owner	Parcel(s)	Zoning
Rosman, Gary M. 32529 Level Road N. Davenport, WA 99122	2637724700020 2638018400010 2637034800060	Agricultural
Rosman Land Holding, Inc. 32529 Level Road N. Davenport, WA 99122	2637024700030 2637023700040 2637014401040 2637014400130 2637013800020 2637014500100 2637013900010 2638018900050 2638018900071 2638019700000 2637012500010	Agricultural

This site is owned and managed by Gary Rosman.

This site is zoned as listed in the table above.

See Appendix 1 for signed agreements from landowners (as distinguished from a lessee, farmer, or others entitled to use the land) that acknowledge the applicability and requirements of Chapter 173-308 WAC when their property is used for biosolids land application or storage.

### 2.0 Past Biosolids Use

A portion of the farm is permitted for and has received septage, but no biosolids have been applied to this site. Any biosolids that will be applied will meet WAC 173-308-160 (3) (Table 3) for pollutants.

### 3.0 Maps

Mapping units will designate Fire Mountain Farm's area of biosolids land application. These maps denote both site and setback boundaries (road and property line) as well as anomalies (e.g. swales, slopes >25%, physical barriers, etc.). Fire Mountain Farms site application maps will show, field acreage, field name, and other identifying characteristics for each site. Maps are located in Appendix 2 of this plan. There is no flood zone map included as the site does not lie in either the 100 or 500 year flood zone.

- 3.1 **General Location Map**
  - Appendix 2.A – Vicinity Map
  - Appendix 2.B – General Location & Haul Route Maps
  
- 3.2 **Site Map or Field Map**
  - Appendix 2.C – Aerial Overview of Site
  - Appendix 2.D – Residences, Wells, Roads, Accesses, Staging, Signage Field Identification Map
  - Appendix 2.E – not used
  - Appendix 2.F – not used
  - Appendix 2.G – Zoning Map
  - Appendix 2.H – Topographic Map
  
- 3.3 **Soils Map**
  - Appendix 3 – Soils Report (includes site soils map)

#### **4.0 Seasonal and Daily Timing of Biosolids Applications**

Biosolids applications at this site are limited based on soil and crop conditions. It is proposed that there be no limitations on daily timing of applications or restrictions for holidays. From a practical standpoint, applications will normally occur during daylight hours and operations usually do not occur on weekends or holidays. There may be occasions where deviation from the normal schedule will be required, such as the need to apply biosolids so that a subsequent crop may be planted in a timely manner prior to the rainy season.

Fire Mountain Farms will consider requests from neighbors if biosolids application procedures pose a likelihood of conflicting with planned activities. There are no known special events in this area that biosolids activities could impact. Recreational use of this site is limited to private hunting and a private camp site.

Entry onto this site may be limited due to frost thaw of the roads in the spring.

#### **5.0 Biosolids Staging and Storage**

If storage becomes needed on this site, Fire Mountain Farms will submit a storage proposal to Department of Ecology for approval. At this time there is no expected need of storage.

Access to the site is will be restricted by informational signs that are shown in Appendix 5 of this plan. To insure that drivers follow procedures, Fire Mountain Farms has printed instruction sheets describing biosolids off-loading procedures. These instruction sheets are sent to all biosolids suppliers. New drivers to the site are walked through these procedures. A triple check system is in place to assure all loads are accounted for: First, all loads are to be scheduled with the Operations Office prior to delivery. Second, all sources have been supplied numbered Delivery Tickets (these are numbered sequentially and if a number is missing, Fire Mountain Farms investigates what happened to it). See Appendix

6.C of this plan for an example. Third, all deliveries are recorded on "Delivery Record Sheet" at sites. See Appendix 6.D for an example.

Biosolids would be applied as it is delivered to this site or within a few days unless storage has been approved by Ecology. Most often biosolids are applied from single sources; however we wish to leave open the option of bringing in multiple sources. It is our intent to not blend sources on this site.

Agronomic rates for an application site shall be calculated and approved prior to application or storing of biosolids onsite unless Ecology has specifically granted storage approval in advance of an approved agronomic rate.

## 6.0 Cropping Practices and Livestock Management

### Acres and Number of Fields:

#### Field Acres:

<del>Field</del>			Alternative Crops
Badlands-1	363.22	Timber	Native vegetation
Badlands-2	125.82	Timber	Native vegetation
Badlands-3	28.84	Timber	Native vegetation
CRP-1	5.55	N/A	N/A
CRP-2	3.26	N/A	N/A
CRP-3	9.54	N/A	N/A
CRP-4	13.04	N/A	N/A
CRP-5	2.66	N/A	N/A
CRP-6	8.03	N/A	N/A
CRP-7	11.78	N/A	N/A
CRP-8	27.23	N/A	N/A
CRP-9	14.95	N/A	N/A
<b>R-1</b>	<b>3.76</b>	Wheat	Small grains
<b>R-2</b>	<b>95.88</b>	Wheat	Small grains
<b>R-3</b>	<b>33.28</b>	Wheat	Small grains
<b>R-4</b>	<b>12.54</b>	Wheat	Small grains
<b>R-5</b>	<b>6.83</b>	Wheat	Small grains
<b>R-6</b>	<b>2.72</b>	Wheat	Small grains
<b>R-7</b>	<b>126.98</b>	Wheat	Small grains
<b>R-8</b>	<b>90.89</b>	Wheat	Small grains
<b>R-9</b>	<b>193.95</b>	Wheat	Small grains
<b>R-10</b>	<b>90.94</b>	Wheat	Small grains
<b>R-11</b>	<b>13.73</b>	Wheat	Small grains
<b>R-12</b>	<b>7.19</b>	Wheat	Small grains

R-13	2.72	Wheat	Small grains
R-14	65.62	Wheat	Small grains
R-15	36.39	Wheat	Small grains
R-16	88.53	Wheat	Small grains
R-17	15.5	Wheat	Small grains
Timber-1	64.54	Timber	Native vegetation
Timber-2	28.93	Timber	Native vegetation
Timber-3	63.66	Timber	Native vegetation
Timber-4	80.84	Timber	Native vegetation
Timber-5	230.52	Timber	Native vegetation
R2-1	157.77	Timber	Native vegetation
<b>Total</b>	<b>2127.63</b>		

**Total Acreage:**

Parcel Number	Acreage
2637724700020	6.89
2638018400010	40.00
2637034800060	158.00
2637024700030	266.11
2637023700040	203.00
2637014401040	17.00
2637014400130	17.00
2637013800020	240.00
2637014500100	86.00
2637013900010	166.21
2638018900050	301.80
2638018900071	161.23
2638019700000	315.68
2637012500010	196.25
<b>Total</b>	<b>2175.17</b>

There are no livestock onsite. Currently, only crop ground is planned to have biosolids applied. Crop fields include R1-R17 and R2-1.

**7.0 Other Nutrient Sources and Soil Amendments**

Commercial fertilizer as needed.

**8.0 Methods of Application**

Fire Mountain Farms has a wide variety of application equipment and methods for field applying biosolids. Some of the equipment is very specialized (such as

the timber application setup) and others are more common in typical agricultural production. Land application of biosolids will be conducted with equipment that is suitable for the site and also for the material being land applied. Land application methods will provide for an even and consistent distribution in accordance with the calculated application rate (see Subsection 9.2). Quality management of biosolids requires the flexibility to adjust to various site conditions.

Equipment that may be used includes:

- Rear- and side-discharge manure spreaders for dewatered biosolids.
- Spray irrigation equipment for liquid biosolids.
- Drag hose systems for liquid biosolids.
- Other equipment as approved by Ecology.

Buffer widths have been noted on attached maps and will not generally change with application method. However, from a practical standpoint, some methods of application will require increased setbacks to insure biosolids do not enter the buffer area. For example, using a "big gun" (a sprinkler-type system designed to apply liquid materials) could require the setback of an additional distance if wind is determined to be an operational concern. Compliance may also be met on a calm day by stationing a crew member in the field to closely monitor the operations and maintenance of setbacks. Along with buffers comprised of an approved setback distance, vegetated buffers may also be used to protect sensitive areas from biosolids. Fire Mountain Farms considers the method of application to be less of a factor in the setting of buffers than other aspects such as field slope, type of vegetation, permeability of soil and sensitivity of buffered areas.

Currently Fire Mountain Farms has the following equipment:

For de-watered biosolids:

- Knight side slingers (5)
- Meyers rear discharge
- Big A with FarmCo box
- John Deere hydro push

For liquid applications:

- Truck spread with splash plates
- Houle 7300 gallon tank spreader
- Hard hose reel (2)
  - With big gun
  - With 120ft spray bar
- Drag hose system
  - With airway aerator
  - With sod injector
  - With 7-shank injector



With splash plate

Under normal conditions, the preferred method of land application is the use of a drag-hose with airway aerator or seven shank injector for liquid and the Knight or Meyer spreaders for de-watered material. The method of application will be matched with the type of biosolids being delivered, crop and soil conditions. For example, the 7-shank injector is only usable with liquid biosolids being applied to annual crops, whereas the Meyer works best for very dry biosolids (40%+).

When biosolids must be incorporated to meet the vector attraction reduction (VAR) standard for Class B biosolids, one of the following methods will be used:

- Injection with drag-hose system
- Incorporation with tillage tool such as a disk harrow

#### **9.0 Determining and Validating Application Rates**

The subsections below detail the process to set desired nitrogen levels for a given crop, determine how much nitrogen is available in biosolids being applied, and how to calculate volume of biosolids to apply to a given field.

Ecology reserves the right to exercise professional judgment when evaluating proposed application rates and the site suitability so as to ensure biosolids rule requirements and the goals and objectives of this plan are met.

#### **9.1 Determining the Plant Available Nitrogen Requirement**

Agronomic rates for biosolids application will be determined using one or a combination of the following methods:

- Recommendation of professional agronomist or forester.
- As prescribed in farm plans on file with appropriate County Conservation Districts.
- As recommended by Washington State University (WSU) Cooperative Extension guidance.
- Production estimate based on potential of soil as determined by NRCS Soils Surveys, WSU or other Cooperative Extension guidance.
- As determined by actual production data using WSU rates per production unit or the following formula. Calculation of nitrogen requirement for crop production such as hay or pasture will be as follows:

$$\begin{aligned} \text{Dry matter yield (DmY)} \times (\%N) &= \text{N-uptake} \\ (\%N) &= \text{Crude Protein}/6.25 \end{aligned}$$

Example:

$DmY=4500 \text{ lb}$ , Crude Protein=18.75%, %N=18.75/6.25=3%  
N-uptake=  $4500 \times .03 = 135 \text{ lb}$  nitrogen utilization

- Rates will be adjusted as indicated by biosolids nutrient data, soil sampling and report card soil testing. Record of past production is the preferred method, but when that is not available (i.e., new site or new crop), Fire Mountain Farms will base application rate on the best available recommendation. Biosolids application rates will be calculated using Washington State Department of Ecology's Best Management Guidelines (#93-80, Revised July 2000). The Fire Mountain Farms Application Report (see Appendix 6.A of this plan) will be used to record and document application rates.

## 9.2 Calculating the Application Rate

Application rates are calculated using Worksheet for Calculation Biosolids Application Rates in Agriculture (PNW0511e), Excel spreadsheet based off of PNW0511e (aka Cogger/Sullivan Worksheet). See Appendix 7.A of this plan for an example. This spreadsheet allows input values for previous applications of biosolids, ammonium retention, and mineralization rate.

Ecology shall have 14 calendar days for review of information regarding agronomic rate recommendations. The 14-day review period shall begin after all necessary information to calculate the recommendation is received in writing by the designated Ecology staff member. If Ecology does not respond within 14 days of receiving all necessary information upon which a recommendation is based, it shall be considered approved.

## 9.3 Verifying the Application Rate

When applying biosolids, application rates are calculated in gallons per acre for both dewatered and liquid applications. For dewatered biosolids, each application unit is assigned a volume, and the number of loads per field is determined. For less experienced operators, the square feet of area to be covered will be determined. Depending on which applicator is being used, the correct area will be covered by varying speed and width of spread. More experienced operators will check the maximum number of loads per field and set travel area and width so as to come out at that number or less. The typical application rate procedure works like this: the supervisor determines rate and maximum number of loads for a field. This is entered on the "Application Report" and the report is given to the operator with a conservative factor built in (typically 1 to 3 loads less than specification). For liquid applications, a determination of the number of dry tons required is calculated. Then, using the percent total solids of the biosolids, the gallons per acre can be determined. The percent total solids will be checked periodically and an adjustment to the agronomic rate will be made if needed. When using the drag-hose system, a

flow meter is mounted in the tractor and a read out is displayed in acres per hour. For example, if an application rate requires 30,000 gallons per acre and a flow rate of 1000 gpm (gallons per minute), the tractor speed is set to two acres per hour. All of this information is recorded on the "Liquid Application Report" located as Appendix 6.B of this plan.

## **10.0 Sampling Plan**

The following sections describe soil and biosolids sampling procedures.

### **10.1 Soil Sampling**

The collection of soil samples and observation of crop response will assist with the determination of correct biosolids application rates. The fall report card soil test helps to gauge the effectiveness of the biosolids application rates by measuring the concentration of nitrate-N remaining in the top one foot of soil at the end of the growing season. To perform a report card soil test in the fall, Fire Mountain Farms will sample the top two feet of soil (0 to 12-inch depth and 0 to 24-inch depth) between August 15 and October 15. The timing of soil sampling is critical. Samples will be collected after the determined optimal crop uptake of nitrogen has occurred, but before the fall rains so as to limit the potential for nitrate to be leached from the top one foot of soil.

Report card soil testing is performed by collecting soil cores at multiple locations throughout the field, and combining the cores together to form a composite sample. A minimum of 10 cores per sample area will be collected. The depth of each core will be 12 inches and 24 inches. These samples will be dried or refrigerated to stop biological activity that could change results before shipping to laboratory for analysis.

If the report card soil test results are greater than 15–20 mg/kg (mg of nitrate-N per kg of soil), this may suggest that excess nitrate-N is remaining in the soil after optimal crop utilization. A reevaluation of future biosolids application rates at the site will then be calculated (i.e. a reduced nitrogen loading rate may be appropriate). Nitrate-N levels greater than 30 mg/kg will be considered excessive. When interpreting report card results, factors beyond the biosolids application rate will be analyzed. Consideration of the crop performance and response will also be evaluated. If crop growth and response was poor because of drought, pests, or poor growing conditions, nitrogen uptake may have been less than predicted, resulting in excess nitrate-N remaining in the soil profile. See the Sampling and Analysis Plan for more detailed soil collection and testing information. A sampling and analysis plan detailing the procedures for the collection of soil samples may be found in Appendix 8 of this plan.

### **10.2 Biosolids Sampling and Analysis**

Documenting that biosolids meet the standards for land application in WAC 173-308 is performed by either the biosolids generator (e.g. wastewater

treatment plant) or by Fire Mountain Farms, Inc. A sampling and analysis plan detailing the procedures for the collection of biosolids samples may be found in Appendix 8 of this plan.

### **10.3 Pathogen Reduction**

Pathogens are organisms, such as certain types of bacteria that have the potential to cause disease in humans. Biosolids must be processed to meet certain pathogen reduction standards. The pathogen reduction requirement for biosolids received at the site shall be met by one of the alternatives listed in WAC 173-308-170 (5) through (7). When biosolids from multiple sources are mixed on-site, documentation of pathogen reduction will be provided through the collection of seven samples that are representative of the blended biosolids and analyzed for fecal coliform. These samples will be delivered to a State of Washington accredited laboratory following a chain-of-custody protocol. Pathogen reduction shall be considered to have been accomplished if the geometric mean of the seven fecal coliform samples is less than 2,000,000 MPN/g-total solids (dry weight basis).

For a detailed description of pathogen reduction sampling procedures, please see the Sampling and Analysis Plan located in Appendix 8 of this plan.

### **10.4 Trace Elements**

At a minimum, biosolids land applied at the site, must meet the Ceiling Concentration Limits for pollutants found in Table 1 of WAC 173-308-170 (1). It is a policy of Fire Mountain Farms to only accept biosolids that meet the Pollutant Concentration Limit found in Table 3 of WAC 173-308-170 (3).

### **10.5 Vector Attraction Reduction Standard**

Vector attraction is the characteristic of biosolids that may attract insects and animals (vectors) capable of transmitting disease. In general, biosolids meeting vector attraction prior to arriving at the site will have gone through a process to reduce volatile solids or has physical properties such as high pH that reduces vector attraction. To meet vector attraction reduction (VAR) after biosolids arrive at the site, a physical process such as injection or incorporation of the biosolids will be performed as part of the application procedure.

Most biosolids, prior to being received at the site, shall meet one of the vector attraction reduction (VAR) requirements in WAC 173-308-180 (1) through (6). If the VAR requirement has not been met prior to the biosolids arriving at the site, one of the VAR requirements in WAC 173-308-210 (4) (a) or (4) (b) shall be met at the time of biosolids application.

### **11.0 Groundwater Protection Plan**

Groundwater depth does not come within three feet of the surface at this site in any of the fields that Fire Mountain Farms plans to apply biosolids, thus no Groundwater Protection Plan is required

### **12.0 Erosion Control Plan**

Biosolids will be applied at agronomic rates and managed consistent with established farming practices. Typical farming practices designed to reduce erosion potential are in place. These include managing crop residue and timing of tillage practices. Rosman Farms has an approved and implemented conservation plan on file with the Lincoln County Conservation District. . If tillable of biosolids is required to meet Vector Attraction Reduction standard or to reduce ammonia loss we will work with Conservation District personnel to insure our operations comply with approved plan.

### **13.0 Noxious Weed Plan**

Sites are managed for specific crops with standard farming practices in place to control noxious weeds. There are no known specific concerns in this area that are not being controlled by current practices. Site is monitored by operator to identify new noxious weeds. When new noxious weeds are identified control will depend on species of noxious weed and its spread. Control may be biological control, mechanical control or by herbicide application.

Fire Mountain Farms greatest past efforts in noxious weed control have been in trying to force the state to comply with state law and control noxious weeds on their adjoining land. We will encourage operators of this farm to also aggressively seek compliance of noxious weed laws on adjoining land, be it public or private. The best control of noxious weeds is to prevent them from establishing in the first place.

Land applied with biosolids will receive additional monitoring to insure that noxious weed seeds have not been transported to the site in the biosolids. Very few seeds are able to survive wastewater treatment systems. The only know plants we have seen introduced to a site by the biosolids, (tomatoes and marijuana), are not classed as noxious weeds.

### **14.0 Restricting Site Access**

A copy of Fire Mountain Farms' informational sign can be found in Appendix 5 of this plan. Signs will be placed as noted on the map in Appendix 2.D.

Signs will be placed at all normal points of access and at least every quarter mile along roadways that border application areas. Signs will also be placed at other points along the boundary where it is deemed appropriate by Fire Mountain Farms or as requested by DOE. Entering improved property without permission of land owner or person who has right of possession (lease holder) is a

violation of state law. The posting of signs noting the site is restricted adds an additional measure for public protection and also signals that the land is not open for public access.

### **15.0 Recordkeeping**

Fire Mountain Farms shall keep specific records of land application activities. These records shall be available for inspection by Ecology upon request. As a minimum, the following information shall be included in the land application site records:

Fire Mountain Farms will maintain the following information as required. Forms for maintaining this information are located in Appendices 6 and 7 of this plan.

- Sampling and analysis data obtained or used to make decisions on land application.
- The source of biosolids delivered.
- The amount of biosolids delivered.
- The amount of biosolids applied.
- The number of acres on which biosolids were applied.
- The rate of application.
- The date biosolids were applied.
- The targeted vegetation and its nitrogen requirement.
- Information on how site management and access restrictions were met, including for livestock.
- Information on how vector attraction reduction requirements were met if biosolids were required to be tilled or injected.
- The amount in storage.

### **16.0 Additional Information**

See the following appendices of this Site Specific Land Application Plan for more information.

## Appendices

1. Land Owners Agreement
2. Site Maps
  - A. Vicinity Map
  - B. General Location and Haul Route
  - C. Aerial Overview of Site
  - D. Residences, Wells, Roads, Access, Staging, Signage, Field Identification Map
  - E. Not used for this site
  - F. Not used for this site
  - G. Zoning Map
  - H. Topographic Map
3. Soils Report (includes site soils map)
4. Well Logs
5. Informational Sign
6. Forms
  - A. Land Application Report
  - B. Liquid Application Report
  - C. Haul Delivery Ticket
  - D. Delivery Record Sheet
7. Spreadsheets/Charts
  - A. Agronomic Rate Spreadsheet Example
  - B. Trace Elements Spreadsheet
  - C. Priority Habitat and Species List
8. Sampling and Analysis Plan
9. Report Card Soil Testing
10. Spill Plan Example
11. Public Notice

# APPENDIX 1

## 1.0 LAND OWNER AGREEMENT



# Landowner Consent for the Application of Biosolids

Rosman Farms Unit

Whenever biosolids not meeting exceptional quality standards are applied to the land, the owner of the land where the biosolids are applied must sign a statement acknowledging restrictions on use of the property which are imposed by federal and state laws. These restrictions regard access to the land, grazing of livestock on the land, and harvest of crops from the land. Either all owners of record must sign an acknowledgment, or an individual owner must provide proof that he/she has the authority to make such decisions on behalf of all other owners of record.

I understand that state rules and permit requirements impose certain restrictions on the use of my land after biosolids are applied. I agree to abide by those restrictions as long as they are in effect. I certify that I am (select 1, 2 or 3) 1 \_\_\_ the only landowner, 2 \_\_\_ one of \_\_\_ landowners, 3 \_\_\_ legally able to sign for landowner of record for the parcel(s) in question and have authority to grant permission for the land application of biosolids. I understand that I may revoke my permission at any time by notifying the Department of Ecology and land applier in writing, but that any contractual arrangement I may have with a biosolids generator or land applier will need to be resolved separately between myself and those persons. I understand that revocation of consent does not relieve me from any applicable restriction which may be in place due to the land application of biosolids.

Owner Name Rosman Land Holding Inc.

Signature Gary Rosman Date of Signature 1-20-2014

Operator (if other than owner) \_\_\_\_\_

Signature \_\_\_\_\_ Date of Signature \_\_\_\_\_

Parcel Number(s) of land where biosolids may be applied 2637724700020, 2638018400010, 2637034800060, 2637024700030, 2637023700040, 2637014401040, 2637014400130, 2637013800020, 2637014500100, 2637013900010, 2638018900050, 2638018900071, 2638019700000, and 2637012500010

1. I understand that application of biosolids to my land will affect my ability to use the land immediately after application and for a period of up to 38 months after the last application of biosolids. I understand that livestock grazing is prohibited for 30 days after the last application of biosolids. I understand that some crops including hay cannot be harvested for thirty days after application of biosolids; some crops such as strawberries cannot be harvested for up to 20 months after the last application of biosolids, and some crops such as carrots cannot be harvested for 38 months after the last application of biosolids. I understand that the foregoing are examples and that restrictions vary according to the crop and biosolids management practices involved. I accept responsibility for understanding the implications of biosolids use on my land and farming practices.
2. I understand that it may be a requirement to post informational signs on my property, and that those signs must be maintained in place for a period of up to one year after the last application of biosolids.

3. I understand that I must restrict access to my land for a period of one year after the last application of biosolids. I agree to prohibit uninformed or casual access, and to otherwise make certain that all parties accessing my land are informed as to the use of biosolids and any restrictions which may apply.
4. I understand that biosolids are applied according to agronomic requirements. I understand that the use of other nutrient sources (such as, but not limited to, manure or commercial fertilizers) may require a reduction in the amount of biosolids applied, or may prohibit further application of biosolids to my land. I understand that I must inform the biosolids land applier of any such sources. I also understand if biosolids are applied that application of other nutrient sources may be prohibited or reduced in the same and subsequent years.
5. I understand that the land applier and Department of Ecology staff or their designated representatives will require periodic access to my land in order to assess compliance, and I agree to cooperate in allowing access.
6. I understand that the person who applies biosolids to my land has a record keeping obligation which may require my cooperation, including information on when and where cattle are grazed, what kind of crop is grown, and productivity/harvest records.

I have read and agree to abide by above restrictions JE (owner initial) \_\_\_\_ (operator initial)

### Harvest Restrictions for Class B Biosolids

Food crops – Waiting period after Class B biosolids are applied are required to allow time for pathogens to die off before harvest. The table below details the waiting periods for food crop harvest.

Harvested part comes in contact with biosolids	Part of plant harvested	Biosolids remains on soil surface	Waiting period from biosolids application to harvest
Yes	Leaf/fruit/grain	No time specified	14 months
Yes	Root	More than 120 days	20 months
Yes	Root	Less than 120 days	38 months
No	Leaf/fruit/grain	No time specified	30 days

### Animal Feed and Non-food Crops Harvest Restrictions

Site/Crop	Grazing or Harvest	Public Access
Animal feed and other crops not for human consumption	30 days until harvest or grazing	
Pasture	30 days until grazing	
Turf	365 days until harvest	365 days
Public contact site		30 days (low potential for public exposure), 365 days (high potential for public exposure)

## APPENDIX 2

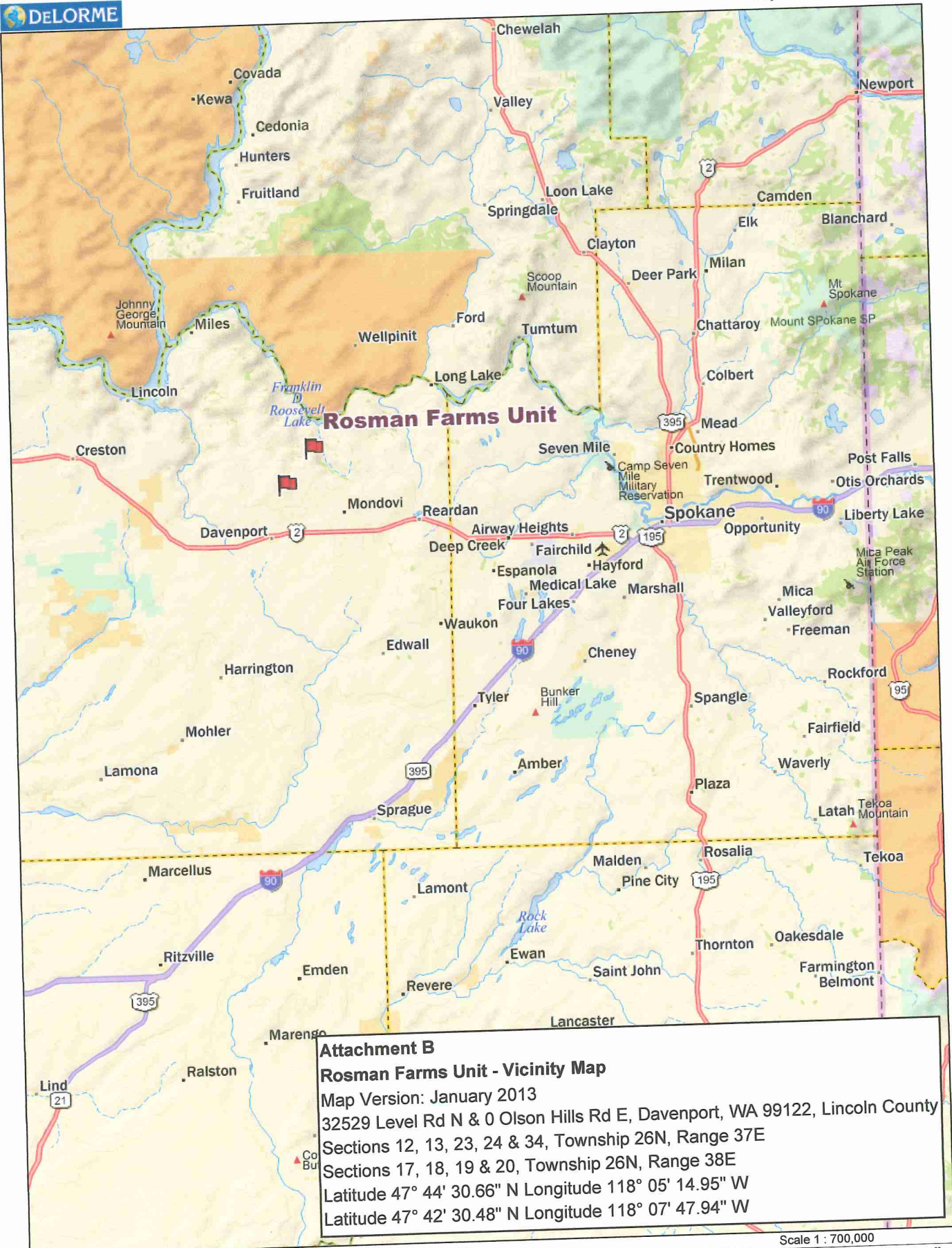
### 3.0 MAPS

3.1 GENERAL MAPS

3.2 FIELD and TOPOGRAPHIC MAPS

3.3 SOIL MAPS

## 3.1 GENERAL MAPS

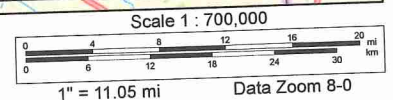


**Attachment B**  
**Rosman Farms Unit - Vicinity Map**  
 Map Version: January 2013  
 32529 Level Rd N & 0 Olson Hills Rd E, Davenport, WA 99122, Lincoln County  
 Sections 12, 13, 23, 24 & 34, Township 26N, Range 37E  
 Sections 17, 18, 19 & 20, Township 26N, Range 38E  
 Latitude 47° 44' 30.66" N Longitude 118° 05' 14.95" W  
 Latitude 47° 42' 30.48" N Longitude 118° 07' 47.94" W

Data use subject to license.

© DeLorme. Topo North America™ 10.

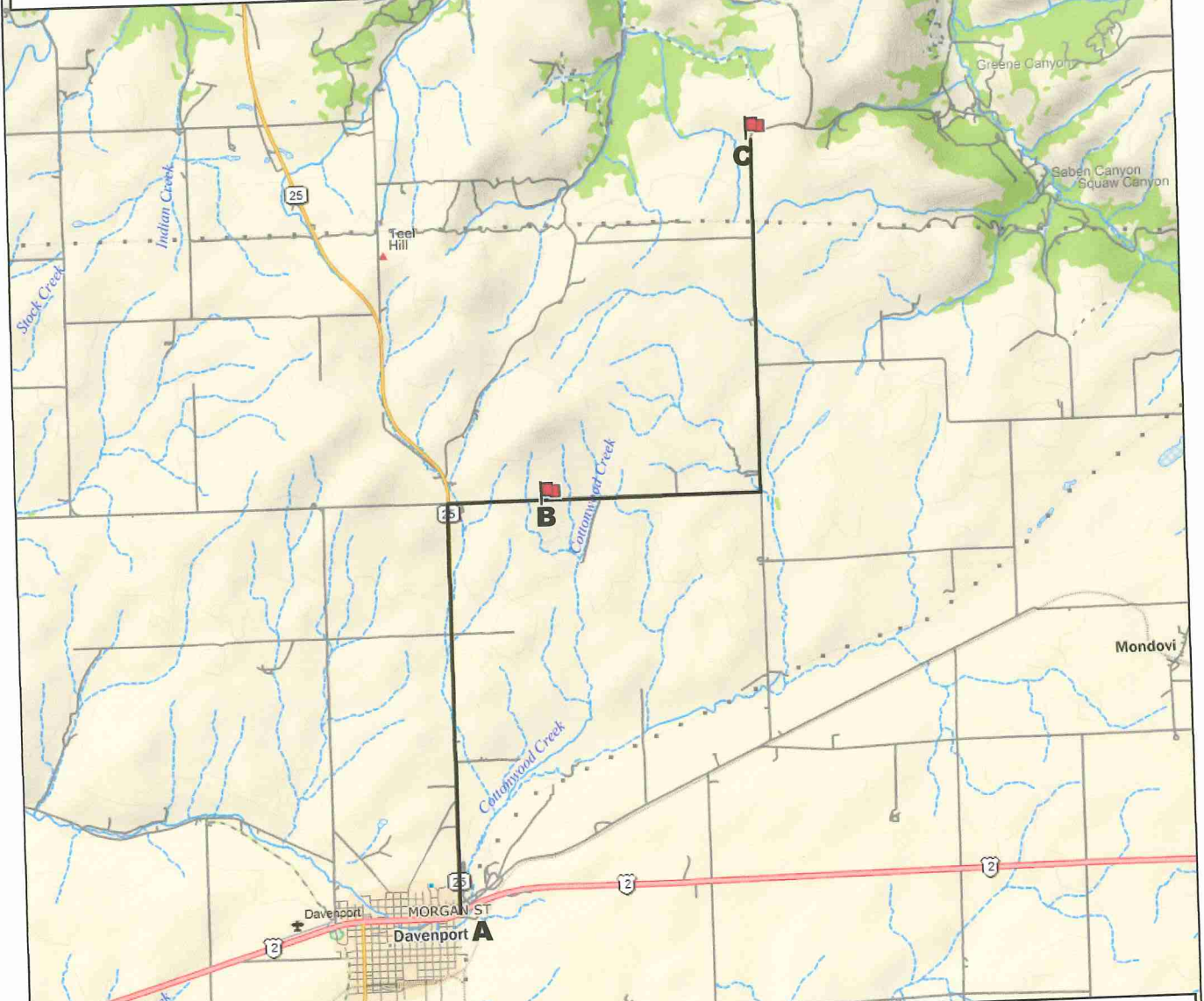
www.delorme.com



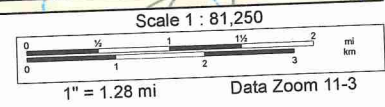
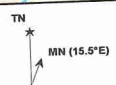


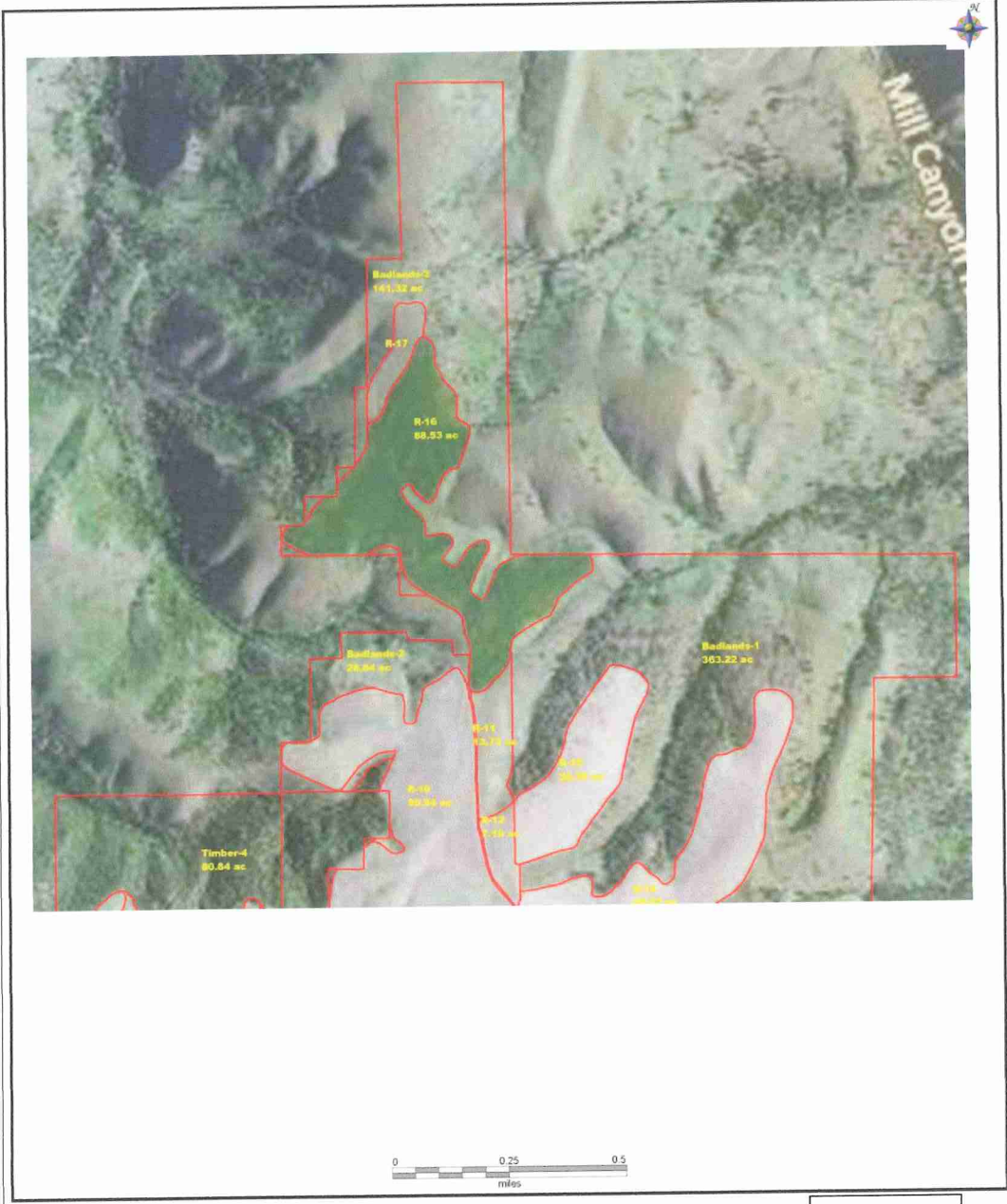
**Directions:**

- A. From US-2 in Davenport, WA**
- 1. Head north on WA-25 N go 3.2 miles
  - 2. Turn R onto Olson Hills Rd E go 0.9 miles
- B. Unaddressed Olson Hills Rd E site will be on the right**
- 3. Continue east on Olson Hills Rd E go 1.6 miles
  - 4. Turn L onto Level Road N go 2.8 miles
- C. 32529 Level Rd will be on the left**



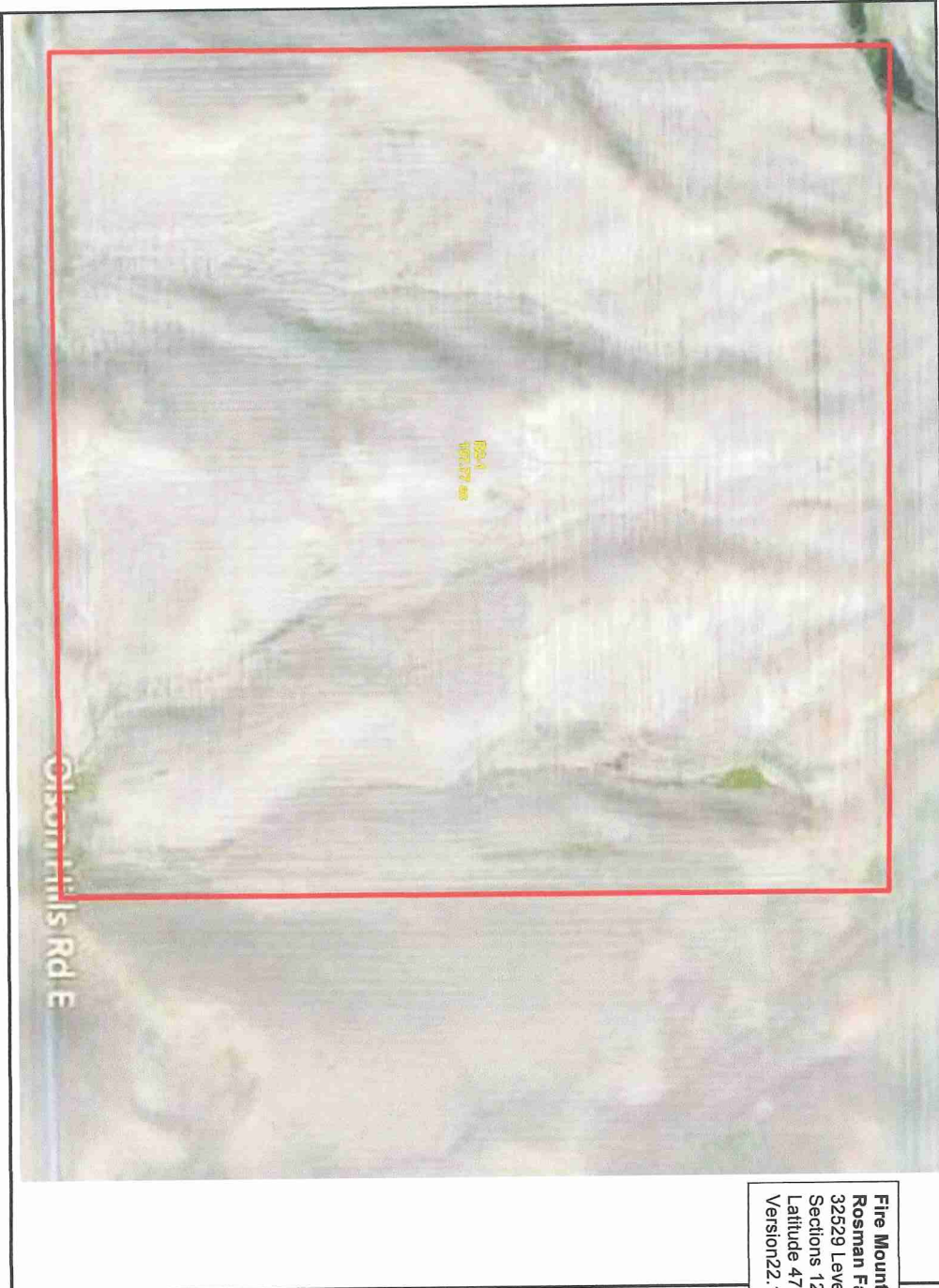
**Attachment C**  
**Rosman Farms Unit - General Location & Haul Route Map**  
 Map Version: January 2013  
 32529 Level Rd N & 0 Olson Hills Rd E, Davenport, WA 99122, Lincoln County  
 Sections 12, 13, 23, 24 & 34, Township 26N, Range 37E  
 Sections 17, 18, 19 & 20, Township 26N, Range 38E  
 Latitude 47° 44' 30.66" N Longitude 118° 05' 14.95" W  
 Latitude 47° 42' 30.48" N Longitude 118° 07' 47.94" W





**Fire Mountain Farms Inc. Permit# BB9902**  
**Rosman Farm Unit Attachment 2.A.3 Overview**  
 32529 Level Road N, Davenport, WA 99122 Lincoln County  
 Sections 12, 13, 23, 24, & 34, Township 26N, Range 37E  
 Latitude 47° 42' 30.48" N, Longitude 118° 05' 14.95" W  
 Version: 22.12.15

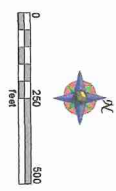
**LEGEND**  
 ● FIELD BOUNDARY  
 ● FIELD NAME & SIZE



**Fire Mountain Farms Inc. Permit# BB9902**  
**Rosman Farm Unit Attachment 2.A.4 Overview**  
 32529 Level Road N, Davenport, WA 99122 Lincoln County  
 Sections 12, 13, 23, 24, & 34, Township 26N, Range 37E  
 Latitude 47° 42' 30.48" N, Longitude 118° 05' 14.95" W  
 Version: 22.12.15

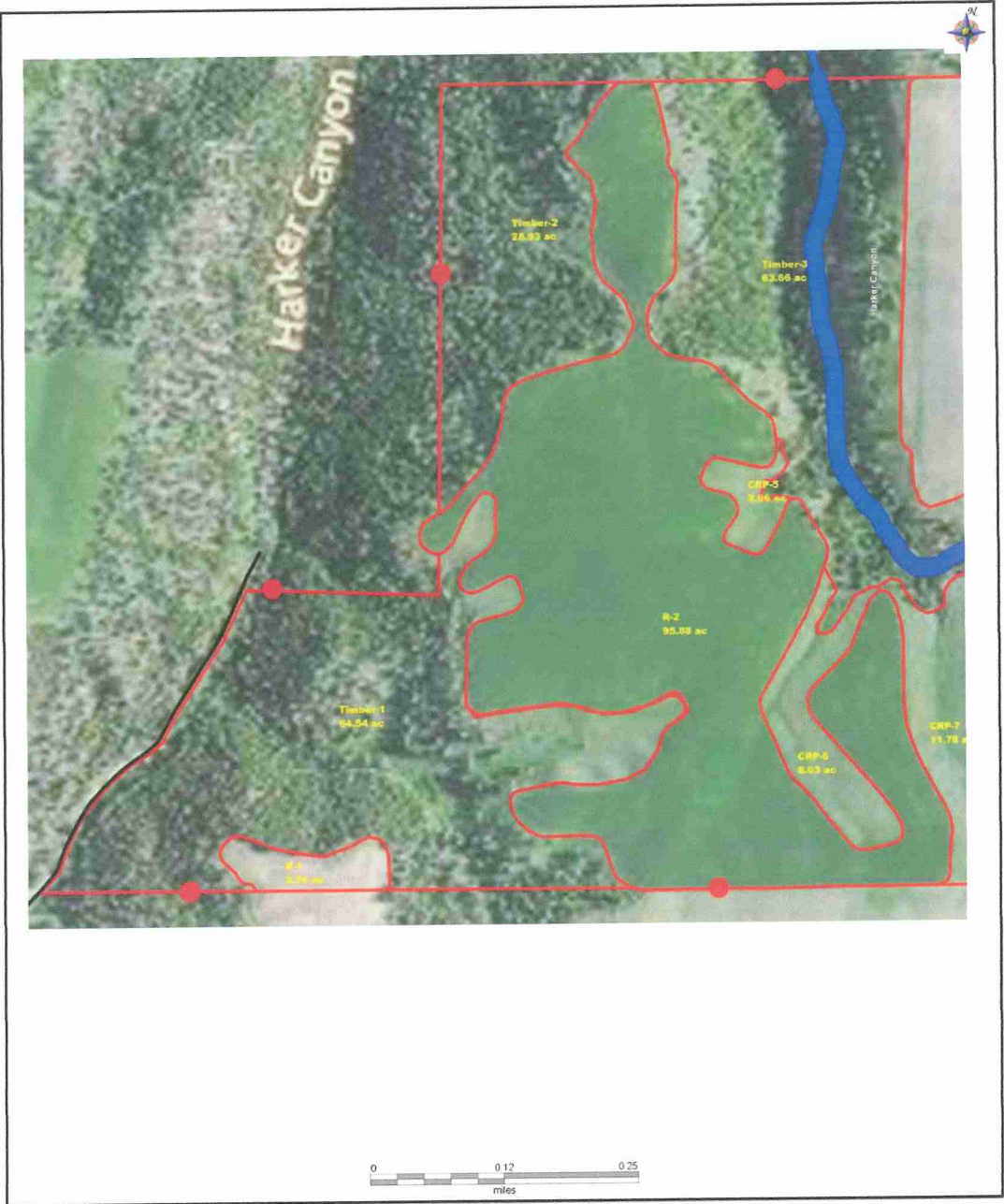
**LEGEND**

- FIELD BOUNDARY
- FIELD NAME & SIZE





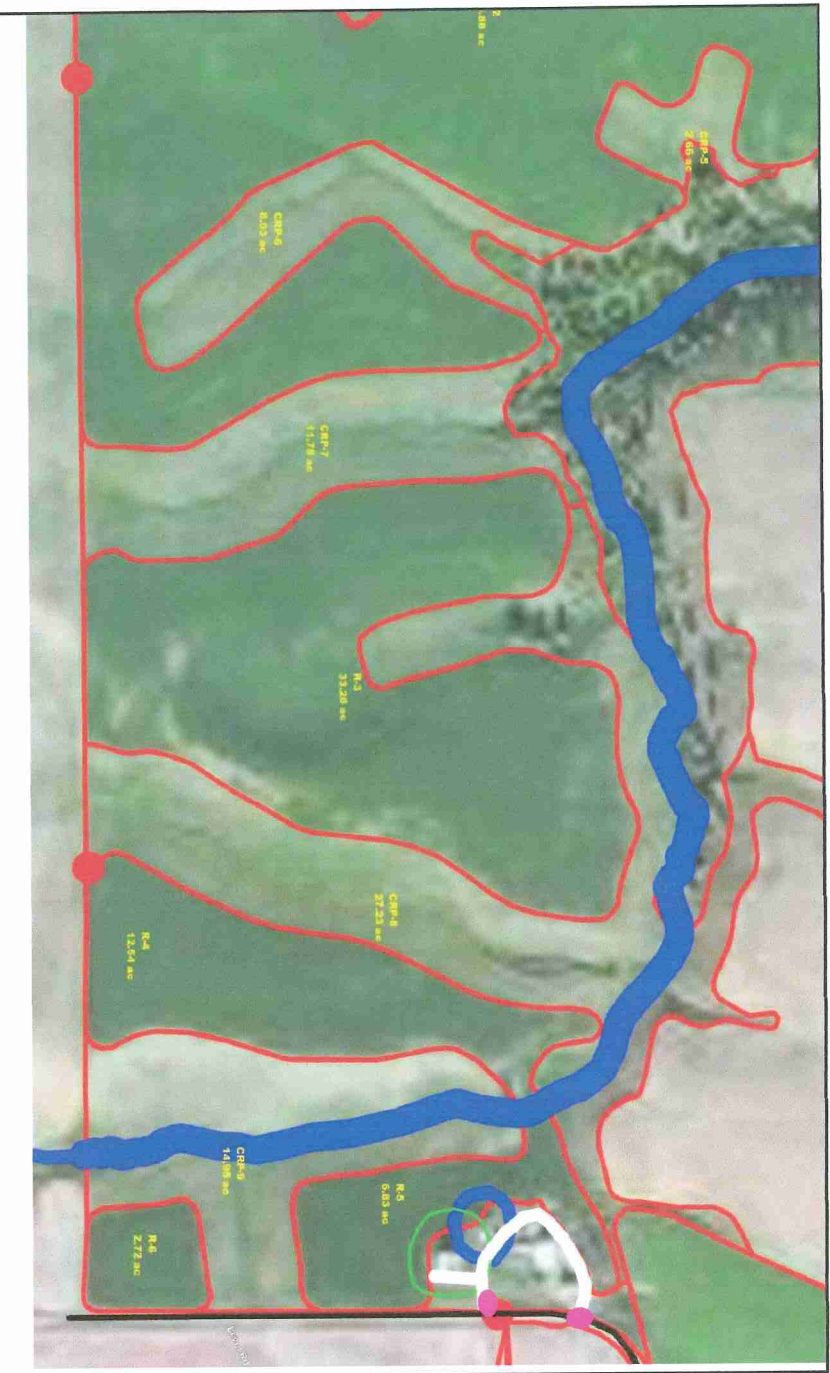
## 3.2 FIELD and TOPOGRAPHIC MAPS



**LEGEND**

- Residence(s) – 100 foot buffers
- Well(s) – 100 foot buffers
- Surface Water – 33 foot buffers
- Public Roadways – 10 foot buffers
- Driveway/Farm Roads – No buffers
- Property Boundaries – 10 foot buffers
- Informational Signs
- Access Points/Staging & Storage

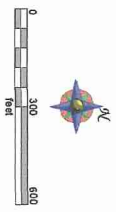
**Five Mountain Farms Inc. Permit# BB9902**  
**Attachment 2.D.1 Rosman Farm Unit**  
**Residences, Wells, Roads, Accesses, Staging, Signage**  
 32529 Level Road N, Davenport, WA 99122 Lincoln County  
 Sections 12, 13, 23, 24, & 34, Township 26N, Range 37W  
 Latitude 47° 42' 30.48" N, Longitude 118° 05' 14.95" W  
 Version 22.12.15

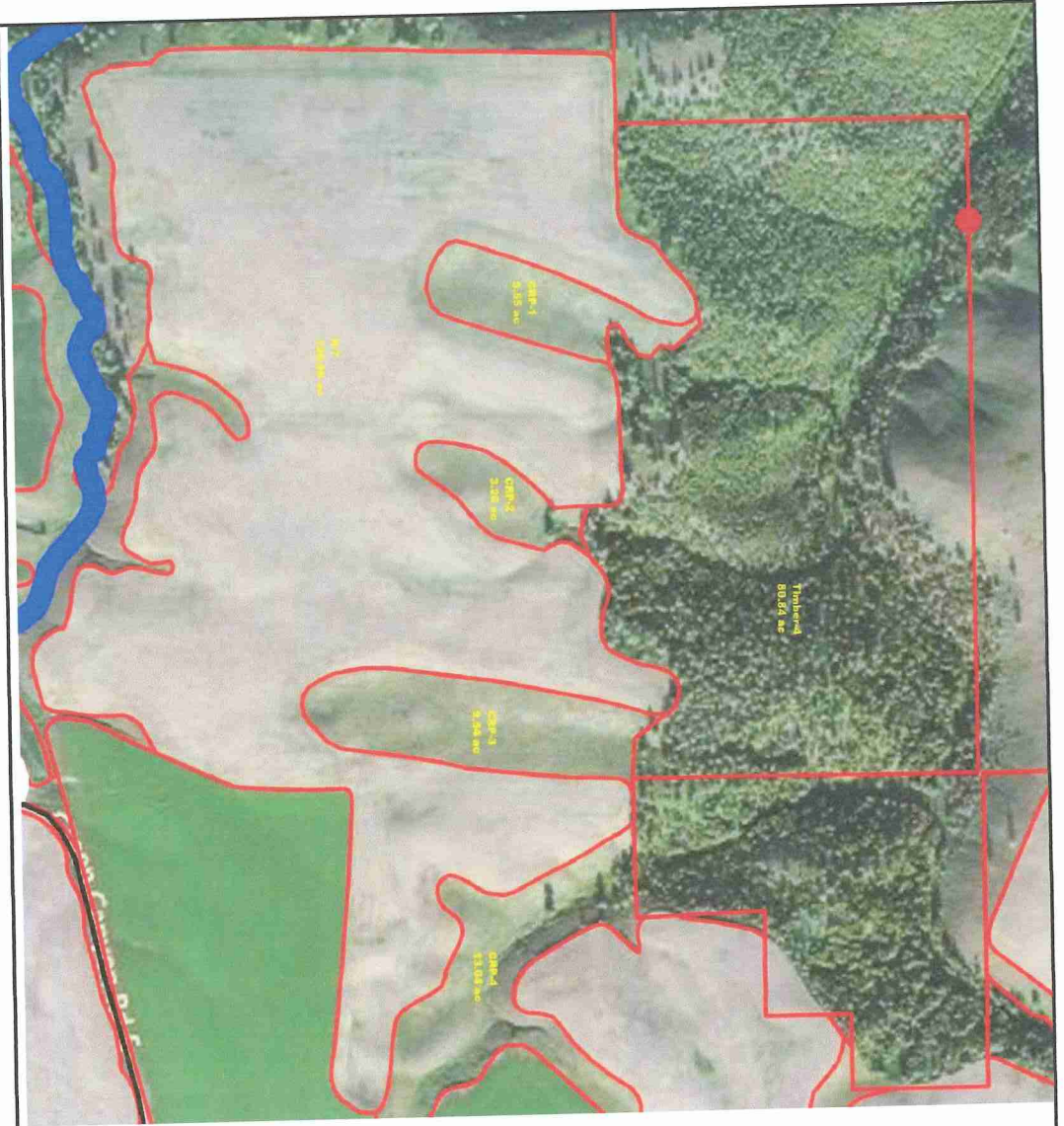


**LEGEND**

- Residence(s) – 100 foot buffers
- Well(s) – 100 foot buffers
- Surface Water – 33 foot buffers
- Public Roadways – 10 foot buffers
- Driveway/Farm Roads – No buffers
- Property Boundaries – 10 foot buffers
- Informational Signs
- Access Points/Staging & Storage

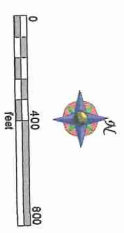
**Fire Mountain Farms Inc. Permit# BB9902**  
**Attachment 2.D.2 Rosman Farm Unit**  
**Residences, Wells, Roads, Accesses, Staging, Signage**  
 32529 Level Road N. Davenport, WA 99122 Lincoln County  
 Sections 12, 13, 23, 24, & 34, Township 26N, Range 37W  
 Latitude 47° 42' 30.48" N, Longitude 118° 05' 14.95" W  
 Version 22.12.15

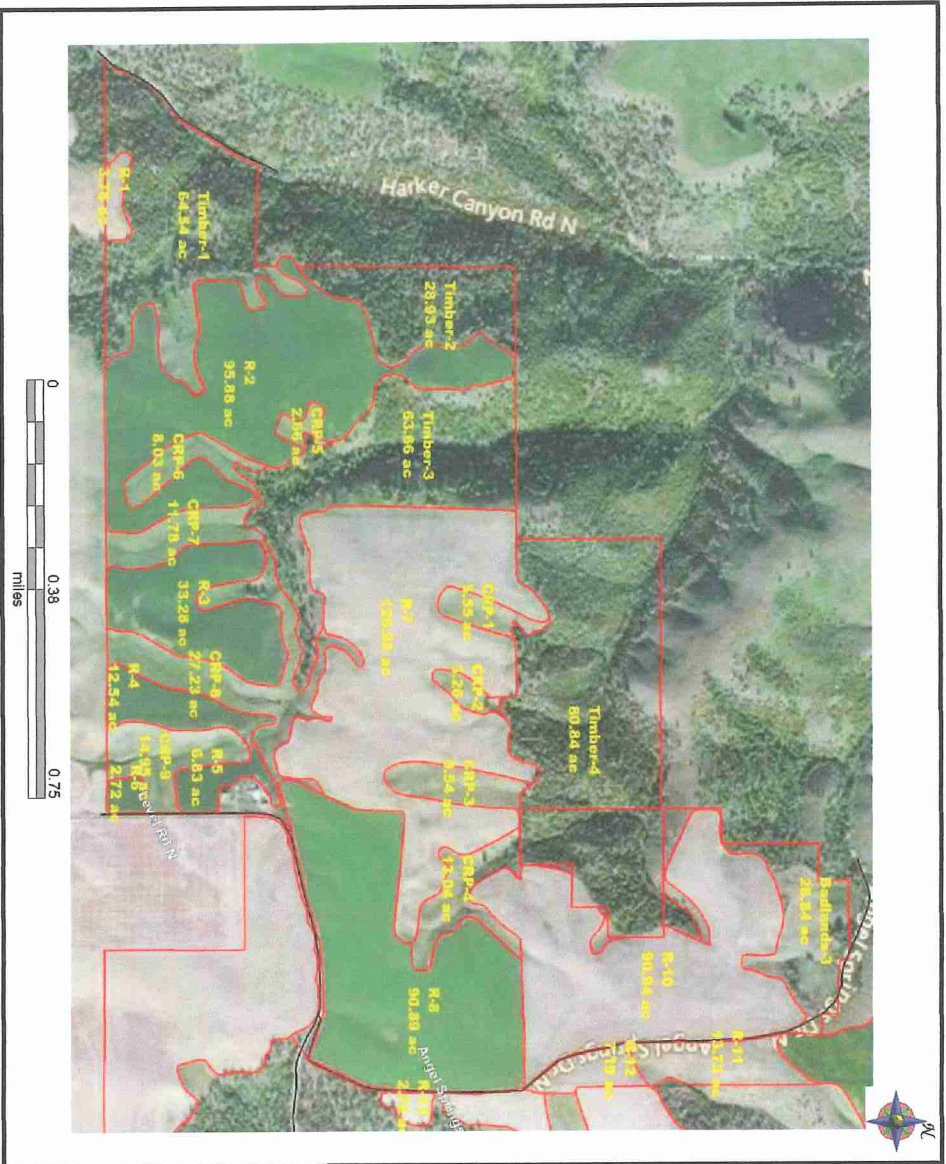




- LEGEND**
- Residence(s) – 100 foot buffers
  - Well(s) – 100 foot buffers
  - Surface Water – 33 foot buffers
  - Public Roadways – 10 foot buffers
  - Driveway/Farm Roads – No buffers
  - Property Boundaries – 10 foot buffers
  - Informational Signs
  - Access Points/Staging & Storage

**Fire Mountain Farms Inc. Permit# BB9902**  
**Attachment 2.D.3** Rosman Farm Unit  
 Residences, Wells, Roads, Accesses, Staging,  
 Signage  
 32629 Level Road N. Davenport, WA 99122 Lincoln  
 County  
 Sections 12, 13, 23, 24, & 34, Township 26N, Range 37W  
 Latitude 47° 42' 30.48" N, Longitude 118° 05' 14.95" W  
 Version 22.12.15





**Fire Mountain Farms Inc. Permit# BB9902**  
**Rosman Farm Unit Attachment 2.A.1 Overview**  
 32529 Level Road N, Davenport, WA 99122 Lincoln County  
 Sections 12, 13, 23, 24, & 34, Township 26N, Range 37E  
 Latitude 47° 42' 30.48" N, Longitude 118° 05' 14.95" W  
 Version 21.12.15

**LEGEND**

- FIELD BOUNDARY
- FIELD NAME & SIZE



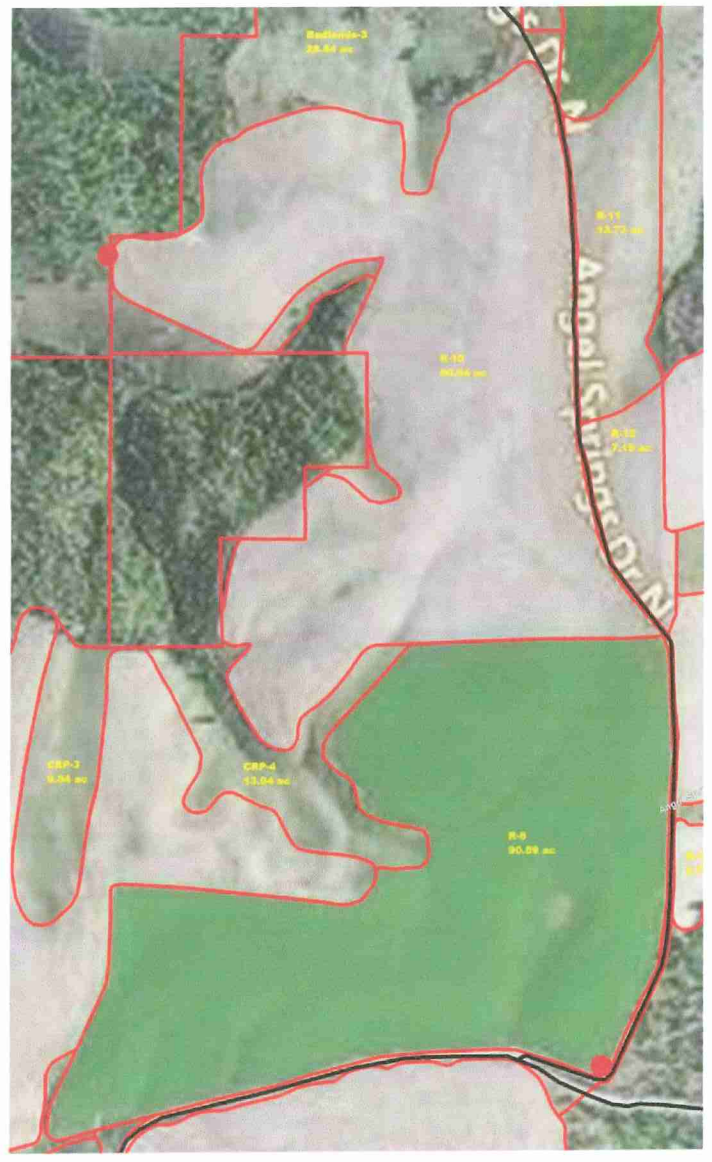
**Fire Mountain Farms Inc. Permit# BB9902**  
**Rosman Farm Unit Attachment 2.A.2 Overview**  
 32529 Level Road N, Davenport, WA 99122 Lincoln County  
 Sections 12, 13, 23, 24, & 34; Township 26N, Range 37E  
 Latitude 47° 42' 30.48" N, Longitude 118° 05' 14.95" W  
 Version: 22.12.15









**LEGEND**

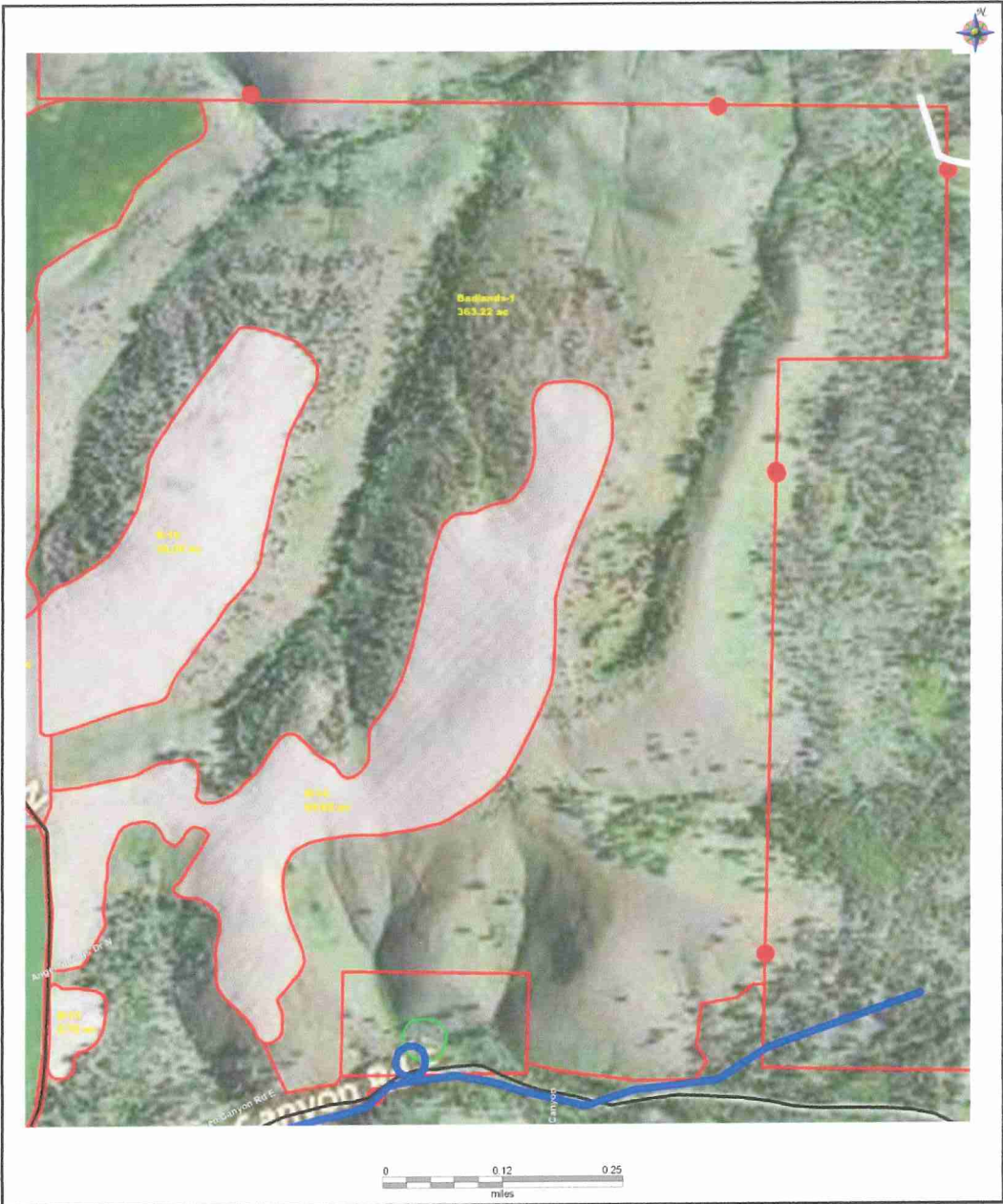
- FIELD BOUNDARY
- FIELD NAME & SIZE



**Fire Mountain Farms Inc. Permit# BB9902**  
**Attachment 2.D.4 Rosman Farm Unit**  
**Residences, Wells, Roads, Accesses, Staging, Signage**  
 32529 Level Road N. Davenport, WA 99122 Lincoln County  
 Sections 12, 13, 23, 24, & 34, Township 26N, Range 37W  
 Latitude 47° 42' 30.48" N, Longitude 118° 05' 14.95" W  
 Version 22.12.15



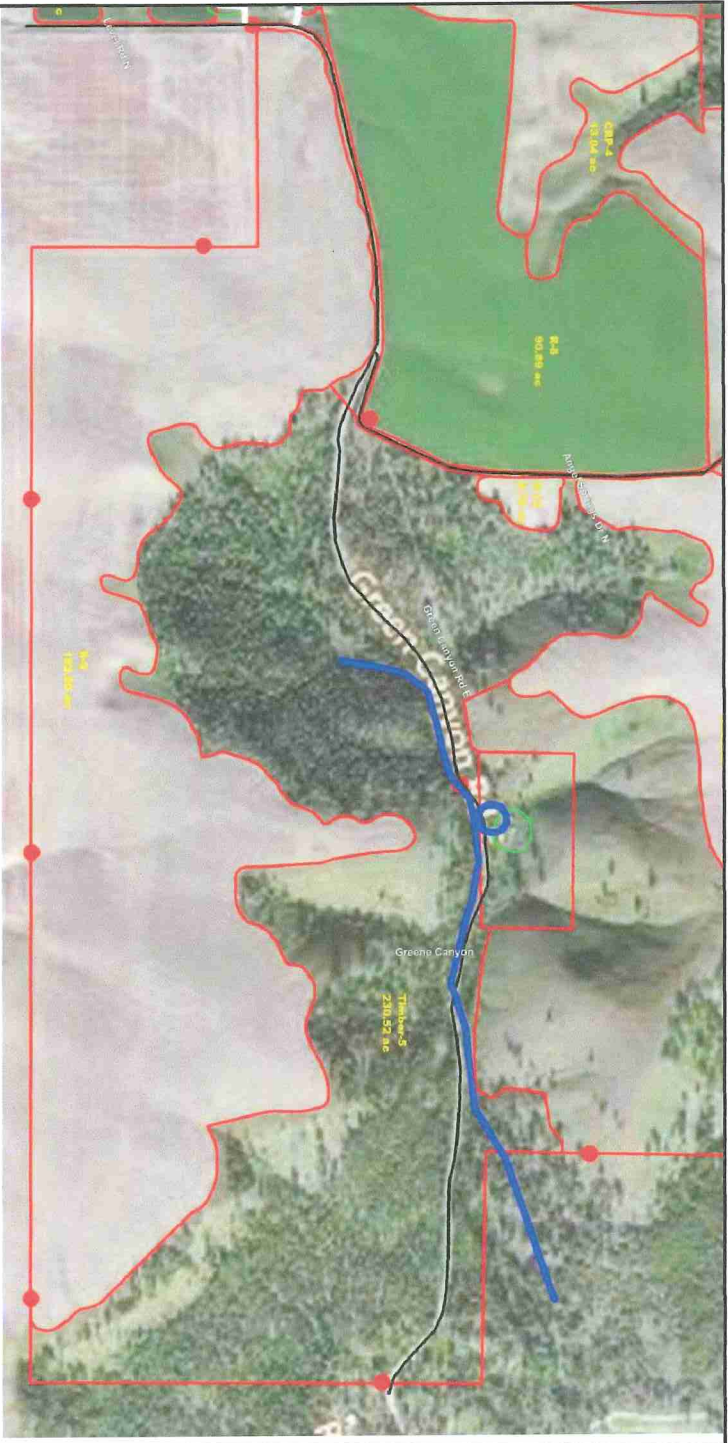
- LEGEND**
-  Residence(s) – 100 foot buffers
  -  Well(s) – 100 foot buffers
  -  Surface Water – 33 foot buffers
  -  Public Roadways – 10 foot buffers
  -  Driveway/Farm Roads – No buffers
  -  Property Boundaries – 10 foot buffers
  -  Informational Signs
  -  Access Points/Staging & Storage



- LEGEND**
- Residence(s) – 100 foot buffers
  - Well(s) – 100 foot buffers
  - Surface Water – 33 foot buffers
  - Public Roadways – 10 foot buffers
  - Driveway/Farm Roads – No buffers
  - Property Boundaries – 10 foot buffers
  - Informational Signs
  - Access Points/Staging & Storage

**Fire Mountain Farms Inc. Permit# BB9902**  
**Attachment 2.D.5. Rosman Farm Unit**  
**Residences, Wells, Roads, Accesses, Staging, Signage**  
 32529 Level Road N. Davenport, WA 99122 Lincoln County  
 Sections 12, 13, 23, 24, & 34, Township 26N, Range 37W  
 Latitude 47° 42' 30.48" N, Longitude 118° 05' 14.95" W  
 Version 22.12.15

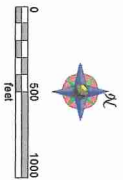




**Fire Mountain Farms Inc. Permit# BB9902**  
**Attachment 2.D.6 Rosman Farm Unit**  
**Residences, Wells, Roads, Accesses, Staging,**  
**Signage**  
 32529 Level Road N. Davenport, WA 99122 Lincoln  
 County  
 Sections 12, 13, 23, 24, & 34, Township 26N, Range 37W  
 Latitude 47° 42' 30.48" N, Longitude 118° 05' 14.95" W  
 Version 22.12.15

**LEGEND**

- Residence(s) – 100 foot buffers
- Well(s) – 100 foot buffers
- Surface Water – 33 foot buffers
- Public Roadways – 10 foot buffers
- Driveway/Farm Roads – No buffers
- Property Boundaries – 10 foot buffers
- Informational Signs
- Access Points/Staging & Storage











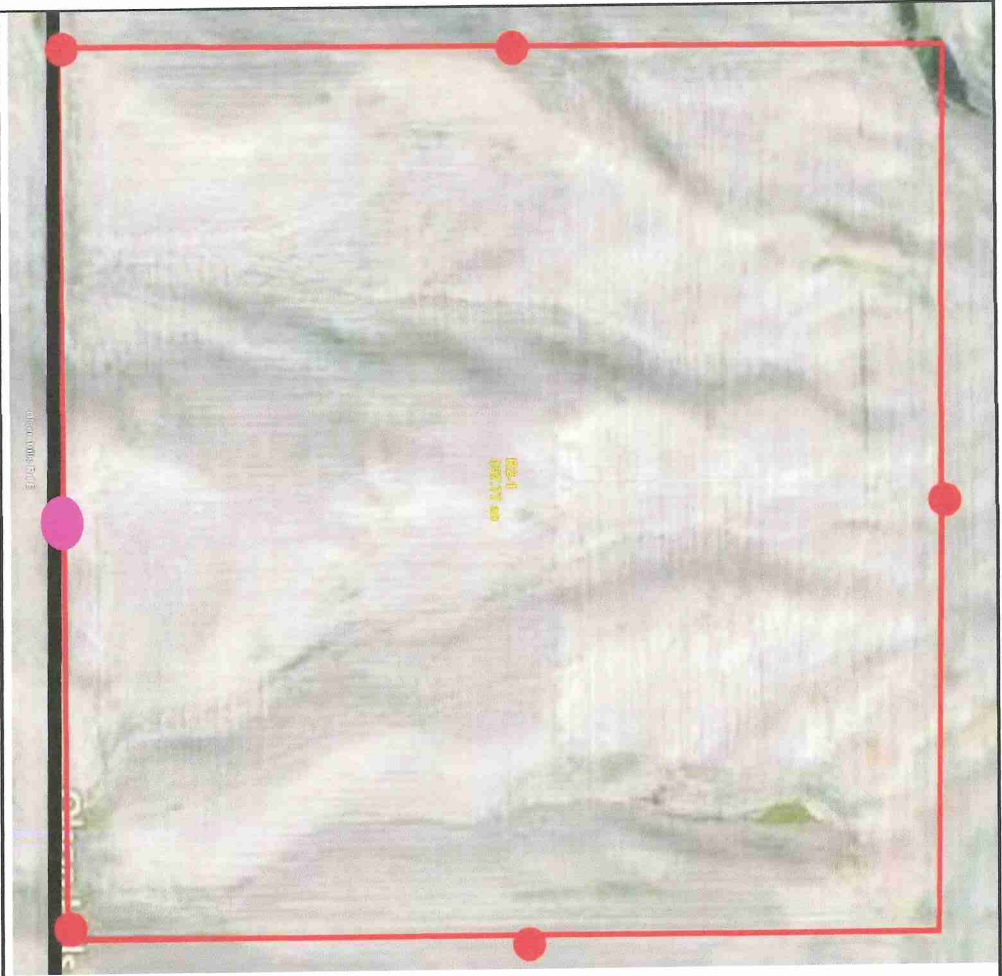


**Fire Mountain Farms Inc. Permit# BB9902**  
**Attachment 2.D.7 Rosman Farm Unit**  
**Residences, Wells, Roads, Accesses, Staging,**  
**Signage**  
 32529 Level Road N. Davenport, WA 99122 Lincoln  
 County  
 Sections 12, 13, 23, 24, & 34, Township 26N, Range 37W  
 Latitude 47° 42' 30.48" N, Longitude 118° 05' 14.95" W  
 Version 22.12.15











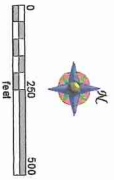
**LEGEND**

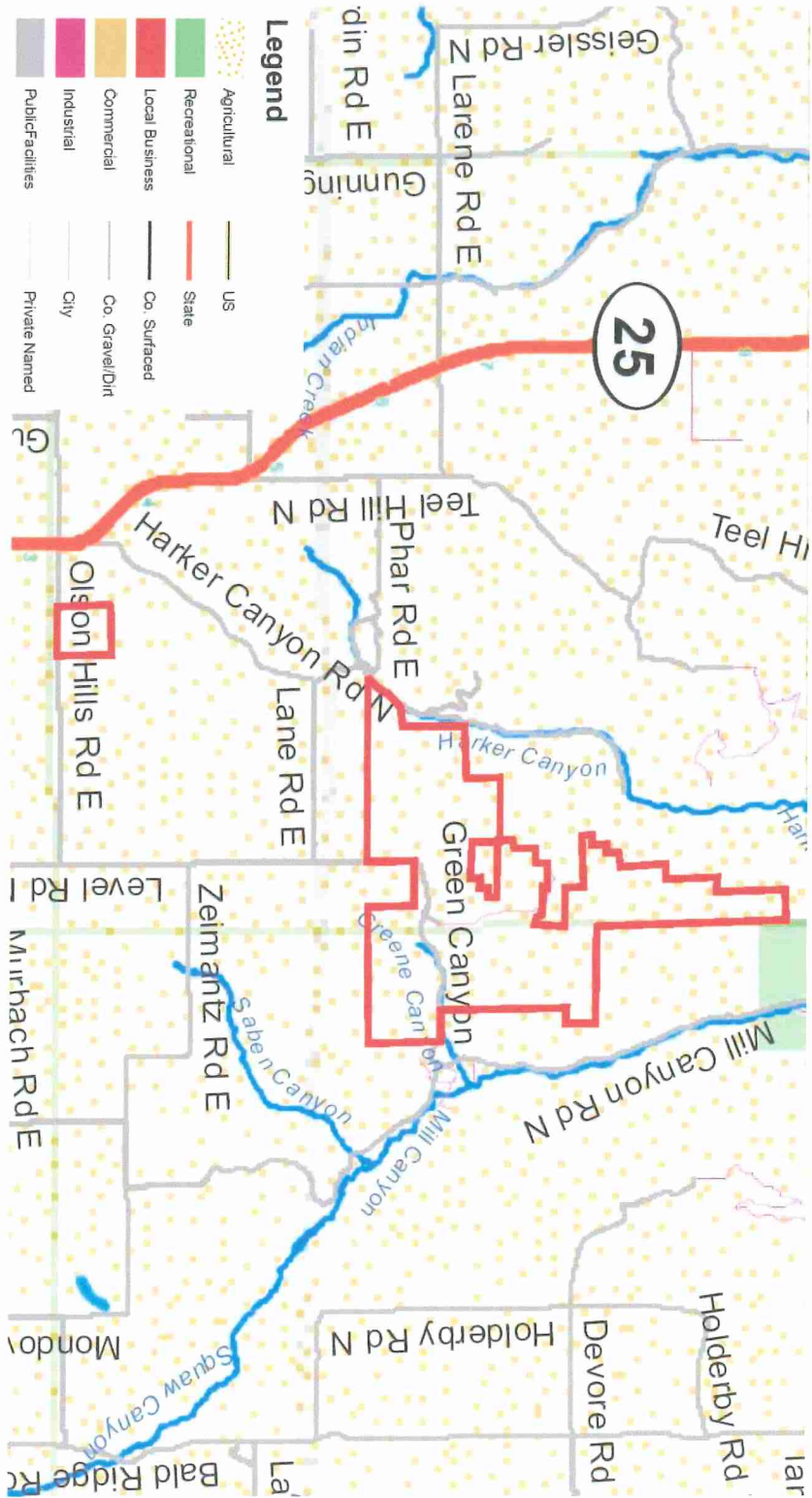
-  Residence(s) – 100 foot buffers
-  Well(s) – 100 foot buffers
-  Surface Water – 33 foot buffers
-  Public Roadways – 10 foot buffers
-  Driveway/Farm Roads – No buffers
-  Property Boundaries – 10 foot buffers
-  Informational Signs
-  Access Points/Staging & Storage



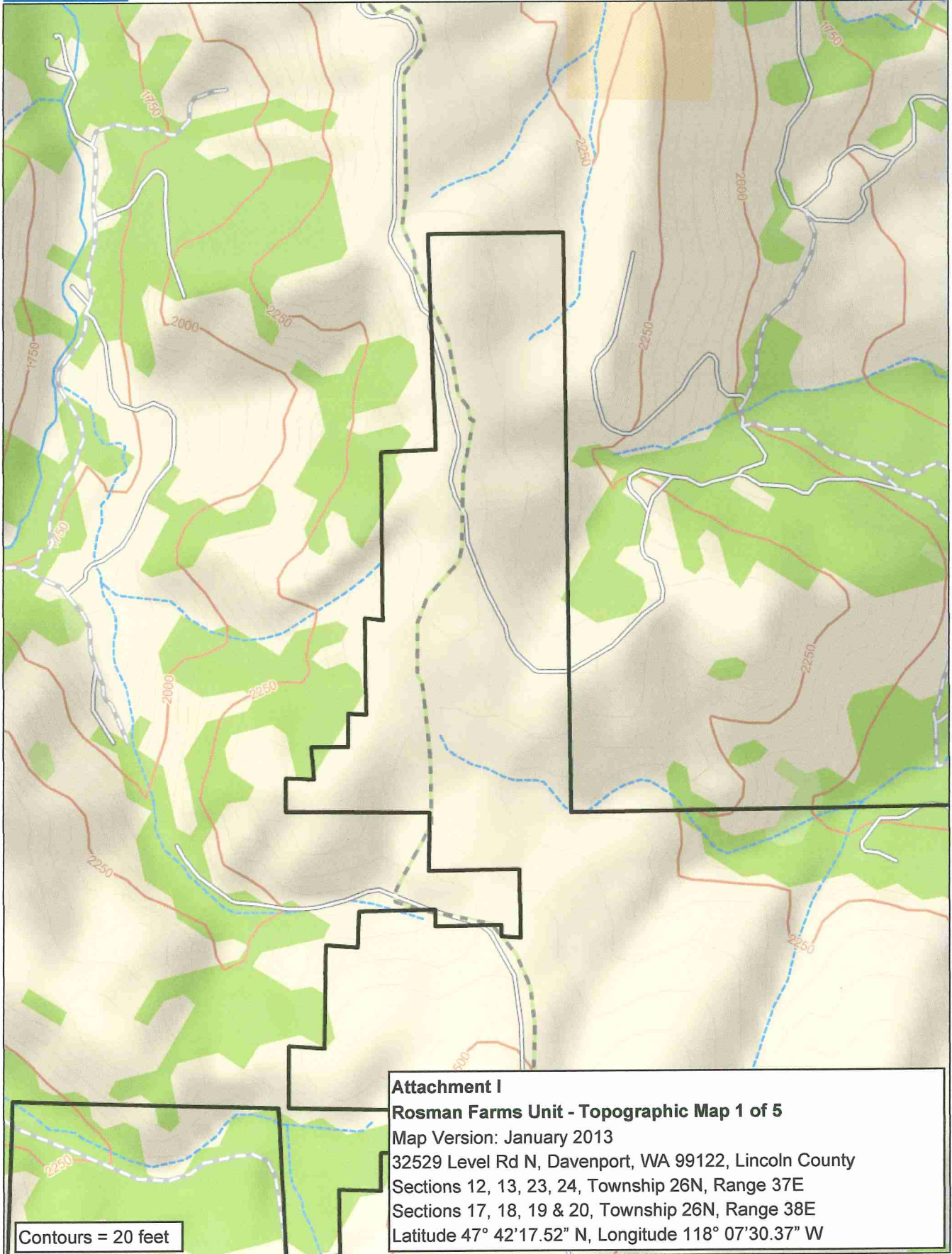
**Fire Mountain Farms Inc. Permit# BB9902**  
**Attachment 2.D.8 Rosman Farm Unit**  
**Residences, Wells, Roads, Accesses, Staging,**  
**Signage**  
 32529 Level Road N. Davenport, WA 99122 Lincoln  
 County  
 Sections 12, 13, 23, 24, & 34, Township 26N, Range 37W  
 Latitude 47° 42' 30.48" N, Longitude 118° 05' 14.95" W  
 Version 22.12.15

- LEGEND**
-  Residence(s) – 100 foot buffers
  -  Well(s) – 100 foot buffers
  -  Surface Water – 33 foot buffers
  -  Public Roadways – 10 foot buffers
  -  Driveway/Farm Roads – No buffers
  -  Property Boundaries – 10 foot buffers
  -  Informational Signs
  -  Access Points/Staging & Storage





**Site Map G**  
**Rosman Farms Unit – Zoning Map**  
 Map Version: 2012  
 32529 Level Road N. & Unaddressed Olson Hills Rd. E.  
 Davenport, WA 99122, Lincoln County  
 Sections 12, 13, 23, 24 & 34, Township 26N, Range 37E  
 Sections 17, 18, 19 & 20, Township 26N, Range 38E  
 Latitude 47° 42' 17.52" N, Longitude 118° 07' 30.37" W  
 Latitude 47° 44' 55.58" N, Longitude 118° 04' 24.54" W



**Attachment I**

**Rosman Farms Unit - Topographic Map 1 of 5**

Map Version: January 2013

32529 Level Rd N, Davenport, WA 99122, Lincoln County

Sections 12, 13, 23, 24, Township 26N, Range 37E

Sections 17, 18, 19 & 20, Township 26N, Range 38E

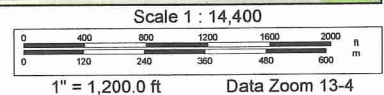
Latitude 47° 42'17.52" N, Longitude 118° 07'30.37" W

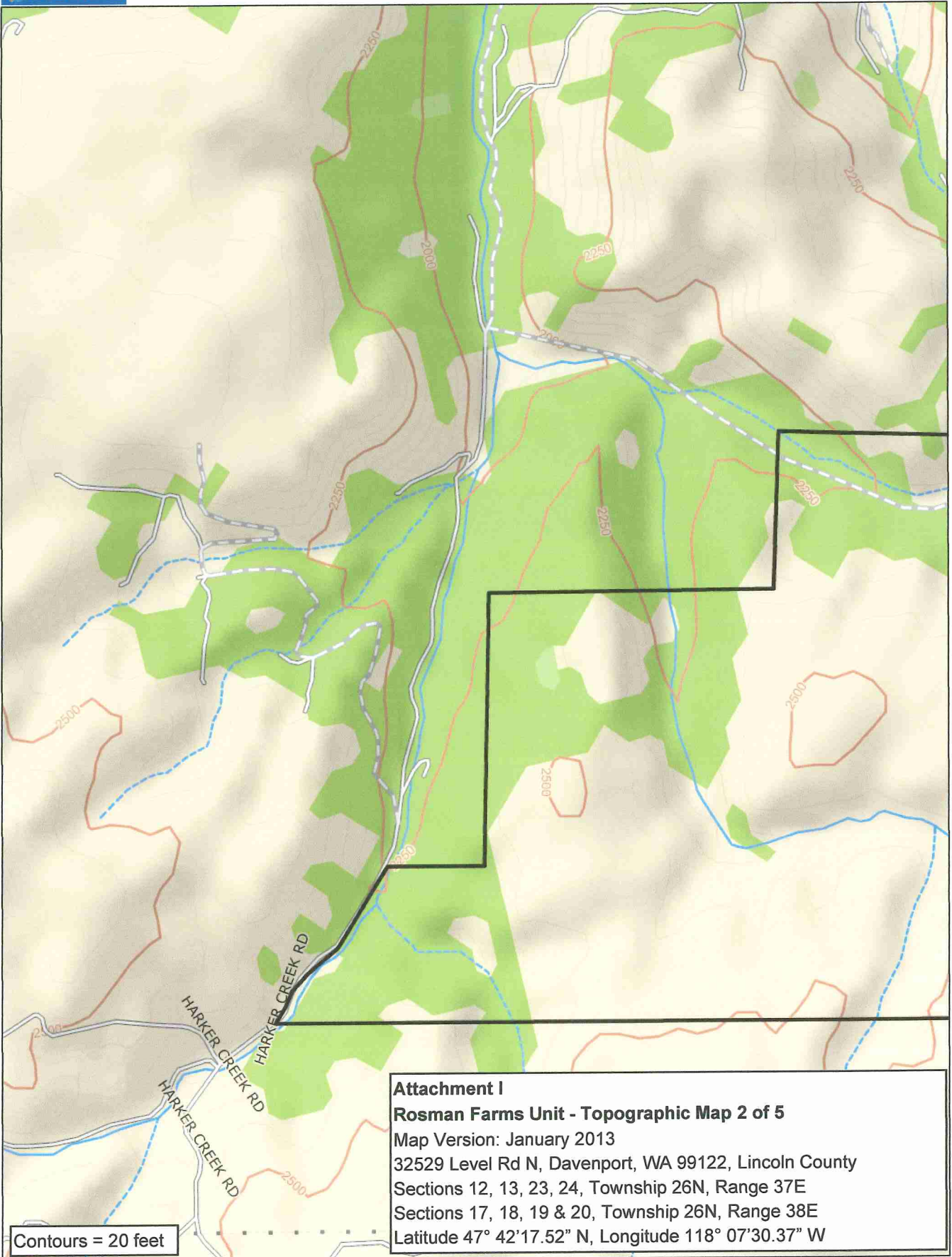
Contours = 20 feet

Data use subject to license.

© DeLorme. Topo North America™ 10.

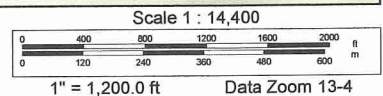
www.delorme.com

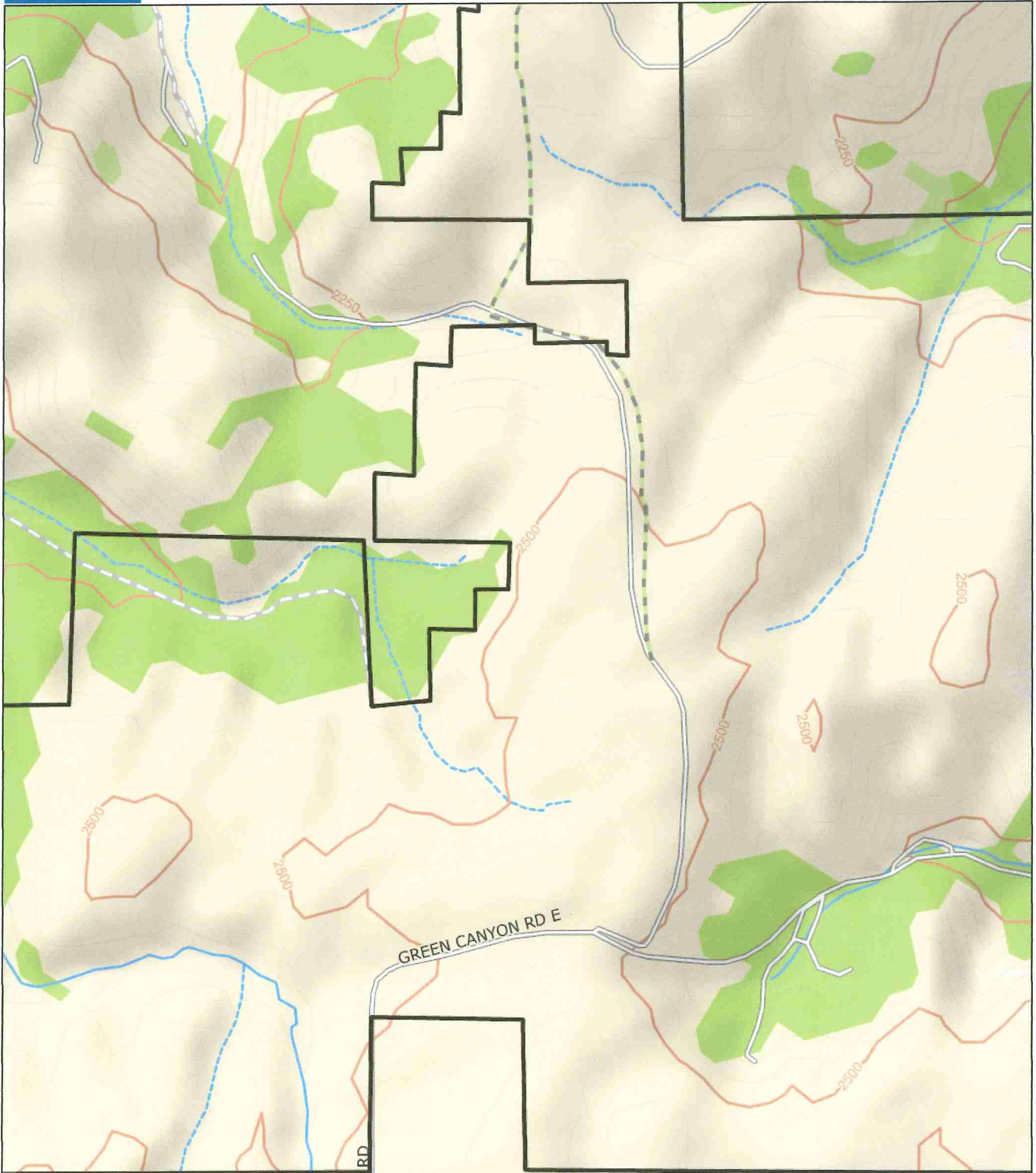




Contours = 20 feet

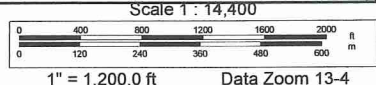
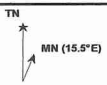
**Attachment I**  
**Rosman Farms Unit - Topographic Map 2 of 5**  
 Map Version: January 2013  
 32529 Level Rd N, Davenport, WA 99122, Lincoln County  
 Sections 12, 13, 23, 24, Township 26N, Range 37E  
 Sections 17, 18, 19 & 20, Township 26N, Range 38E  
 Latitude 47° 42'17.52" N, Longitude 118° 07'30.37" W

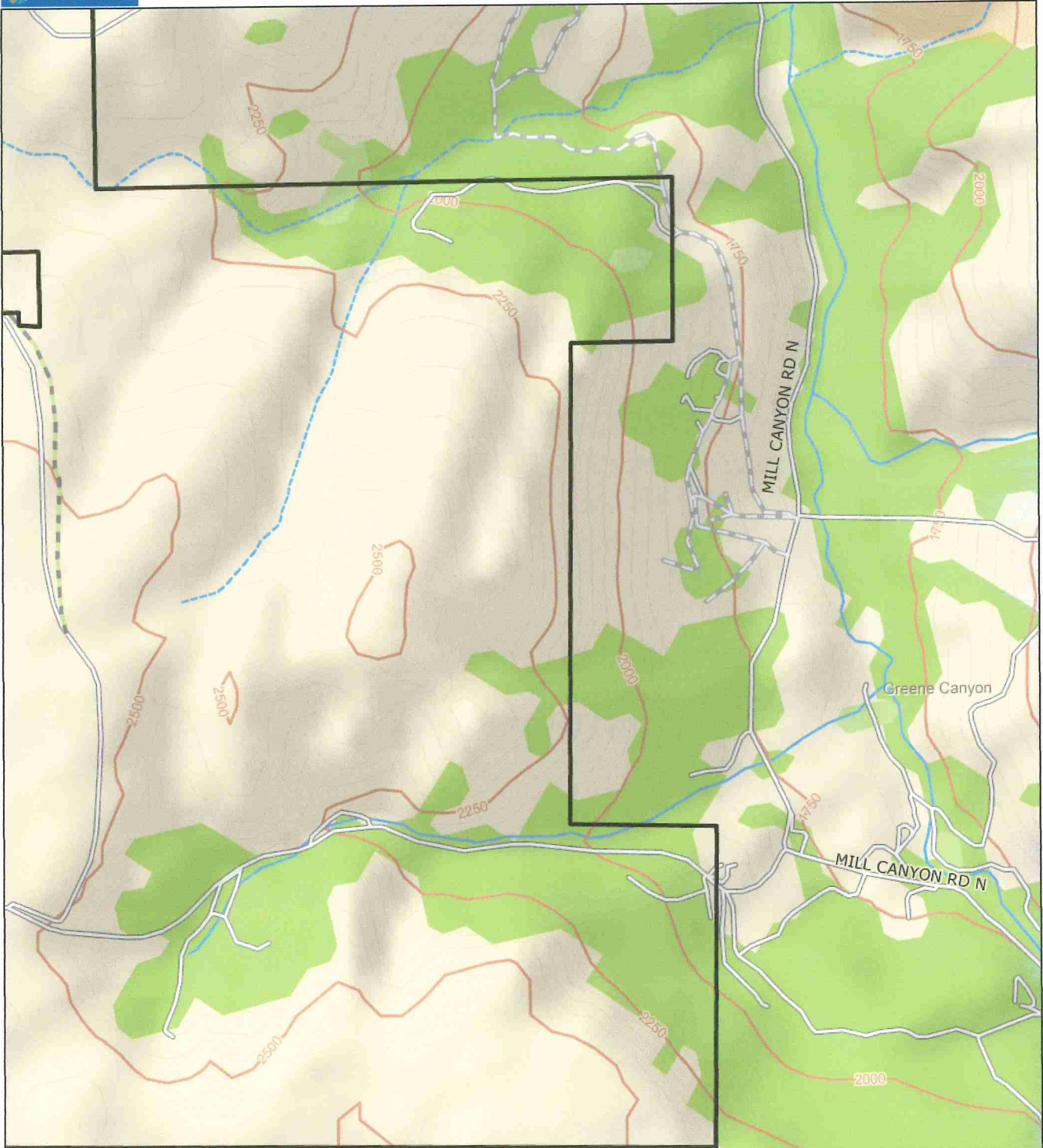




Contours = 20 feet

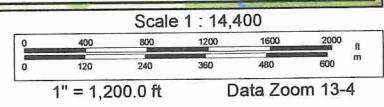
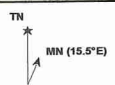
**Attachment I**  
**Rosman Farms Unit - Topographic Map 3 of 5**  
 Map Version: January 2013  
 32529 Level Rd N, Davenport, WA 99122, Lincoln County  
 Sections 12, 13, 23, 24, Township 26N, Range 37E  
 Sections 17, 18, 19 & 20, Township 26N, Range 38E  
 Latitude 47° 42'17.52" N, Longitude 118° 07'30.37" W



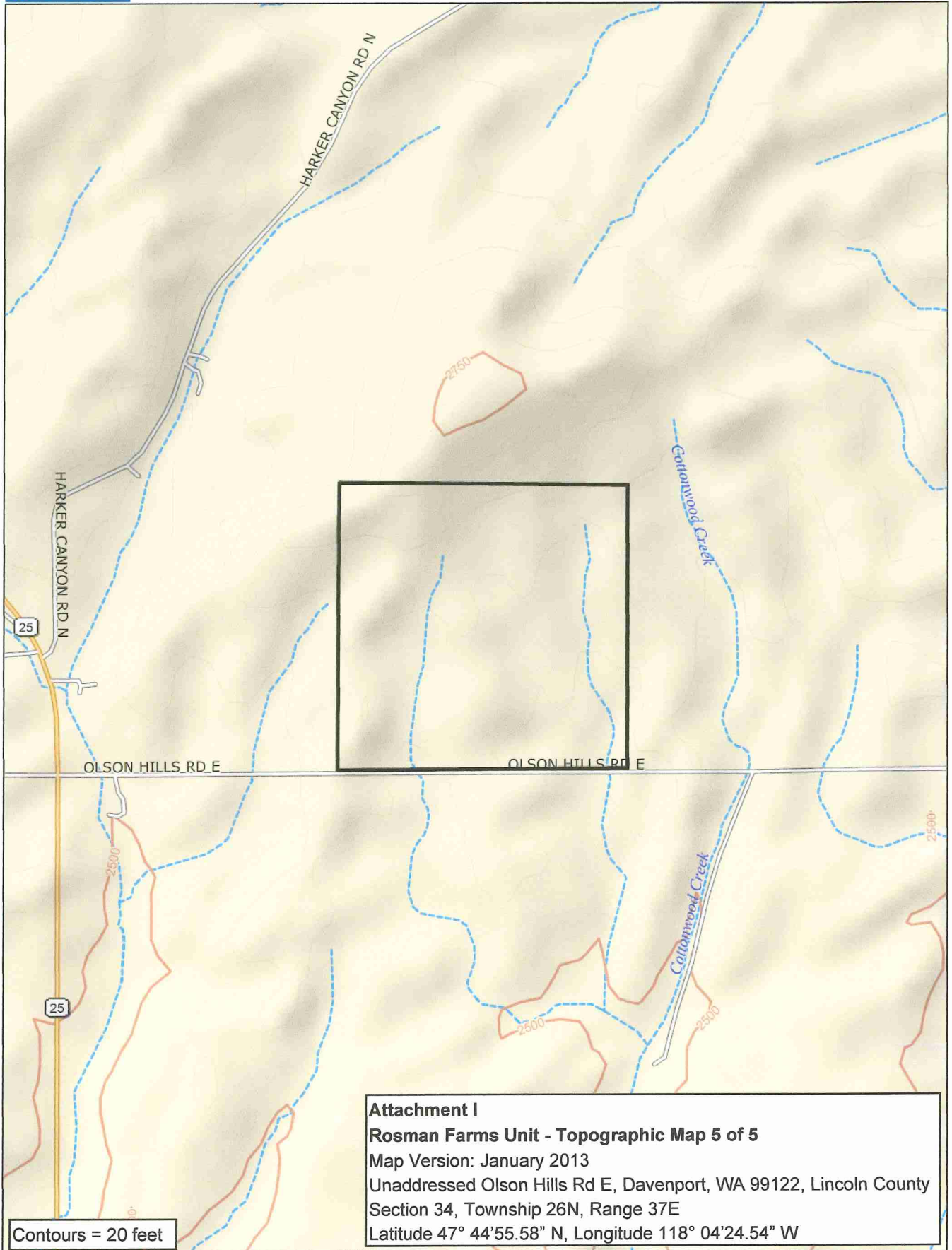


**Attachment I**  
**Rosman Farms Unit - Topographic Map 4 of 5**  
 Map Version: January 2013  
 32529 Level Rd N, Davenport, WA 99122, Lincoln County  
 Sections 12, 13, 23, 24, Township 26N, Range 37E  
 Sections 17, 18, 19 & 20, Township 26N, Range 38E  
 Latitude 47° 42'17.52" N, Longitude 118° 07'30.37" W

Contours = 20 feet



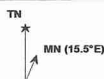




Data use subject to license.

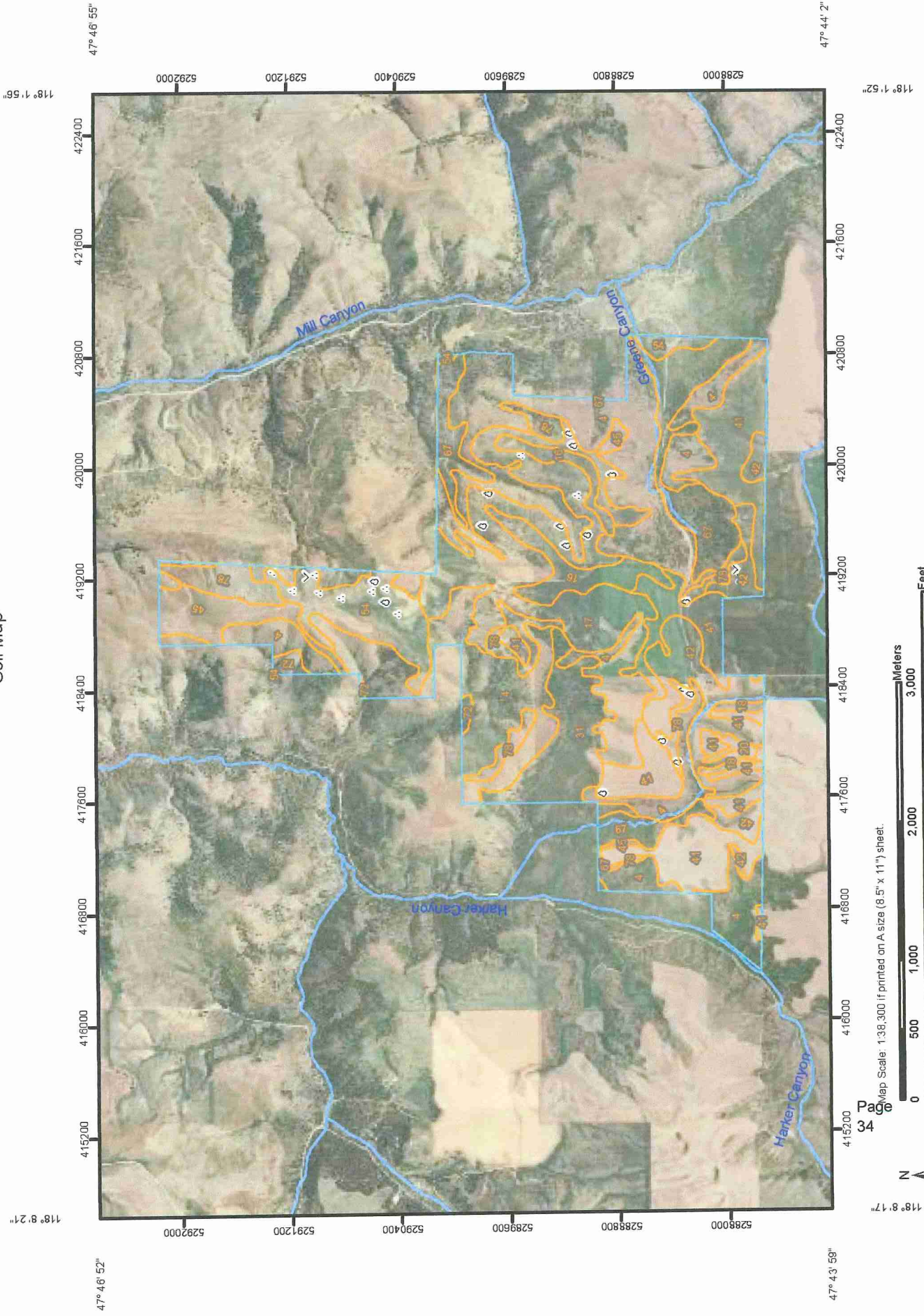
© DeLorme. Topo North America™ 10.

www.delorme.com



### 3.3 SOIL MAPS

Custom Soil Resource Report  
Soil Map













































Map Scale: 1:38,300 (if printed on A size (8.5" x 11") sheet).



## MAP INFORMATION

Map Scale: 1:36,300 if printed on A size (8.5" x 11") sheet.  
 The soil surveys that comprise your AOI were mapped at 1:24,000.  
 Please rely on the bar scale on each map sheet for accurate map measurements.  
 Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>  
 Coordinate System: UTM Zone 11N NAD83  
 This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.  
 Soil Survey Area: Lincoln County, Washington  
 Survey Area Data: Version 7, Jun 17, 2009  
 Date(s) aerial images were photographed: 6/26/2006  
 The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## MAP LEGEND

- |   |                        |   |                       |
|---|------------------------|---|-----------------------|
|    | Area of Interest (AOI) |  | Very Stony Spot       |
|    | Area of Interest (AOI) |  | Wet Spot              |
|    | Soils                  |  | Other                 |
|    | Soil Map Units         |  | Special Line Features |
|    | Special Point Features |  | Gully                 |
|    | Blow out               |  | Short Steep Slope     |
|    | Borrow Pit             |  | Other                 |
|    | Clay Spot              |  | Political Features    |
|    | Close d Depression     |  | Cities                |
|    | Gravel Pit             |  | Water Features        |
|    | Gravelly Spot          |  | Streams and Canals    |
|    | Land fill              |  | Transportation        |
|    | Lava Flow              |  | Rails                 |
|    | Marsh or swamp         |  | Interstate Highways   |
|    | Mine or Quarry         |  | US Routes             |
|    | Miscellaneous Water    |  | Major Roads           |
|    | Perennial Water        |   |                       |
|    | Rock Outcrop           |   |                       |
|    | Saline Spot            |   |                       |
|    | Sandy Spot             |   |                       |
|   | Severely Eroded Spot   |   |                       |
|  | Sinkhole               |   |                       |
|  | Slide or Slip          |   |                       |
|  | Sodic Spot             |   |                       |
|  | Spoil Area             |   |                       |
|  | Stony Spot             |   |                       |

## Map Unit Legend

Lincoln County, Washington (WA043)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
4	Badge-Bakeoven-Rock outcrop complex, very steep	760.9	31.9%
16	Broadax silt loam, 0 to 7 percent slopes	85.9	3.6%
17	Broadax silt loam, 7 to 25 percent slopes	359.8	15.1%
18	Broadax silt loam, 25 to 40 percent slopes	12.0	0.5%
20	Broadax-Lance silt loams, 7 to 25 percent slopes	7.6	0.3%
31	Dragoon very stony silt loam, 7 to 25 percent slopes	127.0	5.3%
41	Hanning silt loam, 0 to 7 percent slopes	330.8	13.9%
42	Hanning silt loam, 7 to 25 percent slopes	173.4	7.3%
45	Kuhl cobbly silt loam, 0 to 15 percent slopes	76.0	3.2%
54	Phoebé sandy loam, 0 to 15 percent slopes	129.2	5.4%
67	Speigle very stony silt loam, 25 to 55 percent slopes	195.3	8.2%
72	Spokane-Rock outcrop complex, very steep	13.6	0.6%
78	Tucannon silt loam, 0 to 5 percent slopes	114.2	4.8%
<b>Totals for Area of Interest</b>		<b>2,385.7</b>	<b>100.0%</b>

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas

## Custom Soil Resource Report

for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of

## Custom Soil Resource Report

the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

## Lincoln County, Washington

### 4—Badge-Bakeoven-Rock outcrop complex, very steep

#### Map Unit Setting

*Elevation:* 540 to 4,000 feet

*Mean annual precipitation:* 9 to 18 inches

*Mean annual air temperature:* 45 to 52 degrees F

*Frost-free period:* 100 to 180 days

#### Map Unit Composition

*Badge and similar soils:* 40 percent

*Bakeoven and similar soils:* 25 percent

*Rock outcrop:* 20 percent

#### Description of Badge

##### Setting

*Landform:* Canyons

*Parent material:* Mixed colluvium from basalt and loess

##### Properties and qualities

*Slope:* 25 to 55 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 1.98 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)

*Available water capacity:* Moderate (about 6.8 inches)

##### Interpretive groups

*Land capability (nonirrigated):* 7e

*Ecological site:* COOL STONY 9-15 PZ (R008XY203WA)

##### Typical profile

*0 to 18 inches:* Very cobbly silt loam

*18 to 34 inches:* Very gravelly silt loam

*34 to 60 inches:* Very gravelly loam

#### Description of Bakeoven

##### Setting

*Landform:* Plateaus

*Parent material:* Loess over residuum weathered from basalt

##### Properties and qualities

*Slope:* 0 to 25 percent

*Depth to restrictive feature:* 4 to 10 inches to lithic bedrock

*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to  
0.57 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None



## Custom Soil Resource Report

*Frequency of ponding:* None  
*Available water capacity:* Very low (about 0.5 inches)

### **Interpretive groups**

*Land capability (nonirrigated):* 7s  
*Ecological site:* VERY SHALLOW 9-15 PZ (R008XY301WA)

### **Typical profile**

*0 to 2 inches:* Very cobbly loam  
*2 to 5 inches:* Very cobbly loam  
*5 to 9 inches:* Unweathered bedrock

### **Description of Rock Outcrop**

#### **Properties and qualities**

*Slope:* 25 to 55 percent  
*Depth to restrictive feature:* 0 inches to lithic bedrock

#### **Interpretive groups**

*Land capability (nonirrigated):* 8s

## **16—Broadax silt loam, 0 to 7 percent slopes**

### **Map Unit Setting**

*Elevation:* 1,500 to 3,000 feet  
*Mean annual precipitation:* 12 to 18 inches  
*Mean annual air temperature:* 48 to 50 degrees F  
*Frost-free period:* 105 to 160 days

### **Map Unit Composition**

*Broadax and similar soils:* 100 percent

### **Description of Broadax**

#### **Setting**

*Landform:* Hills  
*Parent material:* Loess

#### **Properties and qualities**

*Slope:* 0 to 7 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 1.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 15 percent  
*Maximum salinity:* Nonsaline (0.0 to 2.0 mmhos/cm)  
*Available water capacity:* High (about 11.1 inches)

Page 40

**Interpretive groups**

*Land capability classification (irrigated): 2e*  
*Land capability (nonirrigated): 2e*

**Typical profile**

*0 to 16 inches: Silt loam*  
*16 to 35 inches: Silt loam*  
*35 to 60 inches: Silt loam*

**17—Broadax silt loam, 7 to 25 percent slopes**

**Map Unit Setting**

*Elevation: 1,500 to 3,000 feet*  
*Mean annual precipitation: 12 to 18 inches*  
*Mean annual air temperature: 48 to 50 degrees F*  
*Frost-free period: 105 to 160 days*

**Map Unit Composition**

*Broadax and similar soils: 100 percent*

**Description of Broadax**

**Setting**

*Landform: Hills*  
*Parent material: Loess*

**Properties and qualities**

*Slope: 7 to 25 percent*  
*Depth to restrictive feature: More than 80 inches*  
*Drainage class: Well drained*  
*Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high*  
*(0.57 to 1.98 in/hr)*  
*Depth to water table: More than 80 inches*  
*Frequency of flooding: None*  
*Frequency of ponding: None*  
*Calcium carbonate, maximum content: 15 percent*  
*Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)*  
*Available water capacity: High (about 11.1 inches)*

**Interpretive groups**

*Land capability classification (irrigated): 6e*  
*Land capability (nonirrigated): 4e*

**Typical profile**

*0 to 16 inches: Silt loam*  
*16 to 35 inches: Silt loam*  
*35 to 60 inches: Silt loam*

## 18—Broadax silt loam, 25 to 40 percent slopes

### Map Unit Setting

*Elevation:* 1,500 to 3,000 feet

*Mean annual precipitation:* 12 to 18 inches

*Mean annual air temperature:* 48 to 50 degrees F

*Frost-free period:* 105 to 160 days

### Map Unit Composition

*Broadax and similar soils:* 100 percent

### Description of Broadax

#### Setting

*Landform:* Hills

*Parent material:* Loess

#### Properties and qualities

*Slope:* 25 to 40 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 1.98 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 15 percent

*Maximum salinity:* Nonsaline (0.0 to 2.0 mmhos/cm)

*Available water capacity:* High (about 11.1 inches)

#### Interpretive groups

*Land capability (nonirrigated):* 6e

#### Typical profile

*0 to 16 inches:* Silt loam

*16 to 35 inches:* Silt loam

*35 to 60 inches:* Silt loam

## 20—Broadax-Lance silt loams, 7 to 25 percent slopes

### Map Unit Setting

*Elevation:* 1,500 to 3,000 feet

*Mean annual precipitation:* 12 to 20 inches

*Mean annual air temperature:* 46 to 50 degrees F

*Frost-free period:* 105 to 160 days

Page 42

## Custom Soil Resource Report

### Map Unit Composition

*Broadax and similar soils: 60 percent*

*Lance and similar soils: 30 percent*

### Description of Broadax

#### Setting

*Landform: Hills*

*Parent material: Loess*

#### Properties and qualities

*Slope: 7 to 25 percent*

*Depth to restrictive feature: More than 80 inches*

*Drainage class: Well drained*

*Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high  
(0.57 to 1.98 in/hr)*

*Depth to water table: More than 80 inches*

*Frequency of flooding: None*

*Frequency of ponding: None*

*Calcium carbonate, maximum content: 15 percent*

*Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)*

*Available water capacity: High (about 11.1 inches)*

#### Interpretive groups

*Land capability classification (irrigated): 6e*

*Land capability (nonirrigated): 4e*

#### Typical profile

*0 to 16 inches: Silt loam*

*16 to 35 inches: Silt loam*

*35 to 60 inches: Silt loam*

### Description of Lance

#### Setting

*Landform: Hillslopes*

*Parent material: Loess*

#### Properties and qualities

*Slope: 7 to 25 percent*

*Depth to restrictive feature: More than 80 inches*

*Drainage class: Well drained*

*Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to  
0.57 in/hr)*

*Depth to water table: More than 80 inches*

*Frequency of flooding: None*

*Frequency of ponding: None*

*Calcium carbonate, maximum content: 20 percent*

*Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)*

*Available water capacity: Moderate (about 9.0 inches)*

#### Interpretive groups

*Land capability classification (irrigated): 6e*

*Land capability (nonirrigated): 4e*

#### Typical profile

*0 to 8 inches: Silt loam*

## Custom Soil Resource Report

8 to 40 inches: Silt loam  
40 to 60 inches: Silt loam

### **31—Dragoon very stony silt loam, 7 to 25 percent slopes**

#### **Map Unit Setting**

*Elevation:* 2,000 to 4,500 feet  
*Mean annual precipitation:* 15 to 18 inches  
*Mean annual air temperature:* 45 to 48 degrees F  
*Frost-free period:* 110 to 150 days

#### **Map Unit Composition**

*Dragoon and similar soils:* 100 percent

#### **Description of Dragoon**

##### **Setting**

*Landform:* Hills, buttes  
*Parent material:* Loess and/or residuum weathered from granite

##### **Properties and qualities**

*Slope:* 7 to 25 percent  
*Depth to restrictive feature:* 20 to 38 inches to paralithic bedrock  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 1.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water capacity:* Low (about 4.6 inches)

##### **Interpretive groups**

*Land capability (nonirrigated):* 6s  
*Ecological site:* Pinus ponderosa var. ponderosa/Festuca idahoensis  
(F009XY802WA)

##### **Typical profile**

*0 to 11 inches:* Very stony silt loam  
*11 to 23 inches:* Loam  
*23 to 27 inches:* Weathered bedrock

### **41—Hanning silt loam, 0 to 7 percent slopes**

Page 44

#### **Map Unit Setting**

*Mean annual precipitation:* 15 to 18 inches  
*Mean annual air temperature:* 48 degrees F  
*Frost-free period:* 120 to 140 days

**Map Unit Composition**

*Hanning and similar soils: 100 percent*

**Description of Hanning**

**Setting**

*Landform: Hills  
Parent material: Loess*

**Properties and qualities**

*Slope: 0 to 7 percent  
Depth to restrictive feature: More than 80 inches  
Drainage class: Well drained  
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high  
(0.57 to 1.98 in/hr)  
Depth to water table: More than 80 inches  
Frequency of flooding: None  
Frequency of ponding: None  
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)  
Available water capacity: High (about 11.2 inches)*

**Interpretive groups**

*Land capability classification (irrigated): 2e  
Land capability (nonirrigated): 2e*

**Typical profile**

*0 to 21 inches: Silt loam  
21 to 49 inches: Silt loam  
49 to 60 inches: Silt loam*

**42—Hanning silt loam, 7 to 25 percent slopes**

**Map Unit Setting**

*Mean annual precipitation: 15 to 18 inches  
Mean annual air temperature: 48 degrees F  
Frost-free period: 120 to 140 days*

**Map Unit Composition**

*Hanning and similar soils: 100 percent*

**Description of Hanning**

**Setting**

*Landform: Hills  
Parent material: Loess*

**Properties and qualities**

*Slope: 7 to 25 percent  
Depth to restrictive feature: More than 80 inches  
Drainage class: Well drained  
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high  
(0.57 to 1.98 in/hr)*

## Custom Soil Resource Report

*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Maximum salinity:* Nonsaline (0.0 to 2.0 mmhos/cm)  
*Available water capacity:* High (about 11.2 inches)

### **Interpretive groups**

*Land capability classification (irrigated):* 6e  
*Land capability (nonirrigated):* 4e

### **Typical profile**

*0 to 21 inches:* Silt loam  
*21 to 49 inches:* Silt loam  
*49 to 60 inches:* Silt loam

## **45—Kuhl cobbly silt loam, 0 to 15 percent slopes**

### **Map Unit Setting**

*Elevation:* 1,400 to 2,500 feet  
*Mean annual precipitation:* 12 to 18 inches  
*Mean annual air temperature:* 48 to 50 degrees F  
*Frost-free period:* 140 to 150 days

### **Map Unit Composition**

*Kuhl and similar soils:* 100 percent

### **Description of Kuhl**

#### **Setting**

*Landform:* Canyons on drainageways, plateaus on drainageways  
*Parent material:* Loess and colluvium from basalt

#### **Properties and qualities**

*Slope:* 0 to 15 percent  
*Depth to restrictive feature:* 10 to 20 inches to lithic bedrock  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 1.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water capacity:* Very low (about 1.9 inches)

#### **Interpretive groups**

*Land capability (nonirrigated):* 6s  
*Ecological site:* STONY 9-15 PZ (R008XY202WA)

#### **Typical profile**

*0 to 8 inches:* Cobbly silt loam  
*8 to 12 inches:* Cobbly silt loam  
*12 to 16 inches:* Unweathered bedrock

Page 46

## 54—Phoebe sandy loam, 0 to 15 percent slopes

### Map Unit Setting

*Elevation:* 1,300 to 2,600 feet

*Mean annual precipitation:* 15 to 25 inches

*Mean annual air temperature:* 46 to 48 degrees F

*Frost-free period:* 125 to 150 days

### Map Unit Composition

*Phoebe and similar soils:* 100 percent

### Description of Phoebe

#### Setting

*Landform:* Terraces

*Parent material:* Glacial outwash

#### Properties and qualities

*Slope:* 0 to 15 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water capacity:* Moderate (about 7.3 inches)

#### Interpretive groups

*Land capability classification (irrigated):* 4e

*Land capability (nonirrigated):* 3e

*Ecological site:* Pinus ponderosa var. ponderosa/Purshia tridentata/Achnatherum hymenoides (F043XY803WA)

#### Typical profile

*0 to 14 inches:* Sandy loam

*14 to 23 inches:* Fine sandy loam

*23 to 46 inches:* Sandy loam

*46 to 60 inches:* Loamy sand

## 67—Speigle very stony silt loam, 25 to 55 percent slopes

### Map Unit Setting

*Elevation:* 1,400 to 2,600 feet

*Mean annual precipitation:* 15 to 21 inches

*Mean annual air temperature:* 45 to 48 degrees F

*Frost-free period:* 100 to 145 days

Page 47



## Custom Soil Resource Report

### Map Unit Composition

*Speigle and similar soils:* 100 percent

### Description of Speigle

#### Setting

*Landform:* Canyon walls

*Parent material:* Loess and colluvium from basalt

#### Properties and qualities

*Slope:* 25 to 55 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 1.98 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water capacity:* Moderate (about 7.0 inches)

#### Interpretive groups

*Land capability (nonirrigated):* 7s

#### Typical profile

*2 to 6 inches:* Very stony silt loam

*6 to 16 inches:* Very stony loam

*16 to 60 inches:* Very cobbly loam

## 72—Spokane-Rock outcrop complex, very steep

### Map Unit Setting

*Elevation:* 1,800 to 3,000 feet

*Mean annual precipitation:* 15 to 24 inches

*Mean annual air temperature:* 46 to 48 degrees F

*Frost-free period:* 100 to 140 days

### Map Unit Composition

*Spokane and similar soils:* 40 percent

*Rock outcrop:* 25 percent

### Description of Spokane

#### Setting

*Landform:* Hills

*Parent material:* Loess over residuum weathered from granite

#### Properties and qualities

*Slope:* 30 to 55 percent

*Depth to restrictive feature:* 20 to 40 inches to paralithic bedrock Page 48

*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 1.98 in/hr)

## Custom Soil Resource Report

*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water capacity:* Low (about 3.8 inches)

### Interpretive groups

*Land capability (nonirrigated):* 7e  
*Ecological site:* Pinus ponderosa var. ponderosa/Purshia tridentata/  
Pseudoroegneria spicata (F043XY804WA)

### Typical profile

*0 to 8 inches:* Loam  
*8 to 36 inches:* Gravelly sandy loam  
*36 to 40 inches:* Weathered bedrock

### Description of Rock Outcrop

#### Properties and qualities

*Slope:* 30 to 55 percent  
*Depth to restrictive feature:* 0 inches to lithic bedrock

#### Interpretive groups

*Land capability (nonirrigated):* 8s

## 78—Tucannon silt loam, 0 to 5 percent slopes

### Map Unit Setting

*Elevation:* 900 to 2,600 feet  
*Mean annual precipitation:* 9 to 19 inches  
*Mean annual air temperature:* 45 to 52 degrees F  
*Frost-free period:* 90 to 150 days

### Map Unit Composition

*Tucannon and similar soils:* 90 percent  
*Minor components:* 6 percent

### Description of Tucannon

#### Setting

*Landform:* Plateaus  
*Parent material:* Loess and residuum from basalt

#### Properties and qualities

*Slope:* 0 to 5 percent  
*Depth to restrictive feature:* 20 to 40 inches to lithic bedrock  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 1.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water capacity:* Low (about 6.0 inches)

Page 49

## Custom Soil Resource Report

### **Interpretive groups**

*Land capability classification (irrigated): 2e*

*Land capability (nonirrigated): 3s*

*Ecological site: LOAMY 15+ PZ (R009XY102WA)*

### **Typical profile**

*0 to 10 inches: Silt loam*

*10 to 30 inches: Silt loam*

*30 to 34 inches: Unweathered bedrock*

### **Minor Components**

#### **Emdent**

*Percent of map unit: 3 percent*

*Landform: Depressions*

*Ecological site: ALKALI BOTTOM 15+ PZ (R009XY401WA)*

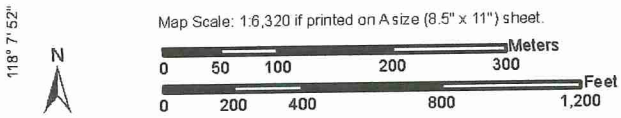
#### **Cocolalla**

*Percent of map unit: 3 percent*

*Landform: Depressions*

*Ecological site: WET MEADOW 15+ PZ (R009XY601WA)*

Custom Soil Resource Report  
Soil Map



## MAP INFORMATION

Map Scale: 1:6,320 if printed on A size (8.5" x 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

**Warning:** Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>  
 Coordinate System: UTM Zone 11N NAD83









































This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lincoln County, Washington  
 Survey Area Data: Version 7, Jun 17, 2009

Date(s) aerial images were photographed: 6/26/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## MAP LEGEND

- |   |                        |   |                     |
|---|------------------------|---|---------------------|
|    | Area of Interest (AOI) |  | Very Stony Spot     |
|    | Soils                  |  | West Spot           |
|    | Special Point Features |  | Other               |
|    | Blowout                |  | Gully               |
|    | Borrow Pit             |  | Short Steep Slope   |
|    | Clay Spot              |  | Other               |
|    | Closed Depression      |  | Political Features  |
|    | Gravel Pit             |  | Cities              |
|    | Gravelly Spot          |  | Water Features      |
|    | Land fill              |  | Streams and Canals  |
|    | Lava Flow              |  | Transportation      |
|    | Marsh or swamp         |  | Rails               |
|    | Mine or Quarry         |  | Interstate Highways |
|    | Miscellaneous Water    |  | US Routes           |
|    | Perennial Water        |  | Major Roads         |
|   | Rock Outcrop           |  | Local Roads         |
|  | Saline Spot            |   |                     |
|  | Sandy Spot             |   |                     |
|  | Severely Eroded Spot   |   |                     |
|  | Sinkhole               |   |                     |
|  | Slide or Slip          |   |                     |
|  | Sodic Spot             |   |                     |
|  | Spoil Area             |   |                     |
|  | Stony Spot             |   |                     |

## Map Unit Legend

Lincoln County, Washington (WA043)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
16	Broadax silt loam, 0 to 7 percent slopes	12.4	7.7%
17	Broadax silt loam, 7 to 25 percent slopes	105.0	65.6%
29	Dragoon silt loam, 7 to 25 percent slopes	39.5	24.7%
30	Dragoon silt loam, 25 to 40 percent slopes	0.3	0.2%
41	Hanning silt loam, 0 to 7 percent slopes	0.0	0.0%
56	Reardan silt loam, 7 to 25 percent slopes	2.8	1.7%
<b>Totals for Area of Interest</b>		<b>159.9</b>	<b>100.0%</b>

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially

## Custom Soil Resource Report

where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Page 54

## Lincoln County, Washington

### 16—Broadax silt loam, 0 to 7 percent slopes

#### Map Unit Setting

*Elevation:* 1,500 to 3,000 feet

*Mean annual precipitation:* 12 to 18 inches

*Mean annual air temperature:* 48 to 50 degrees F

*Frost-free period:* 105 to 160 days

#### Map Unit Composition

*Broadax and similar soils:* 100 percent

#### Description of Broadax

##### Setting

*Landform:* Hills

*Parent material:* Loess

##### Properties and qualities

*Slope:* 0 to 7 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 1.98 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 15 percent

*Maximum salinity:* Nonsaline (0.0 to 2.0 mmhos/cm)

*Available water capacity:* High (about 11.1 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 2e

*Land capability (nonirrigated):* 2e

##### Typical profile

*0 to 16 inches:* Silt loam

*16 to 35 inches:* Silt loam

*35 to 60 inches:* Silt loam

### 17—Broadax silt loam, 7 to 25 percent slopes

#### Map Unit Setting

*Elevation:* 1,500 to 3,000 feet

*Mean annual precipitation:* 12 to 18 inches

*Mean annual air temperature:* 48 to 50 degrees F

*Frost-free period:* 105 to 160 days

Page 55

#### Map Unit Composition

*Broadax and similar soils:* 100 percent



## Custom Soil Resource Report

### Description of Broadax

#### Setting

*Landform:* Hills  
*Parent material:* Loess

#### Properties and qualities

*Slope:* 7 to 25 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 1.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 15 percent  
*Maximum salinity:* Nonsaline (0.0 to 2.0 mmhos/cm)  
*Available water capacity:* High (about 11.1 inches)

#### Interpretive groups

*Land capability classification (irrigated):* 6e  
*Land capability (nonirrigated):* 4e

#### Typical profile

*0 to 16 inches:* Silt loam  
*16 to 35 inches:* Silt loam  
*35 to 60 inches:* Silt loam

## 29—Dragoon silt loam, 7 to 25 percent slopes

#### Map Unit Setting

*Elevation:* 2,000 to 4,500 feet  
*Mean annual precipitation:* 15 to 21 inches  
*Mean annual air temperature:* 45 to 48 degrees F  
*Frost-free period:* 100 to 140 days

#### Map Unit Composition

*Dragoon and similar soils:* 100 percent

### Description of Dragoon

#### Setting

*Landform:* Hills, buttes  
*Parent material:* Loess and/or residuum weathered from granite

#### Properties and qualities

*Slope:* 7 to 25 percent  
*Depth to restrictive feature:* 20 to 40 inches to paralithic bedrock  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 1.98 in/hr)  
*Depth to water table:* More than 80 inches

## Custom Soil Resource Report

*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water capacity:* Low (about 4.6 inches)

### **Interpretive groups**

*Land capability classification (irrigated):* 6e  
*Land capability (nonirrigated):* 4e  
*Ecological site:* Pinus ponderosa var. ponderosa/Festuca idahoensis  
(F009XY802WA)

### **Typical profile**

*0 to 11 inches:* Silt loam  
*11 to 23 inches:* Loam  
*23 to 27 inches:* Weathered bedrock

## **30—Dragoon silt loam, 25 to 40 percent slopes**

### **Map Unit Setting**

*Elevation:* 2,000 to 4,500 feet  
*Mean annual precipitation:* 15 to 21 inches  
*Mean annual air temperature:* 45 to 48 degrees F  
*Frost-free period:* 100 to 140 days

### **Map Unit Composition**

*Dragoon and similar soils:* 100 percent

### **Description of Dragoon**

#### **Setting**

*Landform:* Hills, buttes  
*Parent material:* Loess and/or residuum weathered from granite

#### **Properties and qualities**

*Slope:* 25 to 40 percent  
*Depth to restrictive feature:* 20 to 40 inches to paralithic bedrock  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 1.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water capacity:* Low (about 4.6 inches)

### **Interpretive groups**

*Land capability (nonirrigated):* 6e  
*Ecological site:* Pinus ponderosa var. ponderosa/Festuca idahoensis  
(F009XY802WA)

### **Typical profile**

*0 to 11 inches:* Silt loam  
*11 to 23 inches:* Loam  
*23 to 27 inches:* Weathered bedrock

Page 57

## **41—Hanning silt loam, 0 to 7 percent slopes**

### **Map Unit Setting**

*Mean annual precipitation:* 15 to 18 inches

*Mean annual air temperature:* 48 degrees F

*Frost-free period:* 120 to 140 days

### **Map Unit Composition**

*Hanning and similar soils:* 100 percent

### **Description of Hanning**

#### **Setting**

*Landform:* Hills

*Parent material:* Loess

#### **Properties and qualities**

*Slope:* 0 to 7 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 1.98 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Maximum salinity:* Nonsaline (0.0 to 2.0 mmhos/cm)

*Available water capacity:* High (about 11.2 inches)

#### **Interpretive groups**

*Land capability classification (irrigated):* 2e

*Land capability (nonirrigated):* 2e

#### **Typical profile**

*0 to 21 inches:* Silt loam

*21 to 49 inches:* Silt loam

*49 to 60 inches:* Silt loam

## **56—Reardan silt loam, 7 to 25 percent slopes**

### **Map Unit Setting**

*Elevation:* 1,500 to 2,800 feet

*Mean annual precipitation:* 15 to 18 inches

*Mean annual air temperature:* 46 to 48 degrees F

*Frost-free period:* 100 to 130 days

Page 58

### **Map Unit Composition**

*Reardan and similar soils:* 100 percent

**Description of Reardan**

**Setting**

*Landform:* Hills  
*Parent material:* Loess

**Properties and qualities**

*Slope:* 7 to 25 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 35 percent  
*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)  
*Available water capacity:* High (about 11.4 inches)

**Interpretive groups**

*Land capability classification (irrigated):* 6e  
*Land capability (nonirrigated):* 4e

**Typical profile**

*0 to 13 inches:* Silt loam  
*13 to 23 inches:* Silt loam  
*23 to 35 inches:* Silty clay loam  
*35 to 60 inches:* Silty clay loam

## APPENDIX 3

### 9.0 Determining and Validating Application Rates

#### 9.2 Calculating the Application Rate

This spreadsheet will help you determine a nitrogen-based biosolids application rate for agricultural sites. This was adapted from Pacific Northwest Extension Publication PNW0511e (aka *The Cogger/Sullivan Worksheet*). For further information you can view PNW0511e via the 'PNW0511e' worksheet or via <http://cru.cahe.wsu.edu/CEPublications/pnw0511e/pnw0511e.pdf>

Enter information below to obtain a nitrogen-based biosolids application rate.

You must enter information in pink cells.

Enter information in yellow cells as applicable.

Blue cells are calculated for you.

**GENERAL INFORMATION**

Biosolids Source  
 Field Number/ID  
 Dry tons biosolids available  
 Acres available  
 Acres needed

Example
Somewhere
560
185
118.7

**BIOSOLIDS DATA**

Total solids (%)  
 Total Kjeldahl N (mg/kg)  
 Ammoniacal-N (mg/kg)  
 Nitrate-N (mg/kg)  
 Organic nitrogen (mg/kg)

5.0%	(#/dry ton)
37,100	74
7,670	15
29,430	59

**N CREDITS NOT ACCOUNTED FOR IN N RECOMMENDATION BELOW**

N from previous biosolids applications (#/acre)  
 N applied in irrigation water (#/acre)  
 N applied at seeding (#/acre)  
 N in root zone (#/acre)  
 N from plowdown of cover crop (#/acre)  
 N from previous manure applications (#/acre)  
 Total N credit (#/acre)

48
48

If the site has received biosolids within the past 4 years, go to 'Previous Applications' and enter the applicable information. Generally applies to sites east of the Cascades. If applicable, go to 'Soil Nitrogen' and enter the applicable information.

**N RECOMMENDATION**

N recommendation (# N/acre/year)

150
-----

Obtain this from an appropriate fertilizer guideline, an agronomist, etc.

**BIOSOLIDS N**

Ammonium-N retained after application (%)  
 Organic N mineralized in Year 1 (%)  
 N in biosolids (# N/dry ton)  
 N needed from biosolids (# N/acre)

55%
23%
22
102

See 'Ammonium Retention',  
 See 'Mineralization'.

**AGRONOMIC APPLICATION RATE**

Dry tons per acre =  
 Wet tons per acre =  
 Cubic yards per acre =  
 Gallons per acre =  
 Acre-inches per acre =

4.7
94.3
112.2
22,671
0.84

See 'Conversion Factors, etc'.

## APPENDIX 4

### 10.0 SAMPLING PLAN

10.1 Soil Sample Plan

10.2 Biosolids Sample Plan

## 10.1 SOIL SAMPEL PLAN



## 10.2 BIOSOLIDS SAMPEL PLAN

**Fire Mountain Farms, Inc.**

**SAMPLING AND ANALYSIS PLAN**

**A GUIDE FOR BIOSOLIDS & SOIL SAMPLING**

DATE FEBRUARY, 2015

Fire Mountain Farms, Inc.  
Sample Analysis Plan  
February, 2015

SAMPLING & ANALYSIS PLAN  
A GUIDE FOR  
BIOSOLIDS & SOIL SAMPLING

**1.0 INTRODUCTION ..... 3**

**2.0 LABORATORY DESIGNATION..... 3**

**3.0 BIOSOLIDS SAMPLING PROTOCOL ..... 4**

    3.1 Tools Required for Sample Collection.....6

    3.2 Sampling for Nutrients, Metals, Total & Volatile Solids.....7

    3.3 Sampling for Fecal Coliform – 7 Samples Method (Alternative 1) -WAC 173-308-170.....9

**4.0 SHIPPING SAMPLES ..... 10**

**5.0 BIOSOLIDS ANALYSIS ..... 10**

    5.1 Biosolids analysis evaluation..... 11

**6.0 SOIL SAMPLING..... 12**

    6.1 Sampling location determination ..... 13

    6.2 Sampling the Field..... 14

    6.3 Soil Sampling Analysis ..... 15

**7.0 BIOSOLIDS SCENARIOS..... 16**

## 1.0 Introduction

An important part of the biosolids program is based upon valid analytical data derived from relatively small samples. The collection of a sample and its proper preservation during shipment is fundamental to obtaining reliable analytical results.

The concentration of nutrients, pathogens, and pollutants in biosolids are variable. In addition, pathogenic organisms are both time and temperature sensitive. Establishing a written protocol is important in order to collect samples that are both representative and consistent. In accordance with WAC 173-308-140 (1), all sampling that is conducted must be representative of the biosolids that are to be land applied.

Analysis of potential pollutants (so-called 503 metals) and pathogens provide the basis for establishing Class B biosolids. Nutrient concentrations are used to determine agronomic rates when biosolids are land applied. The analysis of biosolids will follow the methods outlined in WAC 173-308-140. Biosolids sampling frequency is set forth in WAC 173-308-150 see table 1. Samples shall be tested for the pollutants in section WAC 173-308-160. The pollutants that shall be tested are: arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc.

In addition to sampling biosolids, soil samples are collected at land application sites to provide important crop nutrient data. The nitrogen status of the soil is combined with the nitrogen of the biosolids and the predicted crop uptake to develop the agronomic rates at which the biosolids are to be applied to the land. Accurate assessment of soil nitrogen is dependent on good sampling techniques.

This sampling and analysis plan (SAP) will describe the processes involved with sampling biosolids at Fire Mountain Farms, Inc. The intent is to be complete and concise so that sample collection, preservation, and shipment to a laboratory for appropriate analysis may be performed by personnel with little or no assistance outside this document.

## 2.0 Laboratory Designation

When Fire Mountain Farms chooses a laboratory to perform the required analysis of biosolids samples they will determine and verify some important aspects of the analysis program:

1. Ensure that the laboratory is accredited by the State of Washington. Fire Mountain Farms, Inc. personnel will contact the laboratory prior to collecting biosolid samples to ensure that the lab is accredited by the State of Washington for Solids and Chemical Materials matrix. Fire Mountain Farms, Inc. personnel may also use a website to search for accredited laboratories (<https://fortress.wa.gov/ecy/laboratorysearch/>).

2. Determine that the required analyses can be performed by the laboratory. Fire Mountain Farms, Inc. personnel will confirm with the lab to make sure that all requested analyses can be performed. Fire Mountain Farms, Inc. personnel will check to confirm that the lab is approved by Washington State Department of Ecology.
3. Ensure that required turn-around times can be met by the laboratory. Fire Mountain Farms, Inc. will contact the laboratory to make certain that the requested turn-around-times for submitted analyses can be met by the laboratory. If turn-around-time can't be met, Fire Mountain Farms, Inc. may search for another laboratory that meets accreditation criteria.
4. Make sure that the laboratory understands how to report the results (e.g. dry-weight basis, mg/kg, etc.). Fire Mountain Farms, Inc. will direct the laboratory as to how the desired layout of results reports should appear. Analysis results will be reported on a dry weight basis. Due to variability of percent solids on some projects dry weight basis will allow Fire Mountain Farms staff to make adjustments to application rates as needed.

Fire Mountain Farms, Inc. may submit a copy of this SAP to the reporting lab so that the required analyses and sample collection protocol may be on record for them to review.

Due to the large geographic region in which Fire Mountain Farms, Inc. operates, specific laboratories used for analysis of biosolids are not listed. Fire Mountain Farms, Inc. will ensure that all biosolids analyses are performed by a Washington State accredited laboratory, as described in *General Permit for Biosolids Management* (General Permit).

### **3.0 Biosolids Sampling Protocol**

A number of tools and personal protection equipment will be required to complete the task aseptically so as to avoid contamination of one's self or the sample. Collected samples will be placed in sample bottles provided by laboratory and chilled to 4<sup>0</sup> C using ice, blue ice, or dry ice. All equipment that is used to collect and prepare samples must be prepared so that it does not contaminate or react with the material being sampled. Contamination can arise if equipment is improperly cleaned or is made of materials that are released into the sample. (Galvanized or chrome-plated implements must be avoided.) Relatively inert materials such as Teflon, glass, or stainless steel are typically used for sampling equipment or containers. In certain situations, plastic, non-stainless steel, or aluminum sampling equipment can be used in place of the preferred materials. For example, if a sample is collected for metals analysis, a plastic sampling device or container is acceptable. Sampling equipment needs to be chosen based on the analysis being performed as well as the consistency of the material being sampled.

**Examples of Fire Mountain Farms, Inc. equipment are as follows:** stainless steel spatula, disposable plastic spatula, shovel, custom built sludge judge, sampling tube, soil sampling probe or auger and or other equipment approved by Department Of Ecology. Samples and sample equipment for Fire Mountain Farms, Inc. site location vary based on the type of samples being taken and type of site. Prior to collecting samples Fire Mountain Farms personnel will have to determine what tools will be needed. Some examples are listed below.

**Lagoon:** Fire Mountain Farm personnel will verify what current activities are operational at site to decided what type of equipment is needed, such as an agi-pump being active means that personnel can collect a sample out of the line at the sampling point, so the equipment Fire Mountain Farms personnel will take are labeled sample bottles, cleaning supplies, cooler, and the specific chain of custody paperwork for the lab that will be providing the analysis. If no current active operations are available at the lagoon in question personnel will take a sludge judge or DOE approved equipment, labeled sample bottles, cleaning supplies, a cooler, and chain of custody paperwork for the lab that will be providing the analysis. Also some personal equipment such as a life vests if samples are being taken out in the lagoon. Also latex or nitrile gloves and full rain gear (optional).

**Bunker:** For a our concrete, covered storage bunkers Fire Mountain Farms personnel will use a shovel, spatula, sampling tube, soil sample probe, or other equipment approved by the Department of Ecology to take the sample, sample containers with labels filled out at the office except for the time of sample, a cooler, and the chain of custody paperwork for the lab that will be providing the analysis. Some personal equipment: latex or nitrile gloves.

**Fields:** Fire Mountain Farms personnel will use stainless steel spatula, disposable plastic spatula, shovel, sampling tube, soil sample probe, mixing chamber, or other equipment approved by Department of Ecology to collect the samples. Sample containers with labels filled out at the office except for the time of sample, a cooler, and the chain of custody paperwork for the lab that will be performing the analysis. Some personal equipment: latex or nitrile gloves.

**Sample:** All samples are required to have sample container with a label filled with the sample names (time that the sample is taken is placed on label on site as soon as the sample is taken) and a chain of custody provided by the lab that will be preforming the analysis(chain of custody will be filled out prior with all types of samples that are being taken, names of samples, what type of material that is being collect for sampling, (time of sample to added after sample is taken). 24 hour notice to the lab is generally required before taking samples.

For each fecal coliform test you will need seven 100ml or larger sample containers per test. A fecal coliform tests need to be chilled to 4°C directly after sample is taken and delivered to the lab within 6 hours of the sample being collected.

For a vector attraction reduction sample (VARs) you will need one 1 liter sample container. This sample is cooled and shipped overnight up to the lab for analysis or driven up to lab same day; however the lab needs to be notified 24hours in advance. WAC 173-308-180

For TKN, Ammonia, Nitrate, and Potential Pollutants (503 metals): one 500ml sample is taken. The time limit for analysis is up to 6 months. Fire Mountain Farms normally delivers samples same day but these sample could be shipped in a cooler within a few day. WAC 173-308-160 & WAC 173- 308-205

**Cleaning and locations of equipment:** all equipment can be located in the Fire Mountain Farms, office. After collecting the samples, the equipment needs to be cleaned on site with soap and water then dried and wrapped in an inert material such as aluminum foil or plastic to protect it until the next use. Tools are returned to operations office.

### 3.1 Tools Required for Sample Collection

- Prior to anyone new using sample equipment, experienced Fire Mountain Farms, Inc. personnel will demonstrate and train on how to use the equipment and fill out the required paperwork for the lab (s) and Fire Mountain Farms, Inc. records.
- Latex or Nitrile gloves (be sure to have plenty on hand)
- Sample containers will be obtained from laboratory doing the analysis. Sample containers from our stock can be obtained from Fire Mountain Farms, Inc. office personnel, for fecal coliform samples Fire Mountain Farms, Inc. will take seven 100ml sample. For vector attraction reduction samples (VARs) we will take one 1 liter sample and for “503” metals we will take one 500ml sample. Contact the laboratory at least two weeks prior to sampling event to request sample containers if none are on hand)
- Ice chest with ice, “blue ice”, or dry ice for transporting the samples.
- Shipping containers (may be the ice chest or Styrofoam –type container)
- Sharpie® pens, ink pens, labels for sample containers
- Chain of Custody forms. For the lab (s) to which the sample will be delivered.
- Suitable sample collection equipment (depends on type of biosolids collected). Shovel, stainless steel spatula or disposable plastic spatula for dewatered biosolids or custom built “sludge judge” for sampling lagoon storage units
- Stainless steel bowl or suitable container to composite samples

### 3.2 Sampling for Nutrients, Metals, Total & Volatile Solids

- 1) Ensure that you have the appropriate labels. A description label includes project name, sample name, date, analysis, preservative and a comment section on it them. These sample labels need to be on the containers **before** samples are collected. After the sample is collected write in the time that the sample was collected on the label that is on your sample container. These labels shall be picked up from Fire Mountain Farms Inc. office personnel. Labeling is the same for all types of samples, ill-regardless of percent solid or source.
- 2) Ensure that you have the appropriate containers. The sample containers are provided by the lab (s) prior to use and more can be picked up when samples are delivered. Generally, sample containers are made of glass or plastic because these materials are relatively inert and easily cleaned. Sample containers come in several sizes. For Fire Mountain Farms, Inc. the container sizes are generally 100, 250, 500 milliliters or 1 liter. For vector attraction reduction samples (VARs) we will take one 1 liter sample and for "503" metals we will take one 500ml sample. These volumes should be sufficient but if the lab performing the analysis requests different volumes you will need to comply with their request. A special case, for example, would be using a 1 gallon container for samples collected to determine the appropriate polymer for use in de-watering.
- 3) Ensure that you have the appropriate Chain of custody form for the lab you intend on utilizing for sample analysis. This form can be obtained in the Fire Mountain Farms, Inc. office file cabinet in the first drawer or from the office personnel. These can also be picked up from the lab (s) prior to samples being taken or downloaded from the lab (s) internet site. These should be filled out with Fire Mountain Farms, Inc. information, sample identification, types of test you want per sample, and after the sample is taken, the time that the sample was collected.
- 4) Put on your latex or nitrile gloves that are found in the Fire Mountain Farms, Inc. office.
- 5) Map out where you plan to collect biosolids samples using the map provided by Fire Mountain Farms, Inc. office personnel. 10-15 samples should be taken that are representative of current volume of biosolids.  
Use appropriate equipment for the type of biosolids (e.g. liquid or solid) you are collecting. The equipment needed is to be determined before sampling: stainless steel spatula, disposable plastic spatula, shovel, custom built sludge judge, sampling tube, soil sampling probe, auger, or equipment approved by DOE. Each sample location varies on the types of equipment that Fire Mountain Farms, personnel will use. Collect and place 10-15 small (the number of samples collected varies due to size of field/ lagoon/bunker being sampled,) separate, grab-samples of biosolids into a stainless bowl or suitable container (an example of a suitable container would



be a clean plastic bucket when collecting liquid samples from a lagoon. Prior to someone new collecting samples, Fire Mountain Farms, Inc. experienced personnel will train and demonstrate how to use all sampling equipment.

Some examples are:

**Lagoon:** Fire Mountain Farm personnel will verify what current activities are operational at site to decided what type of equipment is needed, such as an agi-pump being active means that personnel can collect a sample out of the line at the sampling point, so the equipment Fire Mountain Farms personnel will take are labeled sample bottles, cleaning supplies, cooler, and the specific chain of custody paperwork for the lab that will be providing the analysis. If no current active operations are available at the lagoon in question personnel will take a sludge jug or DOE approved equipment, labeled sample bottles, cleaning supplies, a cooler, and chain of custody paperwork for the lab that will be providing the analysis. Also some personal equipment such as a life vest if samples are being taken out in the lagoon, latex or nitrile gloves, and full rain gear (optional rain gear).

**Bunker:** For a our concrete, covered storage bunkers Fire Mountain Farms personnel will use a shovel, spatula, sampling tube, soil sample probe, or other equipment approved by the Department of Ecology to take the sample, sample containers with labels filled out at the office except for the time of sample, a cooler, and the chain of custody paperwork for the lab that will be providing the analysis. Some personal equipment: latex or nitrile gloves.

**Fields:** Fire Mountain Farms personnel will use stainless steel spatula, disposable plastic spatula, shovel, sampling tube, soil sample probe, mixing chamber, or other equipment approved by Department of Ecology to collect the samples. Sample containers with labels filled out at the office except for the time of sample, a cooler, and the chain of custody paperwork for the lab that will be performing the analysis. Some personal equipment: latex or nitrile gloves.

**Cleaning and locations of equipment:** all equipment can be located in the Fire Mountain Farms, office. After collecting the samples, the equipment needs to be cleaned on site with soap and water then dried and wrapped in an inert material such as aluminum foil or plastic to protect it until the next use.

- 6) Mix the grab samples together thoroughly in the composite sample container. The number of samples added to the composite mix needs to be representative of size of area and distribution of solids in the storage unit with a minimum of 10 sample. The total sampled amount should be more than the amount needed to send to the lab.
- 7) Once the grab samples have been thoroughly mixed in the composite bowl or container, take a portion of the total and place it in the lab supplied container. Fill the container so that the lab has enough biosolids for the analysis. 500ml to 1 liter

samples are sufficient for nutrients, % solids and metals but volatile solids reduction tests will require a 1 liter sample.

- 8) Place the sample into a travel container to begin preservation (see Table-1 for preservation). (Note: VRS samples should be maintained at ambient temperature.
- 9) After collecting the samples, the equipment needs to be cleaned on site with soap and water then dried and wrapped in an inert material such as aluminum foil or plastic to protect it until the next use. For storage, bring back the equipment to the Fire Mountain Farms, Inc. office to be placed in its appropriate storage area until needed for another sampling.

### 3.3 Sampling for Fecal Coliform - 7 Samples Method (Alternative 1) - WAC 173-308-170

- 1) Ensure that you have the appropriate labels and 100ml sample containers. A description label includes project name, sample name, date, analysis, preservative and a comment section on it them. These sample labels need to be on the containers **before** samples are collected. After the sample is collected write in the time that the sample was collected on the label that is on your sample container. These labels and sample containers shall be picked up from Fire Mountain Farms, Inc. office personnel. The sample containers are provided by the laboratory prior to use and more can be picked up when samples are delivered.
- 2) Put on nitrile rubber gloves.
- 3) Mapping out where you plan to collect biosolids samples from. This will be done based on what location and type of sample that is being taken. **An example is:** Office personnel will provide a map of the lagoon. If the lagoon is currently operating with an agi-pump a sample can be taken out of the line at the sampling point. If there is no agi-pump operating personnel will take a sludge jug, sample tube, or other approved sample equipment by Department Of Ecology. Samples are taken in containers ranging from 100ml to 1 liter plastic or glass containers approved by Department Of Ecology and the Lab performing the testing. Samples should be taken that are representative of current volume of biosolids.
- 4) Using appropriate equipment for type of biosolids.  
Examples are: stainless steel spatula, disposable plastic spatula, shovel, custom built sludge judge, agi-pump lines, soil sampling probe, auger, and other approved equipment by Department Of Ecology. Each sample location varies on the types of equipment that Fire Mountain Farms, personnel will use.  
Some examples are:  
**Lagoon:** Personnel will verify what current activities are operational at site to decide what type of equipment is needed, such as an agi-pump being active means that personnel can collect a sample out of the line. If no current active operations are available at the lagoon in question personnel will take a sludge jug or sampling

tube, or other Department Of Ecology approved equipment. Also some personal equipment such as a life vest if samples are being taken out in the lagoon, latex or nitrile gloves, and full rain gear (optional rain gear)

**Bunker:** For a bunker Fire Mountain Farms personnel will use a shovel, spatula, soil sampling probe, or other Department Of Ecology approved equipment to take the sample. Some personal equipment: latex or nitrile gloves.

**Fields:** Fire Mountain Farms personnel can use stainless steel spatula, disposable plastic spatula, shovel, soil sampling probe, auger, or other Department Of Ecology approved equipment to collect samples. Collect a single sample and place it in the lab-supplied container Examples are: 100ml containers to 1 liter containers plastic or glass. Some personal equipment: latex or nitrile gloves.

- 5) **Immediately place the sample on ice** and into the shipping container to begin preservation (see Table-1 for preservation).
- 6) Seven individual samples need to be collected for fecal coliform analysis. Fecal coliform samples shall arrive at the accredited laboratory conducting the analysis **within 6 hours of collection.**

#### 4.0 Shipping Samples

- 1) Complete the chain of custody form. **Be sure that the chain of custody form is accurate!** This is an area where misidentification is common and a careful “second-check” will help greatly in keeping paperwork and sample identification in order.
- 2) Ensure lids are sealed tightly. Pack samples into the shipping container. Place regular ice into Ziploc® bags and pack into shipping container around the samples. If it’s hot weather, dry-ice may be necessary to properly preserve the sample during shipment.
- 3) If there is space in the shipping container that allows the sample containers to easily move around, fill the void with packing material.
- 4) Place the completed Chain of custody form into a Ziploc® bag, seal, and place it into the shipping container. **This is important!** It keeps the paperwork dry and legible when it arrives at the lab. Tape the container securely shut with packing tape. If you cannot drop the package from 3 feet onto the floor and be confident that the contents will not be damaged, it is improperly packed.
- 5) Transport samples to shipping facility (e.g. UPS, FedEx, etc.). Due to short hold times, it will normally be necessary for FMF staff to directly deliver samples to laboratory when testing for Fecal Coliform bacteria and Vector Attraction Reduction Samples (VARs). (See table 5.1 below)

#### 5.0 Biosolids Analysis

Ensure the chain of custody lists the appropriate constituents to be analyzed. The following list can be utilized to double-check for completeness of the chain of custody

form. If there are mistakes or omissions, the analysis will be wrong or insufficient. If a constituent is not listed on the chain of custody form received from the laboratory, or you are uncertain about some detail, **CALL THE LAB AND CONFIRM BEFORE SHIPPING.**

**Table 5.1-Biosolids Analytical Methods and Holding Time**

Constituent	Analysis Method	Preservation	Hold-Time
Arsenic	SW-846 Method 6010	Cool to ~4° Celsius	6 months
Cadmium	SW-846 Method 6010	Cool to ~4° Celsius	6 months
Copper	SW-846 Method 6010	Cool to ~4° Celsius	6 months
Lead	SW-846 Method 6010	Cool to ~4° Celsius	6 months
Molybdenum	SW-846 Method 6010	Cool to ~4° Celsius	6 months
Nickel	SW-846 Method 6010	Cool to ~4° Celsius	6 months
Selenium	SW-846 Method 6010	Cool to ~4° Celsius	6 months
Zinc	SW-846 Method 6010	Cool to ~4° Celsius	6 months
Mercury	SW-846 Method 7471	Cool to ~4° Celsius	6 months
Vector Attraction Reduction	EPA/625/R-92/013	Cool to ~4° Celsius	24 Hours
Total Kjeldahl Nitrogen	SM 4500- N <sub>org</sub> C <u>or</u> EPA PAI-DK 01	Cool to 4° Celsius	28 days
Nitrate – N	EPA 300.0 or 353.2	Cool to 4° Celsius	28 days
Ammonia – N	SM4500-NH <sub>3</sub>	Cool to 4° Celsius	28 days
Fecal Coliform	SM 9221 E <u>or</u> EPA Method 1680 <u>or</u> 1681	Cool to 4° Celsius	6 HOURS TO LAB, 24 HOURS FOR ANALYSIS
Total Solids	SM 2540 G	Cool to 4° Celsius	7 days

### 5.1 Biosolids analysis evaluation

When Fire Mountain Farms, Inc. receives analytical results they will be evaluated to determine if the biosolids will meet the class B requirements for land application. Special attention will be given to common errors such as metals results with detection levels higher than those listed in table 5.2- Biosolids limits for potential pollutants listed below and results provided in wet basis rather than dry weight basis. Analysis will also be reviewed and evaluated to determine if results are within and not pushing close to (table 3) limits. As a general rule we will take action anytime a result is within 75% of the table 3 limit as shown in table 5.2 below. The first action when analytical results confirm levels outside limits would require consultation with Ecology to determine appropriate steps to take.

Below in table 5.2 are limits for potential pollutants in biosolids.

**Table 5.2-Biosolids limits for potential pollutants**

		Concentration Limit	
Element	Symbol	("503" Table 3)	("503" Table 1) (Ceiling Limit)
		mg/kg	mg/kg
Arsenic	As	41	75
Cadmium	Cd	39	85
Copper	Cu	1500	4300
Lead	Pb	300	840
Mercury	Hg	17	57
Molybdenum	Mo	*	71
Nickel	Ni	420	420
Selenium	Se	100	100
Zinc	Zn	2800	7500

## 6.0 Soil Sampling

**Background:** Soil sampling is an important element in the management of the biosolids land application program. Soil samples are used to determine the quantity of plant available nitrogen (PAN) and other constituents in the surface horizons; typically the top 12 inches for Western Washington. Each of these separate samples will be a composite sample comprised of at least 10 soil cores thoroughly mixed together.

The timing of sampling may vary depending upon the planned application date(s) and the purpose for which the data is being collected. Early growing season samples provide data on nutrient carryover; late spring early summer samples (such as a pre-sidedress nitrate test) may provide information on mineralization of organic matter after soils warm; and fall sampling can provide information on N uptake when combined with early season data. Fire Mountain Farms may choose or be directed by Ecology that any or all of the above samples to be collected and analyzed depending on the crops, soils, and farming practices. At a minimum, fall "report card" nitrate testing will be done on all fields applied during that season.

Some of the resource that we utilize can be found on the following links:

<http://cru.cahe.wsu.edu/CEPublications/EM037E/EM037E.pdf> – Soil Report Card Information

<http://www.extension.oregonstate.edu/catalog/pdf/em/em8832-e.pdf> -This is the Post Harvest Report.

[http://www.neiwpcc.org/neiwpcc\\_docs/biosampleguide/SamplingGuide\\_Ch7\\_Web.pdf](http://www.neiwpcc.org/neiwpcc_docs/biosampleguide/SamplingGuide_Ch7_Web.pdf)- this site contains information that can be utilized and beneficial to the soil sample testing processes.

### Tools used for soil sampling:

Fire Mountain Farms, Inc.  
Sample Analysis Plan  
September, 2014

- Sampling equipment: probe unit, auger unit, and spade. These are the tools that can be used to take samples. However you need to figure out which one is needed to take specific samples. This is based on the type of soil you intend on sampling, and the moisture level of the soil. Then use the most appropriate tool based on the information you gather about the soil that you intend on sampling.
- Sample chain of custody forms for the lab you intend on using. These forms are in the Fire Mountain Farms, Inc. office.
- Sharpie® pens and ink pens
- Soil sample bags from laboratory (ensure to notify lab at least two weeks prior to sampling events for bags; good practice to keep extras on hand)
- Clean buckets labeled by field
- Field book to record field description, dates, and information on sample location.
- Farm maps with field identification names and size.
- Clean stainless steel spatula and/or shovel
- Soil sampler (e.g. hand auger, probe, etc.)
- Ice chest or other Styrofoam type shipping container
- Blue-ice, ice, or dry-ice
- Ziploc® type clear re-sealable plastic bags
- Packing tape
- Packing material to fill air space within shipping container (air-filled bags, paper, etc.)
- Shipping labels
- Directions to lab or location or shipping office

### 6.1 Sampling location determination

Specific sample locations shall be determined semi-randomly to avoid bias, but they should be fairly evenly distributed across the sampling area in order for the composite samples to be representative of the soil in the field. Locations of sample points should be marked on field map.

**Table 3 Subsample Number Recommendations<sup>1</sup>**

<b>Sample points recommended by field size to form a unique composite</b>	
<b>Field Size-acres</b>	<b>Subsamples Required-12 inch samples</b>
<b>10-25</b>	<b>10</b>
<b>25-50</b>	<b>20</b>
<b>&gt;50</b>	<b>30</b>

<sup>1</sup> University of Idaho Cooperative Extension, *Soil Sampling-Bulletin 704*  
 Fire Mountain Farms, Inc.  
 Sample Analysis Plan  
 September, 2014

## 6.2 Sampling the Field

Determine the size in acres of the field that you are sampling. Refer to table 3 above to establish the number of subsamples required. Remember that this number of subsamples is a recommendation and not a steadfast count. However, to form a thoroughly representative composite sample and to maintain best management practices consistent with farm nutrient management, collect within the range of subsamples from table 3.

- 1) All samples shall be taken within the field where land application is to occur. Bring the field map with you to insure that samples are not located in buffer areas or outside permitted boundaries.
- 2) Plan in advance what pattern will be used and how you will perform the sample pattern.
- 3) Be aware of anomalies within the sample location (e.g. eroded areas, vegetative/fenced boundaries, etc.).<sup>2</sup> Avoid these areas as potential sample locations.
- 4) Make note in your field book of the approximate location of each subsample.
- 5) Upon reaching the first subsample location, remove the loose liter matter from area of sample.
- 6) Using the soil sampling instrument, collect soil in 12-inch intervals to desired depth or until refusal.
- 7) If multiple 12-inch intervals are being collected (i.e. you are collecting 1, 2 & 3 foot intervals) ensure that you have appropriately labeled buckets for holding the respective subsamples.
- 8) After collecting the subsample, load the equipment back into the vehicle and move to the next subsample location along your pattern and repeat sample collection process.
- 9) Once the appropriate numbers of subsamples are collected, a single composite can be generated from each 12-inch interval. With a clean, spatula, thoroughly mix each bucket of soil containing the representative soil subsamples.
- 10) From each bucket, fill a paper soil sample bag (from lab) to the indicated fill-line. It is important to place enough soil into the bag to reach this line because the laboratory requires a certain amount of material to perform the requested analyses.
- 11) Soil samples may be dried in an oven specifically built for that purpose when only analyzing for nitrate. This eliminates the need for refrigeration storage and ice when shipped.
- 12) Once the samples are bagged and sealed, ensure to write the sample ID and date on the bag. The sample ID for each sample will need to be on the chain of custody form.

---

<sup>2</sup> University of Idaho Cooperative Extension, *Soil Sampling-Bulletin 704*  
Fire Mountain Farms, Inc.  
Sample Analysis Plan  
September, 2014

Crosscheck the samples with the chain of custody when finished to verify this information is correct.

- 13) Packing and shipping: If the soil samples are moist it is imperative that you preserve the samples on ice immediately. Biological activity must be diminished so as not to affect soil nutrient levels. Overnight shipping is not generally as critical in soil sampling as it is in biosolids samples; however, the soil-bags must be kept cooled through ice preservation in an ice chest or refrigeration until shipped to analyzing laboratory.
- 14) When shipping, ensure preservation of samples through blue-ice, ice, or dry-ice. Place the chain of custody form in a Ziploc® bag and include with samples. Pack the samples so that they cannot move around by added air-filled bags or paper. Tape the shipping container so that it cannot accidentally open during transport to laboratory. Ensure that the shipping label is properly affixed to the top of the container and has the correct shipping address.

### 6.3 Soil Sampling Analysis

Ensure the chain of custody form lists the appropriate constituents to be analyzed. The list below can be utilized to double-check for completeness. Table-4 should only be used as an example and not be considered as steadfast and absolute when requesting soil analysis. That being said, the soil sample analyses generally change only infrequently. It is a wise practice to carry example chain of custody forms and laboratory data pages to be used as verification tools while in the field.

**Table 4-Common Soil Analysis**

Common Soils Analysis Used			
Constituent	Analysis Method	Preservation	Hold-time
*503 Metals	SW-846 Method 6010	Cool to 4° Celsius	6 months
Total Solids	SM 2540 G	Cool to 4° Celsius	7 days
pH	EPA 9045	Cool to 4° Celsius	15 minutes
Nitrate-N	Nitrate-FIA	Cool to 4° Celsius	28 days

\* Mercury analyzed by SW-846 Method 7471

It is common to see a sample-package terminology denoted on the chain of custody form instead of the individual constituents (i.e. you might see typed on the chain of custody form: S1A/Nitrate/Total Metals/Total P). This would include those constituents listed in



Table-3 plus additional constituents (e.g. sulfur, calcium, potassium, magnesium, organic matter, etc.).

**Table 5-Report-Card Soil Nitrate Analyses**

Range	Nitrate-N 1-ft Sample (lb/acre)	Nitrate-N 2-ft Sample (lb/acre)
Low	0-15	0-25
Medium	15-55	25-75
High	55-105	75-150
Very High	>105	>150

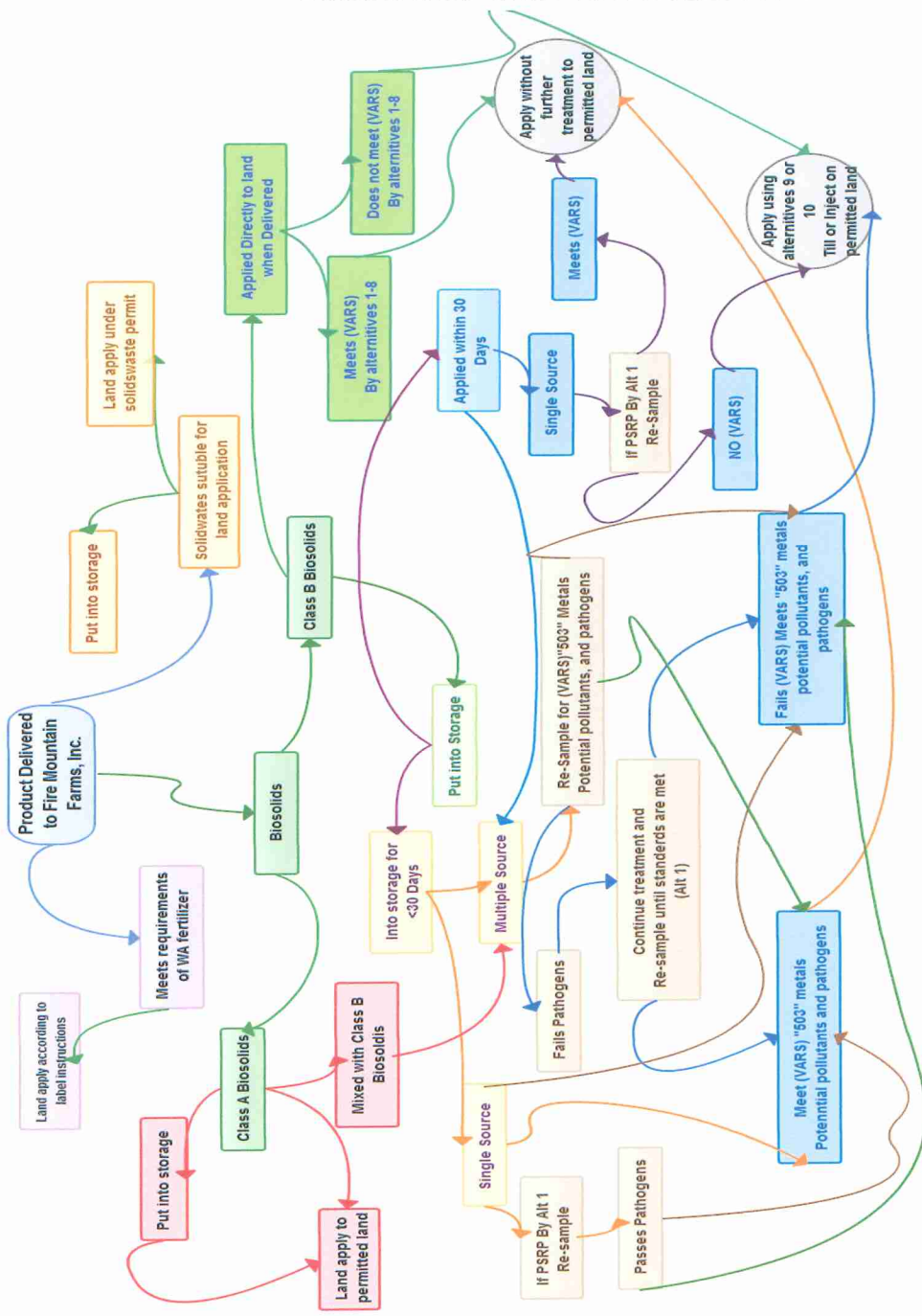
## 7.0 Biosolids Scenarios

The Washington State Department of Ecology (Ecology) allows the mixing of non-exceptional quality (non-EQ) biosolids products produced by different sources. However, when this occurs the mixer is viewed as a person who prepares a *material derived from biosolids*. A material derived from biosolids is considered to be a new biosolids product that must meet all applicable quality standards and management requirements in the state biosolids rule (*Chapter 173-308 WAC, Biosolids Management*).

Any facility that mixes non-EQ biosolids must have coverage under the *General Permit for Biosolids Management* or an individual permit allowing it to mix. During the permitting process, the permittee must make clear its intention to mix or to maintain the option to mix.

Using table 5 you can see how biosolids are handled when they come into Fire Mountain Farms, Inc. and the processes we use when handling biosolids once on site at Fire Mountain Farms, Inc. This flow chart represents most of different possible scenarios during the delivery of biosolids and the required testing of biosolids once they have been delivered. These scenarios also note include testing that is done prior to land application.

**Table 5-Flow Chart of Biosolids Scenarios**



**Alternatives**

<b>Alternative 1</b>	Fecal coliform are less than 2,000,000 most probable number or 2,000,000 colony-forming units per gram of total solids, based on a geometric means of seven samples.
<b>Alternative 2</b>	Use a process to significantly reduce pathogens (PSRP)

<b>Alternative 3</b>	Use a process determined by the state or the EPA to be equivalent to a process to significantly reduce pathogens.
----------------------	---

***Frequency of Sampling***

The mixing facility will be required to sample in accordance with the frequency requirements in WAC 173-308-150. The frequency of sampling is based on the dry weight tonnage of biosolids applied to the land in a given year. The minimum frequency of monitoring applies to pollutants, pathogen reduction, and vector attraction reduction. The minimum frequency of monitoring is:

**Biosolids Sampling Frequency**

Metric dry tons (U.S. tons) per 365-day period	Frequency
Greater than zero but less than 290 (320)	Once per year
Equal to or greater than 290 (320) but less than 1,500 (1,653)	Once per quarter (4 times per year)
Equal to or greater than 1,500 (1,653) but less than 15,000 (16,535)	Once per 60 days (6 times per year)
Equal to or greater than 15,000 (16,535)	Once per month (12 time per year)

The volume of biosolids “treated” by Fire Mountain Farms, Inc. (blended) is greater than 290 metric dry tons and less than 1500 metric dry tons. We will have four sampling events per year.

- Aberdeen
- Bio Recycling
- Castle Rock
- Central Kitsap Co.
- Gig Harbor
- Grand Mound
- Kalama
- Kitsap Co. #7
- Lewis County #6
- L.O.T.T.
- Morton
- Mossyrock
- Ocean Shores
- PeEll

Winlock  
West Sound Utility District  
Port of Longview  
Emerald Kalama Chemical  
McCleary

The above list represents treatment plants that we receive biosolids from on a continuous base. All these sources have documentation that they meet Class B biosolids standards including V.A.R.S. The volume received from each varies from low 2 dry tons from Kitsap district #7 (2012) to a high of 960 dry tons from L.O.T.T. (2012). The amount each supplier produces remains relatively stable.

We currently have 2 lagoon storage units and three covered concrete bunkers. It is our intent to have one or two of the concrete bunkers used as single source storage unit(s) and will not be subject to blending rule which requires sampling and analysis. (Retesting would occur if pathogen reduction testing was by sample.)

Where blending in the storage units is now considered “treatment” we need to apply the sampling and analysis rule designed for wastewater treatment plants. Based on volume we “treat” by blending we fall in the category requiring testing four times a year. The sources and quantity of deliveries substantially the same year round. There will be variability just as there is variability in wastewater entering a treatment plant. We will apply testing rules as they are applied in WWTP. The sampling event is not intended to document the material tested, but to document the process is meeting standards. As with WWTP’s our supply substantially consistent, and is similar to a WWTP in that some sources will stop and new ones come online. We will go one step further than the rules require, re-testing when an addition of any new source to storage units after sampling has been done. The plan is that new sources would be sent to storage units that have not yet had a sampling event.

We will schedule four sampling events to best evaluate if our “process” is meeting the state and federal requirements for land application of biosolids. On some storage units it may be possible to schedule sampling after all deliveries have ended and still have time to complete analysis prior to application but this is not a requirement for WWTP’s and will not be possible in all cases here. There will be times when deliveries will continue even as application has begun. We will use “seven samples” method to determine if PSRP (Process to Significantly Reduce Pathogens) has been met. This test is good for only 30 days which may require us to re-test storage units as they are being applied.

### **Method of Meeting Vector Attraction Reduction Standards**

1	Biosolids digestion processes with greater than 38% volatile solids reduction
2	Test end-product of anaerobic digestion process. Forty day anaerobic test at 30-37°C. Acceptable stabilization if less than 17% volatile solids reduction occurs during the test.
3	Test end-product of aerobic digestion process having less than 2% solids. Thirty day aerobic test at 20°C. Acceptable stabilization if less than 15% volatile solids reduction occurs during the test.
4	<b>Facilities with aerobic digestion.</b> Specific oxygen uptake rate (SOUR) testing using end-product of digestion process. Acceptable stabilization if uptake is less than 1.5 mg oxygen per g total solids per hour at 20°C
5	<b>Time/ temperature requirement for composting:</b> Fourteen days residence time at temperatures greater than 40°C, with average temperature greater than 45°C
6	<b>High pH stabilization.</b> Biosolids pH above 12 for 2 hours and greater than 11.5 for 22 hours.
7	<b>Treatment by drying.</b> Not to include unsterilized primary wastewater solids. Total solids content greater than 75% before mixing, with other material.
8	<b>Treatment by drying.</b> Can include unstabilized primary wastewater solids. Total solids greater than 90% before mixing with other materials.
9	<b>Barrier process.</b> Injection into soil. No biosolids on soil surface 1 hour after application. For Class A biosolids, injection must occur within 8 hours of discharge from the pathogen reducing process. See WAC 173-308-210, 220,230,240(3)
10	<b>Barrier process.</b> Soil incorporation by tillage. Soil incorporation by tillage within 6 hours of application. For Class A biosolids, application must occur within 8 hours of discharge from the pathogen reducing process. See WAC 173-308-210,
11	<b>Septage only.</b> High pH treatment before land application. Acceptable stabilization if pH is greater than 12 for 30 minutes. See WAC 173-308-270 (4)

## APPENDIX 5

### 14.0 INFORMATIONAL SIGNS

**NO TRESPASSING**

**BIOSOLIDS  
RECYCLING SITE**

Access to this Site is Restricted Until

MM/DD/YYYY

*For Information Contact:*

**Fire Mountain Farms, Inc.** – 856 Burnt Ridge Road,  
Onalaska, WA 98570, Robert Thode, firemt@Q.com,  
(360) 266-0695 or (360) 508-0904

**Washington Department of Ecology** – PO Box 47775,  
Olympia, WA 98504, Biosolids Coordinator, (360) 407-6393

**REMOVAL OF THIS SIGN DURING THE TIME ACCESS IS  
RESTRICTED IS A VIOLATION OF STATE LAW**

**NO TRESPASSING**

# Public Notice

## NOTICE OF DETERMINATION OF NON-SIGNIFICANCE (DNS), AMENDMENT TO COVERAGE UNDER THE STATEWIDE GENERAL PERMIT FOR BIOSOLIDS MANAGEMENT

Notice is hereby given that Fire Mountain Farms, Inc. (FMF) is applying to the Washington State Department of Ecology (Ecology) to amend its existing coverage as a biosolids beneficial use facility under the Statewide General Permit for Biosolids Management. A copy of the general permit can be found at:

<http://www.ecy.wa.gov/programs/swfa/biosolids/pdf/BiosolidsManagement.pdf>. FMF is proposing to add a new land application site located at Sections 12, 13, 23, 24 & 34, Township 26N, Range 37W, WM and

Sections 17, 18, 19 & 20, Township 26N, Range 38W, WM near 32529 Level Rd. N. and unaddressed Olson Hill Rd. E, Davenport, WA. A Site Specific Land Application Plan (SSLAP) has been submitted to address the management of biosolids at this site. FMF proposes to accept biosolids from unspecified sources for land application at the new site. The site consists of fields totaling approximately 2 thousand acres.

As the lead agency for this proposal, Ecology has determined that the proposed action will likely not have a probable significant adverse impact on the environment. An environmental impact statement is not required under RCW 43.21C.030 (2) (c). This decision was made after review of a completed environmental checklist and other information on file with Ecology.

Copies of the Site Specific Land Application Plan, DNS and completed Environmental Checklist are available at: by contacting Betty Ann Bickner. Any person wishing to comment on the DNS or proposed permit application must do so in writing or as described below. Comments must be received by Ecology, at the address listed below by 5:00 p.m. on May 15, 2015

Any person who wants to comment of this proposal or to request a public hearing or meeting must do so in writing. Comments or requests must be submitted to Betty Ann Bickner by May 15, 2015.

If you wish to receive notification of activities relating to this project, please notify, in writing, the Fire Mountain Farms contact listed. Fire Mountain Farms, Inc. will provide written confirmation by certified mail, return receipt requested, to each interested person or organization that their name has been placed on the list.

Contact persons to receive questions, comments, or requests:

<p><b>Department of Ecology</b> <b>Betty Ann Bickner</b> <b>4601 N. Monroe</b> Spokane, WA 99205-1295 <b>509-329-3505</b> <b><a href="mailto:bbic461@ecy.wa.gov">bbic461@ecy.wa.gov</a></b></p>	<p><b>Fire Mountain Farms, Inc</b></p> <p><b>Robert Thode</b> <b>856 Burnt Ridge Road</b> <b>Onalaska, WA 98570</b> <b>(360)266-0695</b> <b><a href="mailto:Robert.Thode@Firemtn.us">Robert.Thode@Firemtn.us</a></b></p>
---	--



## APPENDIX 6

### 15.0 RECORD KEEPING/FORMS

# BIOSOLIDS APPLICATION REPORT

*Fire Mountain Farms, Inc.*

\_\_\_\_\_ / \_\_\_\_\_ - \_\_\_\_\_ = \_\_\_\_\_  
 Unit                      Field ID                      Acres                      Buffers                      Acres Spread  
 Crop \_\_\_\_\_ @ \_\_\_\_\_ lb Nitrogen (plant available nitrogen, PAN)

MATERIAL TYPE \_\_\_\_\_ SOURCE(S) \_\_\_\_\_  
 NITROGEN PER DRY TON \_\_\_\_\_  
 GALLONS PER ACRE \_\_\_\_\_

**SPREADER LOADS**  
 = \_\_\_\_\_ gal/ac / \_\_\_\_\_ Spreader Size \* \_\_\_\_\_ ac = \_\_\_\_\_ Loads

Date	Unit	# loads	Operator	Notes

**Special Instruction:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

# APPLICATION REPORT (LIQUID)

*Fire Mountain Farms, Inc.*

Unit \_\_\_\_\_ / Field ID \_\_\_\_\_ Acres \_\_\_\_\_ Buffers \_\_\_\_\_ Acres Spread \_\_\_\_\_  
 Crop \_\_\_\_\_ @ \_\_\_\_\_ lb Nitrogen (plant available nitrogen, PAN)

MATERIAL TYPE \_\_\_\_\_ SOURCE(S) \_\_\_\_\_  
 NITROGEN / DRY TON \_\_\_\_\_ GALLONS PER ACRE \_\_\_\_\_  
 Or NITROGEN / 1000 gal \_\_\_\_\_

Volume / Acre = N rate desired \_\_\_\_\_ / lb per 1000 gal \_\_\_\_\_ = \_\_\_\_\_ Gal/Ac  
 Nozzle Size \_\_\_\_\_ PSI \_\_\_\_\_ Width \_\_\_\_\_ G.P.M. \_\_\_\_\_  
 Liner ft / ac = 43560 / width \_\_\_\_\_ = \_\_\_\_\_ Feet pull per acre  
 Gal/acre \_\_\_\_\_ / G.P.M. \_\_\_\_\_ = \_\_\_\_\_ Minutes per acre  
 Travel Rate = Feet pull per acre \_\_\_\_\_ / Minutes per acre \_\_\_\_\_ = \_\_\_\_\_  
 Ft/Min

Environmental Data  
 Wind direction \_\_\_\_\_ Light, Moderate, High  
 Rain Amount \_\_\_\_\_ Light, Moderate, High  
 Areas of special concern (streams, ditches, slopes, etc.) \_\_\_\_\_

Date	Operator	Pumping Hours	Gallons Pumped	Acers Covered

Special Instruction: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

5300

# FIRE MOUNTAIN FARMS, INC. Biosolids Haul Delivery Ticket

Biosolids Source \_\_\_\_\_

Date \_\_\_\_\_

Transport Company \_\_\_\_\_

Driver \_\_\_\_\_

Delivered to BR HS NP MC MF BC LC BH other \_\_\_\_\_

Gross weight \_\_\_\_\_

Tare weight \_\_\_\_\_

Net Weight \_\_\_\_\_

Tons \_\_\_\_\_

For each delivery complete this delivery ticket and staple or clip top copy to scale slip and bill of lading (if used). Second copy for treatment plant, third for transport company. (Delivery ticket on top) Be sure to sign in on delivery record sheet at site. Any concerns or questions call FMF shop 360-266-0695 or office 360-985-7780

Comments \_\_\_\_\_

Original - Fire Mountain Farms, Inc., Pink - Treatment Plant, Yellow- Transport Company

# FIRE MOUNTAIN FARMS, INC.

## *Delivery Record Sheet*

Site: \_\_\_\_\_ Month: \_\_\_\_\_, 20\_\_

*All loads must be recorded on this sheet when delivered* Page \_\_\_\_ of \_\_\_\_

DATE	TIME	SOURCE	MATERIAL	TON/GAL	DRIVER