FULCRUM
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Soil Remediation Work Plan
Model Remedy 3 - Capping in Place

Hwy 150
Manson, Washington

Project Number: 213286.00

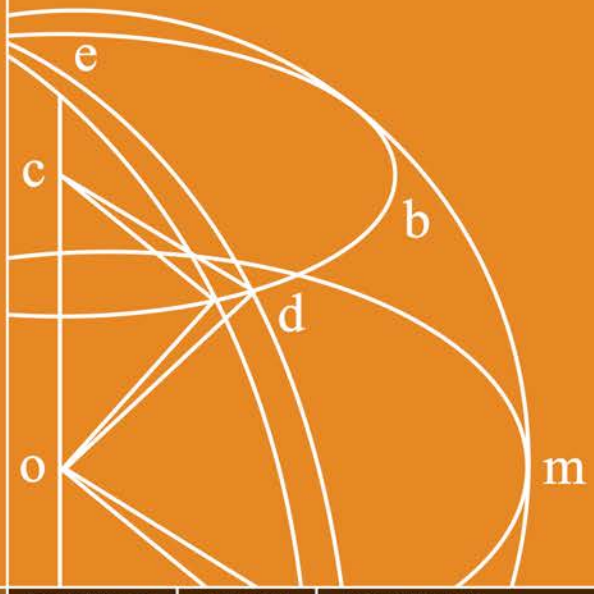
July 6, 2021

Prepared for:

Seawest Investment Associates, LLC
c/o: Matt Aatai, Managing Member
13120 NE 70th Place, Suite 201
Kirkland, Washington 98033

Prepared by:

Fulcrum Environmental Consulting, Inc.
406 North Second Street
Yakima, Washington 98901



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13120 NE 70th Place, Suite 201
Kirkland, Washington 98033

Prepared by: Fulcrum Environmental Consulting, Inc.
406 North Second Street
Yakima, Washington 98901
509.574.0839

The professionals who completed site services, prepared, and reviewed this report include but are not limited to:

Authored by: _____ Date: 7/6/2021

Amanda Enbysk, GIT, Project Scientist
Fulcrum Environmental Consulting, Inc.

Reviewed by: _____ Date: 7/6/2021

Ryan K. Mathews, CIH, CHMM, Principal
Fulcrum Environmental Consulting, Inc.

Report Integrity:

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1.0 Introduction

Fulcrum Environmental Consulting, Inc. (Fulcrum) was retained by Seawest Investment Associates, LLC to complete a Soil Remediation Work Plan (SRWP) for three tax parcels totaling about 11.98-acres located north of Highway 150 in Manson, Washington (Site). Highway 150 is also referred to as State Route 150 and East Wapato Way. Fulcrum understands that the property will be redeveloped as 40 single-family residential parcels, roadways, and two stormwater infiltration ponds. See Appendix A, Figure 1 for the Site location.

Fulcrum understands that the Washington State Department of Ecology (Ecology) previously completed field screening of site soils to determine if arsenic and lead exceeded the WAC 173-340: *Model Toxics Control Act* (MTCA) Method A cleanup level for unrestricted land use. Testing identified arsenic to range from less than 20 milligrams per kilogram (mg/Kg) to more than 172 mg/Kg, with all but one location at or above the MTCA Method A cleanup level for unrestricted land use. Lead concentrations ranged from 14 mg/Kg to 1,980 mg/Kg in the soil, with 15 of 21 samples above the Method A cleanup level for unrestricted land use. Depth of arsenic extended to at least 26-inches below ground surface.

The purpose of this soil remediation plan is to assist with property redevelopment consistent with WAC 173-340: Model Toxics Control Act and Ecology's *Draft Model Remedies for Cleanup of Former Orchard Properties in Central and Eastern Washington*, enroll the site in the Voluntary Cleanup Program, and receive an opinion of No Further Action (NFA) at the conclusion of the project. To receive an NFA, an environmental covenant will be recorded on the property.

1.1 Remedy Selection

The final public comment period recently closed on Ecology's *Draft Model Remedies for Cleanup of Former Orchard Properties in Central and Eastern Washington*[1]. While some minor changes are likely to occur as a result of public comment, it is expected that the primary remedial approaches, which have been used for more than 20 years, will be a part of the final model remedies.

As provided in in Draft Model Remedies document, Site redevelopment will consist of implementation of *Model Remedy 3 - Capping in Place*. Site development will consist of mass grading of the property, installation of underground utilities, construction of road, sidewalk, and other hard surfaces, construction of two stormwater infiltration ponds, and stabilization of disturbed soil. Following construction of new single-family residences, all exposed soils will be capped by either barrier fabric and 4-inches of compacted gravel or 6-inches of compacted clean soil or marking barrier and clean soil with turf or other landscaping.

1.2 Site Description

The Site is located north of Highway 150 in Manson, Washington and is recognized by the Chelan County Assessor's office as tax parcels 282136681140, 282136681141, and 282136681142.

[1] *DRAFT - Draft Model Remedies for Cleanup of Former Orchard Properties in Central and Eastern Washington Available for Review and Comment*, https://apps.ecology.wa.gov/publications/SummaryPages/2109006.html

The Site is located about 18 miles north of Lake Chelan in the east portion of the unincorporated Manson community.

The property totals approximately 11.98-acres and currently consists of undeveloped former orchard. See Appendix A, Figure 2 for an aerial photograph of existing conditions.

The purpose of this Soil Remediation Plan (Plan) is to assist with property redevelopment by Seawest Investment Associates, LLC; referenced as Chelan County Project File No. P-2019-04. The development area encompasses the three tax parcels totaling 11.98-acres and will include: 40 single-family residential lots; three Tracts (A, B, and C); subsurface utilities inclusive of electricity, water, sewer, irrigation, communications, and stormwater; and city owned and operated roadways. All buildings will be single-family residences. A site plan is presented in Appendix B.

Seawest Investment Associates, LLC will retain a qualified earthworks contractor to complete roadway, utility, and grading work tasks. While this Plan has been primarily designed to address work tasks completed by the selected earthworks contractor, it is understood that Seawest Investment Associates, LLC will require that any contractor working in Site soils will be required to comply with the Plan.

1.3 Background

According to the Ecology's *Lands Dirt Alert* mapping tool and historical aerial photograph, the Site is located on land used for orchards prior to 1950 and until they were removed in the 1990s. Site conditions have remained as such until present-day.

Fulcrum understands that Ecology previously completed field screening of site soils to determine if arsenic and lead exceeded the WAC 173-340: *Model Toxics Control Act* (MTCA) Method A cleanup level for unrestricted land use. Testing identified arsenic to range from less than 20 milligrams per kilogram (mg/Kg) to more than 172 mg/Kg, with all but one location at or above the MTCA Method A cleanup level for unrestricted land use. Lead concentrations ranged from 14 mg/Kg to 1,980 mg/Kg in the soil, with 15 of 21 samples above the Method A cleanup level for unrestricted land use. Depth of arsenic extended to at least 26-inches below ground surface.

Between the late 1800s and 1950, lead-arsenate pesticides were widely used in orchards to control coddling moth infestations. With the breakdown of lead-arsenate into lead and arsenic, the pesticide does not go away over time and generally remains in the upper 2-feet to 4-feet of soil. Exposure to lead is known to have neurological development effects especially in children, while exposure to arsenic is known to cause pulmonary and gastrointestinal damage and an increase risk of skin, liver, bladder, and lung cancer[2].

Due to the nature of historic application of lead-arsenate pesticides on trees, residual concentrations of pesticides in soils typically vary and are not consistent across a given former orchard site.

[2] The Legacy Pesticide Work Group. https://www.ezview.wa.gov/

2.0 Characterization and Distribution of Soil Contaminants

Arsenic and lead are expected to be present above the applicable Ecology Model Toxic Control Act (MTCA) Method A cleanup levels (CUL) across the site to a depth of at least 2-feet below ground surface.

Arsenic and lead concentrations up to an order of magnitude higher than MTCA Method A concentrations are common in historical orchard properties. Due to the historical application of lead-arsenate pesticides on live trees, residual concentrations of pesticides in soils are typically not homogenous across a former orchard site.

3.0 Regulatory Discussion

Washington State environmental protection regulations governing the project include MTCA, Area Wide Soil Contamination Task Force, Dangerous Waste regulations, Stormwater regulations, and Air Pollution Sources. These regulations are discussed below:

3.1 Model Toxics Control Act

In March of 1989, the MTCA was enacted in Washington State. The MTCA regulations set standards to ensure quality of cleanup and protection of human health and the environment. Media regulated under MTCA include soils, sediments, and groundwater. A major portion of the MTCA regulations (completed in 1991 and subsequently amended) was the development of numerical cleanup standards and requirements for cleanup actions. Three options were established under MTCA for site-specific cleanup levels: Method A, B, and C.

Method A defines cleanup levels for 25 of the most common hazardous substances found at sites. Method B levels are set using a site risk assessment, which enables consideration of site-specific characteristics to determine minimum appropriate cleanup. Method C is similar to Method B; however, the individual substance's cancer risk portion of the assessment is set at 1 in 100,000 rather than 1 in 1,000,000. Method A can be used for establishing cleanup levels for unrestricted land use.

The MTCA cleanup levels will be utilized for evaluation purposes associated with confirmation soil sampling subsequent to excavation activities. Fulcrum will utilize MTCA Method A cleanup levels.

3.2 Area-Wide Soil Contamination Task Force

The Area-Wide Soil Contamination Task Force (Task Force), comprised of various Washington State agencies and stakeholders, was convened in 2002 to evaluate and make recommendations for future management of low to moderate level contamination in large geographic areas. The Area-Wide Soil Contamination Task Force Report (Task Force 2003) defines area-wide contamination as low to moderate level soil contamination that is dispersed over a large geographic area. The first contaminants designated for assessment were arsenic and lead accumulations in specific geographic areas associated with two primary sources, smelter operations in Puget Sound and agricultural use, specifically fruit orchards, in Central and Eastern Washington.

3.3 Model Remedies

Under WAC 173-340-390: *Model Remedies*, for sites where the contaminants are well understood and industry standard remediation approaches are used, a streamlined and accelerated cleanup selection process can be used. The *Draft Model Remedies for Cleanup of Former Orchard Properties in Central and Eastern Washington* provides four model remedies from which to choose:

- Model Remedy 1 – Excavation and Removal
- Model Remedy 2 – Mixing
- Model Remedy 3 – Capping in Place
- Model Remedy 4 – Consolidation and Capping

Each of the model remedies provide remedial approaches that can result in full remediation (referred to as a permanent solution), mixing to achieve presence of clean soils in the upper elevation of the soil, or use of soft and hard barriers to prevent access to contaminated soils.

3.4 Dangerous Waste

Under WAC 173-303: Dangerous Waste regulations, Washington State implemented the Hazardous Waste Management Act of 1976 as amended in 1980 and 1983 and implements in part Subtitle C of the Resource Conservation and Recovery Act (RCRA) in Washington State. A major portion of the Dangerous Waste regulations is the differentiation between solid and dangerous waste. This determination impacts the methods of removal, packaging, transportation, and treatment/disposal requirements.

The intent is that no soil will be exported during the project; however, if soil export is required, waste characterization will be required as provide in WAC 173-303. See Section 5.0 for additional detail.

3.5 Stormwater and Dust Control

In 2001, a chartering meeting was held in Moses Lake and a steering committee was formed to work with Ecology and a consultant on the completion of a Stormwater Management Manual and a Model Municipal Stormwater Program for Eastern Washington. The most recent manual was released in August 2019 and requires preparation of a stormwater pollution prevention plan (SWPPP) for projects disturbing more than 1-acre of soil.

This Soil Remediation Plan does not include specific stormwater management criteria; a project stormwater pollution prevention plan (SWPPP) has been prepared by the project engineer. Portions of the SWPPP overlap with remedial tasks.

To the extent feasible, stormwater management and soil remediation objectives will align and include:

- Tracking of site soils during excavation and placement
- Eliminate soil track-off
- Stabilization of stockpiles and exposed soils

In Chelan County, fugitive dust associated with construction projects is regulated by Ecology's General Regulations for Air Pollution Sources and require no visible emissions leaving the site boundaries and limiting dust plumes to no more than the length of the truck or equipment.

3.6 Selected Environmental Protection Criteria

The MTCA Method A Unrestricted Site Use levels defined in Ecology's Washington Administrative Code (WAC) 173-340, have been used as a threshold for determining the management of site soils. Ecology's MTCA Method A contaminant concentrations are appropriate for unrestricted site use and are therefore appropriate for use at the site.

The screening criteria will be used for evaluation of imported soils, sod and/or soil amendments; areas of clean fill and capping/cover; and remediation of stormwater infiltration areas. The following table presents the applicable MTCA Method A values as presented in Ecology's Cleanup Level and Risk Calculation (CLARC) summary April 2020.

Table 1: MTCA Method A Cleanup Levels & Clean Soil Criteria

Contaminant of Concern	MTCA Method A CUL (mg/Kg)	Clean Soil Criteria (mg/Kg)
Arsenic	20	20
Lead	250	250

The cleanup levels and clean soil criteria will be used for evaluation of imported soils, sod and/or soil amendments; areas of clean fill and capping/cover; and remediation of stormwater infiltration areas.

4.0 Site Geology and Hydrology

Site soils are identified by the U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) report for Chelan County to consist of Burch fine sandy loam and Wenatchee silt.

Burch fine sandy loam is present on the approximate western 1/3 of the Site and derived from alluvium originating from sandstone. It's reported to be well drained with a high water holding capacity. The soil generally consists of the following profile:

- Surface to 8 inches bgs: fine sandy loam
- 8 inches to at least 60 inches: loam

Wenatchee silt loam is present on the approximate eastern 2/3 of the Site and derived from alluvium with a minor amount of loess and volcanic ash in the surface. It's reported to be well drained with a high water holding capacity. The soil generally consists of the following profile:

- Surface to 8 inches bgs: silt loam
- 8 to 17 inches bgs: silt loam
- 17 to 60 inches bgs: sandy clay loam

Well logs located on Ecology's website were reviewed for the subject site and surrounding parcels. No well logs were available for the project site. Well log documentation for surrounding parcels suggests that local near surface groundwater level is between approximately 29 to 45 feet below ground surface, as a result of the topographic change in the general area of the property.

5.0 Pre-Construction Planning

As a portion of the contractor's responsibilities, the contractor will be required to implement or facilitate implementation of this Soil Remediation Plan. In addition, the selected contractor will be responsible for providing the following pre-construction plans:

- Stormwater Pollution Prevention Plan
- Site-specific Health and Safety Plan

5.1 Stormwater Pollution Prevention Plan (SWPPP)

A SWPPP establishes limited construction entry pathways, typically constructed of a gravel and/or paved entry intended to provide gross dry removal of soil clinging to external equipment components prior to equipment leaving site. Gross removal is confirmed by contractor's visual inspection of equipment and absence of soil in the adjacent paved roadways. A SWPPP must additionally include corrective action measures should soil be tracked out of the construction site.

Munson Engineering has prepared a SWPPP which has been included in Appendix C.

5.2 Site-specific Health and Safety Plan

Prior to beginning construction activities, the contractor is required under this Soil Remediation Plan to develop a site-specific Health and Safety Plan (HSP). The contractor shall ensure that the site-specific HSP complies with health and safety requirements under applicable federal, state, and local laws and regulations. The contractor shall ensure that the site-specific HSP is correctly implemented. As a result of legacy pesticide contamination, the following regulations apply to site development for worker protection:

- Arsenic, WAC 296-848
- Lead, WAC 296-62
- Hazardous Waste Operations, WAC 296-843

Worker exposure regulations provide specific requirements for communication of potential chemical hazards to employees, exposure prevention training, and permitted levels of employee exposure to particulate and specific chemicals. These regulations are applicable whenever there is potential for worker exposure to hazardous chemicals. For sites contaminated with residual agricultural chemicals, engineering controls such as dust suppression and personal protective equipment (such as wash stations, respirators, and coveralls) are used to reduce potential exposure. Air monitoring is used to verify regulatory compliance.

This Soil Remediation Plan anticipates implementation of contractual requirements specific to worker protection regulations. The contractor will be required to develop and submit a site-specific HSP. At a minimum the contractor-submitted worker protection plan will be required to include awareness level training for all employees, subcontractors, and site visitors accessing the site during soil impacting activities. For employees and subcontractors whose work tasks involve soil impacting tasks the contractor will be further required to conduct additional training specific to reducing potential personal and community exposure; personal and equipment decontamination; means of measuring potential exposure; engineering and institutional controls that will be implemented during construction to control potential exposure; and the contents of this Plan.

6.0 Remedial Design

The intent of this remedial design is to prevent access and subsequent exposure to contaminated soils using permanent capping approaches and institutional controls. At the completion of remediation, no lead or arsenic contaminated soils should be accessible except through the intentional penetration of the cap. Under the current *Draft Model Remedies for Cleanup of Former Orchard Properties in Central and Eastern Washington* this approach is referred to as Model Remedy 3: Capping.

The selected remedy eliminates the routes of exposure to contaminated soil of the ingestion of contaminated soils, either through hand to mouth contact or soil particles on root vegetables, and inhalation of airborne contaminated dust.

This SRWP provides the implementation steps necessary to complete the model remedy. These steps are necessary prior to the construction and sale of single-family residential properties. This SRWP anticipates that site development will require a substantial grading effort. The draft short plat is included in Appendix B.

Stormwater infiltration will be designed to collect stormwater from asphalt driveways and parking lots and concrete sidewalks, convey stormwater into a common infiltration pond, and release stormwater into clean soils, generally anticipated to be at a depth of greater than 6-feet. Stormwater falling on roofs and portions of hardscape on each individual parcel will be captured and conveyed to individual drywells.

Irrigation will be managed to provide what is needed for planted sod, shrubs, and trees without overwatering.

These remedial actions will be utilized during construction of initial development features such as subsurface infrastructure, roadways, and stormwater features. Subsequently, construction of individual residences is planned to be completed by a common builder.

6.1 Clean Soil Criteria

Clean soil, including any soil nutrients, fertilizers, or other amendments, shall be documented at the source, prior to transport to the site. At a minimum, all proposed clean soil will be tested for the presence of arsenic and lead. If the proposed clean soil source has been used for any commercial, industrial, agricultural, or mining use, additional analysis shall be completed to demonstrate that potential contaminants of concern are not presence at or above the applicable cleanup levels.

The number of soil samples will be consistent with WAC 173-340-709, *Methods for defining background concentrations*, including the statistical analysis of laboratory results and as provided in the *Draft Model Remedies for Cleanup of Former Orchard Properties in Central and Eastern Washington*. A minimum of six samples, each composed of six subsamples, will be collected as required to establish the natural background concentration for soil of the suspected contaminant(s), except where the import stockpile is less than 50 cubic yards. Statistical evaluation of samples will be completed using the *Statistical Guidance for Ecology Site Managers* and MTCAStat tool.

At no time will soil or any other material with concentrations of arsenic or lead above the clean soil criteria in Table 1 be imported to the Site. Clean soil shall not have any samples with greater than two times the applicable MTCA Method A CUL, and upper confidence limit shall not exceed the applicable MTCA Method A CUL.

Clean soils may be sourced onsite if conditions allow. Soil will be evaluated as specificized in the *Draft Model Remedies for Cleanup of Former Orchard Properties in Central and Eastern Washington* regardless of the source(s).

6.2 Property Development

The contractor shall follow project SWPPP Best Management Practices (BMPs) and safe work practices as provided in Ecology publications during hand work in the soil.

6.2.1 Vegetation Removal

The first step in the remedial process will be vegetation removal. The contractor will cut the existing vegetation as close to ground surface as feasible, thereby reducing the comingling of site vegetation and soils. Following mowing, accumulated cut vegetation will be removed via raking, windrowing, bailing or similar methods designed to facilitate vegetation removal.

Vegetation is not expected to have loose soil and does not require separate disposal.

6.2.2 Gross Site Grading

The second step in the remedial process will be gross site grading. To the extent feasible, the contractor will be required to minimize the handling of Site soils. Surface skimming of soils containing high concentrations of organic material (grubbing) will be completed first and staged onsite separate from other grading activities.

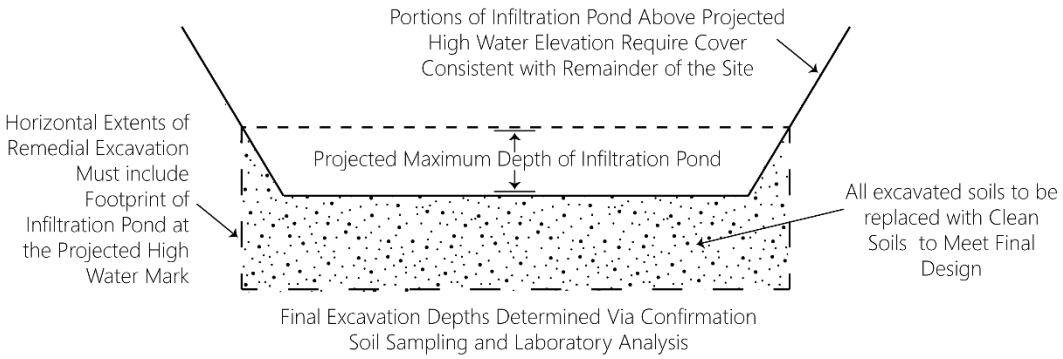
These materials are typically determined unlikely to be suitable for compaction beneath site structures and can only be used for non-structural features, such as landscape and berm construction. It is not intended that these materials will be removed from site unless there is no other viable reuse. Should export be determined to be required for these materials, approval for offsite disposal will be required as presented in Section 7.0.

After gross site grading, building pad, foundation areas, and temporary stormwater features will also be excavated. Surplus soil from building pads, foundations, and stormwater infiltration pond excavation will be generated and incorporated into the existing soils at the Site.

6.2.3 Development-wide Stormwater Control Features

Also, at the appropriate stage during gross grading, the contaminated soil horizons at specific stormwater infiltration zones will be removed entirely prior to final construction of stormwater infiltration features. For stormwater infiltration ponds, this will require excavation to at least 4-feet below ground surface and may require excavation to more than 6-feet below ground surface at each location to remove the residual contaminated soils. The purpose of excavation of all contaminated soils at these locations is to prevent migration of contamination via an increased volume of stormwater infiltration through the contaminated soil horizons within these localized areas. Remediation via excavation to depth at these locations includes the infiltration pond bottom and sidewalls up to the projected maximum depth of water.

Detail - Stormwater Infiltration Pond Details



Stormwater infiltration areas will require sampling of final cut elevations to ensure soils meet the selected project remedial concentrations as presented in Section 3.6.

Except as required to provide infiltration through clean soil in the floor of the stormwater pond, no soil

remediation will occur in Tract B or Tract C. Rather Tract B and Tract C will be secured within a fence, preventing unauthorized access and capped with sod or hydroseeded to effect soil stabilization.

To the extents feasible, all gross grading of contaminated soils should be completed prior to application of final cover. Segregation of impacted soils from imported clean soils will be required to be documented by the contractor throughout the project.

6.2.4 Underground Utilities

Underground utilities will include water, sewer, irrigation water, stormwater, electrical services, communications/data, and other services.

Underground utilities will be excavated directly through any contained soils and that in general, the depth of utility installation will occur in soils below 4-feet and likely to contain low levels of residual arsenic contamination. Bedding of utilities shall be completed as provided in the engineering design. Arsenic and lead contaminated soils can be used in the backfilling of subgrade excavations.

6.2.5 Roadways and Sidewalks

During development of roadways and sidewalks, contaminated soils will be graded and then covered beneath 4-inches of compacted gravel or 6-inches of compacted clean soil, asphalt pavement or concrete sidewalks.

Concrete sidewalk and asphalt roadways and parking areas will be constructed of not less than 4-inches of compacted gravel or compacted clean soil and finished with either a concrete or asphalt. The gravel or compacted clean soil is considered the capping material.

Geotextile fabrics will only be used where a geotechnical/soil stabilization need is present below roadways and sidewalks.

6.2.6 Development Capping Documentation

Documentation of completed infrastructure and the effective capping of contaminated soils will be completed through photographs and inspection findings.

Confirmation sampling will be conducted in the development's stormwater infiltration pond(s). Sampling criteria will be based on the area of the final stormwater infiltration pond(s).

6.3 Individual Lot Development

After construction of initial infrastructure, individual lots not being managed by an active fugitive dust mitigation plan must be temporarily stabilized to limit exposure and migration of contaminated soils. The contractor shall follow project SWPPP BMPs and safe work practices as provided in the SWPPP and Ecology publications during hand work in the soil.

6.3.1 Vegetation Removal

No vegetation is anticipated to remain on individual lots during construction beyond *de minimis* weeds or stabilization vegetation.

6.3.2 Footing and Crawlspace Excavation

Excavation on each lot will occur for footings, crawlspaces, utility connections, etc. Generally, development phase soil elevations will anticipate that soils excavated for footings and crawlspaces will remain onsite and be used to establish final lot subgrade.

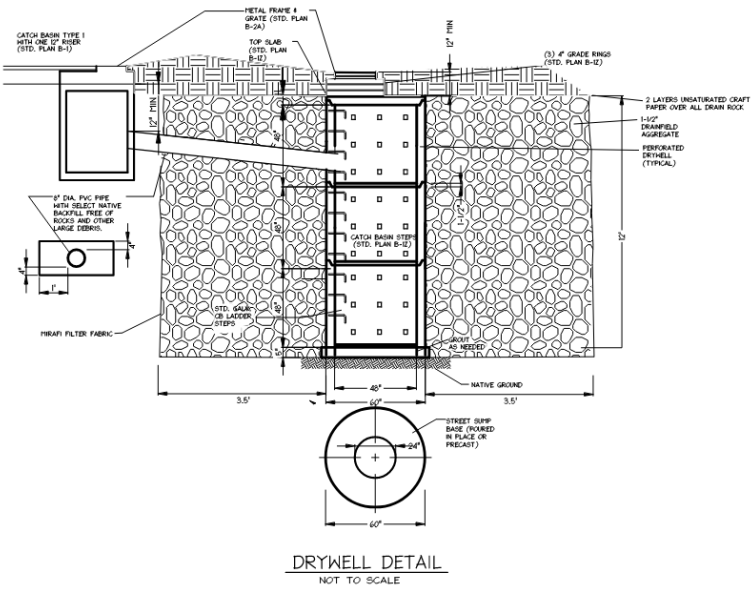
There is no prohibition of arsenic and lead contaminated soil from an individual lot within the development being relocated to another uncapped lot within the development.

6.3.3 Individual Lot Stormwater Management

Given the slope on the property, significant grading will be required to create flat billable lots. Because of the elevations of lots, stormwater on the individual lots will be managed as either a part of the community, common stormwater system, or individually on each lot.

All single-family residences will be constructed with gutters to handle precipitation from building roofs. Some of these lots will drain stormwater to the community stormwater system by directing runoff towards the public right-of-way where it will be collected by catch basins and conveyed to the stormwater infiltration ponds. On those lots, precipitation that falls on individual lot driveways will also be collected by catch basins and conveyed to the stormwater infiltration ponds.

Lots will utilize slot drains and drywells for collection and infiltration of rainfall and snow melt. These drywells are proposed to be placed adjacent to the driveway. The drywells are proposed to have an outer diameter of 60-inches and an interior diameter of 48-inches with a solid bottom grouted to the drywell barrels. The drywells are planned to be placed to a depth of about 12-feet below ground surface and surrounded by drain field aggregate within a filter fabric envelope.



Drywell detail courtesy of Munson Engineers, Inc.

The design of the drywells provides that the majority of collected water will infiltrate into site soils at depths greater than 6-feet and into a drain field

aggregate system. The drywells are proposed to have a grated cover. The project SWPPP included maintenance requirements of the drywells.

6.3.4 Utilities

Utilities for each lot will be extended from the meter, junction box, or connection placed during property development to the respective single-family residence. Bedding of utilities shall be completed as provided in the engineering design. Lot utilities are generally shallower than development utilities and are anticipated to be placed within contaminated site soils. Arsenic and lead contaminated soils can be used in the backfilling of subgrade excavations.

6.3.5 Irrigation System Installation

On each lot, the irrigation main lines and service lines to individual sprinklers or drip tube irrigation connections will be installed prior to the installation of protective barriers. Irrigation lines are anticipated to be placed within contaminated site soils.

Irrigation piping shall be extended above the contaminated soils such that connection of fittings for individual sprinkler or drip tube irrigation components can be installed following placement of clean soils.

6.3.6 Protective Barriers

During development on each lot, contaminated soils will be graded and then covered beneath building footprint, pavement, sidewalks, or other protective barriers. One or more of the following protective barriers will be used within all areas of the site:

- 4-inches of gravel or 6-inches of compacted clean soil overlain with building footprint, concrete, or asphalt, **or**
- Fabric or mesh barrier overlain with a minimum of 4-inches of rock landscaping, **or**
- Fabric or mesh barrier overlain with a minimum of 6-inches of clean soil overlain with 2-inches of bark, **or**
- Fabric or mesh barrier overlain with a minimum of 6-inches of clean soil overlain with 2-inches of sod, **or**
- Fabric or mesh barrier overlain with a minimum of 8-inches of clean soil with hydroseed.

If any community child play areas are incorporated into the final design, the area must be covered in either a minimum of 18-inches of clean soil, or an engineered hard surface to prevent access to underlying soils. In any private child play areas, the area must be covered in either a minimum of 8-inches of clean soil, or an engineered hard surface to prevent access to underlying soils.

Placement of Hardscape

Concrete building foundations, driveways, sidewalks, and parking areas will be constructed of not less than 4-inches of compacted gravel or 6-inches of compacted clean soil finished with concrete. The gravel or

compacted clean soil is considered the capping material. Geotextile fabrics will only be used where a geotechnical/soil stabilization need is present.

Placement of Landscaping

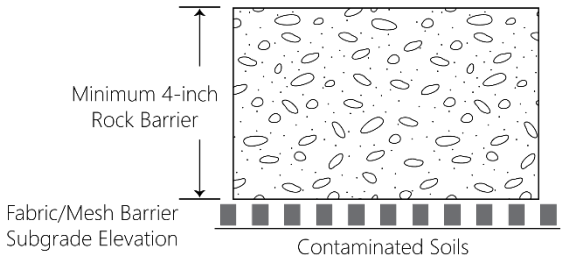
Landscaping will be used at the Site generally around building foundations. Materials in landscaped areas include large keystone rocks with 4-inch cobble rocks to create a rock barrier.

Landscaping will be underlain by landscaping fabric with a minimum of 4-inch average depth to establish the rock barrier.

No clean soil will be placed beneath the rock barrier landscaping areas. Stormwater in rock barrier locations is limited to direct precipitation from rainfall and snowfall.

It is anticipated that any drip irrigation used within landscaping will be connected to an irrigation supply line and that drip tubing will be placed on or within the rock barrier.

Detail - Rock Barrier Requirements



Placement of Trees or Large Vegetation

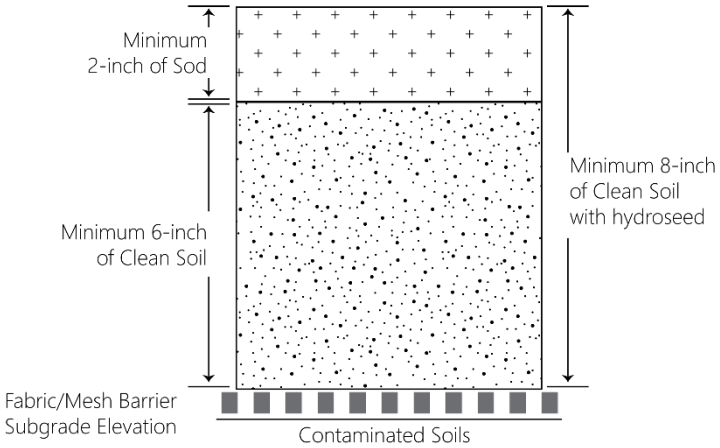
Trees or large vegetation should be planted prior to the placement of clean soil so that roots extend below the fabric or mesh barrier. Planting depth should accommodate placement of clean soil.

Placement of Clean Soil

Care shall be taken to prevent disturbance of existing contaminated soils prior to clean soil placement. Contractor may utilize conveyor aggregate delivery or similar equipment to assist with placement of clean soil.

Contractor shall work each individual area from upwind to downwind orientation. Water shall be applied to the contaminated soils layer sufficient to prevent wind erosion and to serve as an indicator for equipment operator of the working edge of clean soil placement.

Detail - Sod/Hydroseed Barrier



If both contaminated soils and clean soils are handled on the same lot, the Contractor shall utilize temporary barriers or flagging to denote areas of work and shall establish clean, decontamination and contaminated equipment corridors as used during emergency response projects.

The contractor shall also utilize multiple pieces of earth handling equipment such that excessive tracking of contaminated soils does not occur.

For general sod areas, the contractor shall place 6-inch or greater marking whiskers upon the contaminated soil layer at a rate of one per 200 square feet, or a grid of about every 10-feet. If 8-inches of clean soil and hydroseed is selected, marking whiskers shall also be used, either with 8-inch whickers or with longer stakes protruding such that the whiskers provide 8-inches of clean soil.

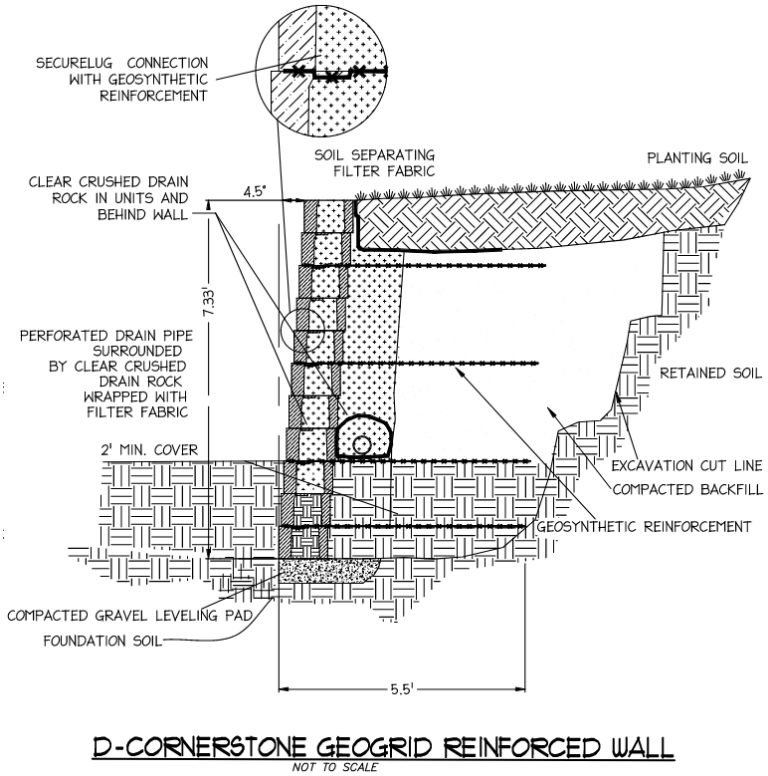
Clean soils shall not be tracked or traveled upon by equipment within the potential to carry contaminated soils. Once clean soil is placed, only clean tracked or wheeled equipment will be permitted within the area. Sod will be installed promptly following placement of clean soil.

If clean soil is inadvertently mixed with contaminated soils, the soil shall be segregated into a separate pile for testing or shall be considered contaminated.

Block Walls

As a result of the slope on the property, block walls will used to address significant elevation changes between lots, and in some cases within a lot. The block walls range from 6 feet to more than 17 feet in height and require geosynthetic reinforcement, compacted backfill, and other design elements.

The marker fabric/barrier will be placed only at the top of the wall system where contaminated soil will be separated from the clean soil and sod or landscaping soft cap. The fabric/barrier will not be placed where it would interfere with the geotechnical design of the wall system.

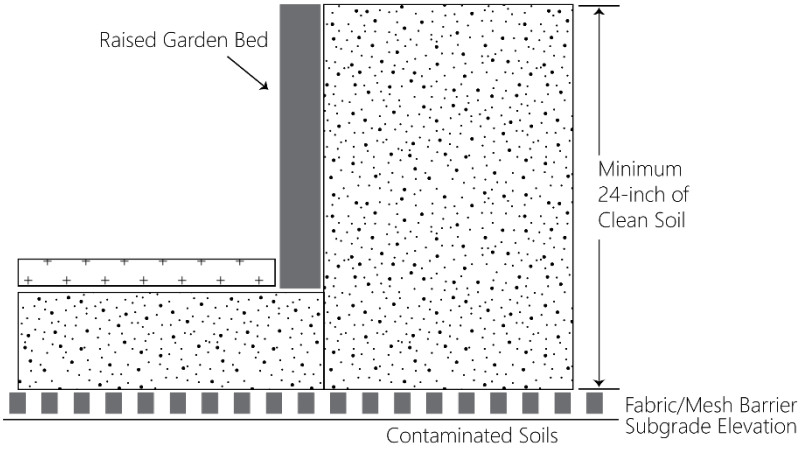


Example of block wall. Drawing courtesy of Munson Engineers, Inc.

6.3.7 Garden Areas

Soils within residential garden areas will be excavated and a minimum of 6-inches of clean soil applied over landscaping fabric. Additionally, the area will be constructed with raised garden beds. The raised beds will have a minimum height of 18-inches, resulting in a total clean soil barrier thickness within the community garden of at least 24-inches.

Detail - Raised Garden Bed Requirement



6.3.8 Crawlspaces

In all building crawlspaces, the soils within the crawlspace area will be covered with a vapor barrier directly on the contaminated soil.

6.3.9 Individual Lot Capping Documentation

Soils, sod, and soil amendments will be sampled or otherwise documented as being free of contamination prior to importing to the site. No sampling is anticipated following placement of clean soils, sod, or soil amendments.

7.0 Capping Documentation

Documentation of completed infrastructure and the effective capping of contaminated soils will be completed through photographs and inspection findings.

8.0 Excess Soils

If arsenic and lead contaminated soils cannot be used onsite, excess soil will be transported offsite to an appropriately permitted landfill. Offsite disposal or reuse (such as landfill capping materials) will require waste characterization as provided in WAC 173-303, *Dangerous Waste*, to consist of analysis of soil samples from the excess soils by *Toxic Characteristic Leaching Procedure* SW-846 Test Method 1311 for leachable arsenic and leachable lead.

Generally, orchard soils from similar sites have not characterized as a dangerous waste and can be accepted at local landfills. Approval for disposal or reuse must be received from the Chelan-Douglas Health District, the local authority having jurisdiction for landfill permitting and operations.

9.0 In-Progress Inspections

Fulcrum will complete routine inspection of the development, including documenting the major stages of grubbing, grading, utility, roadway, and sidewalks. For each individual lot, Fulcrum will document placement of fabric/mesh barriers, whiskers, clean soil, and sod or hydroseeding.

The Site Superintendent will complete and document site inspections daily during soil impacting activities. The Site Superintendent will record contractors working, respective number of workers, and work tasks completed by each contractor. Site observations will include stormwater, wind erosion, dust control, and weather forecast. The daily inspection form is included in Appendix D.

The project engineer will be responsible for the inspection and document of utility, road, and other infrastructure, including location, slopes, bedding materials, etc.

10.0 Post-Remediation Evaluation

Subsequent to construction of initial infrastructure, the following will be incorporated into a final remediation report:

10.1 General Contractor Responsibility

- As-built construction drawings documenting final cover in all areas of the site.
- Waste receipt and disposal documentation for any grubbing material and/or soils transported offsite for disposal.

10.2 Fulcrum Responsibility

- Confirmation soil sample results documenting final site conditions (where specified).
- Prepare a final site remediation report.
- Prepare an individual lot pre-sale inspection memorandum.
- Operations and Maintenance (O&M) plan for long-term site management by the Home Owner's Association (HOA).

The development remediation report and individual lot summaries will be submitted to Ecology for review either as an independent cleanup action, or under Ecology's Voluntary Cleanup Program. Individual lot operations and maintenance plans will not be prepared; however, lot owners may adopt the O&M plan for their own use.

11.0 Post-Project Site Management

The intent of the selected remediation methods is that the post-project site management will maintain existing capping systems while notifying lot owners of the environmental nature of the property. The selected development, including the sale of lots that are fully constructed and landscaped, is intended to make it uncommon that a homebuyer would dig into the soil and cause a significant exposure to legacy pesticides.
Post-project management will include:

- Notification of complete remediation activities
- Management of common areas by a home owners association
- Maintenance by individual lot owners

The plat will carry the following notice:

> "These parcels were occupied by orchard during the time period when lead arsenate was applied as a pesticide. As a result, soil on these parcels was sampled and found to contain concentrations of lead and arsenic at concentrations above state cleanup levels. Parcels XXXXXXX, XXXXXX and XXXXXX were successfully remediated during development using methods agreed upon and approved by the Washington State Department of Ecology to prevent exposure to contaminated soils. Documents detailing the remediation process can be found in the Declaration of Covenants, Conditions and Restrictions, A.F.N. _____."

A Declaration of Covenants, Conditions and Restrictions (CC&Rs) will be filed for the development. The CC&R includes common elements, establishing a home owners association, defining the acceptable uses of each lot, development standards, the responsibilities to maintain, and notification of the environmental nature and remediation completed in the development. The final remediation report will be delivered to Ecology and made publicly available.

A home owners association (HOA) will be established as part of the development. The HOA will be responsible for maintaining private, shared areas, including private roadways, stormwater infiltration pond and associated tracts, open space, etc. An Operations and Maintenance Plan will be prepared for the HOA to govern all HOA owned spaces and establish minimum criteria for individual lot maintenance consistent with the CC&Rs. If conditions of disrepair occur on a lot, the HOA has the ability to undertake action to address the deficiencies.

Post-project maintenance of individual, private lots will be responsibility of the lot owner. The CC&Rs include sections to provide Environmental Education & Information, summarize Environmental Remediation Matters, and establish an Environmental Covenant. It is not anticipated that any restrictive covenants will be filed as part of the development will be used to address the completed environmental remediation. Ecology shall have the right to inspect each lot.

12.0 Limitations

Fulcrum Environmental Consulting, Inc. has performed professional services in accordance with generally accepted professional consulting principles and practices and the principles of the Report Integrity paragraph at the beginning of this report. No other warranty, expressed or implied, is made. The conclusions and recommendations are based upon our field observations, field screening and independent laboratory analysis.

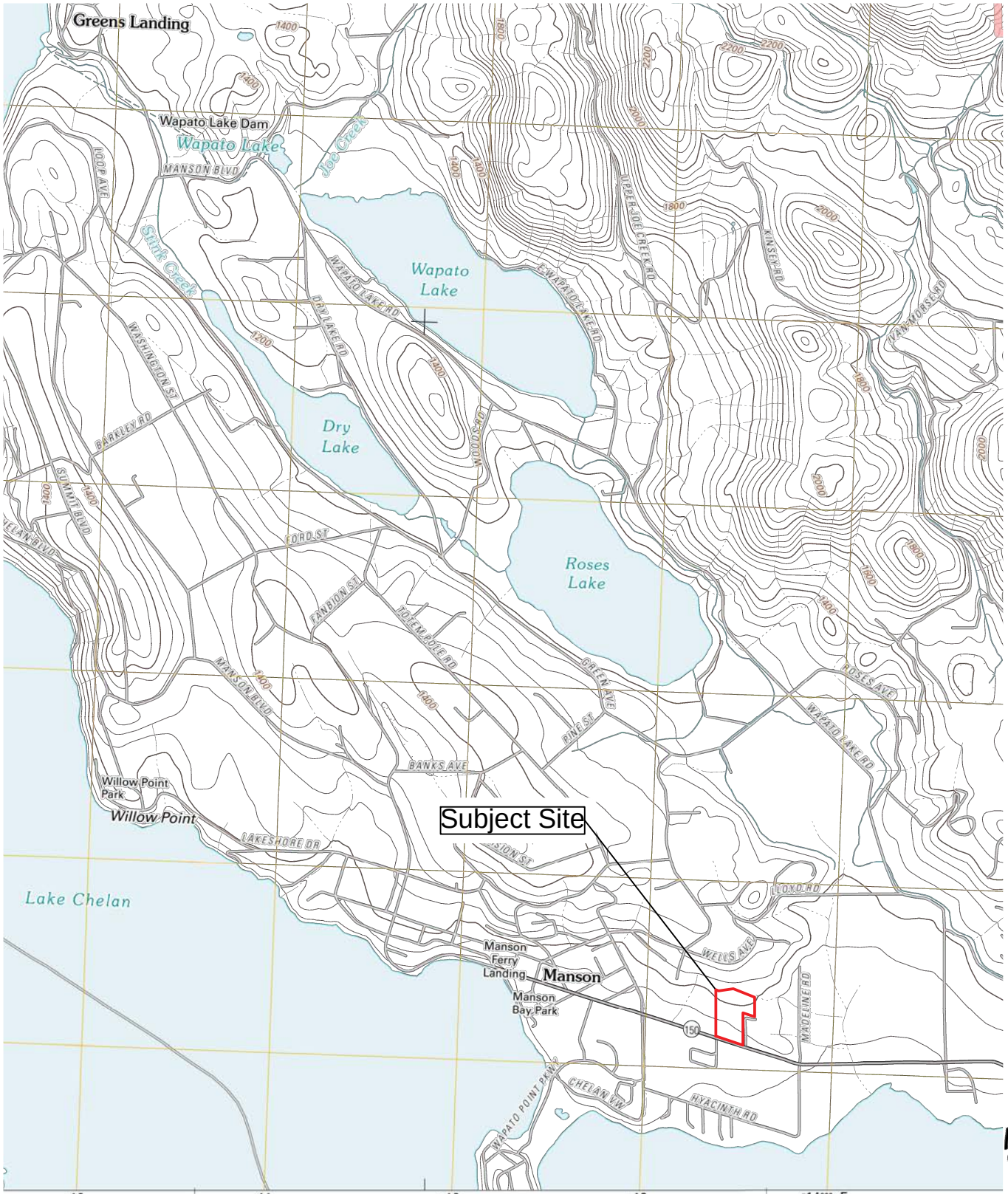
Fulcrum makes no warranties expressed or implied as to the accuracy or completeness of other's work included or referenced herein, except as observed and described in this report. This document does not imply that the property is free of other environmental concerns. This report is solely for the use and information of our client. Any reliance on this report by a third party is at that party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing at the time services were performed. Fulcrum Environmental Consulting, Inc. is not responsible for the impact of changes in environmental standards, practices or regulations subsequent to the performance of services. Fulcrum Environmental Consulting, Inc. assumes no liability for conditions that were not included in our scope of services, or conditions not generally recognized as predictable when services were performed.

Appendix A

Site Figures

FULCRUM
environmental consulting



Fulcrum Environmental Consulting, Inc. 406 North Second Street, Yakima, Washington p: 509.574.0839 f: 509.575.8453 efulcrum.net Viridian Development SRP. 213286. AME. 070221	Viridian Development - Highway 150 Manson, Washington	Site Location	FIGURE 1

FULCRUM environmental consulting

Fulcrum Environmental Consulting, Inc.
406 North Second Street, Yakima, Washington
p: 509.574.0839 f: 509.575.8453 efulcrum.net
Viridian Development SRP. 213286. AME. 070221

Viridian Development - Highway 150
Manson, Washington

Existing Conditions

FIGURE
2

Appendix B

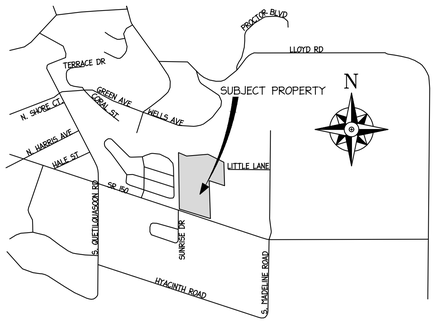
Site Plan

VIRIDIAN

P2019-004

EAST 1/2 SEC 36, TWP 28N, RGE 21E, WM CHELAN COUNTY, WASHINGTON

WAPATO JOHN INDIAN ALLOT. NO. 8



VICINITY MAP

NO SCALE

GENERAL CONSTRUCTION NOTES:

1. THE INTENT OF THESE DRAWINGS AND SPECIFICATIONS IS TO DESCRIBE AND PROVIDE FOR THE FURNISHING INSTALLING, TESTING AND PLACING IN SATISFACTORY AND FULLY OPERATIONAL CONDITION ALL EQUIPMENT, MATERIALS, DEVICES AND NECESSARY APPURTENANCES TO PROVIDE A COMPLETE PROJECT, TOGETHER WITH SUCH OTHER MISCELLANEOUS INSTALLATIONS AND EQUIPMENT HEREINAFTER SPECIFIED AND/OR SHOWN ON THE DRAWINGS. THE WORK SHALL INCLUDE ALL MATERIALS, APPLIANCES AND APPARATI NOT SPECIFICALLY MENTIONED HEREIN OR SHOWN ON THE DRAWINGS, BUT WHICH ARE NECESSARY TO MAKE A COMPLETE, FULLY OPERATIONAL INSTALLATION OF ALL SYSTEMS SHOWN ON THE DRAWINGS OR DESCRIBED HEREIN.

2. CONSTRUCTION SHALL BE IN COMPLIANCE WITH ALL CODES AND REQUIREMENTS OF THE WASHINGTON STATE DEPARTMENTS OF HEALTH, ECOLOGY, AND LABOR AND INDUSTRIES.

3. IF ANY CONFLICT OCCURS BETWEEN GOVERNMENT ADOPTED CODE RULES AND THESE SPECIFICATIONS, THE CODES SHALL GOVERN. THESE DRAWINGS AND SPECIFICATIONS SHALL NOT BE CONSTRUED TO PERMIT WORK IN NON CONFORMANCE WITH THE GOVERNING CODES. THIS SHALL NOT BE CONSTRUED AS RELIEVING THE CONTRACTOR FROM COMPLYING WITH ANY REQUIREMENTS IN EXCESS OF THE REQUIREMENTS OF THE HERE-IN-BEFORE MENTIONED GOVERNING CODES.

4. THE CONTRACTOR SHALL CONDUCT ALL WORK IN A SAFE MANNER IN COMPLIANCE WITH ALL APPLICABLE SAFETY REQUIREMENTS OF THE APPROPRIATE AGENCIES.

5. CONSTRUCTION OF IMPROVEMENTS SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION, LATEST EDITION, AS ISSUED BY THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION AND THE AMERICAN PUBLIC WORKS ASSOCIATION, AND THE STANDARDS AND SPECIFICATIONS OF CHELAN COUNTY AND LAKE CHELAN RECLAMATION DISTRICT

6. A PRECONSTRUCTION CONFERENCE IS REQUIRED PRIOR TO CONSTRUCTION & 48 HOURS ADVANCE NOTIFICATION TO THE CHELAN COUNTY DEPARTMENT OF PUBLIC WORKS IS REQUIRED PRIOR TO ACTUAL START OF WORK.

7. A PRECONSTRUCTION CONFERENCE IS REQUIRED PRIOR TO CONSTRUCTION & 48 HOURS ADVANCE NOTIFICATION TO CHELAN COUNTY P.U.D. #1 IS REQUIRED PRIOR TO ACTUAL START OF WORK.

8. LOCATIONS OF EXISTING UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY, LOCATE AND PROTECT ALL UTILITIES WITHIN THE PROJECT AREA. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING OR REPAIRING ANY UTILITIES DAMAGED DURING CONSTRUCTION.

9. LOCATION AND EXTENT OF IRRIGATION PIPELINES WITHIN PROJECT LIMITS ARE UNKNOWN. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL IRRIGATION MAINS AND REPLACING OR REPAIRING PIPELINES DAMAGED DURING CONSTRUCTION.

10. RESTORATION OF DAMAGED ROAD SURFACING SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND CHELAN COUNTY REQUIREMENTS.

11. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL LICENSES, PERMITS AND INSPECTIONS REQUIRED BY LAWS, ORDINANCES AND RULES GOVERNING WORK SPECIFIED HERE-IN. THE CONTRACTOR SHALL ARRANGE FOR INSPECTION OF WORK BY INSPECTORS AND SHALL GIVE THE INSPECTORS ALL NECESSARY ASSISTANCE IN THEIR WORK.

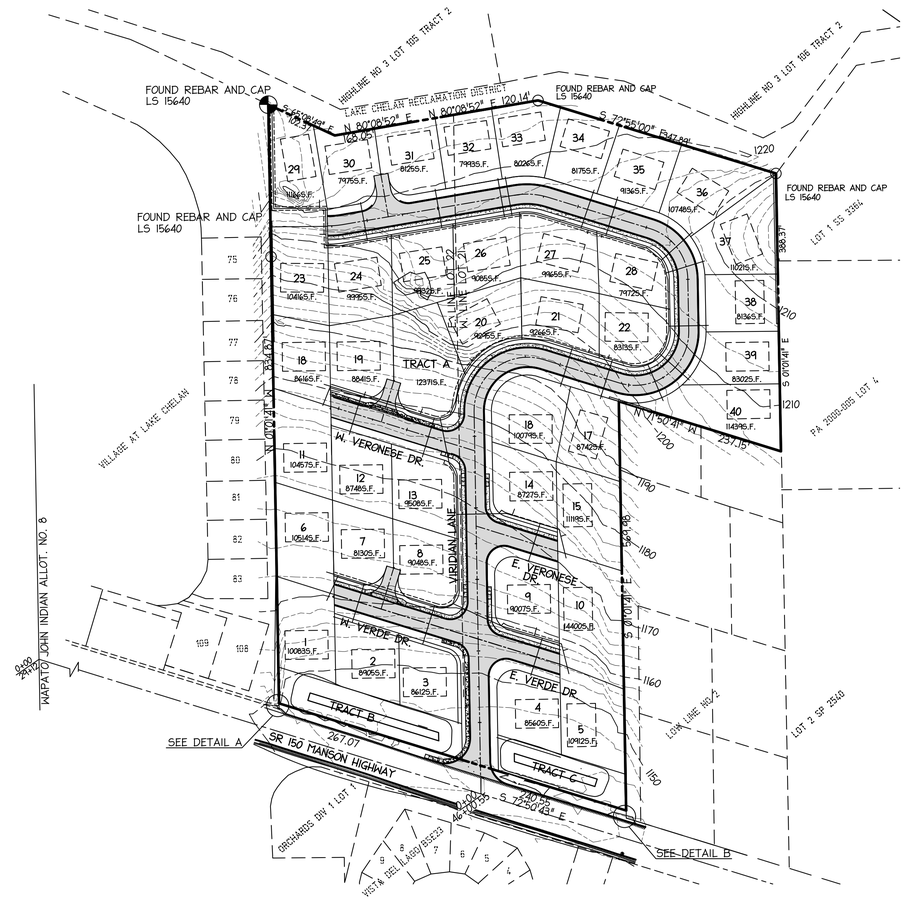
12. THE CONTRACTOR SHALL CLEAN UP ALL MATERIALS FROM THE PROJECT SITE TO THE SATISFACTION OF THE OWNER AND DISPOSE OF SUCH MATERIALS AT HIS OWN EXPENSE.

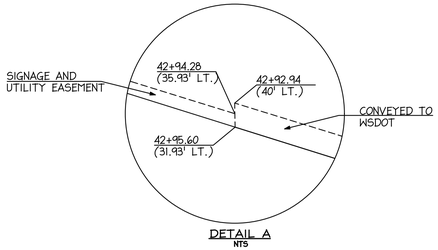
13. THE CONTRACTOR SHALL GUARANTEE ALL WORK INSTALLED UNDER THESE DRAWINGS AND SPECIFICATIONS. HE SHALL MAKE GOOD, REPAIR OR REPLACE, AT HIS OWN EXPENSE, ANY DEFECTIVE WORK, MATERIALS, OR PARTS WHICH MAY SHOW THEMSELVES WITHIN ONE YEAR AFTER FINAL INSPECTION, IF IN THE OPINION OF THE ENGINEER, SAID DEFECT IS DUE TO IMPERFECTION IN MATERIAL, DESIGN OR WORKMANSHIP.

14. THE CONTRACTOR SHALL DEVELOP A TRAFFIC CONTROL PLAN FOR WORK IN COUNTY STREETS AND STATE HIGHWAY AND SUBMIT TO THE COUNTY ENGINEERING DEPARTMENT AND STATE HIGHWAY DEPARTMENT FOR APPROVAL .

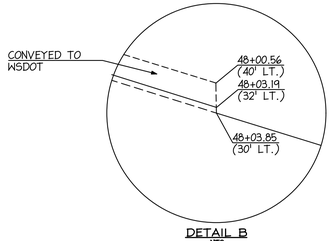
15. THE CONTRACTOR SHALL OBTAIN A RIGHT OF WAY PERMIT AND A STREET CUT PERMIT FOR WORK IN COUNTY STREETS AND/OR STATE HIGHWAY.

16. AS-BUILT PLANS AND A CERTIFICATION OF CONSTRUCTION MEETING THE DESIGN INTENT BY THE CONSTRUCTION ENGINEER ARE REQUIRED.





DETAIL A
NTS



DETAIL B
NTS

SITE PLAN

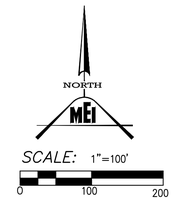
SCALE: 1"=100'

LEGAL DESCRIPTION:

LOTS A, B, AND C, JOACHIM RICHTER SHORT PLAT NO. 3391, CHELAN COUNTY WASHINGTON, RECORDED APRIL 30, 1996 IN BOOK SP-13 OF SHORT PLATS, PAGES 91 AND 92.
EXCEPT THAT PORTION OF LOT A CONVEYED TO THE STATE OF WASHINGTON, DEPARTMENT OF TRANSPORTATION IN WARRANTY DEED RECORDED JULY 20, 2006, UNDER AUDITORS FILE NO. 2232644.

ROBERT H. CHILD
STATE OF WASHINGTON
22505
REGISTERED
PROFESSIONAL ENGINEER

MUNSON ENGINEERS
P.O. BOX 3796 610 N. CHELAN AVE.
WENATCHEE, WASHINGTON 98801 (509) 663-0544 FAX (509) 663-0546



DATUM: ASSUMED
BENCHMARK: TOP REBAR AND CAP AT NORTHWEST BOUNDARY CORNER
TBM EL = 1225.59

EQUIPMENT AND PROCEDURE:

TRAVERSE WAS PERFORMED WITH THE TRIMBLE TSC2/R8 GPS EQUIPMENT AND MEETS OR EXCEEDS THE STANDARDS CONTAINED IN WAC 332-130-090. THE TOPOGRAPHIC PORTION OF THIS SURVEY WAS PERFORMED WITH A LEICA TC 1103 TOTAL STATION, HAVING A 1 SECOND ANGULAR READING. TRAVERSE NOT BALANCED

DEVELOPMENT DATA:

OWNER: SEAWEST INVESTMENTS
13120 NE 70th PL.
KIRKLAND, WA. 98033

ENGINEER AND SURVEYOR: MUNSON ENGINEERS
610 N. CHELAN AVE.
WENATCHEE, WA 98801
PHONE NO. 663-0544

COUNTY FILE #:	PL 18-210
PARCEL NO:#	282136681140, #282136681141, #282136681142
NO. LOTS:	40
NO. TRACTS:	3
ZONING:	UR2 (URBAN RESIDENTIAL)
AVERAGE LOT AREA:	9355 S.F.
SMALLEST:	8000 S.F.
LARGEST:	13960 S.F.
TOTAL:	522,720 S.F. - 12.0 ACRES
POWER:	CHELAN COUNTY PUD
TELEPHONE:	FRONTIER
CABLE TV:	CHARTER COMMUNICATIONS
WATER:	LAKE CHELAN RECLAMATION DISTRICT
SEWER:	LAKE CHELAN RECLAMATION DISTRICT

LEGEND OF SHEETS

1. SITE PLAN AND VICINITY MAP
2. STORMWATER POLLUTION PREVENTION PLAN
3. GRADING PLAN
4. ROADWAY CROSS SECTIONS
5. SOIL REMEDIATION PLAN
6. SOIL REMEDIATION ROADWAY PROFILE
7. SOIL REMEDIATION ELEVATIONS
8. RETAINING WALL SECTIONS AND ELEVATIONS
9. RETAINING WALL SECTIONS AND ELEVATIONS
10. SANITARY SEWER PLAN
11. SANITARY SEWER PROFILE
12. SANITARY SEWER DETAILS
13. WATER DISTRIBUTION PLAN
14. WATER DISTRIBUTION DETAILS
15. ROADWAY & STORM DRAIN PLAN
16. ROADWAY AND STORM DRAIN PROFILE
17. ROADWAY STRIPING AND SIGNAGE PLAN
18. ROADWAY AND STORM DRAIN DETAILS
19. ROADWAY AND STORM DRAIN DETAILS
20. INDIVIDUAL LOT STORM DRAIN DETAILS

THESE PLANS HAVE BEEN REVIEWED BY CHELAN COUNTY PUBLIC WORKS AND HAVE BEEN ACCEPTED FOR COMPLYING WITH THE REQUIREMENTS OF CHELAN COUNTY ROAD STANDARDS. THESE PLANS ARE VALID FOR FIVE YEARS FROM THE DATE OF ACCEPTANCE.

APPROVED: _____
CHELAN COUNTY ENGINEER DATE

1/20

Appendix C

Stormwater Pollution Prevention Plan

VIRIDIAN

PARCEL NOS. 282136681140, 282136681141, 282136681142

CHELAN COUNTY, WASHINGTON
STORMWATER PLAN-PROJECT REPORT

JUNE 2020
REVISED SEPTEMBER 2020

Consultants:

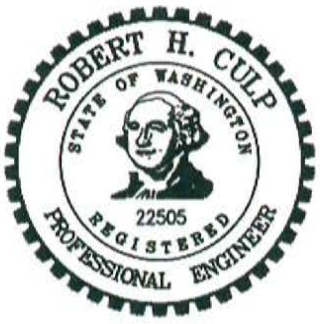
MUNSON ENGINEERS, INC.
610 North Chelan Avenue
Wenatchee, WA 98801
Robert Culp, P.E.
(509) 663-0544

VIRIDIAN

PARCEL NOS. 282136681140, 282136681141, 282136681142

CHELAN COUNTY, WASHINGTON
STORMWATER PLAN-PROJECT REPORT

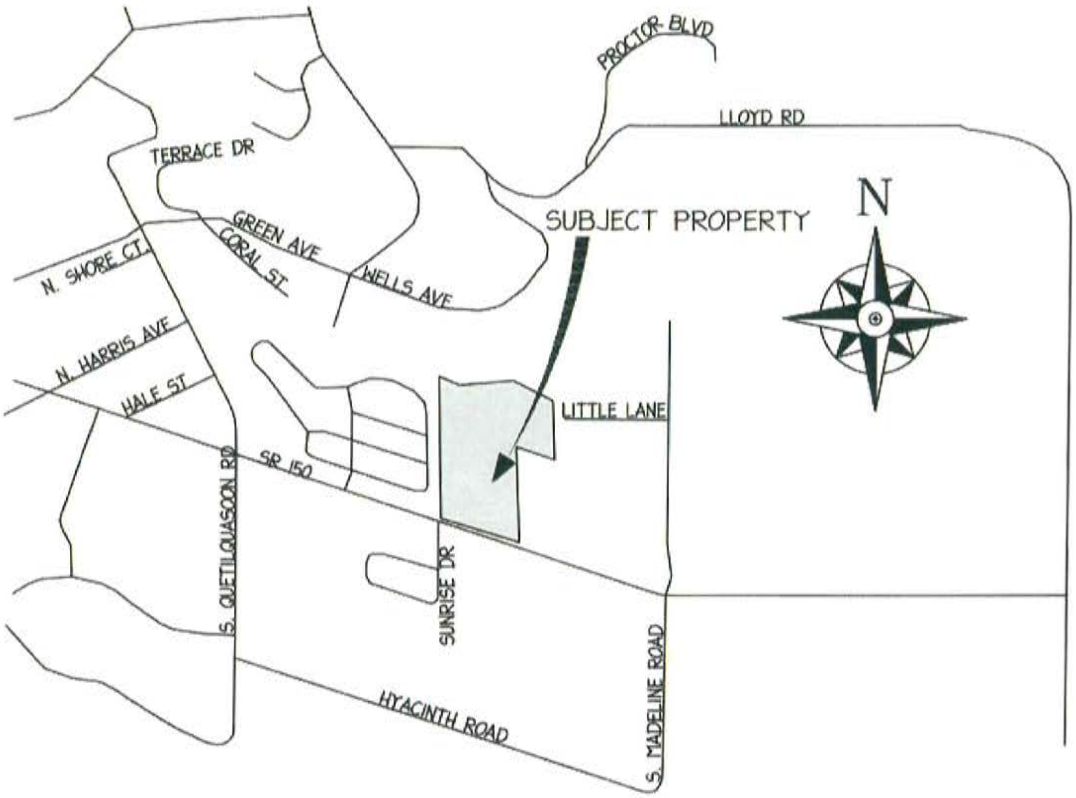
JUNE 2020
REVISED SEPTEMBER 2020



Consultants:

MUNSON ENGINEERS, INC.
610 North Chelan Avenue
Wenatchee, WA 98801
Robert Culp, P.E.
(509) 663-0544

INTRODUCTION



VICINITY MAP

The 12.0-acre Seawest Investment property is comprised of 3 parcels located in Chelan County. The site lies directly north of SR150 near Manson, Washington. A project is proposed that includes a 40-lot plat, the design of an access road, emergency-vehicle turnarounds, and adequate drainage amenities. Lot access will be provided by the construction of an internal access road to each of the lots. The site-plan with proposed roadway is shown in Figure 4.2. The drainage analysis included in this report describes changes to storm water flow characteristics resulting from proposed modifications to the property. The report identifies the volume of the 24-hour storm of a 100-year return frequency as it is generated on the improved property. The report evaluates the impacts of storm water flow rate and the impacts of storm water volume due to development of impervious surfaces such as roof tops and driveways. It then proposes a design to mitigate those impacts. All run-off due to land use modifications resulting from the design storm and proposed impervious surfaces will be retained on-site in a stormwater infiltration facility.

This analysis uses a methodology developed by the United States Department of Agriculture Soil Conservation Service, now known as the Natural Resources Conservation Service. The method utilizes the SCS 24-hour rainfall distributions as the classic examples of dimensionless depth rainfall occurrences. Different rainfall depths may be applied to the dimensionless distributions to create rainfall models for various

storm magnitudes and geographic locations. The appropriate rainfall model is applied to specific conditions of the site which include soil types and permeability, vegetative coverage and type, improvements and developments added to the site, and other characteristics of the site as described by the "curve number" (CN). The accuracy of the selection of the curve numbers for the type of soil, type of cover, and condition of cover is essential for proper prediction of runoff characteristics. Haestad Methods PondPack Version 9 for Windows was used to calculate the maximum flow rate of storm water runoff and the maximum volume of runoff attributable to the post development design storm. Watershed properties such as area and curve number were determined using Carlson Civil Suite 2018.

This report has been prepared consistent with the provisions of the *Stormwater Management Manual for Eastern Washington,* published by the Washington State Department of Ecology, September 2004 version.

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1-EXISTING CONDITIONS

Topography

The subject property is comprised of three parcels totaling 12.0 acres. It lies just north of SR150. The site is terraced. The lower terrace is relatively flat for the first 100 feet from the southern boundary. It then begins to rise at a rate of 15 percent for 40 feet (Fig. 1.1). At that point, there is a large terrace that sweeps across the middle portion of the site. The terrace has an upward slope to the north of approximately 4.5 percent for 400 feet. The slope then increases to 16.5 percent for 150 feet where the upper terrace begins. The upper terrace is flat with a slope less than 2 percent and continues to the north beyond the northern boundary line. The landscape on the upper terrace is nearly flat in the east-west direction. Approximately 550 feet from the southern boundary, there is a bulge in the landscape. The 50' wide bulge is comprised of soil and exposed rock formations and is elevated nearly 15 feet above the middle terrace.

Figure 1.1 Terraced Landscape

Drainage Patterns

The site has natural drainage patterns that allow runoff to flow from the upper terrace to the lower regions of the property and adjacent properties. The gentle rolling slopes allow runoff to sheet-flow. There are off-site features including Wells Avenue and homes that intercept flow in the natural drainage basin, preventing it from entering the property.

Soils

The U. S. Department of Agriculture Natural Resources Conservation Service classifies soil types and identifies their properties and characteristics. The soil survey mapped the location of the development and identified five different soil types that cover the site. The classifications include Antilon gravelly sandy loam, 0 to 3 percent slopes, Antilon gravelly sandy loam, 3 to 8 percent slopes, Antilon gravelly sandy loam, 8 to 25 percent slopes, Chelan gravelly sandy loam, pumiceous, 8 to 15 percent slopes, and Entiat-rock outcrop complex, 25 to 65 percent slopes.

Antilon gravelly sandy loam, 0 to 3 percent slopes, comprises a small portion of the lower terrace. This moderately well drained, coarse textured soil typically has a dark grayish-brown surface layer of gravelly ashy sandy loam 10 inches thick. The substratum is light gray silty-clay loam that extends to a depth of 60 inches or more. Permeability is moderate. Runoff is very slow, and there is slight hazard of water erosion. The parent material is volcanic ash, pumice and loess over lacustrine deposits. The soil is not susceptible to flooding or ponding. Available water storage is high, about 10.1 inches. The soil is classified within Hydrologic Soil Group C.

A small portion of the lower terrace at the southwest corner of the site is comprised of Antilon gravelly sandy loam, 3 to 8 percent slopes. This moderately well drained, coarse textured soil typically has a dark grayish-brown surface layer of gravelly ashy sandy loam 10 inches thick. The substratum is light gray silty-clay loam that extends to a depth of 60 inches or more. Permeability is moderate. Runoff is very slow, and there is slight hazard of water erosion. The parent material is volcanic ash, pumice and loess over lacustrine deposits. The soil is not susceptible to flooding or ponding. Available water storage is high, about 10.1 inches. The soil is classified within Hydrologic Soil Group C.

The stretch of land between the lower terrace and the upper terrace is comprised of Antilon gravelly sandy loam, 8 to 25 percent slopes. This moderately well drained, coarse textured soil typically has a dark grayish-brown surface layer of gravelly ashy sandy loam 10 inches thick. The substratum is light gray silty-clay loam that extends to a depth of 60 inches or more. Permeability is moderate. Runoff is very slow, and there is slight hazard of water erosion. The parent material is volcanic ash, pumice and loess over lacustrine deposits. The soil is not susceptible to flooding or ponding. Available water storage is high, about 10.1 inches. The soil is classified within Hydrologic Soil Group C.

Chelan gravelly sandy loam, pumiceous, 8 to 15 percent slopes, comprises the upper terrace. This well drained, moderately coarse textured soil typically has a gray surface layer of gravelly sandy loam 6 inches thick. The substratum is pale-brown very gravelly sandy loam that extends to a depth of 60 inches or more. Permeability is moderate. Runoff is medium, and there is moderate hazard of water erosion. The parent material is volcanic ash, pumice and loess over basal till. The soil is not susceptible to flooding or ponding. Available water storage is high, about 9.0 inches. The soil is classified within Hydrologic Soil Group B.

Small portion of the northeasterly portion of the site is comprised of Entiat-rock outcrop complex, 25 to 65 percent slopes. The complex consists of about 90 percent Entiat sandy loam, 25 to 65 percent slopes, and 10 percent Rock outcrop. Runoff is rapid to very rapid, and the hazard of water erosion is high to very high. The soil is classified within Hydrologic Soil Group D.

Ground Cover

The preponderance of the site is covered in grassy weeds and brush. There are several small deciduous trees covering the property (Fig. 1.1).

Presence of Critical Areas

There are no known critical areas on the site.

Adjacent Areas

The site is within a low density residential area. The property is adjacent to other residential properties including single family homes, orchard, and vacant undeveloped lots. The lots in this area are typically small but range from 0.1 to 4 acres. Figure 1.2 shows a neighboring subdivision to the west of the subject property.

Figure 1.2 Neighboring Subdivision

Existing Development

There are no existing developments on-site.

Existing Stormwater Facilities

No storm water facility has been developed on the site. If run-off occurs, it will sheet flow off the site and into SR150 or adjacent properties.

Utilities

Chelan County Public Utility District will supply power to the site. Frontier communications will provide telephone service and Charter Communications will provide cable TV service. Domestic water supply and wastewater treatment will be provided by the Lake Chelan Reclamation District.

2-SURFACE INFILTRATION AND BIO-INFILTRATION TREATMENT

The Stormwater Management Manual for Eastern Washington identifies nine Site Suitability Criteria that must be considered for siting infiltration treatment systems such as the infiltration pond proposed for this site.

1. Setback Criteria
2. Groundwater Protection Areas
3. High Vehicle Traffic Areas
4. Soil Infiltration Rate/Drawdown Time
5. Depth to Bedrock, Water Table, or Impermeable Layer
6. Soil Physical and Chemical Suitability for Treatment
7. Seepage Analysis and Control
8. Cold Climate and Impact of Roadway Deicing Chemicals
9. Previously Contaminated Soils or Unstable Soils

SSC-1

Setback requirements are generally required by local regulations, Uniform Building Code, or state regulations. The Stormwater Management Guide for Eastern Washington provides SSC-1 as guidance. This requirement prevents water infiltration facilities from being placed too close to other aspects of the development such as drinking water wells, drainfields building foundations, and critical areas.

SSC-2

Ground water protection area criteria is intended to protect groundwater in the area. If the site is located in an aquifer sensitive area, sole source aquifer, or wellhead

protection zone, local jurisdictions should be consulted for pretreatment requirements. None of these conditions are present.

SSC-3

An infiltration BMP may be considered for runoff from areas of industrial activity and the high vehicle traffic areas described below. For such applications, sufficient pollutant removal (including oil removal) must be provided upstream of the infiltration BMP to ensure that ground water quality standards will not be violated and that the BMP is not adversely affected.

High Vehicle Traffic Areas include the following:

- Commercial or industrial sites subject to an expected average daily traffic (ADT) count ≥ 100 vehicles/1,000 square feet (sf) gross building area (trip generation)

- Road intersections with an ADT of ≥ 25,000 on the main roadway, or ≥ 15,000 on any intersecting roadway

The subject property is not a high vehicle traffic area

SSC-4

Soil infiltration rate/drawdown time requirements include a minimum infiltration rate of 0.5 inches per hour and a maximum of 2.4 inches per hour to a depth of 2.5 times the maximum design flooded depth. The maximum ponded depth must be emptied within 72 hours of inflow completion to restore hydraulic capacity, maintain infiltration rates, and aerate vegetation and soil. The long-term infiltration rate is determined by dividing the short-term rate by a factor of two. The presumptive long-term infiltration rate for sandy loam is 0.5 inches per hour, resulting in a drawdown time of 32 hours for the pond on tract B and 37 hours for the pond on tract C.

SSC-5

The base of all infiltration basins should be more than or equal to 5 feet above the seasonal highwater mark, bedrock, or other low permeability layer. There is no shallow low permeability layer at the site.

SSC-6

Soil texture and design infiltration rates should be considered with the physical and chemical characteristics of the soil to determine if the soil is adequate for removing target pollutants. Considerations include:

-Cation exchange
-Depth of soil
-Organic content
-Waste fill materials
-Engineered soils
-Local jurisdictions

The sandy loam on site is expected to have a cation exchange capacity greater than 5meq/100h. The soil is deep and natural vegetation is abundant in areas on the property not cleared.

SSC-7

Determine if any adverse effects would occur from seepage from the infiltration facility. Nearby building foundations, basements, roads, parking lots, and slopes must all be considered. Infiltration of stormwater is not recommended upgradient of contaminated sites that would mobilize pollutants if the infiltration facility were to seep. In this instance, the storm water runoff is at the low point of the property at a relatively level area.

SSC-8

Consider the potential impact of roadway deicing chemicals dissolved within infiltrated stormwater on potable water wells in the siting determination. Implement mitigation measures if the infiltration of roadway deicing chemicals could cause a violation of ground water quality standards.

SSC-9

Infiltration of stormwater is not recommended on or upgradient of contaminated sites where infiltration of even clean water can cause contaminants to mobilize. If the site is known or suspected to contain contaminated soils, the design professional should investigate whether the soil under the proposed infiltration BMP contains contaminants that could be transported by infiltrated water from the BMP. If so, measures should be taken for remediation of the site prior to construction of the BMP, or an alternative location should be chosen. The design professional should also determine if the site history, regional geology or local geology indicates that the soil beneath the proposed infiltration BMP could be unstable, due to improper placement of fill, subsurface geologic features, etc. If so, further investigation and planning should be undertaken prior to siting of the BMP.

3-CORE ELEMENTS

The Stormwater Management Manual for Eastern Washington identifies eight core elements. These core elements apply to new development projects and redevelopment projects in eastern Washington. Depending upon the project's size and type, all the

elements may not apply. Different combinations of the core elements apply to the differing types and sizes of projects. The eight core elements are as follows:

1. Preparation of a Stormwater Site Plan
2. Construction Stormwater Pollution Prevention
3. Source Control of Pollution
4. Preservation of Natural Drainage Systems
5. Runoff Treatment
6. Flow Control
7. Operation and Maintenance
8. Local Requirements

For all new development projects such as this one, core elements 1 through 8 apply. Core element 5 is added to address runoff treatment. Core element 6 is included to outline procedures and precautions preventing pollution of the water bodies in the vicinity. Core element 7 is included whenever core elements 5 or 6 are included. Therefore all 8 of the core elements are included.

Core Element #1 – Preparation of a Stormwater Site Plan

The purpose of the stormwater site plan is to provide a means of integrating stormwater management into the design and planning of the project.

Core Element #2 – Construction Stormwater Pollution Prevention

Control of erosion and prevention of sediment and other pollutants from leaving the site enhances stormwater quality. The Stormwater Management Manual for Eastern Washington lists best management practices to be implemented to prevent pollution migration during the construction phase of the development.

Core Element #3 – Source Control of Pollution

Potential pollutants are controlled to prevent stormwater from contamination. The Stormwater Management Manual for Eastern Washington lists best management practices to be implemented to control pollution.

Core Element #4 – Preservation of Natural Drainage Systems

Every piece of land has a drainage system. The goal of this core element is to maintain the natural drainage patterns. By maximizing the extent to which stormwater discharge patterns, rates, and outfall locations remain the same, the impact to downstream development is decreased.

Core Element #5 – Runoff Treatment

Runoff treatment reduces pollutant loads and concentrations in stormwater runoff. The goal is to treat 90% of the annual runoff to protect receiving waters on a long-term basis. Treatment of runoff will be achieved by absorption to soil, root uptake, and periodic removal of sediment.

Core Element #6 – Flow Control

Flow control is intended to mitigate the impacts of increased storm runoff volumes and flow rates on streams. Flow rates and volumes are typically increased by development. Future impacts can be minimized with measures outlined in this core element. In this development, all runoff will be retained on site. No flow generated on-site will flow offsite.

Core Element #7 – Operation and Maintenance

Operation and maintenance ensures that the stormwater facilities perform to required standards. Without an operation and maintenance plan stormwater facilities often fail to perform adequately. This core element provides a plan for preventative maintenance and performance checks at regular intervals.

Core Element #8 – Local Requirements

This core element provides a means to protect local water bodies with additional conditions and measures required by the local jurisdiction.

4-PERMANENT STORMWATER CONTROL PLAN

Improvements to the site, such as rooftops and driveways, create additional impervious surfaces. Runoff from the roadway and sidewalk surface will flow into two onsite infiltration ponds. The onsite infiltration facility will require a capacity of 0.303 ac-ft. The runoff will be collected in catch basins which will also reduce the amounts of suspended solids and floating materials in the flowing water.

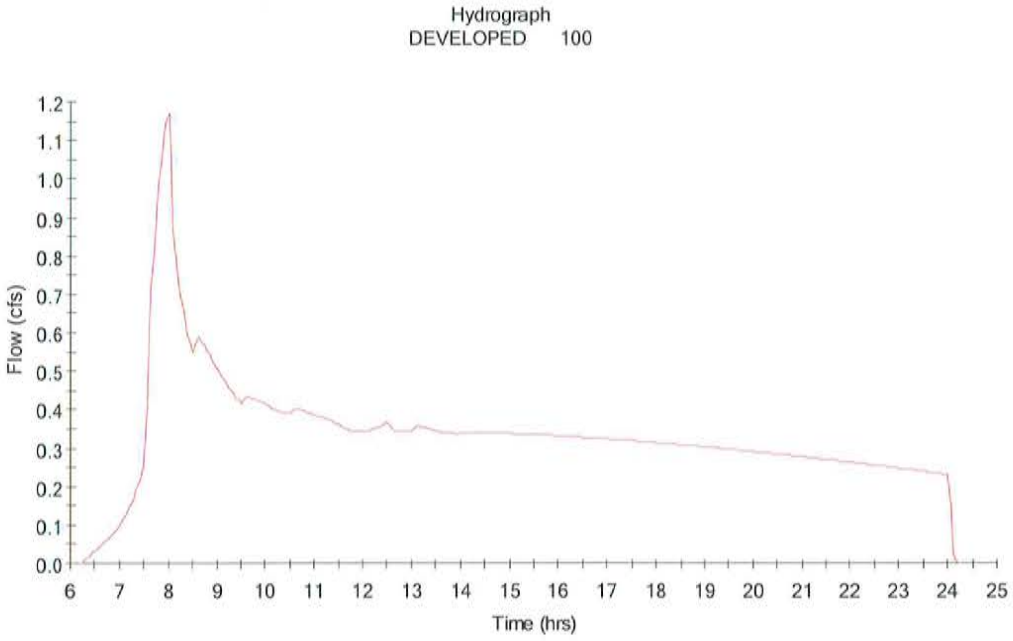

Figure 4.1 Outflow Hydrograph of Developed Property

The predevelopment watershed area includes the land area contained within the property boundary totaling 14.92 acres. The entire undeveloped site is covered in grassy vegetation and brush. Runoff was determined based on soil type, area, and curve number. The curve numbers used for the analysis are 61 for hydrologic group B soil, 74 for hydrologic group C soil, and 80 for hydrologic group D soil.

For the developed condition, the site was analyzed as two watershed areas. The runoff accumulated within the right of way is collected in catch basins and dispersed into an infiltration facility. Runoff generated by the design storm as it falls onto driveways and rooftops is retained on each lot by the use of individual drywells. The impervious areas were assigned a curve number of 98. 92994 square feet of impervious area is created by the roadway and sidewalks. 2600 square feet of impervious area was assumed for each of the 40 lots.

The storm water analysis was conducted using Haested Methods Pondpack 9.0. Records published by the National Oceanic and Atmospheric Administration show that the 100-year frequency storm in this area has an intensity of 3.0 inches in 24 hours. The outflow hydrographs for the roadway and for the average lot is shown in Figure 4.1 above and in Appendix 2. Time of concentration for the roadway was calculated using a shallow concentrated flow with an average slope of 8.0 percent. The hydraulic length was determined to be 1545 feet. Carlson Civil Suite 2018 was used to determine

hydraulic length and slope. The values were then used in Haested Methods Pondpack 9.0 to determine runoff volume.

Calculations

The site was modeled as a drainage area into a pond. The outflow hydrograph shows that the storm follows the standard Type 1A distribution. The peak discharge from the design storm as it falls on the developed right of way is 1.17 cubic feet per second, producing a volume of 13,200 cubic feet. Runoff generated by the 100-year 24-hour event on each individual lot is 0.012 ac-ft, 522 cubic feet. An infiltration facility will be utilized to retain runoff from the impervious surfaces within the right of way and 25 lots. The required storage volume for the right-of-way and 25 developed lots is 0.503 ac-ft, 21,910 cubic feet. Two ponds will be used. The pond on Tract B will be 54'x232'x5.5' with a water depth of 3.46'. The pond on Tract C will be 45'x154'x6.0' with a water depth of 3.96'. The total capacity of the infiltration ponds is 27,000 cubic feet with 0.5' of freeboard. Lots 1-5, 11-13, and 23-28 will use a single 12'x12'x12' dry well facility providing a 650 cubic foot retention capacity.

Geotechnical Information

The Chelan Mountains terrane is dominated by the Chelan Complex of migmatite and tonalite of deep-seated igneous and metamorphic rock. The underlying soils are Antilon gravelly sandy loam, 0 to 3 percent slopes, Antilon gravelly sandy loam, 3 to 8 percent slopes, Antilon gravelly sandy loam, 8 to 25 percent slopes, Chelan gravelly sandy loam, pumiceous, 8 to 15 percent slopes, and Entiat-rock outcrop complex, 25 to 65 percent slopes.

Drainage Area Maps

The current conditions establish a drainage basin that drains through the property from North to South (Figure 4.2).

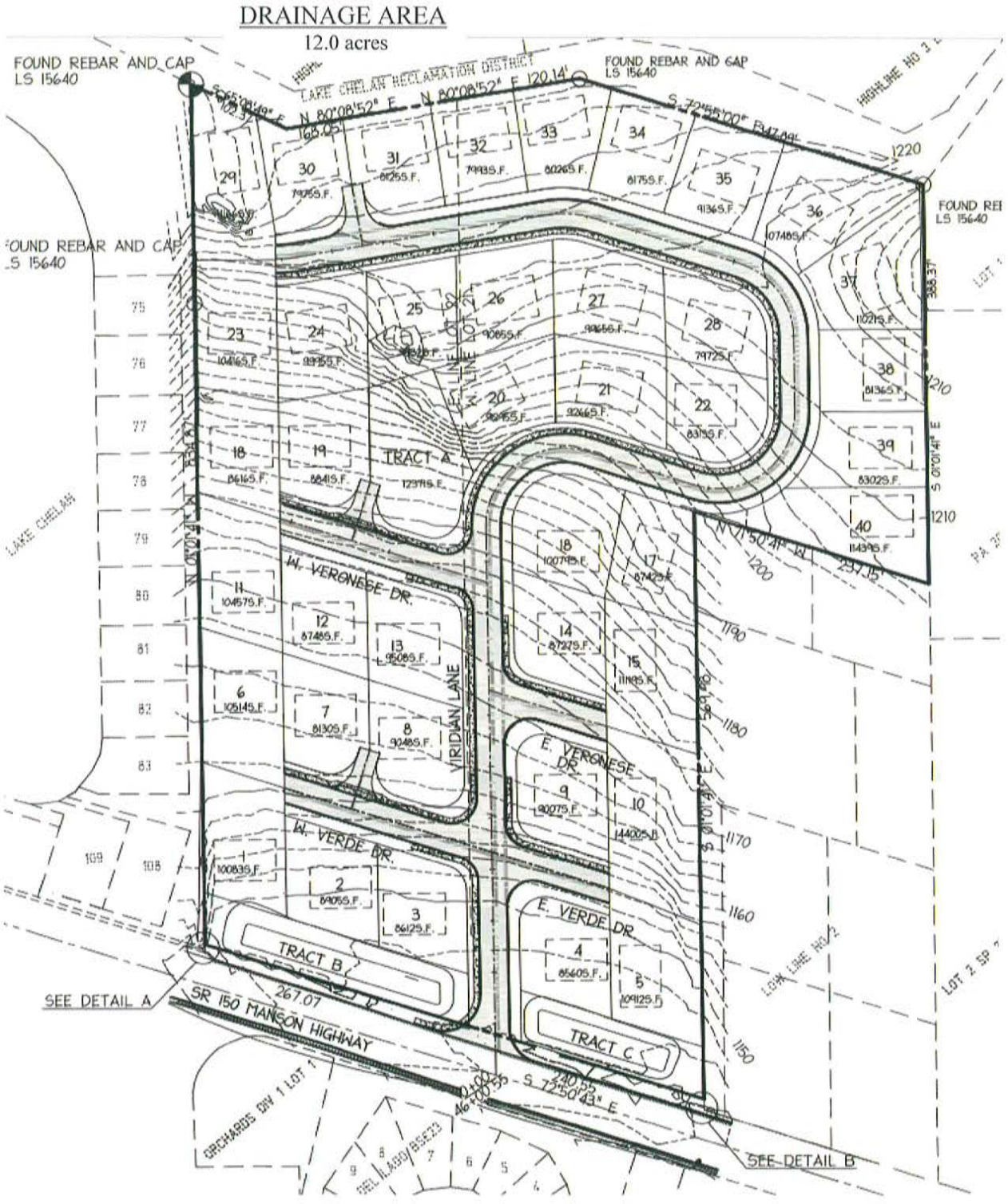

Figure 4.2 Drainage Study Map

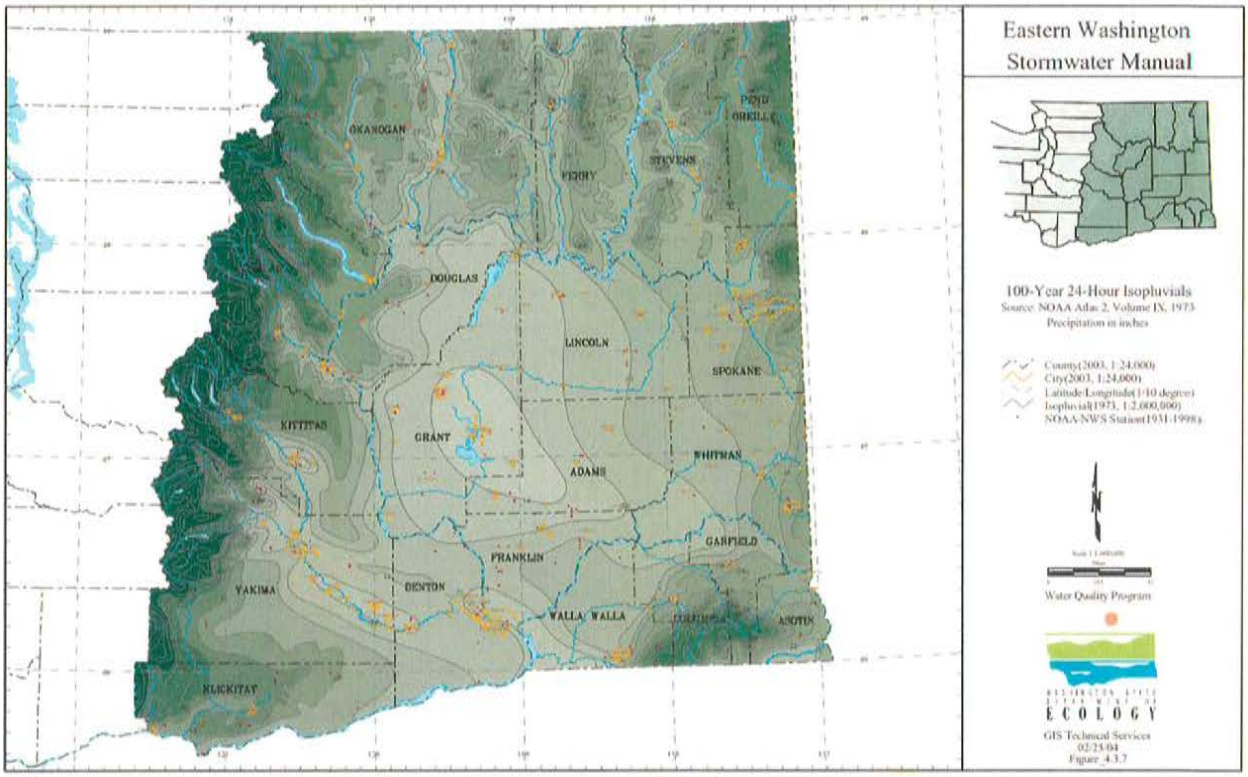

Figure 4.3 Washington State Isopluvial Map for 100 Year Frequency Storm

5-CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (C.E. #2)

Construction stormwater pollution will be prevented using best management practices as outlined in the Stormwater Management Manual for Eastern Washington. The manual establishes 12 elements that are to be considered in prevention of construction stormwater pollution. Each element will be analyzed to determine applicability and provide a solution. Best Management Practices (BMPs) are described in detail in Chapter 7 of the manual.

Mark Clearing Limits

The site will require clearing for construction. The site is now primarily covered by weeds, brush, and wetland.

Establish Construction Access

Construction access will be provided at SR150. The access will be stabilized and maintained by the contractor throughout the construction phase. All construction vehicles will utilize the designated access. Access is prohibited at any point other than the designated construction access. BMP C105: Stabilized Construction Entrance shall be implemented in accordance with the Stormwater Management Manual for Eastern

Washington. The intent of this BMP is to prevent tracking of sediment onto paved areas by vehicles and equipment leaving the project site.

Control Flow Rates

Flow rates will be controlled to prevent sedimentation of neighboring properties. The temporary silt fence contains runoff before it exits the project boundary.

Sediment Controls

Sediment controls will prevent sediment from being carried to adjacent properties in the stormwater runoff. Where necessary sediment controls will be implemented using BMP C233: Silt Fence, as shown on the construction drawings. Figure 5.1 shows installation details for the silt fence. The details can also be seen in the Stormwater Management Manual for Eastern Washington.

Silt fences (BMP C233) will be used as the primary source of sediment control. If silt fences fail to be effective other practices shall be used. Alternatives to silt fences and may be installed if needed. Geotextile standards and silt fence installation details can be found in Table 7.3.10 and Figure 7.3.20 of the DOE Manual, respectively. Silt fence details and construction entrance details are shown on the construction drawings.

Stabilize Soils

Soils shall be stabilized as needed to prevent erosion of exposed soils. Soil exposure time periods are specified in Figure 1B or Figure 4.3.1 of the DOE Manual. Best management practices will be implemented as necessary to control dust and erosion. BMP C140 outlines the procedures for dust control.

Protect Slopes

Steep slopes should be managed by not disturbing natural vegetation and possibly the use of erosion control blankets.

Protect Drain Inlets

Storm drain inlets are susceptible to sedimentation when made operational during construction activity. All inlets that are installed prior to final soil stabilization shall be protected to prevent sedimentation in the drainage system. Where necessary, BMP C20: Storm Drain Inlet Protection shall be implemented. Several options are listed in BMP C220 for use in differing situations.

Stabilize Channels and Outlets

The site will be graded for control of storm water during the project. The on soils on site are sufficient to infiltrate runoff until hard surfaces are created. If necessary, a pond area may be established near the construction entrance to capture storm runoff.

Control Pollutants

Pollutants will be managed in a manner that prevents pollution of stormwater. Concrete shall be handled in accordance with BMP C151 and saw cutting shall conform to the provisions of BMP C152.

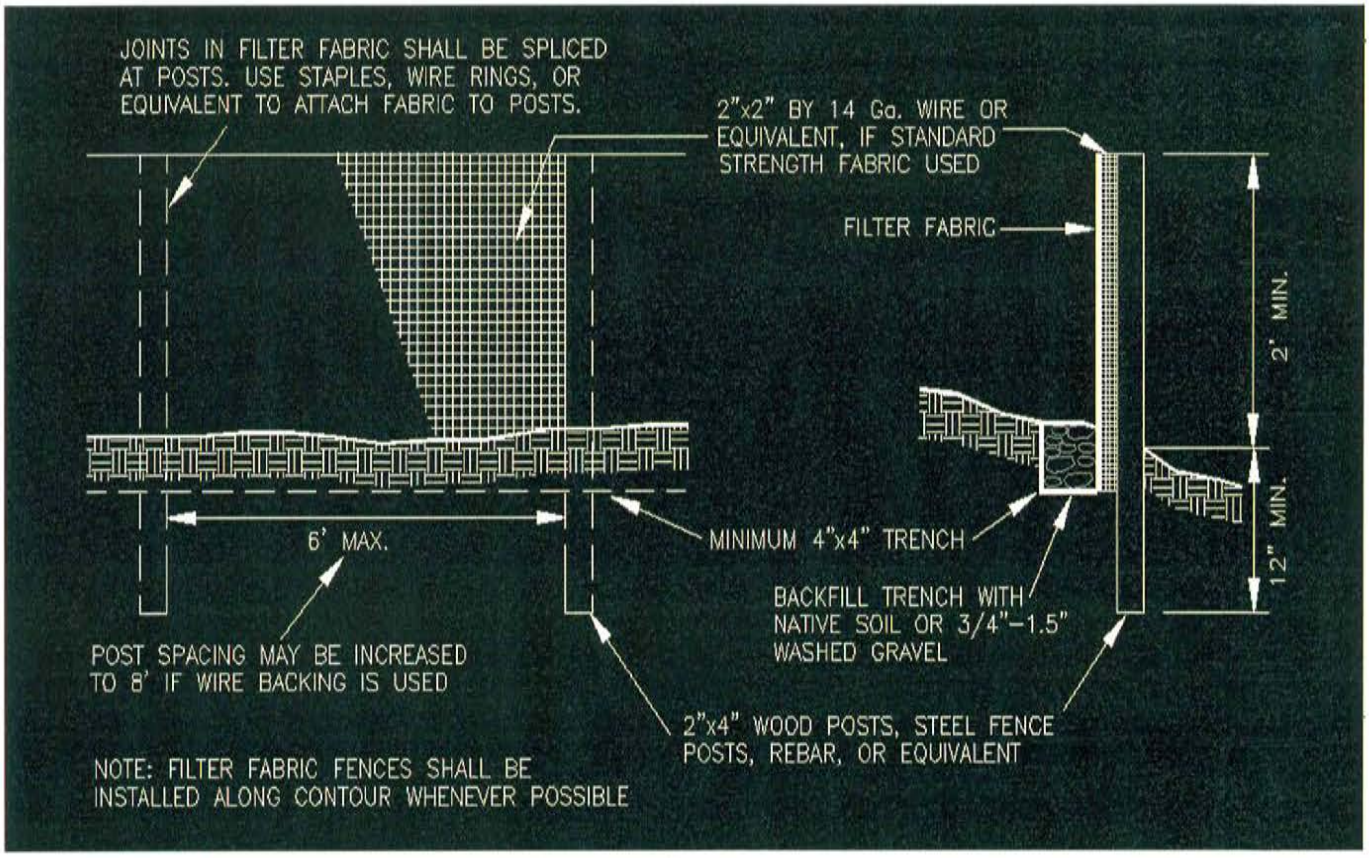

Figure 5.1 Silt Fence Installation Details

Control De-watering

There are no de-watering processes required for this project. However, if de-water becomes needed, it will be performed such that de-watering water does not contaminate runoff.

Maintain BMPs

Best management practices shall be maintained and repaired as needed. Maintenance requirements are specified in the outline of the BMPs in the DOE Manual.

Manage the Project

Construction will be conducted in a manner to prevent the spread of sediment from the site. Phasing will be implemented when feasible, and revegetation will be conducted in a timely manner.

6-SOURCE CONTROL OF POLLUTION (C.E. #3)

Pollution sources will be controlled to eliminate contamination of stormwater. Operational BMPs including, but not limited to good housekeeping, employee training, spill prevention and cleanup, preventative maintenance, regular inspections, and record keeping will be implemented. These BMPs are detailed in Chapter 8 of the DOE Manual.

Dust

Air and water are susceptible to dust pollution, the DOE Manual suggests a few operational BMPs to control dust. The Applicable Operational BMPs include:

1. Sprinkle or wet down soil or dust with water as long as it does not result in wastewater discharge.
2. Use only local and/or state government approved dust suppression chemicals such as those listed in Ecology Publication #96-433, "Techniques for Dust Prevention and Suppression."
3. Avoid excessive and repeated applications of dust suppression chemicals. Time the application of dust suppressants to avoid or minimize their wash-off by rainfall to human activity, such as irrigation.
4. Apply stormwater containment to prevent the conveyance of stormwater TSS into storm drains or receiving waters.
5. The use of motor oil for dust control is prohibited. Care should be taken when using lignin derivatives and other high BOD chemicals in excavations or areas easily accessible to surface water or groundwater.

Recommended BMPs include limiting use of dust generating land, paving and/or stabilizing road shoulders, and applying windbreaks if feasible. Preparation of a dust control plan is also recommended.

Landscaping

Landscaping includes grading, moving soil, removal of vegetation, and the application of fertilizers and pesticides. These activities can introduce contaminants such as toxic

organic compounds, heavy metals, total suspended solids, coliform bacteria, fertilizers, and pesticides to the stormwater if not managed properly.

To control the contamination of stormwater, an Integrated Pest Management Plan should be implemented if pesticide use is contemplated. The Applicable Operational BMPs include:

1. Install engineered soil/landscape systems to improve the infiltration and regulation of stormwater in landscaped areas.
2. Do not dispose of collected vegetation into waterways or storm drainage systems.

Recommended BMPs include use of mulching and composting when possible, avoid the use of pesticides and herbicides, and till fertilizer into the soil.

7-PRESERVATION OF NATURAL DRAINAGE WAYS (C.E. #4)

The general topographic features of the site will remain the same. Drainage ways will not be altered created or altered. Infiltration will enter the ground from the subsurface rather than the surface, maintaining the natural drainage below that level.

8-RUNOFF TREATMENT (C.E. #5)

An infiltration pond BMP F6.21 will be used to treat storm water runoff.

Water Quality Design Volume

The subject project is located in the Chelan County. The design storm for Chelan County is the 100-year 24-hour Type IA storm. The design storm is necessary to compute the design volume for runoff treatment.

Chelan County Design Storm

The volume of runoff predicted for the proposed development condition is calculated on the basis of the 24-hour 100-year return frequency Type IA storm. The 24-hour 100-year frequency Type IA storm yield approximately the same results as a 50 percent increase of the 24-hour 25-year frequency Type IA storm. Records published by the United States Department of Commerce National Oceanic and Atmospheric Administration show that the 100-year frequency storm, at this location, is 3.0 inches of rainfall in 24 hours (Figure 4.3).

9-FLOW CONTROL (C.E. #6)

The purpose of flow control is to mitigate to the maximum extent practicable the impacts of increased storm runoff volumes and flow rates on streams. The intent of this Core

Element is to prevent cumulative future impacts from urban runoff. Flow control will consist of allowing the design storm to disperse through infiltration and not migrate offsite horizontally. BMP 6.21 infiltration pond will be used for flow control. This is identical to BMP T5.10 used for runoff treatment.

10-OPERATION AND MAINTENANCE (C.E. #7)

The infiltration system at the property of Seawest Investments is a private system that will be privately maintained. A schedule will be implemented to ensure that the stormwater facilities are adequately maintained and properly operated.

The site will be inspected weekly during construction to observe the condition of the stormwater infiltration system. After construction it will be inspected quarterly or as often as necessary to insure proper operation. The person conducting the inspection will assure compliance with storm water standards and see that necessary repairs are made.

11-LOCAL REQUIREMENTS (C.E. #8)

Storm System

The storm drain system has been designed to exceed the provisions of Chelan County requirements. The design storm is a SCS Type IA storm event equal to or exceeding 2.6 inches of rainfall in a 24-hour time-period.

APPENDIX

LIST OF APPENDIX DOCUMENTS

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APPENDIX 2	HYDROGRAPH
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APPENDIX 5	OPERATION AND MAINTENANCE PLAN

APPENDIX 1

Stormwater Report

Job File: F:\Documents and Settings\wes\My Documents\18030SEAWEST.PPW
Rain Dir: F:\Documents and Settings\wes\My Documents\

==========
JOB TITLE
==========

Project Date: 12/10/2018
Project Engineer: Austin Harper
Project Title: Watershed
Project Comments:

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MASTER DESIGN STORM SUMMARY

Network Storm Collection: Viridian 100

Return Event	Total Depth in	Rainfall Type	RNF ID
100	2.6000	Synthetic Curve	TypeIA 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
DEVELOPED	AREA	100	.503		8.0000	1.17		
INDIVIDUAL LOT	AREA	100	.012		7.8000	.04		
*LOT OUT	JCT	100	.012		7.8000	.04		
*ROADWAY OUT	JCT	100	.503		8.0000	1.17		

NETWORK SUMMARY -- NODES
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = Viridian 100

Storm Tag Name = 100

Data Type, File, ID = Synthetic Storm TypeIA 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 2.6000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

	Node ID	Type	HYG Vol ac-ft	Trun.	Qpeak hrs	Qpeak cfs	Max WSEL ft
	DEVELOPED	AREA	.503		8.0000	1.17	
	INDIVIDUAL LOT	AREA	.012		7.8000	.04	
Outfall	LOT OUT	JCT	.012		7.8000	.04	
Outfall	ROADWAY OUT	JCT	.503		8.0000	1.17	

NETWORK SUMMARY -- LINKS
(UN=Upstream Node; DL=DNstream End of Link; DN=DNstream Node)
(Trun.= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left & Rt)

DEFAULT Design Storm File,ID = Viridian 100

Storm Tag Name = 100

Data Type, File, ID = Synthetic Storm TypeIA 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 2.6000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Link ID	Type		HYG Vol ac-ft	Trun.	Peak Time hrs	Peak Q cfs	End Points
ADDLINK 10	ADD	UN	.503		8.0000	1.17	DEVELOPED
		DL	.503		8.0000	1.17	
		DN	.503		8.0000	1.17	ROADWAY OUT
ADDLINK 20	ADD	UN	.012		7.8000	.04	INDIVIDUAL LOT
		DL	.012		7.8000	.04	
		DN	.012		7.8000	.04	LOT OUT

NETWORK RUNOFF NODE SEQUENCE

Runoff Data		Apply to Node		Receiving Link	
SCS UH	DEVELOPED	Subarea	DEVELOPED	Add Hyd	DEVELOPED
SCS UH	INDIVIDUAL LOT	Subarea	INDIVIDUAL LOT	Add Hyd	INDIVIDUAL LOT

NETWORK ROUTING SEQUENCE

Link Operation	UPstream Node	DNstream Node
Add Hyd ADDLINK 20	Subarea INDIVIDUAL LOT	Jct LOT OUT
Add Hyd ADDLINK 10	Subarea DEVELOPED	Jct ROADWAY OUT

File.... F:\Documents and Settings\wes\My Documents\
Title... Project Date: 12/10/2018
Project Engineer: Austin Harper
Project Title: Watershed
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = Viridian 100

Storm Tag Name = 100

Data Type, File, ID = Synthetic Storm TypeIA 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 2.6000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

DESIGN STORMS SUMMARY

Design Storm File,ID = Viridian 100

Storm Tag Name = 100

Data Type, File, ID = Synthetic Storm TypeIA 24hr
Storm Frequency = 100 yr
Total Rainfall Depth= 2.6000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

CUMULATIVE RAINFALL FRACTIONS
Output Time increment = .1000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.000	.002	.004	.006	.008
.5000	.010	.012	.014	.016	.018
1.0000	.020	.023	.026	.029	.032
1.5000	.035	.038	.041	.044	.047
2.0000	.050	.053	.056	.060	.063
2.5000	.066	.069	.072	.076	.079
3.0000	.082	.085	.088	.091	.095
3.5000	.098	.101	.105	.109	.112
4.0000	.116	.120	.123	.127	.131
4.5000	.135	.139	.143	.147	.152
5.0000	.156	.161	.165	.170	.175
5.5000	.180	.185	.190	.195	.200
6.0000	.206	.212	.218	.224	.231
6.5000	.237	.243	.249	.255	.261
7.0000	.268	.275	.283	.291	.300
7.5000	.310	.331	.355	.379	.403
8.0000	.425	.439	.452	.462	.472
8.5000	.480	.489	.498	.505	.513
9.0000	.520	.527	.533	.539	.545
9.5000	.550	.556	.561	.567	.572
10.0000	.577	.582	.587	.592	.596
10.5000	.601	.606	.610	.615	.620
11.0000	.624	.628	.633	.637	.641
11.5000	.645	.649	.653	.657	.660
12.0000	.664	.668	.671	.675	.679
12.5000	.683	.687	.690	.694	.697
13.0000	.701	.705	.708	.712	.716
13.5000	.719	.722	.726	.729	.733
14.0000	.736	.739	.743	.746	.749
14.5000	.753	.756	.759	.763	.766
15.0000	.769	.772	.776	.779	.782
15.5000	.785	.788	.792	.795	.798
16.0000	.801	.804	.807	.810	.813
16.5000	.816	.819	.822	.825	.828
17.0000	.831	.834	.837	.840	.843
17.5000	.846	.849	.851	.854	.857
18.0000	.860	.863	.865	.868	.871
18.5000	.874	.876	.879	.882	.884
19.0000	.887	.890	.892	.895	.897
19.5000	.900	.903	.905	.908	.910
20.0000	.913	.915	.918	.920	.922
20.5000	.925	.927	.930	.932	.934
21.0000	.937	.939	.941	.944	.946
21.5000	.948	.951	.953	.955	.957

CUMULATIVE RAINFALL FRACTIONS
Output Time increment = .1000 hrs
Time on left represents time for first value in each row.

Time hrs					
22.0000	.959	.962	.964	.966	.968
22.5000	.970	.972	.974	.976	.978
23.0000	.980	.982	.984	.986	.988
23.5000	.990	.992	.994	.996	.998
24.0000	1.000				

CUMULATIVE RAINFALL DEPTHS (in)
Output Time increment = .1000 hrs
Time on left represents time for first value in each row.

Time hrs					
.0000	.0000	.0058	.0112	.0163	.0212
.5000	.0260	.0308	.0357	.0408	.0462
1.0000	.0520	.0592	.0668	.0747	.0828
1.5000	.0910	.0987	.1065	.1142	.1221
2.0000	.1300	.1382	.1465	.1548	.1632
2.5000	.1716	.1799	.1882	.1966	.2049
3.0000	.2132	.2214	.2296	.2378	.2462
3.5000	.2548	.2638	.2731	.2824	.2920
4.0000	.3016	.3112	.3209	.3307	.3408
4.5000	.3510	.3614	.3721	.3830	.3941
5.0000	.4056	.4175	.4298	.4423	.4550
5.5000	.4680	.4808	.4940	.5074	.5213
6.0000	.5356	.5511	.5670	.5832	.5997
6.5000	.6162	.6314	.6468	.6627	.6793
7.0000	.6968	.7154	.7355	.7571	.7805
7.5000	.8060	.8617	.9222	.9848	1.0466
8.0000	1.1050	1.1423	1.1744	1.2020	1.2263
8.5000	1.2480	1.2715	1.2936	1.3142	1.3337
9.0000	1.3520	1.3693	1.3856	1.4011	1.4159
9.5000	1.4300	1.4447	1.4590	1.4731	1.4868
10.0000	1.5002	1.5131	1.5258	1.5382	1.5505
10.5000	1.5626	1.5750	1.5871	1.5991	1.6109
11.0000	1.6224	1.6337	1.6449	1.6558	1.6665
11.5000	1.6770	1.6871	1.6971	1.7069	1.7167
12.0000	1.7264	1.7361	1.7458	1.7557	1.7657
12.5000	1.7758	1.7853	1.7947	1.8040	1.8133
13.0000	1.8226	1.8323	1.8418	1.8511	1.8603
13.5000	1.8694	1.8784	1.8872	1.8961	1.9048
14.0000	1.9136	1.9224	1.9312	1.9399	1.9486
14.5000	1.9573	1.9659	1.9745	1.9830	1.9915
15.0000	2.0000	2.0084	2.0168	2.0252	2.0335
15.5000	2.0418	2.0500	2.0582	2.0663	2.0744
16.0000	2.0825	2.0905	2.0985	2.1065	2.1144
16.5000	2.1223	2.1301	2.1379	2.1456	2.1533
17.0000	2.1610	2.1687	2.1763	2.1838	2.1913
17.5000	2.1988	2.2062	2.2136	2.2210	2.2283
18.0000	2.2356	2.2428	2.2500	2.2572	2.2643
18.5000	2.2714	2.2784	2.2854	2.2924	2.2993
19.0000	2.3062	2.3130	2.3199	2.3266	2.3333
19.5000	2.3400	2.3467	2.3533	2.3598	2.3664
20.0000	2.3729	2.3793	2.3857	2.3921	2.3984
20.5000	2.4047	2.4110	2.4172	2.4234	2.4295
21.0000	2.4356	2.4416	2.4476	2.4536	2.4595
21.5000	2.4655	2.4713	2.4771	2.4829	2.4886

CUMULATIVE RAINFALL DEPTHS (in)
Output Time increment = .1000 hrs
Time on left represents time for first value in each row.

Time hrs					
22.0000	2.4943	2.5000	2.5056	2.5112	2.5167
22.5000	2.5222	2.5277	2.5331	2.5385	2.5438
23.0000	2.5491	2.5544	2.5596	2.5648	2.5700
23.5000	2.5751	2.5801	2.5852	2.5901	2.5951
24.0000	2.6000				

File.... F:\Documents and Settings\wes\My Documents\18030SEAWEST.PPW

::
TIME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: TR-55 Shallow

Hydraulic Length 1545.78 ft
Slope .080000 ft/ft
Paved

Avg.Velocity 5.75 ft/sec

Segment #1 Time: .0747 hrs

Total Tc: .0747 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

File.... F:\Documents and Settings\wes\My Documents\18030SEAWEST.PPW

Tc Equations used...

==== SCS TR-55 Shallow Concentrated Flow ================================

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... F:\Documents and Settings\wes\My Documents\18030SEAWEST.PPW

::
TIME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: TR-55 Shallow

Hydraulic Length 100.00 ft
Slope .100000 ft/ft
Unpaved

Avg.Velocity 5.10 ft/sec

Segment #1 Time: .0054 hrs

Total Tc: .0054 hrs

Calculated Tc < Min.Tc:
Use Minimum Tc...
Use Tc = .0833 hrs

Tc Equations used...

==== SCS TR-55 Shallow Concentrated Flow ==========

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved surface:
V = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where: V = Velocity, ft/sec
Sf = Slope, ft/ft
Tc = Time of concentration, hrs
Lf = Flow length, ft

File.... F:\Documents and Settings\wes\My Documents\18030SEAWEST.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Developed Area	88	2.480			88.00
25 lots	73	4.590			73.00
COMPOSITE AREA & WEIGHTED CN --->		7.070			78.26 (78)

File.... F:\Documents and Settings\wes\My Documents\18030SEAWEST.PPW

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	Impervious Adjustment %UC	Adjusted CN
Developed Lot	98	.059			98.00
COMPOSITE AREA & WEIGHTED CN --->		.059			98.00 (98)

SCS UNIT HYDROGRAPH METHOD
(Computational Notes)

DEFINITION OF TERMS: ----------

At = Total area (acres): At = Ai+Ap
Ai = Impervious area (acres)
Ap = Pervious area (acres)
CNi = Runoff curve number for impervious area
CNp = Runoff curve number for pervious area
fLoss = f loss constant infiltration (depth/time)
gKs = Saturated Hydraulic Conductivity (depth/time)
Md = Volumetric Moisture Deficit
Psi = Capillary Suction (length)
hK = Horton Infiltration Decay Rate (time^-1)
fo = Initial Infiltration Rate (depth/time)
fc = Ultimate(capacity)Infiltration Rate (depth/time)
Ia = Initial Abstraction (length)
dt = Computational increment (duration of unit excess rainfall)
Default dt is smallest value of 0.1333Tc, rtm, and th
(Smallest dt is then adjusted to match up with Tp)
UDdt = User specified override computational main time increment
(only used if UDdt is => .1333Tc)
D(t) = Point on distribution curve (fraction of P) for time step t

K = 2 / (1 + (Tr/Tp)): default K = 0.75: (for Tr/Tp = 1.67)
Ks = Hydrograph shape factor
= Unit Conversions * K:
= ((1hr/3600sec) * (1ft/12in) * ((5280ft)**2/sq.mi)) * K
Default Ks = 645.333 * 0.75 = 484

Lag = Lag time from center of excess runoff (dt) to Tp: Lag = 0.6Tc
P = Total precipitation depth, inches
Pa(t) = Accumulated rainfall at time step t
Pi(t) = Incremental rainfall at time step t
qp = Peak discharge (cfs) for 1in. runoff, for 1hr, for 1 sq.mi.
= (Ks * A * Q) / Tp (where Q = 1in. runoff, A=sq.mi.)
Qu(t) = Unit hydrograph ordinate (cfs) at time step t
Q(t) = Final hydrograph ordinate (cfs) at time step t
Rai(t)= Accumulated runoff (inches) at time step t for impervious area
Rap(t)= Accumulated runoff (inches) at time step t for pervious area
Rii(t)= Incremental runoff (inches) at time step t for impervious area
Rip(t)= Incremental runoff (inches) at time step t for pervious area
R(t) = Incremental weighted total runoff (inches)
Rtm = Time increment for rainfall table
Si = S for impervious area: Si = (1000/CNi) - 10
Sp = S for pervious area: Sp = (1000/CNp) - 10
t = Time step (row) number
Tc = Time of concentration
Tb = Time (hrs) of entire unit hydrograph: Tb = Tp + Tr
Tp = Time (hrs) to peak of a unit hydrograph: Tp = (dt/2) + Lag
Tr = Time (hrs) of receding limb of unit hydrograph: Tr = ratio of Tp

SCS UNIT HYDROGRAPH METHOD
(Computational Notes)

PRECIPITATION: ----------
Column (1): Time for time step t
Column (2): D(t) = Point on distribution curve for time step t
Column (3): Pi(t) = Pa(t) - Pa(t-1): Col.(4) - Preceding Col.(4)
Column (4): Pa(t) = D(t) x P: Col.(2) x P

PERVIOUS AREA RUNOFF (using SCS Runoff CN Method) ----------
Column (5): Rap(t) = Accumulated pervious runoff for time step t
If (Pa(t) is <= 0.2Sp) then use: Rap(t) = 0.0
If (Pa(t) is > 0.2Sp) then use:

Rap(t) = (Col.(4)-0.2Sp)**2 / (Col.(4)+0.8Sp)

Column (6): Rip(t) = Incremental pervious runoff for time step t
Rip(t) = Rap(t) - Rap(t-1)
Rip(t) = Col.(5) for current row - Col.(5) for preceding row.

IMPERVIOUS AREA RUNOFF ----------
Column (7 & 8)... Did not specify to use impervious areas.

INCREMENTAL WEIGHTED RUNOFF: ----------
Column (9): R(t) = (Ap/At) x Rip(t) + (Ai/At) x Rii(t)
R(t) = (Ap/At) x Col.(6) + (Ai/At) x Col.(8)

SCS UNIT HYDROGRAPH METHOD: ----------
Column (10): Q(t) is computed with the SCS unit hydrograph method
using R() and Qu().

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = F:\Documents and Settings\wes\My Documents\
Rain File -ID = - TypeIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = F:\Documents and Settings\wes\My Documents\
HYG File - ID = - DEVELOPED 100
Tc (Min. Tc) = .0833 hrs
Drainage Area = 7.070 acres Runoff CN= 78

==========
Computational Time Increment = .01111 hrs
Computed Peak Time = 8.0079 hrs
Computed Peak Flow = 1.17 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 8.0000 hrs
Peak Flow, Interpolated Output = 1.17 cfs
==========

DRAINAGE AREA

ID:DEVELOPED
CN = 78
Area = 7.070 acres
S = 2.8205 in
0.2S = .5641 in

Cumulative Runoff

.8535 in
.503 ac-ft

HYG Volume... .503 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .08330 hrs (ID: DEVELOPED)
Computational Incr, Tm = .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = 96.17 cfs
Unit peak time Tp = .05553 hrs
Unit receding limb, Tr = .22213 hrs
Total unit time, Tb = .27767 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = F:\Documents and Settings\wes\My Documents\
Rain File -ID = - TypeIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = F:\Documents and Settings\wes\My Documents\
HYG File - ID = - DEVELOPED 100
Tc (Min. Tc) = .0833 hrs
Drainage Area = 7.070 acres Runoff CN= 78
Calc.Increment= .01111 hrs Out.Incr.= .0500 hrs
HYG Volume = .503 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time hrs | Time on left represents time for first value in each row.

Time hrs					
6.2000	.00	.00	.01	.01	.02
6.4500	.03	.03	.04	.04	.05
6.7000	.05	.06	.07	.07	.08
6.9500	.09	.10	.11	.12	.13
7.2000	.15	.16	.18	.19	.21
7.4500	.23	.26	.40	.60	.72
7.7000	.82	.91	.99	1.06	1.11
7.9500	1.15	1.17	1.05	.87	.79
8.2000	.74	.70	.66	.63	.60
8.4500	.57	.55	.56	.59	.59
8.7000	.58	.57	.55	.54	.53
8.9500	.52	.51	.50	.49	.48
9.2000	.47	.46	.45	.44	.43
9.4500	.42	.42	.42	.43	.43
9.7000	.43	.43	.43	.42	.42
9.9500	.42	.42	.41	.41	.40
10.2000	.40	.40	.40	.39	.39
10.4500	.39	.39	.39	.40	.40
10.7000	.40	.40	.40	.39	.39
10.9500	.39	.39	.39	.38	.38
11.2000	.38	.38	.37	.37	.37
11.4500	.37	.36	.36	.35	.35
11.7000	.35	.35	.35	.35	.34
11.9500	.34	.34	.34	.35	.35
12.2000	.35	.35	.35	.36	.36
12.4500	.36	.37	.36	.35	.35
12.7000	.35	.34	.34	.34	.34
12.9500	.34	.34	.35	.36	.36
13.2000	.36	.35	.35	.35	.35
13.4500	.35	.34	.34	.34	.34

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
13.7000	.34	.34	.34	.34	.34
13.9500	.34	.34	.34	.34	.34
14.2000	.34	.34	.34	.34	.34
14.4500	.34	.34	.34	.34	.34
14.7000	.34	.34	.34	.34	.34
14.9500	.34	.34	.34	.34	.34
15.2000	.34	.34	.34	.34	.34
15.4500	.34	.34	.33	.33	.33
15.7000	.33	.33	.33	.33	.33
15.9500	.33	.33	.33	.33	.33
16.2000	.33	.33	.33	.33	.33
16.4500	.33	.33	.33	.33	.33
16.7000	.33	.33	.33	.33	.32
16.9500	.32	.32	.32	.32	.32
17.2000	.32	.32	.32	.32	.32
17.4500	.32	.32	.32	.32	.32
17.7000	.32	.32	.32	.32	.31
17.9500	.31	.31	.31	.31	.31
18.2000	.31	.31	.31	.31	.31
18.4500	.31	.31	.31	.31	.31
18.7000	.31	.31	.31	.30	.30
18.9500	.30	.30	.30	.30	.30
19.2000	.30	.30	.30	.30	.30
19.4500	.30	.30	.30	.30	.30
19.7000	.29	.29	.29	.29	.29
19.9500	.29	.29	.29	.29	.29
20.2000	.29	.29	.29	.29	.29
20.4500	.28	.28	.28	.28	.28
20.7000	.28	.28	.28	.28	.28
20.9500	.28	.28	.28	.28	.28
21.2000	.27	.27	.27	.27	.27
21.4500	.27	.27	.27	.27	.27
21.7000	.27	.27	.27	.27	.26
21.9500	.26	.26	.26	.26	.26
22.2000	.26	.26	.26	.26	.26
22.4500	.26	.26	.26	.25	.25
22.7000	.25	.25	.25	.25	.25
22.9500	.25	.25	.25	.25	.25
23.2000	.24	.24	.24	.24	.24
23.4500	.24	.24	.24	.24	.24
23.7000	.24	.24	.24	.23	.23
23.9500	.23	.23	.15	.04	.01
24.2000	.00	.00			

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = F:\Documents and Settings\wes\My Documents\
Rain File -ID = - TypeIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = F:\Documents and Settings\wes\My Documents\
HYG File - ID = - INDIVIDUAL LOT 100
Tc (Min. Tc) = .0833 hrs
Drainage Area = .059 acres Runoff CN= 98

==========
Computational Time Increment = .01111 hrs
Computed Peak Time = 7.8302 hrs
Computed Peak Flow = .04 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 7.8500 hrs
Peak Flow, Interpolated Output = .04 cfs
==========

DRAINAGE AREA

ID:INDIVIDUAL LOT
CN = 98
Area = .059 acres
S = .2041 in
0.2S = .0408 in

Cumulative Runoff

2.3702 in
.012 ac-ft

HYG Volume... .012 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc = .08330 hrs (ID: INDIVIDUAL LOT)
Computational Incr, Tm = .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor = 483.432 (37.46% under rising limb)
K = 483.43/645.333, K = .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp = 1.6698 (solved from K = .7491)

Unit peak, qp = .80 cfs
Unit peak time Tp = .05553 hrs
Unit receding limb, Tr = .22213 hrs
Total unit time, Tb = .27767 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration = 24.0000 hrs Rain Depth = 2.6000 in
Rain Dir = F:\Documents and Settings\wes\My Documents\
Rain File -ID = - TypeIA 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = F:\Documents and Settings\wes\My Documents\
HYG File - ID = - INDIVIDUAL LOT 100
Tc (Min. Tc) = .0833 hrs
Drainage Area = .059 acres Runoff CN= 98
Calc.Increment= .01111 hrs Out.Incr.= .0500 hrs
HYG Volume = .012 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
1.2500	.00	.00	.00	.00	.00
1.5000	.00	.00	.00	.00	.00
1.7500	.00	.00	.00	.00	.00
2.0000	.00	.00	.00	.00	.00
2.2500	.00	.00	.00	.00	.00
2.5000	.00	.00	.00	.00	.00
2.7500	.00	.00	.00	.00	.00
3.0000	.00	.00	.00	.00	.00
3.2500	.00	.00	.00	.00	.00
3.5000	.00	.00	.00	.00	.00
3.7500	.00	.00	.00	.00	.00
4.0000	.00	.00	.00	.00	.00
4.2500	.00	.00	.00	.00	.01
4.5000	.01	.01	.01	.01	.01
4.7500	.01	.01	.01	.01	.01
5.0000	.01	.01	.01	.01	.01
5.2500	.01	.01	.01	.01	.01
5.5000	.01	.01	.01	.01	.01
5.7500	.01	.01	.01	.01	.01
6.0000	.01	.01	.01	.01	.01
6.2500	.01	.01	.01	.01	.01
6.5000	.01	.01	.01	.01	.01
6.7500	.01	.01	.01	.01	.01
7.0000	.01	.01	.01	.01	.01
7.2500	.01	.01	.01	.01	.01
7.5000	.01	.02	.03	.03	.03
7.7500	.04	.04	.04	.04	.03
8.0000	.03	.03	.02	.02	.02
8.2500	.02	.02	.02	.01	.01
8.5000	.01	.01	.01	.01	.01

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
8.7500	.01	.01	.01	.01	.01
9.0000	.01	.01	.01	.01	.01
9.2500	.01	.01	.01	.01	.01
9.5000	.01	.01	.01	.01	.01
9.7500	.01	.01	.01	.01	.01
10.0000	.01	.01	.01	.01	.01
10.2500	.01	.01	.01	.01	.01
10.5000	.01	.01	.01	.01	.01
10.7500	.01	.01	.01	.01	.01
11.0000	.01	.01	.01	.01	.01
11.2500	.01	.01	.01	.01	.01
11.5000	.01	.01	.01	.01	.01
11.7500	.01	.01	.01	.01	.01
12.0000	.01	.01	.01	.01	.01
12.2500	.01	.01	.01	.01	.01
12.5000	.01	.01	.01	.01	.01
12.7500	.01	.01	.01	.01	.01
13.0000	.01	.01	.01	.01	.01
13.2500	.01	.01	.01	.01	.01
13.5000	.01	.01	.01	.01	.01
13.7500	.01	.01	.01	.01	.01
14.0000	.01	.01	.01	.01	.01
14.2500	.01	.01	.01	.01	.01
14.5000	.01	.01	.01	.01	.01
14.7500	.01	.01	.01	.01	.01
15.0000	.00	.00	.00	.00	.00
15.2500	.00	.00	.00	.00	.00
15.5000	.00	.00	.00	.00	.00
15.7500	.00	.00	.00	.00	.00
16.0000	.00	.00	.00	.00	.00
16.2500	.00	.00	.00	.00	.00
16.5000	.00	.00	.00	.00	.00
16.7500	.00	.00	.00	.00	.00
17.0000	.00	.00	.00	.00	.00
17.2500	.00	.00	.00	.00	.00
17.5000	.00	.00	.00	.00	.00
17.7500	.00	.00	.00	.00	.00
18.0000	.00	.00	.00	.00	.00
18.2500	.00	.00	.00	.00	.00
18.5000	.00	.00	.00	.00	.00
18.7500	.00	.00	.00	.00	.00
19.0000	.00	.00	.00	.00	.00
19.2500	.00	.00	.00	.00	.00
19.5000	.00	.00	.00	.00	.00
19.7500	.00	.00	.00	.00	.00

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
20.0000	.00	.00	.00	.00	.00
20.2500	.00	.00	.00	.00	.00
20.5000	.00	.00	.00	.00	.00
20.7500	.00	.00	.00	.00	.00
21.0000	.00	.00	.00	.00	.00
21.2500	.00	.00	.00	.00	.00
21.5000	.00	.00	.00	.00	.00
21.7500	.00	.00	.00	.00	.00
22.0000	.00	.00	.00	.00	.00
22.2500	.00	.00	.00	.00	.00
22.5000	.00	.00	.00	.00	.00
22.7500	.00	.00	.00	.00	.00
23.0000	.00	.00	.00	.00	.00
23.2500	.00	.00	.00	.00	.00
23.5000	.00	.00	.00	.00	.00
23.7500	.00	.00	.00	.00	.00
24.0000	.00	.00	.00		

SUMMARY FOR HYDROGRAPH ADDITION
at Node: LOT OUT

HYG Directory: F:\Documents and Settings\wes\My Documents\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
ADDLINK 20	INDIVIDUAL LOT		INDIVIDUAL LOT	100

INFLOWS TO: LOT OUT

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	INDIVIDUAL LOT	100	.012	7.8000	.04

TOTAL FLOW INTO: LOT OUT

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	LOT OUT	100	.012	7.8000	.04

TOTAL NODE INFLOW...
HYG file =
HYG ID = LOT OUT
HYG Tag = 100

Peak Discharge =	.04 cfs
Time to Peak =	7.8000 hrs
HYG Volume =	.012 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
1.2500	.00	.00	.00	.00	.00
1.5000	.00	.00	.00	.00	.00
1.7500	.00	.00	.00	.00	.00
2.0000	.00	.00	.00	.00	.00
2.2500	.00	.00	.00	.00	.00
2.5000	.00	.00	.00	.00	.00
2.7500	.00	.00	.00	.00	.00
3.0000	.00	.00	.00	.00	.00
3.2500	.00	.00	.00	.00	.00
3.5000	.00	.00	.00	.00	.00
3.7500	.00	.00	.00	.00	.00
4.0000	.00	.00	.00	.00	.00
4.2500	.00	.00	.00	.00	.01
4.5000	.01	.01	.01	.01	.01
4.7500	.01	.01	.01	.01	.01
5.0000	.01	.01	.01	.01	.01
5.2500	.01	.01	.01	.01	.01
5.5000	.01	.01	.01	.01	.01
5.7500	.01	.01	.01	.01	.01
6.0000	.01	.01	.01	.01	.01
6.2500	.01	.01	.01	.01	.01
6.5000	.01	.01	.01	.01	.01
6.7500	.01	.01	.01	.01	.01
7.0000	.01	.01	.01	.01	.01
7.2500	.01	.01	.01	.01	.01
7.5000	.01	.02	.03	.03	.03
7.7500	.04	.04	.04	.04	.03
8.0000	.03	.03	.02	.02	.02
8.2500	.02	.02	.02	.01	.01
8.5000	.01	.01	.01	.01	.01
8.7500	.01	.01	.01	.01	.01

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
9.0000	.01	.01	.01	.01	.01
9.2500	.01	.01	.01	.01	.01
9.5000	.01	.01	.01	.01	.01
9.7500	.01	.01	.01	.01	.01
10.0000	.01	.01	.01	.01	.01
10.2500	.01	.01	.01	.01	.01
10.5000	.01	.01	.01	.01	.01
10.7500	.01	.01	.01	.01	.01
11.0000	.01	.01	.01	.01	.01
11.2500	.01	.01	.01	.01	.01
11.5000	.01	.01	.01	.01	.01
11.7500	.01	.01	.01	.01	.01
12.0000	.01	.01	.01	.01	.01
12.2500	.01	.01	.01	.01	.01
12.5000	.01	.01	.01	.01	.01
12.7500	.01	.01	.01	.01	.01
13.0000	.01	.01	.01	.01	.01
13.2500	.01	.01	.01	.01	.01
13.5000	.01	.01	.01	.01	.01
13.7500	.01	.01	.01	.01	.01
14.0000	.01	.01	.01	.01	.01
14.2500	.01	.01	.01	.01	.01
14.5000	.01	.01	.01	.01	.01
14.7500	.01	.01	.01	.01	.01
15.0000	.00	.00	.00	.00	.00
15.2500	.00	.00	.00	.00	.00
15.5000	.00	.00	.00	.00	.00
15.7500	.00	.00	.00	.00	.00
16.0000	.00	.00	.00	.00	.00
16.2500	.00	.00	.00	.00	.00
16.5000	.00	.00	.00	.00	.00
16.7500	.00	.00	.00	.00	.00
17.0000	.00	.00	.00	.00	.00
17.2500	.00	.00	.00	.00	.00
17.5000	.00	.00	.00	.00	.00
17.7500	.00	.00	.00	.00	.00
18.0000	.00	.00	.00	.00	.00
18.2500	.00	.00	.00	.00	.00
18.5000	.00	.00	.00	.00	.00
18.7500	.00	.00	.00	.00	.00
19.0000	.00	.00	.00	.00	.00
19.2500	.00	.00	.00	.00	.00
19.5000	.00	.00	.00	.00	.00
19.7500	.00	.00	.00	.00	.00
20.0000	.00	.00	.00	.00	.00

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
20.2500	.00	.00	.00	.00	.00
20.5000	.00	.00	.00	.00	.00
20.7500	.00	.00	.00	.00	.00
21.0000	.00	.00	.00	.00	.00
21.2500	.00	.00	.00	.00	.00
21.5000	.00	.00	.00	.00	.00
21.7500	.00	.00	.00	.00	.00
22.0000	.00	.00	.00	.00	.00
22.2500	.00	.00	.00	.00	.00
22.5000	.00	.00	.00	.00	.00
22.7500	.00	.00	.00	.00	.00
23.0000	.00	.00	.00	.00	.00
23.2500	.00	.00	.00	.00	.00
23.5000	.00	.00	.00	.00	.00
23.7500	.00	.00	.00	.00	.00
24.0000	.00	.00	.00		

SUMMARY FOR HYDROGRAPH ADDITION
at Node: ROADWAY OUT

HYG Directory: F:\Documents and Settings\wes\My Documents\

Upstream Link ID	Upstream Node ID	HYG file	HYG ID	HYG tag
ADDLINK 10	DEVELOPED		DEVELOPED	100

INFLOWS TO: ROADWAY OUT

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	DEVELOPED	100	.503	8.0000	1.17

TOTAL FLOW INTO: ROADWAY OUT

HYG file	HYG ID	HYG tag	Volume ac-ft	Peak Time hrs	Peak Flow cfs
	ROADWAY OUT	100	.503	8.0000	1.17

TOTAL NODE INFLOW...
HYG file =
HYG ID = ROADWAY OUT
HYG Tag = 100

Peak Discharge =	1.17 cfs
Time to Peak =	8.0000 hrs
HYG Volume =	.503 ac-ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
6.2000	.00	.00	.01	.01	.02
6.4500	.03	.03	.04	.04	.05
6.7000	.05	.06	.07	.07	.08
6.9500	.09	.10	.11	.12	.13
7.2000	.15	.16	.18	.19	.21
7.4500	.23	.26	.40	.60	.72
7.7000	.82	.91	.99	1.06	1.11
7.9500	1.15	1.17	1.05	.87	.79
8.2000	.74	.70	.66	.63	.60
8.4500	.57	.55	.56	.59	.59
8.7000	.58	.57	.55	.54	.53
8.9500	.52	.51	.50	.49	.48
9.2000	.47	.46	.45	.44	.43
9.4500	.42	.42	.42	.43	.43
9.7000	.43	.43	.43	.42	.42
9.9500	.42	.42	.41	.41	.40
10.2000	.40	.40	.40	.39	.39
10.4500	.39	.39	.39	.40	.40
10.7000	.40	.40	.40	.39	.39
10.9500	.39	.39	.39	.38	.38
11.2000	.38	.38	.37	.37	.37
11.4500	.37	.36	.36	.35	.35
11.7000	.35	.35	.35	.35	.34
11.9500	.34	.34	.34	.35	.35
12.2000	.35	.35	.35	.36	.36
12.4500	.36	.37	.36	.35	.35
12.7000	.35	.34	.34	.34	.34
12.9500	.34	.34	.35	.36	.36
13.2000	.36	.35	.35	.35	.35
13.4500	.35	.34	.34	.34	.34
13.7000	.34	.34	.34	.34	.34

HYDROGRAPH ORDINATES (cfs)
Output Time increment = .0500 hrs
Time on left represents time for first value in each row.

Time hrs					
13.9500	.34	.34	.34	.34	.34
14.2000	.34	.34	.34	.34	.34
14.4500	.34	.34	.34	.34	.34
14.7000	.34	.34	.34	.34	.34
14.9500	.34	.34	.34	.34	.34
15.2000	.34	.34	.34	.34	.34
15.4500	.34	.34	.33	.33	.33
15.7000	.33	.33	.33	.33	.33
15.9500	.33	.33	.33	.33	.33
16.2000	.33	.33	.33	.33	.33
16.4500	.33	.33	.33	.33	.33
16.7000	.33	.33	.33	.33	.32
16.9500	.32	.32	.32	.32	.32
17.2000	.32	.32	.32	.32	.32
17.4500	.32	.32	.32	.32	.32
17.7000	.32	.32	.32	.32	.31
17.9500	.31	.31	.31	.31	.31
18.2000	.31	.31	.31	.31	.31
18.4500	.31	.31	.31	.31	.31
18.7000	.31	.31	.31	.30	.30
18.9500	.30	.30	.30	.30	.30
19.2000	.30	.30	.30	.30	.30
19.4500	.30	.30	.30	.30	.30
19.7000	.29	.29	.29	.29	.29
19.9500	.29	.29	.29	.29	.29
20.2000	.29	.29	.29	.29	.29
20.4500	.28	.28	.28	.28	.28
20.7000	.28	.28	.28	.28	.28
20.9500	.28	.28	.28	.28	.28
21.2000	.27	.27	.27	.27	.27
21.4500	.27	.27	.27	.27	.27
21.7000	.27	.27	.27	.27	.26
21.9500	.26	.26	.26	.26	.26
22.2000	.26	.26	.26	.26	.26
22.4500	.26	.26	.26	.25	.25
22.7000	.25	.25	.25	.25	.25
22.9500	.25	.25	.25	.25	.25
23.2000	.24	.24	.24	.24	.24
23.4500	.24	.24	.24	.24	.24
23.7000	.24	.24	.24	.23	.23
23.9500	.23	.23	.15	.04	.01
24.2000	.00	.00			

Index of Starting Page Numbers for ID Names

----- D -----
DEVELOPED... 5.01, 6.01, 7.03, 7.04

----- I -----
INDIVIDUAL LOT... 5.03, 6.02, 7.06, 7.07

----- L -----
LOT OUT 100... 8.01

----- R -----
ROADWAY OUT 100... 8.05

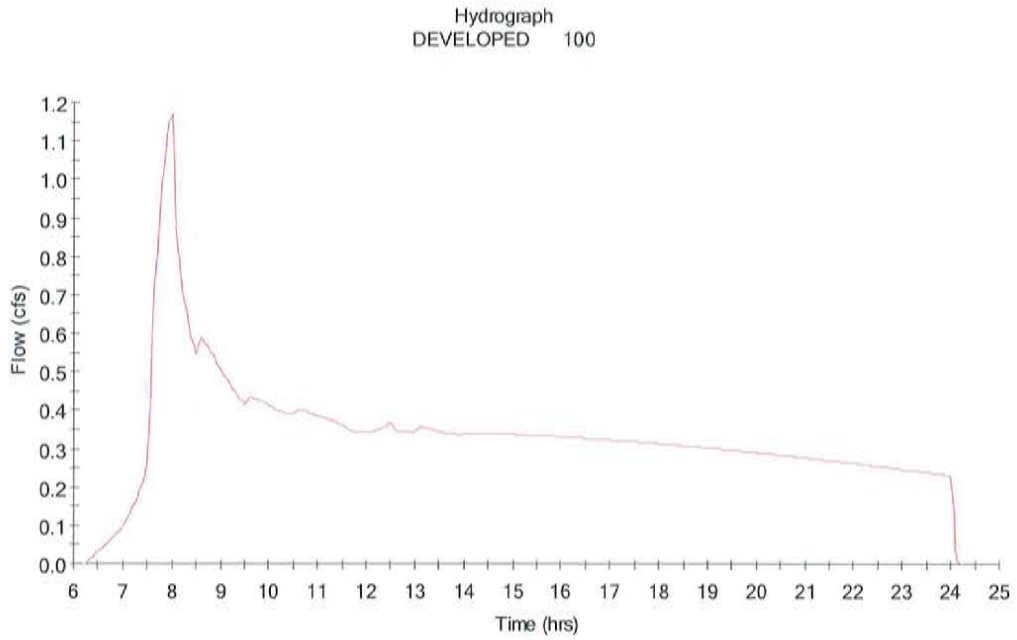
----- T -----
TypeIA 24hr 100... 4.01, 4.03

----- V -----
Viridian 100... 3.01, 3.02

----- W -----
Watershed... 1.01, 2.01, 2.02, 2.03

APPENDIX 2

100-Year 24-Hour Outflow Hydrograph



APPENDIX 3

Natural Resources Conservation Service Soil Survey Map and Soil Data

Soil Map—Chelan County Area, Washington (Parts of Chelan and Kittitas Counties)

Map Scale: 1:1,860 if printed on A portrait (8.5" x 11") sheet.

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
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: Chelan County Area, Washington (Parts of Chelan and Kittitas Counties)
Survey Area Data: Version 14, Sep 10, 2018

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

Date(s) aerial images were photographed: Sep 16, 2012—Nov 3, 2016

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 Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AnA	Antilon gravelly sandy loam, 0 to 3 percent slopes	0.3	2.8%
AnB	Antilon gravelly sandy loam, 3 to 8 percent slopes	1.1	8.5%
AnD	Antilon gravelly sandy loam, 8 to 25 percent slopes	8.7	69.0%
CIC	Chelan gravelly sandy loam, pumiceous, 8 to 15 percent slopes	2.3	18.5%
ErF	Entiat-Rock outcrop complex, 25 to 65 percent slopes	0.2	1.3%
Totals for Area of Interest		**12.6**	**100.0%**

Chelan County Area, Washington (Parts of Chelan and Kittitas Counties)

AnA—Antilon gravelly sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2g7m
Elevation: 1,200 to 1,800 feet
Mean annual precipitation: 10 to 15 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 185 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Antilon

Setting

Landform: Terraces
Parent material: Volcanic ash, pumice and loess over lacustrine deposits

Typical profile

H1 - 0 to 10 inches: gravelly ashy sandy loam
H2 - 10 to 30 inches: gravelly ashy sandy loam
H3 - 30 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 19 to 35 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C
Ecological site: SANDY 10-16 PZ (R008XY501WA)

Hydric soil rating: No

Data Source Information

Soil Survey Area: Chelan County Area, Washington (Parts of Chelan and Kittitas Counties)
Survey Area Data: Version 14, Sep 10, 2018

Chelan County Area, Washington (Parts of Chelan and Kittitas Counties)

AnB—Antilon gravelly sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2g7n
Elevation: 1,200 to 1,800 feet
Mean annual precipitation: 10 to 15 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 185 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Antilon

Setting

Landform: Terraces
Parent material: Volcanic ash, pumice and loess over lacustrine deposits

Typical profile

H1 - 0 to 10 inches: gravelly ashy sandy loam
H2 - 10 to 30 inches: gravelly ashy sandy loam
H3 - 30 to 60 inches: silty clay loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 19 to 35 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: SANDY 10-16 PZ (R008XY501WA)

Hydric soil rating: No

Data Source Information

Soil Survey Area: Chelan County Area, Washington (Parts of Chelan and Kittitas Counties)
Survey Area Data: Version 14, Sep 10, 2018

Chelan County Area, Washington (Parts of Chelan and Kittitas Counties)

AnD—Antilon gravelly sandy loam, 8 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2g7p
Elevation: 1,200 to 1,800 feet
Mean annual precipitation: 10 to 15 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 185 to 200 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Antilon

Setting

Landform: Terraces
Parent material: Volcanic ash, pumice and loess over lacustrine deposits

Typical profile

H1 - 0 to 10 inches: gravelly ashy sandy loam
H2 - 10 to 30 inches: gravelly ashy sandy loam
H3 - 30 to 60 inches: silty clay loam

Properties and qualities

Slope: 8 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 19 to 35 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: SANDY 10-16 PZ (R008XY501WA)

Hydric soil rating: No

Data Source Information

Soil Survey Area: Chelan County Area, Washington (Parts of Chelan and Kittitas Counties)
Survey Area Data: Version 14, Sep 10, 2018

Chelan County Area, Washington (Parts of Chelan and Kittitas Counties)

CIC—Chelan gravelly sandy loam, pumiceous, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2g92
Elevation: 1,000 to 2,200 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Chelan

Setting

Landform: Terraces
Parent material: Volcanic ash, pumice and loess over basal till

Typical profile

H1 - 0 to 6 inches: gravelly sandy loam
H2 - 6 to 18 inches: gravelly sandy loam
H3 - 18 to 35 inches: gravelly sandy loam
H4 - 35 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B

Hydric soil rating: No

Data Source Information

Soil Survey Area: Chelan County Area, Washington (Parts of Chelan and Kittitas Counties)
Survey Area Data: Version 14, Sep 10, 2018

Chelan County Area, Washington (Parts of Chelan and Kittitas Counties)

ErF—Entiat-Rock outcrop complex, 25 to 65 percent slopes

Map Unit Setting

National map unit symbol: 2gb0
Elevation: 1,800 to 2,500 feet
Mean annual precipitation: 0 to 14 inches
Mean annual air temperature: 32 to 55 degrees F
Frost-free period: 135 to 165 days
Farmland classification: Not prime farmland

Map Unit Composition

Entiat and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Entiat

Setting

Landform: Hillslopes
Parent material: Resdiuum from granite with loess and volcanic ash

Typical profile

H1 - 0 to 3 inches: sandy loam
H2 - 3 to 8 inches: very gravelly sandy loam
H3 - 8 to 18 inches: very gravelly sandy loam
H4 - 18 to 28 inches: weathered bedrock

Properties and qualities

Slope: 25 to 65 percent
Depth to restrictive feature: 12 to 20 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: SANDY 10-16 PZ (R008XY501WA)
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 10 percent
Hydric soil rating: No

Data Source Information

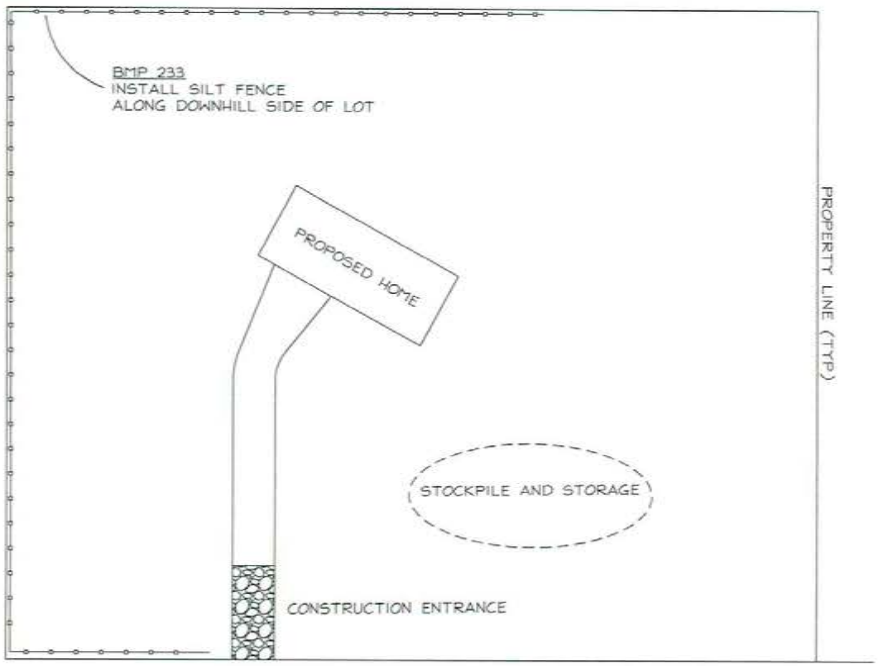
Soil Survey Area: Chelan County Area, Washington (Parts of Chelan and Kittitas Counties)
Survey Area Data: Version 14, Sep 10, 2018

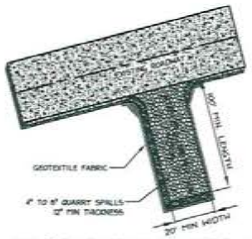
APPENDIX 4

Individual Lot Temporary Erosion and Sediment Plan

EAST 1/2 SEC 20, TWP 23N, RGE 20E, WM CHELAN COUNTY, WASHINGTON

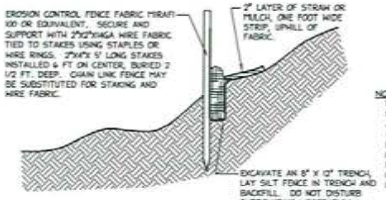
GENERAL CONSTRUCTION STORMWATER POLLUTION PREVENTION NOTES





CONSTRUCTION ACCESS DETAIL

NOT TO SCALE



EROSION CONTROL FENCING

NOT TO SCALE

NOTES

1. THE GEOTEXTILE USED MUST MEET THE STANDARDS LISTED BELOW. A COPY OF THE MANUFACTURER'S FABRIC SPECIFICATIONS MUST BE AVAILABLE ON-SITE.
   A05 (ASTM D-4751) = 30-100 SIEVE SIZE (0.60-0.15mm) FOR AT FILM
   = 50-100 SIEVE SIZE (0.30-0.15mm) FOR OTHER FABRICS.
   WATER PERMITTIVITY (ASTM D-4491) = 0.02 PER SEC MIN.
   GRAB TENSILE STRENGTH (ASTM D-4632) = 180 LBS. MIN. FOR EXTRA STRENGTH FABRIC = 100 LBS. MIN. FOR STANDARD STRENGTH FABRIC.
   GRAB TENSILE ELONGATION (ASTM D-4632) = 30% MAX.
   ULTRAVIOLET RESISTANCE (ASTM D-4355) = 70% MIN.
2. STANDARD STRENGTH FABRIC REQUIRES WIRE BACKING TO INCREASE THE STRENGTH OF THE FENCE. WIRE BACKING OR CLOSER POST SPACING MAY BE REQUIRED FOR EXTRA STRENGTH FABRIC IF FIELD PERFORMANCE WARRANTS A STRONGER FENCE.
3. WHERE THE FENCE IS INSTALLED, THE SLOPE SHALL BE NO STEEPER THAN 2H:1V.

GENERAL SHPPP NOTES

1. ALL WORK SHALL CONFORM TO THE CURRENT EDITIONS OF STANDARD PLANS AND SPECIFICATIONS OF THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT), STANDARDS OF CHELAN COUNTY, AND STANDARDS OF THE CITY OF WENATCHEE.
2. THE NEED AND EXTENT FOR EROSION CONTROL IS DEPENDENT ON SEVERAL VARIABLES INCLUDING WEATHER CONDITIONS, SITE SLOPES, DURATION OF EXPOSURE, AND AMOUNT OF AREA EXPOSED. THE EROSION CONTROL MEASURES SHOWN HEREIN ARE SUGGESTIONS. THE EXTENT AND TYPE OF EROSION CONTROL SHALL BE DETERMINED BY THE CONTRACTOR DURING CONSTRUCTION.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE EROSION CONTROL MEASURES SHOWN OR DESCRIBED IN THE PLANS, AND ANY ADDITIONAL MEASURES THAT MAY BE REQUIRED AS NEEDED BY THE CONTRACTOR'S MEANS AND METHODS OF CONSTRUCTION, TO CONTROL EROSION AND SEDIMENT AT THE CONSTRUCTION SITE AND TO PREVENT VIOLATION OF SURFACE WATER QUALITY STANDARDS. EROSION CONTROL MEASURES SHALL BE MAINTAINED THROUGHOUT THE COURSE OF CONSTRUCTION AND UNTIL ALL DISTURBED EARTH IS STABILIZED IN FINISHED GRADES.
4. WHEREVER UNPAVED CONSTRUCTION VEHICLE ACCESS ROUTES INTERSECT PAVED ROADS, PROVISION SHALL BE MADE TO MINIMIZE THE TRANSPORT OF SEDIMENT ONTO THE PAVED ROADS. IF NECESSARY, PAVED ROADS SHALL BE CLEANED ON A DAILY BASIS BY SWEEPING. STREET WASHING IS DISCOURAGED AND IS ALLOWED ONLY IF OTHER METHODS HAVE PROVEN UNSUCCESSFUL.
5. THE CONTRACTOR SHALL SCHEDULE AND ATTEND A PRECONSTRUCTION CONFERENCE WITH CHELAN COUNTY PRIOR TO BEGINNING WORK.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION AND MAINTENANCE OF EROSION CONTROL THROUGHOUT THE DURATION OF THE PROJECT. ALL EROSION CONTROL SHALL BE INSTALLED AND OPERATIONAL PRIOR TO BEGINNING ANY CONSTRUCTION.
7. A COPY OF THE APPROVED SHPP PLAN SHALL BE ONSITE AT ALL TIMES DURING CONSTRUCTION ACTIVITY.
8. THE CONTRACTOR SHALL MAKE EVERY EFFORT TO KEEP OFFSITE RUNOFF SEPARATE FROM ONSITE RUNOFF.

INSPECTION AND MAINTENANCE

1. ALL BEST MANAGEMENT PRACTICES (BMPs) SHALL BE INSPECTED, MAINTAINED AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. ALL ONSITE EROSION CONTROL MEASURES SHALL BE INSPECTED AT LEAST ONCE EVERY SEVEN DAYS AND WITHIN 24 HOURS AFTER ANY STORM EVENT.

SILT FENCES

1. INSTALL SILT FENCES IN APPROPRIATE LOCATIONS SHOWN ON THE PLANS. ADDITIONAL SILT FENCE MAY BE REQUIRED BASED ON FIELD CONDITIONS. THE CONTRACTOR SHALL ROUTINELY MONITOR THE NEED FOR ADDITIONAL SILT FENCING AND ADD AS NECESSARY.
2. SILT FENCING SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL, AND AT LEAST DAILY DURING PROLONGED RAINFALL. MAKE REPAIRS IMMEDIATELY.
3. SEDIMENT IS TO BE REMOVED FROM THE FENCE BEFORE IT REACHES ½ THE HEIGHT OF THE FENCE.
4. REPLACE FABRIC THAT HAS BECOME WEAKENED OR INEFFECTIVE DUE TO NATURAL DECOMPOSITION, OR OTHER CAUSES.

STABILIZE SOILS AND PROTECT SLOPES

1. IF NECESSARY, FROM MAY 1 THROUGH OCTOBER 30, ALL EXPOSED SOIL SHALL BE PROTECTED FROM EROSION BY MULCHING, PLASTIC SHEETING, HYDROSEEDING, OR OTHER MEASURES WITHIN 1 WEEK OF GRADING. FROM NOVEMBER 1 THROUGH APRIL 30 EXPOSED SOIL SHOULD BE PROTECTED WITHIN 48 HOURS OF GRADING. DURING UNUSUALLY HEAVY RAINS, PROTECTION MAY BE REQUIRED IMMEDIATELY. GEOTECHNICAL RECOMMENDATIONS MAY SUPERCEDE THIS REQUIREMENT.
2. SOILS SHALL BE STABILIZED BEFORE A WORK SHUTDOWN, HOLIDAY, OR WEEKEND, IF NECESSARY, BASED ON THE WEATHER FORECAST. HOWEVER, THE CONTRACTOR'S SHPP REPRESENTATIVE SHALL MONITOR THE WEATHER DURING THE ABSENCE AND SHALL IMMEDIATELY RESPOND IF NECESSARY.
3. SCHEDULE AND CONSTRUCT CUT AND FILL SLOPES IN A MANNER THAT WILL MINIMIZE EROSION. REDUCE RUNOFF VELOCITIES ON SLOPES BY PROVIDING TEMPORARY BARRIERS.
4. NATIVE TOPSOIL AND NATURAL VEGETATION SHALL REMAIN UNDISTURBED AS MUCH AS PRACTICAL. AREAS TO REMAIN UNDISTURBED SHALL BE CLEARLY MARKED INCLUDING SETBACKS, SENSITIVE/CRITICAL AREAS, AND THE BUFFERS.

SEDIMENT CONTROL

1. THE CONTRACTOR MAY ELECT TO CONSTRUCT TEPPORARY SEDIMENTATION PONDS, TANKS, OR OTHER FACILITIES AS NECESSARY TO CONTROL SHP. TEMPORARY ONSITE CONVEYANCE CHANNELS TO CONVEY WATER TO THESE TEMPORARY FACILITIES SHALL BE DESIGNED, CONSTRUCTED, AND STABILIZED TO PREVENT EROSION FROM THE EXPECTED VELOCITY OF A 2-YEAR, 24-HOUR STORM EVENT. IN LIEU OF SUCH DESIGN, THE CONTRACTOR MAY ELECT TO LINE THE TEMPORARY CHANNELS WITH EROSION CONTROL MAT AT THE CONTRACTOR'S EXPENSE.
2. SEDIMENT LADEN WATER CAN BE ROUTED THROUGH NATIVE VEGETATION AS A MEANS OF REDUCING OR ELIMINATING SEDIMENT.
3. PROTECT ALL STORM DRAIN CATCH BASINS AND INLETS DURING CONSTRUCTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CLEANING ANY SEDIMENT FROM ALL CATCH BASINS, INLETS, AND STORM PIPES.
4. PUBLIC RIGHTS-OF-WAY ARE TO BE KEPT CLEAN AT ALL TIMES. REMOVE ANY SEDIMENT TRACKED ONTO THE ROADWAYS PROMPTLY. SWEEP SEDIMENT FROM STREETS PRIOR TO FLUSHING.

FINAL STABILIZATION

1. ALL SHPPP MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY BMPs ARE NO LONGER NEEDED. TRAPPED SEDIMENT SHALL BE REMOVED FROM THE SITE AND INCORPORATED INTO FINISHED GRADING. DISTURBED SOIL AREAS RESULTING FROM REMOVAL SHALL BE PERMANENTLY STABILIZED.

DUST ABATEMENT

1. THE CONTRACTOR IS RESPONSIBLE FOR PREPARING AND IMPLEMENTING A DUST ABATEMENT PLAN. THE CONTRACTOR SHALL PROVIDE A 24 HOUR CONTACT NAME AND PHONE NUMBER FOR THE MANAGER RESPONSIBLE FOR IMPLEMENTING THE PROJECT'S DUST ABATEMENT PLAN AT THE PRE-CONSTRUCTION MEETING WITH CHELAN COUNTY.
2. DUST CONTROL SHALL BE PROVIDED DAILY OR MORE OFTEN (AS DEEMED NECESSARY BASED ON WIND CONDITIONS, TYPE OF TEAR, AND PHYSICAL CONDITIONS OF THE SITE) BY APPLICATION OF WATER ALONE OR WITH ADDITION OF MAGNESIUM CHLORIDE OR CALCIUM CHLORIDE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
3. ACRYLIC CO-POLYMERS OR OTHER BIODEGRADABLE PRODUCTS (SOIL STABILIZERS /TACKIFIERS) MAY BE USED FOR DAILY DUST CONTROL IF APPROVED BY THE PROJECT ENGINEER AND LOCAL REGULATORS.
4. WATER APPLIED FOR DUST CONTROL SHOULD BE APPLIED EVENLY AND WITHOUT OVER-WATERING WHICH GENERATES RUNOFF AND MAY RESULT IN EROSION.
5. OIL OR OTHER PETROLEUM-BASED PRODUCTS SHALL NOT BE USED FOR DUST CONTROL.
6. NON-POTABLE WATER SHOULD NOT BE CONVEYED IN TANKS OR DRAINPIPES THAT WILL BE USED TO CONVEY POTABLE WATER AND THERE SHOULD BE NO CONNECTION BETWEEN POTABLE AND NON-POTABLE SUPPLIES. NON-POTABLE TANKS, PIPES AND OTHER CONVEYANCES SHOULD BE MARKED "NON-POTABLE WATER - DO NOT DRINK."

REVEGETATION

1. PRIOR TO SEEDING, INSTALL NECESSARY EROSION CONTROL MEASURES SHOWN ON THESE PLANS.
2. ALL DISTURBED AREAS SHALL BE REVEGETATED BY HYDRO-SEEDING. THE SEEDING LIMITS SHALL BE CLEARLY DELINEATED USING FLAGS OR NON-TOXIC PAINT TO PREVENT DAMAGE AND DIE-OFF OF GROWING SEED.
3. SCARIFY SOIL SURFACE TO A DEPTH OF 3 INCHES, TO ENSURE ADEQUATE SEED CONTACT WITH SOIL.
4. RECOMMENDED SEEDING MIX COMPOSITION IS:
   - 40% SHEEP FESCUE
   - 40% HARD FESCUE
   - 20% PERENNIAL RYE GRASS

   SEEDING RATE IS 2 POUNDS PER THOUSAND SQUARE FEET (2 LB./1000 SQ. FT.)
5. HYDRO-SEED SLURRY MIX SHALL BE AS FOLLOWS:
   - BIOSOL 7-2-3 FERTILIZER — 500 LBS./AC.
   - WOOD MULCH — 1,750 LBS./AC.
   - J-TAC TACKIFIER — 50 LBS./AC.
6. NEWLY SEEDED AREAS NEED TO BE INSPECTED FREQUENTLY TO ENSURE THE GRASS IS GROWING. AREAS THAT FAIL TO ESTABLISH COVER ADEQUATE TO PREVENT SHEET AND RILL EROSION SHALL BE RESEEDED AT SOON AS SUCH AREAS ARE IDENTIFIED.
7. TEMPORARY VEGETATED AREAS SHALL BE MAINTAINED UNTIL PERMANENT VEGETATION OR OTHER EROSION CONTROL MEASURES CAN BE ESTABLISHED.

SHPPP CONSTRUCTION SCHEDULE

THE FOLLOWING IS A GENERAL OUTLINE AND SCHEDULE FOR INSTALLING EROSION CONTROL BMPs. IN ALL CASES THE EROSION CONTROL MEASURES SHOWN ON THE PLANS ARE A GENERAL GUIDE, AND THE CONTRACTOR IS ULTIMATELY RESPONSIBLE FOR ALL EROSION CONTROL MEASURES.

1. IDENTIFY AND FLAG CLEARING LIMITS.
2. INSTALL TEMPORARY CONSTRUCTION ENTRANCE.
3. INSTALL TEMPORARY FILTER FENCE WHERE APPROPRIATE.
4. ONCE EROSION CONTROL MEASURES ARE IN PLACE, CLEARING AND GRADING CAN BEGIN.
5. ADDITIONAL BMP MATERIALS SHALL BE KEPT ON HAND. THIS MIGHT INCLUDE GRAVEL, STRAW, PLASTIC, OR EQUIVALENT.
6. MONITOR EROSION REGULARLY AND ADD ADDITIONAL EROSION CONTROL MEASURES AS REQUIRED.
7. PROTECT ALL CATCH BASINS AND STORM PIPE FROM SEDIMENT.
8. WHEN GRADING AND CONSTRUCTION IS COMPLETE, SEED AND STABILIZE ALL EXPOSED SOILS.
9. WHEN CONSTRUCTION IS COMPLETE, CLEAN ALL CATCH BASINS AND STORM PIPES.
10. SITE RUNOFF IS TO BE CONVEYED TO THE PERMANENT DETENTION PONDS ONLY AFTER THE SITE IS STABILIZED AND STORM CONVEYANCE HAS BEEN CLEANED.

PROJECT CONTACT

24 HR CONTACT: MATT ATTAI
13120 NE 70TH PL., SUITE 201
KIRKLAND, WA 98033
PHONE: (425) 766-6630

APPROVED

CHELAN COUNTY ENGINEER — DATE

CALL BEFORE YOU DIG 811

REVISIONS			
NO.	DATE	DESCRIPTION	APPR.

MUNSON ENGINEERS, INC.
CONSULTING CIVIL ENGINEERS AND LAND SURVEYORS
P.O. BOX 3796 — 616 N. CHELAN AVE.
WENATCHEE, WASHINGTON 98801
(509) 663-0644 — FAX (509) 663-0646
EMAIL: mail@munsonengineers.com WEB PAGE: www.munsonengineers.com

DATE: 5/19/2020	SCALE:	ACAD DWG FILE: 15030Esmc
DRAWN: AH	CHKD: BC	PLOT: 1=1

VIRIDIAN
P. 20YR-004

EROSION AND SEDIMENTATION CONTROL

SHEET 1/1

JOB NO. 15030

APPENDIX 5

Operation and Maintenance Plan

Table 6.19: Maintenance Criteria for Drywells

Maintenance Interval	Description of Maintenance to Be Performed
Every 3 months	Visually inspect
Every 6 months	Remove debris and sediment
Annually	Check for structural damage
Whichever Is More Frequent: Above Schedule or Below Observed Events:	
Following substantial (> 24-hour) rainfall event	If possible, observe drywells in operation during the rainfall event. Aim to identify and correct problem prior to failure.
Following intense but short-duration event	
Following snowmelt event	It is especially important to observe the drywells if the melt occurred concurrently with frozen ground conditions.

6.A.2 Maintenance Criteria for Detention Ponds

Table 6.15: Maintenance Criteria for Detention Ponds

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash and Debris	Any trash and debris > 5 cubic feet (cf) per 1,000 square feet (sf), which is about equal to the amount of trash it would take to fill up one standard size garbage can. In general, there should be no visual evidence of dumping. If less than threshold all trash and debris will be removed as part of next scheduled maintenance.	Trash and debris cleared from site.
	Poisonous Vegetation and Noxious Weeds	Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined by State or local regulations. (Apply requirements of adopted integrated pest management (IPM) policies for the use of herbicides).	No danger of poisonous vegetation where maintenance personnel or the public might normally be. (Coordinate with local health department). Complete eradication of noxious weeds may not be possible. Compliance with State or local eradication policies required.
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants (Coordinate removal/cleanup with local water quality response agency).	No contaminants or pollutants present.
	Rodent Holes	Any evidence of rodent holes if pond is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.	Rodents destroyed and dam or berm repaired. (Coordinate with local health department and Ecology Dam Safety Office if pond ≥ 10 acre-feet).
	Beaver Dams	Dam results in change or function of the pond.	Pond is returned to design function. (Coordinate trapping of beavers and removal of dams with appropriate permitting agencies).
	Insects	When insects such as wasps and hornets interfere with maintenance activities.	Insects destroyed or removed from site. Apply insecticides in compliance with adopted IPM policies.
	Tree Growth and Hazard Trees	Tree growth does not allow maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vacuuming, or equipment movements). If trees are not interfering with access or maintenance, do not remove If dead, diseased, or dying trees are identified (Use a certified arborist to determine health of tree or removal requirements)	Trees do not hinder maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., alders for firewood). Remove hazard trees.
Side Slopes of Pond	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. Any erosion observed on a compacted berm embankment.	Slopes should be stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction. If erosion is occurring on compacted berms a licensed engineer in the state of Washington should be consulted to resolve source of erosion.
Storage Area	Sediment	Accumulated sediment that exceeds 10% of the designed pond depth unless otherwise specified or affects inletting or outletting condition of the pond.	Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion.
	Liner	Liner is visible and has > three 0.25-inch holes in it.	Liner repaired or replaced. Liner is fully covered.

Table 6.15: Maintenance Criteria for Detention Ponds (continued)

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
	(if applicable)		
Pond Berms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation. If settlement is apparent measure berm to determine amount of settlement. Settling can be an indication of more severe problems with the berm or outlet works. A licensed engineer in the state of Washington should be consulted to determine the source of the settlement.	Dike is built back to the design elevation.
	Piping	Discernible water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a licensed engineer in the state of Washington with geotechnical expertise be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Overflow/Spillway	Tree Growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. Tree growth on berms > 4 feet in height may lead to piping through the berm which could lead to failure of the berm.	Trees should be removed. If root system is small (base < 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A licensed engineer in the state of Washington should be consulted for proper berm/spillway restoration.
	Piping	Discernible water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a licensed engineer in the state of Washington with geotechnical expertise be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
	Emergency Overflow/ Spillway	Only one layer of rock exists above native soil in area ≥ 5 sf, or any exposure of native soil at the top of outflow path of spillway. (Riprap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.
	Erosion	See Side Slopes of Pond.	

Appendix D

Daily Site Inspection

Daily Site Activities and Observations Report **Viridian Development**

Inspector:_____ Date: _____

Weather: _____ Wind Speed/Direction:_____

Contractors Onsite:

Contractor	Number of Workers	Work Tasks
Selland		

Are soil impacting activities occurring today? _____ Yes _____ No

Have all contractor's workers received lead and arsenic soil awareness training? _____ Yes _____ No

In what areas of the site have soil impacting activities occurred? _____

Stormwater:

Are all construction stormwater BMPs in place and in good condition? _____ Yes _____ No

Did a precipitation event occur within the previous 24 hours? _____ Yes _____ No

Wind Erosion:

Are strong winds in for forecast for the next 2 to 3 days? _____ Yes _____ No

Have all **soil** stockpiles been covered or treated to prevent wind erosion? _____ Yes _____ No

Dust Control:

Are site soils naturally wetted due to precipitation? _____ Yes _____ No

Is dust abatement by water application needed? _____ Yes _____ No

Are dust abatement activities sufficient to prevent offsite migration of visible dust? _____ Yes _____ No

Is soil being tracked offsite? _____ Yes _____ No

Weather Forecast:

Is rain forecast for the next 2 to 3 days? _____ Yes _____ No

Will forecast temperatures exceed 80°F in the next 3 days? _____ Yes _____ No

Other remarks: _____

_____

Signature:_____ Date: _____