

2015 Application for Coverage Under the General Permit for Biosolids Management

1. Facility Information	
Name of Facility	Bio Recycling Corporation - North Ranch
Owner	Roger A. Hickey
Ownership Status	<input type="checkbox"/> Federal <input type="checkbox"/> State <input type="checkbox"/> Local <input checked="" type="checkbox"/> Private <input type="checkbox"/> Other:
Physical Address	820 E Webb Hill Rd, Union WA 98592
Mailing Address	PO Box 982, Centralia, WA 98531
Permit Number	BT 9901

2. Facility Contacts		
	Primary Contact	Responsible Official
Name	Brian Hickey	Roger A. Hickey
Title	General Manager	President
Phone	360-870-3042	360-507-1865
Email	brian@biorecycle.com	roger@biorecycle.com

3. Facility type <i>(check all that apply)</i>
<input type="checkbox"/> Major sewage treatment facility (design flow of ≥ 1 mgd <u>or</u> serving a population of $\geq 10,000$)
<input checked="" type="checkbox"/> Minor sewage treatment facility (design flow of < 1 mgd <u>and</u> serving a population of $< 10,000$)
<input type="checkbox"/> Class I sewage treatment facility (have a pretreatment program or designated as Class I)
<input type="checkbox"/> Composting facility (receive biosolids or sewage sludge for composting)
<input checked="" type="checkbox"/> Septage management facility (land apply or prepare septage for land application)
<input type="checkbox"/> Beneficial use facility (receive biosolids from others for direct land application)
<input type="checkbox"/> Lagoon facility (all solids are stored in lagoons)
<input type="checkbox"/> Out-of-State (importing material to a facility within Washington State)
<input type="checkbox"/> Other—describe:



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4. Other Permits (check all that apply)	
<input type="checkbox"/> National Pollutant Discharge Elimination System (NPDES) – Permit Number:	
<input type="checkbox"/> State Waste Discharge – Permit Number:	
<input type="checkbox"/> National Emission Standards for Hazardous Pollutants Preconstruction	
<input type="checkbox"/> Prevention of Significant Deterioration Program	
<input type="checkbox"/> Ocean Dumping	<input type="checkbox"/> Nonattainment Program
<input type="checkbox"/> Stormwater Discharge	<input type="checkbox"/> Underground Injection Control Program
<input type="checkbox"/> Dredge or Fill	<input type="checkbox"/> Hazardous Waste Management Program
<input type="checkbox"/> Other – Describe:	

5. Pathogen Reduction (check all that apply; see WAC 173-308-170 or WAC 173-308-270[3])	
Class A	Class B
<input checked="" type="checkbox"/> Alternative 1 (time/temperature)	<input type="checkbox"/> Alternative 1 (7 samples)
<input type="checkbox"/> Alternative 2 (pH/time/temperature/% solids)	Alternative 2 (process to significantly reduce pathogens [PSRP]) <ul style="list-style-type: none"> <input type="checkbox"/> Aerobic digestion <input type="checkbox"/> Air drying <input type="checkbox"/> Anaerobic digestion <input type="checkbox"/> Composting <input checked="" type="checkbox"/> Liming (septage, see below)
Alternative 3 (process to further reduce pathogens [PFRP]) <ul style="list-style-type: none"> <input type="checkbox"/> Composting <input type="checkbox"/> Heat drying <input type="checkbox"/> Heat treatment <input type="checkbox"/> Pasteurization <input type="checkbox"/> Beta ray irradiation <input type="checkbox"/> Gamma ray irradiation <input type="checkbox"/> Thermophilic aerobic digestion 	
<input type="checkbox"/> Alternative 4 (PFRP equivalent)	
Septage	<input type="checkbox"/> Sent for Further Treatment <input type="checkbox"/> Did not meet requirements (explain):
<input type="checkbox"/> Injection	
<input type="checkbox"/> Incorporation	
<input type="checkbox"/> pH stabilization	



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6. Vector Attraction Reduction (see WAC 173-308-180 or WAC 173-308-270[3])	
<input type="checkbox"/> Alternative 1 (38% volatile solids reduction) <input type="checkbox"/> Alternative 1a (bench test-anaerobic) <input type="checkbox"/> Alternative 1b (bench test-aerobic)	<input checked="" type="checkbox"/> Alternative 4 (pH stabilization) <input type="checkbox"/> Alternative 5 ($\geq 75\%$ solids) <input type="checkbox"/> Alternative 6 ($\geq 90\%$ solids)
<input type="checkbox"/> Alternative 2 (SOUR)	<input type="checkbox"/> Alternative 7 (injection)
<input type="checkbox"/> Alternative 3 (aerobic process)	<input type="checkbox"/> Alternative 8 (incorporation)
<input type="checkbox"/> Sent for Further Treatment	<input type="checkbox"/> Did not meet requirements (explain):

7. Pollutants (not applicable to septage unless required by permit; see WAC 173-308-160)	
Number of pollutant monitoring events in the past year:	2
Pollutants Exceeding Table 1 or 3 Values:	0

8. Process, Production & Storage	
How are your biosolids produced and managed?	Alkaline stablization followed by on-site land application of liquids, dewatering and transport solids to BUFs.
Planned Changes?	Pasteurization of solids likely in 2016, pasteurization of filtrate biosolids in the future.
Average Production (+/- 10 dry tons)	1535 Dry Tons
How often and what time of year testing conducted?	Testing is done every two weeks for Ammonia Nitrogen, Total Kjeldahl Nitrogen, Total Solids & Nitrate Nitrogen. Pollutant testing is done quarterly. Water monitoring is done quarterly by Pacific Groundwater. Soil Sampling is conducted once a year by Land Profiles.
Who hauls your biosolids?	Bio Recycling Corporation and Tribeca
Where do your biosolids go? How much?	Land applied on site and shipped to Tribecas Woodland BUF's and Natural Selection Farms BUF's or Bio Recycling Corp. Centralia Facility for Class A processing.
If you are not a Lagoon Facility proceed to Section 9 (all lagoon facilities must answer the following)	
Date of last measured depth. How much has accumulated?	



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When was the last dredging event?	
Do you plan to dredge during this permit cycle?	
9. Attachments (Check off each requirement for your facility type)	
Wastewater Treatment Plants that DO NOT Land Apply Biosolids	
<input type="checkbox"/> Vicinity Map. The map must extend at least 1 mile around the perimeter of the facility and any associated treatment or storage facilities. The map must also show the location and means of access.	
<input type="checkbox"/> Facility Schematic. The Facility Schematic must show how you process and/or manage biosolids.	
<input type="checkbox"/> State Environmental Policy Act (SEPA). The act of applying for coverage under this permit triggers a requirement for review under SEPA. This does not necessarily mean that a new SEPA threshold determination will be required.	
<input type="checkbox"/> Contingency Plan. Describe your plans for handling biosolids in the event that your biosolids cannot be sent to their usual end use location or fail to meet quality goals.	
<input type="checkbox"/> N/A. We have long-term treatment (lagoons).	
<input type="checkbox"/> Biosolids/Soil Sampling & Analysis Plan (SAP). A Biosolids/Soil Sampling and Analysis Plan is required when you sample your biosolids and land application site(s).	
<input type="checkbox"/> N/A. We have long term treatment or send for further treatment.	
<input type="checkbox"/> Analytical Data. The past two years of data related to your biosolids, land application site soil, and/or land application site waters.	
<input type="checkbox"/> N/A. We have long term treatment or send for further treatment and have no data.	
<input type="checkbox"/> Spill Prevention & Response Plan. Required if you or your agent transport your biosolids.	
Wastewater Treatment Plants that Land Apply Biosolids	
<input checked="" type="checkbox"/> Vicinity Map. The map must extend at least 1 mile around the perimeter of the facility and any associated treatment or storage facilities. The map must also show the location and means of access.	
<input checked="" type="checkbox"/> Facility Schematic. The Facility Schematic must show how you process and/or manage biosolids.	
<input checked="" type="checkbox"/> Contingency Plan. Describe your plans for handling biosolids in the event that your biosolids cannot be sent to their usual end use location or fail to meet quality goals.	
<input type="checkbox"/> N/A. We have long-term treatment (lagoons).	
<input checked="" type="checkbox"/> Analytical Data. The past two years of data related to your biosolids, land application site soil, and/or land application site waters.	



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- Spill Prevention & Response Plan.** Required if you or your agent transport your biosolids.
- Biosolids/Soil Sampling & Analysis Plan (SAP).** A Biosolids/Soil Sampling and Analysis Plan is required when you sample your biosolids and land application site(s).
- Site Specific Land Application Plan (SSLAP).** Required for every site where non-exceptional quality biosolids are applied.
- General Land Application Plan (GLAP).** To maintain the option of proposing new sites for applying non-exceptional quality biosolids during the term of this permit.
- State Environmental Policy Act (SEPA).** The act of applying for coverage under this permit triggers a requirement for review under SEPA. This does not necessarily mean that a new SEPA threshold determination will be required.
- Public Notice.** Depending on your operation you may be required to conduct Public Notice as part of submitting this application.

Beneficial Use Facilities

- Vicinity Map.** The map must extend at least 1 mile around the perimeter of the facility and any associated treatment or storage facilities. The map must also show the location and means of access.
- Spill Prevention & Response Plan.** Required if you or your agent transport your biosolids.
- Analytical Data.** The past two years of data related to your biosolids, land application site soil, and/or land application site waters.
- Biosolids/Soil Sampling & Analysis Plan (SAP).** A Biosolids/Soil Sampling and Analysis Plan is required when you sample your biosolids and land application site(s).
- Site Specific Land Application Plan (SSLAP).** Required for every site where non-exceptional quality biosolids are applied.
- General Land Application Plan (GLAP).** To maintain the option of proposing new sites for applying non-exceptional quality biosolids during the term of this permit.
- State Environmental Policy Act (SEPA).** The act of applying for coverage under this permit triggers a requirement for review under SEPA. This does not necessarily mean that a new SEPA threshold determination will be required, but any decisions regarding what is needed in order to comply with SEPA must be made by the SEPA Lead Official.
- Public Notice.** Depending on your operation you may be required to conduct Public Notice as part of submitting this application.

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Other

- Temporary Disposal Plan.** Required if you dispose sewage sludge in a landfill on a temporary basis (see [WAC 173-308-300\(8\)](#)).
- N/A.** We do not send (or plan to send) any sewage sludge to a landfill.

10. Certification Statement (must be signed by the *Responsible Official* listed above) (see *WAC 173-308-310*)

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Responsible Official Signature _____ Date 11/26/2015

Responsible Official Name and Title Roger A. Hickey, President

SITE SPECIFIC LAND APPLICATION PLAN

Bio Recycling Corporation	Site Name: NORTH RANCH
Submitted: FEBRUARY 23, 2016	Permit Number: BT9901

The site described in this plan is located in: Mason County

The area described in this plan is located in Water Resource Inventory Area: Mason County WRIA#14

The physical address (or Public Land Survey System description) of this site is: Located at 820 E. Webb Hill Road, Union WA, the site consists of the SE 1/4, SW 1/4 of the SW 1/4, E1/2 of the SW1/4, SE1/4 of the NW1/4, and the S1/2 of the NE 1/4, of Section 18 T21N R3W located between the Webb Hill and McReavy roads in Mason County, approximately 1-mile north of their intersection.

Site Address: (Primary Access)	820 E Webb Hill Road Union, WA 98592
GPS Coordinates of Site Entrance:	Lat 46° 31' 38.84" N, Long 122° 54' 27.126" W
Sec, Twp, Rge:	Section 18, Township N,21 Range 3W
Water Resource Inventory Area:	Mason County WRIA #14
County:	Mason

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1.0 Ownership, Management, and Landowner Agreements

Owner	Parcel(s)	Zoning
The Kirk Company	32118-10-02000 32118-24-00000 32118-40-00000 32118-31-00000	83-Resource

See **Appendix 1** for signed lease/agreements from landowner.

2.0 Past Biosolids Use

No biosolids containing pollutants in excess of the values in WAC 173-308-160 Table 3 have ever been applied to any portion of the site.

Biosolids application began in 1986 under Solganic Services Company, a now defunct company owned by The Washington Water Power Company, now named Avista. Biosolids from Thurston and Pierce County POTW were applied annually up to 1990 on portions of fields now designated as 1, 2 and 3.

3.0 Maps

Maps are located in Appendix 2 of this plan.

3.1 General Location Map

Appendix 2.a – Vicinity Map

Appendix 2.b – Site Plan Map

Appendix 2. b1 – Topography Map

3.2 Site Map or Field Map

Appendix 2.c – Field Map

Appendix 2.c1 – Field Application Runs Map

Appendix 2.c2 – Buffers Map

Appendix 2.d – Residences Map

Appendix 2.e – Mason County Wetlands Map

Appendix 2.f - Well logs within one quarter mile

Appendix 2.g – Zoning Map

3.3 Soils Map

Appendix 3 – Soils Report (Includes soils map)

Appendix 4 – Soil Sampling Plan

Appendix 5 – Water Monitoring Plan

Appendix 6 – North Ranch Schematic

Appendix 7 – Record Keeping Samples

Appendix 8 – Application Loading Worksheet

Appendix 9a – Soil samples 2007-2013

Appendix 9b – Soil samples 2014

Appendix 9c1 – Soil samples 2015 September sampling

Appendix 9c2 – Soil samples 2015 September sampling

Appendix 9c3 – Soil samples 2015 October sampling fields 1&2

4.0 Seasonal and Daily Timing of Biosolids Applications

Currently, the adjacent land application receives surface applications on a year around basis to produce agricultural and forestry crops. In the next 2-3 years, it is hoped a surface impoundment will be constructed to allow for the application of liquid biosolids during the summer months. This will facilitate the best use of water during drier periods when grass crops will require it, and benefit most from it. Forestry crops will only be irrigated during the summer months using drip irrigation to ensure that tree water requirements are met as well as to minimize water losses.

Certain fields or portions of fields are avoided during winter months due to runoff potential. A minimum of 200 foot buffers are maintained from seasonal water bodies and ephemeral streams when water is present. Buffers are indicated on North Ranch Map Appendix 2 c2.

A vegetative buffer is planned for all low lying areas. Hybrid poplars are going to be planted in 2016. If successful, the poplars will be used in all of the vegetative buffers. If the poplars don't thrive an alternative vegetation such as Douglas fir trees will be tried. Douglas fir trees don't use as much water or nitrogen, but they have thrived on the property and are well suited to drought prone areas. Additional shrubs may be used with the Douglas fir trees to take up additional nitrogen and provide the strongest buffer possible. Some of the low lying areas may be used to produce forage as well.

Application is suspended when areas are saturated, or are likely to become saturated from heavy rainfall events that are likely based on weather forecasts and precipitation radar. Application is also suspended when significant snow cover is present over frozen ground where a rapid thaw could generate runoff. The decision when to terminate operations for weather, or resume operations is made by a Bio Recycling employee that is experienced with year around operations at the North Ranch site; usually in consultation with Bio Recycling's owner or managers.

During the warmer months, most of the application will occur on Fields 1, 2 and portions of 3. During the wetter, colder months application will occur on all areas that are suitable for haying (Fields 1, 2 and portions of 3, 4, 4b, 10). Full nutrient loading will only occur on Fields 1

and 2. The other fields will receive no more than 50% of recommended fertilization rates until soil and other monitoring results indicated plant nutrient levels may be deficient.

Site loading reductions are being accomplished by dewatering the solids and diverting them away from the site to other facilities permitted to accept biosolids.

Prior to dewatering, limed biosolids at North Ranch typically contain 100 lbs. of total nitrogen per 10,000 gallons. The remaining filtrate biosolids produced by dewatering contains about 28 lbs. of total nitrogen per 10,000 gallons. In the second quarter of 2016, a process called dissolved air flotation will be introduced. Pilot testing has shown that total nitrogen levels should be further reduced to approximately 18 lbs. per 10,000 gallons.

Additional steps to reduce filtrate nitrogen concentrations are being considered including heating and/aerating to increase volatilization loss, biological denitrification, (a process used at wastewater treatment plants before discharging to receiving waters), and physical denitrification by adding zeolite, a naturally occurring mineral that ammonia and organic nitrogen will attach to. It is possible that nitrogen concentrations in filtrate could be reduced by over 90% if economically and operationally feasible. Also, the quantities accepted from certain high nitrogen sources such as municipal wastewater treatment plants, may also be restricted in quantity or seasonal timing.

Full loading (agronomic application rate) on any of the fields, is usually reached over a period of several months. During which time a series of light applications, or "lifts" are made. Each lift is approximately one quarter inch of liquid during the winter months. Four or five lifts are needed to achieve full loading for biosolids, and fifteen for filtrate biosolids. During the late spring and summer months, applications could increase up to one inch per lift, depending upon irrigation needs. Plans are to limit nutrient loading to less than 50% of fertilizer recommendations except where multiple forage cuttings are planned. The proper volume will be adjusted based upon actual biosolids characteristics as determined per the monitoring plan.

Daily timing of treatment plant operation and land application usually occurs between 6 a.m. and 6 p.m. Monday through Saturday. Factors which interrupt normal daily operations may make it necessary to operate outside of these times periods occasionally. Filtrate biosolids used to irrigate the forage fields will be monitored using rain gauges capable of holding one foot of water. This will help determine the exact amount of liquid to be applied. Water Mark sensors will be located in 3 areas of each of the hay fields to determine the need for irrigation. Because of the extremely low water holding capacity of the soil it may be necessary to irrigate at night to improve water use efficiency. By not irrigating until the crop requires water and by knowing and adjusting the irrigation to ensure maximum crop uptake – water losses to ground water should be reduced if not eliminated.

The major soil on the site is Alderwood gravelly sandy loam, 5-15% slopes. Recent lab analysis indicates approximately 2.4 inches of moisture holding capacity in the top two feet. Soil testing for nitrates, per the monitoring plan will be used to determine if agronomic rates were

successful at providing sufficient nitrogen for optimum plant growth, while minimizing residual nitrate remaining after harvest or the growing season. *Ecology publication 99-508*, a copy of this publication found at <https://fortress.wa.gov/ecy/publications/documents/99508.pdf>

Soil nitrate results may also be used to determine if application rates have exceeded agronomic rates, or if application methods and timing need to be changed. Soil testing results to date have been inconsistent, likely due to the stoniness of the soil making it very difficult for the collection of representative samples. In addition to soil sampling, forage crop analysis will be utilized to identify nutrient deficiency that may be caused by excessive or inadequate plant nutrient levels in the soil.

The installation of shallow lysimeters to a depth below the root zone is being considered to help confirm whether soil tests are accurate and if application rates and timing are appropriate.

For soil monitoring data for 2013, 2014 and 2015 see Appendices 9a-9c.

5.0 Biosolids Staging and Storage

There is currently a storage capacity for approximately 100 tons of dewatered biosolids and 300,000 gallons of liquid storage capacity at the plant site. A storage lagoon will be constructed by 2020 if feasible. This storage facility would allow Bio to save filtrate for application during months with historic rainfall totals under 4" when it can be of maximum benefit for crop production.

6.0 Cropping Practices and Livestock Management

Starting in the spring of 2016, Field 1 will be plowed and replanted to a blend of orchard grass (10 lbs./ac) and alfalfa (10 lbs./ac). Both plants use approximately 50 lbs. of N per ton of harvest if harvested at the early bloom stage of alfalfa. (*WSU publication: PNW0611 & Ecology Publication #99-508*)

The soil has extremely low water holding capacity below the 6-8" layer of soil. It is in this 6-8" surface layer that contains the organic matter(OM). Because of this lack of OM deeper than eight inches, grass plants have not sent roots down below the OM zone. Water below the OM zone, down to the underlying glacial till layer 36" deep is not utilized. Alfalfa can send down tap roots up to 6' to take advantage of this deep moisture. The tap root is not solely limited to the OM containing layer as is typical for grass species. This gives alfalfa a competitive advantage over the shallower rooted grasses. Though alfalfa is a legume and fixes nitrogen symbiotically with rhizobia, if there is supplement nitrogen present the rhizobium become "lazy" and do not contribute significant nitrogen to the plant or soil.

Using these two different plants to remove nitrogen from two different zones in the soil should provide a more effective means of ensuring minimal nitrate leaching. The site is not irrigated except for the irrigation effect from the application of liquid biosolids. Using the Water Mark

sensors, fields will be irrigated at 50% field capacity. Applications will be done such that the maximum amount of acres will be covered with the available filtrate/water. To maximize the water efficiency, irrigation will take place in the evenings, during days that temperatures exceed 85 degrees Fahrenheit. In order to maximize yield, the first cutting will be done when orchard grass is in late vegetative stage, and when 10% of the alfalfa is in early bloom.

Most years this will occur around the middle of May. Because temperatures in May historically average 67 degrees Fahrenheit the first cutting is projected to be put into baleage. Baling forage at higher moisture levels than what is required for dry hay offers some advantages. Typically, the first cutting of cool season grass is difficult to harvest for hay at the proper maturity stage. Usually, excessive spring rainfall makes it nearly impossible to dry down forages into the 15-18% moisture range necessary for hay. As a result, these crops are often over-mature when baled as dry hay. However, such crops would work well in a baleage system, which requires a higher moisture range (40-60%) and shorter field-drying time. This should allow the harvest of high protein baleage, that will utilize large amounts of nitrogen present in the soil.

Irrigation for first cuttings will be done 30 days prior to harvest. This should not pose a problem because of historically adequate spring rainfall. The second round of irrigation will proceed immediately after the harvest is complete, and will continue based on sensor data. Every effort will be made to keep the grass from becoming dormant from drought. If, the 30-day window before harvest cannot be met while keeping the grass actively growing, then the hay will be harvested for mulch and not sold as feed. The third cutting should not encounter this problem because rainfall totals historically increase in September. Baleage may again be used to harvest hay depending on heat and rainfall. Field 1 is currently under renovation and the first season will not be mature enough to harvest at the usual time.

Also, in order to minimize damage to the young plants irrigation will not take place on Field 1 until after first cutting. Two cuttings are expected for newly renovated fields. Field 1 will be the only field renovated in 2016 because of time constraints. Depending upon the results for Field 1 the remaining fields that would be adequate to use for haying (Fields 2, 3 & 10) will be renovated between 2017-2018 as time and weather allows. Approximately 62 acres in Fields 1 & 2, will receive the bulk of liquid application during most years; especially during the drier summer months as irrigation to produce up to 3 cuttings. The remainder of the acreage is in portions of Fields 3, 4, 4b and 10.

In 2016, these fields will be over seeded with a blend of perennial rye grass and orchard grass to fill in any bare spots and maximize nitrogen use. Reseeding, periodic mowing and herbicides (only on grass fields) will be utilized as necessary to keep the site fully vegetated with desirable grasses. Hay fields that will not receive summer liquid application will likely only produce a first cutting. If sufficient rainfall occurs, a second cutting may be possible. Grazing may follow the first cutting. It is believed a single cutting taken at the proper time will utilize more nitrogen than grazing. These areas may receive applications after a storage basin is built but not until fall soil nitrogen and crop protein levels indicate a nitrogen deficiency exists.

Field 11 and the portions of Fields 3, 4 and 4b that are not currently suitable for haying will only have forage removed by grazing up to twice per year. Those areas that are “grazed only” will not receive any filtrate irrigation after the surface impoundment is operational, and minimal application until then.

Beginning in 2016, about 5 acres in the low lying area of Field 3 in the SW corner will be planted with hybrid poplars to utilize as much stratified water and nitrogen as possible. This will also prevent as much subsurface loss from the site as possible. If the poplars survive and grow well, another area will likely be planted in early 2017, about 8 acres in south portion of Field 10. According to *WDOE Publication #99-508*, Hybrid poplars can utilize up about 240 lbs. of nitrogen per year from age 5-10 when not limited by moisture.

Moisture demand is not at its maximum until the poplar tree canopy has closed. It may take a few growing seasons to determine if the North Ranch soils are suitable. If they are, approximately 69.0 acres of low lying areas could be planted, perhaps more if they thrive. If poplar trees do not do well, Douglas-fir may be planted or another vegetative buffer will be used. The placement of the vegetative buffers (ideally hybrid poplars) is designed to keep a maximum amount of subsurface nitrogen from migrating off site. Trees will be placed in all low lying areas. Steep slopes and other high risk areas will not be irrigated with any filtrate.

The vegetative buffers will be fenced off from cattle in the grazing fields (Fields 4, 4b & 11) with electric fence. Grass under the fence will either be cut short using a weed trimmer, or killed using herbicides. Cattle may be grazed after first cutting on the grazing fields. The number of animals grazed is varied by season. Cattle are moved from field to field to maintain a minimum of 4" average forage height. The grazing timing and herd population is determined by Bio Recycling, the lease holder and an experienced cattle manager.

Areas that are “grazed only” will not be fertilized with biosolids, until crop growth or nutrition becomes less than optimal. Commercial fertilizers could be used as well.

7.0 Other Nutrient Sources and Soil Amendments

Only biosolids have been applied to the site during the past 5 years. Boron and potassium will be applied to maximize yield potential for alfalfa and orchard grass fields. Potassium will be applied in the fall on all fields to insure healthy forage and maximum yields. Phosphorus may be applied to alfalfa fields based on soil test results and crop requirements. It is possible commercial fertilizers could be applied to grazing areas that are not suitable for haying or fertilization with liquid biosolids is not efficient or practical.

8.0 Methods of Application

Liquid biosolids are pumped through a buried 6" PVC pipeline and riser network. From each riser, application is made through a manure gun attached to a hose reel via a 1300' X 4.5" I.D. polypropylene pipe. The manure gun moves along the ground any time liquid is being pumped. It is driven by a gas engine and hydraulic motor, spraying the liquid from 100 to 175 feet from the gun as desired. The width of the swath varies from 200 to 350 feet. The

length of hose and the swath width constitutes a "run". (See Appendix 2c1: Field Runs Illustration)

For uniformity, each run is spaced at 70 to 80 percent of spray width per the gun manufacturer's recommendation. The pumping rate is usually held constant but is checked periodically by measuring the time it takes to pump out a known tank volume. The rate of travel and spray pattern for the gun can be varied for changing field conditions.

Pumping rate 300 GPM										
Travel Rate		SPRAY WIDTH (Feet)								
Feet per minute		200	220	240	260	280	300	320	340	360
3		21,780	19,800	18,150	16,754	15,557	14,520	13,613	12,812	12,100
3.25		20,105	18,277	16,754	15,465	14,360	13,403	12,565	11,826	11,169
3.5		18,669	16,971	15,557	14,360	13,335	12,446	11,668	10,982	10,371
3.75		17,424	15,840	14,520	13,403	12,446	11,616	10,890	10,249	9,680
4		16,335	14,850	13,613	12,565	11,668	10,890	10,209	9,609	9,075
4.25		15,374	13,976	12,812	11,826	10,982	10,249	9,609	9,044	8,541
4.5		14,520	13,200	12,100	11,169	10,371	9,680	9,075	8,541	8,067
4.75		13,756	12,505	11,463	10,581	9,826	9,171	8,597	8,092	7,642
5		13,068	11,880	10,890	10,052	9,334	8,712	8,168	7,687	7,260
5.25		12,446	11,314	10,371	9,574	8,890	8,297	7,779	7,321	6,914
5.5		11,880	10,800	9,900	9,138	8,486	7,920	7,425	6,988	6,600

GALLONS PER ACRE

Full loading with the hose reel is usually accomplished by making several passes that will equal approximately one-third of loading per pass for liquid biosolids and one-eighth for filtrate biosolids. Lighter per pass applications may be made in the summer where maximizing acres covered are desired.

9.0 Determining and Validating Application Rates

9.1 Determining the Plant Available Nitrogen Requirement

Plant available nitrogen requirements are based upon the Fertilizer Guide for Western Oregon and Washington Pastures, FG63 and the "Worksheet for Calculating Biosolids Application Rates in Agriculture" for each field. (See Appendix 8 for example of worksheet)

9.2 Calculating the Application Rate

A loading spreadsheet which computes the applied plant available nitrogen is updated monthly taking into account the annual cumulative volumes applied to each field and changes in biosolids nitrogen levels over time, based upon the lab results of bi-weekly composite samples of biosolids and filtrate biosolids.

These tests determine Organic N, Ammonia N and percent solids for liquid biosolids and filtrate biosolids. Liquid biosolids typically average over 2.5% solids by weight and are analyzed on a dry weight basis (mg/kg). Loading is computed accordingly.

Due to the very low solids levels of filtrate, usually less than .5% by weight, filtrate biosolids are analyzed on a wet weight basis, (mg/l), due to the low precision of the percent solids determination. Thus, the quantity of ammonia N and organic N applied is computed directly, avoiding the potential for conversion error. The percent solids data from the filtrate analysis will be used to provide a dry ton estimate for annual reports. Bio now uses a 40% mineralization rate for organic N in its biosolids, 60% for filtrate biosolids and 55% retention factor for ammonia N for both. The annual cumulative plant available nitrogen (PAN) is updated semi-monthly along with field application volumes which determines application volumes for the remainder of the year.

9.3 Verifying the Application Rate

Application rates are verified by tracking the daily volume applied to each field compared to the planned annual volume for each field based on the Cogger-Sullivan worksheet. The information is loaded daily into a spreadsheet which deducts the applied volume from the planned annual volume for biosolids and filtrate biosolids; and displays the remaining field capacity. Application uniformity is accomplished by maintaining constant pumping rates and pressures, desired travel speeds and proper spacing between runs. Operators keep a log totaling the number of passes made on each run.

10.0 Soil Sampling Plan

Bio Recycling's soil sampling program for the North Ranch is scheduled & performed by Land Profile, Inc. A copy of our Soil Sampling Plan is attached as Appendix 4. For soil monitoring data for 2013, 2014 and 2015 see Appendices 9a-9c.

11.0 Groundwater Protection Plan

Seasonal perched ground water is 3 feet or less below the surface for extended periods during wetter months primarily in low areas of Fields 3, 10 and 4. For short periods after heavy rains soils in any of the field may saturate but usually drain rapidly after rainfall is reduced or stops. Bio Recycling has a surface and groundwater monitoring plan in place for the North Ranch, see Appendix 5, this monitoring plan is performed by the Pacific Groundwater Group. The vegetative buffers that are referenced in part 6.0 are going to be designed to protect ground water. Each buffer will be strategically placed in an effort to utilize subsurface water not taken up by shallow rooted grass plants.

Expected total areas covered with vegetative buffers will be between 69 to 74 acres. Hybrid poplars will be the main vegetation chosen because of its high requirement for nitrogen and

ability to use large quantities of water. This high demand for water may be problematic during times of drought. In this event it may be necessary to put a drip irrigation system in where feasible. Those areas too removed from the available water/filtrate supply may be supplemented using tree irrigations bags. After the trees get more mature and the canopy closes, less water will be lost due to surface evaporation. The closed canopy is expected to shade the soil and keep the area under the trees cool thus conserving water during the heat of the day. Steep slopes and other high risk areas will not be used for any filtrate applications.

12.0 Erosion Control Plan

The entire site is kept vegetated year around. Occasionally limited tillage may occur for reseeded. The site is almost entirely surrounded by trees which reduces any chance of wind erosion. Surface water erosion is minimal given the high porosity of the soil. Where there is potential for surface erosion to occur, buffers using vegetative areas and soil berms will be in place.

13.0 Noxious Weed Plan

A number of noxious weeds have been identified in Mason County which are degrading to local habitat. Among them are Scotch broom, reed canary grass, giant hogweed, Himalayan blackberry, and the invasive knotweed species. Where noxious weeds are identified they will be eradicated using herbicides when possible or physical removal where necessary. The main fields used for hay will not promote the growth of most of the noxious weeds of concern for Mason County. The edges of fields are the most likely places for noxious weed establishment. Those areas are expected to be put into poplar buffers that will be managed using hand applied herbicides, mowing, or hoes. Employees will be made aware of the noxious weeds of concern; will pay particular attention to eliminate them and keep records of their locations and populations.

14.0 Restricting Site Access

The North Ranch is private property and surrounded by forest land. There is only one access to the site from the E Webb Hill Road. The entire perimeter of the site is fenced to contain the grazing animals and prevent unauthorized trespass. Properly sized and worded signs are placed on the fence posts at the spacing required by regulations. Annually, the signs are inspected and replaced as needed.

Biosolids Land Application Site

This biosolids land application facility is operated by:



under permit from the Washington State Dept. of Ecology.
Beneficial use of biosolids is the most common management method in the United States, and is safe and effective alternative to disposal practices.

Unauthorized access to this site prohibited.

For more information contact:

Bio Recycling PO BOX 982 Centralia, Wa 98531
or the Dept. of Ecology @ 360-407-6393
or write to the Washington State Department of Ecology,
Solid Waste & Financial Assistance Program
PO BOX 47775 Olympia, Wa 98504-7775

15.0 Recordkeeping

The biosolids applied to the North Ranch are received from Western Washington septic tank pumping companies.

Each pumper weighs in and their load is recorded in our database, this reflects the time, date and amount of gallons received. The daily total is then entered into a spreadsheet called "Daily Biosolids Application Record" that reflects the field on which biosolids are applied.

From these records, the daily deliveries for each field are entered into a spreadsheet that tracks the dates of application, and cumulative field volumes for each year. The cumulative field volumes are deducted from planned field volumes to produce the remaining capacity for each field. The field application timing is used to determine the ending dates for the 30 day cattle grazing and forage harvest restrictions.

The monthly volumes for each field are entered into a loading spreadsheet that also includes the analytical results for TKN, ammonia N, organic N and percent solids from semi-weekly composite samples that are produced from subsamples of each load delivered to the site. This data is merged with the volume data to produce cumulative plant available nitrogen applied per acre per field.

Soil sampling and surface and groundwater monitoring records are also kept and discussed separately in their respective sections.

Samples of record keeping documents are found in Appendix 7.

Appendix 1 – Landowner Agreement

LAND LEASE

THIS LEASE (lease) replaces the "Land Lease dated November 1, 1997" between THE KIRK CO. AND BIO RECYCLING CORPORATION dated and all its amendments and is effective the 1st day of November, 1999 between BIO RECYCLING CORPORATION, a Washington corporation, hereinafter referred to as "BIO" and THE KIRK CO., a Washington corporation, hereinafter referred to as "OWNER."

In consideration of the covenants, agreements and stipulations herein contained on the part of BIO to be paid, kept, and faithfully performed, OWNER does hereby lease that certain land, hereinafter referred to as "LAND" as shown in "Attachment A – 11.1.99" and generally described as follows:

All of OWNERS land in Section 18, T21N, R3W excluding that portion of the SE ¼ of the NW ¼ currently planted to Noble fir and the strip of land adjacent and directly north of the Noble fir plantation.

To BIO for a period of ten (10) years commencing November 1, 1999 and ending October 31, 2009 at an annual lease fee of \$50,000 due on November 1, 1999 and the anniversary date of each successive year provided the lease fee will increase 3.5% on each anniversary date.

BIO shall have the option to renew this lease for an additional ten (10) year term subject to terms acceptable to both parties. BIO shall notify OWNER by November 1, 2008 of its desire to renew the lease and both parties shall have 60 days to negotiate new terms. If the both parties are unable to agree upon new terms, the lease will terminate October 31, 2009. In the event OWNER decides to sell any of its interest in Section 18 T21N, R3W during the term of this lease or any extension thereof, OWNER shall give BIO the right of first refusal to purchase said interest. If BIO chooses not to purchase said interest, OWNER's sale shall not adversely affect BIO's rights to conduct its business under this lease.

Representations and Warranties of BIO: BIO represents and warrants to OWNER that to the best of BIO's knowledge, BIO is, in all material respects, in compliance with all requirements of laws and all requirements of all governmental bodies or agencies having jurisdiction over BIO. BIO further represents and warrants that it has all licenses, permits, approvals, authorizations and consents of all government entities and all certification organizations required for the conduct of BIO's business. To the best knowledge of BIO, BIO is and has been in compliance with all such permits and licenses, approvals, authorizations and consents. These representations and warranties shall survive the termination of this Lease.

1. **Business:** BIO may use the LAND to accept, store, treat and land apply organic materials at permitted soil amendment rates. BIO shall obtain and maintain all the required permits and records for such business. OWNER warrants that it will not use the premises surrounding the LAND in anyway which adversely affects BIO use thereof or grant the use of the LAND to any other party. At the termination of its use of the LAND for any reason, BIO shall remove all equipment, and facilities except fencing and buried utilities which it may remove at its option and return the land to its approximate original contour.

KIRK/BIO RECYCLING

2. Lands Management: In conjunction with BIO's business, OWNER grants BIO the use of the LAND for forage production and grazing. To protect adjacent land and crops, BIO shall fence the grazing areas. All proceeds generated from said forage and grazing shall belong to BIO. BIO agrees to comply with all regulations pertaining to its use of said LAND.

3. Ingress/Egress: OWNER grants unrestricted use to BIO of all roads on the LAND and leading to the LAND for the purpose of conducting its business. BIO may install signs, fencing, locked gates, and ditches, as it deems necessary, to control access to the LAND and BIO's facilities.

4. Termination: BIO, at its sole discretion, may terminate this lease with six months written notice. If BIO terminates during a year, OWNER will return the prorata share of the annual lease fee paid by BIO provided BIO has met its obligation to remove equipment and facilities and returned the land to its approximate original contour. OWNER may terminate this lease upon 60 days written notice to BIO for its failure to make any lease payment if BIO fails to make said payment within the 60 days of receiving such notice.

5. Assignment of the Agreement: BIO may assign this lease if its sells the business provided the assignee is determined by OWNER to be financially responsible.

6. Insurance: BIO agrees to carry, at its own expense, insurance covering its work under this Agreement including worker's compensation, comprehensive general liability (including auto), and property insurance in such amounts and on such terms as dictated by prudent Risk Management considerations.

7. Independent Contractor: BIO will perform all work as an independent contractor, and in a safe, workmanlike manner, with the necessary crews, tools, machinery, and equipment furnished and maintained by BIO at its own cost and expense. All work done by BIO, or its designees, shall meet the specifications set forth herein, and the detailed manner and method of doing the same shall be under the sole control and management of BIO, so long as said work does not unduly interfere with activities of OWNER.

8. Force Majeure: Any loss or damage, or delays in or failure of performance by either party hereto shall not constitute default hereunder or give rise to any claims for damage if, but only to the extent that, such loss, damage, delay or failure is as a result of caused by "force majeure." As herein used, the term "force majeure" means war, hurricanes, similar storms or other actions of the elements, acts of God or the public enemy, restrictions or restraints imposed by law or rule, regulation or order of governmental authorities, interruptions of all transportation facilities, and other cause which is beyond the reasonable control of the party affected in which, by the exercise of reasonable diligence, such party is unable to prevent.

KIRK/BIO RECYCLING

9. Indemnification: BIO agrees to indemnify and save harmless OWNER, its agents and employees from and against any and all suits, claims, actions, losses, costs, penalties, and damage of whatsoever kind or nature, including attorneys' fees, arising solely out of, or in connection with or incident to the work performed by BIO.

OWNER agrees to indemnify and save harmless BIO, its agents and employees from and against any and all suits, claims, actions, losses, costs, penalties, and damage of whatsoever kind and nature, including attorneys' fees, arising solely out of, or in connection with or incident to any negligence on the part of OWNER.

10. Non-Waiver: The failure or delay of either party to insist upon or enforce strict performance by the other party of any of the provisions of this Agreement, to exercise any rights or remedies afforded under this Agreement or applicable law or to notify the other party in the event of breach or default shall not relieve either party of its obligations under this Agreement or constitute a waiver or relinquishment to any extent of either party's rights to enforce or rely upon such provisions, rights or remedies in that or any other instance.

11. Modifications: No change in this Agreement shall be of any force or effect until such time as the parties have entered into a written agreement signed by both parties specifying such change.

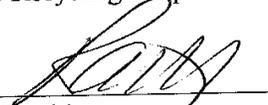
12. Notices: All notices pertaining to this Agreement shall be in writing, and shall be sufficient if delivered by facsimile or regular mail to the parties at the following addresses:

Bio Recycling Corp
P.O. Box 982
Centralia, WA. 98531
Attn: Roger Hickey

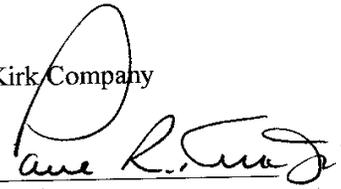
The Kirk Co.
201 St. Helens Ave.
Tacoma WA 98402-8482
Attn: Rick Kirk

DATED the day and year stated in the first paragraph.

Bio Recycling Corporation

By 
Its President

The Kirk Company

By 
Its President

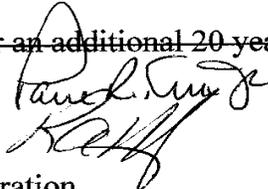
AMENDMENT TO LAND LEASE

This is an Amendment to that Land Lease between The Kirk Company (“Owner”) and Bio Recycling Corporation, a Washington corporation (“Bio”) dated November 1, 1999, for the lease of certain real property depicted on Attachment “A” of said Land Lease, and legally described therein. Except as amended by this Amendment, the Land Lease remains in full force and effect and is ratified by this Amendment.

The thirteenth line of text on the first page starting with the words “To Bio” and the paragraph following it are amended as follows:

To Bio for a period of twenty (20) years commencing November 1, 2007 and ending October 31, 2028 at an annual initial lease fee of \$65840.46 due on November 1, 2007 and the anniversary date of each successive year provided the lease fee will increase 3.5% on each anniversary date.

~~Bio shall have the option to renew the Land Lease for an additional 20 year term under the same terms and conditions.~~

DELETE 

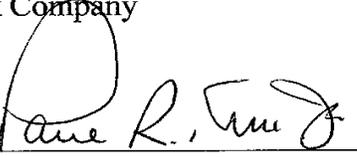
Bio Recycling Corporation

Date: July 30, 2007

By: 
Roger Hickey, President

The Kirk Company

Date: 8/7/07

By: 
Rick Kirk, President



June 21, 1999

Mr. Roger Hickey, President
Bio Recycling Corporation
P.O. Box 982
Centralia, WA 98531

Dear Roger:

Mac and I have discussed the issue of you expanding the Lease on our Section 18-21-3W.

Our proposal is to start a new anniversary date on November 1, 1999 with an annual Lease payment of \$50,000.00. Each concurrent year on November 1st the Lease will increase 3.5%.

The Lease will be a ten-year Lease with an option to renew and renegotiate.

We want to add the following paragraphs to the Lease:

Representations and Warranties of BIO: BIO represents and warrants to owner that to the best knowledge of BIO, BIO is, in all material respects, in compliance with all requirements of laws and all requirements of all governmental bodies or agencies having jurisdiction over BIO. BIO further represents and warrants that it has all licenses, permits, approvals, authorizations and consents of all government entities and all certification organizations required for the conduct of BIO's business. To the best knowledge of O'O, BIO is and has been in compliance with all such permits and licenses, approvals, authorizations and consents. These representations and warranties shall survive the termination of this Lease.

Indemnification: BIO agrees to indemnify and save harmless OWNER, its agents and employees from and against any and all suits, claims, actions, losses, costs, penalties, and damage whatsoever kind of nature, including attorneys' fees, arising solely out of, or in connection with or incident to, the work performed by BIO.

BIORECYC/RICK/WPLIB

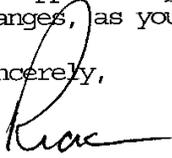
Mr. Roger Hickey
June 7, 1999
Page 2

OWNER agrees to indemnify and save harmless BIO, its agents and employees from and against any and all suits, claims, actions, losses, costs, penalties, and damage of whatsoever kind and nature, including attorneys' fees, arising solely out of, or in connection with or incident to any negligence on the part of OWNER.

We also require a Certificate of Approval from the State so that we can have it in our files. Our concern is the long range potential liability which could be created with the application of the sewer material.

If approved please have your attorney draw up the contract with the changes, as you have done in the past.

Sincerely,



Paul R. Kirk, Jr.
President

PRKjr/law

BIORECYC/RICK/WPLIB

June 28, 1999

Mr. Rick Kirk
The Kirk Co.
201 St. Helens Ave.
Tacoma WA 98401-2519

SUBJECT: Lease Changes

Dear Rick:

Thank you for reply to my May 19, 1999 request for lease changes. Because your proposal requests an additional \$5,000 per year and starting the annual 3.5% increases on November 1, 2000, I request the lease area be modified further to include all land except the Noble fir area and the adjacent strip of land to the directly north of the Noble fir. This area change will not add much usable acreage but will simplify the management of these areas. The enclosed Attachment A – 11.1.99 shows the area as requested.

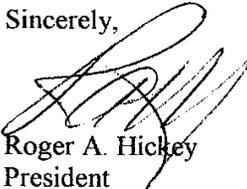
The additional paragraphs are satisfactory. The indemnification is a duplication of the existing lease without the grammatical errors. The enclosed lease replaces the current lease with the changes you requested.

I am enclosing a copy of our application to the state. They have yet to issue any site specific permits but their general statewide permit covers us until they do.

Please sign the enclosed leases if you accept these additional changes and return one to me. If you want to make further changes please let me know.

What are your plans for the trees on the involved areas? If you were not going to harvest them, we would start clearing sooner with your approval. Please let me know.

Sincerely,


Roger A. Hickey
President

May 19, 1999

Mr. Rick Kirk
The Kirk Co.
201 St. Helens Ave.
Tacoma WA 98401-2519

SUBJECT: Lease Changes

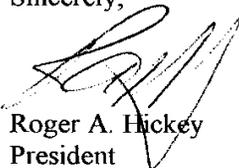
Dear Rick:

Well, its seems things are always changing in our business. I don't suppose that is ever a problem for you is it? Due to new regulations, we need to reduce application rates. To do this without restricting our business and meet the future needs of our clients we would like to increase our lease acreage. Enclosed you will find a site diagram showing the proposed additional area in green. This area would add about 100 acres and is the most suitable for application given its topography, size, and shape. Of course it would require clearing, seeding and fencing.

In addition we are evaluating the feasibility of constructing a temporary storage basin. As you know, last winter was very wet. For the first time in our history we suspended business for rain. A storage basin would minimize weather-related impacts and give us more credibility with environmental agencies with the heightened concern for salmon. Because the construction costs will be quite high, we would like to propose increasing the initial lease term to 20 years with an option for an additional 10. The rate per acre would remain the same as it is, with 3.5 percent increases starting as currently planned. What do you think?

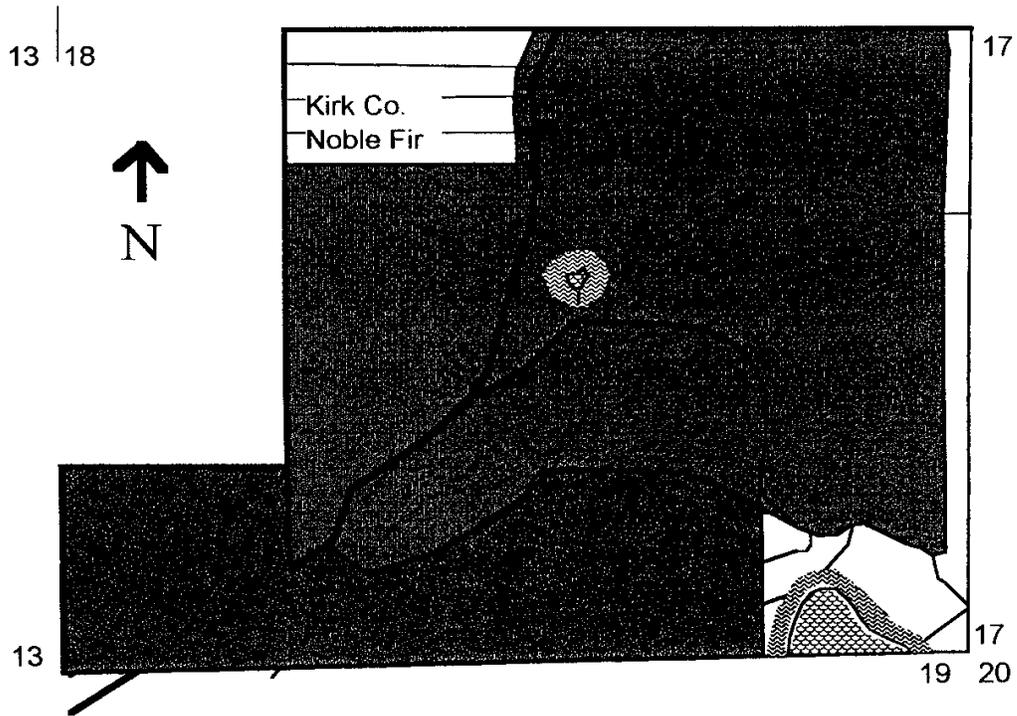
I would like to meet with you to discuss this at your earliest convenience.

Sincerely,


Roger A. Hickey
President

ATTACHEMENT A

**KIRK
SECTION 18**



LEGEND

	Main Road		Lease area
	Field Road		Treatment station location
	Seasonal Stream		Seasonal ponds
Scale 1" = 1000'			Bufferzones

March 31, 1998

Mr. Rick Kirk
The Kirk Co.
201 St. Helens Ave.
Tacoma WA 98401-2519

SUBJECT: Lease Terms

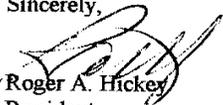
Dear Rick:

I'll bet you thought you were done with this subject for a while. On March 21, 1998, as expected, Washington State implemented new rules for septage and sewage sludge, now called "biosolids". The rule has been in development since 1994 and shifts permitting responsibilities from the counties to the State of Washington Department of Ecology. Under the new rule, we have the option to choose how we would like to be regulated, depending upon the type of materials we accept and the land application rates wish to utilize. Our preferred option would allow us to continue as we have in the past with two exceptions, we have to increase our storage tank capacity four fold and modify our treatment process slightly.

Because this change is quite expensive and increases our operating costs, we would like to change the lease term to twenty years, with an option for an additional 10 years; start the annual 3% escalator after 10 years instead of 5; and provide for more land if we need it by granting an option to expand our application area to all suitable area, except the Noble fir area, at the per acre lease rate in effect at the time for the original lease area. Any merchantable trees would belong to and be removed by Kirk; any clearing would be performed by Bio at its expense.

Thanks for your consideration and please let me know your thoughts at your earliest opportunity.

Sincerely,


Roger A. Hickey
President

April 27, 1994

Rick Kirk, President
The Kirk Co.
P.O. Box 1597
Tacoma WA 98401

SUBJECT: Section 18 Land Use Agreement Revision

Dear Rick:

This letter will summarize our meeting of April 26, 1994 at your office. I requested the meeting to discuss my determination that the application of lime stabilized septage, at the current rates, to the Douglas-fir planted on the septage application land use area was not beneficial to the trees. The applied septage, particularly during dry weather, coats the tree foliage thus limiting growth functions of the needles. Trees in several areas are visually stressed and some mortality has occurred. Little if any nutrient is being utilized by the trees in this condition. I requested the following changes be considered.

Bio wishes to convert the present application area excluding Douglas Fir Co. sheared trees, Kirk's Noble fir, and the strip area along the north side of the Noble fir, to pasture crops consisting of grass and legumes. (Drawing attached) *Rick, please note in the legend that I have included the acreage of the areas we discussed which total only 107, excluding the Douglas Fir Co. area (25 acres). To obtain 150 acres it will be necessary to add some additional area beyond what we discussed. I have shown an area for illustration purposes as a growth contingency area which can be used to provide the necessary acreage to reach 125 acres. When the Douglas Fir Co. tree area is available, the total acreage would reach 150.*

Bio would fence the application areas to control and facilitate grazing and protect adjacent areas and crops. Bio would provide the cattle at its expense. Cattle would probably be on the site during spring, summer, and early fall and removed for the remainder of the year to allow for regrowth. Temporary fencing would be established around

the Douglas Fir Co. trees to keep animals out of their plantation until their harvest term is complete. Bio would then convert the area to pasture and remove the temporary fencing.

Bio's current and projected acreage needs for septage application at agronomic rates range from 120 to 150 acres. At current delivery volumes to the site, annual revenues to Kirk from the land use fee should fall between \$38 and \$46 thousand. In the future, volumes could increase, if current trends continue and Mason County does not limit the volumes allowed under the permit, producing annual revenues for Kirk Co. over \$50,000.

Under current federal regulations 40 CFR part 503, which must be adopted by the state later this year, the site life for septage application is infinite. Due to the low concentration of metals in septage and their permanent attenuation in the soil matrix over time, soil productivity or land use will not be limited by the applications of septage into the future.

You will contact credible sources of information regarding the risk of long term septage application to satisfy yourself about the safety of this ongoing program. Also you will compare the value of the land for timber production to the value derived by Kirk Co. from Bio septage application.

If your findings are favorable, Kirk Co. will agree to the above program changes and to extend the term of the land use agreement with Bio.

Thank you for your cooperation in this project. I am confident your review of the long term safety and the financial benefit of this program will be clearly favorable.

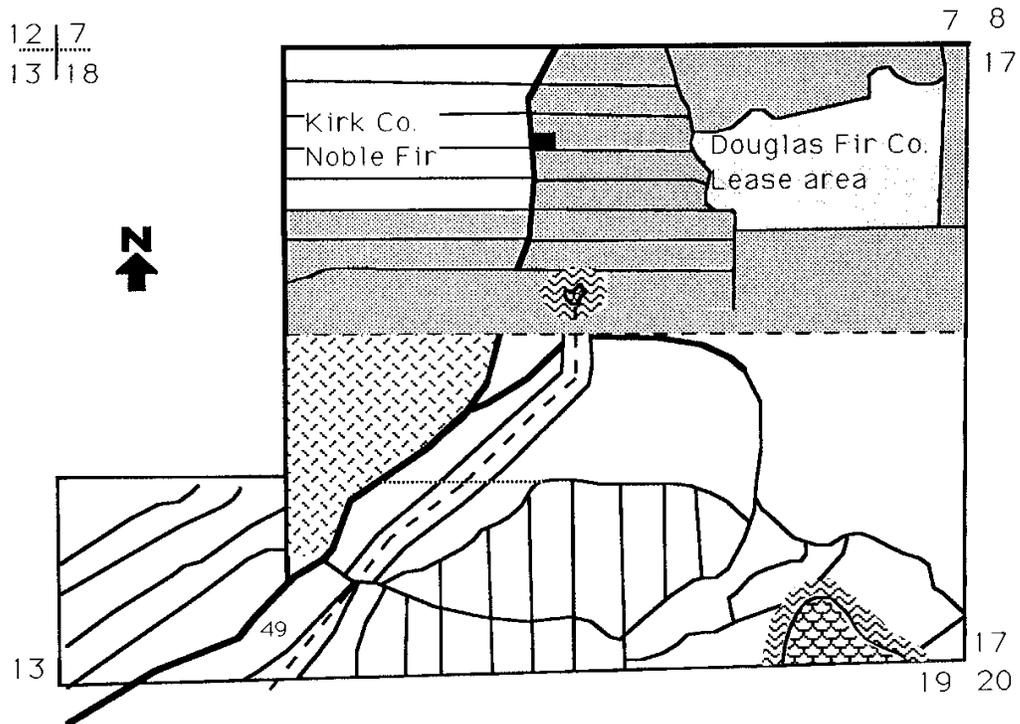
Sincerely,



Roger A. Hickey
President

ATTACHEMENT A

KIRK
SECTION 18



LEGEND

	Main Road		107 acres
	Field Road		Douglas Fir Co. 25 acres
	Seasonal Stream		25 acres growth contingency
	Scale 1" = 1000'		Seasonal ponds
			Buffer zones

BIO RECYCLING CORPORATION

P.O. BOX 982
CENTRALIA WA 98531
PHONE 360 273-5398
FAX 360 273-9368

DATE: 8-25-97

TO: Stephanie Arend

FROM: Roger Brickley

Number of pages being sent, including this cover sheet: 10

Type of Machine: Canon Faxphone B140

Messages: Hi. Can we purchase other
Mason Co property and develop for
sewage treatment & application, and
discontinue using the Kirk site.

AMENDMENT NO. 1

THIS AMENDMENT, entered into this 1st day of June 1994, is by and between BIO RECYCLING CORPORATION, a Washington corporation, herein called "BIO" whose mailing address is P.O. Box 982 Centralia WA 98531 and THE KIRK COMPANY, a Washington Corporation, herein called "OWNER" whose mailing address is P.O. Box 1597, Tacoma WA 98401.

WITNESSETH:

WHEREAS, the parties hereto did on September 15, 1992, enter into a LAND USE AND BIOSOLIDS STORAGE, TREATMENT, AND APPLICATION AGREEMENT (herein called "AGREEMENT"), the terms and provisions of which are incorporated herein by this reference; and

WHEREAS, it is necessary to amend such AGREEMENT;

NOW, THEREFORE, it is mutually agreed:

The second, third, and fourth paragraphs shall be replaced by the following:

In consideration of the covenants, agreements and stipulations herein contained on the part of the BIO to be paid, kept, and faithfully performed, the OWNER does hereby grant the use of those certain lands, hereinafter referred to as "LAND" as shown "Attachment A1" and described as follows:

Approximately 125 acres in Section 18, T21N, R3W located in the NE1/4 and the East 1/2, NW1/4 and the NE1/4, SW1/4 except those areas planted to Noble Fir and approximately 25 acres in the NE1/4, NE1/4 which is currently leased to Douglas Fir Co. until _____, 199__ after which the use of the area is granted to BIO.

OWNER grants the use of LAND to BIO for a period of five (5) years commencing June 1, 1994 and ending June 1, 1999 for a monthly fee equal

to the quantity, in gallons, of septage delivered to the premises during each calendar month times a per gallon rate of \$.0046. For the purpose of the agreement septage is the liquid waste from domestic septic tanks or other similar liquid wastes delivered to the LAND. Septage does not include liquid or dewatered wastes from municipal wastewater treatment plants.

BIO shall have the option to renew this Land Use Agreement for additional two (2) year terms upon the same terms and conditions as set forth herein with the exception of the monthly fee which shall be renegotiated between the parties. Within 60 days of one year prior to the end of the 5 year term or any two year option period thereafter, BIO shall notify OWNER of its interest to renew the Land Use Agreement. OWNER shall then notify BIO, within 60 days of BIO's notice, of its intent to increase the land use fee for the upcoming two year term and the amount of the change. Not less than sixty (60) days prior to the date set for termination of this Agreement, or each successive 2 year term, BIO shall deliver written notice to OWNER stating BIO's election to exercise the option to renew. Any increase in the monthly fee for each two year renewal period shall not exceed the increase in the Seattle Consumer Price Index during the preceding five year term.

In the event OWNER decides to sell any or all of its ownership in Section 18 T21N, R3W, OWNER shall give BIO the right of first refusal to purchase. If BIO chooses not to purchase and OWNER's sale of said land is dependent upon termination of BIO activities on the LAND, OWNER may terminate this agreement upon six (6) months advance written notice. Either party may terminate this agreement after the first five years, without cause, by providing a minimum of two years advance written notice.

Paragraphs numbered 2 and 3 are replaced as follows:

2. Business: BIO shall use the premises to accept, store, treat and land apply septage at fertilizer rates. BIO shall obtain and maintain all the required permits and records for such business. OWNER warrants that it will not use the premises in anyway which adversely affects BIO use thereof or grant the use of the premises to any other party. At the termination of its use of the premises for any reason, BIO shall remove all equipment and facilities, except any fencing BIO installed, and return the LAND to its approximate original contour.

3. Lands Management: OWNER grants BIO the use of the LAND for forage production and grazing. To protect adjacent land and crops, Bio shall fence the grazing areas. All proceeds generated from said forage and grazing shall belong to Bio. Bio agrees to comply with all regulations pertaining to its use of said LAND.

BIO RECYCLING CORPORATION

By

Its

THE KIRK COMPANY

By

Its

LAND USE AND
BIOSOLIDS STORAGE, TREATMENT, AND APPLICATION AGREEMENT

THIS AGREEMENT (Agreement) is entered into this 15th day of September, 1992 between BIO RECYCLING CORPORATION, a Washington corporation, hereinafter referred to as "BIO" and THE KIRK CO., a Washington corporation, hereinafter referred to as "OWNER." This Agreement covers work to be performed under the terms and conditions hereinafter provided.

In consideration of the covenants, agreements and stipulations herein contained on the part of the BIO to be paid, kept, and faithfully performed, the OWNER does hereby grant the use of those certain lands, hereinafter referred to as "Land" as shown "Attachment A" and described as follows:

Approximately 120 acres in Section 18, T21N, R3W located in the NE1/4 and the East 1/2, NW1/4 except those areas planted to Noble Fir and approximately 30 acres in the NE1/4, NE1/4 which is currently leased to Douglas Fir Co. until Douglas Fir has completed its harvest and replanting of said 30 acres after which the use of the area is granted to BIO.

To have the use of Land unto BIO for a period of five (5) years commencing September 15, 1992 and ending September 14, 1997 at a monthly fee based upon the quantity, in gallons, of septage delivered to the premises during each calendar month times a per gallon rate of \$.0046. For the purpose of the agreement septage is the liquid waste from domestic septic tanks or other similar liquid wastes delivered to the Land. Septage does not include liquid or dewatered wastes from municipal wastewater treatment plants.

BIO shall have the option to renew this Land Use Agreement for two (2) additional five (5) year terms upon the same terms and conditions as set forth herein with the exception of the monthly fee which shall be renegotiated between the parties. Not less than sixty (60) days prior to the date set for termination of this Agreement, BIO shall deliver written notice to OWNER stating BIO election to exercise the option to renew. The increase in the monthly fee for each five year renewal period shall not exceed the increase in the Seattle Consumer Price Index during the preceding five year term. In the event OWNER decides to sell the Land, OWNER shall give BIO the right of first refusal to purchase the Land. If BIO

KIRK/BIO RECYCLING

chooses not to purchase the Land and OWNER's sale of the land is dependent upon termination of BIO activities on the Land, OWNER may terminate this agreement upon six (6) months advance written notice.

1. Monthly fee payment: BIO agrees to pay to the order of OWNER the monthly fees above stated for the full term of this agreement within 30 days of the end of each month. With each payment, BIO shall provide the volume of septage delivered to the premises during the month.

2. Business: BIO shall use the premises to accept, store, treat and land apply septage at fertilizer rates. BIO shall obtain and maintain all the required permits and records for such business. OWNER warrants that it will not use the premises in anyway which adversely affects BIO use thereof or grant the use of the premises to any other party. At the termination of its use of the premises for any reason, BIO shall remove all equipment and facilities and return the land to its approximate original contour.

3. Lands Management: BIO agrees to perform certain land management services, including but not limited to weed control, and replanting, stocking surveys, and precommercial thinning within 10 years at approximately 12' by 12' spacing for OWNER for the purposes of establishing and maintaining a viable timber plantation at approximately 12' by 12' spacing on the Land.

4. Ingress/Egress: OWNER grants unlimited use of all roads on the premises and leading to the premises for the purpose of conducting its business. BIO may install signs, gates, and ditches, as it deems necessary, to control access to the Land and its facilities.

5. Assignment of the Agreement: BIO may assign this agreement if its sells the business provided the assignee is determined by Lessor to be financially responsible.

6. Insurance: BIO agrees to carry, at its own expense, insurance covering its work under this Agreement including worker's compensation, comprehensive general liability (including auto), and

KIRK/BIO RECYCLING

property insurance in such amounts and on such terms as dictated by prudent Risk Management considerations.

7. Independent Contractor: BIO will perform all work as an independent contractor, and in a safe, workmanlike manner, with the necessary crews, tools, machinery, and equipment furnished and maintained by BIO at its own cost and expense. All work done by BIO, or its designees, shall meet the specifications set forth herein, and the detailed manner and method of doing the same shall be under the sole control and management of BIO, so long as said work does not unduly interfere with activities of OWNER.

8. Force Majeure: Any loss or damage, or delays in or failure of performance by either party hereto shall not constitute default hereunder or give rise to any claims for damage if, but only to the extent that, such loss, damage, delay or failure is as a result of caused by "force majeure." As herein used, the term "force majeure" means war, hurricanes, similar storms or other actions of the elements, acts of God or the public enemy, restrictions or restraints imposed by law or rule, regulation or order of governmental authorities, interruptions of all transportation facilities, and other cause which is beyond the reasonable control of the party affected in which, by the exercise of reasonable diligence, such party is unable to prevent.

9. Indemnification: BIO agrees to indemnify and save harmless OWNER, its agents and employees from and against any and all suits, claims, actions, losses, costs, penalties, and damage of whatsoever kind or nature, including attorneys' fees, arising solely out of, or in connection with or incident to, the work performed by negligence on the part of BIO.

OWNER agrees to indemnify and save harmless BIO, its agents and employees from and against any and all suits, claims, actions, losses, costs, penalties, and damage of whatsoever kind and nature, including attorneys' fees, arising solely out of, or in connection with or incident to any negligence on the part of OWNER.

10. Non-Waiver: The failure or delay of either party to insist upon or enforce strict performance by the other party of any of the provisions of this Agreement, to exercise any rights or remedies afforded under this Agreement or applicable law or to notify the other party in the

KIRK/BIO RECYCLING

event of breach or default shall not relieve either party of its obligations under this Agreement or constitute a waiver or relinquishment to any extent of either party's rights to enforce or rely upon such provisions, rights or remedies in that or any other instance.

11. Modifications: No change in this Agreement shall be of any force or effect until such time as the parties have entered into a written agreement signed by both parties specifying such change.

12. Notices: All notices pertaining to this Agreement shall be in writing, and shall be sufficient if delivered in person or sent certified mail to the parties at the following addresses:

Bio Recycling Corp
P.O. Box 982
Centralia, WA. 98531
Attn: Roger Hickey

The Kirk Co.
P.O. Box 1597
Tacoma, WA 98401
Attn: Rick Kirk

DATED The day and year first above written.

Bio Recycling Corporation

By 
Its *President*

The Kirk Company

By 
Its *PRESIDENT*

January 22, 199~~2~~3

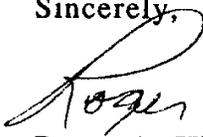
Rick Kirk, President
The Kirk Co.
P.O. Box 1597
Tacoma WA 98401

SUBJECT: December 1992 Land Use Fee

Dear Rick:

During November we received 117766 gallons of septage at Section 18. Based upon the above quantity and the per gallon land use fee of \$.0046, November's land use fee is \$541.72. Enclosed please find a check in the amount of \$541.72.

Sincerely,



Roger A. Hickey
President



June 7, 1994

Mr. Roger Hickey
Bio Recycling Corporation
P.O. Box 982
Centralia, WA 98531

Dear Roger:

Enclosed is the copy of Amendment #1 with the new terms on the lease you have with us on Section 18, Township 21 N, Range 3 W.

I did not fill in the timing on Douglas Fir Tree Company finishing the cutting of the trees on the property. It should be in the next three years, but I'm not positive and no one wants to make a total commitment on this. Based on this let's leave it open.

I hope everything works out well.

Sincerely,

A handwritten signature in black ink, appearing to read 'Paul R. Kirk, Jr.' with a stylized flourish.

Paul R. Kirk, Jr.
President

PRKjr/jlh

encls

HICKEY/RICK/WPLIB

**Bio
Recycling
Corporation**

P.O. Box 982

Centralia, WA 98531

206-736-8292

June 3, 1991

Rick Kirk, President
The Kirk Co.
P.O. Box 1597
Tacoma WA 98401

Dear Rick:

I have recently established a new corporation which is called Bio Recycling Corp. The purpose of this new company is to provide waste management services to septic tank pumpers. This week we expect acquire certain Solganic assets used exclusively for this portion of Solganic business.

As Bio Recycling, we are interested in purchasing some of Kirk's property in Mason County, more particularly portions of section 18, which are permitted for sludge or septage. As you might expect, as a new company, we are not flush with capital and would need to finance the purchase of the land. In an earlier conversation, you had indicated a price of \$750.00 per acre, if Solganic was interested.

I would like to propose entering into an option between Bio and Kirk with the following specifics.

1. Properties covered; SE1/4; S1/2, NE1/4; SE1/4 of the NW1/4; and E1/2, SW1/4; T21N, R3W.
2. Exercisable over 3 years on portions (minimum 80 acres) or all.
3. Sale price \$750.00 per acre plus 5 percent annually after the first year.

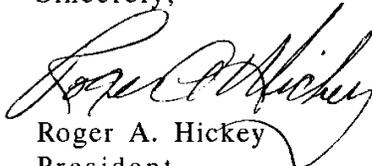
4. Owner will sell on 12 year contract at 10 percent annual interest with quarterly payments of interest and principal, no down payment required.

The attached photo copy of a Metsker map shows the area described above. You have mentioned the Douglas Fir Co. has purchased cutting rights on the trees in the SE1/4, NE1/4. I would propose the agreement between Kirk and Douglas Fir would continue under its current terms, even if Bio exercised the option on the SE1/4, NE1/4, until the planned cut and replanting to the agreed stocking has been achieved.

Please let me know at your earliest convenience if you find this proposal and its terms acceptable or if you desire a change in terms. I will proceed with the development of an option agreement after we have agreed upon the terms.

Thank you for your consideration of this proposal

Sincerely,



Roger A. Hickey
President



September 8, 1997

Mr. Roger A Hickey, President
Bio Recycling Corporation
P O Box 982
Centralia, WA 98531

Dear Roger:

I am in receipt of your recent letter about the trade of our Section 18 for a couple of pieces outlined as Hoferts ownership.

I am not the least bit interested in trading for grounds in that area. It is a very very low quality site. If we are going to make a trade, it must be a much better grade of property than that, and more acreage.

Mac and I prefer to keep ownership of our property. The Noble is important to us and the timber that you applied sludge to is really growing well.

I am leaving Tuesday, September 9, 1997 and will be gone for three weeks. When I return let's get together again for further consideration.

Sincerely,

Paul R. Kirk, Jr.
President

PRKjr/lw

The World's Largest Producer of Quality Christmas Trees

BIO/RICK/WPLIB

September 3, 1997

Mr. Rick Kirk
The Kirk Co.
201 St. Helens Ave.
Tacoma WA 98401-2519

SUBJECT: Property Acquisition

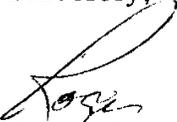
Dear Rick:

Thank you for responding so promptly to my letter of August 26 and your willingness to consider trading the Section 18 property for other similar property. I am enclosing a copy of a Metsker map showing two parcels totaling 400 acres which are available for trade. One adjoins the Section 31 site on the Ells Hill Rd. and the other is about one mile west in Section 33. Both have been recently logged and replanted.

I understand you wish to keep managing the Noble Fir at Section 18 for boughs. We would like to acquire ownership in that portion of Section 18 because it is permitted for sludge application. However, we do not foresee a need to use that portion of the site in the near future. Maybe we could work out an arrangement in which you could continue to take boughs until you had another site for bough production.

Again, your prompt attention to this matter is needed and appreciated. Please don't hesitate to call if I can be of assistance.

Sincerely,



Roger A. Hickey
President

August 26, 1997

Mr. Rick Kirk
The Kirk Co.
201 St. Helens Ave.
Tacoma WA 98401-2519

SUBJECT: Property Acquisition

Dear Rick:

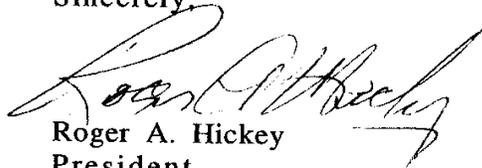
We have an opportunity to purchase property in Mason County that could serve as our septage treatment and utilization site. It meets all of the criteria for a suitable site and according to Mason County would be permissible. We need to make a decision in the next few weeks whether to pursue the acquisition. Before we make the decision to purchase and develop a new site, we would like to discuss with you the possibility of acquiring Section 18 from the Kirk Co. either through a property trade or purchase.

Because of the logistics associated with developing a new site and The Kirk Company's desire to hold land in Mason County for timber production, it might be most beneficial to arrange a property trade. Under a trade (1031 exchange), we would acquire land, possibly adjacent to other Kirk Co. property. You would receive land already replanted and supporting an established plantation which would actually increase your timber production base, we would continue using a site that is permitted and developed. The Kirk Co. could avoid the cost and difficulties of establishing a plantation in the heavy grass cover of the septage application area and we could avoid the time and cost of permitting and moving.

The other option is to purchase Section 18 from the Kirk Co. if a suitable price and terms could be reached.

Please let me know at your earliest convenience of your interest in either of these possibilities. I look forward to hearing from you.

Sincerely,

A handwritten signature in black ink, appearing to read "Roger A. Hickey". The signature is fluid and cursive, with a prominent initial "R".

Roger A. Hickey
President

October 8, 1997

Mr. Rick Kirk
The Kirk Co.
201 St. Helens Ave.
Tacoma WA 98401-2519

SUBJECT: Property Acquisition

Dear Rick:

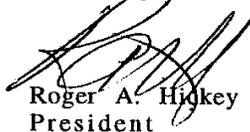
Per your request this letter will summarize the status of our property trade proposal and where we go from here. The Kirk Co. does not find the property that we proposed for trade to be of acceptable quality or quantity and we do not have other property to propose for trade. There is probably little reason to pursue the trade option. Also Kirk Co. is not interested in selling its interest in Section 18 to Bio and Bio remains committed to acquiring suitable property for our business.

You have indicated an interest for Bio to continue using the section 18 site if the economics make sense. Bio remains interested in continuing to use the site but we need to make some changes in the arrangement to make it a viable long term option. We propose the following changes to our existing agreement.

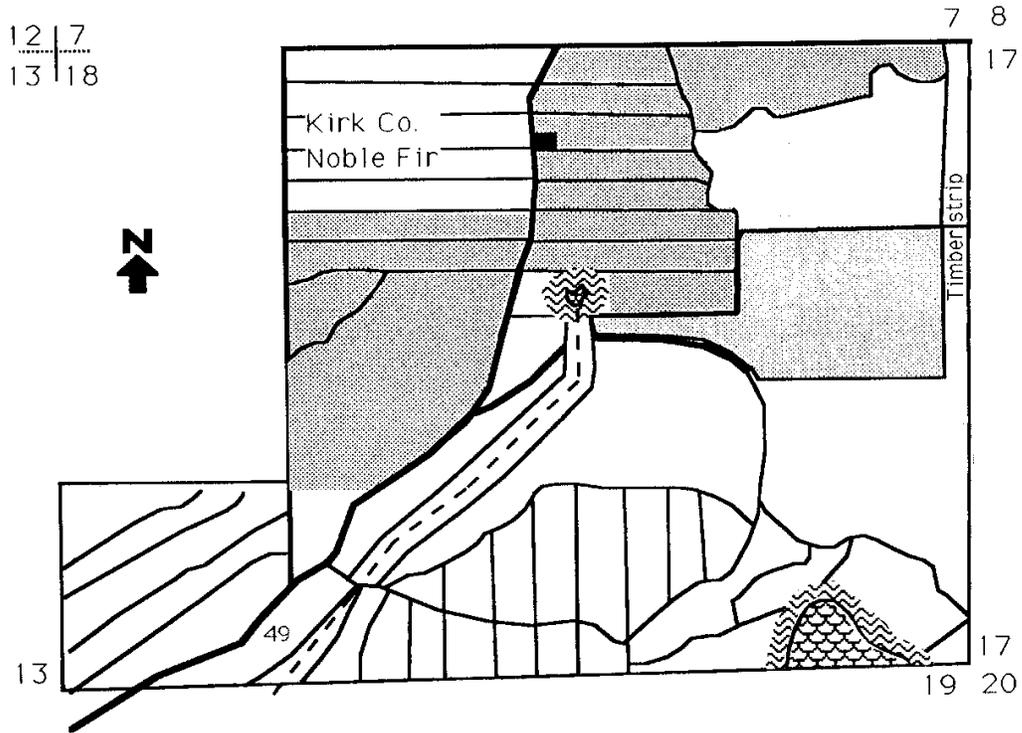
- 1) Effective November 1, 1997, change the land rental fee from a per gallon fee to a fixed rate of \$100.00 per acre per year paid monthly at the rate of 1/12 per month.
- 2) Increase the acreage available for septage application from 150 to 200 acres as shown on the attached map.
- 3) 10 year term w/option for additional 10 year term.
4. Bio may terminate upon 6 months notice.

Give me a call to discuss this further at your earliest convenience.

Sincerely,


Roger A. Hickey
President

KIRK SECTION 18

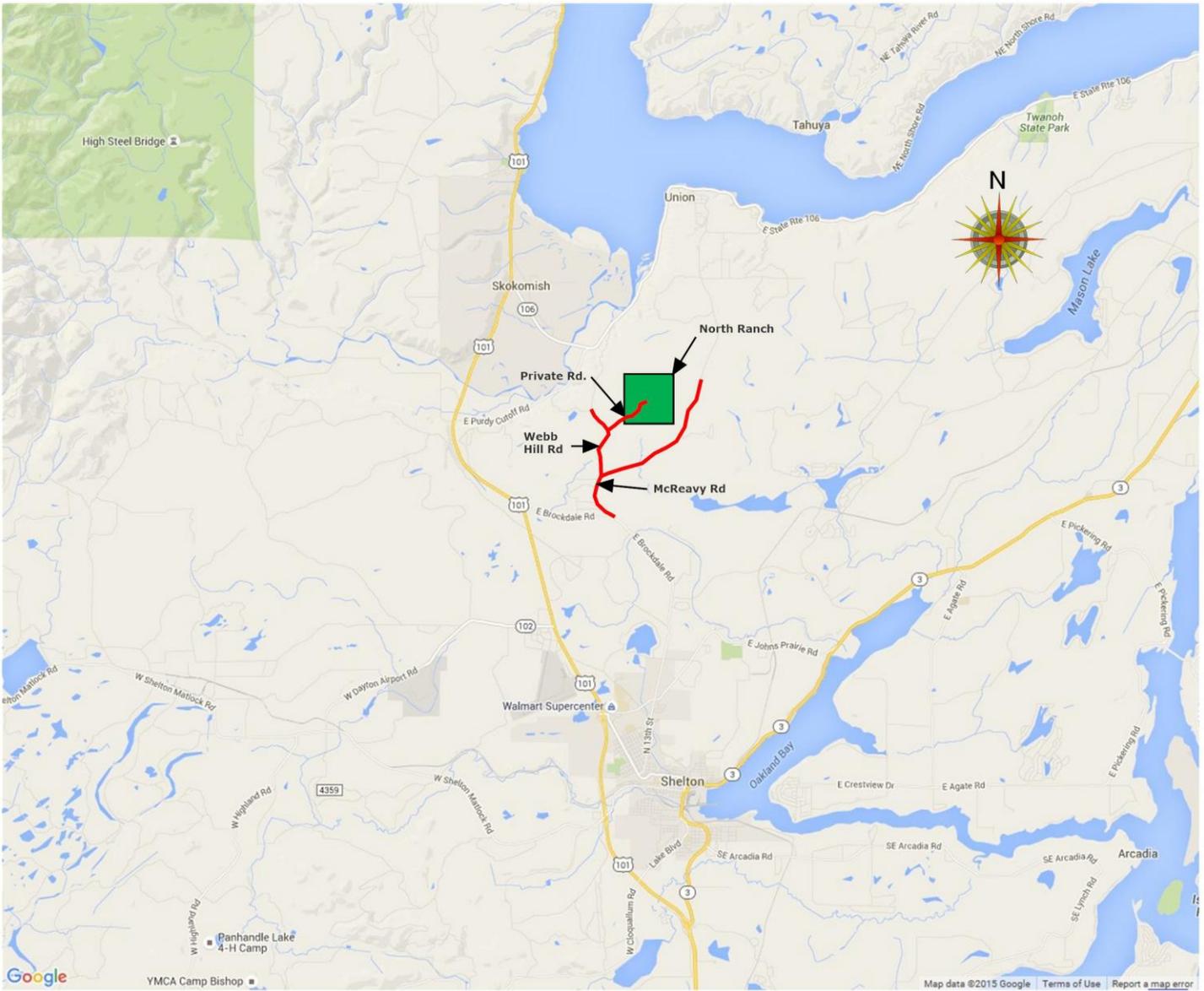


LEGEND

	Main Road		125 ac. Land use area
	Field Road		25 ac. future additional area
	Seasonal Stream		Treatment station location
Scale 1" = 1000'			Seasonal ponds
			Buffer zones

Appendix 2 – Maps

Appendix 2a – Vicinity Map



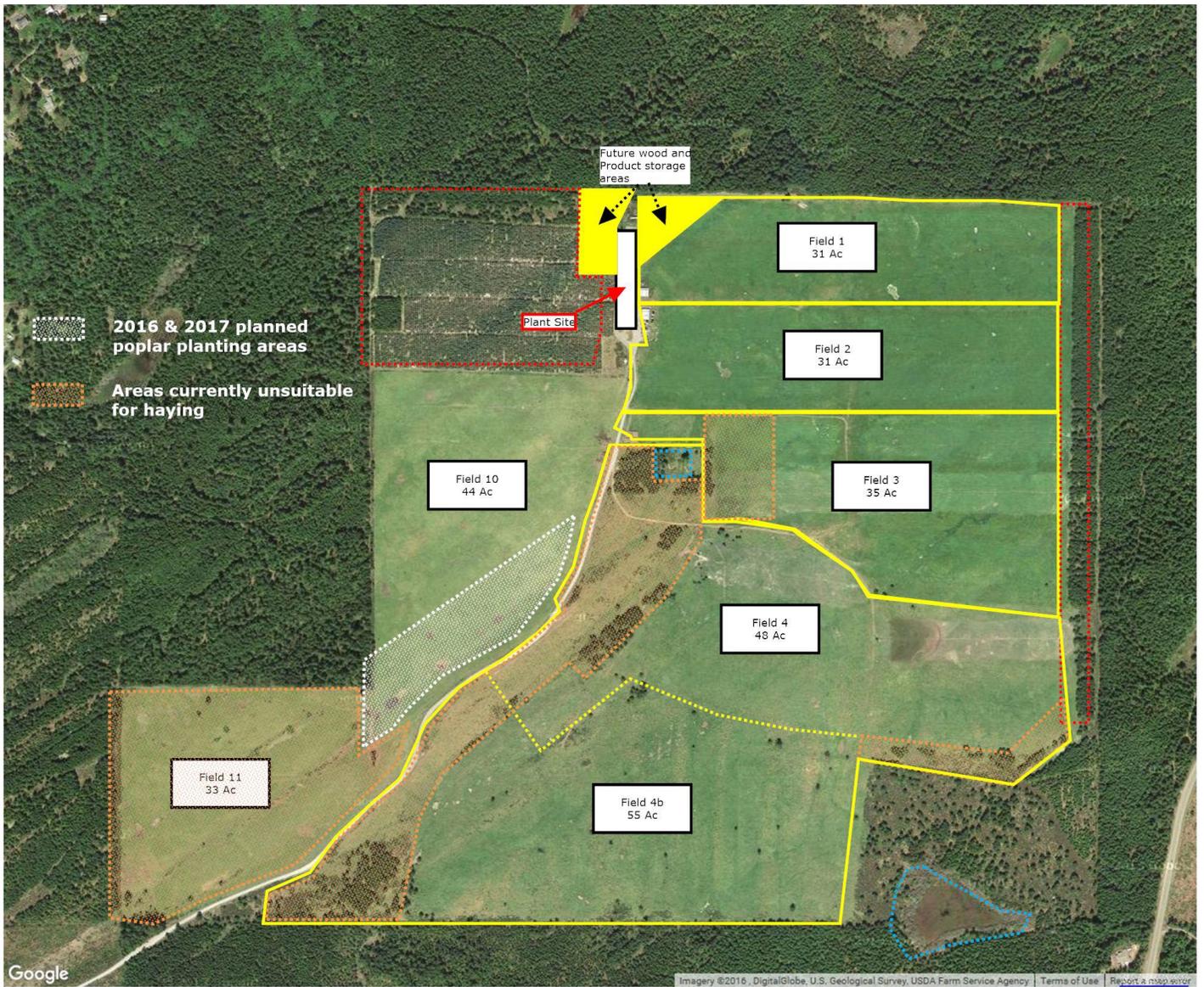
Appendix 2b – Site Plan Map



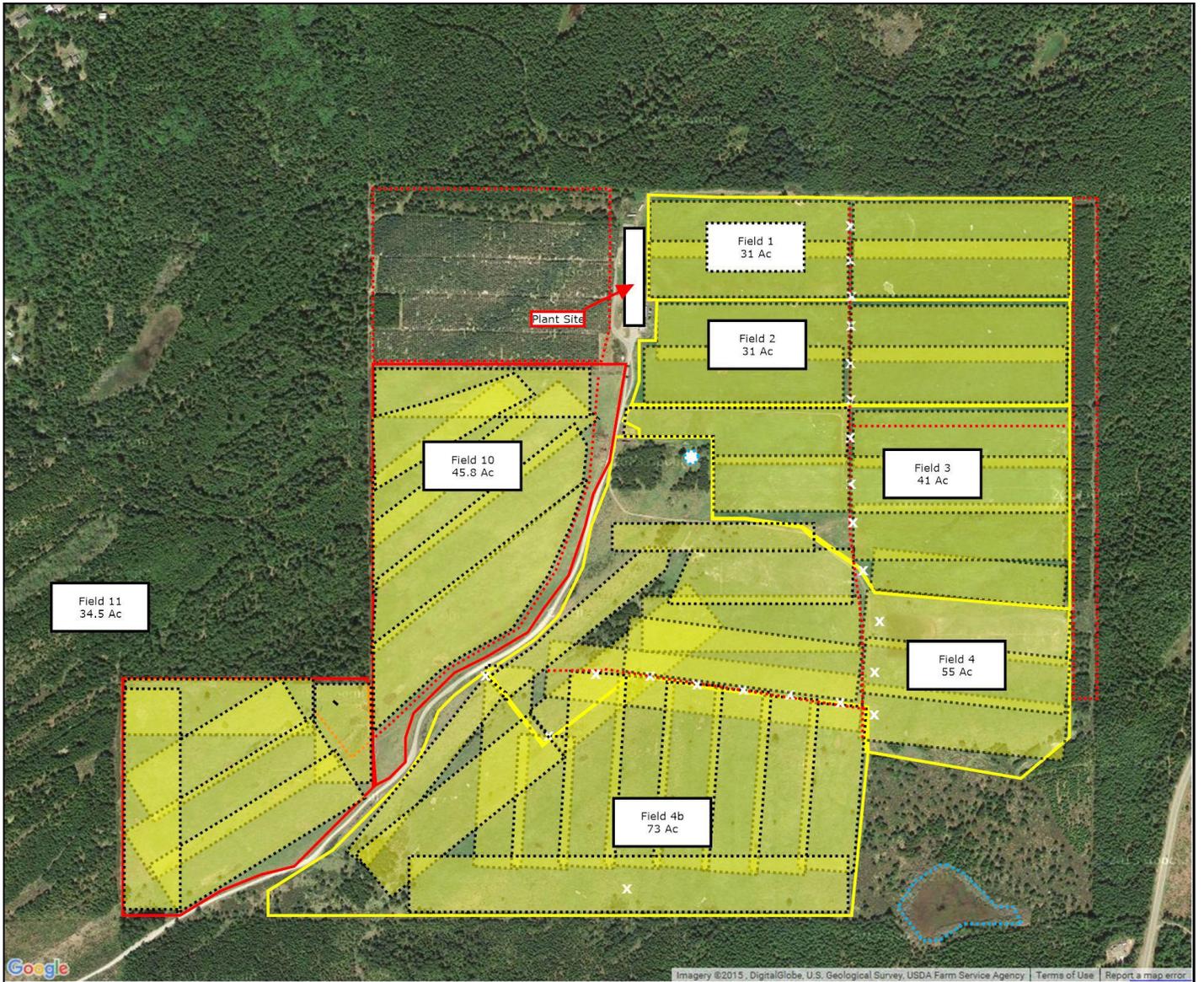
Appendix 2b1 – Topography Map



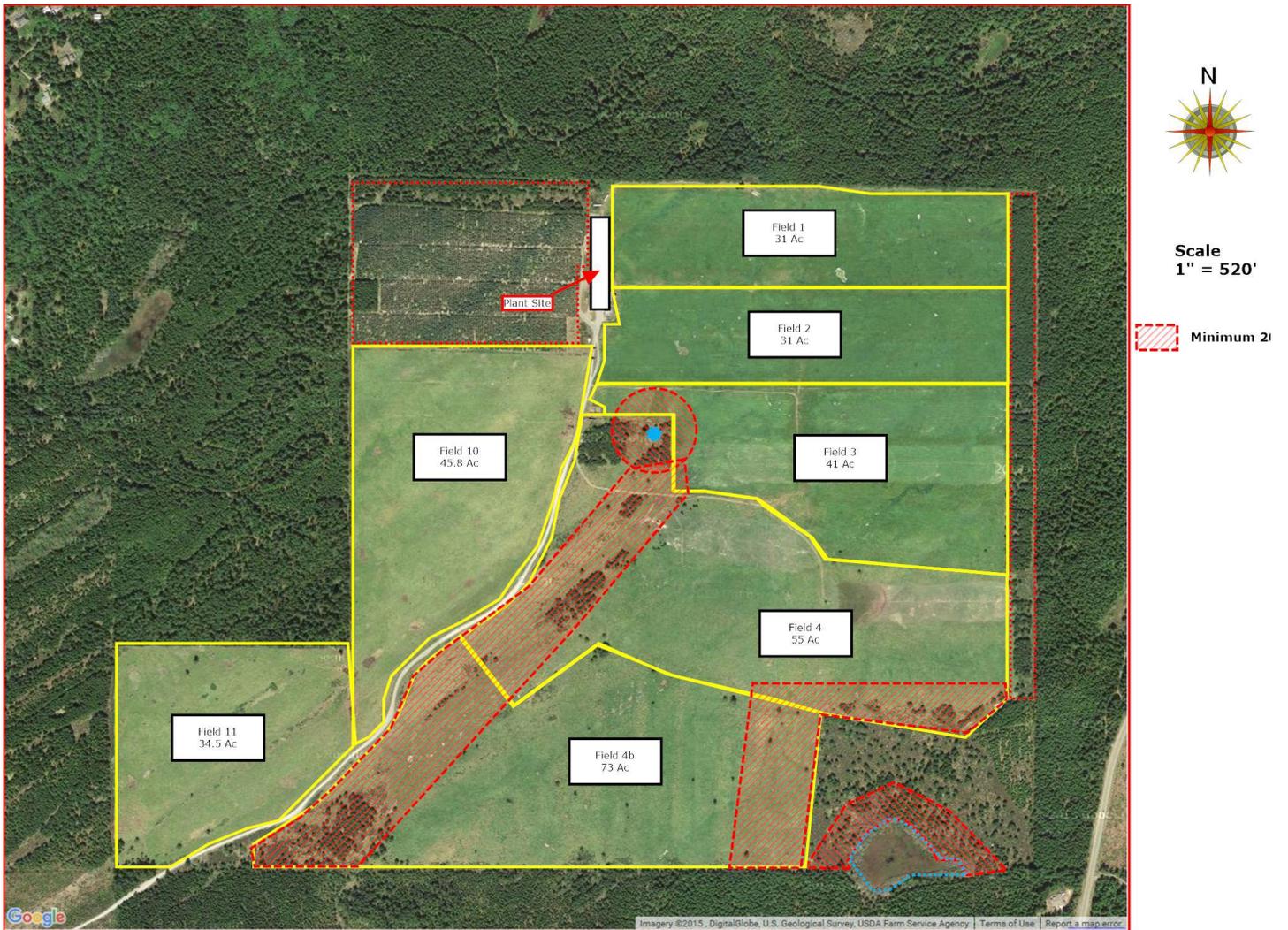
Appendix 2c – Field Map



Appendix 2c1 – Field Application Runs Map



Appendix 2c2 – Buffers Map

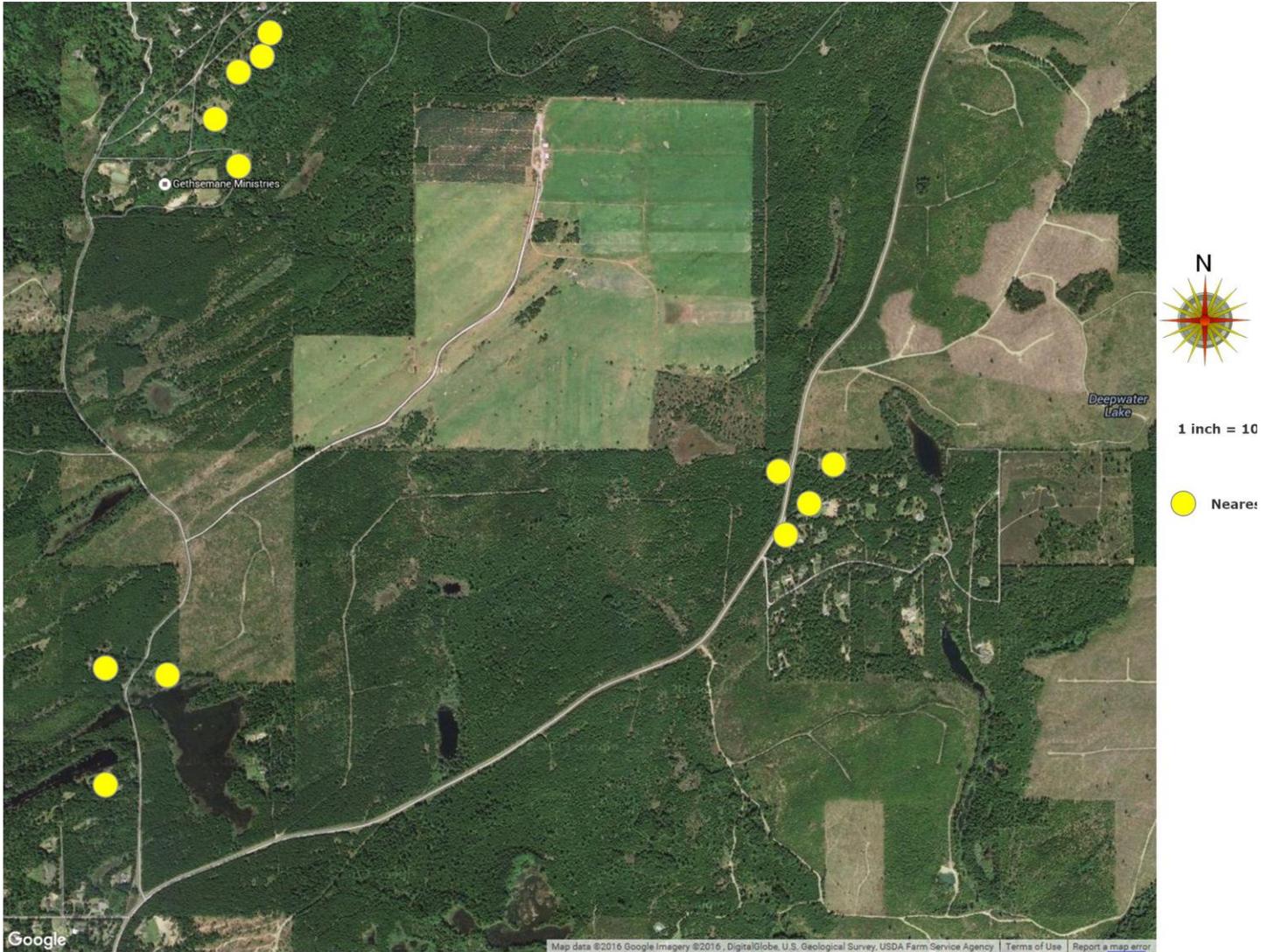


————— Current Field Boundaries

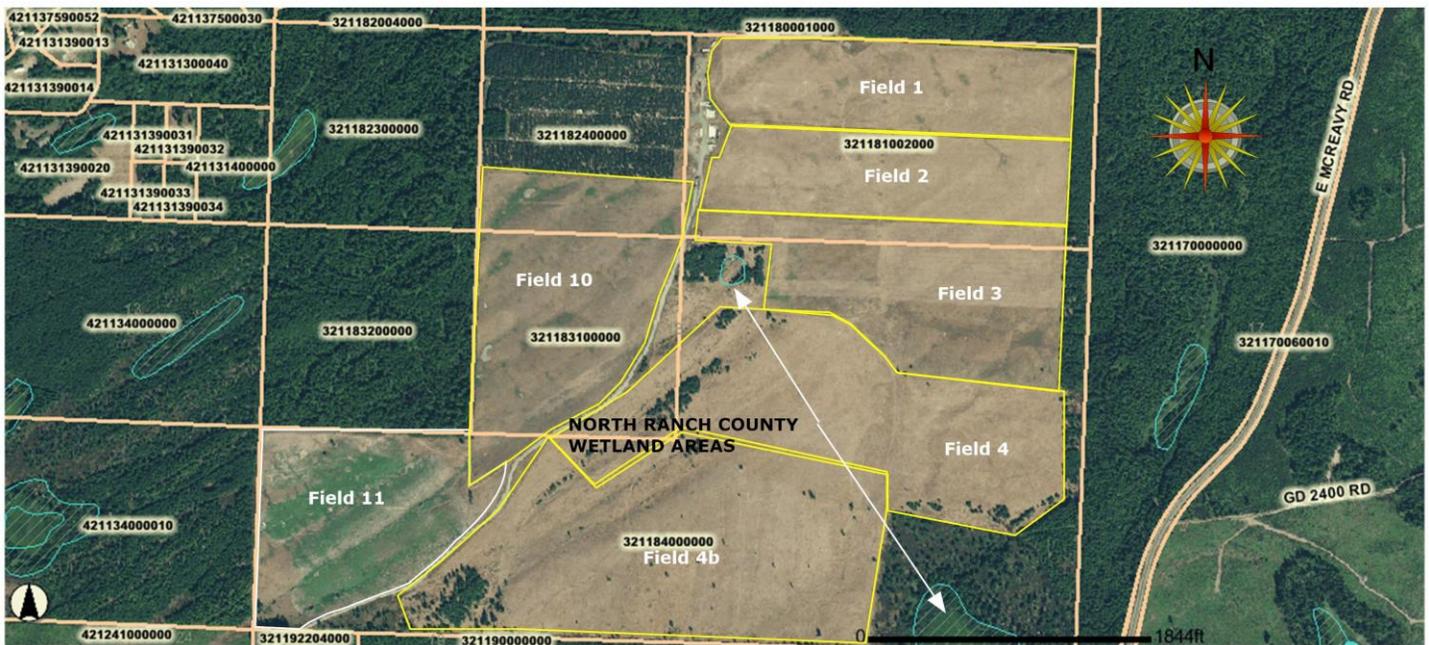
- - - - - Future Field Boundaries

- Wetland Areas

Appendix 2d – Residences Map



Appendix 2e – Mason County Wetlands Map



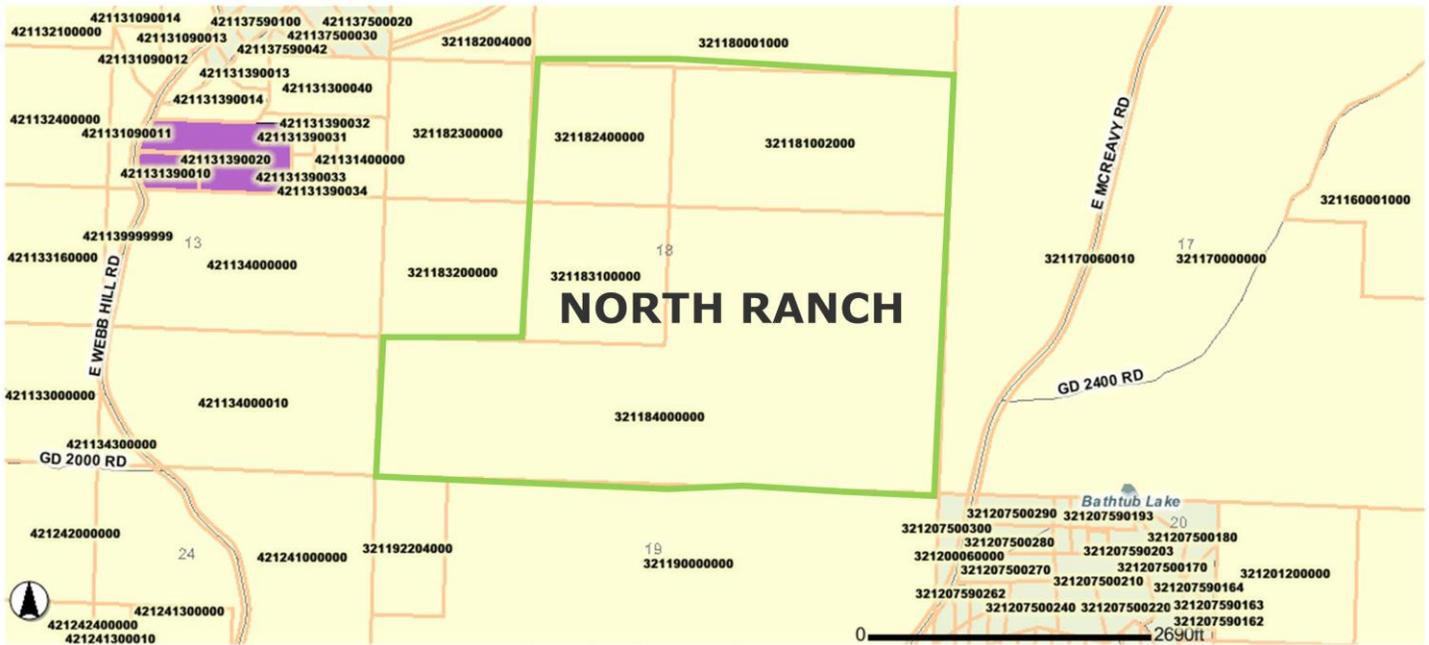
Appendix 2f – Well logs within one quarter mile

Wells Within 1/4 Mile of Application Areas at the North Ranch Biosolids Facility

Ecology Well Log ID	Ecology Well Tag Number	Notice of Intent ID	Well Depth (ft)	Well Diameter (inches)	Well Owner Name	Township	Range	Direction	Section	Quarter Section	Quarter-Quarter Section	Well Completion Date	County Name	Well Type	Well Log Receiveal Date at Ecology	Tax Parcel	State Plane X Coordinate	State Plane Y Coordinate
427895	ALL316	W192382	300	6	Carlstrom Construction	21	3	W	20	NW	NW	11/4/2005	Mason	Water	12/15/2005	321207500300	995890	727797
251275	AFE643	W124738	197	6	Bio Recycling, WS-2	21	3	W	18	NW	SE	4/18/2000	Mason	Water	5/1/2000		992859	731673
917976	AFE643	WE17779	260	6	Bio Recycling, WS-2 (deepened)	21	3	W	18	NW	SE	2/14/2014	Mason	Water	3/31/2014		992859	731673
498068	APS444	R070269	125	2	Bio Recycling, MW-1	21	3	W	18	SE	NW	4/26/2007	Mason	Resource Protection	10/15/2007		993069	730844
569884	APS446	R070269	168	2	Bio Recycling, MW-2	21	3	W	18	SW	NW	5/3/2007	Mason	Resource Protection	12/4/2008		991371	731148
498066	APS443	R070269	185	2	Bio Recycling, MW-3	21	3	W	18	NE	SW	4/24/2007	Mason	Resource Protection	10/15/2007		992946	732495
498132	APS445	R070269	97	2	Bio Recycling, MW-4	21	3	W	18	SE	SE	4/30/2007	Mason	Resource Protection	10/15/2007		994200	729408
513471	BAL059	R072444	166	2	Bio Recycling, MW-5	21	3	W	18	SW	SW	12/4/2007	Mason	Resource Protection	1/16/2008		990367	728694
			145	2	Bio Recycling, MW-6	21	3	W	18	SW	SE	5/28/2008	Mason	Resource Protection			992589	728588
			171	2	Bio Recycling, MW-7	21	3	W	18	SW	SW	5/30/2008	Mason	Resource Protection			991229	729866
	BHN905		131	2	Bio Recycling, MW-8	21	3	W	24	NE	NE	5/22/2013	Mason	Resource Protection			988691.8	727648.4
	BHN906		161	2	Bio Recycling, MW-9	21	3	W	24	NE	SE	5/30/2013	Mason	Resource Protection			989621.4	727246.2

Notes:
Wells listed are from the Washington State Well Log Viewer website or are facility monitoring wells known to be within a quarter mile of biosolid application areas.
All Bio Recycling wells have surveyed coordinates listed.

Appendix 2g – Zoning Map





Custom Soil Resource
Report for

Mason County, Washington



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<http://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information. The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

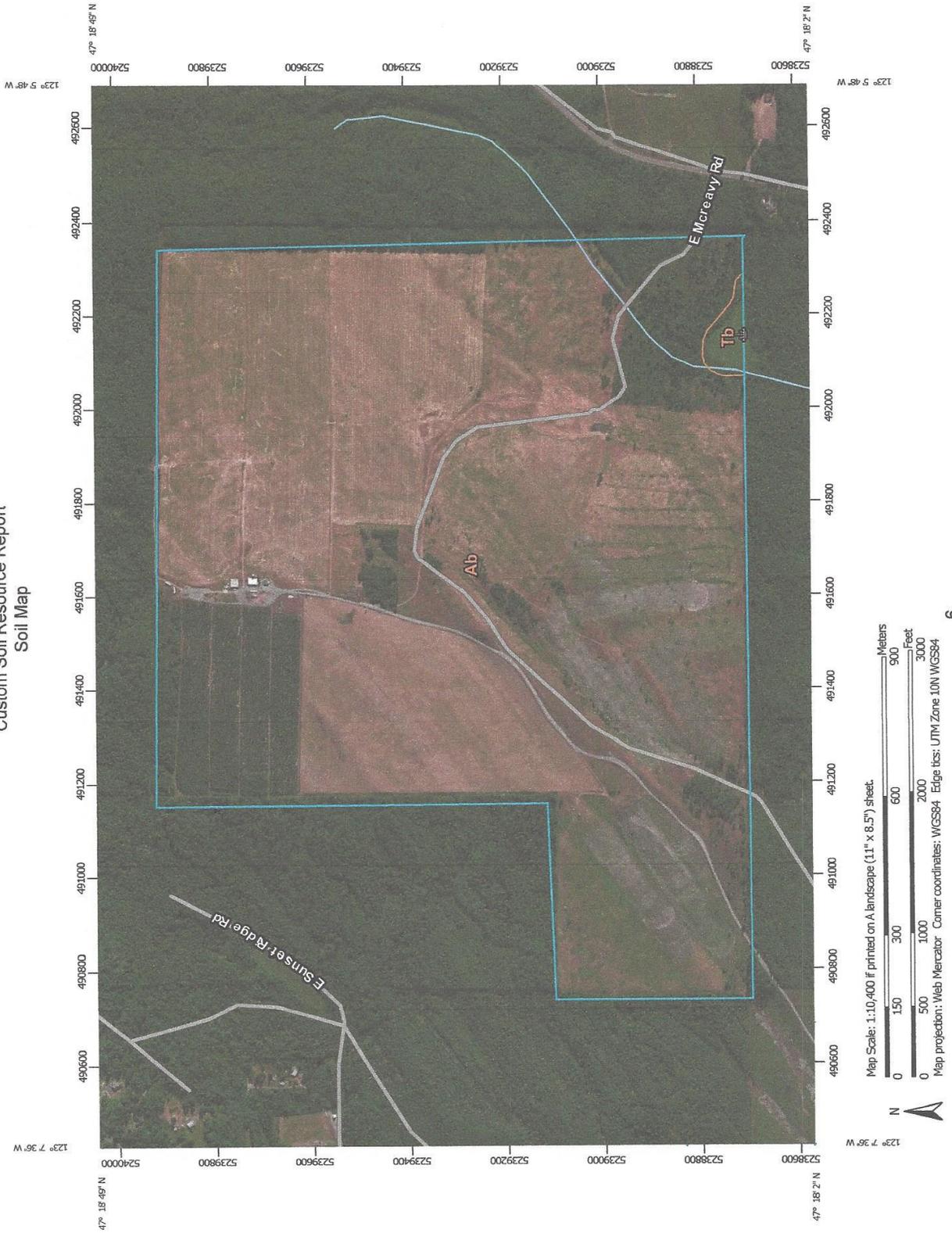
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Map Unit Descriptions.....	8
Mason County, Washington.....	10
Ab—Alderwood gravelly sandy loam, 8 to 15 percent slopes.....	10
Tb—Tanwax peat, 0 to 2 percent slopes.....	11

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:31,700.

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 map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Mason County, Washington
 Survey Area Data: Version 11, Sep 15, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Data not available.

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)	 Spoil Area
 Soils	 Stony Spot
 Soil Map Unit Polygons	 Very Stony Spot
 Soil Map Unit Lines	 Wet Spot
 Soil Map Unit Points	 Other
 Special Point Features	 Special Line Features
 Blowout	 Water Features
 Borrow Pit	 Streams and Canals
 Clay Spot	 Transportation
 Closed Depression	 Rails
 Gravel Pit	 Interstate Highways
 Gravelly Spot	 US Routes
 Landfill	 Major Roads
 Lava Flow	 Local Roads
 Marsh or swamp	 Background
 Mine or Quarry	 Aerial Photography
 Miscellaneous Water	
 Perennial Water	
 Rock Outcrop	
 Saline Spot	
 Sandy Spot	
 Severely Eroded Spot	
 Sinkhole	
 Slide or Slip	
 Sodic Spot	

Map Unit Legend

Mason County, Washington (WA645)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ab	Alderwood gravelly sandy loam, 8 to 15 percent slopes	400.8	99.3%
Tb	Tanwax peat, 0 to 2 percent slopes	2.9	0.7%
Totals for Area of Interest		403.7	100.0%

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 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

Custom Soil Resource Report

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.

Mason County, Washington

Ab—Alderwood gravelly sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2t626
Elevation: 50 to 800 feet
Mean annual precipitation: 20 to 60 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 160 to 240 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Alderwood and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alderwood

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Nose slope, talf
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Glacial drift and/or glacial outwash over dense glaciomarine deposits

Typical profile

A - 0 to 7 inches: gravelly sandy loam
Bw1 - 7 to 21 inches: very gravelly sandy loam
Bw2 - 21 to 30 inches: very gravelly sandy loam
Bg - 30 to 35 inches: very gravelly sandy loam
2Cd1 - 35 to 43 inches: very gravelly sandy loam
2Cd2 - 43 to 59 inches: very gravelly sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: B
Other vegetative classification: Limited Depth Soils (G002XS301WA), Limited Depth Soils (G002XF303WA), Limited Depth Soils (G002XN302WA)

Minor Components

Everett

Percent of map unit: 5 percent
Landform: Eskers, kames, moraines
Landform position (two-dimensional): Shoulder, footslope
Landform position (three-dimensional): Crest, base slope
Down-slope shape: Convex
Across-slope shape: Convex

Indianola

Percent of map unit: 5 percent
Landform: Kames, terraces, eskers
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Shalcar

Percent of map unit: 3 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave

Norma

Percent of map unit: 2 percent
Landform: Drainageways, depressions
Landform position (three-dimensional): Dip
Down-slope shape: Linear, concave
Across-slope shape: Concave

Tb—Tanwax peat, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2nhh
Elevation: 300 to 1,000 feet
Mean annual precipitation: 30 to 70 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Tanwax and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tanwax

Setting

Landform: Tidal flats
Parent material: Organic material

Custom Soil Resource Report

Typical profile

H1 - 0 to 12 inches: peat

H2 - 12 to 60 inches: coprogenous material

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Very poorly drained

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

Depth to water table: About 0 inches

Frequency of flooding: None

Frequency of ponding: Frequent

Available water storage in profile: Very high (about 16.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 5w

Hydrologic Soil Group: C/D

Other vegetative classification: Wet Soils (G002XF103WA)

Appendix 4 – Soil Sampling Plan

The following soil test procedure will be used by Bio Recycling:

1. Every year in September or October, depending upon seasonal temperatures and precipitation, soil samples will be collected from all fields. Samples will be collected at least 30 days after the last biosolids application. Parameters include Total N, Ammonia N, Nitrate N, Organic matter, pH, zinc, phosphorus, potassium, boron, calcium, magnesium and sulfur. [still need to further review this list]
2. Sample collection will consist of collecting 15 soil samples per representative field, each to a depth of 24 inches producing two samples, the top foot and the lower foot. Sample pattern and pit locations should remain consistent from year to year.
3. The samples will be taken from the face of a fresh backhoe pit below a surface free of anomalous constituents [thinking: materials capable of influencing the results (recent manure or deer scat)], and into a pit face cleaned back 2 inches prior to sampling. At each pit a minimum of a half-gallon of soil material will be collected from each foot increment, excluding cobble (3-12") and rock (>12"). Pit faces dominated by unrepresentative material: rock, cobble, wood, or charcoal, should be avoided. Pits with unrepresentative soil profiles [previous pits, filled areas] should not be sampled.
4. Collected soil material (approximately a half gallon per foot increment) is then to be sorted at the pit over a No. 4 screen. Obvious wood and charcoal, identifiable plastic, glass, and metal foreign objects, surface organic (grass and leaf) litter, and live root masses are removed, soil aggregates are pushed through.
5. Remaining soil material is then reduced to a 1 cup subsample from each pit/foot sample location and is retained for combining into the two individual samples representing the field. It is important that this volume not vary from pit to pit.
6. Each batch (about 1 gallon each) of retained soils is mixed thoroughly in a large container, and a 4 cup (1 quart) portion selected for submission to the lab.
7. All samples will be placed on ice in an ice chest for transport to the lab.
8. The lab will use analytical procedures recommended by Washington State University Extension.

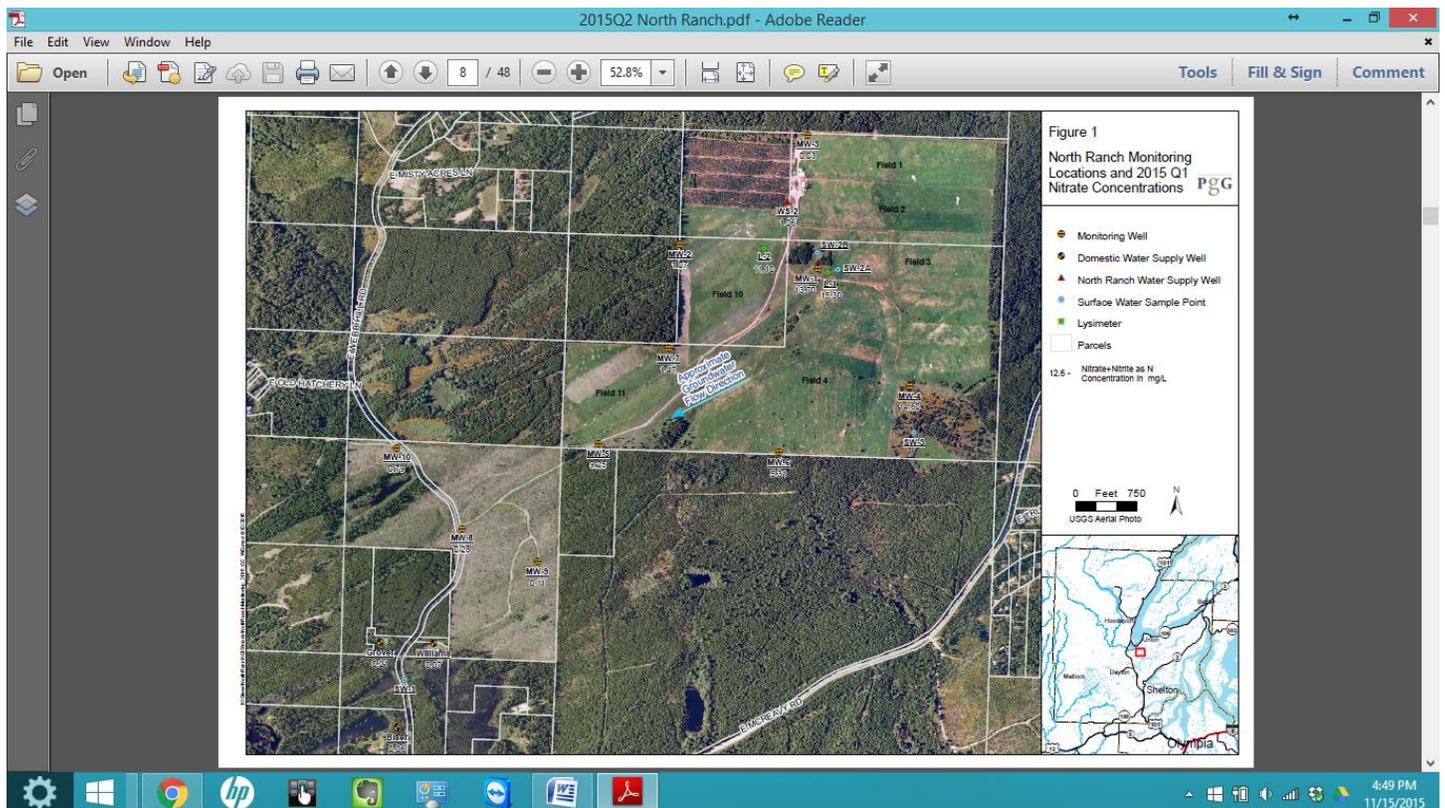
Appendix 5 – Water Monitoring Plan

North Ranch Groundwater Quality Monitoring

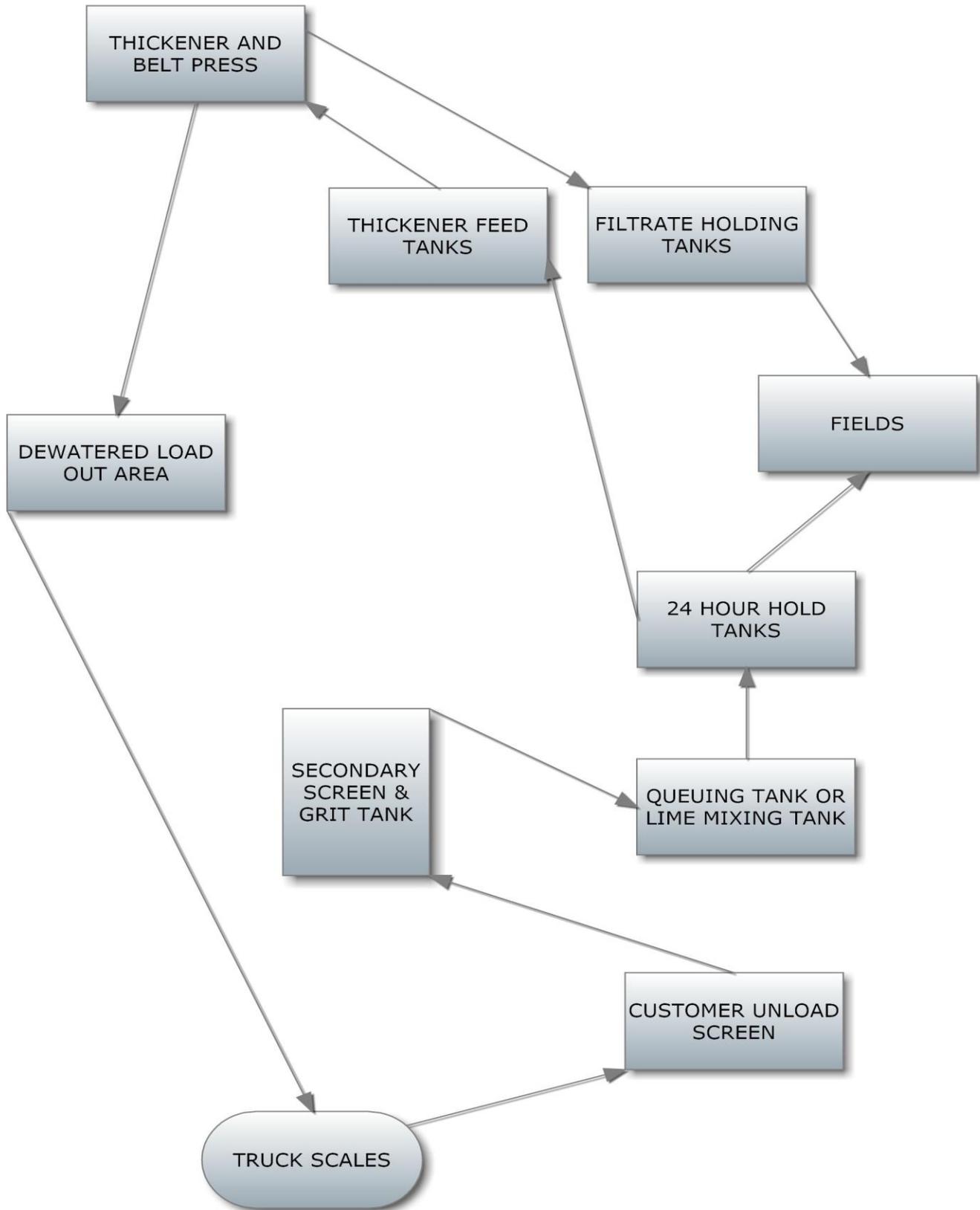
Bio Recycling will continue the current program of sampling ten wells and two lysimeters. The down gradient wells are sampled and analyzed quarterly for temperature, pH, specific conductance, fecal coliform, nitrate, alkalinity and chloride. The up-gradient wells are sampled annually and analyzed for the same constituents.

Surface Water Quality Monitoring

Bio Recycling will continue the current program of sampling four surface water sampling locations at the North Ranch site. These surface waters will be sampled and analyzed quarterly if water is present for temperature, pH, specific conductance, fecal coliform, nitrate, ammonia, alkalinity and chloride.



Appendix 6 – North Ranch Schematic



Appendix 7 – Record Keeping Samples



Date	Customer Deliveries	Class B Cake Removed	Class A Cake Removed	Septage Applied per Field				Filtrate Applied per Field				Month Septage total	Month Filtrate total	Total		
				Field 1	Field 5	Field 6	Field 24	Field 78	Field 1	Field 5	Field 6				Field 24	Field 78
Wednesday, Dec 31, 2014	0															
Thursday, January 1, 2015	0															
Friday, January 2, 2015	50925		0	21.24	0	40940	0	0	0	0	0	0	0	0	0	40940
Saturday, January 3, 2015																
Sunday, January 4, 2015																
Monday, January 5, 2015																
Tuesday, January 6, 2015																
Wednesday, January 7, 2015																
Thursday, January 8, 2015																
Friday, January 9, 2015																
Saturday, January 10, 2015																
Sunday, January 11, 2015																
Monday, January 12, 2015																
Tuesday, January 13, 2015																
Wednesday, January 14, 2015																
Thursday, January 15, 2015																
Friday, January 16, 2015																
Saturday, January 17, 2015																
Sunday, January 18, 2015																
Monday, January 19, 2015																
Tuesday, January 20, 2015																
Wednesday, January 21, 2015																
Thursday, January 22, 2015																
Friday, January 23, 2015																
Saturday, January 24, 2015																
Sunday, January 25, 2015																
Monday, January 26, 2015																
Tuesday, January 27, 2015																



SAMPLE OF OUR COMPUTERIZED RECORDS

Kalberg Farm

Septage/Filtrate Blend	Field	Acres	Total Year		%TS - avg.	dry tons	dl/l	NH4 lb/yr	TKN lb/yr	Gross application rate before losses		Org N/lac Mineritize @ 40.00%	NH4/lac Retain @ 55.00%	Septage + Filtrate PAN lbs. per acre	
			gallons	gal/lac						NH4 lb/lac	TKN lb/lac by source				
Septage Only	1	61.4	1,921,369	29,664	1.44%	109	1.78	1,982	7,333	32	119	35	18	112	
	5														
	6														
	24														
	78														
	Total														
	Total Yr			501,380	10,028	2.02%	42	0.85	572	2803	11	56	18	6	
Filtrate	1	61.4										40%	55%		
	5	50													
	6	36.4													
	24	65													
	78	27													
	Total	240													
	Total Yr														
Total			819,460	12,807				822	1,637	13	25	5	7		
Total		240													

Appendix 8 – Application Loading Worksheet

FILTRATE

NOTE: This is adapted from Pacific Northwest Extension publication number, PNW0511e.

Enter information in these cells as applicable

You must enter information in these cells to determine an application rate

Cells of this color are calculations for your use

GENERAL INFORMATION

Biosolids Source		
Field Number/ID	N. Ranch	
2016 Planned biosolids Application	1,950,000	Gallons
Acres available	48	acres

BIOSOLIDS DATA

Ammonia/ammonium-N	141	mg/l	1,179	lbs/million gal
Nitrate-N		mg/l		lbs/million gal
Total Kjeldahl N	333	mg/l	2,777	lbs/million gal
Organic nitrogen	71	mg/l	590	lbs/million gal

NITROGEN (N) CREDITS

PREVIOUS BIOSOLIDS APPLICATIONS	2015	2014	2013	2012
Pounds filtrate applied/acre to site	434,431	134,824		
Organic N concentration (mg/l)	140	202		
N credit (#/acre)	5	1		

OTHER CREDITS NOT ACCOUNTED FOR

Nitrate-N applied in irrigation water		#/acre
N applied at seeding (starter fertilizer)		#/acre
Preplant nitrate-N in root zone (east of Cascades)		#/acre
Plowdown of cover or green manure crop		#/acre
Previous manure applications		#/acre
Total N credit	6	#/acre

NITROGEN FERTILIZER RECOMMENDATION

Nitrogen recommendation (via guidelines, agronomist, etc.)	60	# N/acre/yr
--	----	-------------

ESTIMATED BIOSOLIDS PLANT-AVAILABLE NITROGEN

Percent of ammonium-N retained after application (see Table 1)	55%	
Percent of organic N mineralized in Year 1 (see Table 2)	60%	
Estimated plant-available N in biosolids	1,003	# N/million gal
Amount of plant-available N needed from biosolids	41	# N/acre
Biosolids needed per acre	40,556	Gallons

AGRONOMIC BIOSOLIDS APPLICATION RATE

Planned Gallons per acre =	40,625.00	gal/ac
Wet tons per acre =	169.3	wt/acre
Cubic yards per acre =	201.4	yd ³ /acre
Cubic feet per acre =	5,438.7	ft ³ /acre
Gallons per acre =	40,625.0	gallons/acre
Acre-inches per acre	1.50	acre-inches/acre

ACREAGE NEEDED

Acres needed	48.1	acres
Planned application area	48	acres
Planned application rate (% of agronomic rate)	100.17%	

SEPTAGE

NOTE: This is adapted from Pacific Northwest Extension publication number, PNW0511e.

Enter information in these cells as applicable

You must enter information in these cells to determine an application rate

Cells of this color are calculations for your use

GENERAL INFORMATION

Biosolids Source		
Field Number/ID	N. Ranch	
Dry tons biosolids available (= wet tons x % solids)		dry tons
Acres available	48	acres

BIOSOLIDS DATA

Ammonia/ammonium-N	9,128	mg/kg	18	#/dry ton
Nitrate-N		mg/kg		#/dry ton
Total Kjeldahl N	34,358	mg/kg	69	#/dry ton
Percent solids	3.00%			
Organic nitrogen	25,230	mg/kg	50	#/dry ton

NITROGEN (N) CREDITS

PREVIOUS BIOSOLIDS APPLICATIONS	2015	2014	2013	2012
Dry tons applied/acre to site	0.1	4.4	7.1	6.6
Organic N concentration (mg/kg)	24,855	26,541	24,220	21,307
N credit (#/dry ton)	3.98	1.59	0.48	0.43
N credit (#/acre)	0	7	3	3

OTHER CREDITS NOT ACCOUNTED FOR

Nitrate-N applied in irrigation water		#/acre
N applied at seeding (starter fertilizer)		#/acre
Preplant nitrate-N in root zone (east of Cascades)		#/acre
Plowdown of cover or green manure crop		#/acre
Previous manure applications		#/acre

Total N credit	14	#/acre
----------------	----	--------

NITROGEN FERTILIZER RECOMMENDATION

Nitrogen recommendation (via guidelines, agronomist, etc.)	60	# N/acre/yr
--	----	-------------

ESTIMATED BIOSOLIDS PLANT-AVAILABLE NITROGEN

Percent of ammonium-N retained after application (see Table 1)	55%	
Percent of organic N mineralized in Year 1 (see Table 2)	40%	
Estimated plant-available N in biosolids	30	# N/dry ton
Amount of plant-available N needed from biosolids	41	# N/acre

AGRONOMIC BIOSOLIDS APPLICATION RATE

Dry tons per acre =	1.3	dt/acre
Wet tons per acre =	44.8	wt/acre
Cubic yards per acre =	53.4	yd ³ /acre
Cubic feet per acre =	1,440.8	ft ³ /acre
Gallons per acre =	10,777.7	gallons/acre
Acre-inches per acre	0.40	acre-inches/acre

ACREAGE NEEDED

Acres needed		acres
--------------	--	-------

Planned application area _____ acres

Planned application rate (% of agronomic rate) #DIV/0!

Appendix 9a – Soil Samples 2007-2013

Data

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008*	2009	2010	2011	2012	2013
NO3-N (I)	16.8	40.3	31.9	34.6	12.9	11.7	32.9	50.0	16.7	35.7	35.6	25.0	28.8	14.4	26.2
NO3-N (II)	2.6	11.2	12.5	3.3	2.5	15.1	3.1	3.9	4.7	23.6	8.6	13.9	2.6	2.8	11.9
NH4-N									7.7	17.7	16.6	3.6	5.3	7.6	4.5
S		12.4	5.9	3.8	7.3	6.6	11.8	16.6	1.8	2.8	1.8	22.3	20.1	9.0	15.8
OM	10.4	10.5	9.9	8.1	8.2	9.4	11.4	9.9	8.8	13.4	13.8	8.1	12.6	13.1	13.7
pH (I)	6.0	6.2	6.1	6.3	6.6	6.8	6.7	6.2	6.1	6.8	7.1	7.3	6.7	7.0	6.9
pH (II)	5.6	5.4	5.7	6.2	6.3	5.9	6.5	5.9	5.6	6.3	6.7	7.1	6.8	7.0	6.6
Sol. Salts									0.43	0.48	0.60	0.41	0.53	0.49	0.52
P	103	161	53	49	150	111	69	58	58	85	111	118	126	75.9	117.9
K	45	71	85	100	67	81	133	121	86	149	180	100	127	198.7	94.0
Ca			8.62	6.72	10.09	13.10	20.16	14.04	18.63	27.35	32.73	17.89	25.81	29.1	27.5
Mg			0.36	0.37	0.32	0.59	1.00	0.44	0.61	0.69	0.99	0.54	0.86	0.6	0.7
Na													0.18	0.2	0.2
B		0.2	0.5	0.2	0.2	0.6	0.7	0.5	0.2	0.5	0.5	0.3	0.7	0.6	0.7
Zn									12.3	27.4	35.4	24.4	36.9	33.1	39.4

*2008 was single pit sampling. Fields 10 and 11 excluded from averages – soil levels too low to be representative.

NO3-N	in progress															
1-1	3.2									65.5	44.2	38.7	24.8	23.9	12.9	19.8
1-2	3.2									18.0	22.6	5.4	11.6	1.4	1.8	8.6
2-1	25									3.2	16.9	46	10.7	39.4	17.1	22.5
2-2	3.1									2.1	42.3	7.1	21.8	1.7	3.1	15
3-1										18.4	56.8	49.9	32.6	26.2	9.2	73.4
3-2										3.8	40.5	12.8	16.8	1	2.2	29.1
4-1										16.1	49	27	34.3	42.2	19.2	32.8
4-2										2.8	8.7	6.8	20.4	5.4	1.9	13.9
4B-1										1.4	11.5	20.5	35	12.9	12.4	9.8
4B-2										0.9	4.1	8	9.1	0.7	1.7	7.1
10-1										9.4	1.8	37.2	25	45.8	25.6	15.2
10-2										3.4	1	12.4	12.8	6.8	7.2	7.3
11-1										3	1.2	29.6	12.5	11	4.1	10.1
11-2										1.9	6.3	7.6	5.1	0.9	1.9	2.6
OM	in progress															
1-1										10	11	16	8	12	14	14
2-1										8	11	15	3	13	12	14
3-1										9	18	15	11	15	14	16
4-1										11	19	14	10	14	13	16
4B-1										5	7	12	7	10	10	11
10-1										8	8	14	9	13	14	13
11-1										10	8	11	8	11	15	12
pH (I)	in progress															
1-1																
2-1																

Data

3-1
4-1
4B-1
10-1
11-1

pH (II)

1-1
2-1
3-1
4-1
4B-1
10-1
11-1

in progress

1-1
2-1
3-1
4-1
4B-1
10-1
11-1

in progress

116	106	117	150	141	76.8	123
54	44	88	30	114	86.3	84.3
60	113	120	156	131	91.9	150
68	109	118	164	156	82.3	147
27	55	106	122	155	50.3	92.5
31	23	140	138	122	83.5	155
51	26	85	69	62.6	60.0	73.3

K

1-1
2-1
3-1
4-1
4B-1
10-1
11-1

in progress

117	111	185	87	129	172	109
87	119	170	63	102	183	89.4
88	171	198	102	109	145	165
66	173	166	162	154	251	117
72	173	175	89	111	238	55.5
94	87	190	100	155	228	57.8
75	76	175	100	132	174	64.5

Data

Trend	2008-cores
UP	97.3
UP	No Data
DOWN	85.1
UP	17.1
UP	25.8
DOWN	7.0
DOWN	No Data
UP	0.8
UP	180.9
DOWN	315.4
DOWN	53.2
UP	1.5
UP	
UP	0.9
UP	123.7
UP	163.4
UP	22.6
UP	167.0
UP	42.3
UP	98.3
UP	40.5
UP	62.5
UP	8.7
DOWN	11.9
UP	4.1
DOWN	121.2
UP	1.0
UP	56.8
UP	6.3
LEVEL	2008 cores
UP	31
UP	30
UP	26
UP	23
UP	15
DOWN	26
DOWN	31

Data



UP
DOWN
UP
UP
UP
UP
UP

DOWN
DOWN
UP
DOWN
DOWN
DOWN
DOWN

Appendix 9b – Soil Samples 2014



3019 G. S. Center Rd.
Wenatchee, WA 98801
(509) 662-1888
Fax: (509) 662-8183
1-800-545-4206

1008 W. Ahtanum Rd.
Union Gap, WA 98903
(509) 452-7707
Fax: (509) 452-7773

Batch: 413885
Grower: Land Profile
Account: 03371
Sampler: Phil Small
PO Number:

--- SOIL ANALYSIS RESULTS ---

Land Profile Inc.
Phil Small
PO Box 2175
Spokane, WA 99210

Report Date: 10/ 7/14
Date Received: 9/26/14
Date Sampled: 9/24/14

Lab Number: 14-S025388

Sample Id: 01-NR-01
Sample Comment: Biorecycling

Test Requested	ppm	meq/100g	%TEB	Relative Level	Optimum Range
Potassium	149.	0.382	1.13	Optimum	120-200
Calcium	6490	32.4	96.1	Excess	600 - 4000
Magnesium	86.0	0.707	2.10	Below Optimum	90 - 480
Sodium	55.1	0.240	0.71		
Sum of Exchangeable Bases		33.7		Ca/Mg Ratio 46.	

Test Requested	Results	Relative Level	Optimum Range
pH	7.0	Optimum	6.0-7.0
Lime Req	0.0 Tons/A		
Soluble Salts	1.1 mmho/cm	Above Optimum	<1.0
Phos Bray	165. ppm		8-20
Boron	0.78 ppm	Optimum	0.5-1.0
Sulfate - S	17. ppm	Above Optimum	6-20
Organic Matter	16. %	Excess	0.8-2
Estimated Nitrogen Release	480 lbs		
Nitrate	90.4 ppm	Excess	5-15
Ammonium-N	2.0 ppm		
Zinc	61.2 ppm	Excess	1-10

Please keep results in your reference files. Test every other year.

Approved By:

Calcium & Magnesium Ratio: Heavy (Clay) 10:1, Medium (loam) 5:1, Light (sandy) 2:1 The relative levels and optimum ranges are suggestions that have been established for tree fruits. Please consult your fieldstaff or county extension agent before using the guidelines for fertilizer application.

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 1-800-545-4206
 1008 W. Ahtanum Rd.
 Union Gap, WA 98903
 (509) 452-7707
 Fax: (509) 452-7773

Batch: 413885
 Grower: Land Profile
 Account: 03371
 Sampler: Phil Small
 PO Number:

--- SOIL ANALYSIS RESULTS ---

Land Profile Inc.
 Phil Small
 PO Box 2175
 Spokane, WA 99210

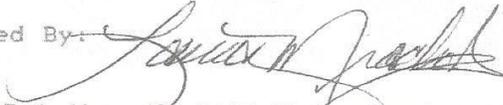
Report Date: 10/ 7/14
 Date Received: 9/26/14
 Date Sampled: 9/24/14

Lab Number: 14-S025389

Sample Id: 02-NR-01
 Sample Comment: Biorecycling

Test Requested	Results	Relative Level	Optimum Range
pH	7.0	Optimum	6.0-7.0
Nitrate	25.4 ppm 102. lbs	Above Optimum	5-15

Please keep results in your reference files. Test every other year.

Approved By: 

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Report Date: 10/ 7/14
 Date Received: 9/26/14
 Date Sampled: 9/24/14

Lab Number: 14-S025390

Sample Id: 01-NR-02
 Sample Comment: Biorecycling

Test Requested	ppm	meq/100g	%TEB	Relative Level	Optimum Range
Potassium	108.	0.277	1.09	Below Optimum	120-200
Calcium	4890	24.4	96.1	Above Optimum	600 - 4000
Magnesium	67.2	0.553	2.18	Below Optimum	90 - 480
Sodium	39.9	0.173	0.68		
Sum of Exchangeable Bases		25.4		Ca/Mg Ratio 44.	

Test Requested	Results	Relative Level	Optimum Range
pH	6.9	Optimum	6.0-7.0
Lime Req	0.0 Tons/A		
Soluble Salts	0.65 mmho/cm	Optimum	<1.0
Phos Bray	84.6 ppm		8-20
Boron	0.49 ppm	Below Optimum	0.5-1.0
Sulfate - S	11. ppm	Optimum	6-20
Organic Matter	13. %	Excess	0.8-2
Estimated Nitrogen Release			
Nitrate	45.9 ppm	Excess	5-15
Ammonium-N	4.9 ppm		
Zinc	32.0 ppm	Excess	1-10

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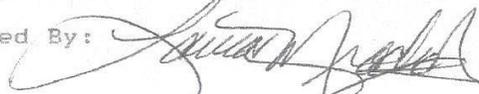
Report Date: 10/ 7/14
 Date Received: 9/26/14
 Date Sampled: 9/24/14

Lab Number: 14-S025391

Sample Id: 01-NR-02
 Sample Comment: Biorecycling

Test Requested	Results	Relative Level	Optimum Range
pH	7.1	Excess	6.0-7.0
Nitrate	3.4 ppm 14. lbs	Below Optimum	5-15

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Report Date: 10/ 7/14
Date Received: 9/26/14
Date Sampled: 9/24/14

Lab Number: 14-S025382

Sample Id: 01-NR-03
Sample Comment: Biorecycling

Test Requested	ppm	meq/100g	%TEB	Relative Level	Optimum Range
Potassium	154.	0.395	1.24	Optimum	120-200
Calcium	6130	30.6	96.0	Excess	600 - 4000
Magnesium	91.3	0.751	2.36	Optimum	90 - 480
Sodium	33.0	0.143	0.45		
Sum of Exchangeable Bases		31.9		Ca/Mg Ratio 41.	

Test Requested	Results	Relative Level	Optimum Range
pH	7.2	Excess	6.0-7.0
Lime Req	0.0 Tons/A		
Soluble Salts	0.62 mmho/cm	Optimum	<1.0
Phos Bray	109. ppm		8-20
Boron	0.64 ppm	Optimum	0.5-1.0
Sulfate - S	13. ppm	Optimum	6-20
Organic Matter	13. %	Excess	0.8-2
Estimated Nitrogen Release	390 lbs		
Nitrate	37.3 ppm	Excess	5-15
Ammonium-N	2.3 ppm		
Zinc	44.8 ppm	Excess	1-10

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Report Date: 10/ 7/14
 Date Received: 9/26/14
 Date Sampled: 9/24/14

Lab Number: 14-S025383

Sample Id: 02-NR-03
 Sample Comment: Biorecycling

Test Requested	Results	Relative Level	Optimum Range
pH	7.4	Excess	6.0-7.0
Nitrate	3.4 ppm 14. lbs	Below Optimum	5-15

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Report Date: 10/ 7/14
 Date Received: 9/26/14
 Date Sampled: 9/24/14

Lab Number: 14-S025384

Sample Id: 01-NR-04
 Sample Comment: Biorecycling

Test Requested	ppm	meq/100g	%TEB	Relative Level	Optimum Range
Potassium	206.	0.528	1.58	Above Optimum	120-200
Calcium	6370	31.8	95.1	Excess	600 - 4000
Magnesium	105.	0.864	2.58	Optimum	90 - 480
Sodium	55.6	0.242	0.72		
Sum of Exchangeable Bases		33.4		Ca/Mg Ratio 37.	

Test Requested	Results	Relative Level	Optimum Range
pH	6.9	Optimum	6.0-7.0
Lime Req	0.0 Tons/A		
Soluble Salts	1.2 mmho/cm	Above Optimum	<1.0
Phos Bray	158. ppm		8-20
Boron	0.86 ppm	Optimum	0.5-1.0
Sulfate - S	23. ppm	Above Optimum	6-20
Organic Matter	16. %	Excess	0.8-2
Estimated Nitrogen Release	480 lbs		
Nitrate	97.9 ppm	Excess	5-15
Ammonium-N	3.7 ppm		
Zinc	54.4 ppm	Excess	1-10

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Report Date: 10/ 7/14
 Date Received: 9/26/14
 Date Sampled: 9/24/14

Lab Number: 14-S025385

Sample Id: 02-NR-04
 Sample Comment: Biorecycling

Test Requested	Results	Relative Level	Optimum Range
pH	7.1	Excess	6.0-7.0
Nitrate	8.2 ppm 33. lbs	Optimum	5-15

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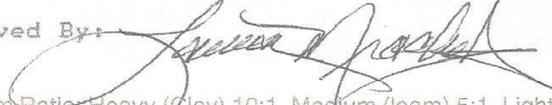
Lab Number: 14-S025386

Sample Id: 01-NR-04B
 Sample Comment: Biorecycling

Test Requested	ppm	meq/100g	%TEB	Relative Level	Optimum Range
Potassium	131.	0.336	1.56	Optimum	120-200
Calcium	4090	20.4	95.0	Above Optimum	600 - 4000
Magnesium	72.9	0.600	2.79	Below Optimum	90 - 480
Sodium	29.9	0.130	0.61		
Sum of Exchangeable Bases		21.5		Ca/Mg Ratio 34.	

Test Requested	Results	Relative Level	Optimum Range
pH	6.9	Optimum	6.0-7.0
Lime Req	0.0 Tons/A		
Soluble Salts	0.42 mmho/cm	Optimum	<1.0
Phos Bray	108. ppm		8-20
Boron	0.58 ppm	Optimum	0.5-1.0
Sulfate - S	6.6 ppm	Optimum	6-20
Organic Matter	9.0 %	Excess	0.8-2
Estimated Nitrogen Release	270 lbs		
Nitrate	19.4 ppm	Above Optimum	5-15
Ammonium-N	2.9 ppm		
Zinc	19.8 ppm	Above Optimum	1-10

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Approved By: 

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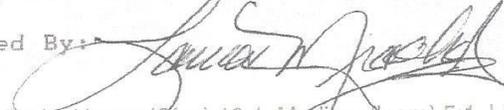
Report Date: 10/ 7/14
 Date Received: 9/26/14
 Date Sampled: 9/24/14

Lab Number: 14-S025387

Sample Id: 02-NR-04B
 Sample Comment: Biorecycling

Test Requested	Results	Relative Level	Optimum Range
pH	6.9	Optimum	6.0-7.0
Nitrate	2.4 ppm 10. lbs	Deficient	5-15

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Report Date: 10/ 7/14
 Date Received: 9/26/14
 Date Sampled: 9/24/14

Lab Number: 14-S025392

Sample Id: 01-NR-10
 Sample Comment: Biorecycling

Test Requested	ppm	meq/100g	YTEB	Relative Level	Optimum Range
Potassium	168.	0.431	1.22	Optimum	120-200
Calcium	6780	33.8	95.7	Excess	600 - 4000
Magnesium	101.	0.831	2.35	Optimum	90 - 480
Sodium	63.0	0.274	0.77		
Sum of Exchangeable Bases		35.4		Ca/Mg Ratio 41.	

Test Requested	Results	Relative Level	Optimum Range
pH	7.0	Optimum	6.0-7.0
Lime Req	0.0 Tons/A		
Soluble Salts	0.70 mmho/cm	Optimum	<1.0
Phos Bray	146. ppm		8-20
Boron	0.79 ppm	Optimum	0.5-1.0
Sulfate - S	18. ppm	Above Optimum	6-20
Organic Matter	17. %	Excess	0.8-2
Estimated Nitrogen Release	510 lbs		
Nitrate	55.4 ppm	Excess	5-15
Ammonium-N	3.3 ppm		
Zinc	65.2 ppm	Excess	1-10

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Approved By:

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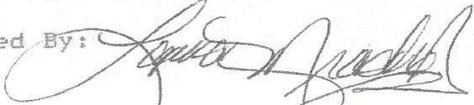
Report Date: 10/ 7/14
 Date Received: 9/26/14
 Date Sampled: 9/24/14

Lab Number: 14-S025393

Sample Id: 02-NR-10
 Sample Comment: Biorecycling

Test Requested	Results	Relative Level	Optimum Range
pH	6.9	Optimum	6.0-7.0
Nitrate	18.3 ppm 73. lbs	Above Optimum	5-15

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Approved By: 

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Report Date: 10/ 7/14
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Date Sampled: 9/24/14

Lab Number: 14-S025394

Sample Id: 01-NR-11
Sample Comment: Biorecycling

Test Requested	ppm	meq/100g	%TEB	Relative Level	Optimum Range
Potassium	131.	0.936	1.27	Optimum	120-200
Calcium	5070	25.3	95.3	Above Optimum	600 - 4000
Magnesium	78.4	0.645	2.43	Below Optimum	90 - 480
Sodium	61.3	0.267	1.00		
Sum of Exchangeable Bases		26.5		Ca/Mg Ratio 39.	

Test Requested	Results	Relative Level	Optimum Range
pH	6.9	Optimum	6.0-7.0
Lime Req	0.0 Tons/A		
Soluble Salts	0.82 mmho/cm	Optimum	<1.0
Phos Bray	80.8 ppm		8-20
Boron	0.65 ppm	Optimum	0.5-1.0
Sulfate - S	13. ppm	Optimum	6-20
Organic Matter	13. %	Excess	0.8-2
Estimated Nitrogen Release	390 lbs		
Nitrate	52.5 ppm	Excess	5-15
Ammonium-N	3.5 ppm		

Zinc 29.8 ppm Excess 1-10

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Approved By:

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Report Date: 10/ 7/14
Date Received: 9/26/14
Date Sampled: 9/24/14

Lab Number: 14-S025395

Sample Id: 02-NR-11
Sample Comment: Biorecycling

Test Requested	Results	Relative Level	Optimum Range
pH	6.6	Optimum	6.0-7.0
Nitrate	7.3 ppm 29. lbs	Optimum	5-15

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Approved By:

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Appendix 9c1 – Soil Samples 2015 September Sampling



(509) 662-1888
 Fax: (509) 662-8183
 3019 G.S. Center Rd.
 Wenatchee, WA 98801

(509) 452-7707
 Fax: (509) 452-7773
 1008 W. Ahtanum Rd.
 Union Gap, WA 98903

SOIL ANALYSIS ORDER FORM

SAMPLER'S NAME	Philip Small	A
----------------	--------------	---

Fully complete shaded areas only

DATE OF SAMPLING						SEND RESULTS TO: G. GROWER A: BILLING ADDRESS B: BOTH		GEOGRAPHIC ZONE (SEE REVERSE SIDE)	
M	M	D	D	Y	Y	A: Billing Addr		19.S.W. Washington	
0	9	2	4	1	5				

GROWER'S NAME/ADDRESS	E
Biorecycling	

BILLING NAME/ADDRESS	F
Philip Small	
Land Profile Inc.	
POB 2175 Spokane WA 99210-2175	
PHONE NO. 509-844-2944 philip.small@landprofile.com	

SAMPLE INFORMATION									
G	CLIENT'S SAMPLE IDENTIFICATION	I CROP/VARIETY (Enter selection from reverse side)	J SOIL DEPTH (1=0-6", 2=6-12", 3=6-18", 4=12-24", 5=24-36")	K TREE AGE (Years)	L GROU LOAD (N=non-producing, L=light, A=average, H=heavy)	M PRUNING (N=none, L=light, M=medium, H=heavy)	N VIGOR (1=0, 2=1-6", 3=7-18", 4=19-35", 5=36+)	O PREDOMINANT SOIL TYPE (1=sand, 2=sandy loam, 3=silt loam, 4=clay)	P LAB REQUEST TYPE (1=EWI, 2=EWII, 3=EWIII, 4=WWI, 5=complete, 6=garden, 9=your selection)
1509 N 10 A	55 Pasture, Gi	0-6" 12		N=non-produc	N=none	0	Sandy Loam	4=WWI	
1509 N 10 B	55 Pasture, Gi	12" 24		N=non-produc	N=none	0	Sandy Loam	9=your selection	
1509 N 11 A	55 Pasture, Gi	0-6" 12		N=non-produc	N=none	0	Sandy Loam	1=EWI	
1509 N 11 B	55 Pasture, Gi	12" 24		N=non-produc	N=none	0	Sandy Loam	1=EWI	
	55 Pasture, Gi	0-6"		N=non-produc	N=none	0	Sandy Loam	1=EWI	

TEST REQUEST	pH	E.C.	B	NO ₃ -N	As	P	K	Ca	Mg	Zn	% OM	Lim Res	S ₀	Fe	Cu	Mn	Op Res	CEC	Exchangeable				Texture
																			K	CA	Mg	Na	
1 E WASH I	✓	✓	✓	✓								✓											
2 E WASH II	✓	✓	✓	✓		✓	✓					✓											
3 E WASH III	✓	✓	✓	✓		✓	✓	✓	✓			✓	✓										
4 W WASH I	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓										
5 COMPLETE	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
6 GARDEN	✓		✓	✓		✓	✓					✓	✓										
9 YOUR SELECTION																							
Sample 1																							
Sample 2	✓			✓																			
Sample 3																							
Sample 4	✓			✓																			
Sample 5																							

1	SAMPLE AREA COMMENT	Surface Foot: WW1 plus Total N, EC, NH4-N
	CURRENT FERTILIZATION	
2	SAMPLE AREA COMMENT	Second Foot: NO3-N, pH
	CURRENT FERTILIZATION	
3	SAMPLE AREA COMMENT	Surface Foot: WW1 plus Total N, EC, NH4-N
	CURRENT FERTILIZATION	
4	SAMPLE AREA COMMENT	Second Foot: NO3-N, pH
	CURRENT FERTILIZATION	
5	SAMPLE AREA COMMENT	
	CURRENT FERTILIZATION	



3019 G. S. Center Rd.
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 Fax: (509) 662-8183
 1-800-545-4206

1008 W. Ahtanum Rd.
 Union Gap, WA 98903
 (509) 452-7707
 Fax: (509) 452-7773

Batch: 530130
 Grower: Biorecycling
 Account: 03371
 Sampler: Phil Small
 PO Number:

--- SOIL ANALYSIS RESULTS ---

Land Profile Inc.
 Phil Small
 PO Box 2175
 Spokane, WA 99210

Report Date: 10/12/15
 Date Received: 9/25/15
 Date Sampled: 9/24/15

Lab Number: 15-S029674

Sample Id: 1509N10A

Test Requested	ppm	meq/100g	%TEB	Relative Level	Optimum Range
Potassium	132.	0.338	1.16	Optimum	120-200
Calcium	5610	28.0	95.9	Above Optimum	600 - 4000
Magnesium	72.5	0.596	2.04	Below Optimum	90 - 480
Sodium	56.8	0.247	0.85		
Sum of Exchangeable Bases		29.2		Ca/Mg Ratio 47.	

Test Requested	Results	Relative Level	Optimum Range
pH	7.2	Excess	6.0-7.0
Lime Req	0.0 Tons/A		
Soluble Salts	0.58 mmho/cm	Optimum	<1.0
Phos Bray	122. ppm		8-20
Boron	0.90 ppm	Optimum	0.5-1.0
Sulfate - S	23. ppm	Above Optimum	6-20
Organic Matter	15. %	Excess	0.8-2
Estimated Nitrogen Release	450 lbs		
Nitrate	31.7 ppm	Excess	5-15
Ammonia	2.8 ppm		
Total Nitrogen/Solid	5900 mg/Kg		AOAC 993.13
Zinc	52.2 ppm	Excess	1-10

Please keep results in your reference files. Test every other year.

Approved By:

Calcium & Magnesium Ratio: Heavy (Clay) 10:1, Medium (loam) 5:1, Light (sandy) 2:1 The relative levels and optimum ranges are suggestions that have been established for tree fruits. Please consult your fieldstaff or county extension agent before using the guidelines for fertilizer application.

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 Fax: (509) 452-7773

Batch: 530130
 Grower: Biorecycling
 Account: 03371
 Sampler: Phil Small
 PO Number:

--- SOIL ANALYSIS RESULTS ---

Land Profile Inc.
 Phil Small
 PO Box 2175
 Spokane, WA 99210

Report Date: 10/12/15
 Date Received: 9/25/15
 Date Sampled: 9/24/15

Lab Number: 15-S029675

Sample Id: 1509 N 10B

Test Requested	Results	Relative Level	Optimum Range
pH	6.9	Optimum	6.0-7.0
Nitrate	30.4 ppm 122. lbs	Excess	5-15

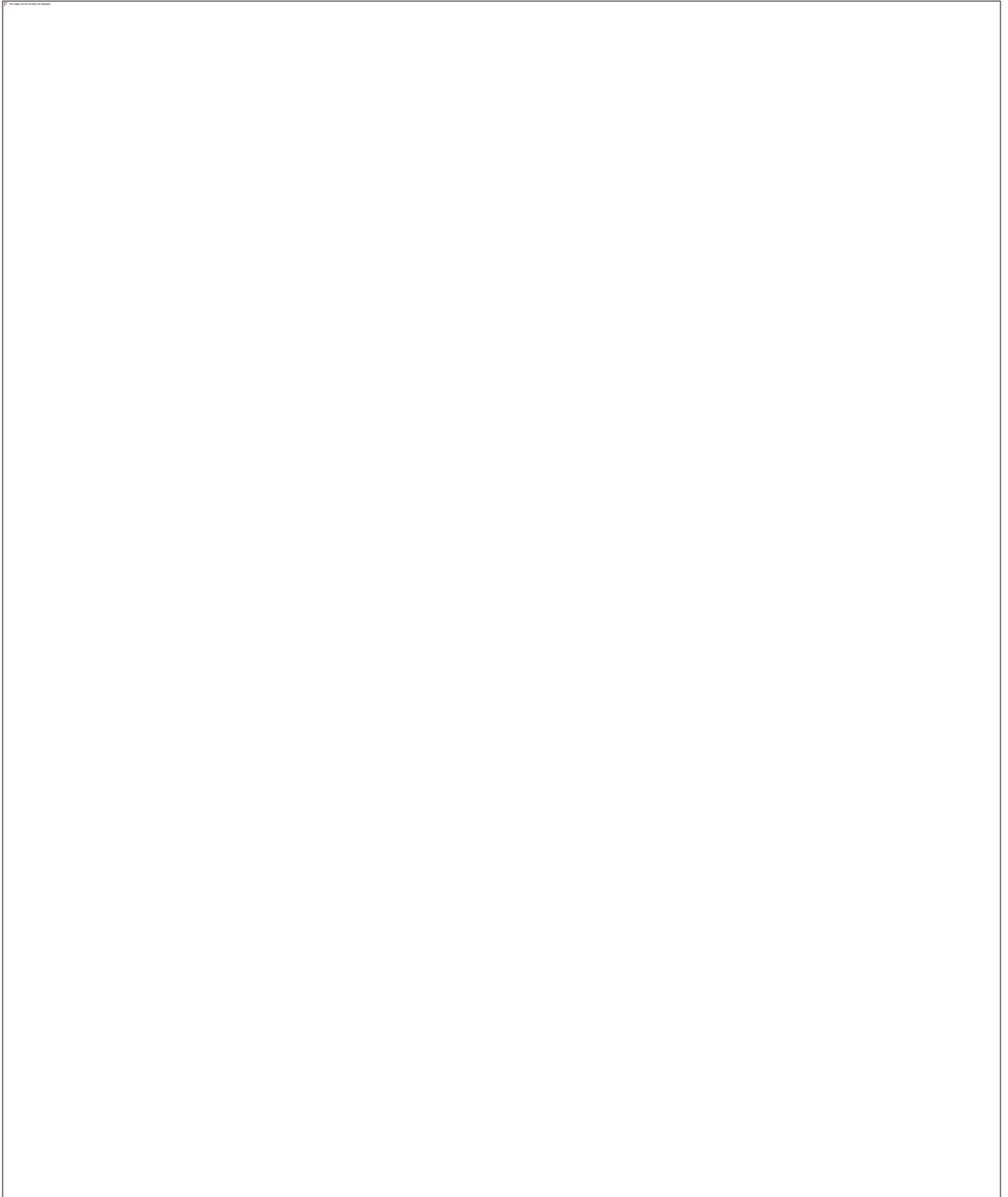
Please keep results in your reference files. Test every other year.

Approved By:

Calcium & Magnesium Ratio: Heavy (Clay) 10:1, Medium (loam) 5:1, Light (sandy) 2:1 The relative levels and optimum ranges are suggestions that have been established for tree fruits. Please consult your fieldstaff or county extension agent before using the guidelines for fertilizer application.

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Appendix 9c2 – Soil Samples 2015 September Sampling





3019 G. S. Center Rd.
 Wenatchee, WA 98801
 (509) 662-1888
 Fax: (509) 662-8183
 1-800-545-4206

1008 W. Ahtanum Rd.
 Union Gap, WA 98903
 (509) 452-7707
 Fax: (509) 452-7773

Batch: 530034
 Grower: Biorecycling
 Account: 03371
 Sampler: Phil Small
 PO Number:

--- SOIL ANALYSIS RESULTS ---

Land Profile Inc.
 Phil Small
 PO Box 2175
 Spokane, WA 99210

Report Date: 10/12/15
 Date Received: 9/24/15
 Date Sampled: 9/23/15

Lab Number: 15-S029444

Sample Id: 1509 N04B
 Sample Comment: Biorecycling

Test Requested	Results	Relative Level	Optimum Range
pH	7.0	Optimum	6.0-7.0
Nitrate	21.9 ppm 88. lbs	Above Optimum	5-15

Please keep results in your reference files. Test every other year.

Approved By:

Calcium & Magnesium Ratio: Heavy (Clay) 10:1, Medium (loam) 5:1, Light (sandy) 2:1 The relative levels and optimum ranges are suggestions that have been established for tree fruits. Please consult your fieldstaff or county extension agent before using the guidelines for fertilizer application.

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 Fax: (509) 662-8183
 1-800-545-4206

1008 W. Ahtanum Rd.
 Union Gap, WA 98903
 (509) 452-7707
 Fax: (509) 452-7773

Batch: 530034
 Grower: Biorecycling
 Account: 03371
 Sampler: Phil Small
 PO Number:

--- SOIL ANALYSIS RESULTS ---

Land Profile Inc.
 Phil Small
 PO Box 2175
 Spokane, WA 99210

Report Date: 10/12/15
 Date Received: 9/24/15
 Date Sampled: 9/23/15

Lab Number: 15-S029445

Sample Id: 1509 N01 A
 Sample Comment: Biorecycling

Test Requested	ppm	meq/100g	%TEB	Relative Level	Optimum Range
Potassium	122.	0.313	1.31	Optimum	120-200
Calcium	4580	22.9	95.6	Above Optimum	600 - 4000
Magnesium	65.1	0.535	2.24	Below Optimum	90 - 480
Sodium	45.3	0.197	0.82		
Sum of Exchangeable Bases		23.9		Ca/Mg Ratio 43.	

Test Requested	Results	Relative Level	Optimum Range
pH	7.3	Excess	6.0-7.0
Lime Req	0.0 Tons/A		
Soluble Salts	0.53 mmho/cm	Optimum	<1.0
Phos Bray	127. ppm		8-20
Boron	0.68 ppm	Optimum	0.5-1.0
Sulfate - S	16. ppm	Above Optimum	6-20
Organic Matter	11. %	Excess	0.8-2
Estimated Nitrogen Release	330 lbs		
Nitrate	19.9 ppm	Above Optimum	5-15
Ammonia	2.5 ppm		5.0 lbs
Total Nitrogen/Solid	3970 mg/Kg		AOAC 993.13
Zinc	32.2 ppm	Excess	1-10

Please keep results in your reference files. Test every other year.

Approved By:

Calcium & Magnesium Ratio: Heavy (Clay) 10:1, Medium (loam) 5:1, Light (sandy) 2:1 The relative levels and optimum ranges are suggestions that have been established for tree fruits. Please consult your fieldstaff or county extension agent before using the guidelines for fertilizer application.

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Appendix 9c3 – Soil Samples 2015 October Sampling Fields 1 & 2



3019 G. S. Center Rd.
 Wenatchee, WA 98801
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 Fax: (509) 662-8183
 1-800-545-4206

1008 W. Ahtanum Rd.
 Union Gap, WA 98903
 (509) 452-7707
 Fax: (509) 452-7773

Batch: 531640
 Grower: Land Profile
 Account: 03371
 Sampler: Phillip
 PO Number:

--- SOIL ANALYSIS RESULTS ---

Land Profile Inc.
 Phil Small
 PO Box 2175
 Spokane, WA 99210

Report Date: 11/ 6/15
 Date Received: 10/27/15
 Date Sampled: 10/21/15

Lab Number: 15-S033314

Sample Id: 1510 N 01A

Test Requested	ppm	meq/100g	%TEB	Relative Level	Optimum Range
Potassium	86.1	0.221	0.87	Deficient	120-200
Calcium	4920	24.6	96.4	Above Optimum	600 - 4000
Magnesium	59.1	0.486	1.91	Deficient	90 - 480
Sodium	47.2	0.205	0.81		
Sum of Exchangeable Bases		25.5		Ca/Mg Ratio 51.	

Test Requested	Results	Relative Level	Optimum Range
pH	7.4	Excess	6.0-7.0
Lime Req	0.0 Tons/A		
Soluble Salts	0.39 mmho/cm	Optimum	<1.0
Phos Bray	88.3 ppm		8-20
Boron	0.43 ppm	Below Optimum	0.5-1.0
Sulfate - S	13. ppm	Optimum	6-20
Organic Matter	12. %	Excess	0.8-2
Estimated Nitrogen Release	360 lbs		
Nitrate	15.4 ppm	Above Optimum	5-15
Ammonia	1.8 ppm		
Total Nitrogen/Solid	4150 mg/Kg		AOAC 993.13
Zinc	33.4 ppm	Excess	1-10

Please keep results in your reference files. Test every other year.

Approved By: 

Calcium & Magnesium Ratio: Heavy (Clay) 10:1, Medium (loam) 5:1, Light (sandy) 2:1 The relative levels and optimum ranges are suggestions that have been established for tree fruits. Please consult your fieldstaff or county extension agent before using the guidelines for fertilizer application.

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 1-800-545-4206

1008 W. Ahtanum Rd.
 Union Gap, WA 98903
 (509) 452-7707
 Fax: (509) 452-7773

Batch: 531640
 Grower: Land Profile
 Account: 03371
 Sampler: Phillip
 PO Number:

--- SOIL ANALYSIS RESULTS ---

Land Profile Inc.
 Phil Small
 PO Box 2175
 Spokane, WA 99210

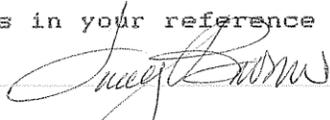
Report Date: 11/ 6/15
 Date Received: 10/27/15
 Date Sampled: 10/21/15

Lab Number: 15-S033317

Sample Id: 1510 N02B

Test Requested	Results	Relative Level	Optimum Range
pH	7.1	Excess	6.0-7.0
Nitrate	11.0 ppm 44. lbs	Optimum	5-15

Please keep results in your reference files. Test every other year.

Approved By: 

Calcium & Magnesium Ratio: Heavy (Clay) 10:1, Medium (loam) 5:1, Light (sandy) 2:1 The relative levels and optimum ranges are suggestions that have been established for tree fruits. Please consult your fieldstaff or county extension agent before using the guidelines for fertilizer application.

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 Fax: (509) 452-7773

Batch: 531640
 Grower: Land Profile
 Account: 03371
 Sampler: Phillip
 PO Number:

--- SOIL ANALYSIS RESULTS ---

Land Profile Inc.
 Phil Small
 PO Box 2175
 Spokane, WA 99210

Report Date: 11/ 6/15
 Date Received: 10/27/15
 Date Sampled: 10/21/15

Lab Number: 15-S033319

Sample Id: 1510 K 06 B

Test Requested	Results	Relative Level	Optimum Range
pH	7.0	Optimum	6.0-7.0
Nitrate	5.8 ppm 23. lbs	Optimum	5-15

Please keep results in your reference files. Test every other year.

Approved By:

Calcium & Magnesium Ratio: Heavy (Clay) 10:1, Medium (loam) 5:1, Light (sandy) 2:1 The relative levels and optimum ranges are suggestions that have been established for tree fruits. Please consult your fieldstaff or county extension agent before using the guidelines for fertilizer application.

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SPILL PREVENTION/RESPONSE PLAN

INTRODUCTION

This *Spill Prevention/Response Plan* is being submitted as required by the *General Permit for Biosolids Management*.

Facility Name: Bio Recycling Corporation – North Ranch

Permit Number: BT9901

Biosolids Quality: Class B

Biosolids % solids: 25% Class B Biosolids

Start location: North Ranch – 820 E Webb Hill Rd, Union WA 98592

End location: Natural Selection Farms – Goldendale, WA (Finn Ridge Rd) or Natural Selections Sunnyside, WA.

MAIN ROUTE TRAVELED

Attached

ALTERNATE ROUTE TRAVELED

Attached

SPILL PREVENTION MEASURES

To minimize the possibility of spills, Bio Recycling has implemented the following measures:

- All vehicles are regularly inspected and serviced.
- Drivers never exceed the posted speed limit and only travel at speeds appropriate for current road conditions.
- Drivers attend a “Defensive Driving” course every 3 years.
- Loads are fully covered with a tarp during transportation.
- Vehicles are certified to be “leak-proof” upon purchase and are regularly examined to ensure no leaking occurs.
- Drivers consult the Washington State Department of Transportation’s website during times of possible inclement weather.

EQUIPMENT TO ADDRESS A SPILL

In order to be able to promptly and properly respond to a spill, Bio Recycling Corporation equips all biosolids transportation vehicles with the following:

- A copy of the most current Spill Prevention/Response Plan.
- A cell phone.
- Gloves and boots.
- Hazard Flares.
- Reflective traffic cones.
- A shovel.
- Bagged hydrated lime.

SPILL RESPONSE MEASURES

In the event of a spill, the following measures may occur:

1. Safely exit roadway if possible.
2. Place reflective traffic cones along roadway leading up to the spill (use flares if needed).
3. If the spill has or could result in an emergency situation: dial 911.
4. If the spill poses a risk to public or environmental health or is odorous, use hydrated lime to cover exposed biosolids (non-waterways only).
5. If the spill is large:
 - a. Contact the Department of Ecology's Spill Response Team.
 - b. Contact the City staff, in the location of the spill, to have them contact a local excavation or pumping company to excavate or pump all biosolids and place back into the hauling truck.
6. If the spill is on a state or interstate roadway and may obstruct traffic for an extended period:
 - a. Contact the appropriate Department of Transportation regional office.
7. If the spill is small, use shovel to remove all biosolids and place back into the hauling truck.

Contact the State Biosolids coordinator and the Regional Biosolids coordinator, were the spill occurred, as soon as possible, but not more than 24 hours following the spill. Unless waived by Ecology, submit a written explanation of the spill within 5 days. The written explanation must include the following:

- A description of the spill and its cause.
- The exact date and time of the spill, and, if it has not been cleaned-up, the anticipated time when cleanup will occur.
- Steps taken or planned to reduce, eliminate, and prevent reoccurrence of spills.

11/13/2015

Contact the appropriate staff at the local health department in the county where the spill occurs.

If a spill may have affected natural resources and/or fish and wildlife, contact the appropriate Department of Natural Resources regional office or Department of Fish and Wildlife regional office

MANDATORY CONTACTS – WITHIN 24 HOURS

Department of Ecology

State Biosolids Coordinator (contact regardless of location of spill): 360-407-6000

Regional Biosolids Coordinator (for the County the spill is located)

Central Region: 509-575-2490

Okanogan, Chelan, Douglas, Kittitas, Yakima, Klickitat

Northwest Region: 425-649-7000

Whatcom, Skagit, Snohomish, King, San Juan, Island, Kitsap

Southwest Region: 360-407-6300

Clallam, Jefferson, Grays Harbor, Mason, Thurston, Pacific, Lewis, Wahkiakum, Cowlitz, Clark, Skamania, Pierce

Eastern Region: 509-329-3400

Ferry, Stevens, Pend Oreille, Lincoln, Spokane, Grant, Adams, Whitman, Franklin, Walla Walla, Columbia, Garfield, Asotin



OTHER POSSIBLE CONTACTS

Emergency: 911.

Department of Ecology, Spill Response Team

Central Region: 509-575-2490

Okanogan, Chelan, Douglas, Kittitas, Yakima, Klickitat, Benton

11/13/2015

Northwest Region: 425-649-7000

Whatcom, Skagit, Snohomish, King, San Juan, Island, Kitsap

Southwest Region: 360-407-6300

Clallam, Jefferson, Grays Harbor, Mason, Thurston, Pacific, Lewis, Wahkiakum, Cowlitz, Clark, Skamania, Pierce

Easton Region: 509-329-3400

Ferry, Stevens, Pend Oreille, Lincoln, Spokane, Grant, Adams, Whitman, Franklin, Walla Walla, Columbia, Garfield, Asotin

Local Health Department

Lewis County Health Department: 360-740-4104

Tacoma-Pierce County Health Department: 253-798-6538

Mason County Health Department: 360-427-9670

Thurston County Health Department: 360-786-5490

Department of Transportation

Eastern Region: 509-324-6000

North Central Region: 509-667-3000

Northwest Region: 206-440-4000

Olympic Region: 360-357-2600

South Central Region: 509-557-1600

Southwest Region: 360-905-2000

Department of Natural Resources

Olympic Region: 360-374-2800

Pacific Cascade Region: 360-577-2025

South Puget Sound Region: 360-825-1631

Southeast Region: 509-925-8510

Northeast Region: 509-684-7474

Northwest Region: 360-856-3500

Department of Fish and Wildlife

Southwest Region: 360-696-6211

Lewis, Wahkiakum, Cowlitz, Skamania, Clark, Klickitat

Coastal Region: 360-249-4628

Clallam, Jefferson, Kitsap, Grays Harbor, Mason, Thurston, Pacific, Pierce

North Puget Sound Region: 425-775-1311

Whatcom, Skagit, Snohomish, King, San Juan, Island

North Central Region: 509-754-4624

Okanogan, Chelan, Douglas, Grant, Adams

South Central Region: 509-575-2740

Kittitas, Yakima, Benton, Franklin

Eastern: 509-892-1001

Ferry, Stevens, Pend Oreille, Lincoln, Spokane, Whitman, Walla Walla, Columbia, Garfield, Asotin

Map\$ Route Directions

mapquest

YOUR TRIP TO:

6800 Emerald Rd = Natural Selection Farms - Sunnyside
4 HR 16 MIN | 235.7 MI 🚗 Primary Route

 820 E Webb Hill Rd, Union, WA 98592

 1. Start out going **southwest** on E Webb Hill Rd toward E Misty Acres Ln.
Then 1.06 miles 1.06 total miles

 2. E Webb Hill Rd becomes E McReavy Rd.
Then 1.46 miles 2.52 total miles

 3. Turn **right** onto E Brockdale Rd.
E Brockdale Rd is 0.1 miles past E Road Runner Dr.
If you are on E Brockdale Rd and reach E Jensen Rd you've gone about 1.6 miles too far.
Then 1.48 miles 4.00 total miles

 4. Take US-101 S.
Then 24.86 miles 28.86 total miles

 5. Merge onto I-5 S toward **Portland**.
Then 33.05 miles 61.91 total miles

 6. US HIGHWAY 12 E.

 US Highway 12 E, Chehalis WA

This leg: **61.91 miles**

Start of next leg of route

 7. Start out going **south** on I-5 S/US-12 E.
Then 2.58 miles 64.49 total miles

 8. Take the **US-12 E** exit, EXIT 68, toward **Morton/Yakima**.
Then 0.42 miles 64.91 total miles

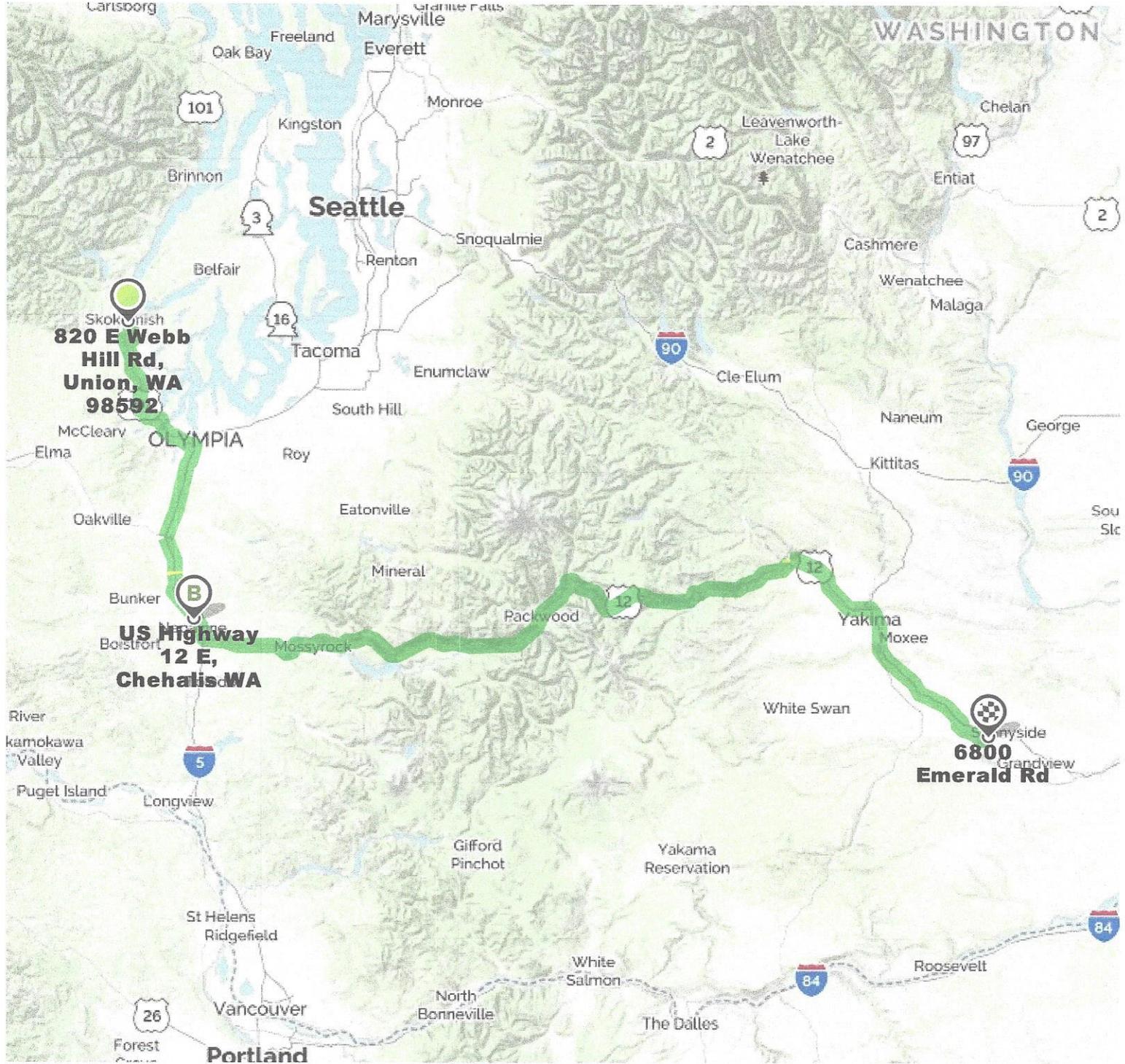
 9. Turn **left** onto US Highway 12/US-12 E.
Then 118.87 miles 183.78 total miles

-  **10.** Turn **right** onto US Highway 12/US-12 E. Continue to follow US-12 E.
Then 44.14 miles 227.92 total miles
-  **11.** Take the **WA-223 S** exit, EXIT 58, toward **Granger**.
Then 0.28 miles 228.20 total miles
-  **12.** Turn **right** onto WA-223.
If you reach I-82 E you've gone about 0.4 miles too far.
Then 0.57 miles 228.77 total miles
-  **13.** Take the 1st **left** onto Cherry Hill Rd.
Cherry Hill Rd is 0.5 miles past Bailey Ave.
If you reach Main St you've gone about 0.3 miles too far.
Then 0.03 miles 228.80 total miles
-  **14.** Turn **right** to stay on Cherry Hill Rd.
Then 0.18 miles 228.98 total miles
-  **15.** Cherry Hill Rd becomes Emerald Rd.
Then 2.27 miles 231.25 total miles
-  **16.** Turn **right** to stay on Emerald Rd.
Then 4.47 miles 235.72 total miles
-  **17.** 6800 EMERALD RD is on the **right**.
Your destination is 0.6 miles past S Emerald Rd.
If you are on Wendell Phillips Rd and reach Camp Ln you've gone about 0.8 miles too far.



6800 Emerald Rd

This leg: **173.80 miles**



**820 E Webb Hill Rd,
Union, WA
98592**

**US Highway
12 E,
Chehalis WA**

**6800
Emerald Rd**

YOUR TRIP TO:



6800 Emerald Rd = Natural Selection Farms - Sunnyside

4 HR 12 MIN | 245.7 MI

Alternate Route



1. Start out going **southwest** on E Webb Hill Rd toward E Misty Acres Ln.

Then 1.06 miles

1.06 total miles



2. E Webb Hill Rd becomes E McReavy Rd.

Then 1.46 miles

2.52 total miles



3. Turn **right** onto E Brockdale Rd.

E Brockdale Rd is 0.1 miles past E Road Runner Dr.

If you are on E Brockdale Rd and reach E Jensen Rd you've gone about 1.6 miles too far.

Then 1.48 miles

4.00 total miles



4. Take US-101 S.

Then 24.86 miles

28.86 total miles



5. Merge onto I-5 N via the exit on the **left** toward **Olympia/Seattle**.

Then 37.64 miles

66.50 total miles



6. Merge onto WA-18 E via EXIT 142A toward **Auburn**.

Then 27.83 miles

94.33 total miles



7. Merge onto I-90 E toward **Spokane**.

Then 85.04 miles

179.37 total miles



8. Merge onto I-82 E via EXIT 110 toward **Yakima**.

Then 58.53 miles

237.89 total miles



9. Take the **WA-223 S** exit, EXIT 58, toward **Granger**.

Then 0.28 miles

238.17 total miles



10. Turn **right** onto WA-223.

If you reach I-82 E you've gone about 0.4 miles too far.

Then 0.57 miles

238.75 total miles



11. Take the 1st **left** onto Cherry Hill Rd.

Cherry Hill Rd is 0.5 miles past Bailey Ave.

If you reach Main St you've gone about 0.3 miles too far.

Then 0.03 miles

238.77 total miles



12. Turn **right** to stay on Cherry Hill Rd.

Then 0.18 miles

238.95 total miles



13. Cherry Hill Rd becomes Emerald Rd.

Then 2.27 miles

241.22 total miles



14. Turn **right** to stay on Emerald Rd.

Then 4.47 miles

245.69 total miles

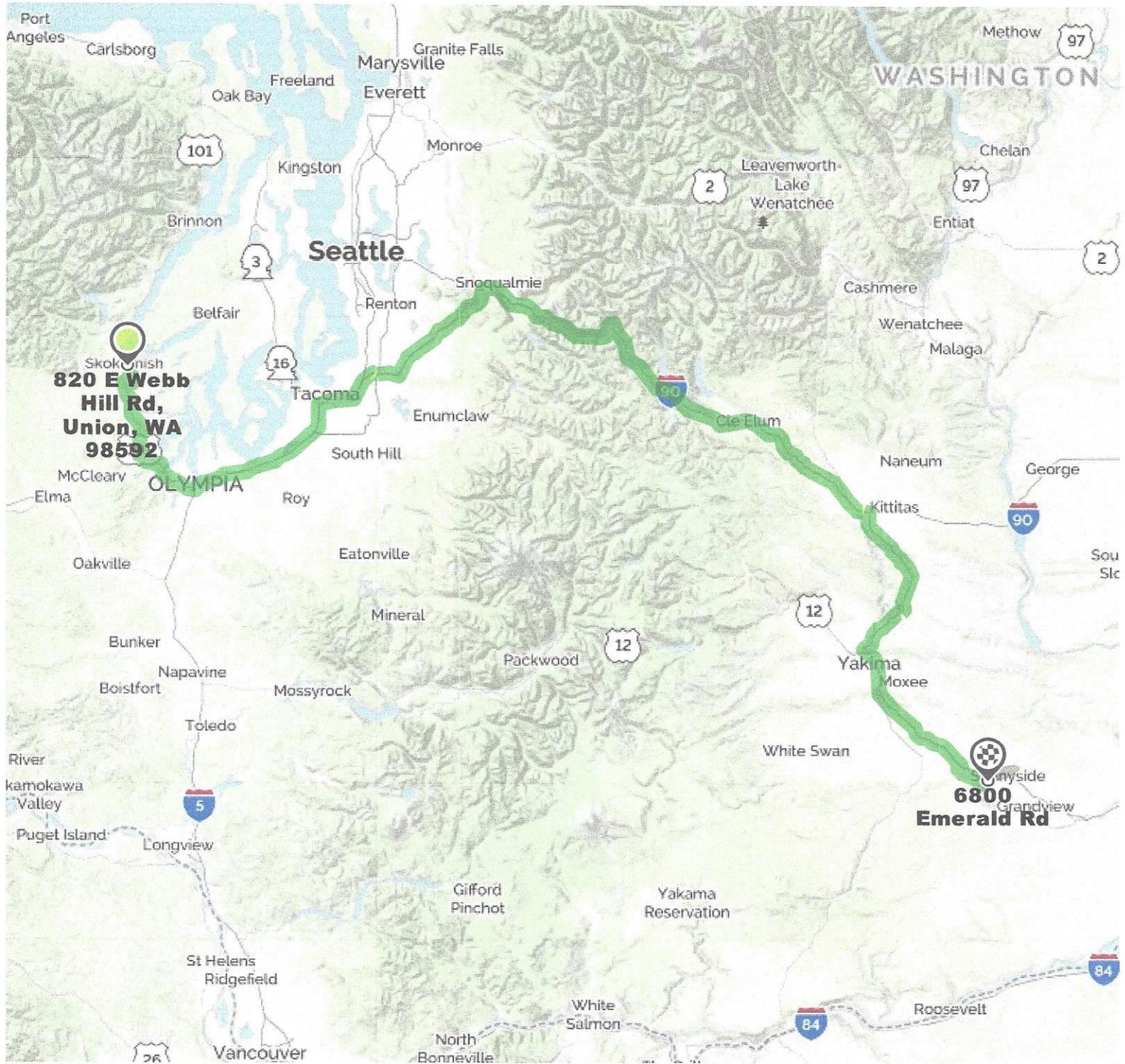


15. 6800 Emerald Rd, Sunnyside, WA 98944-9708, 6800 EMERALD RD is on the **right**.

Your destination is 0.6 miles past S Emerald Rd.

If you are on Wendell Phillips Rd and reach Camp Ln you've gone about 0.8 miles too far.

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Skokanish
**820 E Webb
Hill Rd,
Union, WA
98592**

6800
Emerald Rd
Grandview

YOUR TRIP TO: **Natural Selection Farms** 
[300 - 999] Finn Ridge Rd **Centerville / Gordendale**
4 HR 13 MIN | 239.3 MI  **Primary Route**

 820 E Webb Hill Rd, Union, WA 98592

 1. Start out going **southwest** on E Webb Hill Rd toward E Misty Acres Ln.
Then 1.06 miles 1.06 total miles

 2. E Webb Hill Rd becomes E McReavy Rd.
Then 1.46 miles 2.52 total miles

 3. Turn **right** onto E Brockdale Rd.
E Brockdale Rd is 0.1 miles past E Road Runner Dr.

If you are on E Brockdale Rd and reach E Jensen Rd you've gone about 1.6 miles too far.

Then 1.48 miles 4.00 total miles

 4. Take US-101 S.
Then 24.86 miles 28.86 total miles

 5. Merge onto I-5 S toward **Portland**.
Then 96.48 miles 125.34 total miles

 6. Keep **right** to take I-205 S/Veterans Memorial Fwy S via EXIT 7 toward **NE 134th St/Salem**.
Then 10.05 miles 135.39 total miles

 7. Merge onto WA-14 E/Lewis and Clark Hwy E via EXIT 27 toward **Camas**.
Then 2.82 miles 138.21 total miles

 8. LEWIS AND CLARK HWY E.

 Lewis and Clark Hwy E, Vancouver WA

This leg: **138.21 miles**

Start of next leg of route

 9. Start out going **east** on WA-14 E/Lewis and Clark Hwy E.
Then 1.52 miles 139.73 total miles



10. Take the **SE 192nd Ave** exit, **EXIT 10**.

Then 0.23 miles 139.96 total miles



11. Turn **left** onto **SE 192nd Ave**.

If you reach WA-14 E you've gone about 0.2 miles too far.

Then 0.06 miles 140.02 total miles



12. Merge onto **WA-14 W/Lewis and Clark Hwy W** via the ramp on the **left**.

If you reach SE Brady Rd you've gone about 0.1 miles too far.

Then 3.46 miles 143.48 total miles



13. Take **EXIT 6** toward **I-205 S/Salem**.

Then 0.61 miles 144.09 total miles



14. Merge onto **I-205 S/Veterans Memorial Fwy S/E Portland Fwy S** via **EXIT 6** toward **Salem/I-84** (Crossing into **Oregon**).

Then 4.50 miles 148.58 total miles



15. Merge onto **I-84 E/US-30 E** via **EXIT 22** toward **The Dalles**.

Then 7.95 miles 156.53 total miles



16. **US HIGHWAY 30 E**.



US Highway 30 E, Troutdale OR

This leg: **18.32 miles**

Start of next leg of route 175.21 total miles



17. Start out going **east** on **I-84 E/US-30 E**. Continue to follow **I-84 E**.

Then 47.55 miles 204.08 total miles



18. Take the **OR-35** exit, **EXIT 64**, toward **MT HOOD HWY/White Salmon/Govt Camp**.

Then 0.28 miles 204.36 total miles



19. Turn **left** onto **OR-35/Button Bridge Rd**. Continue to follow **Button Bridge Rd**.
If you reach I-84 E you've gone about 0.2 miles too far.

Then 0.11 miles 204.47 total miles



20. **Button Bridge Rd** becomes **Hood River Bridge** (Portions toll) (Crossing into **Washington**).

Then 1.03 miles 205.50 total miles

 21. Turn **right** onto Highway 14/WA-14. Continue to follow WA-14.

Then 11.15 miles 216.65 total miles

 22. Turn **left** onto 6th St.
6th St is just past 5th St.

If you reach 7th St you've gone a little too far.

Then 0.06 miles 216.71 total miles

 23. 6th St becomes Glenwood Ave.

Then 0.18 miles 216.89 total miles

 24. Glenwood Ave becomes Centerville Hwy.

Then 11.25 miles 228.14 total miles

 25. Centerville Hwy becomes Lyle Goldendale Rd.

Then 0.06 miles 228.20 total miles

 26. Lyle Goldendale Rd becomes Centerville Hwy.

Then 5.38 miles 233.58 total miles

 27. Turn **left** to stay on Centerville Hwy.

Then 3.79 miles 237.37 total miles

 28. Centerville Hwy becomes Erickson Rd.

Then 0.99 miles 238.37 total miles

 29. Turn **left** onto Finn Ridge Rd.

Finn Ridge Rd is 0.6 miles past Windy Hills Rd.

If you reach Anderson Rd you've gone about 1 mile too far.

Then 0.89 miles 239.25 total miles

 30. [300 - 999] FINN RIDGE RD.

If you reach Aloha Rd you've gone about 1.1 miles too far.

 [300 - 999] Finn Ridge Rd

This leg: **82.72 miles**

Skokholmish
**820 E Webb
Hill Rd,
Union, WA
98592**

**Lewis and
Clark Highway
Vancouver
Toussaint
OR**

**[300 - 999]
Finn Ridge
Rd**



YOUR TRIP TO:

Natural Selections
Centerville/Goldendale
Alternate Route



[300 - 999] Finn Ridge Rd

5 HR 9 MIN | 283.6 MI



820 E Webb Hill Rd, Union, WA 98592



1. Start out going **southwest** on E Webb Hill Rd toward E Misty Acres Ln.

Then 1.06 miles 1.06 total miles



2. E Webb Hill Rd becomes E McReavy Rd.

Then 1.46 miles 2.52 total miles



3. Turn **right** onto E Brockdale Rd.

E Brockdale Rd is 0.1 miles past E Road Runner Dr.

If you are on E Brockdale Rd and reach E Jensen Rd you've gone about 1.6 miles too far.

Then 1.48 miles 4.00 total miles



4. Take US-101 S.

Then 24.86 miles 28.86 total miles



5. Merge onto I-5 S toward **Portland**.

Then 35.63 miles 64.49 total miles



6. Take the **US-12 E** exit, EXIT 68, toward **Morton/Yakima**.

Then 0.42 miles 64.91 total miles



7. Turn **left** onto US Highway 12/US-12 E.

Then 84.30 miles 149.21 total miles



8. US HIGHWAY 12.

If you are on US Highway 12 and reach Pacific Crest National Scenic Trl you've gone about 0.7 miles too far.



US Highway 12, Randle WA

This leg: **149.21 miles**

Start of next leg of route



9. Start out going **east** on US-12 E/US Highway 12 toward Pacific Crest National Scenic Trl.

Then 34.57 miles 183.78 total miles



10. Turn **right** onto US Highway 12/US-12 E. Continue to follow US-12 E.

Then 23.49 miles 207.27 total miles



11. Merge onto US-97 S/US Highway 97 via EXIT 37 toward **Goldendale/Bend Ore.**

Then 14.97 miles 222.25 total miles



12. Turn **right** onto US Highway 97/US-97 S. Continue to follow US-97 S.
US-97 S is 0.4 miles past Fort Rd.

Then 53.12 miles 275.36 total miles



13. Turn **right** onto Goldendale-Centerville Rd.
Goldendale-Centerville Rd is 0.6 miles past Gronewald Rd.

If you reach Stringstreet Ln you've gone about 0.9 miles too far.

Then 2.00 miles 277.36 total miles



14. Turn **slight left** onto Centerville Hwy.
Centerville Hwy is 0.9 miles past Wing Rd.

Then 0.19 miles 277.55 total miles



15. Turn **slight right** to stay on Centerville Hwy.
If you are on Eshelman Rd and reach String Street Rd you've gone about 1.2 miles too far.

Then 1.04 miles 278.59 total miles



16. Centerville Hwy becomes Lyle Goldendale Rd.

Then 0.83 miles 279.42 total miles



17. Lyle Goldendale Rd becomes Main St.

Then 0.44 miles 279.86 total miles



18. Main St becomes Lyle Goldendale Rd.

Then 1.85 miles 281.72 total miles

 **19. Turn right** onto Erickson Rd.
If you are on Niva Rd and reach Wilson Rd you've gone about 0.9 miles too far.

Then 0.99 miles

282.71 total miles

 **20. Take the 1st left** onto Finn Ridge Rd.
Finn Ridge Rd is 0.6 miles past Windy Hills Rd.

If you reach Anderson Rd you've gone about 1 mile too far.

Then 0.89 miles

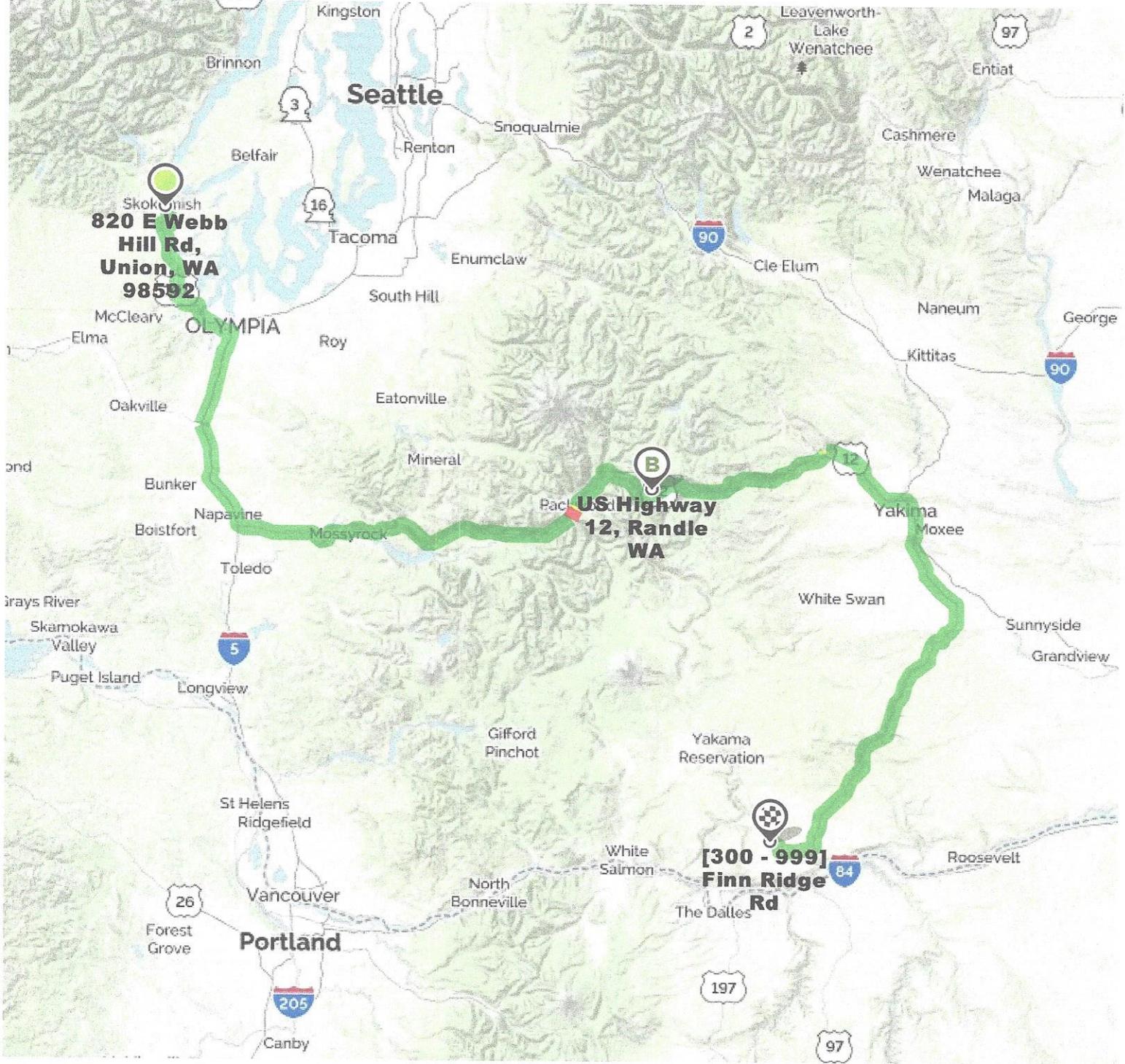
283.60 total miles

 **21. [300 - 999] FINN RIDGE RD.**
If you reach Aloha Rd you've gone about 1.1 miles too far.

 **[300 - 999] Finn Ridge Rd**

This leg: **134.39 miles**

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Bio Recycling Corporation North Ranch Plant Biosolids Sampling and Analysis Plan

All class A and B biosolids will be sampled and analyzed as they are leaving the processing area for land application on site or other offsite alternatives.

Nitrogen Monitoring

- a. Operators take samples daily that are composited for lab analysis. The composite samples will be held in a refrigerator at about 4°C (39°F) and sent to the lab twice per month.
- b. One sample of liquid biosolids will be collected from the contents of each tank as it is being agitated with air and pumped to the field. Filtrate biosolids samples are collected daily from the dewatering equipment drainage pan. Septage and filtrate samples are kept separate. When the dissolved air flotation (DAF) unit is being used, filtrate biosolids samples from the drainage pan will not be collected. Instead, daily samples will be taken from the DAF discharge tank before being pumped to the filtrate holding tanks. Samples from the DAF unit or the dewatering equipment drainage pan will be blended. These samples will be mixed with other like samples taken over a two-week period to form a composite that will be refrigerated and twice monthly sent to a lab for testing. Sample lines will be flushed before collection of the sample. Liquid biosolids samples taken directly from tanks as they are being pumped to the field will be analyzed by a WDOE certified lab using approved procedures on a dry weight basis for Total Solids, Ammonia Nitrogen and TKN expressed as mg/Kg. Filtrate biosolids, because the solids content is usually less than .5%, will be analyzed for Ammonia N and TKN on a wet basis expressed as mg/l.
- c. Grab samples of dewatered biosolids are collected daily, mixed with other like samples, refrigerated and analyzed twice each months for Total Solids, Ammonia Nitrogen and TKN expressed as mg/Kg.
- d. This sampling frequency may be increased or reduced depending upon variability or if patterns become evident.

Metals Monitoring

WAC 173-308-150 requires that the content of selected metals in biosolids be documented 4 times per year for facilities that process up to 1653 dry tons per year.

- Sample each liquid biosolids holding tank as it is being aerated and pumped to the field. Sample dewatering equipment feed tanks daily as they are being agitated with air and pumped to the dewatering equipment.
- Refrigerate and mix above samples together and hold for 3 months

- 4 composite samples per year will be collected and analyzed.
- Transport the samples on ice to a certified lab that uses the analytical procedures listed in WAC 173-308-140.

Vector Attraction Reduction (VAR) Monitoring

Bio Recycling accomplishes VAR by adding quicklime (CaO) to liquid biosolids to raise the pH above 12. Lime is added to various sized batches of up to 16,000 gallons depending on the rate of customer deliveries. A composite sample is created from all of the sub-samples collected from the batches that go into filling a holding tank. Holding tanks range in size from 20,000 to 33,000 gallons, most are the larger type. The composite sample serves as a representative sample of the filled tank and is measured for pH initially and again after at least two hours to determine the pH is 12 or above. The sample is again measured for pH after at least an additional 22 hours to determine if it is 11.5 or greater. The sample collection point may be changed to a sample port on each holding tank in the future. If changed, a sample will be taken when each holding tank is filled and tested at the proper times. If at any point the pH is less than required, additional lime will be added and the hold time restarted. The pH is measured using hand held pH meters. The compliance times and pH of each filled holding tank is recorded manually in a log book. Only material that has complied with the pH and hold time requirements will be land applied or routed to dewatering and Class A equipment.

The pH meters used for this analysis will be operated and maintained per manufacturers instructions. The meters will be calibrated at least weekly using a standard solution with a pH of at least 9.0.

Pathogen Reduction Monitoring for Class A

A. Process descriptions

Dewatered Biosolids (Not currently in use)

Dewatered biosolids are produced with a belt press. Currently dewatered solids are conveyed to covered storage where they are periodically removed and sent to a permitted BUF or composter. In the future a Harburg-Freudenberger rendering cooker may be installed to produce Class A EQ biosolids cake. The cooker is comprised of a 55" diameter horizontal cylinder that is 24.5' long. The cylinder has an insulated steam jacket surrounding it and has a non-direction rotating armature inside that can also be heated with steam. The time and temperature requirements are met by adding steam to the cooker such that the solids are heated as they pass through. The contact time at the required temperature of 70 Celsius has been established for maximum flow rates from the belt press to be greater than 20 minutes. Steam pressure in the jacket and product temperature readings are taken and recorded every two hours when operating.

Filtrate Biosolids (Not currently in use)

In the future the liquid produced during dewatering (filtrate biosolids) may be pasteurized in a two stage shell and tube or plate and frame heat exchanger and an insulated holding loop. The first stage transfers heat from the heat Class A product into the incoming liquid. The second stage adds additional heat using steam as needed to reach the temperature required for pasteurization.

B. Retention time documentation

Dewatered Biosolids

The time to transit the cooker will be determined with an inserted data logger that records time and temperature as it travels the length of the cylinder. These data logger evaluations will be completed several times during the initial weeks of operation at various feed rates from the belt press. Contact time for maximum feed rates from the press will be determined to ensure the 20 minutes required for 160 degrees Fahrenheit is met for Class A EQ limits. Temperatures above 170 degrees Fahrenheit are anticipated but the minimum required detention time of 20 minutes is still required for solids content above 7%. Percent solids are typically 25-35% or greater. Below is an EPA table indicating time and temperature for EQ.-

503-time temperature relationships

Solids Content greater than 7 percent solids

Equation $D=131,700,000/(10^{0.14t})$
 D in
 days
 t in degrees
 Celsius

$$t=\log(131700000/D)/0.14$$

seconds	Time		hours	days	Temp	
	minutes				oC	oF
15	0.250		0.0042	0.0	84.9	184.7
30	0.500		0.0083	0.0	82.7	180.9
60	1.000		0.0167	0.0	80.6	177.0
	2.000		0.0333	0.0	78.4	173.1

6.0	0.1	0.0	75.0	167.0
------------	------------	------------	-------------	--------------

<i>10.0</i>	<i>0.2</i>	<i>0.0</i>	<i>73.4</i>	<i>164.1</i>
<i>11.4</i>	<i>0.2</i>	<i>0.0</i>	<i>73.0</i>	<i>163.4</i>
16.0	0.3	0.0	72.0	161.5
20.0	0.3	0.0	71.3	160.3
25.0	0.4	0.0	70.6	159.0
30.0	0.5	0.0	70.0	158.0

Filtrate Biosolids

The at the design flow rate of 75-200 gpm, a heat treatment pipe loop will be designed to provide a minimum of 45 seconds of non-short circuiting plug flow through the loop. Contact times are calculated based on flow meter readings and the known geometry of the pipe loop. The process pump speed will be set such that the maximum flow rate will result in a pipe loop detention time greater than 45 seconds. The target temperature will be 175 F which requires 30 seconds for biosolids containing less than 7% solids.

C. Temperature documentation

Dewatered Biosolids

The cooker has 4 temperature sampling ports which will be used to sample product temperatures every two hours along with steam pressure which will then be recorded manually on paper.

Separated Liquid Biosolids

For liquid processing, a single Type K thermocouple or similar device will be located at the end of the heat treatment loop. No other temperature reading locations are proposed because it is assumed that if the temperature at the discharge of the loop is compliant the temperature at any point upstream will be compliant. This thermocouple is used by the control system to adjust steam supply and is also the source of compliance temperature data. The temperature reading for each location is monitored by the site computer at 1 minute intervals and recorded in a data base. In addition, all of the temperature data is continuously displayed for operator monitoring at the control panel for each heat treatment unit.

D. Fecal Coliform Analysis for Class A Compliance

The Exceptional Quality biosolids designation requires testing for Fecal Coliform content. A Class A biosolids product must have less than 1000 MPN per gram dry weight. Salmonella analysis is an optional test for Class A designation. Testing to date indicates that Fecal Coliform is a suitable method of analysis for Bio Recycling Corp. Bio Recycling may produce dewatered

cake and liquid Class A products at the North Ranch. Samples for fecal coli form will be collected quarterly.

The Class B designation does not require analysis for Fecal Coliform when the requirement is satisfied with lime treatment.

1. Dewatered and Heat Treated Solids

A short duration but intensive sampling effort will be undertaken at startup of the heat treatment processes to demonstrate that Class A Fecal Coliform results would be attained. Once this intensive period was completed a much less intensive routine monitoring program was implemented.

a. Initial Process Performance Verification

Multiple samples will be taken during two one-week sampling events in order to best represent the performance of a Class A pathogen reduction process. A sampling event is defined as the period during which samples are collected. Samples may include several independently analyzed sub-samples taken during the sampling event.

1) Sampling Locations

Samples will be collected from the inlet and outlet of the cooker.

2) Sampling Frequency

Samples will be collected from each location twice per week

3) Number of Samples

Three grab samples will be collected within a 20-minute period from each of the locations. One random duplicate/split sample will also be collected during each sampling event.

b. Routine Monitoring

1) Sampling Locations

Samples will be collected from product storage areas as it is added either via conveyor belt or screw conveyor.

2) Sampling Frequency

Samples will be collected quarterly in those quarters when the cooker will be operated.

3) Number of Samples

Four grab samples will be collected and composited over a one-hour period.

Sample Collection and Analysis Procedures

Care must be taken to assure that sampling equipment and containers are not contaminated by contact with hands or other environmental surfaces. Failure to properly prepare for and collect samples will result in erroneous results that will result in significant problems with the Class A designation and the potential for remedial action at Class A application sites. The following procedures must be used:

- A. Preparation of equipment
 - 1) Trowel – Soak in a bleach solution for at least 1 minute.
 - 2) Rinse with bottled distilled water.
 - 3) Gloves – Use sterile disposable latex gloves.
- B. Sample collection and cooling – Samples will be collected in sterile containers provided by the contract laboratory. The samples will be cooled for 10 minutes in an ice water bath in the bottom of the cooler or a refrigerator. Any water will then be drained from the cooler for transport to the lab. Sufficient cooling media will be provided to assure the samples is maintained below 4°C (39°F) during transport.
- C. Sample transport and analysis - The samples will be delivered to the lab within 24 hours of collection. The laboratory utilized for the analysis will be certified by the Department of Ecology to analyze for Fecal Coliform (or *Salmonella* if required).

2. Separated Liquid Biosolids (Filtrate)

a. Initial Process Performance Verification

1) Sampling Locations

Samples will be collected from 3 locations:

- The liquid in the equalization tank prior to heat treatment to determine the bacterial density in the VAR product.

- A valved spigot located at the discharge end of the heat treatment loop
- The liquid product storage tank where it held for land application or transport off site.

2) Sampling Frequency

During the first 2 weeks of operation samples will be collected twice weekly

3) Number of Samples

Three samples will be collected from each location

b. Routine Monitoring

1) Number of samples –1) Sampling Locations

The liquid product storage tank as it is pump into the transport trucks.

2) Sampling Frequency

Samples will be collected monthly for the first 12 months of production and then reduced to quarterly thereafter.

3) Number of Samples

Four grab samples collected and composited over a one-hour period.

Sample Collection and Analysis Procedures

After purging the sample line for 5 seconds, the sample will be transferred directly into the lab provided container. The samples will be cooled for 10 minutes in an ice water bath in the bottom of the cooler. Any water will then be drained from the cooler for transport to the lab. The samples will be delivered to the lab within 24 hours of collection. The laboratory utilized for the analysis will be certified by the Department of Ecology to analyze for fecal coliform or *Salmonella*.

17.01.110 FISH AND WILDLIFE HABITAT CONSERVATION AREAS

A. PURPOSE.

Fish and wildlife habitat conservation means land management for maintaining species in suitable habitats within their natural geographic distribution so that isolated populations are not created. This does not mean maintaining all individuals of all species at all times, but it does mean intergovernmental cooperation and coordination is critically important in a region. In some cases, it is sufficient to assure that a species will usually be found in certain regions across the state. The provisions for the protection of habitat contained in this section can not succeed in their purpose of supporting viable populations of fish and wildlife species unless other agencies and the public also act to protect the species. In the case of anadromous fish, the Statewide Salmon Recovery Strategy identifies that it will take a balanced approach to addressing the factors of decline that are within human control, including harvest, hatchery, habitat, and hydropower. The underlying assumption within this section is that impacts to anadromous fish or their habitat or to fish and wildlife conservation areas shall be avoided or mitigated as detailed in an approved Habitat Management Plan as described in Section 17.01.110.J. The intent of this Section is to:

1. Protect critical habitat features to support genetically viable populations of fish and wildlife species and allow for commercial and non-commercial uses;
2. Protect the biological, physical, and chemical components of water quality for the benefit of aquatic and terrestrial resources, as well as human consumptive uses;
3. Ensure that natural stream and marine shoreline functions such as flow patterns, production of sediment and large woody debris are maintained with minimal interference or impact to private property;
4. Protect habitat for federal or state listed endangered, threatened or sensitive fish and wildlife.
5. Encourage non-regulatory methods of habitat retention whenever practical, through education, and the Open Space Tax Program.
6. To supplement the Shorelines Master Plan for Mason County to preserve and protect critical fish and wildlife habitat pursuant to (WAC 365-190-080(5)). It is the intent that this ordinance will compliment and supplement the Shorelines Master Plan.
7. To implement the Mason County Comprehensive Plan and to achieve these purposes consistent with the Comprehensive Plan.

B. FISH AND WILDLIFE HABITAT CONSERVATION AREA CATEGORIES.

Fish and wildlife habitat conservation areas include both aquatic and terrestrial areas within Mason County. The approximate location and extent of critical fish and wildlife habitat areas are displayed in the Washington Department of Fish & Wildlife's (WDFW) Priority Habitat and Species (PHS) Program database. Mason County will also use other available information for these critical fish and wildlife habitat areas, including tribal and federal databases and local knowledge. The following categories shall be used in classifying critical areas to be regulated under this ordinance:

1. Commercial and recreational shellfish areas.
2. Kelp and eelgrass beds; herring, sand lance, and smelt spawning areas.
3. Naturally occurring lakes and ponds under twenty acres and their submerged aquatic beds that provide fish or wildlife habitat.
4. Streams.
5. Saltwater Shorelines, and Lakes 20 Acres and Greater in Surface Area.
6. Lakes, ponds, streams, and rivers planted with game fish by a governmental or tribal

- entity.
7. State Department of Natural Resources natural area preserves and natural resource conservation areas.
 8. Areas with which Federal or State endangered, threatened and sensitive species of fish and wildlife have a primary association. Those species known to be found in Mason County are listed in Table 1. Protection of species habitats is determined by the State or Federal listing, and their actual presence near the site subject to review. Other listed and protected species may be found in Mason County, which are not in Table 1.
 8. Other areas that contain habitats and species of local importance (which include juvenile salmonid migration areas) as listed in Table 1 below. Species of local importance may include, but are not limited to, State Candidate and Monitor species.

Table 1. Species of Importance that may occur in Mason County

Species	Scientific Name	State Status	Federal Status
<i>Fish</i>			
Bull Trout	<i>Salvelinus confluentis</i>	Candidate	Threatened
Puget Sound Chinook	<i>Onchorynchus tshawytscha</i>	Candidate	Threatened
Hood Canal Summer Chum	<i>Onchorynchus keta</i>	Candidate	Threatened
Dolly Varden	<i>Salvelinus malma</i>	none	none
<i>Amphibians</i>			
Western Pond Turtle	<i>Clemmys marmorata</i>	Endangered	Species of Concern
Cascade Frog	<i>Rana cascadae</i>	none	Species of Concern
Van Dyke's salamander	<i>Plethodon vandykei</i>	Species of Concern	Species of Concern
Tailed Frog	<i>Ascaphus truei</i>	Monitor	Species of Concern
Olympic Torrent salamander	<i>Ryacotriton olympicus</i>	Monitor	none
<i>Mollusks</i>			
Newcomb's littorine snail	<i>Algamorda newcombiana</i>	Species of Concern	Species of Concern
<i>Birds</i>			
Marbled Murrelet	<i>Brachyramphus marmoratus</i>	Threatened	Threatened
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Threatened	Threatened
Northern Spotted Owl	<i>Stridex occidentalis</i>	Endangered	Threatened
Northern Goshawk	<i>Accipiter gentilis</i>	Candidate	Species of Concern
Peregrine Falcon	<i>Falco peregrinus</i>	Endangered	Species of Concern
Pileated Woodpecker	<i>Drycopus pileatus</i>	Candidate	none
Common Loon	<i>Gavia immer</i>	Sensitive	none

Harlequin Duck	<i>Histrionicus histrionicus</i>	none	Species of Concern
Brandt's Cormorant	<i>Phalacrocorax penicillatus</i>	Candidate	none
Olive-sided Flycatcher	<i>Contopus boreaus</i>	none	Species of Concern
Golden Eagle	<i>Aquila chrysaetos</i>	Candidate	none
Great Blue Heron	<i>Ardea herodias</i>	Monitor	None
Merlin	<i>Falco columbarius</i>	Candidate	None
Purple Martin	<i>Progne subis</i>	Candidate	None
Western Bluebird	<i>Sialia mexicana</i>	Monitor	None
Vaux's Swift	<i>Chateura vauxi</i>	Candidate	None
Mammals			
Gray Wolf	<i>Canis lupis</i>	Endangered	Endangered
Pacific Fisher	<i>Martes pennanti</i>	Endangered	Species of Concern
Townsend's big-eared bat	<i>Plecotus townsendii</i>	Candidate	Species of Concern
Shelton pocket gopher	<i>Thomomys</i>	Candidate	None
Merriam's Shrew	<i>Sorex merriami</i>	Candidate	None
Roosevelt elk	<i>Cervus elaphus roosevelti</i>	none	None
Pygmy Shrew	<i>Sorex hoyi</i>	Monitor	None

Table 2. Priority Species not Federally or State listed and not governed by this ordinance.

Species	Scientific Name	State Status	Federal Status
Blue Grouse	<i>Dendragapus obscurus</i>	None	None
Band-tailed Pigeon	<i>Colmba fasciata</i>	None	None
Wood Duck	<i>Aix sponsa</i>	None	None
Hooded Merganser	<i>Lophodytes cucullatus</i>	None	None
Mountain Quail	<i>Oreortyx pictus</i>	None	None

C. DESIGNATION

The areas classified in Section B above as Fish and Wildlife Habitat Conservation Areas (FWHCA) are hereby designated under RCW 36.70A.060 and RCW 36.70A.170, as critical areas requiring proper land management to protect their value and functions.

D. ESTABLISHMENT OF BUFFERS ON FISH & WILDLIFE HABITAT CONSERVATION AREAS

1. Fish and Wildlife Habitat Conservation Areas shall have Buffers and Building Setbacks established. The standard buffer and setback requirements are shown in Table 3.
 - a. Buffers or setbacks shall be maintained along the perimeter of Fish and Wildlife Habitat Conservation Areas Buffer distances associated with streams shall be measured horizontally from the ordinary high water mark (OHWM) or channel migration zone (CMZ), whichever is greater. All other buffer distances shall be measured horizontally from the established FWHCA perimeter.

- b. Buffers shall be retained in their natural condition, except as provided elsewhere in this ordinance.
 - c. Building Setback Lines: A building setback line of fifteen (15) feet is required from the edge of any buffer area, except for Type 1 saltwater and lake excluding Conservancy Shorelines.
2. The following are special provisions for buffers and setbacks on lots created prior to December 5, 1996, and which are located on saltwater or on a freshwater lake 20 acres or larger in size. As stated in the Table 3, there shall be a standard 100 foot buffer for a total of 100 feet as measured from the ordinary high water mark (OHWM). Provided, however, that in the following circumstances, these special provisions apply instead of the standard buffer and setback requirement.
- a. *Special provision for view protection on subject lots.*
Applications for single-family residential construction and meeting the following conditions shall have buffers and setbacks as described below:
 - 1) Where existing residences are on both sides of and within 150 feet of the lot line of the subject lot, and no more than 200 feet from the shoreline OHWM, the setback on the subject lot is determined by an imaginary common line drawn across the subject lot which connects the shore-side roof lines of the first adjacent existing residences. (See Figure 1). The common line set back may be more or less than 100 feet from the OHWM, provided, however, that:
 - (a) the buffer shall not be less than 20 feet in width from the OHWM and a minimum setback from the edge of the buffer is 15 feet; and
 - (b) there shall be a maximum buffer of 100 feet from the OHWM with the balance of the setback established by the common line to be a building setback area.
 - (c) if the resulting buffer is less than 100 feet, it will be enhanced for wildlife function which will include at a minimum planting with native vegetation.
 - (d) if the resulting buffer is less than 100 feet, the development of site outside the buffer shall also use best management practices such as those in Appendix C to limit impacts to the resource.
 - 2) Where an existing residence is on one side of and within 150 feet of the lot line of the subject lot, and no more than 200 feet from the shoreline OHWM, the setback on the subject lot is determined by an imaginary common line drawn from the shore-side roof line of the existing residence and across the subject lot to a point which is 100 feet from the OHWM along the far lot line of the subject lot. (See Figure 2). The common line set back may be more or less than 100 feet from the OHWM, provided, however, that:
 - (a) the buffer shall not be less than 20 feet in width from the OHWM and a minimum setback from the edge of the buffer is 15 feet; and
 - (b) there shall be a maximum buffer of 100 feet from the OHWM with the balance of the setback established by the common line to be a building setback area.
 - (c) If the resulting buffer is less than 100 feet, it will be enhanced for wildlife function which will include at a minimum planting with native vegetation.
 - (d) If the resulting buffer is less than 100 feet, the development of site outside the buffer shall also use best management practices such as those in Appendix C to limit impacts to the resource.

- 3) As used in this section, a “residence” refers to the principal dwelling/ residential structure and does not include outbuildings or other structures.
 - 4) When applying 1) above, if the shoreline has a high degree of curvature, the Administrator may use the average set back from OHWM of the two existing residences rather than the imaginary line between the rooflines in order to establish the common line setback. When applying 2) above, if the shoreline has a high degree of curvature, the Administrator may use the average of the set back from OHWM of the existing residence and the 100 foot setback, rather than the imaginary line between the roofline and the 100 foot setback, in order to establish the common line setback.
- b. *Special provision for water-dependent uses on existing lots.*
 Applications for development defined as water-dependent uses shall provide the standard 100 foot buffer along as much of the shoreline as possible while making the minimum necessary adjustments to the buffer to provide for the water-dependent use, as determined by the Director. Such development shall meet the requirements of other applicable regulations, including other Resource Ordinance sections and the Mason County Shoreline Master Program.

Table 3. Fish & Wildlife Habitat Conservation Area Development Standards.

Habitat Type	Buffer	Building Setback from Buffer
Type S Stream	150 feet	15 feet
Type F Stream	150 feet	15 feet
Type SP Stream**	200 feet	15 feet
Type Np Stream	100 feet	15 feet
Type Ns Stream	75 feet	15 feet
Saltwater and Lakes over 20 acres excluding Conservancy Shorelines	100 feet	0 feet
Conservancy Shorelines*, Saltwater and Lakes over 20 acres	100 feet	15 feet

*Conservancy Shorelines are those shorelines designated as Conservancy Shoreline Environment in the Mason County Shoreline Master Program.

Please see the Definitions section under “Stream” for further explanation.

S = shoreline of the state, F = fish habitat, Np = non-fish habitat with perennial (all year) water, Ns = non-fish habitat with dry periods or seasonal water flow. **SP stream is proposed for consideration if any specific streams are identified that are significant in terms of anadromous fish and recommended to be protected by a larger buffer.

3. *Provision for Decreasing Buffer.*

For major new development, Mason County may decrease the buffer after consultation with the Washington State Department of Fish and Wildlife and the Skokomish Tribe, the Quinault Tribe and/or the Squaxin Island Tribe, after review and approval of a Habitat Management Plan, and after a public hearing. Mitigation must be adequate to preserve or enhance the functions and values of the critical area. This means that a finding must be made that the net effect of the proposal equal or better than applying the standard buffers. If enhancement is part of the mitigation plan, then a greater level of enhancement is required to offset the time lost while the enhancement matures.

4. *Provision for Increasing Buffer.*

Mason County may increase the buffer width on a case-by-case basis, after a public

hearing, as provided in subsection 17.01.120.L., when a larger buffer is necessary to protect the structure, function and value of Fish & Wildlife Habitat Conservation Areas. The buffer shall be increased or other protections shall be provided in order to prevent a significant adverse environmental impact by a proposed project on those functions and values. This determination shall be supported by appropriate documentation to be obtained in consultation with the state of Washington and the Skokomish Tribe, Quinault Tribe and/or the Squaxin Island Tribe. Such determination shall be attached as a permit condition and shall demonstrate that:

- a. A larger buffer is necessary to maintain viable populations or critical habitat of endangered, threatened, or sensitive species; or
- b. The adjacent land is susceptible to severe erosion and erosion control measures will not effectively prevent adverse impacts to the FWHCA; or
- c. If the FWHCA contains variations in sensitivity, increasing the vegetation area widths will only be done as necessary to preserve the structure, function and value of the FWHCA.
- d. If the increase in buffer is based on the upland area feeding substantial material to the net-shore drift system, as identified in the Mason County Shoreline Inventory Report, June 12, 1995, that the larger buffer is necessary in maintenance of that system and the functions and values of the FWHCA. The increase shall approximate the bluff erosion distance having occurred over the past 50 years, based on best available information.

5. Lakes and ponds under 20 Acres that are not regulated as wetlands and that do not have critical habitat for listed species of local importance shall have buffers of 35 feet with an additional 15 foot building setback.

E. STEWARDSHIP OPTIONS AND INCENTIVES

The purpose of this subsection is to encourage property owners to protect critical areas and their buffers and to reduce the burden on property owners from the application of the Resource Ordinance regulations. Options given below may be used individually, or they may be combined for greatest effect and benefit.

1. *Open Space Bonus:* Any property owner, except on land designated as Long-Term Commercial Forest Lands, Agricultural Resource Lands or Mineral Resource Lands, may apply for a performance subdivision as provided in Chapter 16.22, Mason County Code. Approval of such a subdivision provides for a development density bonus - that is, it allows more lots for development - in exchange for the protection of critical areas and meeting other design requirements.
2. *Open Space Tax Assessment and Public Benefit Ratings System:* Any property owner may apply for current use property tax assessment for lands which are fish and wildlife habitat conservation areas or their buffers pursuant to RCW 84.34. The county is developing an Open Space Plan and system of evaluating the public benefit rating and an assessed valuation schedule to provide incentives for property owners to conserve important open space lands.
 - a. The land proposed for current use tax assessment shall be in a separate tract or a conservation easement.
 - b. Any person who owns an identified critical area or its associated buffer may place a conservation easement over that portion of the property. A conservation easement is a legal agreement a property owner makes to restrict the type and amount of development that may occur on a parcel. Each easement is tailored to the particular property and to the interest of the individual owner. The property owner grants an easement to an appropriate governmental agency or non-profit land trust. It provides significant property and federal income tax benefits to the property owner. The purpose of the easement shall be to preserve, protect, maintain, restore and limit future use of the property affected. The terms of the conservation easement may include prohibitions or restrictions on access and shall be approved by the property owner and the county.

3. *Density Credit.* On lands containing FWHCAs or their buffers, the county shall allow a transfer of density for residential uses from the portion of the property containing the critical areas or buffers to that portion of the property that does not contain critical areas or buffers - that is, the property could be developed with the same number of lots it would have if critical areas were not present - provided that such transfer does not create any adverse impacts to the critical area that can not be adequately mitigated and provided that all other development regulations can be met.
4. *Tax Re-assessment.* The owner of any property that has been affected by a permit decision by the county may request an immediate re-assessment by the Mason County Assessors Office, as provided by RCW Chapter 84.
5. *Conservation Futures.* If approved by a vote of the people of Mason County, Mason County shall use conservation futures revenue to compensate affected property owners for the impact of protecting fish and wildlife through the purchase of conservation easements on impacted land or the impacted land.
6. *Education.* The county encourages proper stewardship on land to provide benefits to fish and wildlife. The county shall provide educational information to the public through its sponsorship of the Washington State Cooperative Extension Service, the Mason Conservation District, or through the provision of informational materials in its offices.
7. *Best Management Practices:* Where not otherwise required, Mason County encourages the use of best management practices that are part of site preparation, development construction, and use activities after construction: erosion and sediment control measures; maintain existing vegetation and minimize site clearing; use native plants in landscaping rather than lawn areas; control runoff to small ponds and buffer vegetation; and minimize use of fertilizers and chemicals in property maintenance (pest, weed, and moss control; sealants, oils, and fuels).
8. *Enhancement.* Mason County encourages property owners to enhance critical areas and buffers which have been degraded by past land clearing and site modification activities or replaced by noxious vegetation. The county has established a Noxious Weed Board to assist with this process. Critical area enhancement projects shall require staff review and needed approvals. Mason County shall waive review fees for enhancement projects that meet either of the below criteria:
 - (a) *Sponsored Projects.* Enhancement projects sponsored by Mason County, Washington Department of Fish and Wildlife, Mason Conservation District, U.S. Natural Resources Conservation Service, U.S. Fish and Wildlife Service, Washington Department of Natural Resources, or other public agency approved by the Administrator which are consistent with the Comprehensive Plan, Resource Ordinance, and other plans adopted by the Board of County Commissioners.
 - (b) *Vegetation Planting/Removal.* Planting of native vegetation or removal of non-native species for the enhancement of the critical area; provided, that such activities are performed using hand tools and are limited to the area being enhanced; provided further, that watering of newly planted vegetation is limited to the first three years. Watering of newly planted vegetation on landslide hazard areas shall require approval of a geotechnical report, mitigation plan or restoration plan in accordance with this chapter. Allowable hand tools include gas and electric-powered equipment which is typically moved by hand, including equipment such as chain saws, hedge trimmers, and lawn mowers.

F. ACTIVITIES WHICH DO NOT REQUIRE A MASON ENVIRONMENTAL PERMIT

The following uses shall be allowed, within a FWHCA or its buffer to the extent that they are not prohibited by any other applicable law or ordinance, provided they are conducted so as to minimize any impact on the values and functions of the FWHCA, and provided they are consistent with any county approved Resource Ordinance Special Study (such as a Habitat Management Plan or Geotechnical Report) or any state or Federally approved management plan for an endangered, threatened, or sensitive species.

1.
 - a. The remodel, repair, or change of use of an existing building shall be approved within its existing footprint, plus or minus ten percent as long as the modification does not increase any intrusion into the FWHCA or its buffer.
 - b. Reconstruction of structures destroyed by fire or other means shall be approved, provided that the planned reconstruction occurs within the previous structural footprint and completed application is made within two years of the destruction. The ten percent expansion set forth in 1a. may also be applied.
 - c. To further reduce the impacts of existing development, the footprint of existing structures approved by permit within the FWHCA or its buffer may be combined into one footprint area equal to or lesser than the original area, provided that:
 - (1) the combined footprint proposed shall be located in the site of legally established residences and garages most distant from or less intrusive to the FWHCA or buffer, and the other structures nearer to the FWHCA shall be removed from the FWHCA or buffer; and
 - (2) the square footage area of the structure in the combined footprint may not be increased more than 20 percent of the total square footage area of the original structures. The ten percent expansion of footprint set forth in 1a. does not apply.

For the purpose of this section, footprint does not include uncovered decks and patios.

2. Maintenance and use of existing landscaped areas within the buffer area. An existing landscaped area is one which is defined by mowed grass, flower beds, orchard trees, non-native shrubs, and non-native trees. Maintenance and use includes mowing, weeding, trimming, replacement of vegetation types, placing landscape walls no more than 2 feet in height, excavating or placing top soil or compost not exceeding 6 inches in depth or 10 cubic yards in total, placing play equipment (swings, slides, temporary plastic above-ground pools, but not including tree houses or other play houses), and picnic tables and chairs. Maintenance does not include the removal of native trees over 6 inches in diameter at 4 foot height. Exposure of more than 200 square feet of soil at any one time requires stormwater precautions so that no contaminated run off reaches the river, wetland, stream, or lake. If such maintenance or use in the buffer area is abandoned or discontinued for greater than three (3) years, activities must conform to the provisions of Section 17.01.110.G.1.
3. All new and existing agricultural activities within any FWHCA and or its buffer complying with a current conservation plan that conforms with the standards and specifications of the Natural Resources Conservation Service and is submitted to and approved by the Administrator; or operating in conformity with a permit of a state agency, except as required by subsection 17.01.110 G.1.j. below.
4. Buffer alterations for view corridors are allowed with emphasis placed on limbing and with selective timber removal minimized to the extent possible. Proposed alterations shall be the minimum to afford views within the buffer and shall minimize shrub vegetation removal and ground disturbance while maintaining the large mature trees. Under this provision, no more than 10 percent of trees in the buffer less than six inches in diameter at breast height may be cut without specific authorization from Mason County, which may allow removal up to 20 percent. View corridor improvement actions which include the cutting of trees larger than six inches in diameter at breast height will require Mason County approval prior to cutting, replacement with native tree and/or shrub plant species, and are limited to 15 percent of such trees in the buffer. The cutting down of more than 15 percent of such trees requires a Mason Environmental Permit from Mason County.
5. The felling of danger trees within buffers provided the following conditions are met:
 - a. When it is demonstrated to the satisfaction of the Mason County Director of Community Development or his or her designee ("Department") that an imminent threat exists to public health or safety, or the safety of private or public property. Landowner shall provide to the Department a written statement describing tree location, danger it poses, and proposed mitigation.

- b. Should the imminent threat not be apparent to the Department (as danger trees are defined in Section 17.01.240), the Department may require the landowner submit a report from a professional forester or certified arborist.
- c. Before a danger tree may be felled or removed, with the exception of an emergency pursuant to Section 17.01.170, the landowner shall obtain written approval from the Department. This approval shall be processed promptly and may not be unreasonably withheld. If the Department fails to respond to a danger tree removal request within 10 business days, the landowner's request shall be conclusively allowed.
- d. Trees felled as danger trees shall be counted in the allowed amounts under Section 8.52.170(F)(4).
- e. Mitigation as approved by the Department to include:
 - i. the planting within the critical area or its buffer a total of six new native trees, each a minimum three years old. Should a report be submitted under subsection 5(b), it shall contain recommendations for suitable replacement trees.
 - ii. felled trees shall be left within the critical area or buffer unless a submitted report warrants its removal to avoid spreading disease or pests;
 - iii. the trunk of the cut tree may be segmented, but should be left in as large of segments as possible to provide habitat;
 - iv. the branches from the cut tree may be removed to control fire hazard; and
 - v. additional mitigation may be required if three or more trees are to be felled on one property within a 10 year period.
- 6. The removal from buffer areas of noxious weeds designated in Chapter 17.10 RCW and the enhancement of a buffer by planting indigenous vegetation (see also Section 17.01.110.E.8).
- 7. The construction of trails associated with residential use which shall be unpaved when located in the buffer areas and elevated when located in wetlands, which are not intended for motorized use, and which are no wider than three (3) feet, unless additional width is necessary for safety along a precipice, steep hillside, or other hazardous area.
- 8. A habitat enhancement project that has minimum County review and is subject to the review and approval by a governmental agency, tribal agency, or fish and wildlife habitat enhancement group utilizing the process stated in R.C.W. 77.55.290.
- 9. Harvesting of Wild Crops: Harvesting wild crops which do not significantly affect the viability of the wild crop, the function of the Fish and Wildlife Habitat or regulated buffer (does not include tilling of soil or alteration of the Fish and Wildlife Habitat Conservation Area).
- 10. Any of the General Exemptions authorized by Section 17.01.130.

G. DEVELOPMENT AND ACTIVITIES REQUIRING A MASON ENVIRONMENTAL PERMIT IN FISH & WILDLIFE HABITAT CONSERVATION AREAS OR THEIR BUFFERS

A Mason Environmental Permit shall be obtained from the County, using the administrative review process in this Chapter, before undertaking the following activities in FWHCAs or their buffers. When a major new development is proposed within 1/4 mile of a listed species point location (den

or nest site), as identified through the WDFW PHS data base, tribal and other local fish and wildlife databases or knowledge, a preliminary review by a qualified fish and wildlife professional shall be provided to the county which shall determine if a FWHCA or its buffer is within the area of the development.

1. A Habitat Management Plan (HMP) shall be prepared for these activities:
 - a. The removal, excavation, grading, dumping, discharging or filling of any material unless part of a project which has been permitted pursuant to this section or for which no permit is required.
 - b. The destruction or alteration of FWHCA's or their buffers through clearing, harvesting, shading, intentional burning, vegetation removal (terrestrial, freshwater, or marine), or planting of vegetation that would alter the character of the FWHCA or buffer, unless part of a project which has been permitted pursuant to this section or for which no permit is required.
 - c. *New Construction and Major New Development.*
 1. New residential construction and major new development is not permitted within FWHCA or its buffer, except for the activities listed in this subsection G, or as approved through a variance or reasonable use exception as provided in subsection K.
 2. Appurtenant structures not needing building permits, associated with residential development and located in the FWHCA or buffer may be permitted. A proposal shall meet the additional review standards of the Mason County Shoreline Master Program, Resource Ordinance, and other development ordinances.
 3. Saltwater Activities: Accessory uses to existing or new development, such as a saltwater pier, dock, or float; boat ramp, boat lift, stairways, and stair-towers will need to meet the additional review standards of the Mason County Shoreline Master Program, Resource Ordinance, and other development ordinances. All activities in tidal/saltwater submerged lands shall avoid impacts to eelgrass and kelp beds to the maximum extent. If eel grass or kelp is known or suspected in the vicinity, then an aquatic vegetation survey is required to identify the location of eelgrass or kelp. Unavoidable impacts to these sensitive marine areas shall be addressed in a Habitat Management Plan that presents an acceptable mitigation program. Appendix B has best management practices for docks and floats.

The design and siting of these projects should not adversely impact water quality of receiving waters such as wetlands, streams, rivers, Hood Canal or Puget Sound. In addition, project design should meet or exceed any storm water design requirements to avoid any risk of decertification of shellfish beds or impacts to baitfish (herring, smelt, sand lance, candlefish ,etc.) spawning areas.

- d. *Stream Relocation.* Stream relocations are discouraged except for the purpose of fisheries restoration and require a Habitat Management Plan. Stream relocation shall only be permitted when adhering to the following minimum performance standards and when consistent with Washington State Department of Fish and Wildlife Hydraulic Project Approval.
 - i. The channel, bank and buffer areas shall be replanted with native vegetation that replicates a natural, undisturbed riparian condition; and,
 - ii. For those shorelands and waters designated as Frequently Flooded Areas pursuant to Section 17.01.090, a professional engineer licensed in the State of Washington shall provide information demonstrating that the equivalent base flood storage volume and function will be maintained.
 - iii. Relocated stream channels shall be designed to meet or exceed the functions and values of the stream to be relocated as determined by the monitoring in the Habitat Management Plan.

- e. *Bank Stabilization.* A stream channel and bank, bluff, and shoreline may be stabilized when naturally occurring earth movement threatens existing legal structures (structure is defined for this purpose as those requiring a Building Permit pursuant to the International Building Code), public improvements, unique natural resources, public health, safety or welfare, or the only feasible access to property, and, in the case of streams, when such stabilization results in maintenance of fish habitat, flood control and improved water quality. Bluff, bank and shoreline stabilization shall follow the standards of the Mason County Shoreline Master Program, Landslide Hazard Areas, and any floodplain management plan adopted by the Board of Commissioners.

Mason County may require that bank stabilization be designed by a professional engineer licensed in the State of Washington with demonstrated expertise in hydraulic actions of shorelines. For bank stabilization projects within FWHCAs, emphasis shall be placed on bioengineering solutions (techniques used alone or in combination such as beach nourishment, coarse beach fill, gravel berms, or vegetation rather than hard surfaces such as concrete armoring) unless proved by the applicant to be infeasible. Bank stabilization projects may also require a Hydraulic Project Approval from the Washington Department of Fish and Wildlife and will be determined after consultation with WDFW.

- f. *Gravel Mining.* Gravel mining is discouraged within FWHCAs or their buffers, and it shall not be permitted if it causes significant adverse environmental impact, but it may be allowed following the review and approval of a Habitat Management Plan, including a detailed mining and reclamation plan (required by the Washington Department of Natural Resources).
- g. *Conservation.* Any conservation, preservation, or enhancement projects to protect functions and values of the critical area system, including activities and mitigation allowed pursuant to the mitigation priorities identified in Section I (see also Section 17.01.110.E.8).
- h. *Outdoor Recreation, Education and Trails.* Activities and improvements which do not significantly affect the function of the Fish and Wildlife habitat or regulated buffer (including viewing structures, outdoor scientific or interpretive facilities, trails, hunting blinds, etc.) may be permitted in FWHCA or their buffers.
- i. Trails and other facilities shall, to the extent feasible, be placed on existing road grades, utility corridors, or other such previously disturbed areas;
 - ii. Trails and other facilities shall be planned to minimize removal of trees, shrubs, snags and important wildlife habitat;
 - iii. Viewing platforms, interpretive centers, benches and access to them, shall be designed and located to minimize of impacts to wildlife, fish, or their habitat and/or critical characteristics of the affected conservation area.
 - iv. Trails, in general, shall be set back from streams so that there will be minimal impact to the stream from trail use or maintenance. Trails shall be constructed with pervious surfaces when feasible and trails within FWHCAs are not intended to be used by motorized vehicles.
- i. *Road/Street Expansion & Construction.* Any private or public road or street expansion or construction which is allowed in a Fish and Wildlife Habitat Conservation Area or its buffer shall comply with the following minimum development standards:
- i. No other reasonable or practicable alternative exists and the proposed road or street serves multiple properties whenever possible;
 - ii. Public and private roads should provide for other purposes, such as utility crossings, pedestrian or bicycle easements, viewing points, etc.; and,
 - iii. The road or street construction is the minimum necessary, as required by the Department of Public Works and Fire Marshall, and shall comply with the Department of Public Works' guidelines and Fire Code to provide public safety and mitigated storm water impacts. Minimum necessary

- FWHCA.
- ii. After preliminary approval and prior to final land division approval, the common boundary between a required buffer and the adjacent property shall be identified using appropriate signs. In lieu of signs, alternative methods of buffer identification may be approved when such methods (fences or enhanced native planting) are determined by Mason County to provide adequate identification to the buffer and the FWHCA.
 - iii. Buffer areas shall be dedicated as permanent open space tracts, functioning as FWHCA buffers.
 - iv. If development is proposed within a FWHCA or its buffer, a HMP is required.
- c. *Utilities:* Placement of utilities within designated Fish and Wildlife Habitat observation Areas may be allowed pursuant to the following standards:
- i. Construction of utilities may be permitted in FWHCA's or their buffers, only when no practicable or reasonable alternative location is available and the utility corridor meets the requirements for installation, replacement of vegetation and maintenance outlined below. Utilities are encouraged to follow existing or permitted roads where possible.
 - ii. Construction of wells, sewer lines, water lines, or on-site sewage systems are not permitted in FWHCA's but may be permitted in a buffer area when the applicant demonstrates it is necessary to meet State and/or local health code requirements; there are no other practicable alternatives available; and construction meets the requirement of this section. Joint use of the sewer or water utility corridor by other utilities may be allowed. Encroachment of more than 50 feet into the buffer will require a HMP.
 - iii. New Utility Corridors shall not be allowed in FWHCA's with known locations of federal or state listed endangered, threatened or sensitive species, heron rookeries or nesting sites of raptors which are listed as state candidate or state monitor, except in those circumstances where an approved Habitat Management Plan is in place.
 - iv. Utility corridor construction and maintenance shall protect the environment of Fish and Wildlife Habitat Conservation Areas and their buffers.
 - (1) New utility corridors shall be aligned when possible to avoid cutting trees greater than 12 inches in diameter at breast height (four and one-half feet) measured on the uphill side.
 - (2) New utility corridors shall be revegetated with appropriate native vegetation at not less than pre-construction vegetation densities or greater, immediately upon completion of construction or as soon thereafter as possible due to seasonal growing constraints. The utility shall ensure that such vegetation survives for a three-year period;
 - v. Utility towers should be painted with brush, pad or roller and should not be sandblasted or spray painted, nor shall lead base paints be used.
- d. *Forest Practices, Class IV General:* Timber harvesting with associated development activity involving land conversions from Forest Use, or otherwise meeting the DNR definition as a Class IV General application, shall comply with the provisions of this Ordinance including the maintenance of buffers, where required. If harvest or development is proposed within a FWHCA or its buffer, a HMP is required.
- e. *Mobile Home or RV Parks:* new or expanded mobile home or RV parks shall comply with the following development standards:
- i. Lots or spaces and other improved areas shall be outside of FWHCA and its buffer. Roads, utilities, and trails may encroach on the buffer or FWHCA as provided elsewhere in this section. The project as a whole shall not adversely impact the FWHCA.

- ii. The common boundary between a required buffer and the adjacent property shall be identified using signs or alternative methods determined Mason County to provide adequate identification to the buffer and the FWHCA.
 - iii. Buffer areas shall be designated as open space and preserved to the extent possible.
 - iv. If development is proposed within a FWHCA or its buffer, a HMP is required.
- f.
- 1. *Freshwater Activities.* Accessory uses to existing or new development, such as a freshwater pier, dock, or float; boat ramp, boat lift; stairways; stair-towers; will need to meet the additional review standards of the Mason County Shoreline Master Program, Resource Ordinance, and other development ordinances.
 - 2. *Park or community recreation development that is water dependent.* In areas maintained as existing developed use for the park or community recreation land use, new development such as picnic or assembly structures is permitted and are required to meet the additional review standards of the Mason County Shoreline Master Program, Resource Ordinance, and other development ordinances.
- g. *Chemical Application or Storage.* Chemical applications are not permitted within FWHCAs unless expressly approved as part of a farm plan, forest practices application or for the control of invasive or noxious plant species. In cases where approved chemical applications occur as part of a forest practices application or farm plan, proper reporting procedures shall be followed. Chemical application consistent with state and Federal regulation does not require a Mason Environmental Permit, but it does need to comply with the standards included herein. Chemical storage shall not be permitted within a FWHCA or its buffer.

H. HABITATS AND SPECIES OF LOCAL IMPORTANCE -- LISTING & DELISTING
IMPORTANT HABITATS & SPECIES

1. Locally significant species are those which are not state listed as threatened, endangered or sensitive, but which live in Mason County, and the species is special importance to the citizens of Mason County for cultural or historical reasons, or the county is a critically significant portion of their range. Mason County is a critically significant portion of the range of a species when any of the following conditions apply:
 - a. The species would be extirpated from the state of Washington if it is extirpated from Mason County; or
 - b. The species' population would be divided into non-viable populations if it is extirpated from Mason County, where the isolated populations are critical to the survival of the species; or
 - c. The species is listed as a state monitor or candidate species and Mason County is a significant portion of the range of the species and significant reduction or extirpation of the species from Mason County would result in changing the status of the species to that of state endangered, threatened, or sensitive.
2. Locally significant habitats are those habitats in which significant species live, or which is of special importance to the citizens of Mason County because they have been determined to contribute to the variety of habitats or diversity of species.
3. Regulations prepared to protect locally important habitat and species shall consider and, where possible, support the economic development of Mason County and the use of resource lands and resources industry, enhance the affordability of housing, and otherwise promote the achievement of other goals in the Mason County Comprehensive Plan.
4. The process for listing or delisting an important habitat or species in Mason County shall be an amendment to this section of the Interim Resource Ordinance. This action may be initiated by request of the State Department of Fish & Wildlife, the Skokomish Tribe, the Quinault Tribe and/or the Squaxin Island Tribe, County staff, or interested citizens. Any such request shall be in writing and shall include:
 - a. The common and scientific names of for species under consideration;
 - b. Habitat location on a map (scale 1:24,000);
 - c. The reasons for the request, including:
 - (1) declining or increasing population,
 - (2) sensitivity to habitat manipulation.
 - d. Habitat management recommendations, including potential uses and restrictions of the habitat areas, seasonally sensitive areas, and other guidelines necessary for the protection of the nominated species.
 - e. Other supporting documentation, including an analysis which weighs the non-environmental impacts of the proposal, addressing economics and land use, against the benefits of the proposed listing.
5. The written request and supporting data may be evaluated by a qualified wildlife biologist or equivalent professional selected by the County.
6. In addition to the above, the County shall consider the following factors when evaluating the request:
 - a. The specificity and scientific validity of the information about the nominated species needs and behaviors;
 - b. The sufficiency of habitat areas currently available to sustain the species over time; and
 - c. The versatility of the proposed habitat area to sustain species other than the one being nominated for local species of importance designation.

I. APPLICATION REVIEW PROCESS

1. Upon the receipt of an application for development, the Director shall determine whether the requirements of this section apply. The Director may consult with affected Tribes or state agencies in determining that the subject property is shown to be documented habitat

for federal or state listed endangered, threatened or sensitive species.

2. Boundaries: The procedures for formal determination of regulated Fish and Wildlife Habitat Conservation Area boundaries are as follows:
 - a. The FWHCA boundary for streams shall be the Ordinary High Water Mark (OHWM) or channel migration zone (CMZ).
 - b. The FWHCA boundary for marine shorelines and lakes greater than 20 acres shall be the OHWM.
 - c. The boundary of all other FWHCA's may be determined using published databases, resource agency personnel, consultation with the Skokomish Tribe, Quinault and/or the Squaxin Island Tribe, and/or by a qualified environmental professional based upon site specific assessment and species presence.
3. Permit information: When a Mason Environmental Permit is required under this section, it is the applicant's responsibility to provide all necessary and accurate data to the County for its review. This information will include a field delineation by a qualified professional (biologist, hydrologist, soil scientist, and/or other expert as circumstances warrant). Formal boundary determination is the responsibility of the County.
 - a. When sufficient information exists from the County's natural resource inventory or other sources, Mason County may waive the requirement of a field delineation, provided a qualified professional has reviewed and approved such information as reliable.
 - b. When requested by the applicant, or an affected party, the County may perform the data collection, at a fee, in lieu of direct action by the applicant.
 - c. Where Mason County performs a formal determination at the request of the applicant pursuant to subsection b above, it shall be considered a final determination unless contested by the applicant or other affected party.
 - d. Where the applicant has provided the information in support of a permit for a formal determination by the County of the Fish and Wildlife Habitat Conservation Area boundary, Mason County shall verify the accuracy of, and may render adjustments to, the boundary determination in compliance with the provisions of this ordinance.
4. When a Mason Environmental Permit is required, the permit shall be obtained from the County using the administrative review process in this chapter prior to undertaking regulated activities in a FWHCA or its buffer.
5. In addition to any other requirements, permits shall only be granted if:
 - a. The proposed activity avoids adverse impacts to regulated FWHCA, or takes affirmative and appropriate measures to compensate for impacts. Mitigation sequencing should follow the avoidance, reduction, and compensation analysis, in that order of preference, and
 - b. The proposed activity is consistent with an approved Habitat Management Plan, if such a plan is prepared; or
 - c. The proposed activity is approved as a variance or reasonable use exception under this chapter, if applicable.
6. FWHCA permits shall not be effective and no activity thereunder shall be allowed during the time provided to file and process a permit appeal.

J. HABITAT MANAGEMENT PLAN (HMP) REQUIREMENTS

The following describes the requirements of a Habitat Management Plan as discussed in this ordinance.

A HMP shall consider measures to preserve and protect the wildlife habitat and shall consider effects of land use intensity, buffers, setbacks, impervious surfaces, erosion control and retention of natural vegetation on the functions and values of the FWHCA. This report shall identify how the impacts from the proposed use or activity will be avoided or mitigated through habitat mitigation which meets the purposes of this ordinance. The most recent publication of the *Management Recommendations for Washington's Priority Habitats and Species*, as now or hereafter amended, and consultation with a habitat biologist from the Washington State Department of Fish and

Wildlife and with the Skokomish Tribe, the Quinault Tribe and/or the Squaxin Island Tribe and shall be the basis for the report. In the case of bald eagles, an approved Bald Eagle Management Plan by the Washington State Department of Fish and Wildlife meets the requirements for a HMP. For those projects requiring the preparation of a Biological Assessment (BA) or Biological Evaluation (BE) as part of the application for a Corps of Engineers permit, the approved BA or BE meets the requirements of a HMP, and the contents of the BA or BE meet the standards listed in J2.

Prior to submittal to the County, the Habitat Management Plan shall be reviewed and approved for adequacy by a qualified fish and wildlife professional. It shall contain but not be limited to the following information:

1. A map(s) prepared at an easily readable scale, showing:
 - a. The location of the proposed site;
 - b. The relationship of the site to surrounding topographic and built features;
 - c. The nature and density of the proposed use or activity;
 - d. Proposed building locations and sizes;
 - e. A legend which includes:
 - (1) A complete and accurate legal description and total acreage of the parcel;
 - (2) Title, scale, date, and north arrow;
 - (3) Certification by a qualified biologist.
 - f. Existing structures and landscape features including the name and location of all water bodies.
 - g. Location of listed species and their critical habitat areas.
2. A report which contains:
 - a. A description of the nature, density and intensity of the proposed use or activity in sufficient detail to allow analysis of such land use change upon identified wildlife habitat;
 - b. An analysis of the effect of the proposed use or activity upon fish and wildlife species and their habitats listed in this ordinance;
 - c. A plan which explains how the applicant will avoid, minimize or mitigate adverse impacts to fish and/or wildlife habitats created by the proposed use or activity. This explanation must address the management goals, policies and recommendations presented in this ordinance. While species and site specific management practices will often be required, some general best management practices have been developed in Appendix C and may be used in the plan. The mitigation plan must take into account safety issues (including fire safety) resulting from implementation. For instance, if harvest of trees is proposed, the plan must account for the presence of snags being left or other features of the plan. If merchantable timber or other trees can not be harvested safely with the mitigation proposed, then the merchantable timber or other trees must be left as part of the management plan. Monitoring of mitigation shall be required when appropriate or necessary to ensure effectiveness. Mitigation measures within the plan may include, but are not limited to:
 - (1) Establishment of buffer areas;
 - (2) Preservation of critically important plants and trees;
 - (3) Limitation of access to habitat area;
 - (4) Seasonal restriction of construction activities;
 - (5) Clustering of development and preservation of open space;
 - (6) Sign marking habitats or habitat buffer areas;
 - (7) Title notice or plat dedication warning statements;
 - (8) Conservation easements.
3. Review comments by a habitat biologist from the Washington State Department of Fish and Wildlife (WDFW) and the Skokomish Tribe, the Quinault Tribe and/or the Squaxin Island Tribe shall be included in the HMP when available. If the HMP recommends mitigation involving federally listed threatened or endangered species, migratory waterfowl or wetlands, the U.S. Fish and Wildlife Service shall receive a copy of the draft HMP and their review comments shall be included in the final report.

This is provided that the Washington State Department of Fish and Wildlife, the Skokomish Tribe, the Quinault Tribe and/or the Squaxin Island Tribe and, if required, the U.S. Fish and Wildlife Service respond in writing to Mason County with review comments or a request for additional information within 28 days from the date of issuance of a draft habitat management plan. If review comments or a request for additional information is not received in the prescribed time frame, the tribal, state and/or federal review comments on the habitat management plan shall not be required for completion of the HMP. Mason County shall have the authority to approve Habitat Management Plans or require additional information.

K. RELIEF FROM THE REQUIREMENTS IN THIS SECTION

Specific relief from the requirements of this section may be obtained on a case-by-case basis by applying for a variance (Section 17.01.150) or a reasonable use exception (Section 17.01.120).

FIGURE 1

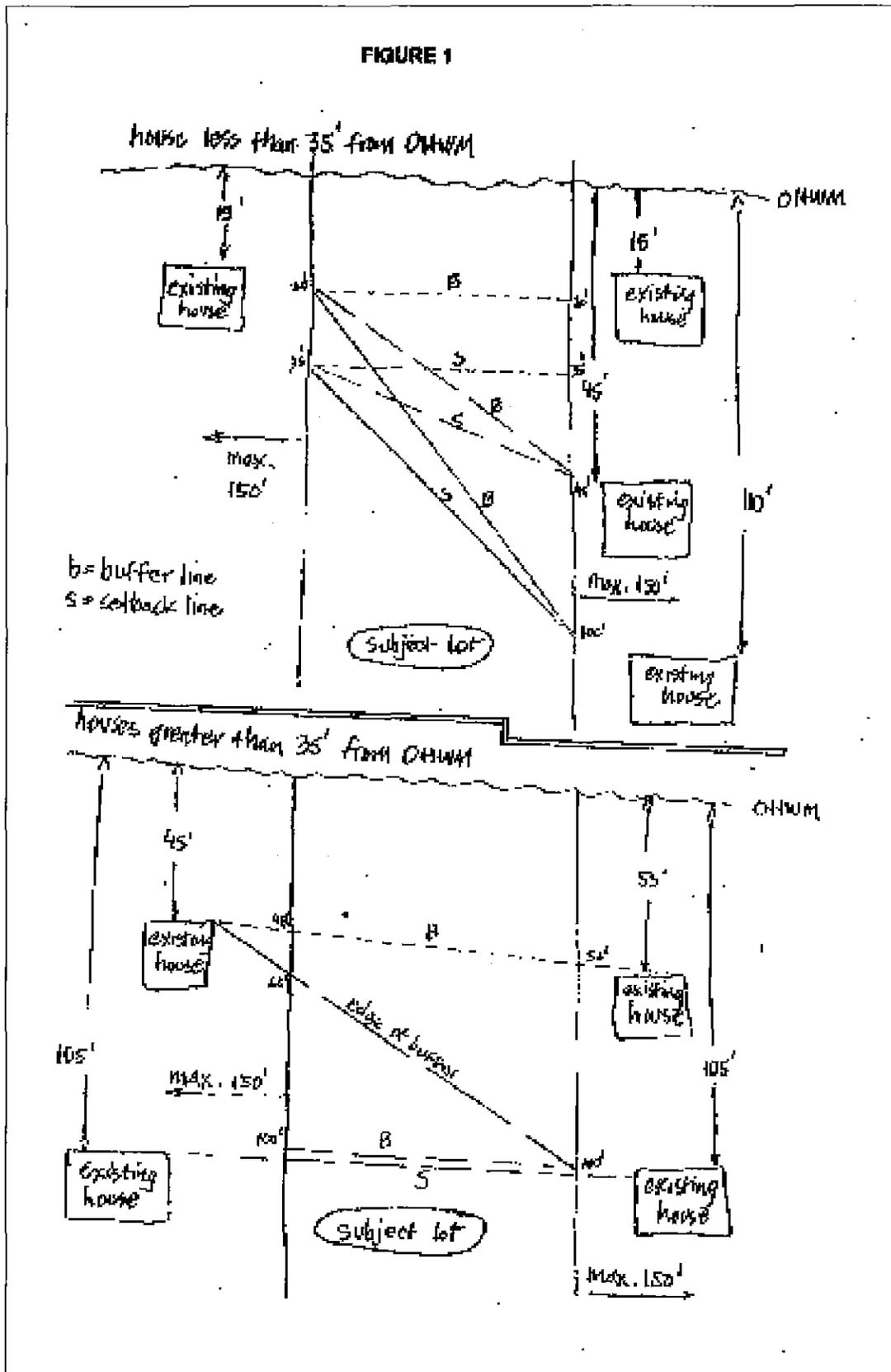
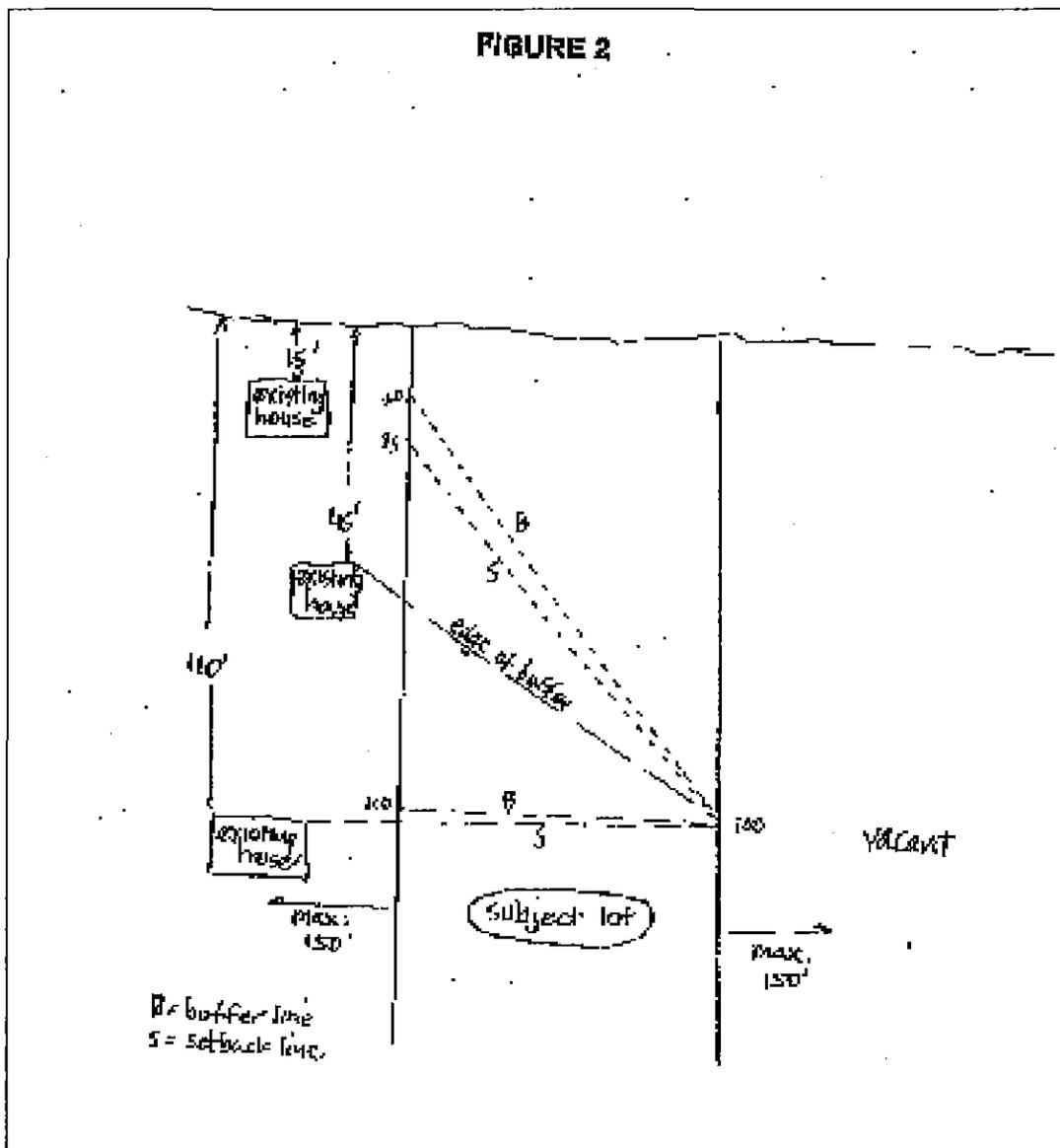


FIGURE 2



APPENDIX B -

Recommendations for Dock and Float Design and Construction

- Encourage the use of shared dock facilities to reduce cumulative impacts.
- Relocate or realign the structure to avoid eelgrass beds.
- Extend the length of the walkway portion of the pier so that the terminal platform/boat mooring is located over water too deep to support eelgrass growth.
- If a deepwater location is not accessible, locate the terminal platform or float in water at least 4 ft deep to avoid grounding and prevent prop scarring.
- Orient all structures in a north-south direction to the maximum extent possible.
- Use elevated fixed piers at least 4-5 ft. above MHHW for the walkway portion, then attach a small float portion at the terminal end.
- Use alternative materials (e.g. grid surface for floats, reflective panels on fixed piers) to increase the amount of light penetration to seagrasses.
- Limit the width of the walkway portion of the pier to 4 ft.
- Limit the maximum size of the terminal platform or float.
- Use the minimum number of pilings required for structural integrity.
- Consider seasonal removal of the float.

APPENDIX C BEST MANAGEMENT PRACTICES FOR HABITAT MANAGEMENT PLANS

DURING CONSTRUCTION

- Perform any excavation and grading work during dry weather
- Install silt fencing around the work area to prevent erosion and siltation of marine and riverine waters.
- Minimize amount of erodible soils at any given time to the maximum extent feasible.
- Check all equipment daily for leaks. Refueling and lubrication of equipment should occur offsite. Don't store any fuel, lubricants, chemicals, or hazardous substances overnight within the project area.
- Do not apply any chemicals when there is a possibility of rain.
- Comply with all permits and requirements of the government authority or agency,

Stream Buffer Protection

Existing trees and other native vegetation within the stream buffer should again be left undisturbed in areas outside of the proposed construction zone. Any storage or stockpiling of construction materials associated with construction or ensuing occupancy of the residence should take place within a designated construction zone in order to limit impacts to the buffer. The banks and channel of the stream should not be used for foot traffic since this would damage vegetation and increase erosion along the stream channel. Logs that currently exist within the stream channel should not be removed or disturbed and future downed woody debris should be encouraged.

Nurse Log Placement

Overstory trees at least 4 inches diameter at breast height removed from the reduced buffer should be placed within the protected buffer to provide nurse log habitat. The logs could be segmented into 10-15 foot pieces to facilitate transport but would best be left as long as possible. It is recommended that these logs be placed randomly throughout the buffer to mimic natural distribution.

Construction Phase Best Management Practices

An increase in the amount of impervious surface is a concern whenever new buildings are constructed. Impermeable surfaces, such as roads, rooftops and drive ways, cause more rain to run off at accelerated rates and less water to infiltrate back into the soil (Leedy and Adams 1984). To prevent increased erosion and impacts to water quality, runoff from the building and other impervious surfaces may require a storm water management plan that diverts this runoff away from the ground surface and back into the ground. Other good examples of Low Impact Development techniques are provided in the "Low Impact Development Technical Guidance Manual for Puget Sound" prepared by Puget Sound Action Team and WSU Extension 2005.

Best Management Practices (BMPs) need to be adhered to throughout the construction phase.

- Appropriate erosion control devices, such as silt fencing, mulch berms, and erosion control matting should again be used if needed during all aspects of the construction phase to mitigate potential erosion and runoff into the stream.
- The most important goal during the construction phase is to consolidate the time period in which heavy earthmoving machinery is used. Earthwork activities should be implemented during the driest season of the year to minimize the risk of erosion-related impacts to the stream. Any work requiring use of this type of equipment (such as site grading, road building, grubbing, cutting and filling) should also be implemented over short periods or events. This should avoid continued and prolonged disturbance of the environment with heavy equipment, as would be the case if the work occurred over multiple and/or unconsolidated events.
- Construction activities should be confined to discrete areas of the site to minimize disturbance to native vegetation in the buffer.
- No construction debris or supplies should be placed in existing forested areas or anywhere

along the stream bank.

- Coinciding with, or immediately subsequent to the completion of the construction work, the restoration and stabilization of bare ground should occur. Restoration and stabilization phases include the application of a native seed mix and landscape stabilization of any cut and filled areas. Native species of plants should be used in transition zones between the construction area and undisturbed native vegetation.

Suggested BMP focus on reducing increases in impervious surfaces, preserving hydrologic functions, and controlling potential adverse impacts to water quality.

- Clearly mark clearing limits with orange construction fencing;
- Install silt fencing at the clearing limits to prevent surface runoff, erosion, and water quality degradation;
- Cover or mulch bare areas to prevent surface erosion
- Hydroseed disturbed areas with a slurry of native grass seed, mulch, and tackifier as soon as possible following completion of construction and at a minimum before the onset of fall rains;

RE-VEGETATION AND PLANTING

Earthwork

- No machinery earthwork will be necessary to implement this restoration plan; planting holes for specified vegetation installation will be hand dug. No additional clearing or grading should be required for site restoration.

Native Plantings

It is recommended that native plantings be installed within 10 foot wide restoration zones in linear strips extending across the site parallel to the edge of the buffer to achieve the following densities:

Trees - 10' on center
Shrubs - 5' on center
Ferns - 4' on center

The general plan calls for installing single trees, or clusters of three shrubs, on approximate 10-foot centers. Each row will alternate between 5 trees + 3 shrub clusters or 4 trees + 4 shrub clusters starting from the edge closest to the identified critical area proceeding to the edge of the buffer. Specifically for stream ravine replanting, cedar will be the first type of tree installed within the first row at the top of the ravine, and then incrementally changing one cedar tree to a fir through the first six rows, with all fir trees thereafter or to the edge of the buffer whichever comes first. Exact placement of installed materials will be up to the landscape installer, following the basic 10-foot spacing pattern prescribed. Finally, a native ground cover planting or sword fern will be randomly installed throughout the planting row on average four-foot centers. These densities have been selected to provide a moderately dense, structurally diverse plant community within the restoration area. Volunteer native vegetation can be counted towards the target densities of restoration plants.

Typical native plant species that may be used with the restoration zone include:

- Trees:
- Western red cedar (*Thuja plicata*) - 2 gallon
 - Douglas fir (*Pseudotsuga menziesii*) - 2 gallon
 - Western hemlock (*Tsuga heterophylla*) - 2 gallon
 - Grand fir (*Abies grandis*) - 2 gallon
 - Cascara (*Rhamnus purshiana*) - 2 gallon
 - Cottonwood (*Populus balsamifera*) - 2 gallon
- Shrubs:
- nootka rose (*Rosa nutkana*) - 1 gallon
 - salmonberry (*Rubus spectabilis*) - 1 gallon
 - salal (*Gaultheria shallon*) - 1 gallon
 - evergreen huckleberry (*Vaccinium ovatum*) - 1 gallon

twinberry (*Lonicera involucrata*)- 1 gallon
snowberry (*Symphoricarpos albus*)- 1 gallon
elderberry (*Sambucus racemosa*)- 1 gallon
red osier dogwood (*Cornus stolonifera*)- 1 gallon

Ferns: sword fern (*Polystichum munitum*) - 1 gallon

All planting should occur during winter dormancy. The optimum time for planting is during February and March.

Installation

Installation of the prescribed vegetation will be performed by qualified landscapers familiar with planting of native vegetation in natural settings. Installation will be performed only after home construction on the property is completed to avoid damage to the plantings from construction activities. All installed vegetation shall be marked with colored flagging to facilitate monitoring inspections. A separate "as-built" plan will be provided by the landscaper if the planting pattern or schedule deviates from that listed within this document.

Fertilizing

Artificial fertilizer may be applied to each planting hole in the form of "slow-release" tablets or some other similar material. However, general broadcast fertilization MAY Not be used within the landscape planting area.

Maintenance

Maintenance of the installations will be the responsibility of the landscape installer. Maintenance is to include weeding or watering necessary to ensure plant survival for up to one year after the date of installation.

Habitat Conservation Measures

In general, proposed measures to protect habitat focus on promoting natural succession of native plant communities and increasing structural diversity and complexity.

- Minimize clearing and conversion of forest habitats to other uses, particularly within the stream and lake buffers;
- Retain larger conifers wherever possible; if trees are removed, use/retain large woody debris (LWD) in native plant communities to be retained. Retained LWD can be installed vertically or horizontally to provide habitat for woodpeckers, including pileated woodpecker.
- Retain and/or salvage downed large woody debris and western red cedar stumps;
- Thin dense, immature (sapling) red alder and underplant with native conifers to promote more rapid natural succession to later serial phase forest types;
- Enhance native plant communities by removing invasive and non-native species, such as Himalayan blackberry, and planting native trees and shrubs;
- Plant native shrubs and trees in the stream buffer, such as willows (*Salix* sp.), re-osier dogwood (*Cornus sericea*); and black twinberry (*Lonicera involucrata*). These will increase structural diversity and buffer functions, such as retention of organic matter and increasing shade and thermal protection;

MONITORING THE SUCCESS OF THE PLANTING

- Monitoring of the installed vegetation will be performed annually for three years following installation. Monitoring will entail inspection of each planted specimen for survival and vigor, and will be performed in August or September of each monitoring year. In addition, two photo points will be established that portray the planting area from each side of the property. A brief letter report summarizing monitoring findings will be submitted to Mason County Planning by 1 October of each monitoring year.

Contingency

- If mortality of the installed vegetation exceeds 10% for trees, 20% for shrubs and ferns, all dead materials will be replaced a 1:1 ratio. If mortality is related to an inappropriate species for the site conditions, adjustments to the Plant Schedule may be made to replant with a species more like to survive.

Monitoring of the site will begin the first fall following tree planting and maintained on a seasonal basis. The information gathered will provide the following: 1) condition of reintroduced plant species; 2) the use of the site by wildlife species; 3) any disturbance caused by the development and its effect on protected zones and associated aquatic habitat; 4) any occurrence of exotic species within the restoration zones; 5) any corrective measures that may be deemed necessary to provide desired conditions. This monitoring will be in effect for the duration of three years. The information gathered will be provided in an annual report and submitted to the Director of Mason County Department of Community Development.

ON-GOING HOMEOWNER RESPONSIBILITIES

Suggested BMP focus on reducing increases in impervious surfaces, preserving hydrologic functions, and controlling potential adverse impacts to water quality.

- Infiltrate clean runoff from impervious surfaces such as roofs using infiltration trenches to maximize groundwater recharge. Avoid using roofing materials, such as zinc-coated products, that could contribute metals to surface waters;
- Properly maintain septic system to avoid septic system failure;
- Landscape with native plants and use mulch and drip irrigation to reduce water consumption, conserve water, and reduce cumulative help maintain instream flows in downstream surface waters;
- Use low flow toilets and shower heads to conserve water and reduce water consumption;
- Avoid use of herbicides and pesticides, which may adversely affect native flora and fauna, as well as pest species;
- Use porous pavement or gravel instead of asphalt or concrete for the driveway to reduce stormwater runoff; use biofiltration swales or infiltration trenches to promote removal of pollutants and promote groundwater recharge.

Home Owners Best Management Practices

Residents living by the unique stream environments have a continuing responsibility for maintaining the conditions that provide the function of the stream.

- Soil or yard waste must not be dumped anywhere within the buffer so that it may enter the stream.
- Runoff from the building and other impervious surfaces should be directed to sub-surface trenching that diverts runoff away from the ground surface and back into the ground, or according to the stormwater management plan that has been approved for the site. The erosion of soil or the forming of channels should be prevented. These efforts will prevent increased erosion and impacts to water quality.
- The occupants of the residence should also promote landscaping with native species.
- Landscaping around the construction zone should be compatible and blend with the native buffer.
- Bird boxes should be built or purchased and placed on the property to promote avian wildlife. Bird boxes can be built and placed on snags or live trees according to the bird species requirements that may be most likely to utilize habitat at the site. Guidance on bird boxes is available from the Mason Conservation District.

Stream Buffer Protection

- Existing trees and other native vegetation within the stream buffer should again be left undisturbed.
- Any storage or stockpiling of materials should take place outside of the buffer in order to limit impacts to the buffer.

- The banks and channel of the stream should not be used for foot traffic since this would damage vegetation and increase erosion along the stream channel.
- Logs that currently exist within the stream channel should not be removed or disturbed and future downed woody debris should be encouraged.

Functions and values of the forested area between the proposed residence and the marine shoreline should be maintained through the following measure.

- Do not remove overstory trees (view corridors can be established or maintained by limbing the trees to the minimum extent necessary)
- Shoreline access should be limited to a 3-foot wide path, with stairs when necessary, to concentrate all foot traffic through a single corridor.
- Species such as English Ivy and Himalayan blackberry should be removed and prevented from further invading the site. This can be accomplished through persistent cuttings during the growing season.
- Sites where invasive species are removed should be replanted using native species.