

Exhibit I

Soil Conditions

Mist Resiliency Project
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Attachment I-1. Preliminary Erosion and Sediment Control Plan

Acronyms and Abbreviations

BMP	Best Management Practices
GeoEngineers	GeoEngineers, Inc.
GIS	Geographic Information System
HDD	Horizontal Directional Drilling
I/W	Injection and Withdrawal
NMCS	North Mist Compressor Station
NRCS	Natural Resources Conservation Service
NW Natural	Northwest Natural Gas Company
OAR	Oregon Administrative Rules
Project	Mist Resiliency Project
ROW	Right-of-Way

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1.0 Introduction

Exhibit I provides information about the site soil conditions for the Mist Resiliency Project (Project). This exhibit demonstrates that the Project can comply with the Oregon Administrative Rules (OAR) 345-021-0010(1)(i) and the approval standards in OAR 345-022-022.

2.0 Project Description

As described in Request for Amendment No. 13, Northwest Natural Gas Company (NW Natural) proposes to amend the Mist Underground Natural Gas Storage Site Certificate for its underground natural gas storage facility in Columbia County, Oregon through the Project. In the Request for Amendment No. 13, NW Natural proposes to complete the following upgrades at the Miller Station and North Mist Compressor Station (NMCS).

- **Miller Station** – upgrade and replace the two existing natural gas turbine driven natural gas compressors with clean burning turbine driven natural gas compressors and, upgrade and replace the existing electric power supply line from its origin at Hwy 202 to Miller Station. An approximately 7.5-acre area just north of the existing compressor station, called the Miller Station Storage Area will be graded as a permanent gravel surfaced equipment and materials staging area for Miller Station. Construction will include vegetation removal and grading to prepare a relatively flat gravel surfaced area.
- **North Mist Compressor Station** – develop the existing Newton, Medicine, and Stegosaur underground storage reservoirs, install injection and withdrawal (I/W) wells and I/W pipelines to connect the underground storage reservoirs to the existing NMCS, install three reciprocating engine driven natural gas compressors, install two natural gas dehydration equipment systems, and construct a control and operations building to facilitate manned operations at the facility.

Development of the Newton, Medicine, and Stegosaur well pads will include grading, construction of I/W wells, and a finish grade rocked surface. The approximate location of the proposed well pads is shown with respect to topography and the surrounding area in Figure I-1. Table I-1 summarizes development at each well pad.

Table I-1. Proposed Well Pad Development Summary

Well Pad Name	Description	Proposed Grading¹	Proposed Well Development
Newton	New well pad development on clearcut forest land.	Grading plans not developed at this time. Assumed cuts and fills up to 10 feet may be required to prepare the well pad.	Construct new 90,000 square foot well pad; Install injection and withdrawal wells.

Well Pad Name	Description	Proposed Grading ¹	Proposed Well Development
Medicine	New well pad development on clearcut forest land.	Grading plans not developed at this time. Assumed cuts and fills up to 20 feet may be required to prepare the well pad.	Construct new 90,000 square foot well pad; Install injection and withdrawal wells.
Stegosaurus	Expansion of existing well pad on clearcut forest land.	Grading plans not developed at this time. Assumed cuts of up to 20 feet may be required to expand the well pad.	Expand existing approximately 43,000 square foot well pad to approximately 160,000 square foot; install pipeline collection headers.
1. Approximate grading based on site topography. Final grading requirements to be determined by production of a site-specific grading plan.			

New 10- to 12-inch-diameter arc-welded steel I/W pipelines will be constructed using conventional open trench methods to move natural gas between the well pads discussed above and the NMCS. The pipelines are termed the Newton to Stegosaurus I/W Pipeline, the Medicine to Stegosaurus I/W Pipeline, and the Stegosaurus to NMCS I/W Pipeline. Most of the pipelines will be routed to follow existing logging roads. However, the Newton to Stegosaurus I/W Pipeline and the Stegosaurus to NMCS I/W Pipeline will traverse undeveloped forest land and/or follow an existing pipeline right-of-way (ROW). The proposed pipeline routes are shown with respect to topography and the surrounding area in Figure I-1. Table I-2 below summarizes the proposed pipelines.

Table I-2. Proposed Pipeline Summary

Name (Proposed Pipeline Diameter)	Approximate Length (Feet)	Generalized Route Description
Newton to Stegosaurus (Up to 16-inches)	4,084	Traverses gentle to moderate sloping clearcut and forested slopes cross country from Newton Well pad to existing rock pit located about 1,300 feet west of the well pad, and then follows an existing logging road to the Stegosaurus Well Pad.
Medicine to Stegosaurus (Up to 16-inches)	6,407	Follows existing logging roads.
Stegosaurus to NMCS (Twin pipelines up to 16-inches)	3,168	Traverses moderate sloping clearcut slope for approximately 300 feet, follows an existing logging road for about 440 feet, traverses gentle to moderate sloping clearcut slopes for about 350 feet, then follows the existing North Mist Expansion Pipeline ROW across gentle to moderately sloping clearcut slopes for about 1,400 feet to the NMCS.

A new, approximately 8,760-foot-long underground powerline will be constructed between Highway 202 and Miller Station. The majority of the powerline will be installed using conventional open trench methods within the fill prism of the gravel surfaced Mainline Road, and along NW Natural's South Mist Pipeline ROW. However, two horizontal directional drilling (HDD)

installations will be completed to cross Lindgren Creek and Lyons Creek. The HDD installations will be roughly 400 to 600 feet long. The proposed powerline route is shown with respect to topography and the surrounding area in Figure I-1.

3.0 Soils Report - OAR 345-021-0010(1)(i)

OAR 345-021-0010(1)(i) Information from reasonably available sources regarding soil conditions and uses in the analysis area, providing evidence to support findings by the Council as required by OAR 345-022-0022.:

This report presents the results of GeoEngineers, Inc.'s (GeoEngineers') soil evaluation for the Project. This evaluation was performed to meet the requirements presented in Oregon Administrative Rule (OAR) 345-021-0010(1)(i). The information used in this evaluation included available geologic maps and the Natural Resources Conservation Service (NRCS) soil maps and a site reconnaissance conducted by GeoEngineers.

4.0 Soils Conditions - OAR 345-021-0010(1)(i)(A)

(A) Identification and description of the major soil types in the analysis area;

4.1 Mapped Soils

Shallow subsurface soil conditions in the Project vicinity were identified using the NRCS website soil maps (NRCS 2023) and the Soil Conservation Service Soil Survey of Columbia County (Smythe 1986). Soils mapped within the Project area are shown in Figures I-1 through I-4. The survey describes soil conditions in the upper 5 feet of the subsurface profile and classifies land use. Eleven soil units were identified by the NRCS within the Project area as summarized in Table I-3.

Table I-3. Soil Unit Descriptions

Soil Unit (label)	Setting Within Project Location	Approximate Thickness	Formation Setting	Permeability	Runoff	Hazard for Erosion
Alstony Gravelly Loam (3E)	Moderate to steep slopes at higher elevations near ridge tops	2 feet	Colluvium derived from volcanic rocks and ash	Moderate	Very Rapid	High
Anunda Silt Loam (5D)	Gentle ridge top	4 feet	Colluvium derived from siltstone and mixed with volcanic ash	Moderately high to high	Medium	High

Soil Unit (label)	Setting Within Project Location	Approximate Thickness	Formation Setting	Permeability	Runoff	Hazard for Erosion
Braun- Scaponia Silt Loam, 5-30 percent slopes (7D)	Gentle to steep, active and stable, convex slopes	2.5 feet	Colluvium derived from siltstone	Moderate	Medium to rapid	High
Braun- Scaponia Silt Loam, 60-90 percent slopes (9F)	Steep stream channel banks	3.5 feet	Colluvium derived from siltstone	Moderately high to high	Medium	High
Eilertsen Silt Loam (20)	Stream terraces	4 feet	Mixed alluvium	Moderately high to high	Medium	High
Hapludalfs- Udifluvents Complex (24)	Gentle, concave slopes and side slopes	5 feet	Colluvium derived from volcanic rocks and sediment	Moderate	Medium to rapid	High
Murnen Silt Loam (36D)	Gentle to moderate, ridge tops and side slopes	4 feet	Colluvium and residuum derived from basalt mixed with volcanic ash	Moderate to high	Medium to rapid	Moderate to high
Natal Silty Clay loam (37)	Stream terraces	4 feet	Alluvium derived from mixed material	Moderately low to high	Medium to rapid	High
Scaponia- Braun Silt Loam (50E)	Active north and south convex slopes	3 to 5 feet	Colluvium derived dominantly from siltstone.	Moderate	Very rapid	High
Tolke Silt Loam (56D)	Broad stable ridge tops and on gentle to moderate side slopes	5 feet	Volcanic ash and colluvium derived from siltstone and shale	Moderate	Medium to rapid	Moderate to high
Treharne Silt (58)	Broad terraces above river	3 to 5 feet	Alluvium derived from mixed sediments	Moderate	Medium to rapid	High
Eilertsen Silt Loam (20)	Stream terraces	5 feet	Alluvium derived from mixed material	Moderate	Slow	Slight

4.2 Groundwater

Regional groundwater in the mountainous northern portion of the Project area is located approximately 200 feet below ground surface. A well log obtained from the Oregon Water Resources Department for a water well drilled at the Miller Station compressor station indicated a

static groundwater level of 188 feet below ground surface (OWRD 2023). However, localized perched groundwater may exist. Groundwater levels will fluctuate with precipitation, site utilization and other factors.

The southern portion of the proposed powerline alignment is located within the Nehalem River Valley. Based on a review of two well logs for borings drilled within the Nehalem River Valley (OWRD 2023), one of which is located within about 600 feet of the powerline alignment, static groundwater levels in the Nehalem River Valley are located about 10 feet below ground surface. The borings associated with the well logs we reviewed were drilled in November 1994 and March 2006, and therefore likely represent relatively high groundwater levels during the rainy winter season in northwest Oregon. However, groundwater levels could be located nearer to the ground surface during heavy rain or flooding events.

5.0 Land Use – OAR 345-021-0010(1)(i)(B)

(B) Identification and description of current land uses in the analysis area, such as growing crops, that require or depend on productive soils;

Land use within the Project area north of the Nehalem River Valley includes managed timber lands, rock quarry development to obtain gravel for haul roads, forested wildlife habitat and natural gas production. Timber harvesting has required construction of a network of skid roads and gravel haul roads for operation and maintenance activities. Gravel roads have also been constructed for the operation of the existing natural gas energy facilities in the area, for injection/withdrawal wells and pipelines.

Land use within the Nehalem River Valley, which is traversed by the proposed powerline alignment, primarily includes rural residential development and agricultural fields. In the Project vicinity, a gravel road, named Mainline Road, traverses the Nehalem River Valley between Highway 202 in the south to mountainous terrain in the north. This gravel road is constructed on a fill prism across the valley floor that is between approximately 5 and 8 feet high relative to the adjacent ground surface. Land use directly adjacent to Mainline Road within the valley includes forested land and grass pasture land.

The proposed Newton, Stegosaur and Medicine well pads, and Miller Station Storage Area are situated on managed timberland that is either forested with mature conifer trees or has been relatively recently clear cut. The NMCS is located on a relatively flat mid-slope bench within managed timberland that has been previously developed as a compressor station site. The compressor replacement area at Miller Station is located on a relatively flat gravel surface within the existing Miller Station compressor station site which is also situated on managed timber land.

The proposed pipeline and powerline routes typically follow existing gravel surfaced haul roads within managed timberland that is either forested with mature conifer trees or had been relatively recently clear cut. However, the western approximately 2,000 feet of the proposed Newton to

Stegosaur I/W Pipeline traverses managed timber land that is either clear cut or forested with mature conifer trees or clearcut. The center approximately 4,500 feet of the powerline alignment traverses recently clear cut forest land.

6.0 Potential Adverse Impacts to Soil – OAR 345-021-0010(1)(i)(C)

(C) Identification and assessment of significant potential adverse impact to soils from construction, operation and retirement of the facility, including, but not limited to, erosion and chemical factors such as salt deposition from cooling towers, land application of liquid effluent, and chemical spills;

The following sections summarize the potential impacts to soil from the construction, operation and retirement of the proposed pipelines, powerline, Miller Station, Miller Station Storage Area and NMCS upgrades.

6.1 Construction

Construction activities can introduce the potential for increased erosion due to soil disturbance, loss of vegetation, compaction, and changes to surface drainage patterns. Erosion can be caused by increasing exposure to wind or water. Wind erosion is influenced by the wind intensity, vegetative cover, soil texture, soil moisture, grain-size of unprotected soil surface, topography and by the frequency of soil disturbance. Wind erosion is not a significant concern in the project area because of the cohesive nature and typical moisture content surface soils. Water erosion is primarily a function of soil type, vegetative cover, precipitation, and slope inclination. If left unmitigated, erosion from rainfall will be a hazard during construction.

The runoff potential and erosion hazard for the identified soils within the project ranges between slight and high depending on the location. The NRCS reports that the site vicinity receives 60-80 inches of rainfall per year. The erosion potential and available precipitation, therefore, make site soils sensitive to water erosion during much of the year particularly where slopes are steep. The following describes the runoff potential and erosion hazard for specific areas within the project.

6.1.1 Newton Well Pad & Newton to Stegosaur I/W Pipeline

The Newton Well Pad construction will include development of an approximately 90,000-square foot flat gravel surfaced well pad on a broad gently sloping topographic knob that was clear cut in the latter months of 2023. Grading is expected to include cuts and fills of up to approximately 10 feet in height. The grading will disturb the soil and increase the potential erosion hazard.

The proposed Newton to Stegosaur I/W Pipeline will traverse gentle to moderate sloping clearcut and forested slopes for approximately 2,000 feet until reaching an existing logging road to end at

the Stegosaur Well Pad. The remaining section of the pipeline will be constructed within the existing gently sloping (less than 10 percent) gravel road surface or the adjacent maintained ditch line where little to no vegetation removal is expected. Construction of the pipeline will primarily involve: grading to prepare an approximately 80-foot-wide construction corridor within forested land; trenching within the prepared construction corridor and gravel road surface; short-term stock piling of excavation soils; installing the pipeline within the trench and backfilling the pipeline trench with soils removed from the excavation; and restoration of the ground surface to pre-existing topographical and surface conditions. The removal of vegetation and grading to prepare a construction corridor will disturb soils and increase the erosion potential along the gentle to moderate slopes. However, where the pipeline is located within gravel road surfacing, the erosion potential is considered to be relatively low.

6.1.2 Stegosaur Well Pad & Stegosaur to NMCS I/W Pipeline

The Stegosaur Well Pad construction will include development of an approximately 126,000-square foot flat gravel surfaced well pad situated on a gently sloping broad topographic knob that has been recently clear cut. Grading is expected to include cuts and fills of up to approximately 20 feet in height. Vegetation removal will include removal of existing stumps, planted young conifer trees and volunteer grasses and shrubs. The vegetation removal and grading will disturb the soil and increase the potential erosion hazard.

The proposed Stegosaur to NMCS I/W Pipeline traverses gently to moderately sloping clearcut slopes. Relatively short segments of the pipeline route traverse these slopes cross country (not following roads) and follow an existing gravel haul road. The majority of the proposed pipeline route follows an existing maintained pipeline ROW that is vegetated with short grasses.

Construction of the pipeline will involve: grading to prepare an approximately 80-foot-wide construction corridor within recently clearcut land; trenching within the existing pipeline ROW and prepared construction corridor and gravel road surface; short-term stock piling of excavation soils; installing the pipeline within the trench and backfilling the pipeline trench with soils removed from the excavation; and restoration of the ground surface to pre-existing topographical and surface conditions. The removal of vegetation and grading to prepare a construction corridor will disturb soils and increase the erosion potential along the gentle to moderate slopes. However, where the pipeline is located within gravel road surfacing, the erosion potential is considered to be relatively low.

6.1.3 Medicine Well Pad & Medicine to Stegosaur I/W Pipeline

The Medicine Well Pad will include development of an approximately 90,000-square foot flat gravel surfaced well pad situated on a gently sloping ridgeline that has been recently clear cut. Grading is expected to include cuts and fills of up to 20 feet in height. Vegetation removal will include removal of existing stumps, planted young conifer trees and volunteer grasses and shrubs. The vegetation removal and grading will disturb the soil and increase the potential erosion hazard.

The Medicine to Stegosaur I/W Pipeline construction will follow gently sloping (less than 10 percent) existing gravel haul roads that typically traverse gentle (20-30 percent) ridge top slopes. The pipeline route (and gravel haul road) crosses uphill of two convergent headwalls where slopes downhill of the gravel road surface may be as steep as approximately 80 percent; however, these slopes will not be disturbed by construction. Construction of the pipeline will primarily involve trenching within the gravel haul road or adjacent uphill ditch line, short-term stock piling of excavation soils, placing pipe in the trench, backfilling the trench with the excavated soils and returning the road surface to its pre-construction topographic and gravel surfaced conditions. Little to no vegetation removal is expected because the pipeline will be installed within the existing gravel road surface or the adjacent maintained ditch line. Erosion potential is considered to be relatively low.

6.1.4 NMCS

The NMCS construction will include installing three reciprocating engine driven natural gas compressors, two natural gas dehydration equipment systems, and constructing a control and operations building to facilitate manned operations at the facility. Existing soils within the NMCS construction area will be removed to match the grade of the adjacent existing NMCS. This will require removal of up to approximately 15 feet of existing soil. The soil will either be placed on the slopes adjacent to the NMCS or hauled off site for disposal. If the soil is placed on slopes adjacent to the NMCS, it will be placed on slopes inclined at 40 percent or less. Furthermore, if the soil is placed on slopes greater than 20 percent, the existing ground surface will be benched with a downslope keyway to reduce the risk of landsliding. Final fill slopes associated with this soil placement will be inclined at 3H:1V or less. Erosion potential is considered to be relatively low to moderate. However, soils could be impacted by installation of concrete foundations, and rain fall on sloping surfaces if not properly managed.

6.1.5 Miller Station

The Miller Station construction will include replacement of two compressors within the existing Miller Station, which is situated on a broad ridgeline. The proposed replacement area is relatively flat and surfaced with gravel and existing buildings. Construction will include: removal of the existing compressor station “pole barn” building (steel frame and siding); removal of the existing compressors and associated foundations; shallow excavations for new foundations; construction of new concrete foundations; placement of new compressors; reconstruction of the compressor station building; and resurfacing of gravel disturbed by construction. Erosion potential is considered to be relatively low. However, soils could be impacted by the building and concrete removal and concrete foundation placement if not properly managed.

6.1.6 Miller Station Storage Area

The Miller Station Storage Area construction will include development of an approximately 7.5-acre flat gravel surfaced area situated on a gently sloping ridgeline that is vegetated with mature conifer trees. Grading is expected to include cuts and fills of up to 10 feet in height. Vegetation removal will include removal of existing trees and stumps. The vegetation removal and grading will disturb the soil and increase the potential erosion hazard.

6.1.7 Powerline Installation

The proposed powerline route follows the gently sloping (less than 10 percent) existing gravel surfaced Mainline Road and then an existing cross-country powerline and pipeline ROW across gently to steeply sloping (gradients up to about 70 percent) recently clearcut managed forest land. Vegetation within this-cross-country segment within the maintained ROW includes short grasses and volunteer shrubs and fern. The alignment crosses two creeks, Lyons Creek and Lindgren Creek, where the powerline conduits will be installed beneath the creeks using HDD trenchless methods to avoid potential disturbance to the creeks. The alignment also crosses several relatively small wetlands. Aside from the proposed HDD installations, construction will include: trenching within the gravel surface of Mainline Road and along the portion of the pipeline that follows the existing ROW; short-term stock piling of excavation soils; placing powerline conduits in the trench; backfilling the trench with the excavated soils; and restoration of the ground surface to pre-existing topographical and surface conditions. Vegetation removal will be minimized within the cross-country portion of the pipeline route and only expected to include the width of the pipeline trench. However, disturbance to the surface from track-mounted construction equipment within the ROW will also likely occur. Erosion potential is considered low within the gravel surfaced portion of the route and high within the cross-country segment of the route.

6.1.8 Temporary Storage Areas

Temporary storage areas will be required during construction to store equipment, materials, and provide a location for worker vehicle parking and meetings. No construction will occur within the temporary storage areas. Four temporary storage areas are currently proposed for the project: Highway 47 storage area 1, Highway 47 storage area 2, Highway 202 storage area and the Bark and Haul storage area.

The Highway 47 storage area 1 (approximately 15 acres) and Highway 47 storage area 2 (approximately 2.5 acres) are situated within existing gravel surfaced logging yards. The yards are relatively flat and gently sloping. Sparse volunteer grass is growing within the laydown yards. No preparation of the storage areas is anticipated prior to use. Because no construction will occur within the storage areas, the storage areas are gravel surfaced and they are relatively flat, there is a low erosion hazard associated with the use of the storage areas.

The Highway 202 storage area is an approximately 6-acre area situated in a gently sloping grass covered field. It is expected that the storage area will be prepared by placement of gravel surfacing, which will remove or at least cover the grass vegetation. Although no construction will occur within the storage area, it is expected that preparation of the storage area will temporarily expose the near surface soils. Based on the gently sloping nature of the storage area and temporary exposed nature of the soils, there is a low to moderate erosion hazard associated with use of the laydown yard.

The Bark and Haul storage area is situated within existing gravel surfaced logging equipment staging yard. The storage area is relatively flat and gently sloping, and surfaced with gravel. No preparation of the storage area is anticipated prior to use. Because no construction will occur within the storage area and the storage area is gravel surfaced and relatively flat, there is a low erosion hazard associated with the use of the storage area.

6.2 Operations

Operations activities will be limited to those areas directly related to the proposed Newton, Medicine, and Stegosaur well pads, the pipelines and powerline alignments, Miller Station, the Miller Station Storage Area and the NMCS. Other parts of the project area will not be affected.

The well pads, NMCS and Miller Stations and Miller Station Storage Area will be relatively flat and level to gently sloping surfaces with a low susceptibility to wind or water erosion. Some stormwater will be shed from graveled surfaces and structures during periods of precipitation. There will be no land application of liquid waste, and no hazardous liquid materials will be produced during operations. As such, no significant potential adverse impacts to soils are anticipated during operation of the well pads, NMCS, Miller Station and Miller Station Storage Area.

Along overland sections of the pipelines and powerline corridors, and on slopes created by placement of soil adjacent to the NMCS, vegetation will be reestablished, and will be maintained to provide access for monitoring during operations. Where the pipelines and powerline follow existing gravel roads, no vegetation management is anticipated. Existing gravel roads will be used to access major components of the Project. As such, no significant potential adverse impacts to soils are anticipated during operation of the pipelines or powerline.

6.3 Retirement

Retirement will consist of abandoning the pipelines and powerline and leaving them in place and removing equipment at the NMCS and Miller Station. Erosion hazards during decommissioning of the pipelines and powerline will be minimal. Potential erosion hazards during retirement of the NMCS and Miller Stations will be similar to those occurring during construction. No significant potential adverse impacts to soils are anticipated during retirement of facilities associated with the Project.

Retirement of the proposed well pads and Miller Station Storage Area will consist of removal of gravel surfacing and establishing vegetative cover where the gravel was removed. Erosion hazards during decommissioning of the well pads and Miller Station Storage Area will be similar to those

occurring during construction. No significant impacts to soils are anticipated during retirement of the well pads or Miller Station Storage Area.

7.0 Mitigation of Potential Adverse Impacts –

OAR 345-021-0010(1)(i)(D)

(D) A description of any measures the applicant proposes to avoid or mitigate adverse impact to soils

Potential adverse impacts to soil from construction, operations and retirement of the proposed well pads, compressor stations, Miller Station Storage Area, pipelines and powerline should be mitigated by adhering to appropriate erosion and sediment control best management practices (BMPs) during construction and operations. Specific mitigation measures are included in the following sections.

7.1 Construction

7.1.1 General

Restoration and revegetation of disturbed areas that are not necessary for operations will be completed following construction. Roadways will be restored to their original grades, drainage conditions and rock surface. Incidental exposed soils that are affected by construction adjacent to roadways or the compressor station and Miller Station Storage Area sites will be seeded when there is adequate soil moisture and stabilized with straw mulch until permanent vegetation is established. Exposed soil in overland segments of the pipelines and powerline routes that are affected by construction will be seeded when there is adequate soil moisture, and reseeded in the spring if a healthy cover crop does not grow. Straw mulch will be placed over the seeded areas to stabilize the soil surface until permanent vegetation is established. Sediment fences and check dams, where required, will remain in place, and be maintained until the affected areas are well vegetated. Regular maintenance of roadway drainage facilities will be conducted to ensure continued proper operation.

Overland corridors associated with the Newton to Stegosaur pipeline, the Stegosaur to NMCS pipeline and powerline will be constructed with waterbars adequately spaced so that surface drainage continues to natural drainage patterns. Regular maintenance of drainage facilities will be conducted to ensure continued proper operation.

Possible contamination from construction equipment or supplies such as lubricant and fuel will be controlled in accordance with the applicant's spill prevention and management plan. Sanitary waste generated during construction will be limited to portable toilets, which will be serviced regularly by a qualified sewage disposal vendor.

Soil within the project area will be susceptible to water erosion. However, where the proposed pipelines and powerline follow existing roadways, and at Miller Station, water erosion will be minimal because of surface water drainage systems and crushed rock road surfacing that are already in place. In overland segments of the Newton to Stegosaur and Stegosaur to NMCS I/W pipelines, the pipeline alignments will be relatively narrow and will be protected from erosion using current erosion control BMPs. The soils at the NMCS, Miller Station and Miller Station Storage Area will also be protected during construction using current erosion control BMPs. A Project-specific Erosion and Sediment Control Plan was completed to address potential erosion concerns during construction and post construction site stabilization. The Erosion and Sediment Control Plan is included as Attachment I-1 of this report. Erosion control measures to be employed during construction, generally include but not necessarily be limited to the following.

7.1.2 *Erosion Control*

7.1.2.1 *Well Pads and Miller Station Storage Area*

Erosion control during construction of the Newton, Stegosaur and Medicine well pads, and Miller Station Storage Area, will include implementing BMPs within and around the well pads and Miller Station Storage Area sites. Erosion will be controlled during operation of the well pads and Miller Station Storage Area by the gravel surfacing and establishing vegetation on cut and fill slopes. Mitigation measures implemented at the well pad and Miller Station Storage Area sites will include:

- Maintaining vegetative borders surrounding the well pad and Miller Station Storage Area sites.
- Installing orange silt fence on the downhill sides of the sites to limit off-site transport of sediment and to clearly delineate the construction limits. The silt fence will remain in place until construction is complete, and vegetation is reestablished on sloping surfaces with exposed soil.
- Installing orange construction fence on upslope sides of the site to clearly delineate the construction limits.
- Temporary stockpiling of soils within the limits of the well pad and Miller Station Storage Area sites. Soils that are not utilized as fill will be hauled off site to an approved disposal location.
- Covering stockpiled soils with plastic sheeting or surrounding them with wattles or silt fence if the soil is stockpiled for more than 7 days without being reworked or if a significant rainfall event occurs.
- Grading and compaction of fill slopes to a final gradient no steeper than 2H:1V, (50 percent or 26.6 degrees).

- Keying and benching of sloping surfaces (greater than 20 percent) prior to placement of fill to construct fill slopes.
- Gravel surfacing within the relatively flat to gently sloping gravel pads.
- Seeding and mulching of cut and fill slopes created during grading.
- Installation of wattles on cut and fill slopes and maintenance of the wattles until permanent vegetation is established.

7.1.2.2 *Pipelines and Powerline*

In general, most of the pipelines and powerline will be installed in open trenches within gravel roadways. However, portions of the Newton to Stegosaur I/W Pipeline, Stegosaur to NMCS I/W Pipeline and powerline will be installed in forested or recently clearcut overland segments. In addition, the powerline will be installed beneath Lyons Creek and Lindgren Creek via two HDD installations.

Mitigation where the pipelines and powerlines are installed within existing gravel roadways will include:

- Maintaining vegetative borders between the project area and waterbodies.
- Installing orange construction fencing on upslope sides of the construction corridor to clearly delineate the construction limits.
- Installing orange silt fence on the downhill sides of the construction corridor to limit off-site transport of sediment and to clearly delineate the construction limits.
- Installing check dams along areas of concentrated water flow runoff, particularly in roadside ditches.
- Restoration of road surfaces and ditches as soon as possible after installation of the pipeline. It is anticipated that the contractor will have a trench backfill and restoration crew that will follow the trenching and pipeline installation crew so that the trench would remain open for a maximum of 1 to 2 days).

Mitigation measures within forested or recently clearcut lands will include:

- Maintaining vegetative buffers between the construction corridor and waterbodies. If waterbodies are located within 50 feet of the construction corridor, secondary erosion control measures such as a silt fence will be placed between the construction corridor and the waterbody.
- Stripping topsoil to a minimum depth of 12 inches, and stockpiling topsoil for replacement after pipeline installation to promote vegetation growth. Stripping topsoil will occur after logging operations to remove large trees, and grubbing operations to remove tree stumps.

- Installing orange sediment fence or other approved BMPs at downslope sides of the construction corridor to limit off-site transport of sediment and clearly delineate the construction limits;
- Installing orange construction fence on the upslope side of the construction corridor to clearly delineate construction limits;
- Placing straw mulching, erosion control fabric, and/or hydroseed with tackifier on all soils disturbed by construction. In general, erosion control fabric will be placed over mulch where slopes exceed 40 percent or within drainage channels restored after construction.
- Planting designated seed mixes and seedlings within affected areas in collaboration with agricultural and commercial timber operators, to reestablish permanent vegetative cover and to restore commercial timber.
- Where wetlands are located along the powerline alignment, the wetland soils will be protected by placing timber mats over the wetlands, except for a proposed 2-foot-wide trench that will be excavated for installation of the powerline conduit. Excavated soils will be stockpiled outside and downslope of wetland areas. Timber mats will also reduce disturbance to wetland vegetation and help distribute ground pressure from equipment over a larger area (compared to tires or tracks of tracked machinery) which reduces soil compaction.
- Construction and maintenance of waterbars in sloping segments of the construction corridor.

In addition to the above noted mitigation measures where the pipeline will be installed in the gravel road surface, Mitigation for HDD installations (inadvertent drilling fluid returns) will include:

- Drilling fluid surface release prevention measures will include the contractor and/or NW Natural environmental representatives closely monitoring drilling fluid returns to the entry/exit points; a reduction or loss of returns indicates a drilling fluid surface release may have occurred. Furthermore, the contractor or NW Natural will provide an employee designated as a "look out" to observe the ground surface within approximately 150 feet of the entry/exit point and at the creek crossings for signs of drilling fluid surface releases any time drilling fluid is being circulated.
- In the event of a drilling fluid surface release in an upland area, the contractor will immediately disengage drilling fluid pumps and drilling will be temporarily halted. These actions should result in relatively low amounts of drilling fluid being released to the ground surface. The contractor will then immediately contain the fluid, typically using silt fencing, hay bales or straw wattles. The fluid will be cleaned from the ground surface using hand tools and a vacuum truck, and then transported to the entry point for cleaning and reuse or hauled off site for disposal.

- If an inadvertent drilling fluid return occurs within a waterbody, the suspended drilling fluid migration will be mitigated by installation of silt curtains within the waterbody. The contractor will then install a sandbag and flume structure to isolate the affected area so drilling fluid can be cleaned from the creek bottom. This will also involve a biologist to remove fish (if present) from the water body and pumping of the water within the containment area into a vacuum truck for disposal at an approved disposal facility. Drilling fluid on the creek bottom will be removed using hand tools and a vacuum truck.
- The drilling fluid release area will be continuously monitored and any additional drilling fluid that surfaces will be immediately removed from the surface as drilling progresses. However, it is common for a drilling fluid release conduit to be plugged with soil cuttings such that no additional drilling fluid surfaces at that location.
- The contractor will have the following supplies/BMPs and equipment ready to deploy at all times when drilling fluid is being circulated:
 - Portable pumps.
 - Hand tools (shovels, Pulaski axes, rubber long-handle squeegee).
 - Silt fence.
 - Hay bales.
 - Sand bags.
 - Silt curtains.
 - Straw wattles.
 - Vacuum trucks; and
 - Other heavy equipment such as backhoes.

- Upon completion of each HDD installation, the drilling fluid will be hauled offsite for disposal. NW Natural expects that the above noted drilling fluid surface release prevention measures, and the immediate containment and removal of any drilling fluid surface release that may occur, will result in a relatively low risk of the drilling fluid adversely affecting soils.

7.1.2.3 NMCS

Mitigation measures during construction of the NMCS will include:

- Installing orange construction fencing on upslope sides of the construction area to clearly delineate the construction limits.
- Installing orange silt fence on the downhill sides of the construction area to limit off-site transport of sediment and to clearly delineate the construction limits.

- Temporary stockpiling of soil within the limits of the NMCS. Soils that are not utilized as landscape fill will be hauled off site to an approved disposal location.
- Any landscape fill placed adjacent to the NMCS will be placed on existing slopes of 40 percent or less. Prior to placing landscape fill, existing vegetation and topsoil will be removed from the existing slopes and stockpiled on site so they can be placed over the landscape fill to promote vegetation growth. Landslide fill placed on existing slopes ranging between 20 and 40 percent will be placed on a keyed and benched prepared surface and compacted to an unyielding state. Final fill slope gradients will be 3H:1V (33 percent) or less. All fill slopes will be seeded and mulched with trees planted to reclaim the area.
- Covering stockpiled soils with plastic sheeting or surrounding them with wattles or silt fence if the soil is stockpiled for more than 7 days without being reworked or if a significant rainfall event occurs.
- Seeding and mulching of any disturbed area that will not receive gravel surfacing.
- Gravel surfacing within the relatively flat to gently sloping gravel pad.
- Concrete washouts and hauling of unused concrete off-site to an approved disposal facility. No concrete will be disposed of onsite.

7.1.2.4 *Miller Station*

- Installing orange construction fencing on upslope sides of the construction area to clearly delineate the construction limits.
- Installing orange silt fence on the downhill sides of the construction area to limit off-site transport of sediment and to clearly delineate the construction limits.
- Temporary stockpiling of soil within the limits of the Miller Station.
- Covering stockpiled soils with plastic sheeting or surrounding them with wattles or silt fence if the soil is stockpiled for more than 7 days without being reworked or if a significant rainfall event occurs.
- Seeding and mulching of any disturbed area that will not receive gravel surfacing.

- Restoration of gravel surfacing within the relatively flat to gently sloping gravel pad.
- Concrete washouts and hauling of unused concrete off-site to an approved disposal facility. No concrete will be disposed of onsite.

7.1.2.5 *Temporary Storage Areas*

The temporary Highway 47 storage area 1, Highway 47 storage area 2 and Bark and Haul storage area will be located within existing gravel surfaced areas. Mitigation measures within the Highway 47 storage area 1, Highway 47 storage area 2 and Bark and Haul temporary storage area will include:

- Maintaining vegetative borders between the project area surrounding the sites.
- Installing orange construction fencing on upslope sides of the storage area to clearly delineate the storage area limits.
- Installing orange silt fence on the downhill sides of the storage areas to limit off-site transport of sediment and to clearly delineate the storage area limits.
- Restoration of disturbed gravel surfaces that expose the underlying soils upon conclusion of construction.

The temporary Highway 202 storage area will be located in a field that is currently vegetated with agricultural grass. Mitigation within the temporary Highway 202 storage area will include:

- Maintaining vegetative borders between the storage area and mapped wetlands. Where the limits of the storage area are located within 50 feet of a mapped wetland, silt fence will be placed between the wetland and the storage area as a secondary BMP control measure.
- Installing orange construction fencing on upslope sides of the storage area to clearly delineate the storage area limits.
- Installing orange silt fence on the downhill sides of the storage area to limit off-site transport of sediment and to clearly delineate the storage area limits.
- Stripping topsoil to a minimum depth of 12 inches, and stockpiling topsoil for replacement after use of the storage area to promote vegetation growth.
- Covering of stockpiled stripped topsoil with plastic sheeting. Stripped soils will be stockpiled within the limits of the storage area and away from mapped wetlands.
- Temporary stockpiling of stripped soils within the limits of the storage area. Soils that are not utilized as landscape fill will be hauled off site to an approved disposal location.
- Placement of a geofabric on the exposed soil that will then be covered with gravel surfacing to stabilize the surface of the storage area and protect soils.
- Removal of gravel surfacing and underlying geofabric.

- Replacement of stripped topsoil.
- Seeding and mulching of the replaced topsoil in accordance with landowner requirements.

7.1.3 Chemical Spills During Construction

NW Natural will require the selected contractors to develop a spill prevention and management plan prior to construction. NW Natural expects that the spill prevention and management plan will incorporate BMPs such as drip pans, secondary containment for all stationary equipment (such as fire pumping stations, ancillary equipment). NW Natural will require spill kits to be readily accessible at all active construction areas and will limit fueling of equipment onsite. Drip pans will be used to catch relatively small quantities of fluids during equipment maintenance. Secondary containment may range from heavy plastic circular swimming pools for equipment such as centrifugal pumps or trash pumps, to thick plastic sheeting that is incorporated with a sandbag berm that will enclose areas beneath unused equipment. If needed, only commonly used lubricants for construction operations will be stored on site during construction (i.e., hydraulic oil, grease), and these materials will be stored in designated enclosed areas within the temporary storage areas to provide secondary containment. No fuel or other hazardous liquids will be stored on site. Spill kits will be staged within the active construction area so in the event that a spill does occur, clean up can begin immediately to mitigate the risk of adverse impacts to the soils. Spill kits will typically include absorbent pads and granules, shovels, plastic for emergency containment, universal containment socks, nitrile gloves and disposal bags. In the event that spill kits are used, the waste products will be handled in accordance with the materials analysis report. In some instances, equipment such as excavators may need to be fueled onsite. Construction vehicles such as tool vans, equipment service vehicles and personal vehicles will be fueled off site. All equipment will be fueled a minimum of 100 feet away from water bodies or delineated wetlands. Spill kits will be staged on fueling equipment in the unlikely event that a fuel spill occurs during equipment fueling. These measures should adequately mitigate the risk of adverse impacts to soil or the risk of public health and safety resulting from potential spills during construction.

7.2 Operations and Maintenance

Operation and maintenance of the proposed well pads, pipelines, compressor stations and powerline will not have a significant impact on the soils because soil disturbance is not anticipated. Consequently, no measures to mitigate adverse impacts to the soil are necessary.

7.3 Retirement

The erosion hazard will be minimal during decommissioning of the pipelines, well pads, compressor stations, Miller Station Storage Area and powerline; adequate erosion control measures will be implemented where necessary. Similar erosion control BMPs presented in Section 7.1 should be implemented to prevent erosion during retirement of the Project facilities.

8.0 Proposed Monitoring Program – OAR 345-021-0010(1)(i)(E)

(E) The applicant's proposed monitoring program, if any, for adverse impact to soils during construction and operation.

NW Natural will monitor the cross-country segments of both the Newton to Stegosaur and Stegosaur to NMCS I/W pipelines and the powerline alignment a minimum of once per quarter. This will occur during the required leakage surveys. If the monitoring observes problem areas, they will be reported to NW Natural's natural forces staff, and appropriate mitigation and remediation measures will be implemented specific to the problem at that time.

No specific monitoring for erosion is anticipated for segments of the pipeline that are located within gravel roadways, the well pads, the Miller Station Storage Area, or for the NMCS and Miller Station because the risk of erosion is low. However, NW Natural staff drive the portion of the powerline installed within Mainline Road on a daily basis and occupy Miller Station and NMCS on a daily basis. Miller Station Storage Area will be observed on a daily to weekly basis since it will be located adjacent to Miller Station. In addition, NW Natural staff will visit the well pad sites on a weekly basis in accordance with their well monitoring program. These visits will necessitate that NW Natural staff travel on the gravel roadways where the proposed pipelines will be installed. So significant erosion issues at the well pads, NMCS, Miller Station, Miller Station Storage Area, or pipelines and powerline installed within gravel roadways can be quickly identified, and if necessary, mitigated.

9.0 Limitations

This exhibit has been prepared for use by NW Natural and other members of the design team involved with the Project. The exhibit is not intended for use by others, and the information contained herein is not applicable to other sites. The data and exhibit should be provided to prospective contractors, but this exhibit, conclusions and interpretations should not be construed as a warranty of the subsurface conditions. The conclusions and recommendations in this exhibit should be applied in their entirety.

Variations in subsurface conditions from those found during this research are possible. Subsurface conditions may also vary with time. A contingency for unanticipated conditions should be included in the Project budget and schedule for such an occurrence. GeoEngineers recommends that sufficient monitoring, testing and consultation be provided by GeoEngineers during construction to confirm that the conditions encountered are consistent with those indicated by this research, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork and pipeline installation activities comply with contract plans and specifications.

The scope of GeoEngineers' services does not include services related to construction safety precautions. These recommendations are not intended to direct the contractor's methods, techniques, sequences or procedures, except as specifically described in this report for consideration in design.

Within the limitations of scope, schedule and budget, GeoEngineers' services have been executed in accordance with generally accepted practices in this area at the time the report was prepared. No warranty or other conditions, express or implied, should be understood.

10.0 References

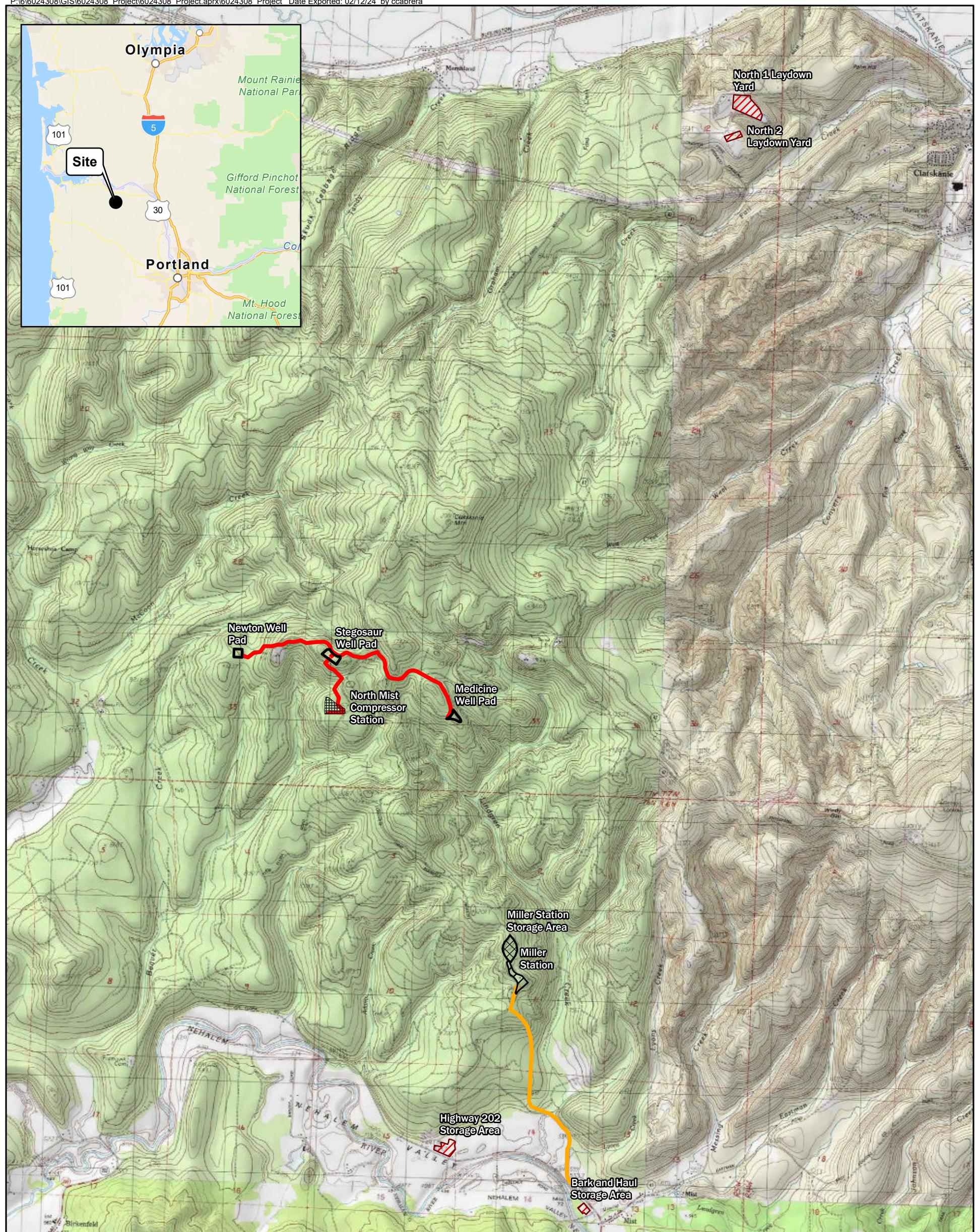
NRCS (Natural Resources Conservation Service). 2023. U.S. Department of Agriculture Web Soil Survey, <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>.

OWRD (Oregon Water Resources Department). 2023. Water Resources Department Well Log Query at http://apps2.wrd.state.or.us/apps/gw/well_log/Default.aspx.

Smythe, R.T.. 1986. Soil survey of Columbia County, Oregon: U.S.D.A., Soil Conservation Service, 1986, p. 198 p + maps.

Figures

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Legend

- Proposed Injection/Withdrawal Pipelines
- Proposed Underground Powerline
- Proposed Well Pad
- Temporary Storage Areas
- Miller Station Storage Yard
- North Mist Compressor Station
- Miller Station Storage Area



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Feet

Vicinity Map

Mist Resiliency Project
Columbia County, Oregon

GEOENGINEERS

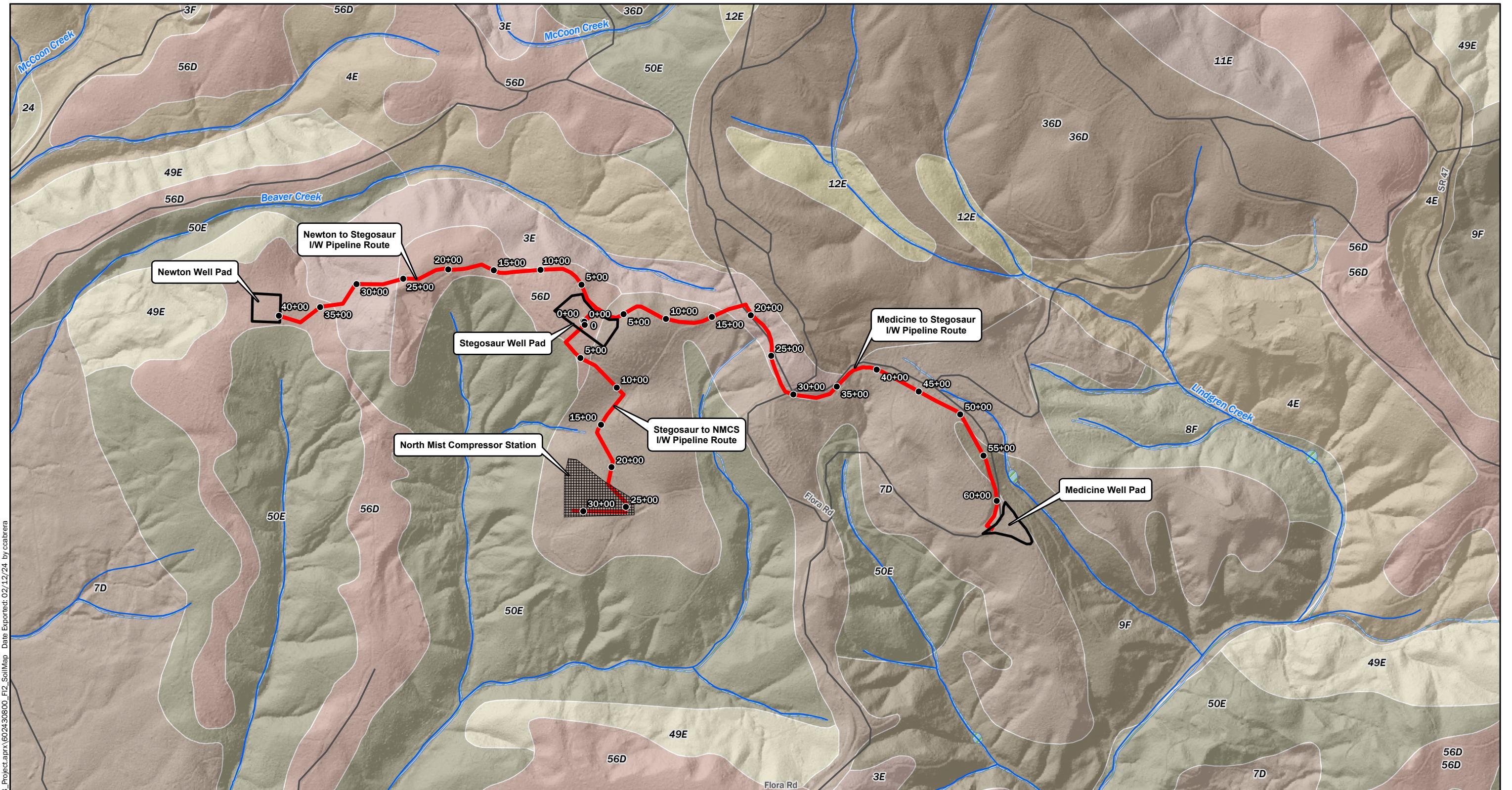
Figure I-1

Source(s):

• USGS Topo

Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet

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Source(s):

- Lidar and Geology from DOGAMI's Oregon Geologic Data Compilation, (OGDC-6).
- Water features from USGS, National Hydrography Dataset.
- NWI Wetland from US Fish and Wildlife.
- 2014 ESRI Street Map

Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet

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Legend

- Stationing
- Proposed Injection/Withdrawal Pipeline
- Well Pad
- North Mist Compressor Station
- NWI Mapped Wetlands
- ~ Streams

Soils Map Unit Symbol and Name

- 11E,Caterl gravelly silt loam, 30 to 60 percent north slopes
- 12E,Caterl gravelly silt loam, 30 to 60 percent south slopes
- 24,Hapludalfs-Udifluvents complex
- 36D,Murnen silt loam, 3 to 30 percent slopes
- 3E,Alstony gravelly loam, 30 to 60 percent north slopes
- 3F,Alstony gravelly loam, 60 to 90 percent north slopes
- 49E,Scaponia-Braun silt loams, 30 to 60 percent north slopes
- 4E,Alstony gravelly loam, 30 to 60 percent south slopes
- 50E,Scaponia-Braun silt loams, 30 to 60 percent south slopes
- 56D,Tolke silt loam, 5 to 30 percent slopes
- 7D,Braun-Scaponia silt loams, 5 to 30 percent slopes



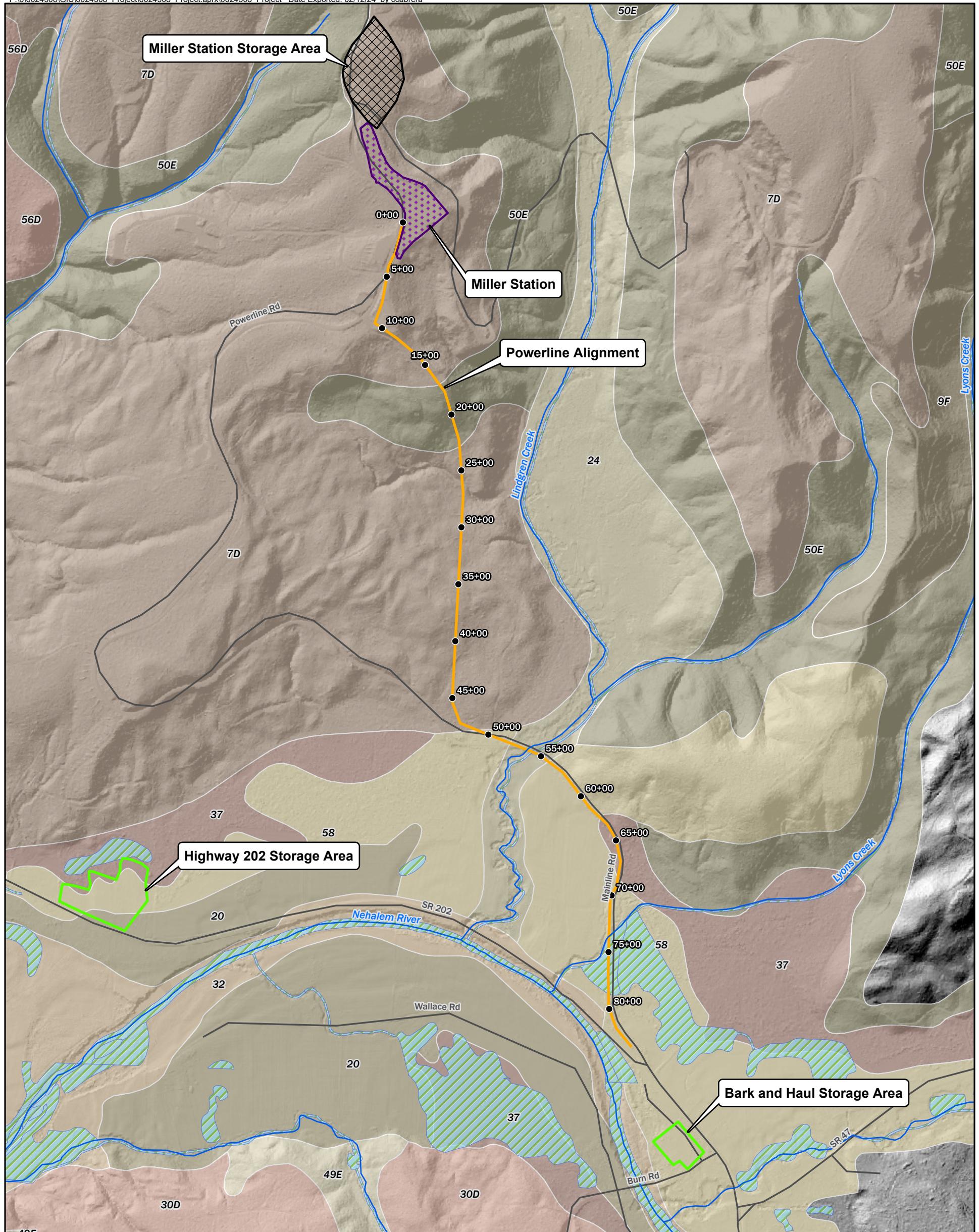
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Feet

Soil Map

Mist Resiliency Project
Columbia County, Oregon

GEOENGINEERS

Figure I-2



Legend

- Stationing
- Power Line Alignment
- Temporary Storage Areas
- Approximate Limits of Existing Miller Station
- Miller Station Storage Area
- NWI Mapped Wetlands
- Streams

Soils Map Unit Symbol and Name

- 20, Eiertsen silt loam
- 24, Hapludalfs-Udifluvents complex
- 30D, Mayer silt loam, 3 to 30 percent slopes
- 32, McNulty silt loam
- 49E, Scaponia-Braun silt loams, 30 to 60 percent north slopes
- 50E, Scaponia-Braun silt loams, 30 to 60 percent south slopes
- 56D, Tolke silt loam, 5 to 30 percent slopes
- 7D, Braun-Scaponia silt loams, 5 to 30 percent slopes

Soils Map Unit Symbol and Name

- 9F, Braun-Scaponia silt loams, 60 to 90 percent south slopes
- 37, Natal silty clay loam
- 58, Treharne silt loam

N
0 850
Feet

Source(s):

- Lidar and Geology from DOGAMI's Oregon Geologic Data Compilation, (OGDC-6).
- Water features from USGS, National Hydrography Dataset.
- NWI Wetland from US Fish and Wildlife.
- 2014 ESRI Street Map

Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet

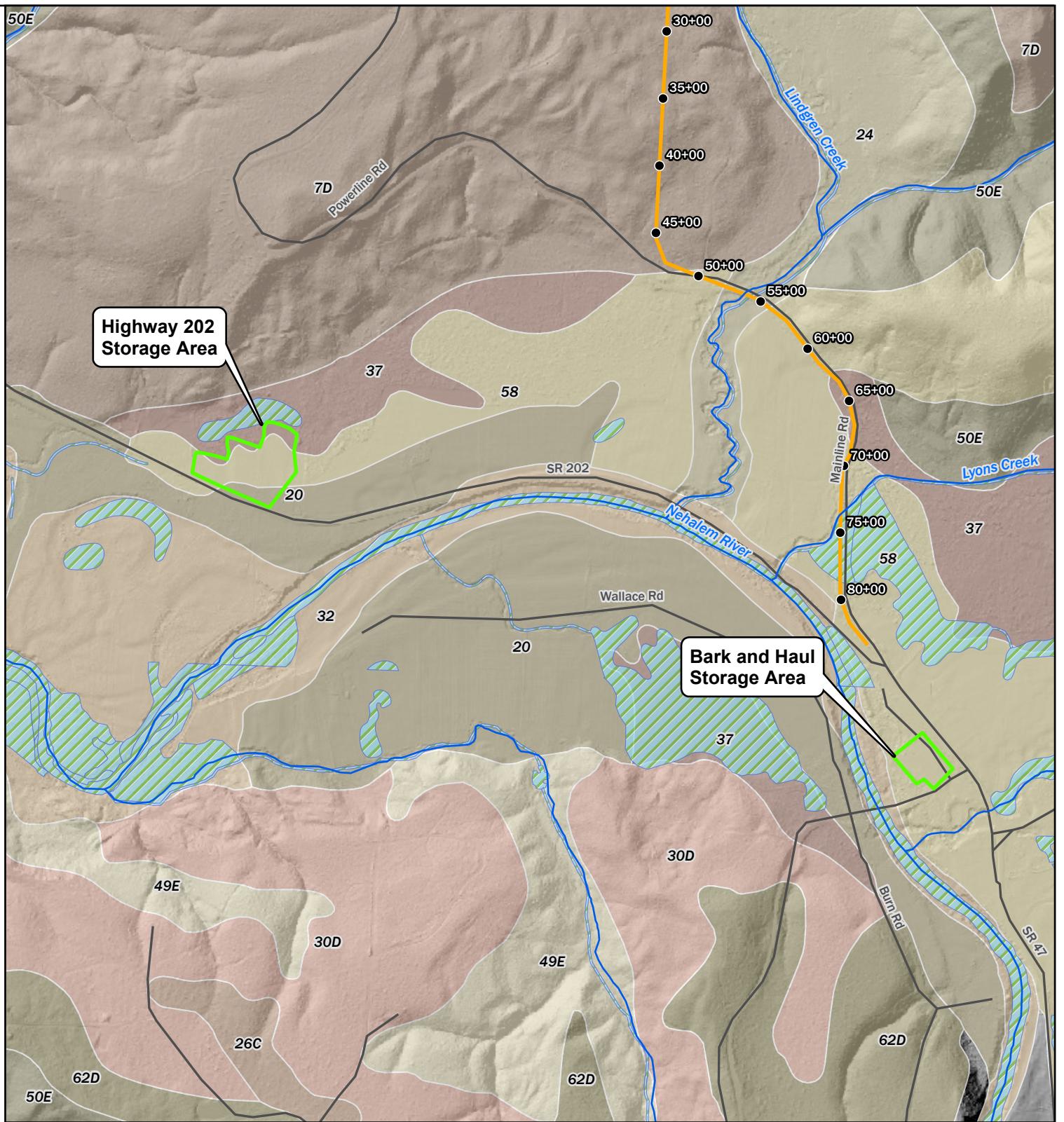
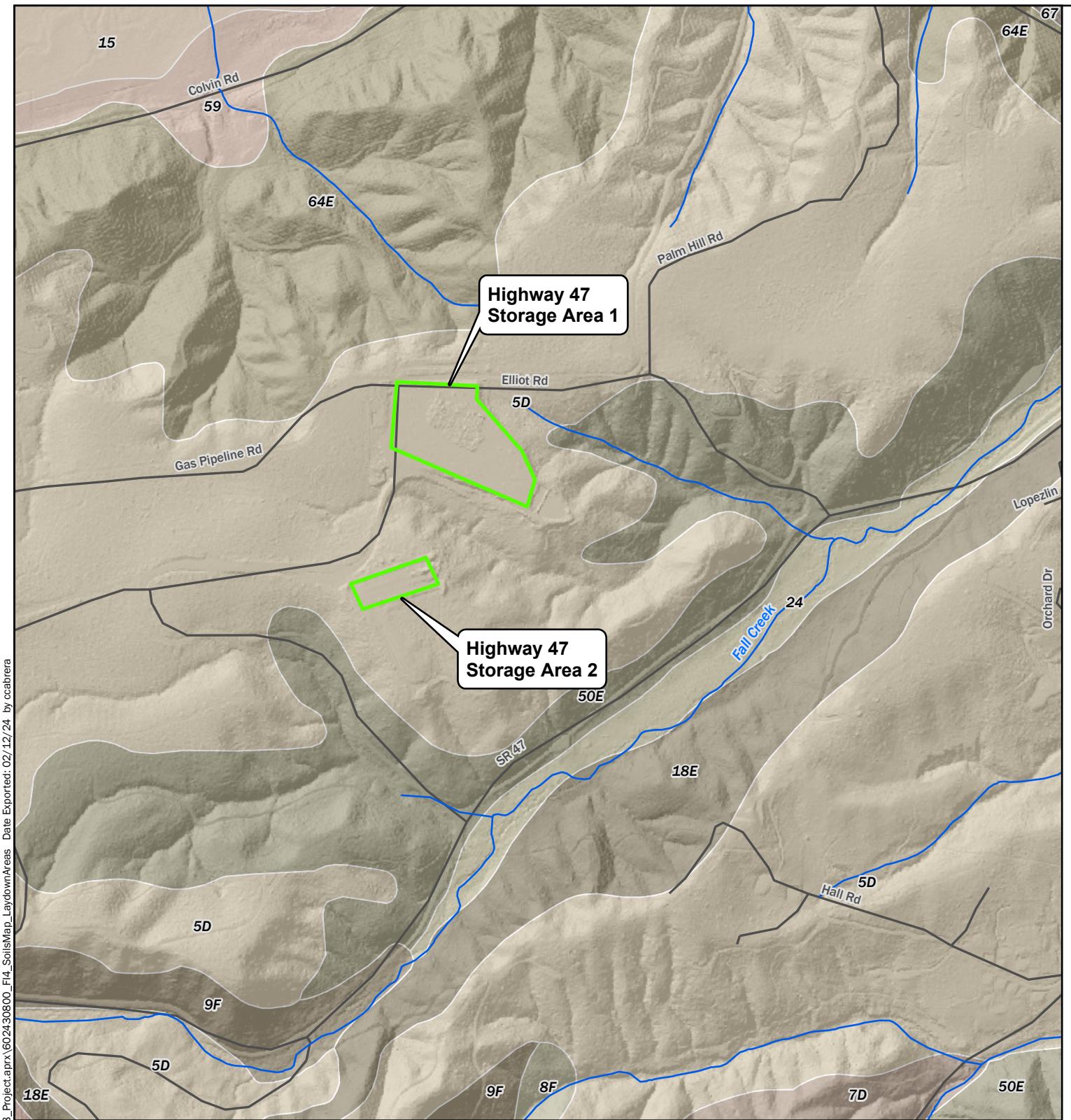
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Soils Map - Miller Station

Mist Resiliency Project
Columbia County, Oregon

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Figure I-3



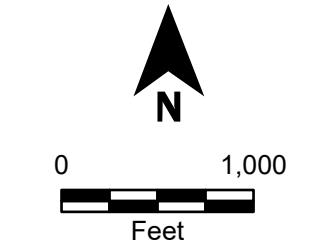
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- Lidar and Geology from DOGAMI's Oregon Geologic Data Compilation, (OGDC-6).
- Water features from USGS, National Hydrography Dataset.
- 2014 ESRI Street Map and ArcGIS Online.

Coordinate System: NAD 1983 StatePlane Oregon North FIPS 3601 Feet

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Legend	
● Stationing	Soils Map Unit Symbol and Name
Streams	18E,Dowde silt loam, 30 to 60 percent north slopes
Powerline Alignment	24,Hapludalfs-Udifluvents complex
Temporary Storage Areas	50E,Scaponia-Braun silt loams, 30 to 60 percent south slopes
NWI Mapped Wetlands	56D,Tolke silt loam, 5 to 30 percent slopes
	59,Udifluvents-Dystrochrepts complex
	5D,Anunde silt loam, 3 to 30 percent slopes
	7D,Braun-Scaponia silt loams, 5 to 30 percent slopes
	8F,Braun-Scaponia silt loams, 60 to 90 percent north slopes
	9F,Braun-Scaponia silt loams, 60 to 90 percent south slopes
	15,Cirms silt loam, protected
	64E,Waald very gravelly loam, 30 to 70 percent slopes
	67,Wauna-Locoda silt loams



Soils Map - Temporary Storage Areas

Mist Resiliency Project
Columbia County, Oregon

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Figure I-4

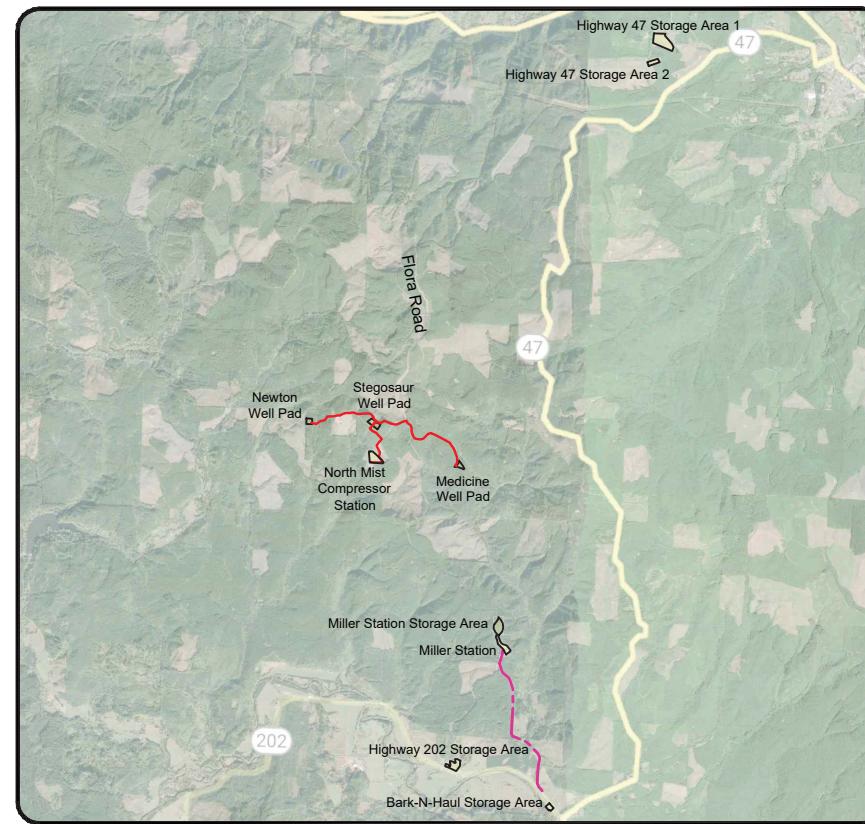
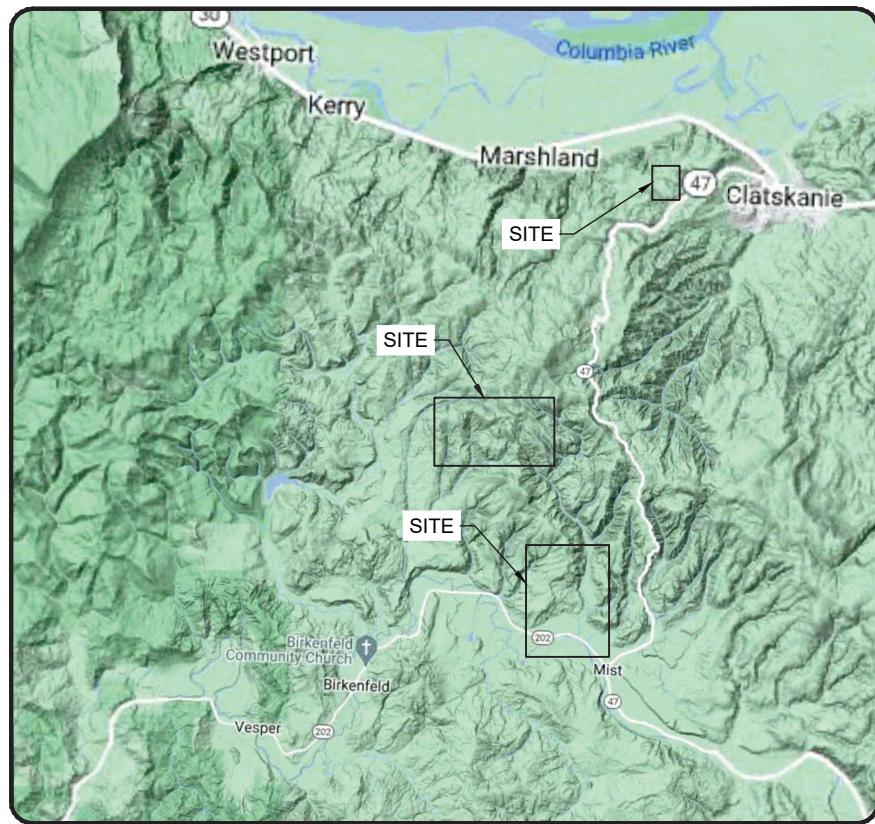
**Attachment I-1.
Preliminary Erosion and
Sediment Control Plan**

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EROSION AND SEDIMENT CONTROL PLAN

MIST RESILIENCY PROJECT

COLUMBIA COUNTY, OREGON



<u>SHEET INDEX</u>	
SHEET 1	COVER SHEET
SHEET 2A	MAP INDEX A
SHEET 2B	MAP INDEX B
SHEET 2C	MAP INDEX C
SHEET 3A-3B	PROJECT INFORMATION/ NARRATIVE DESCRIPTION
SHEET 4	TABLES AND SCHEDULES
SHEET 5	ESCP NOTES
SHEET 6 - 24	EXISTING CONDITIONS PLAN
SHEET 25 - 43	UTILITY INSTALLATION/EROSION CONTROL BMPs PLAN
SHEET 44 - 62	SITE RESTORATION PLAN
SHEET 63 - 67	BMP DETAILS



NW Natural

Prepared For:

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Phone: 503-226-4211
Fax: 503-273-4822

Prepared By:

GeoEngineers, Inc.
4000 Kruse Way, Building 3, Suite 200
Lake Oswego, OR 97035
Brian C. Ranney, CEG CESCL ID# 49949



VICINITY PLAN
3 0 3
SCALE IN MILES

10000 0 10000
SCALE IN FEET

Legend
 Pipeline Alignment
 Powerline Alignment
 Well Pad / Compressor Station / Storage Areas

Revision	Description	Date	By	Chk	Rev

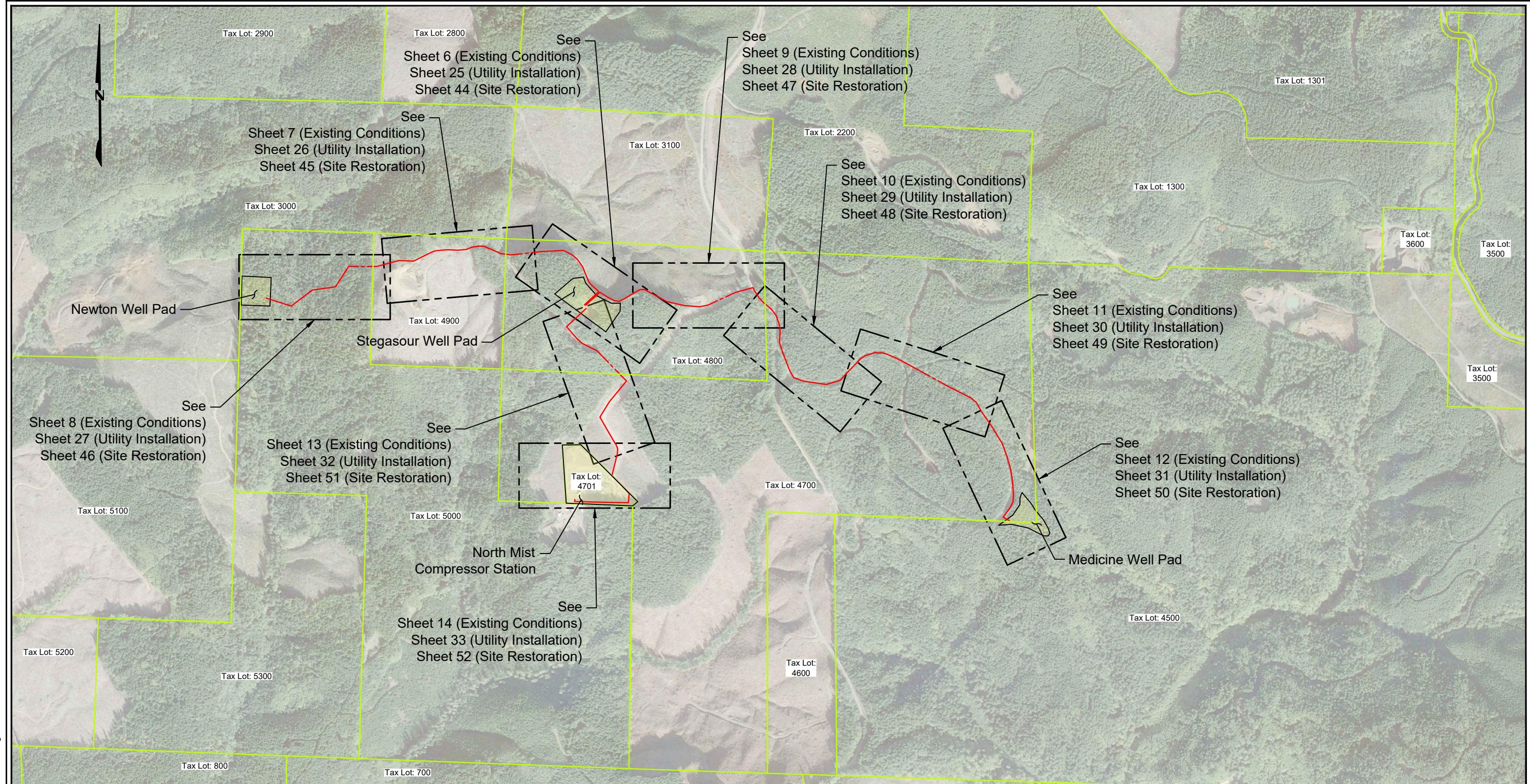
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DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>
CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>

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SUITE 200
LAKE OSWEGO, OREGON 97035
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NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON

EROSION AND SEDIMENT CONTROL PLAN
COVER SHEET

SHEET 1
Sheet 1 of 70



SOURCE: GOOGLE EARTH PRO 2023

Plan

1000 0 1000
SCALE IN FEET

Legend

- Pipeline Alignment
- Well Pad / Compressor Station
- Property Line

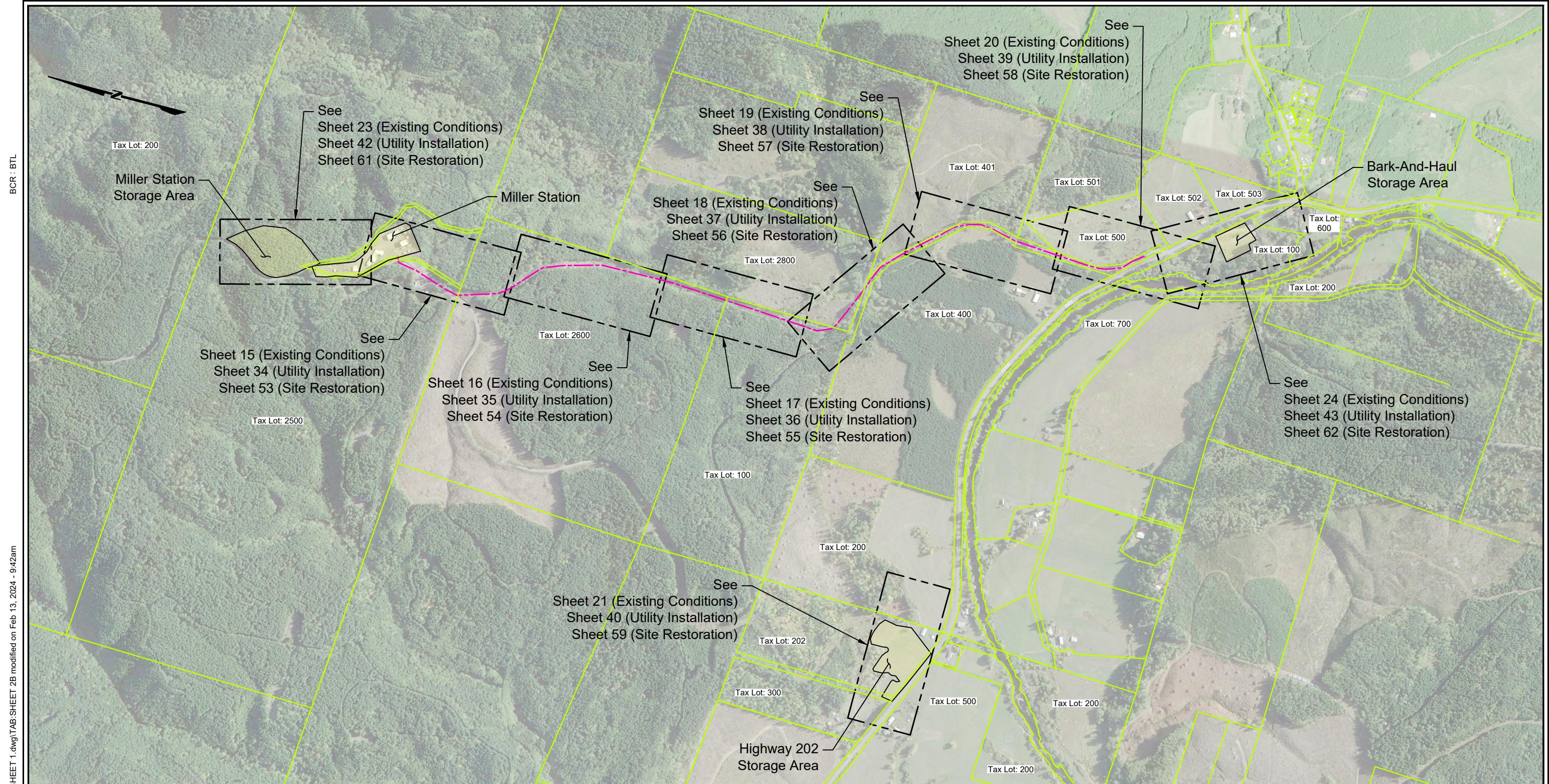
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DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>
CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>

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NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON
EROSION AND SEDIMENT CONTROL PLAN
MAP INDEX A

Drawing No.
SHEET 2A
Sheet
2 of 70



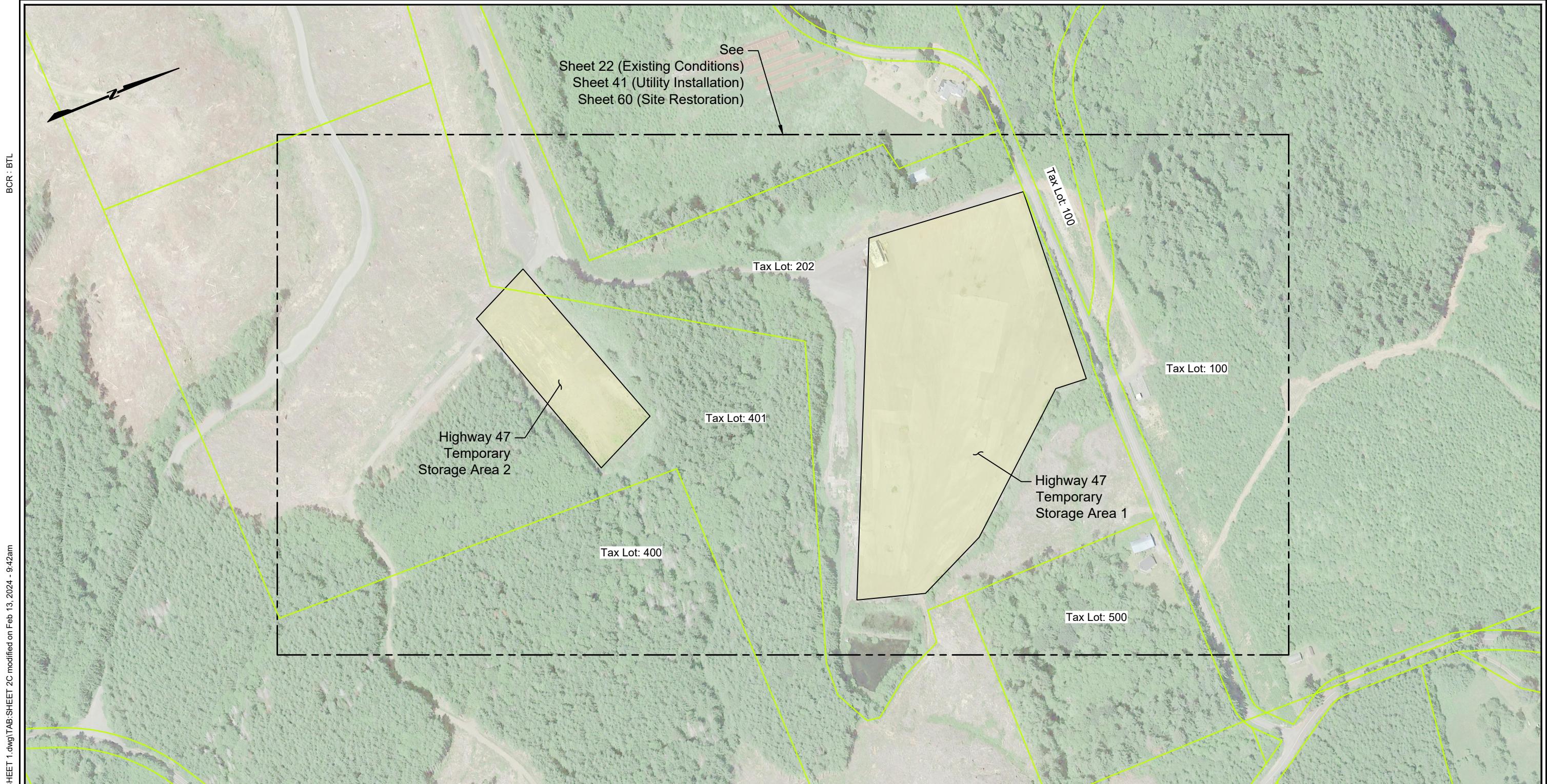
SOURCE: GOOGLE EARTH PRO 2023

The logo for GEOENGINEERS features the word "GEOENGINEERS" in a bold, blue, sans-serif font. A stylized green and blue swoosh graphic is positioned to the right of the text.

NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON

EROSION AND SEDIMENT CONTROL PLAN MAP INDEX B

Sheet 3 of 70



SOURCE: GOOGLE EARTH PRO 2023

Plan

Legend

Rev	DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>
	DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>
	CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>

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NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON

Drawing No.

DEVELOPER / PERMITTEE		LIST OF RESPONSIBLE PARTIES		NARRATIVE DESCRIPTIONS						
<p>NW NATURAL CONTACT: ANDY BAUER, RG 250 SW TAYLOR STREET PORTLAND, OREGON 97204 PHONE: 503-226-4211 FAX: 503-273-4822</p> <p>ESCP PLAN DEVELOPER</p> <p>GEOENGINEERS, INC. CONTACT: BRIAN C. RANNEY, RG; CEG 4000 KRUSE WAY PLACE, BUILDING 3, SUITE 200 PORTLAND, OREGON 97035 PHONE: 503-624-9274 FAX: 503-620-5940 CESCL ID 49949 (EXP 01/06/2024)</p> <p>Pipeline Engineer</p> <p>TO BE DETERMINED</p> <p>Surveyor</p> <p>WESTLAKE CONSULTANTS INC. CONTACT: MICHAEL DOWNHOUR, RPLS, PLS 15115 SW SEQUOIA PARKWAY, SUITE 150 TIGARD, OREGON 97224 PHONE: 503-684-0652 FAX: 503-624-0157</p> <p>Permittee's Primary Site Inspector</p> <p>ANDY BAUER, RG ENVIRONMENTAL COMPLIANCE MANAGER COMPANY / AGENCY: NW NATURAL PHONE: 503-610-7289 FAX: 503-915-5199 Andrew.Bauer@nwnatural.com Andrew is a CESCL certified and has 18 years experience in geotechnical consulting and environmental compliance.</p> <p>Pipeline Contractor</p> <p>TO BE DETERMINED</p>		<p>ESCP DESIGN: GEOENGINEERS, INC.; BRIAN C. RANNEY, ASSOCIATE ENGINEERING GEOLOGIST; BMP INSTALLATION: FOX EROSION CONTROL LANDSCAPING, INC. BMP MAINTENANCE: CONTRACTOR (TBD)</p> <p>RAIN GAUGE</p> <p>MILLER STATION hyperlink: https://www.weather.gov/wrh/timeseries?site=MLL03</p>		<p>GENERAL</p> <p>The project consists of constructing an addition to the existing North Mist Compressor Station site, replacing compressors at the existing Miller Station site, developing two new injection/withdrawal well pads, expanding an existing well pad, installing three new pipelines and installing a new powerline. Currently there are four proposed temporary storage areas that will be used to house materials to support the proposed construction.</p> <p>North Mist Compressor Station (NMCS)</p> <p>Construction will include grading within the northern third of the existing NMCS to place compressors, dehydrators and associated pipeline. Grading will generally include excavating between about 10 and 15 feet of soil from the northern third of the site to match the grade of the southern two-thirds of the site.</p> <p>Miller Station</p> <p>Construction will include replacing two existing compressors at the existing Miller Station. No grading is anticipated.</p> <p>Well Pads</p> <p>Two new well pads, termed the Newton Well Pad and the Medicine Well Pad, will be constructed and one existing well pad, termed the Stegosaur Well Pad, will be expanded. Construction at the Newton and Medicine well pads will include vegetation removal and grading to level the sites and install injection, withdrawal or monitoring wells. Construction at the existing Stegosaur Well Pad will include vegetation and grading to expand and level the existing well pad and installation of pipeline collection headers. The amount of grading is unknown at this time as grading plans have not been developed.</p> <p>Pipelines</p> <p>Three new pipelines are proposed for construction. These pipelines are termed the Newton to Stegosaur Pipeline (10-inch pipeline), the Medicine to Stegosaur Pipeline (12-inch pipeline) and the Stegosaur to NMCS Pipeline (12-inch pipeline). The approximate pipeline lengths are: Newton to Stegosaur = 4,085 feet; Medicine to Stegosaur = 6,410 feet; and Stegosaur to NMCS = 2,602 feet. The pipelines will be installed in approximately 4-foot-wide by 5-foot-deep trenches using conventional open trench methods.</p> <p>Powerline Installation</p> <p>A new powerline will be installed between Highway 202 and the existing Miller Station. Construction will generally include placing 2 to 4-inch conduits in an open trench excavated to depth of approximately 5 feet. However, the conduits will be installed beneath Lyons Creek and Lindgren Creek using Horizontal Directional Drilling (HDD) trenchless methods.</p> <p>Miller Station Storage Area</p> <p>A new permanent gravel surfaced storage area will be constructed just north of Miller Station. Construction will include vegetation removal and grading to prepare a relatively flat gravel pad that will be used for staging equipment and materials for the Miller Station compressor Station.</p> <p>Temporary Storage Areas</p> <p>Four potential storage areas are currently proposed. We have termed them the Highway 47 storage area 1, Highway 47 storage area 2, Highway 202 storage area and Bark-and-Haul Storage Area. These areas will be used for staging vehicles, equipment and materials during construction. Grading is not expected to occur within the laydown yards above and beyond placing gravel surfacing to stabilize the site during construction.</p> <p>EXISTING SITE CONDITIONS</p> <p>TOPOGRAPHIC AND VEGETATIVE CONDITIONS</p> <p>North Mist Compressor Station (NMCS)</p> <p>The NMCS site is relatively flat, except for an approximately 20-foot-high slope on the northern portion of the NMCS that separates the proposed construction area from the existing NMCS. The northern portion of the site, north of the slope, is relatively flat to very gently sloping with elevations ranging between 1,320 feet above mean sea level (MSL) to 1,324 feet above mean sea level. This area of the site is unvegetated or sparsely vegetated with grasses. Elevations of the slope separating the area from the existing NMCS range between approximately 1,299 feet MSL at the base of the slope to 1,320 feet MSL at the top of the slope. The slope inclined at approximately 25 to 30 percent. The slope is unvegetated or sparsely vegetated with grasses.</p> <p>Miller Station</p> <p>Miller Station is an existing compressor station. Near the proposed compressor replacement area in the southern portion of the Miller Station, the site is relatively flat and at an elevation of approximately 1,053 feet MSL. The site is unvegetated and surfaced with gravel.</p> <p>Well Pads</p> <p>The proposed Newton well pad site is located on relatively flat to gently sloping topographic knob with elevations ranging between 1,196 feet MSL and 1,216 feet MSL. The site has been clear cut in the latter months of 2023.</p> <p>The Medicine well pad is located on the nose of a gently sloping northwest-southeast oriented with elevations ranging between 1,410 feet MSL and 1,430 feet MSL. The proposed Medicine Well Pad had previously been clearcut and is vegetated with small deciduous trees, grasses and low-lying shrub vegetation.</p> <p>The Stegosaur Well Pad is situated on a topographic knob. The existing portion of the well pad is relatively flat and covered with gravel. The proposed expansion areas to the northwest and southeast are gently to moderately sloping with elevations ranging between 1,523 feet MSL and 1,553 feet MSL. The expansion areas had been recently clearcut and are vegetated with small conifer trees, grasses and low-lying shrub vegetation.</p> <p>Miller Station Storage Area</p> <p>The proposed Miller Station Storage Area is situated on gentle slopes on a broad topographic knob just north of Miller Station. Elevations within the annex area range between about 1,100 feet MSL and 1,155 feet MSL. The site is currently vegetated with mature conifer trees.</p> <p>Pipelines</p> <p>The Newton to Stegosaur pipeline alignment traverses clear cut or forested gently to moderately sloping northwest facing slopes for a portion of its alignment, and then follows existing gravel roads that traverse an east-west oriented ridge line and the upper portion of a northeast facing slope to the Stegosaur well pad. Elevations along the alignment range between about 1,215 feet at the Newton Well Pad, to about 1,520 feet where the pipeline enters the Stegosaur Well Pad. Beginning at the Newton Well pad and extending eastward for about 1,500 feet, the alignment is clear cut or vegetated with mature conifer trees and forest understory species. Slope gradients in this section of the alignment range between 5 and 40 percent but may be as steep as about 65 percent in localized areas. The remainder of the route is unvegetated as it follows an existing gravel road where the gravel road is inclined at gradients ranging between about 5 and 10 percent. The gravel road portion of the alignment traverses a headwall that is the headwaters of Beaver Creek roughly halfway between the Newton and Stegosaurus well pads.</p> <p>The Medicine to Stegosaur pipeline alignment generally traverses moderate northeast, north and southwest facing slopes associated with and between northeast-southwest oriented ridgelines. The pipeline alignment follows existing gravel road for its entire length. Elevations range from about 1,421 to 1,537 feet MSL between the Medicine and Stegosaur well pads, respectively. Slopes along the pipeline alignment are inclined at gradients between about 5 and 10 percent. Slopes adjacent to the gravel road (and pipeline alignment) typically range between 10 and 30 percent but may be as steep as 80 percent where the gravel road crosses above headwalls. The pipeline alignment is unvegetated and covered with gravel road surfacing.</p> <p>The Stegosaur to NMCS pipeline alignment traverses moderate to steep southwest and northeast facing slopes associated with a northwest-southeast oriented ridgeline and a topographic knob on which the NMCS is situated. Most of this pipeline alignment traverses slopes that had been previously clear cut; however portions of the alignment follow an existing gravel road and a pipeline ROW. Slope gradients along the alignment are typically inclined at gradients ranging between about 10 to 50 percent but may be as steep as about 70 percent in very localized areas. Vegetation along the route consists of recently planted small conifer trees, grasses and low-lying shrub vegetation.</p>						
Revision	Description	Date	By	Chk	Rev	DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>	 <p>4000 KRUSE WAY, BUILDING 3 SUITE 200 LAKE OSWEGO, OREGON 97035 P: 503-624-9274 F: 503-620-5940</p>	<p>NW NATURAL MIST RESILIENCY PROJECT COLUMBIA COUNTY, OREGON</p> <p>EROSION AND SEDIMENT CONTROL PLAN PROJECT INFORMATION/ NARRATIVE DESCRIPTION</p>	Drawing No.
					DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>	SHEET 3A			
					CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>	Sheet 5 of 70			

Powerline Route

The proposed powerline installation route follows a gravel road (locally called the Mainline Road) from Highway 202 and for a distance of approximately 3,500 feet where it then leaves the Mainline Road and traverses an existing powerline/pipeline easement across a gentle to steep southeast facing slope for a distance of about 4,290 feet where it again follows Mainline Road for a distance of about 950 feet to Miller Station.

Elevations between Highway 202 and where the route leaves Mainline Road range between 534 feet MSL to 542 feet MSL. The ground surface along the road has been raised on a fill prism, is unvegetated and covered with gravel. Adjacent to the road, the ground surface is vegetated with conifer trees, forest understory species, shrubs, and wetland species associated with mapped wetlands adjacent to the road surface. The route crosses Lyons Creek about 1,300 feet north of Highway 202. Lyons Creek is incised approximately 5 feet relative to the adjacent ground with moderate to steep side slopes that are vegetated with deciduous trees and other riparian vegetation. The route also crosses Lindgren Creek about 3,231 feet north of Highway 202. Lindgren Creek is incised approximately 8 feet relative to the adjacent ground, also with moderate to steep side slopes that are vegetated with deciduous trees and other riparian vegetation.

From where the powerline route leaves Mainline Road and until it again meets with Mainline Road, the route traverses gentle to steeply sloping terrain with elevations ranging between approximately 542 feet MSL to 990 feet MSL. Localized slopes along this segment may be as steep as 80 percent. However, in general slopes along this part of the route generally range between 10 and 40 percent. Vegetation along this segment of the route includes short grasses growing with a maintained powerline/pipeline ROW.

After meeting up with Mainline Road again at an approximate elevation of 990 feet MSL, the route follows the gently sloping surface of Mainline Road to Miller Station at an elevation of 1,036 feet MSL. The road surface is gravel. The adjacent ground had previously been clear cut and is vegetated with small conifer trees, grasses and low-lying shrub vegetation.

Temporary Storage Areas

The Highway 47 storage area 1 and Highway 47 storage area 2 storage areas are relatively flat to gently sloping gravel surfaced yards that are typically used for logging operations. Elevations within the Highway 47 storage area 1 and Highway 47 storage area 2 storage areas range between about 505 and 520 feet MSL, and 543 and 548 feet MSL, respectively. They are generally unvegetated, although some grasses are present in some areas growing in the gravel.

The Highway 202 storage area is an agricultural grass field located in the Nehalem River Valley. The storage area is relatively flat to gently sloping with elevations ranging between approximately 525 and 530 feet MSL. The ground surface is vegetated with agricultural grass.

The Bark-and-Haul storage area is a flat gravel surfaced area that is currently used for staging logging and natural gas production related equipment. Elevations at the site range between 531 and 535 feet MSL.

Natural Buffer Zones

Natural buffer zones between the proposed construction and waterbodies include conifer tree forest, clearcut areas vegetated with grass and shrubs and riparian zones adjacent to creeks. No vegetation disturbance will occur outside of the designated construction corridor. The designated construction corridor is located more than 50 feet away from existing water bodies, except along the proposed powerline alignment. The existing vegetation outside of designated construction corridor (natural buffer zones) will be maintained throughout the construction. Where workspaces are located within 50 feet of a mapped wetland or stream, silt fence will be installed along the as a secondary erosion control measure.

MAXIMUM AREA OF DISTURBANCE

The total site area (approximately 3,561,537 square feet/ 81.8 acres) includes the proposed pipeline and powerline alignment construction corridors, the northern portion of NMCS and southern portion of Miller Station where construction will occur and the entirety of the well pad sites, and Miller Station storage area. These areas are also considered to be the total disturbed area.

RECEIVING WATER BODIES

Below is a list of the receiving water bodies, portions of the project that could affect the receiving water body and their 303 (d) Category 4 and 5 impairment status. The 303 (d) Category 4 and 5 impairment status were evaluated by researching impairment status on the Oregon Department of Environmental Quality's DEQ WQ Standards and Assessment Tool interactive web map application (<https://hdcgcx2.deq.state.or.us/Html5Viewer211/?viewer=wqsa>)

Beaver Creek: Newton Well Pad, Stegosaur Well Pad, Newton to Stegosaur Pipeline, Medicine to Stegosaur Pipeline, Stegosaur to NMCS Pipeline and NMCS; Not listed as an impaired water body

Unnamed Tributaries of Beaver Creek: Newton Well Pad, Stegosaur Well Pad, Newton to Stegosaur Pipeline, Stegosaur to NMCS Pipeline and NMCS. Not listed as an impaired water body.

Lindgren Creek: Medicine Well Pad, Medicine to Stegosaur Pipeline Miller Station, powerline installation. Not listed as an impaired water body.

Lyons Creek: Powerline installation. Not listed as an impaired water body.

Fall Creek: Highway 47 storage area 1 and Highway 47 storage area 2 areas. Not listed as an impaired water body.

Nehalem River: Highway 202 Storage Area. Category 4 impairment parameters include Temperature-year round and Temperature-spawn. Category 5 impairment parameters include dissolved oxygen - spawn and alkalinity - aquatic life toxics.

DEVELOPED CONDITIONS**NMCS**

Grading, foundation and structural plans have not yet been developed for the proposed NMCS. Therefore developed conditions are not known. It is anticipated that the northern portion of the NMCS will be graded to match the existing elevation of the southern portion of the NMCS. Concrete and gravel will then be placed for structures, roadways and permanent work areas. A site-specific erosion control plan will be developed for the NMCS site upon completion of civil engineering plans.

Miller Station

Grading, foundation and structural plans have not yet been developed for the proposed compressor replacement at Miller Station. However, given that construction will only include replacement of existing equipment we anticipate that no grading will occur. However, minor excavation for new equipment foundations and placement of concrete foundations are anticipated.

Well Pads

Grading plans for the Newton, Medicine and Stegosaur well pads have not yet been developed. However, we anticipate grading will include vegetation and topsoil removal and removal of soils to level each site. At this time we anticipate that the excavated soils will be hauled off site for disposal; however they may be used as fill material. Once the well pads are relatively level, gravel will be placed on the ground surface to stabilize site soils and provide a stable working pad for well drilling and maintenance.

Pipelines and powerline

Where the Newton to Stegosaur Pipeline or powerline traverses cross country across forested terrain, the ROW will be cleared of vegetation before construction. Topsoil will be removed and stockpiled for site restoration. Portions of the ROW that traverse cross slope will be benched to provide a relatively level working surface. Where the ROW follows the fall line of the slope, it will not be benched. A trench will then be excavated and the pipeline or powerline conduit installed in the trench. After open trench installation is complete, soils removed from excavations on side-hill areas will be replaced and compacted to return the ground surface to its pre-construction topographic conditions. Water bars will be constructed to maintain long term erosion control, topsoil will be replaced to promote vegetation growth and the ROW will be seeded with native seed mixes and mulch placed over the seed mix. Final conditions will include establishment of grass from native seed mix. Natural recruitment of native shrubs, deciduous trees and conifer trees will occur over time; however, trees will be maintained within the ROW to allow ROW crews to survey the pipeline and perform leakage tests as required by federal mandates.

Where the pipelines and powerline are located within existing gravel roads, the gravel and trench spoils will be removed from the trench area and stockpiled for reuse. The trench will be backfilled with the native soils and then resurfaced with the gravel to restore the road surface to its pre-construction conditions.

Miller Station Storage Area

Grading plans for the Miller Station storage area have not yet been developed. We anticipate that grading will include vegetation and soil removal to level the site. At this time we anticipate that the excavated soils will be hauled off site for disposal. However, they may be used as fill material. Once the storage area is relatively level, gravel will be placed on the ground surface to stabilize site soils and provide a stable working pad for equipment and material storage.

Temporary Storage Areas

The Highway 47 storage area 1 and Highway 47 storage area 2 areas will be used in their current condition. No vegetation removal or grading will be conducted. Upon the conclusion of construction, gravel may be replaced in disturbed areas of the laydown yards, if necessary.

Within the Highway 202 storage area, grass will be mowed to lower vegetation. If needed, a separation fabric and gravel will be placed within the storage area to create a stable working surface. No grading will occur within the storage area. Upon conclusion of construction, gravel will be removed (if used) and any disturbed vegetation will be replaced in accordance with landowner requirements to return the storage area to its pre-construction vegetative condition.

The Bark-and-Haul storage area will be used in its current condition. No vegetation removal or grading will be conducted. Upon conclusion of construction, gravel may be replaced in disturbed areas, if necessary.

Revision	Description	Date	By	Chk	Rev	DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>		NW NATURAL MIST RESILIENCY PROJECT COLUMBIA COUNTY, OREGON	Drawing No. SHEET 3B
						DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>			
						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>			
									EROSION AND SEDIMENT CONTROL PLAN PROJECT INFORMATION/ NARRATIVE DESCRIPTION	Sheet 6 of 70

NATURE OF CONSTRUCTION ACTIVITY AND ESTIMATED TIMING TABLE			
ACTIVITY	ESTIMATED START	ESTIMATED END	NOTES
Mobilize Onsite	2025: TBD	2025: TBD	
Installation of ESC Measures*	2025:TBD	2025:TBD	
Pipeline Construction	2025:TBD	2025:TBD	
Pipeline Construction	2025:TBD	2025:TBD	
Well Pad Construction	2025:TBD	2025:TBD	
NMCS Construction	2025:TBD	2025:TBD	
Miller Station Compressor Replacement	2025:TBD	2025:TBD	
Miller Station Storage Area	2025:TBD	2025:TBD	
Removal of BMPs/Demobilization/Site Restoration	2025:TBD	2025:TBD	

*To be completed before ground disturbance occurs

Planned Construction Day: Monday through Saturday 7am to 5pm

BMP MATRIX FOR CONSTRUCTION PHASES							
Year	2025						
Phase/BMP	Clearing and Grading	Pipeline Construction	Powerline Construction	NMCS Construction	Miller Station Construction	Miller Station Storage Area Construction	Final Stabilization
EROSION PREVENTION							
Ground Cover	X	X	X	X	X	X	X
Plastic Sheeting	X	X	X			X	
Temporary Stabilization (seeding/mulching)	X	X	X	X	X	X	
Permanent Stabilization (Seeding, mulching)		X	X			X	X
Construction Limits Fence	X	X	X	X	X	X	X
Waterbars		X	X				X
SEDIMENT CONTROL							
Silt Fence	X	X	X	X	X	X	
Wattles	X	X	X				
Waterbars		X	X				X
Vegetative Buffer	X	X	X	X	X	X	X
Construction Entrance	X						
Check Dams	X	X	X				
RUN OFF CONTROL							
Plastic Sheeting	X	X	X	X	X	X	
Waterbars		X	X				X
Silt Fence	X		X			X	
POLLUTION PREVENTION							
Hazard Waste Management	X	X	X	X	X	X	X
Concrete Washout				X	X		
Spill Kit Onsite	X	X	X	X	X	X	X

¹ Seed Mix Composition: PT Lawn Seed, PT 855: ODOT Erosion Control Mix or similar.

Perennial Rye Grass (Lolium Perenne) 40%

Chewings Fescue (Festuca rubra var commutata) 25%

Creeping Red Fescue (Festuca rubra) 25%

Colonial Bentgrass (Agrostis capillaris) 5%

Dutch White Clover (Trifolium repens) 5%

All ESCP Controls and Practices Must be Inspected According to the Following Schedule

Site Condition	Minimum Frequency
1. Active Period	Daily when stormwater runoff, including runoff from snow melt is occurring. At least once every two (2) weeks, regardless of whether stormwater runoff is occurring.
2. Prior to the site becoming inactive or in anticipation of site inaccessibility	Once to ensure that erosion and sediment control measures are in working order. Any necessary maintenance and repair must be made prior to leaving the site.
3. Inactive periods greater than fourteen (14) consecutive calendar	Once every month
4. Periods during which the site is inaccessible due to inclement weather	If practical, inspections must occur daily at a relevant and accessible discharge point or downstream location.
5. Periods during which discharge is unlikely due to frozen conditions	Monthly, Resume monitoring immediately upon melt, or when weather conditions make discharges likely.

Estimated Erosion Control BMP Quantities:	
Silt Fence	39,240 Linear Feet
Construction Fence	18,810 Linear Feet

Pollutant Generating Activities	
ACTIVITY	Potential Pollutants
Mobilize Onsite	Fuel from spills or leaks on equipment/vehicles
Installation of ESC Measures*	Fuel from spills or leaks on equipment/vehicles
Pipeline Construction	Fuel or hydraulic fluid from spills or leaks on equipment
Pipeline Construction	Fuel or hydraulic fluid from spills or leaks on equipment
Well Pad Construction	Fuel or hydraulic fluid from spills or leaks on equipment
NMCS Construction	Fuel or hydraulic fluid from spills or leaks on equipment
Miller Station Compressor Replacement	Fuel or hydraulic fluid from spills or leaks on equipment
Miller Station Storage Area	Fuel or hydraulic fluid from spills or leaks on equipment
Temporary Storage Areas	Fuel or hydraulic fluid from spills or leaks on equipment
Removal of BMPs/Demobilization/Site Restoration	Fuel or hydraulic fluid from spills or leaks on equipment

SITE SOIL CLASSIFICATION		
Map Key	Soil Unit Name	Percent Slopes
3E	Alstony gravelly loam	30 to 60
5D	Anunde silt loam	3 to 30
7D	Braun-Scaponia silt loam	5 to 30
9F	Braun-Scaponia silt loam	60 to 90
20	Eilertsen silt loam	
24	Hapludalfs-Udifluvents complex	
36D	Murnen silt loam	3 to 30
37	Natal silty clay loam	
50E	Scaponia-Braun silt loams	30 to 60
56D	Tolke silt loam	5 to 30
58	Treharne silt loam	
64E	Wauld very gravelly loam	30 to 70

Revision	Description						Date	By	Chk	Rev

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GEOENGINEERS
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SUITE 200
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NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON
EROSION AND SEDIMENT CONTROL PLAN
TABLES AND SCHEDULES

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Standard Erosion Control Notes

- Include a list of all personnel (by name and position) that are responsible for the design, installation and maintenance of stormwater control measures (e.g. ESCP developer, BMP installer (see Section 4.10), as well as their individual responsibilities. (Section 4.4.c.ii)
- Visual monitoring inspection reports must be made in accordance with DEQ 1200-C permit requirements. (Section 6.5)
- Inspection logs must be kept in accordance with DEQ's 1200-C permit requirements. (Section 6.5.q)
- Retain a copy of the ESCP and all revisions on site and make it available on request to DEQ, Agent, or the local municipality. (Section 4.7)
- The permit registrant must implement the ESCP. Failure to implement any of the control measures or practices described in the ESCP is a violation of the permit. (Sections 4 and 4.11)
- The ESCP must be accurate and reflect site conditions. (Section 4.8)
- Submission of all ESCP revisions is not required. Submittal of the ESCP revisions is only under specific conditions. Submit all necessary revision to DEQ or Agent within 10 days. (Section 4.9)
- Sequence clearing and grading to the maximum extent practical to prevent exposed inactive areas from becoming a source of erosion. (Section 2.2.2)
- Create smooth surfaces between soil surface and erosion and sediment controls to prevent stormwater from bypassing controls and ponding. (Section 2.2.3)
- Identify, mark, and protect (by construction fencing or other means) critical riparian areas and vegetation including important trees and associated rooting zones, and vegetation areas to be preserved. Identify vegetative buffer zones between the site and sensitive areas (e.g., wetlands), and other areas to be preserved, especially in perimeter areas. (Section 2.2.1)
- Preserve existing vegetation when practical and re-vegetate open areas. Re-vegetate open areas when practicable before and after grading or construction. Identify the type of vegetative seed mix used. (Section 2.2.5)
- Maintain and delineate any existing natural buffer within the 50-feet of waters of the state. (Section 2.2.4)
- Install perimeter sediment control, including storm drain inlet protection as well as all sediment basins, traps, and barriers prior to land disturbance. (Sections 2.1.3)
- Control both peak flow rates and total stormwater volume, to minimize erosion at outlets and downstream channels and streambanks. (Sections 2.1.1. and 2.2.16)
- Control sediment as needed along the site perimeter and at all operational internal storm drain inlets at all times during construction, both internally and at the site boundary. (Sections 2.2.6 and 2.2.13)
- Establish concrete truck and other concrete equipment washout areas before beginning concrete work. (Section 2.2.14)
- Apply temporary and/or permanent soil stabilization measures immediately on all disturbed areas as grading progresses. Temporary or permanent stabilizations measures are not required for areas that are intended to be left unvegetated, such as dirt access roads or utility pole pads. (Sections 2.2.20 and 2.2.21)
- Establish material and waste storage areas, and other non-stormwater controls. (Section 2.3.7)
- Keep waste container lids closed when not in use and close lids at the end of the business day for those containers that are actively used throughout the day. For waste containers that do not have lids, provide either (1) cover (e.g., a tarp, plastic sheeting, temporary roof) to prevent exposure of wastes to precipitation, or (2) a similarly effective means designed to prevent the discharge of pollutants (e.g., secondary containment). (Section 2.3.7)
- Prevent tracking of sediment onto public or private roads using BMPs such as: construction entrance, graveled (or paved) exits and parking areas, gravel all unpaved roads located onsite, or use an exit tire wash. These BMPs must be in place prior to land- disturbing activities. (Section 2.2.7)
- When trucking saturated soils from the site, either use water-tight trucks or drain loads on site. (Section 2.2.7.f)
- Control prohibited discharges from leaving the construction site, i.e., concrete wash-out, wastewater from cleanout of stucco, paint and curing compounds. (Sections 1.5 and 2.3.9)
- Ensure that steep slope areas where construction activities are not occurring are not disturbed. (Section 2.2.10)
- Prevent soil compaction in areas where post-construction infiltration facilities are to be installed. (Section 2.2.12)

- Use BMPs to prevent or minimize stormwater exposure to pollutants from spills; vehicle and equipment fueling, maintenance, and storage; other cleaning and maintenance activities; and waste handling activities. These pollutants include fuel, hydraulic fluid, and other oils from vehicles and machinery, as well as debris, fertilizer, pesticides and herbicides, paints, solvents, curing compounds and adhesives from construction operations. (Sections 2.2.15 and 2.3)
- Provide plans for sedimentation basins that have been designed per Section 2.2.17 and stamped by an Oregon Professional Engineer. (See Section 2.2.17.a)
- If engineered soils are used on site, a sedimentation basin/impoundment must be installed. (See Sections 2.2.17 and 2.2.18)
- Provide a dewatering plan for accumulated water from precipitation and uncontaminated groundwater seepage due to shallow excavation activities. (See Section 2.4)
- Implement the following BMPs when applicable: written spill prevention and response procedures, employee training on spill prevention and proper disposal procedures, spill kits in all vehicles, regular maintenance schedule for vehicles and machinery, material delivery and storage controls, training and signage, and covered storage areas for waste and supplies. (Section 2.3)
- Use water, soil-binding agent or other dust control technique as needed to avoid wind-blown soil. (Section 2.2.9)
- The application rate of fertilizers used to reestablish vegetation must follow manufacturer's recommendations to minimize nutrient releases to surface waters. Exercise caution when using time-release fertilizers within any waterway riparian zone. (Section 2.3.5)
- If an active treatment system (for example, electro-coagulation, flocculation, filtration, etc.) for sediment or other pollutant removal is employed, submit an operation and maintenance plan (including system schematic, location of system, location of inlet, location of discharge, discharge dispersion device design, and a sampling plan and frequency) before operating the treatment system. Obtain Environmental Management Plan approval from DEQ before operating the treatment system. Operate and maintain the treatment system according to manufacturer's specifications. (Section 1.2.9)
- Temporarily stabilize soils at the end of the shift before holidays and weekends, if needed. The registrant is responsible for ensuring that soils are stable during rain events at all times of the year. (Section 2.2)
- As needed based on weather conditions, at the end of each workday soil stockpiles must be stabilized or covered, or other BMPs must be implemented to prevent discharges to surface waters or conveyance systems leading to surface waters. (Section 2.2.8)
- Sediment fence: remove trapped sediment before it reaches one third of the above ground fence height and before fence removal. (Section 2.1.5.b)
- Other sediment barriers (such as biobags): remove sediment before it reaches two inches depth above ground height and before BMP removal. (Section 2.1.5.c)
- Catch basins: clean before retention capacity has been reduced by fifty percent. Sediment basins and sediment traps: remove trapped sediments before design capacity has been reduced by fifty percent and at completion of project. (Section 2.1.5.d)
- Within 24 hours, significant sediment that has left the construction site, must be remediated. Investigate the cause of the sediment release and implement steps to prevent a recurrence of the discharge within the same 24 hours. Any in-stream clean-up of sediment shall be performed according to the Oregon Department of State Lands required timeframe. (Section 2.2.19.a)
- The intentional washing of sediment into storm sewers or drainage ways must not occur. Vacuuming or dry sweeping and material pickup must be used to cleanup released sediments. (Section 2.2.19)
- Document any portion(s) of the site where land disturbing activities have permanently ceased or will be temporarily inactive for 14 or more calendar days. (Section 6.5.f.)
- Provide temporary stabilization for that portion of the site where construction activities cease for 14 days or more with a covering of blown straw and a tackifier, loose straw, or an adequate covering of compost mulch until work resumes on that portion of the site. (Section 2.2.20)
- Do not remove temporary sediment control practices until permanent vegetation or other cover of exposed areas is established. Once construction is complete and the site is stabilized, all temporary erosion controls and retained soils must be removed and disposed of properly, unless needed for long term use following termination of permit coverage. (Section 2.2.21)

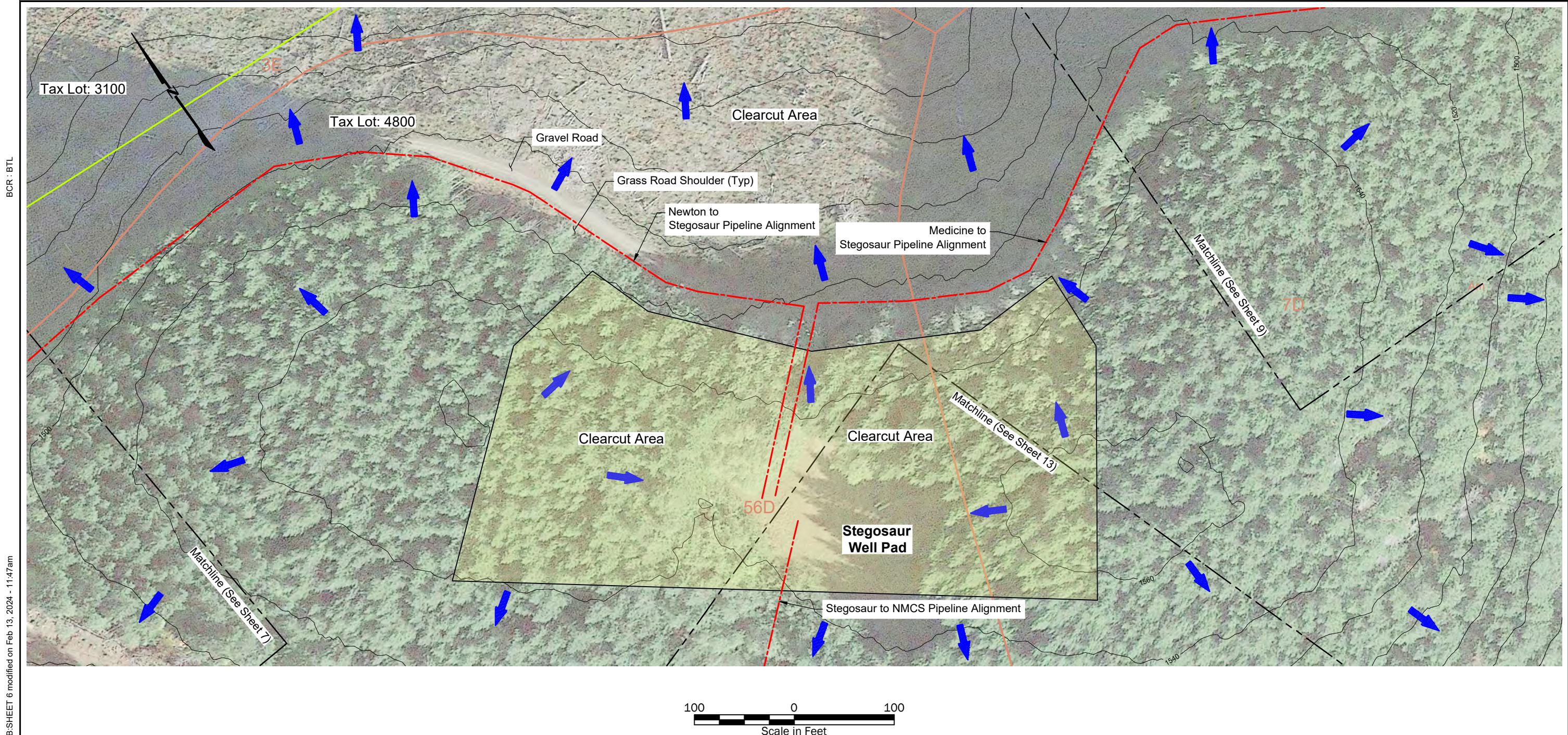
Site Specific Erosion Control Notes

- Temporary stockpiling of soils removed from excavations shall occur within the construction limits shown on these plans.
- If soil is stockpiled for more than 7 days without being reworked or if a sufficient rainfall event occurs, stockpiles must be protected to prevent soil erosion and eliminate all sediment/soil migration from the designated stockpile area. This may include either covering the stockpile using plastic sheeting (see soil stockpile detail) or using a combination of BMPs to obtain the same equivalency (temporary surface stabilization and perimeter control BMPs).
- With the exception of the South Laydown Yard, the gravel Mainline Road will be used as the construction entrance to limit offsite soil tracking.
- Disturbance shall not occur outside of the construction limits shown in these plans.
- Soils that are not suitable for structural fill shall be hauled off site for disposal at an approved disposal area/facility.

Spill Prevention Procedures

- Fueling of equipment shall take place away from surface waters, headwalls, wetlands or drainage ditches that may lead to waters of the state.
- Contractor shall maintain spill kits within vehicles onsite and at any location in which equipment is operating and ensure that personnel are available at all times to respond expeditiously in the event of spill or leak.
- Any spill (e.g., fuel, hydraulic leak, oil leak) shall be immediately contained and cleaned using dry clean up measures (do not clean contaminated surfaces by hosing down the area). Contractor shall eliminate the source of the spill to prevent a discharge or continuation of an ongoing discharge.
- Hazardous materials must be stored in the designated laydown yard(s) within a covered areas (such as temporary building, temporary storage lockers, beneath plastic sheeting, or beneath temporary roofs) or in secondary containment to prevent the exposure of these containers to precipitation or stormwater runoff, or a similarly effective means designed to prevent the discharge of pollutants from these areas.
- Contractor shall minimize material exposure in cases where the exposure to precipitation or to stormwater will result in a discharge of pollutants (e.g., elevate materials from soil to prevent leaching of pollutants)
- Discharges of toxic or hazardous substances from a spill or other release are prohibited. Where a leak, spill or other release containing a hazardous substance or oil occurs during a 24-hour period, the contractor shall immediately notify NW Natural's environmental inspector. NW Natural must notify the Oregon Emergency Response System at (800) 452-0311 as soon as NW Natural has knowledge of the release.

Revision	Description	Date	By	Chk	Rev	DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>		NW NATURAL MIST RESILIENCY PROJECT COLUMBIA COUNTY, OREGON	Drawing No.
						DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>			SHEET 5
						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>			Sheet 8 of 70
									 4000 KRUSE WAY, BUILDING 3 SUITE 200 LAKE OSWEGO, OREGON 97035 P: 503/624-9274 F: 503/620-5940	



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8. Project specific waterbodies, culverts and wetlands provided by Tetra Tech.

Legend

7D	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
→	Drainage Direction
—	Pipeline Alignment
■	Well Pad
—	Property Line
—	Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>
DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>
CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>



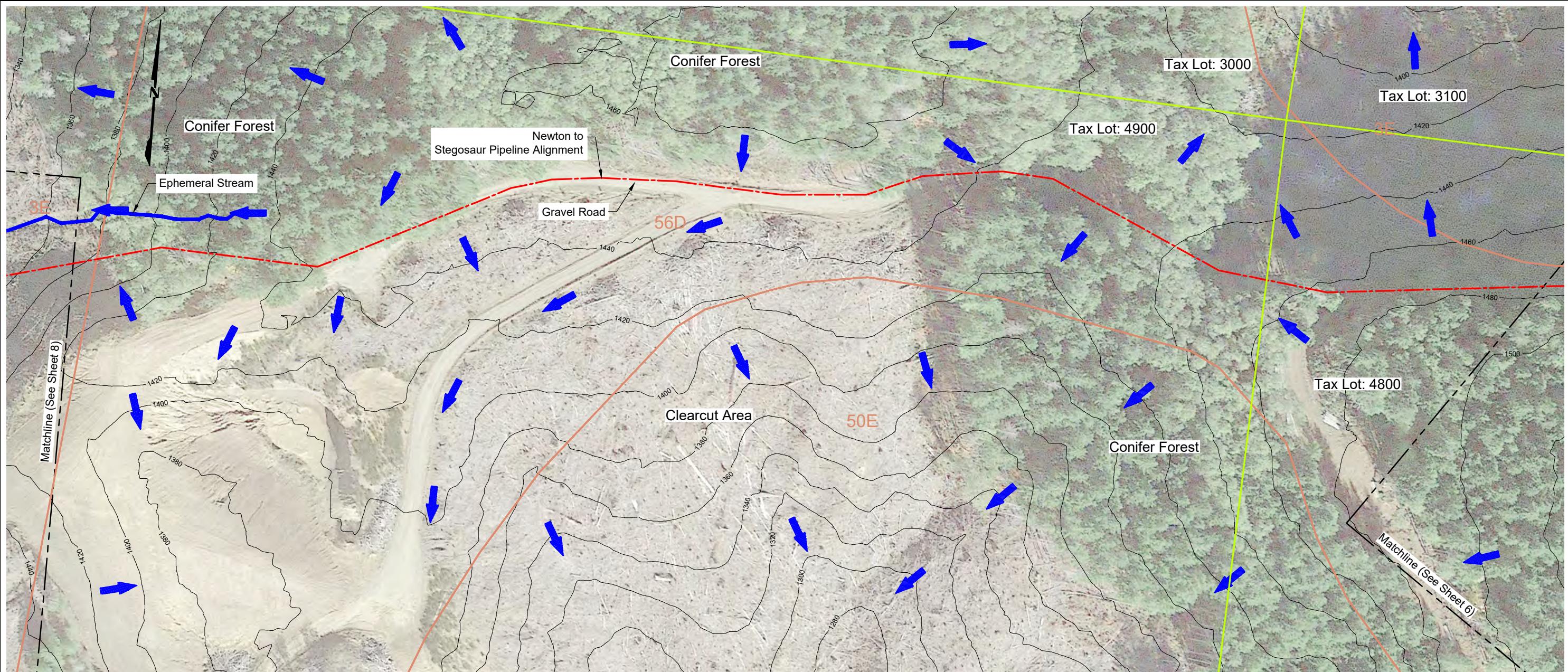
4000 KRUSE WAY, BUILDING 3
SUITE 200
LAKE OSWEGO, OREGON 97035
P: 503/624-9274
F: 503/620-5940

NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON

EROSION AND SEDIMENT CONTROL PLAN
EXISTING CONDITIONS PLAN

Drawing No.
SHEET 6

Sheet
9 of 70



100 0 100
Scale in Feet

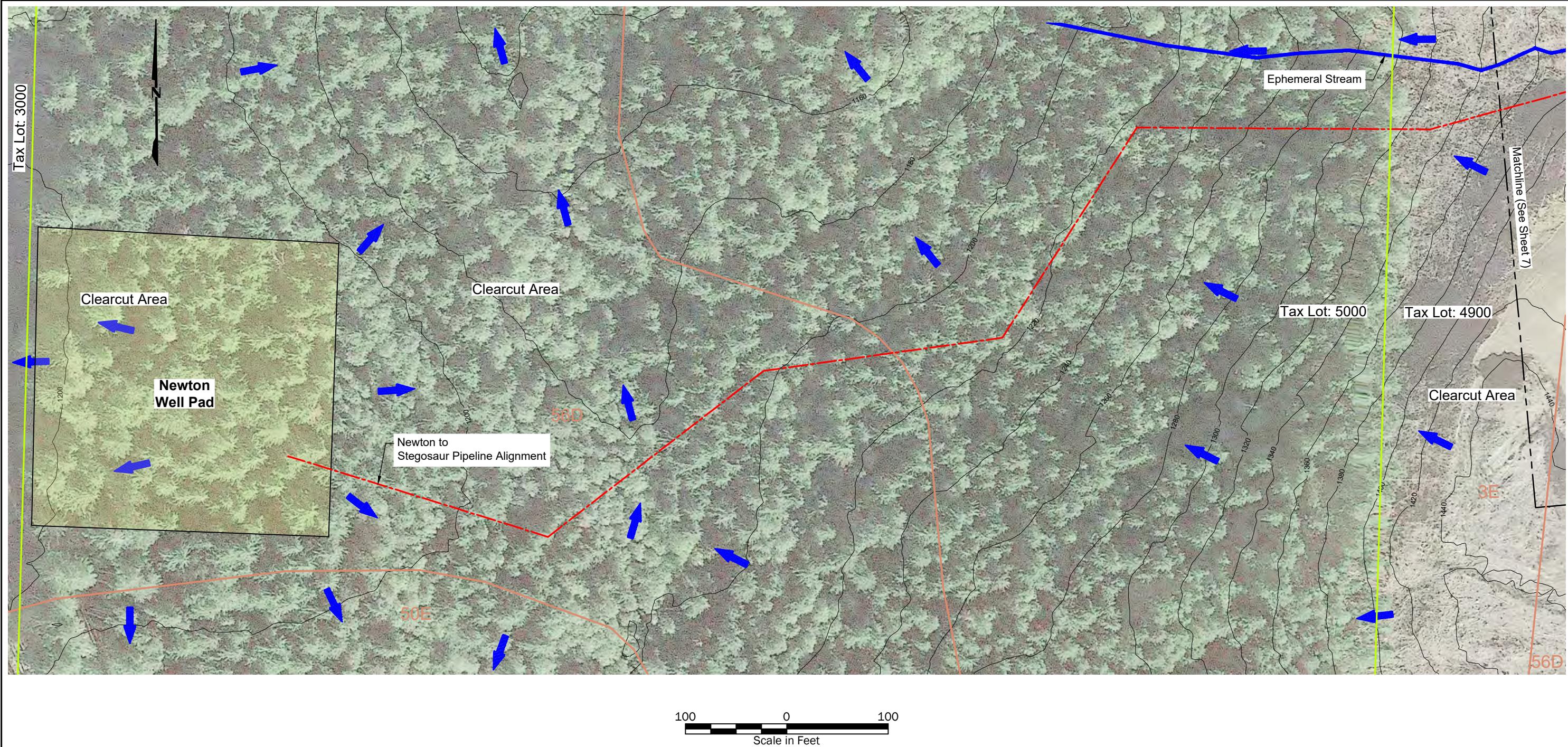
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Legend

- 7D NRCS Soil Map Unit Boundary And ID (See Sheet 4)
- Blue arrow Drainage Direction
- Red dashed line Pipeline Alignment
- Blue line Project Specific Mapped Waterbodies
- Yellow line Property Line
- Black line Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev



General Notes:

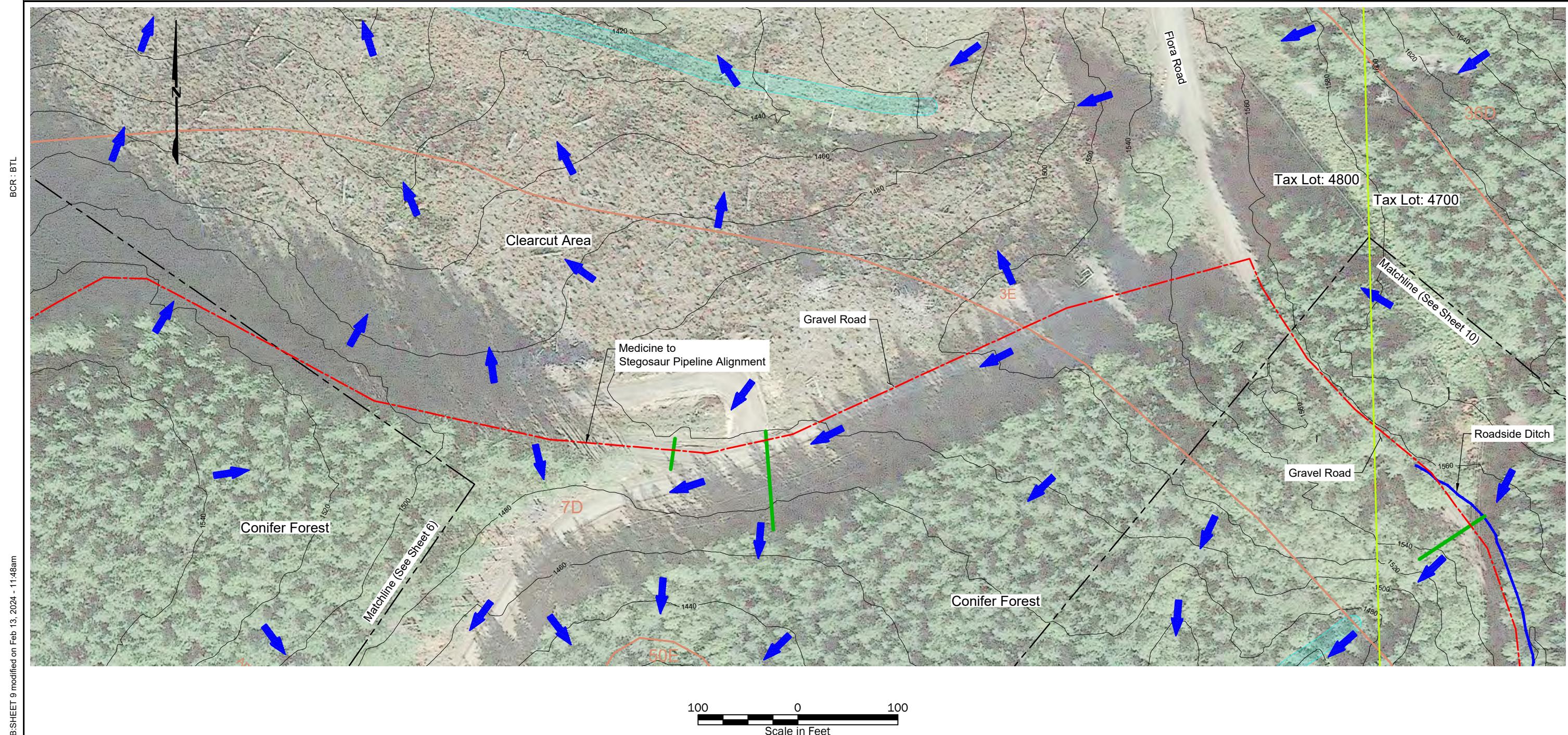
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Legend

—	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
→	Drainage Direction
—	Pipeline Alignment
—	Project Specific Mapped Waterbodies
■	Well Pad
—	Property Line
—	Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

DESIGNED:	BCR	SCALE:	AS NOTED
DRAWN:	BTL	DATE:	02/13/24
CHECKED:	BCR	FILE:	6024-308-00



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Legend

Legend

-  NRCS Soil Map Unit Boundary And ID (See Sheet 4)
-  NWI Riverine Habitat
-  Drainage Direction
-  Pipeline Alignment
-  Project Specific Mapped Waterbodies
-  Project Specific Mapped Culverts
-  Property Line
-  Major Contour - 20' Interval

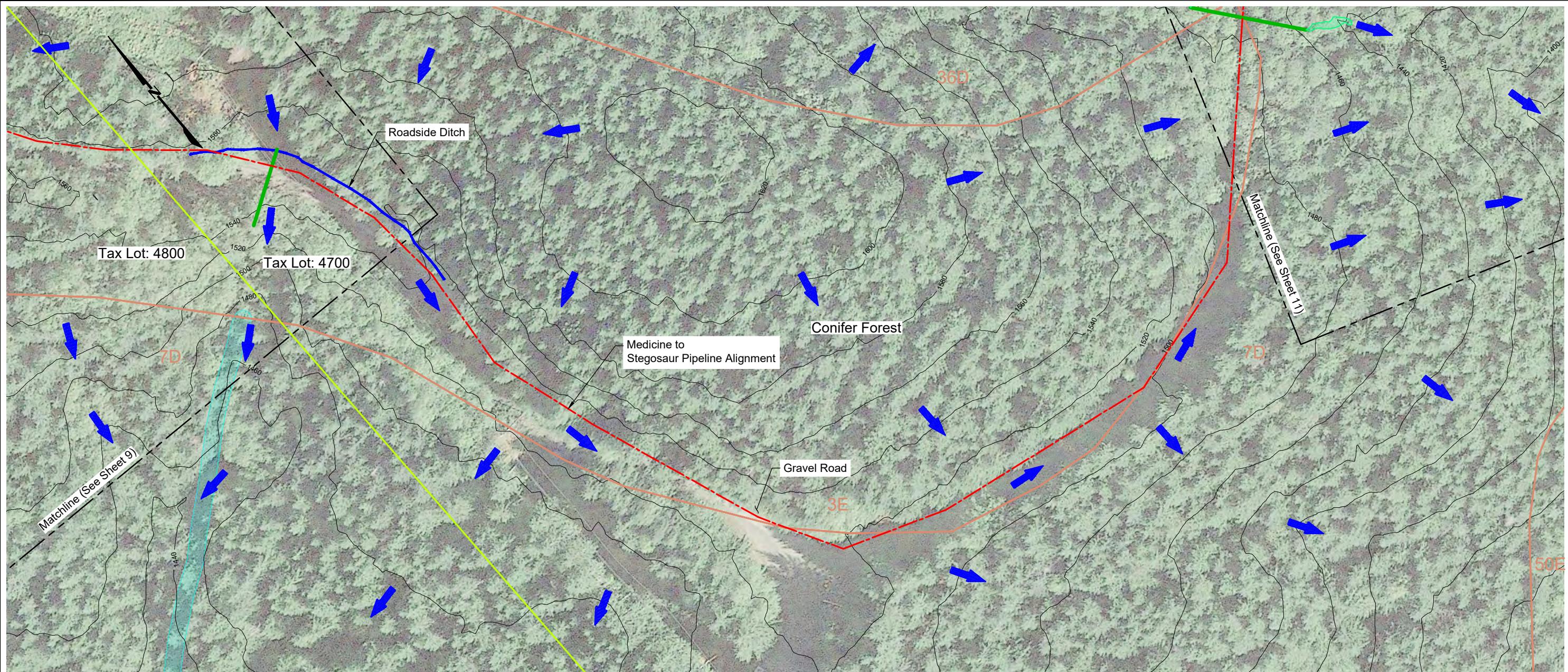
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						DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>
						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>

4000 KRUSE WAY, BUILDING 3
SUITE 200
LAKE OSWEGO, OREGON 97025

NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON

EROSION AND SEDIMENT CONTROL PLAN EXISTING CONDITIONS PLAN

ving No.



100 0 100
Scale in Feet

Legend

7D	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
NWI Riverine Habitat	
Drainage Direction	
Pipeline Alignment	
Project Specific Mapped Waterbodies	
Project Specific Mapped Culverts	
Project Specific Mapped Wetlands	
Property Line	
Major Contour - 20' Interval	

General Notes:

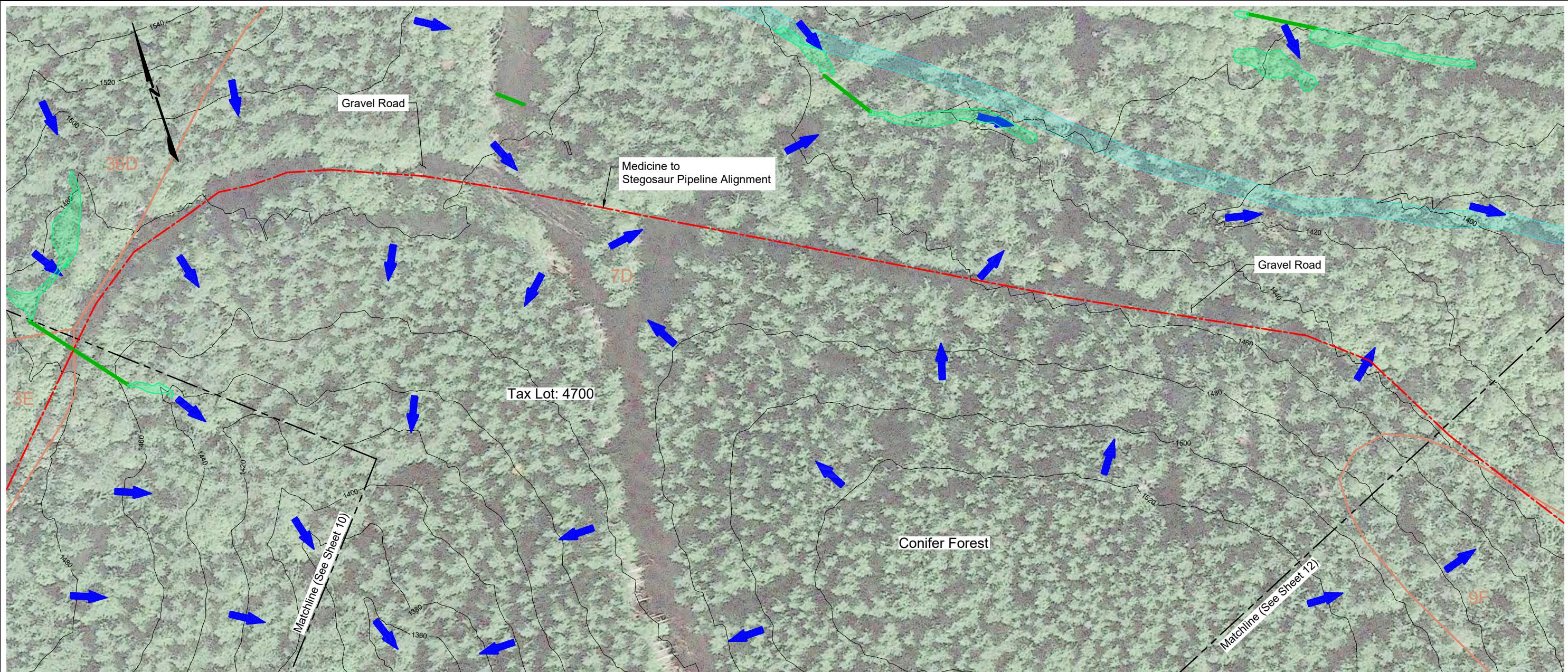
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						DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>			SHEET 10
						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>			Sheet 13 of 70



4000 KRUSE WAY, BUILDING 3
SUITE 200
LAKE OSWEGO, OREGON 97035
P: 503/624-9274
F: 503/620-5940

EROSION AND SEDIMENT CONTROL PLAN
EXISTING CONDITIONS PLAN



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Scale in Feet

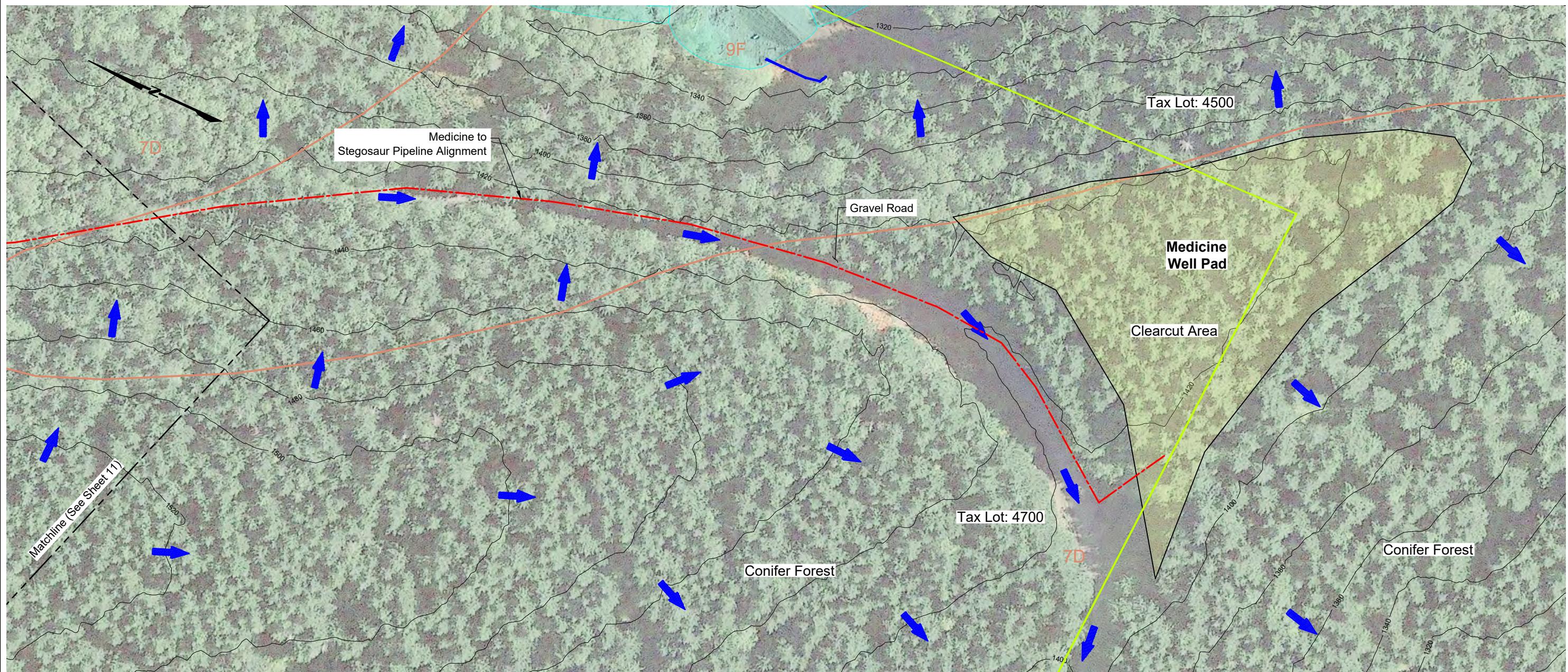
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Legend

	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	NWI Riverine Habitat
	Drainage Direction
	Pipeline Alignment
	Project Specific Mapped Culverts
	Project Specific Mapped Wetlands
	Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev	DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>			Drawing No.
						DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>			SHEET 11
						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>			Sheet
						GEOENGINEERS		4000 KRUSE WAY, BUILDING 3 SUITE 200 LAKE OSWEGO, OREGON 97035 P: 503/624-9274 F: 503/620-5940		14 of 70



General Notes:

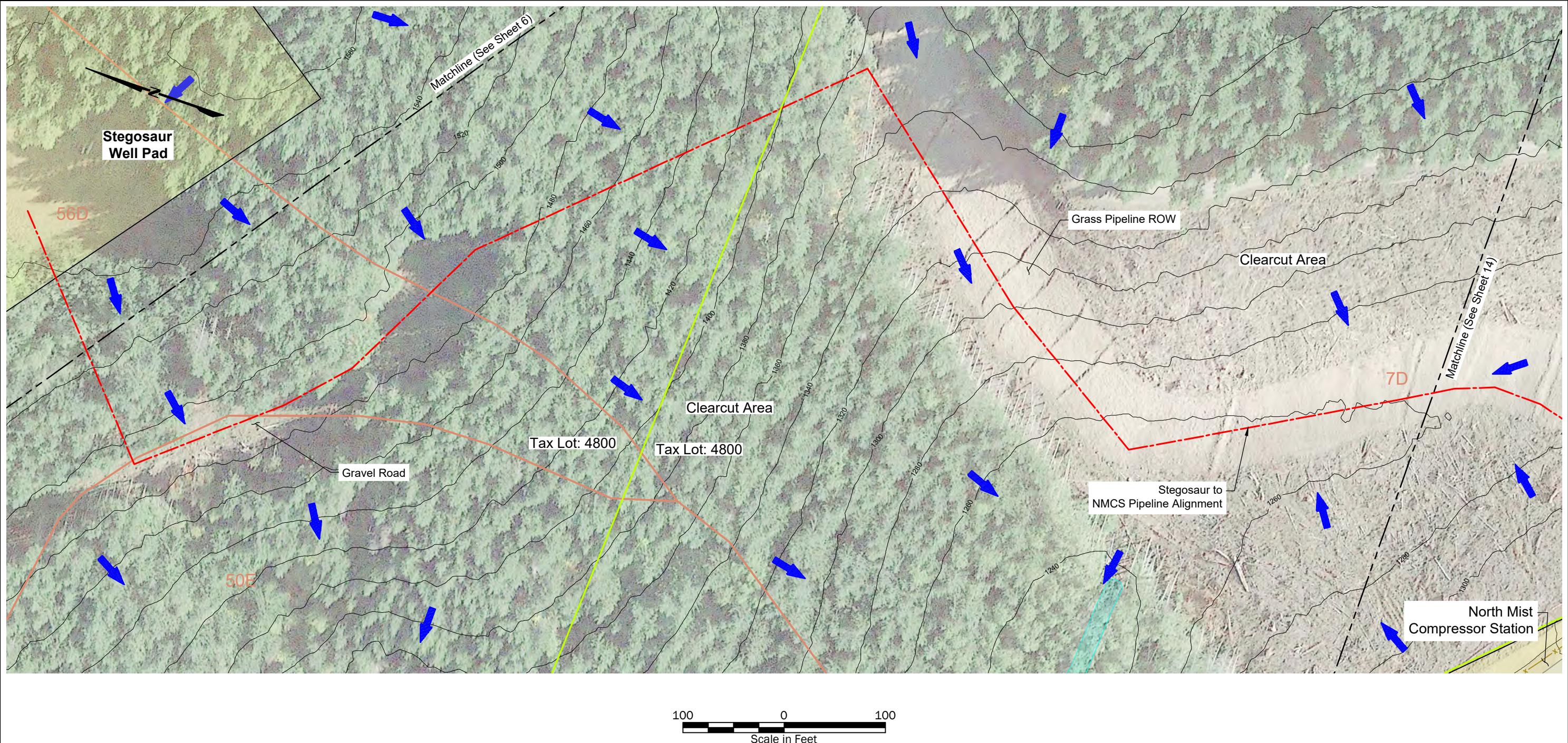
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Legend

—	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
—	NWI Riverine Habitat
→	Drainage Direction
—	Pipeline Alignment
—	Project Specific Mapped Waterbodies
■	Well Pad
—	Property Line
—	Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

DESIGNED:	BCR	SCALE:	AS NOTED
DRAWN:	BTL	DATE:	02/13/24
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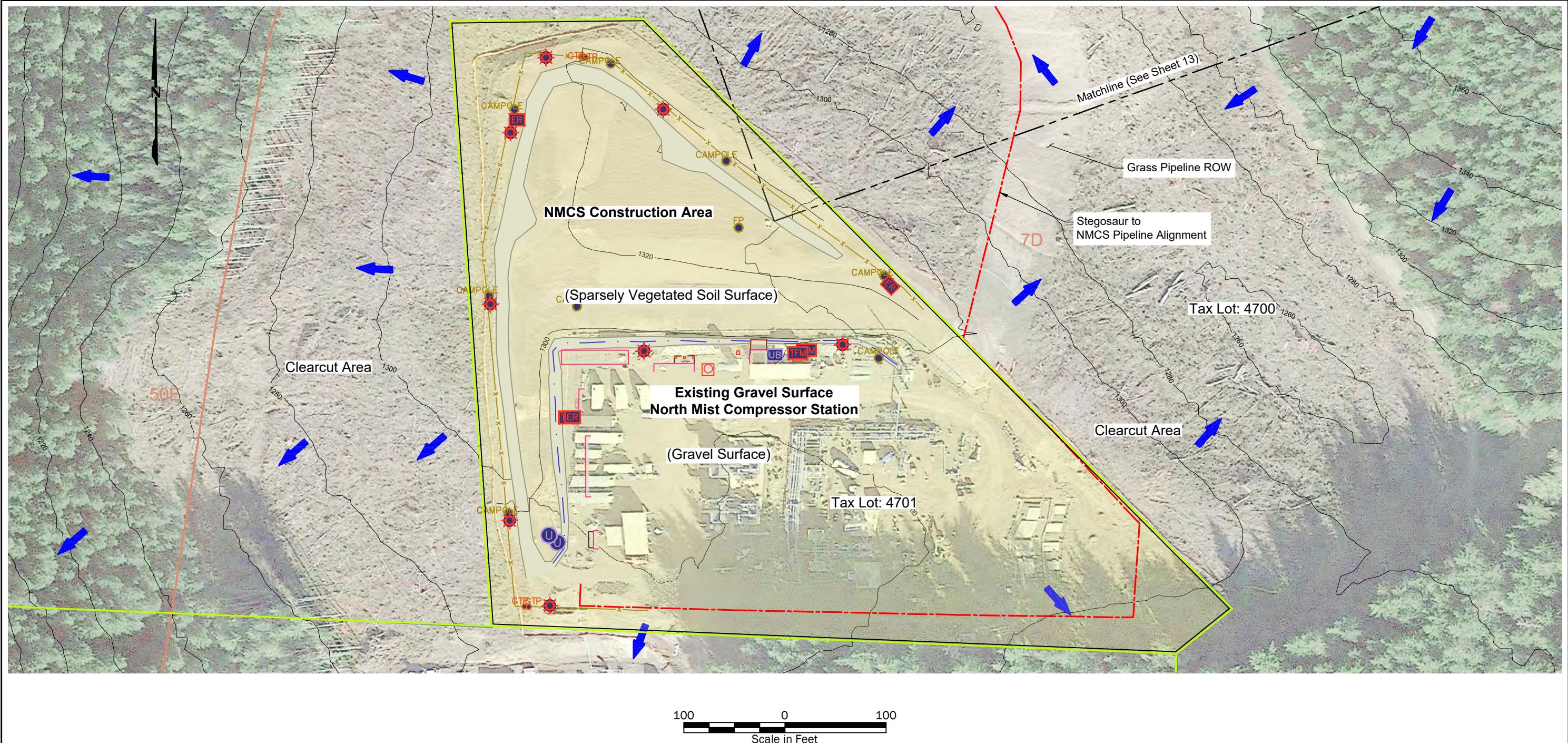
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Legend

7D	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	NWI Riverine Habitat
	Drainage Direction
	Pipeline Alignment
	Well Pad / Compressor Station
	Property Line
	Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>
DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>
CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>



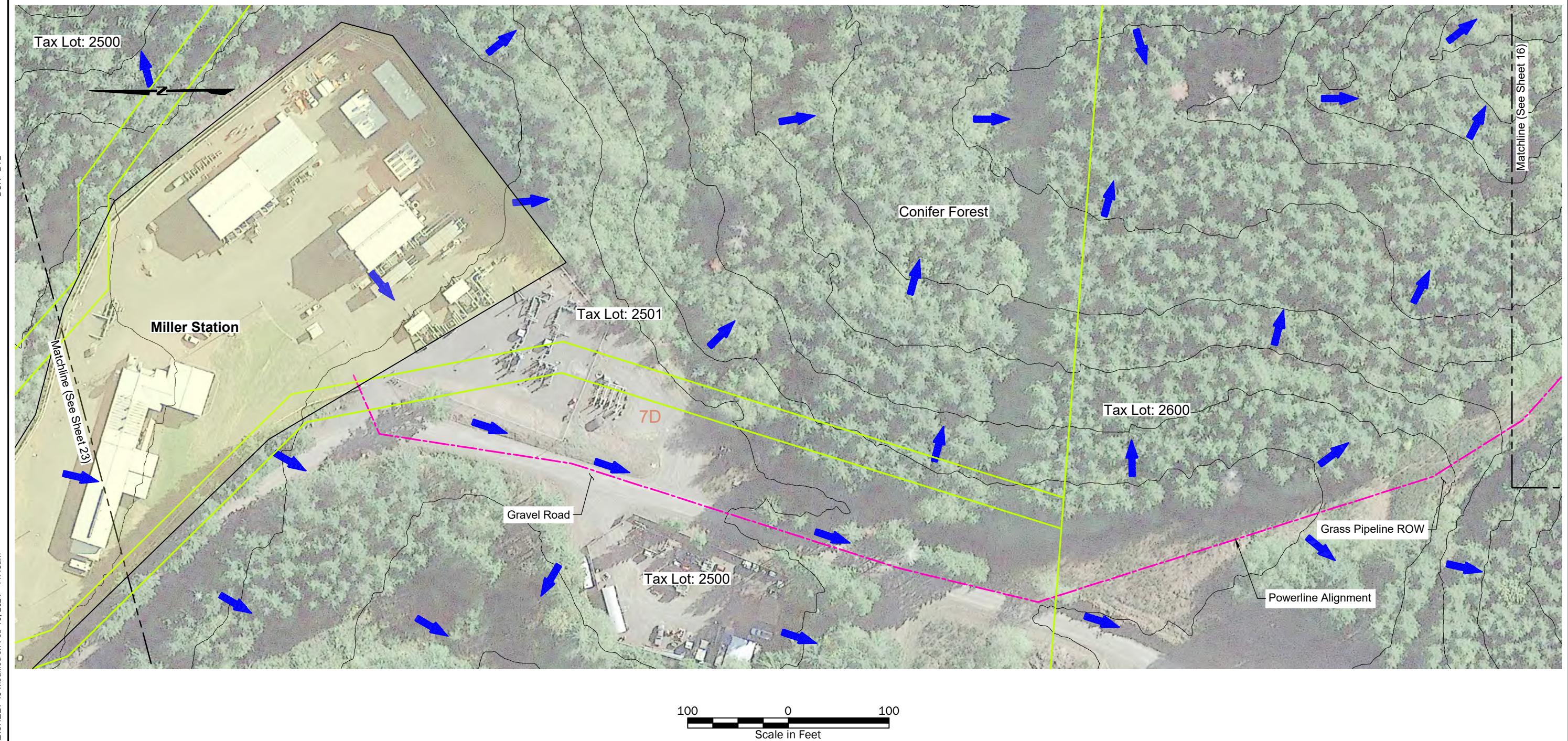
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Legend

7D	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
→	Drainage Direction
—	Pipeline Alignment
■	North Mist Compressor Station
—	Property Line
—	Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev	DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>		NW NATURAL MIST RESILIENCY PROJECT COLUMBIA COUNTY, OREGON	Drawing No.
						DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>		4000 KRUSE WAY, BUILDING 3 SUITE 200 LAKE OSWEGO, OREGON 97035 P: 503/624-9274 F: 503/620-5940	SHEET 14
						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>		EROSION AND SEDIMENT CONTROL PLAN EXISTING CONDITIONS PLAN	Sheet 17 of 70



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Legend

7D	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
→	Drainage Direction
- - -	Powerline Alignment
■	Miller Station
—	Property Line
—	Major Contour - 20' Interval

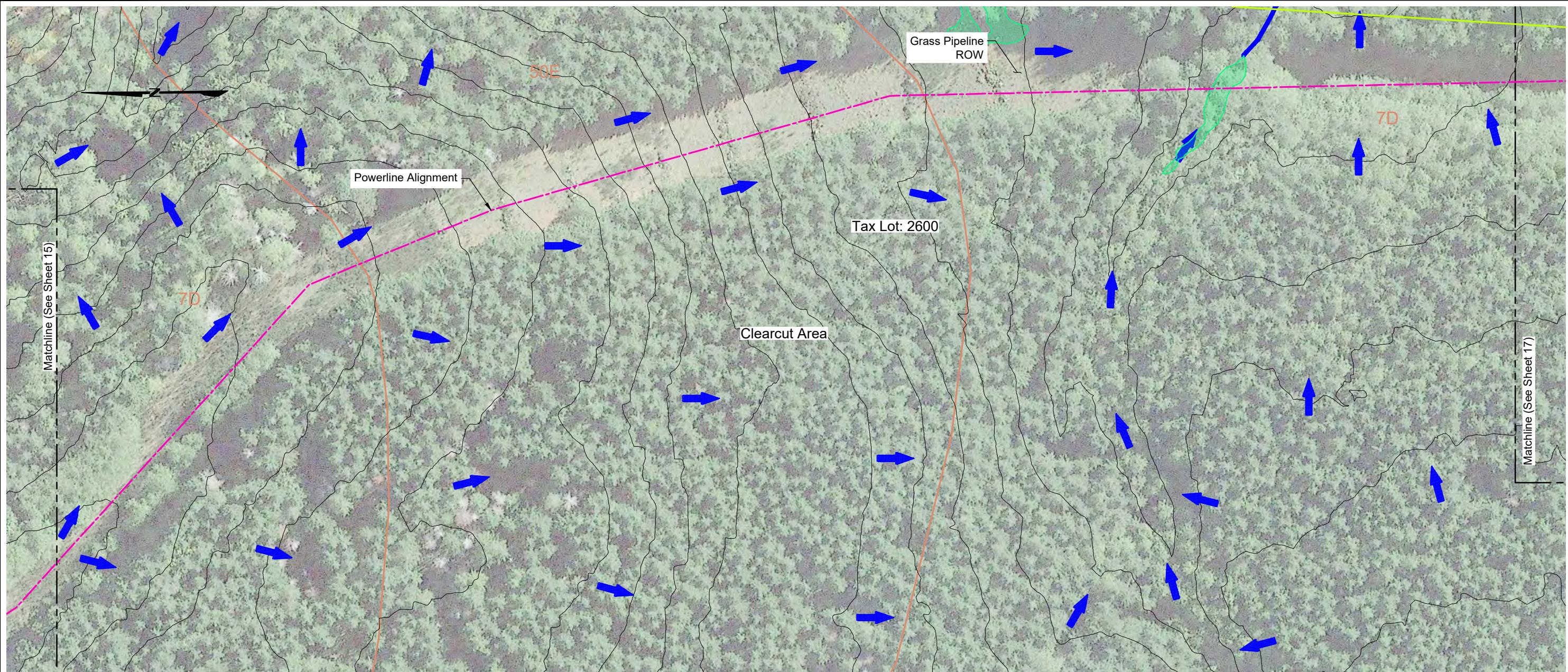
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NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON
EROSION AND SEDIMENT CONTROL PLAN
EXISTING CONDITIONS PLAN

Drawing No.
SHEET 15
Sheet
18 of 70



100 0 100
Scale in Feet

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→	Drainage Direction
---	Powerline Alignment
---	Project Specific Mapped Waterbodies
---	Project Specific Mapped Wetlands
---	Property Line
---	Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

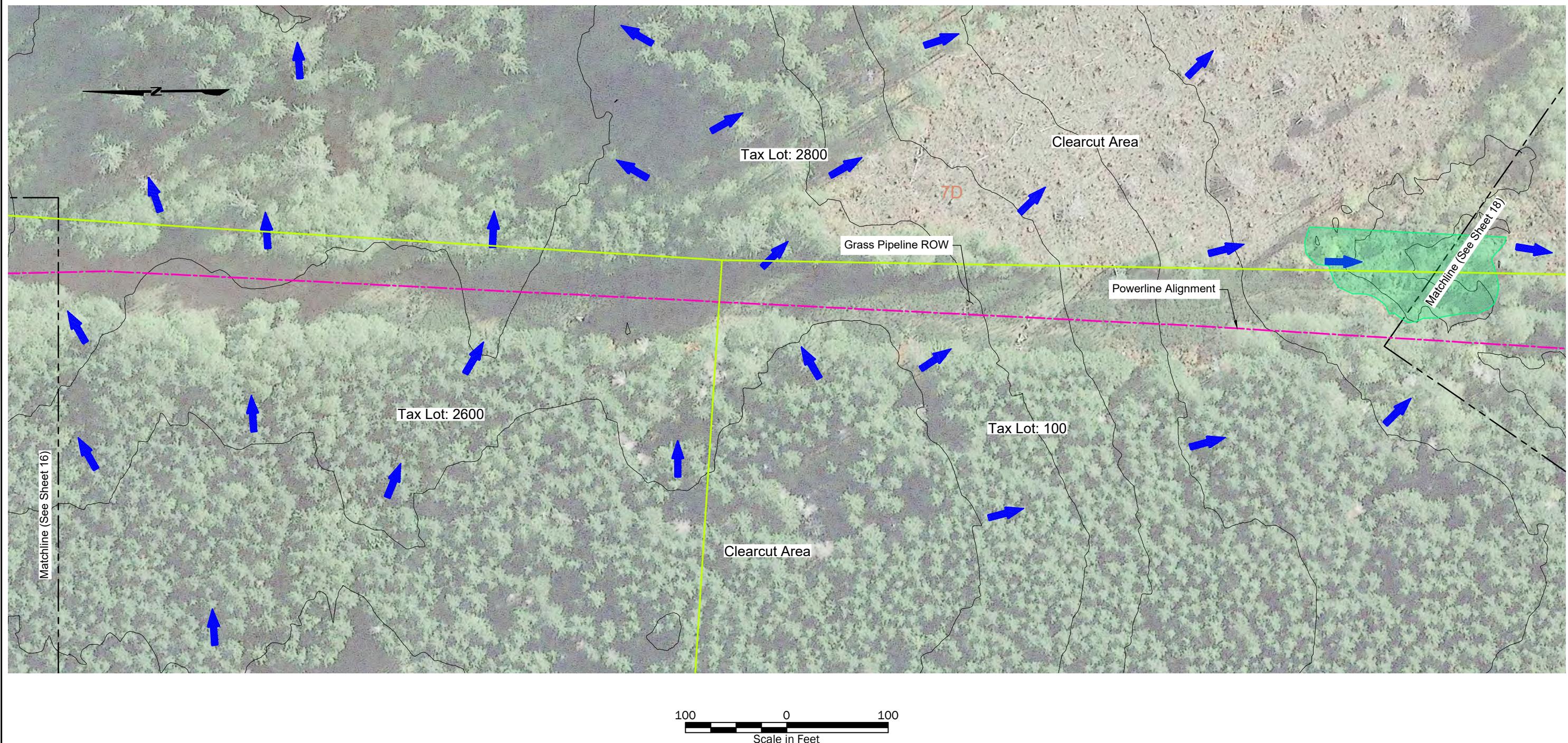
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4000 KRUSE WAY, BUILDING 3
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P: 503/624-9274
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NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON

EROSION AND SEDIMENT CONTROL PLAN
EXISTING CONDITIONS PLAN

Drawing No.
SHEET 16
Sheet
19 of 70



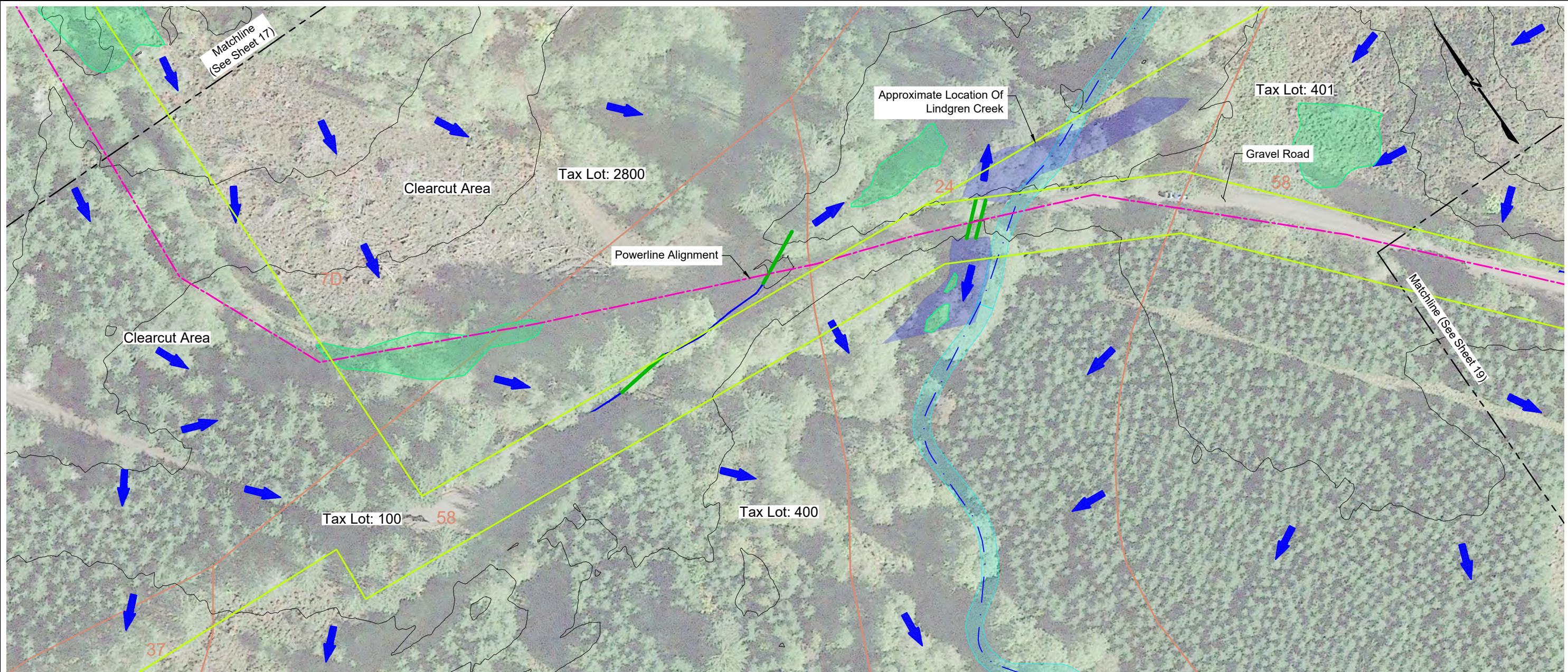
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Legend

7D	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
→	Drainage Direction
-	Powerline Alignment
■	Project Specific Mapped Wetlands
—	Property Line
—	Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev	DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>			Drawing No.
						DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>			SHEET 17
						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>			Sheet
						GEOENGINEERS		4000 KRUSE WAY, BUILDING 3 SUITE 200 LAKE OSWEGO, OREGON 97035 P: 503/624-9274 F: 503/620-5940		20 of 70
						EROSION AND SEDIMENT CONTROL PLAN EXISTING CONDITIONS PLAN				



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100 0 100
Scale in Feet

Legend

58	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	NWI Riverine Habitat
	Drainage Direction
	Powerline Alignment
	Creek Centerline
	Project Specific Mapped Waterbodies
	Project Specific Mapped Culverts
	Project Specific Mapped Wetlands
	Property Line
	Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

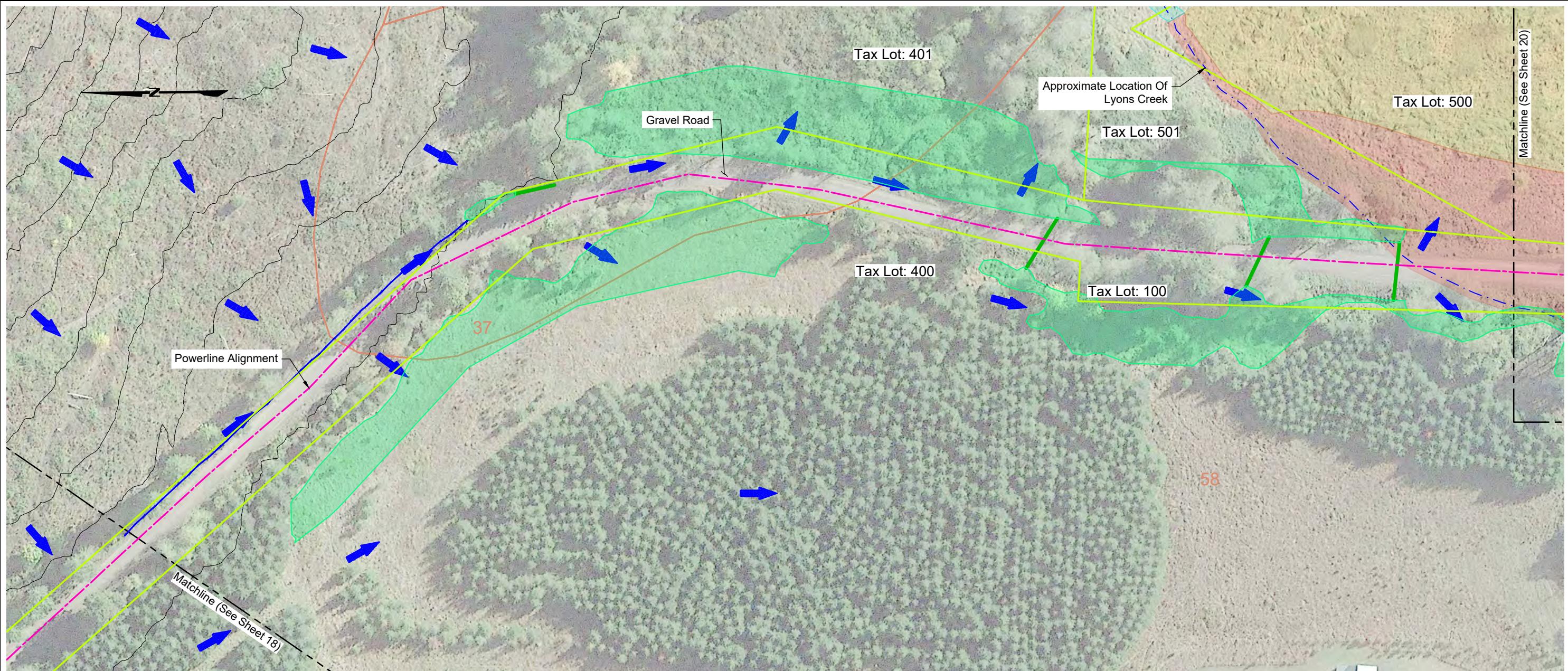
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SUITE 200
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NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON

EROSION AND SEDIMENT CONTROL PLAN
EXISTING CONDITIONS PLAN

Drawing No.
SHEET 18
Sheet
21 of 70



100 0 100
Scale in Feet

Legend

58	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
■	NWI Riverine Habitat
■	NWI Forested Shrub Wetland
■	NWI Emergent Wetland
■	Drainage Direction
■	Powerline Alignment
■	Creek Centerline
■	Project Specific Mapped Waterbodies
■	Project Specific Mapped Culverts
■	Project Specific Mapped Wetlands
■	Property Line
—	Major Contour - 20' Interval

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8. Project specific waterbodies, culverts and wetlands provided by Tetra Tech.

Revision	Description	Date	By	Chk	Rev

DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>
DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>
CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>

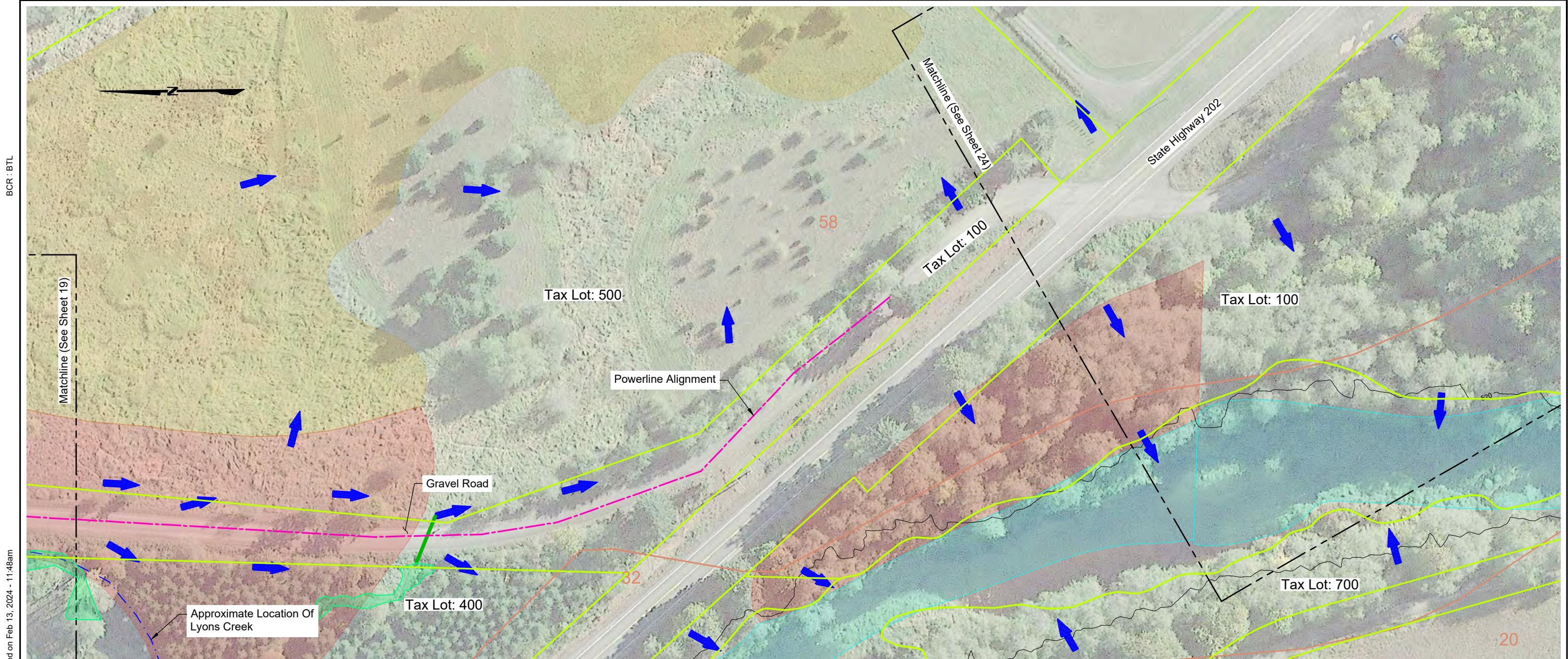


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F: 503/620-5940

NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON

EROSION AND SEDIMENT CONTROL PLAN
EXISTING CONDITIONS PLAN

Drawing No.
SHEET 19
Sheet
22 of 70



100 0 100

Scale in Feet

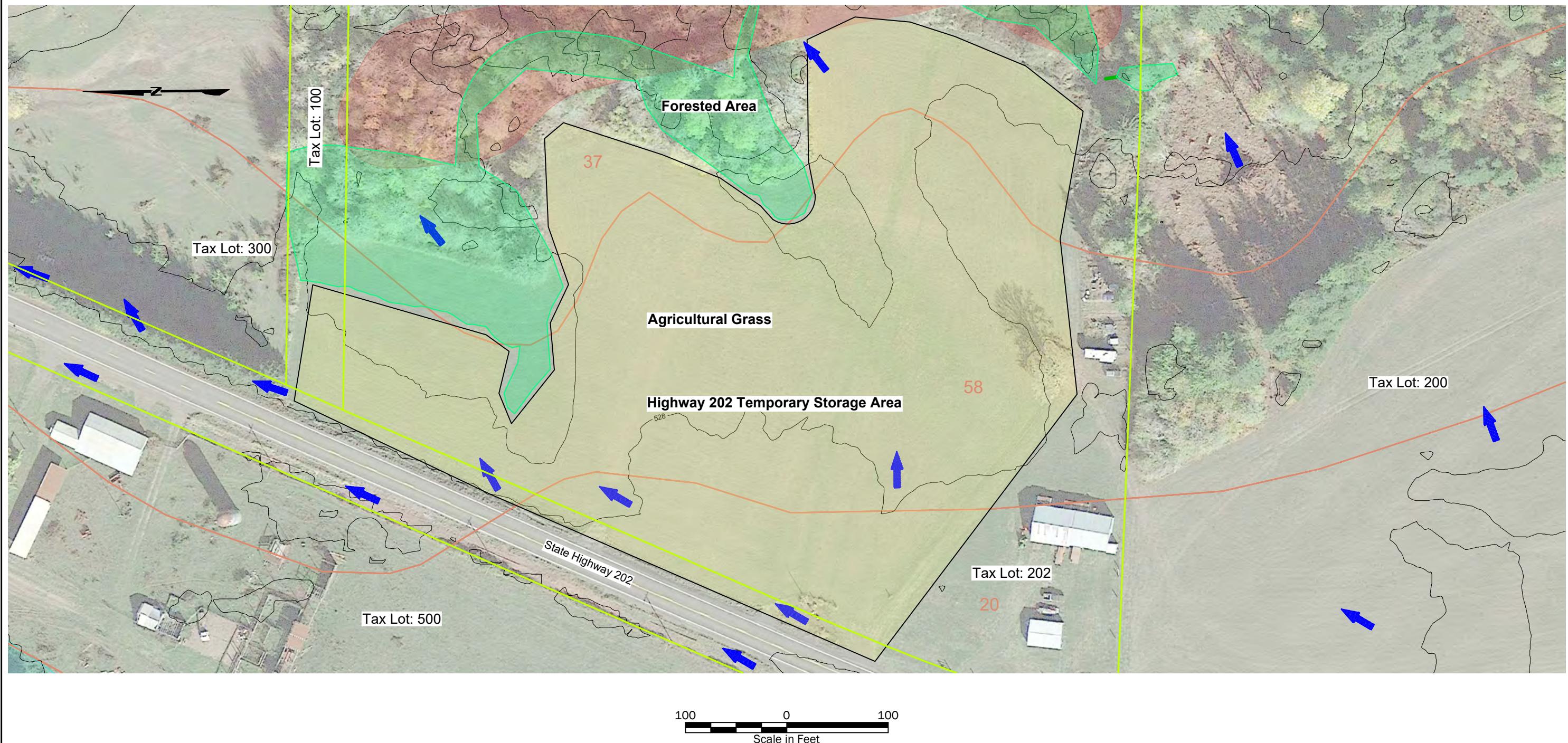
Legend

58	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	NWI Riverine Habitat
	NWI Forested Shrub Wetland
	NWI Emergent Wetland
	Drainage Direction
	Powerline Alignment
	Creek Centerline
	Project Specific Mapped Culverts
	Project Specific Mapped Wetlands
	Property Line
	Major Contour - 20' Interval

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Revision	Description	Date	By	Chk	Rev	DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>		GEOENGINEERS 4000 KRUSE WAY, BUILDING 3 SUITE 200 LAKE OSWEGO, OREGON 97035 P: 503/624-9274 F: 503/620-5940	NW NATURAL MIST RESILIENCY PROJECT COLUMBIA COUNTY, OREGON	Drawing No.	
						DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>			EROSION AND SEDIMENT CONTROL PLAN EXISTING CONDITIONS PLAN		SHEET 20
						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>			Sheet 23 of 70		



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Legend

20	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
■	NWI Forested Shrub Wetland
→	Drainage Direction
—	Project Specific Mapped Culverts
■	Project Specific Mapped Wetlands
—	Highway 202 Storage Area
—	Property Line
—	Major Contour - 4' Interval

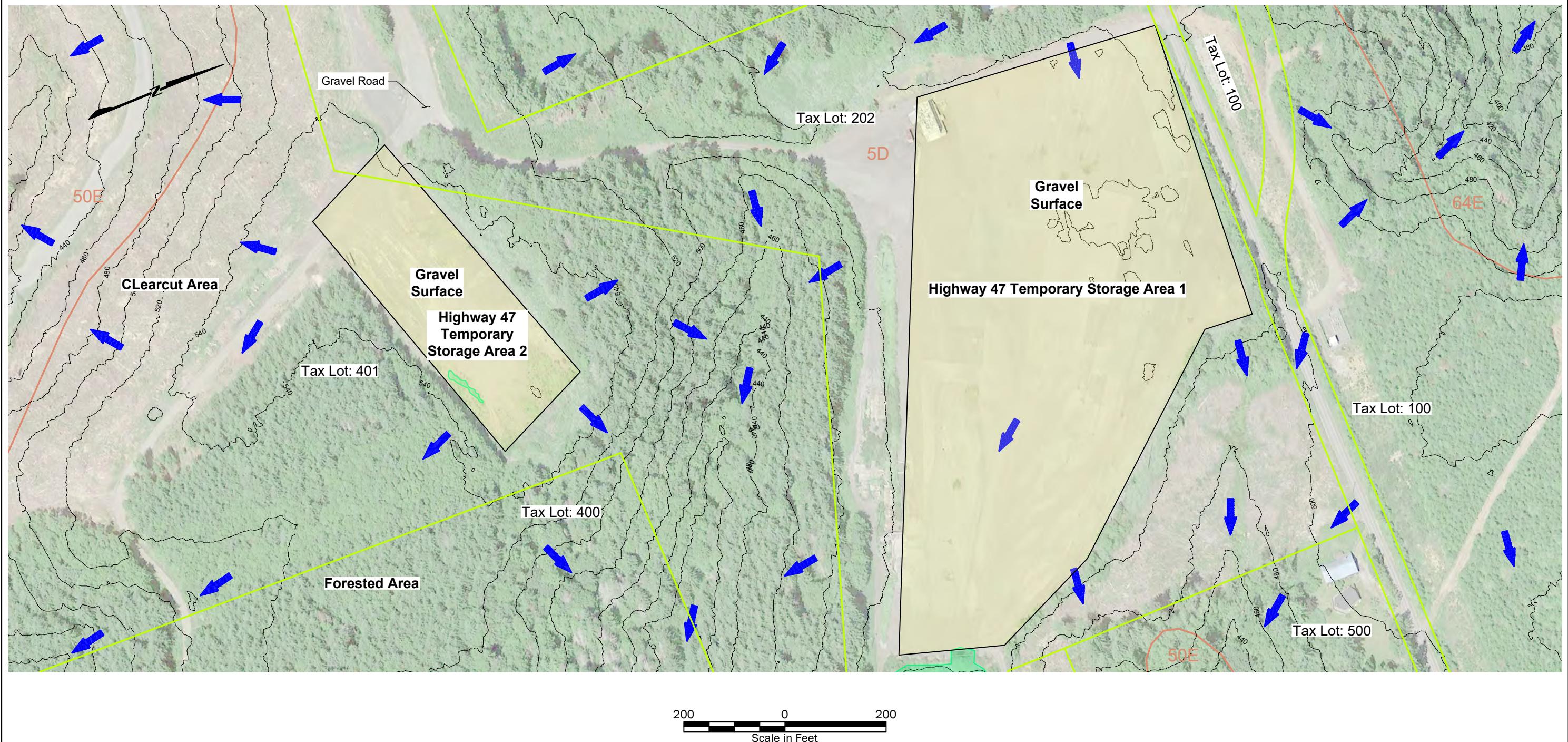
Revision	Description	Date	By	Chk	Rev

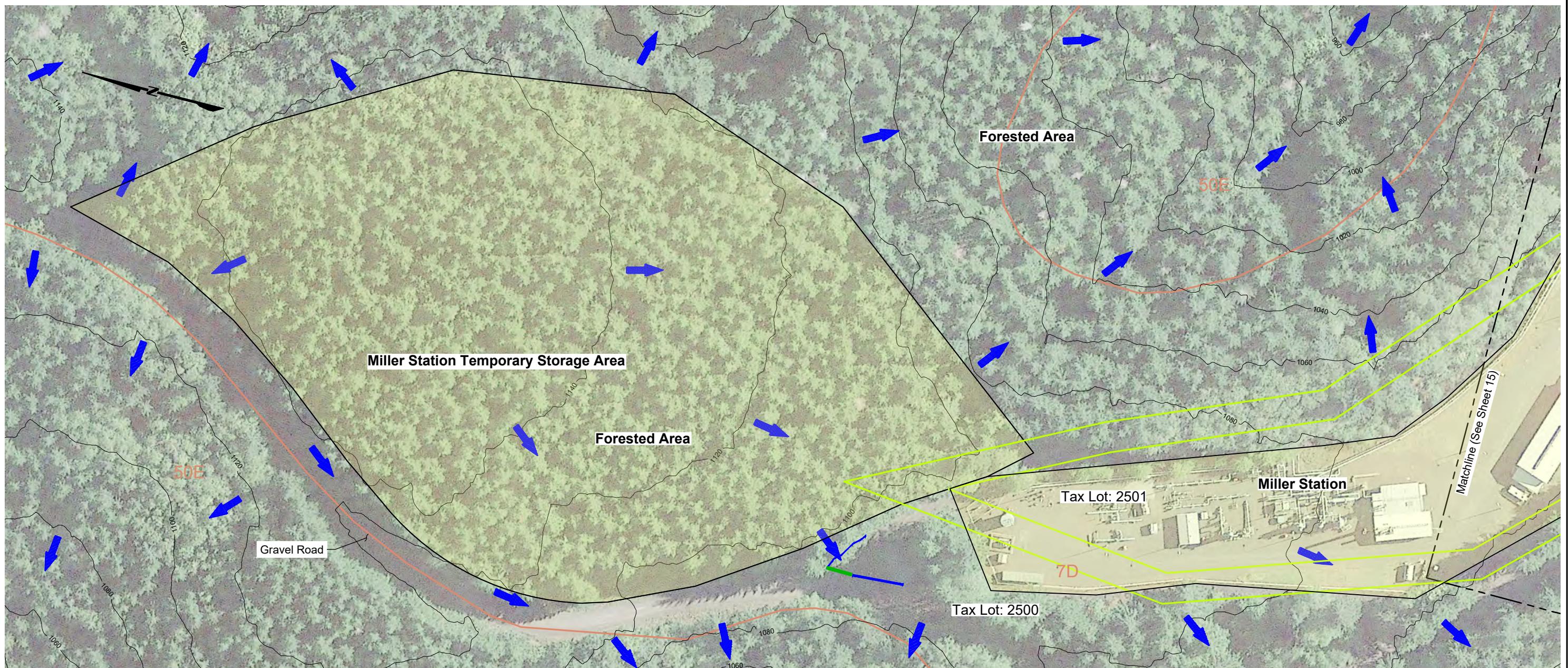
DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>
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CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>

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NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON
EROSION AND SEDIMENT CONTROL PLAN
EXISTING CONDITIONS PLAN

Drawing No.
SHEET 21
Sheet
24 of 70





100 0 100
Scale in Feet

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Legend

	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	Drainage Direction
	Project Specific Mapped Waterbodies
	Project Specific Mapped Culverts
	Miller Station And Storage Area
	Property Line
	Major Contour - 20' Interval

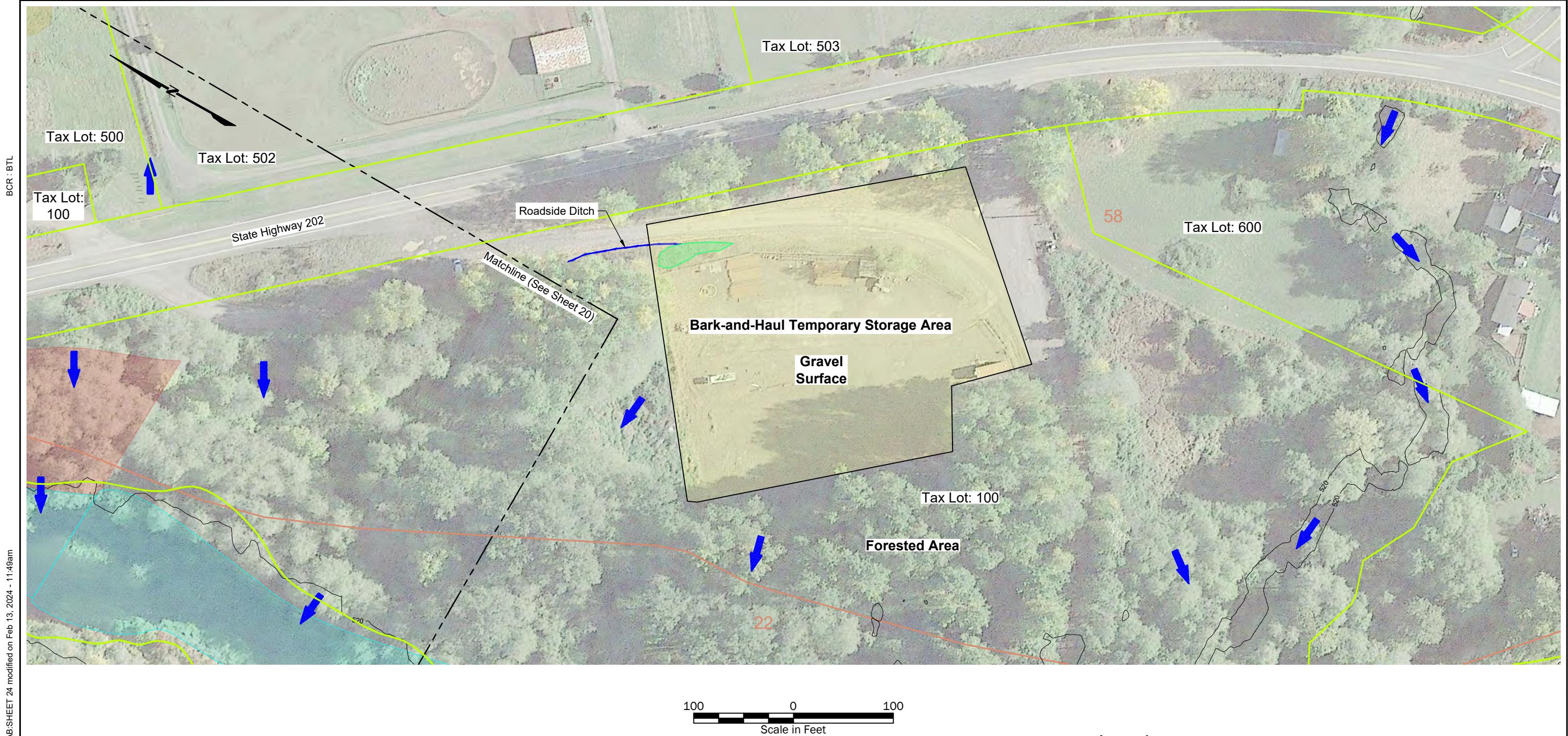
Revision	Description	Date	By	Chk	Rev

DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>
DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>
CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>

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NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON
EROSION AND SEDIMENT CONTROL PLAN
EXISTING CONDITIONS PLAN

Drawing No.
SHEET 23
Sheet
26 of 70



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Legend

58	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	NWI Riverine Habitat
	NWI Forested Shrub Wetland
	Drainage Direction
	Project Specific Mapped Waterbodies
	Project Specific Mapped Wetlands
	Bark-and-Haul Storage Area
	Property Line
	Major Contour - 20' Interval

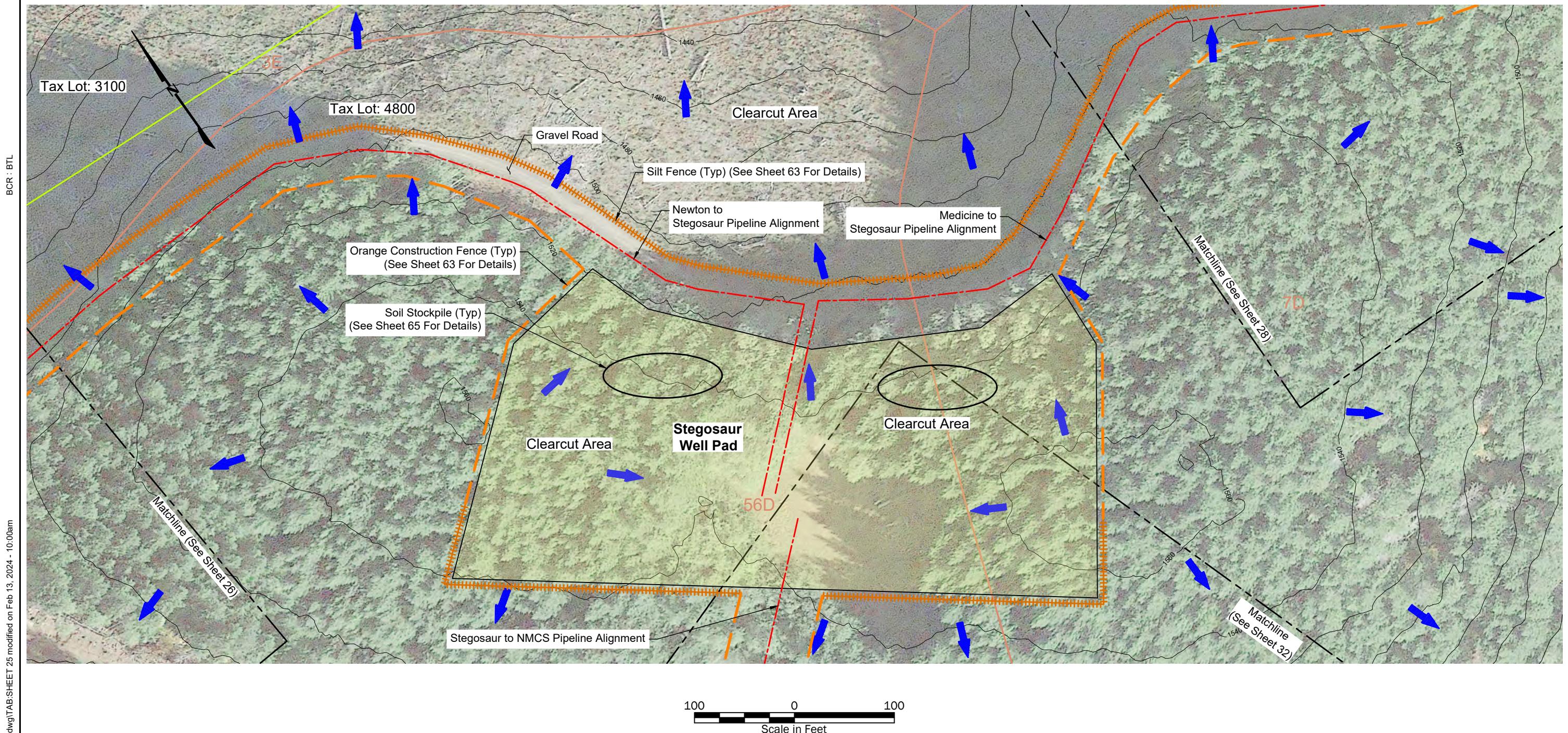
Revision	Description	Date	By	Chk	Rev

DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>	
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NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON
EROSION AND SEDIMENT CONTROL PLAN
EXISTING CONDITIONS PLAN

Drawing No.
SHEET 24
Sheet
27 of 70



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Legend

- 7D NRCS Soil Map Unit Boundary And ID (See Sheet 4)
- Drainage Direction
- Pipeline Alignment
- Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
- Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
- Well Pad / Compressor Station
- Property Line
- Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

DESIGNED:	BCR	SCALE:	AS NOTED
DRAWN:	BTL	DATE:	02/13/24
CHECKED:	BCR	FILE:	6024-308-00

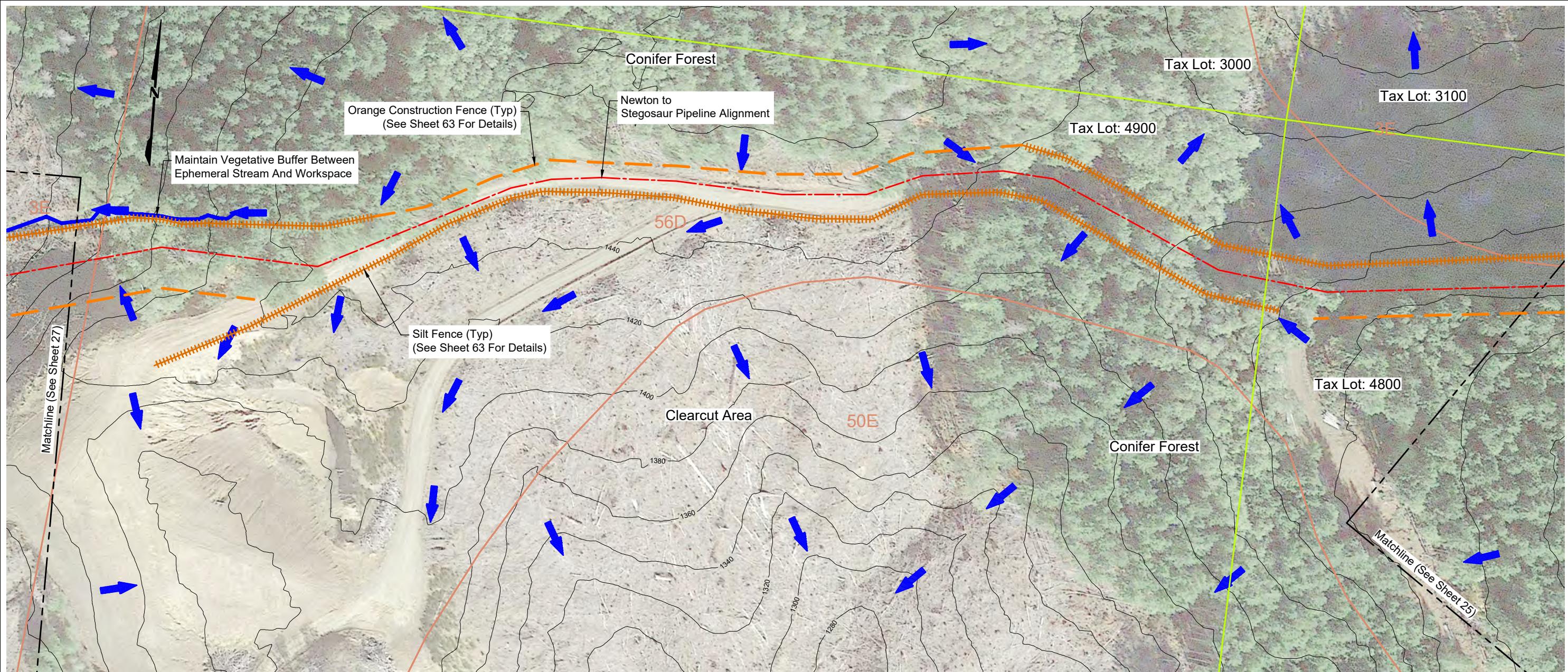


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NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON

EROSION AND SEDIMENT CONTROL PLAN
UTILITY INSTALLATION/EROSION CONTROL BMPs PLAN

Drawing No.
SHEET 25
Sheet
28 of 70



100 0 100
Scale in Feet

General Notes:

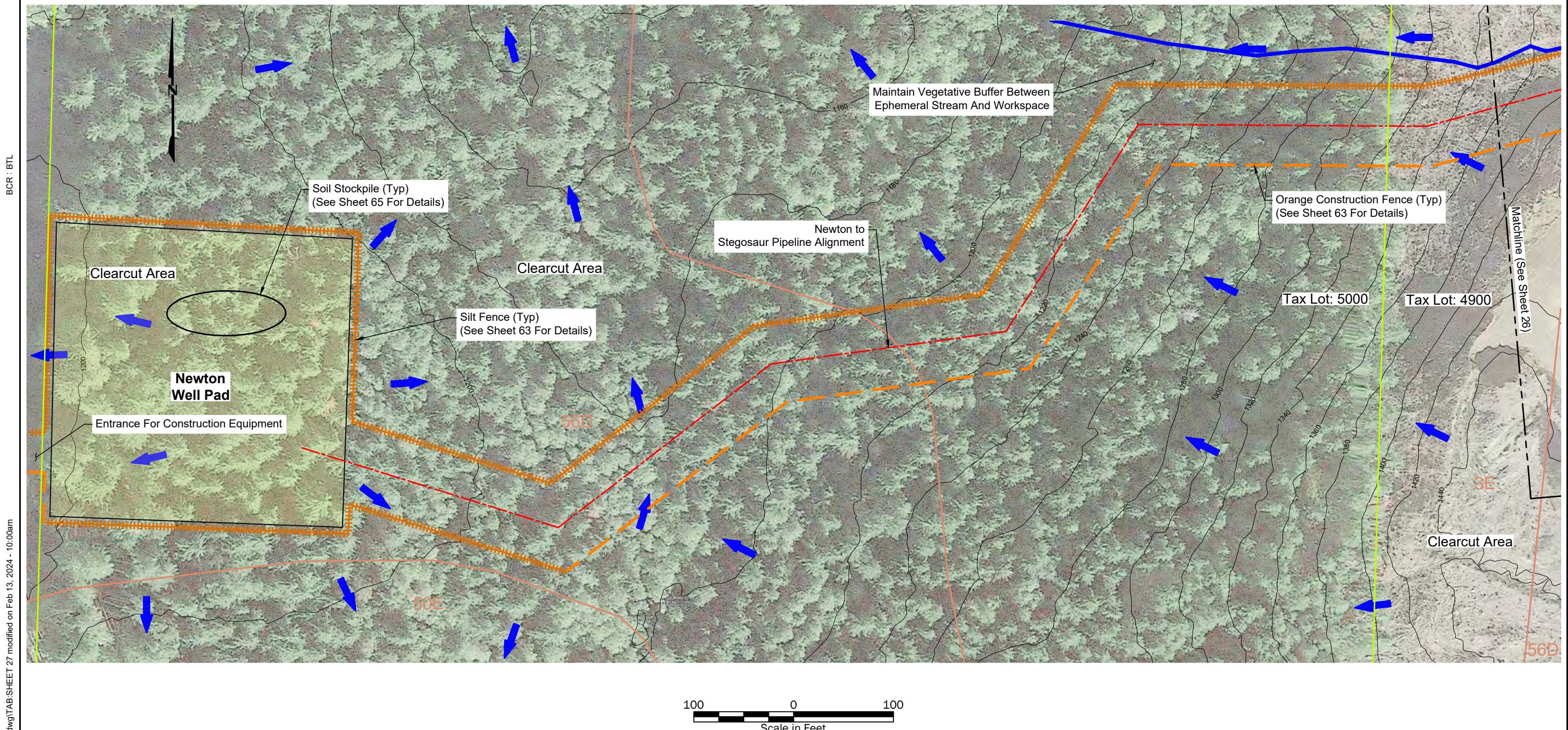
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Legend

	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	Drainage Direction
	Pipeline Alignment
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
	Project Specific Mapped Waterbodies
	Property Line
	Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

DESIGNED:	BCR	SCALE:	AS NOTED
DRAWN:	BTL	DATE:	02/13/24
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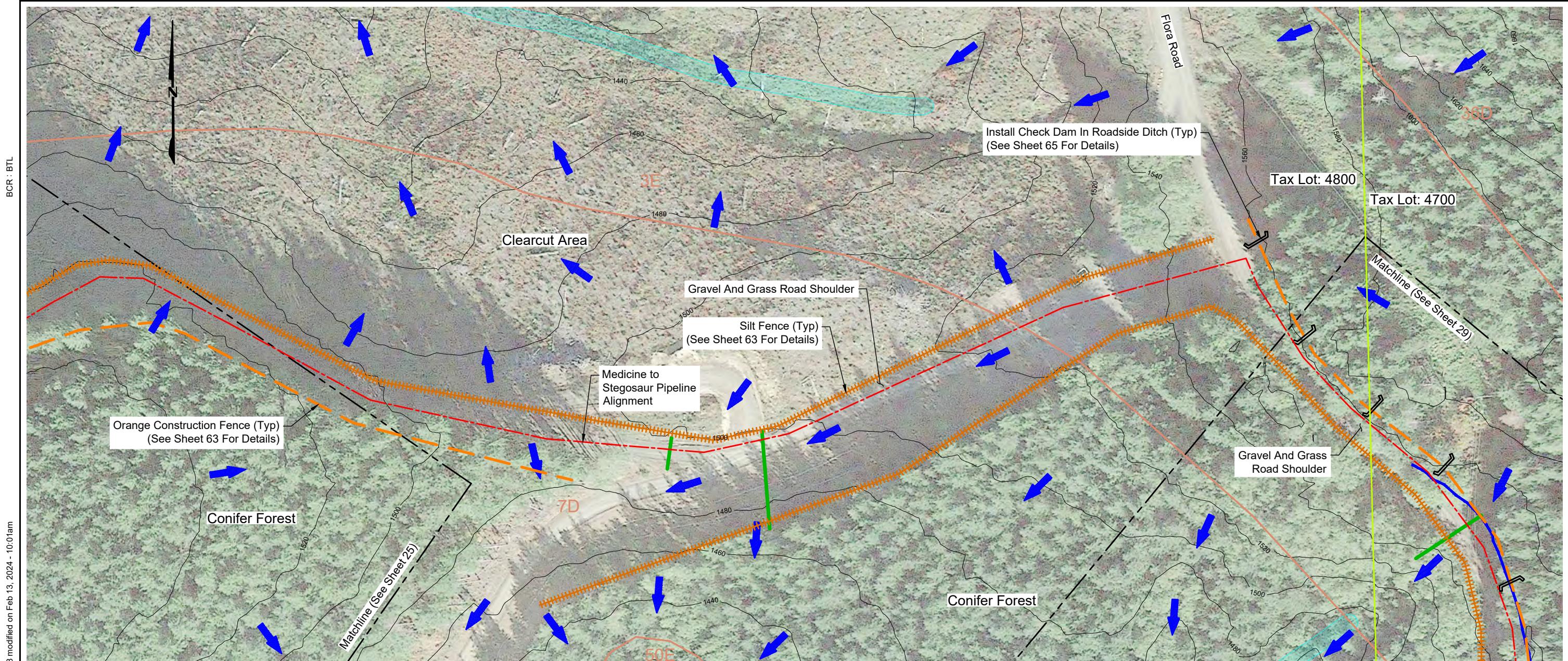
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Legend

- 3E NRCS Soil Map Unit Boundary And ID (See Sheet 4)
- Drainage Direction
- Pipeline Alignment
- Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
- Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
- Project Specific Mapped Waterbodies
- Well Pad
- Property Line
- Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

DESIGNED:	BCR	SCALE:	AS NOTED
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100 0 100
Scale in Feet

Legend

7D	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	NWI Riverine Habitat
	Drainage Direction
	Pipeline Alignment
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
	Check Dam (See Sheet 65 For Details)
	Project Specific Mapped Waterbodies
	Project Specific Mapped Culverts
	Property Line
	Major Contour - 20' Interval

BCR : BTL

36D

3E

7D

50E

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1620

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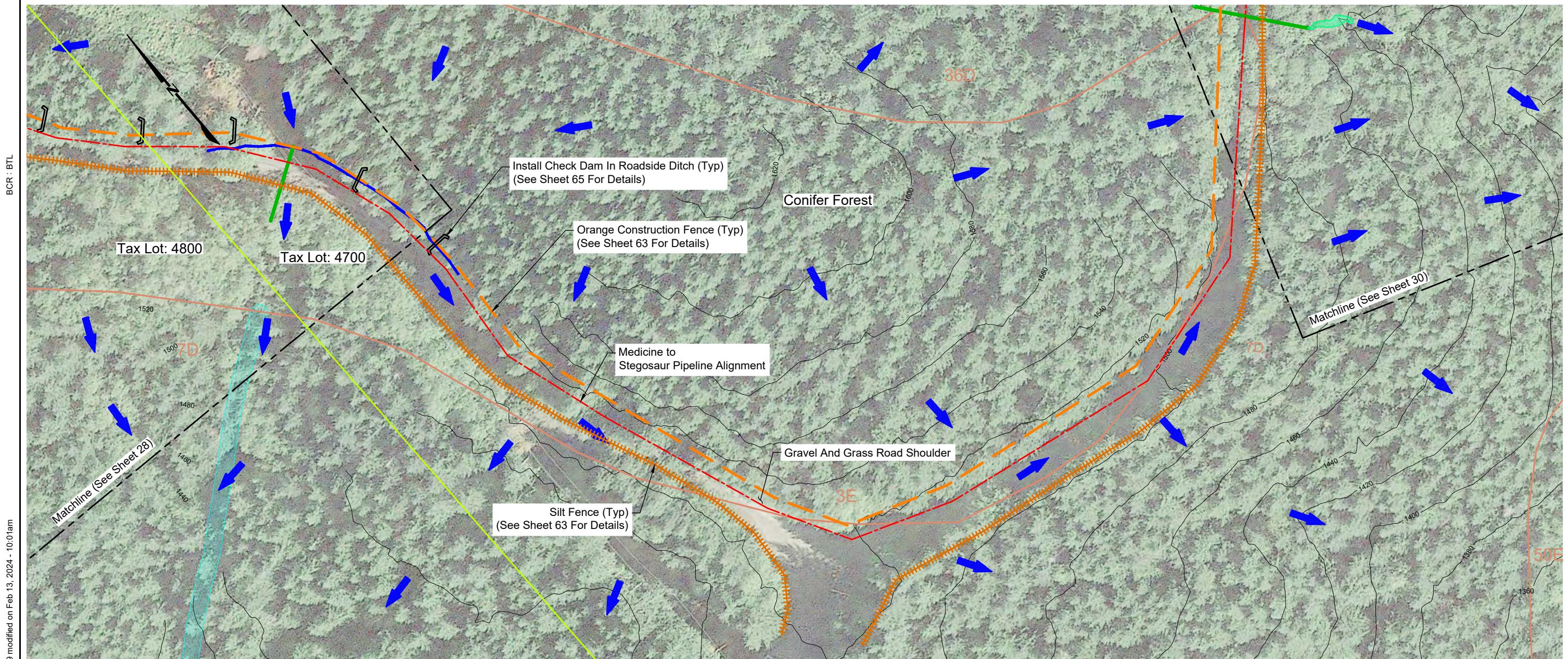
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26200

26400

26600

2



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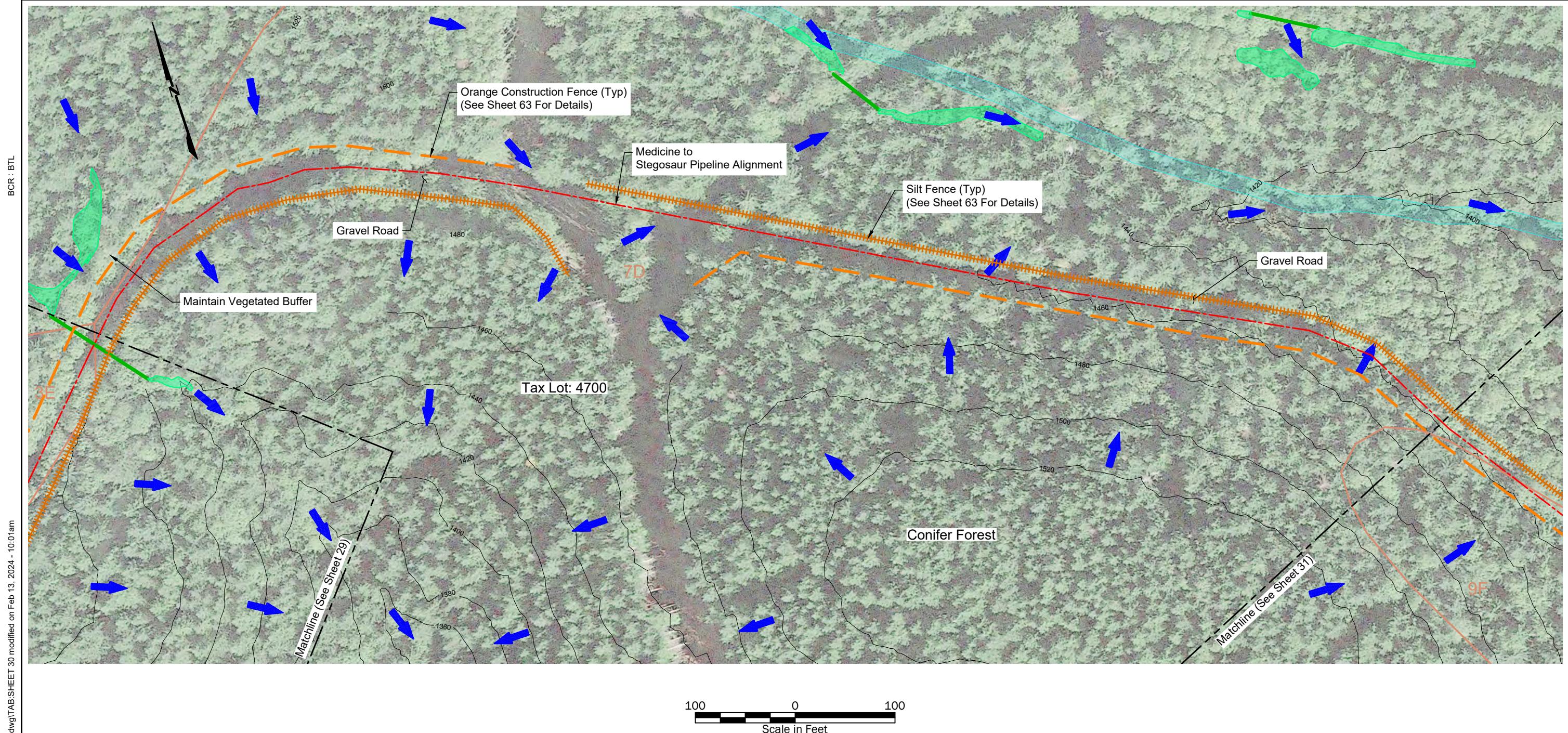
	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	NWI Riverine Habitat
	Drainage Direction
	Pipeline Alignment
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
	Check Dam (See Sheet 65 For Details)
	Project Specific Mapped Waterbodies
	Project Specific Mapped Culverts
	Project Specific Mapped Wetlands
	Property Line
	Major Contour - 20' Interval

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Revision	Description	Date	By	Chk	Rev

DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>
DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>
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Legend

	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	NWI Riverine Habitat
	Drainage Direction
	Pipeline Alignment
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
	Project Specific Mapped Culverts
	Project Specific Mapped Wetlands
	Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

DESIGNED: BCR SCALE: AS NOTED
 DRAWN: BTL DATE: 02/13/24
 CHECKED: BCR FILE: 6024-308-00

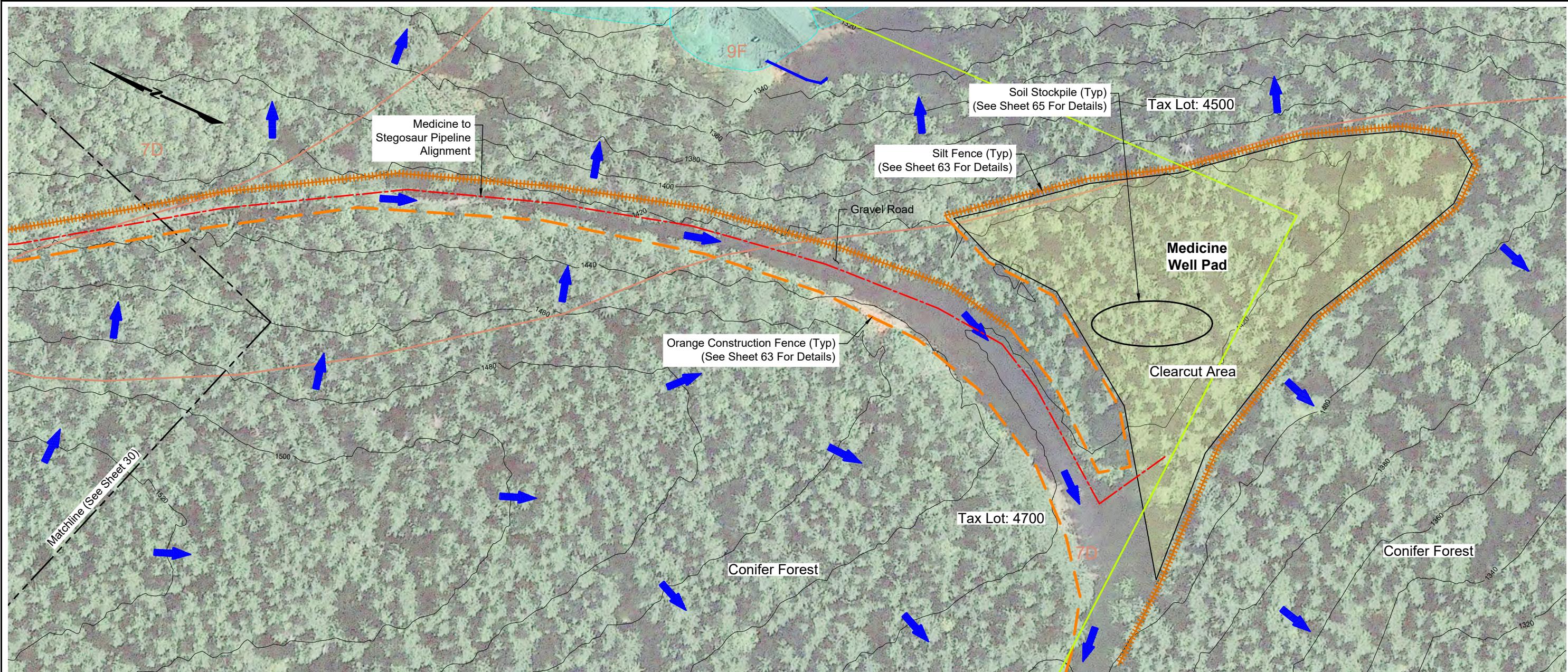


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NW NATURAL
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COLUMBIA COUNTY, OREGON

EROSION AND SEDIMENT CONTROL PLAN
UTILITY INSTALLATION/EROSION CONTROL BMPs PLAN

Drawing No.
SHEET 30
Sheet
33 of 70



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Legend

- 7D** NRCS Soil Map Unit Boundary And ID (See Sheet 4)
-  NWI Riverine Habitat
-  Drainage Direction
-  Pipeline Alignment
-  Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
-  Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
-  Project Specific Mapped Waterbodies
-  Well Pad
-  Property Line
-  Major Contour - 20' Interval

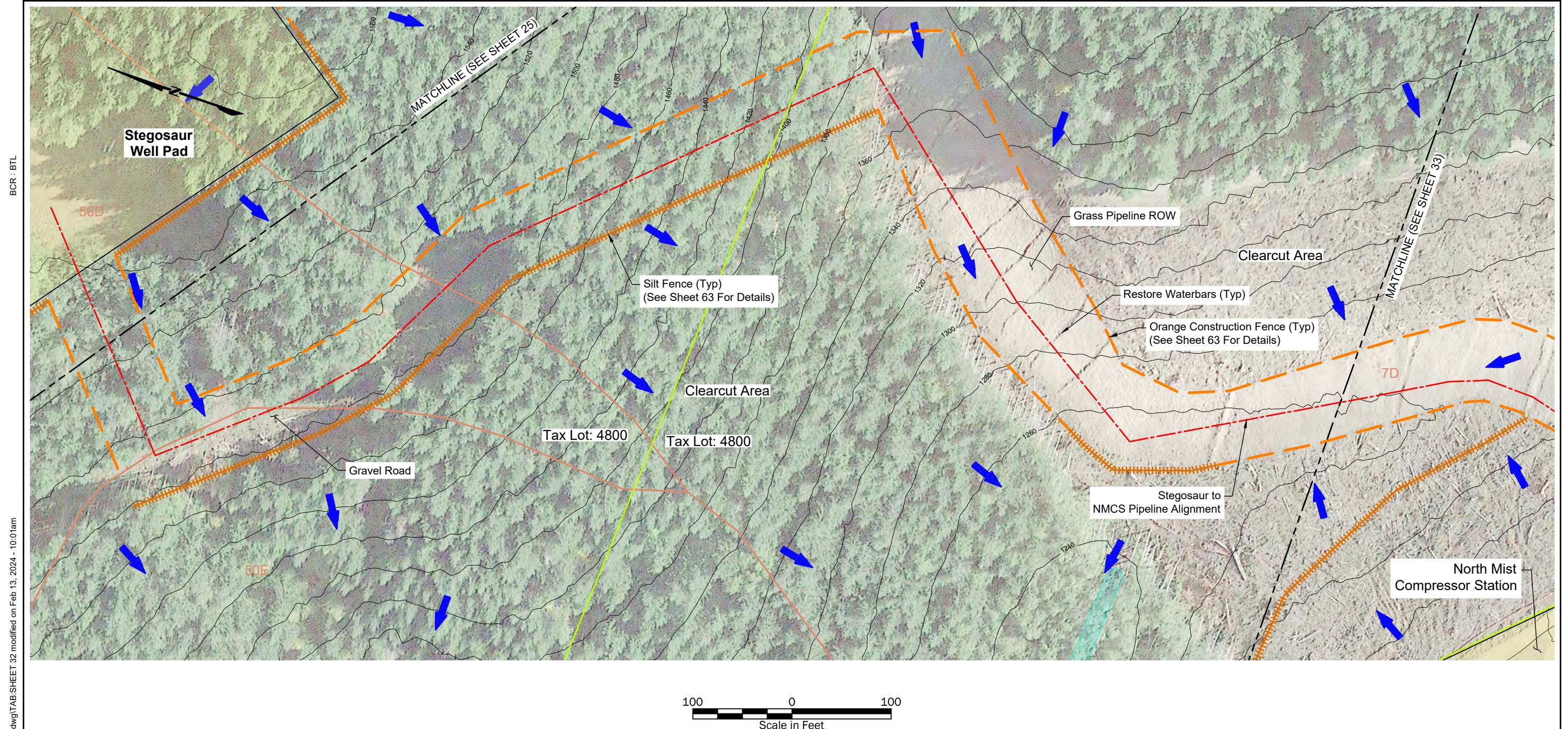
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<u>BTL</u>	DATE: <u>02/13/24</u>
CO: <u>BCR</u>	FILE: <u>6024-308-00</u>



4000 KRUSE WAY, BUILDING 3
SUITE 200
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NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON

Sheet 34 of 70



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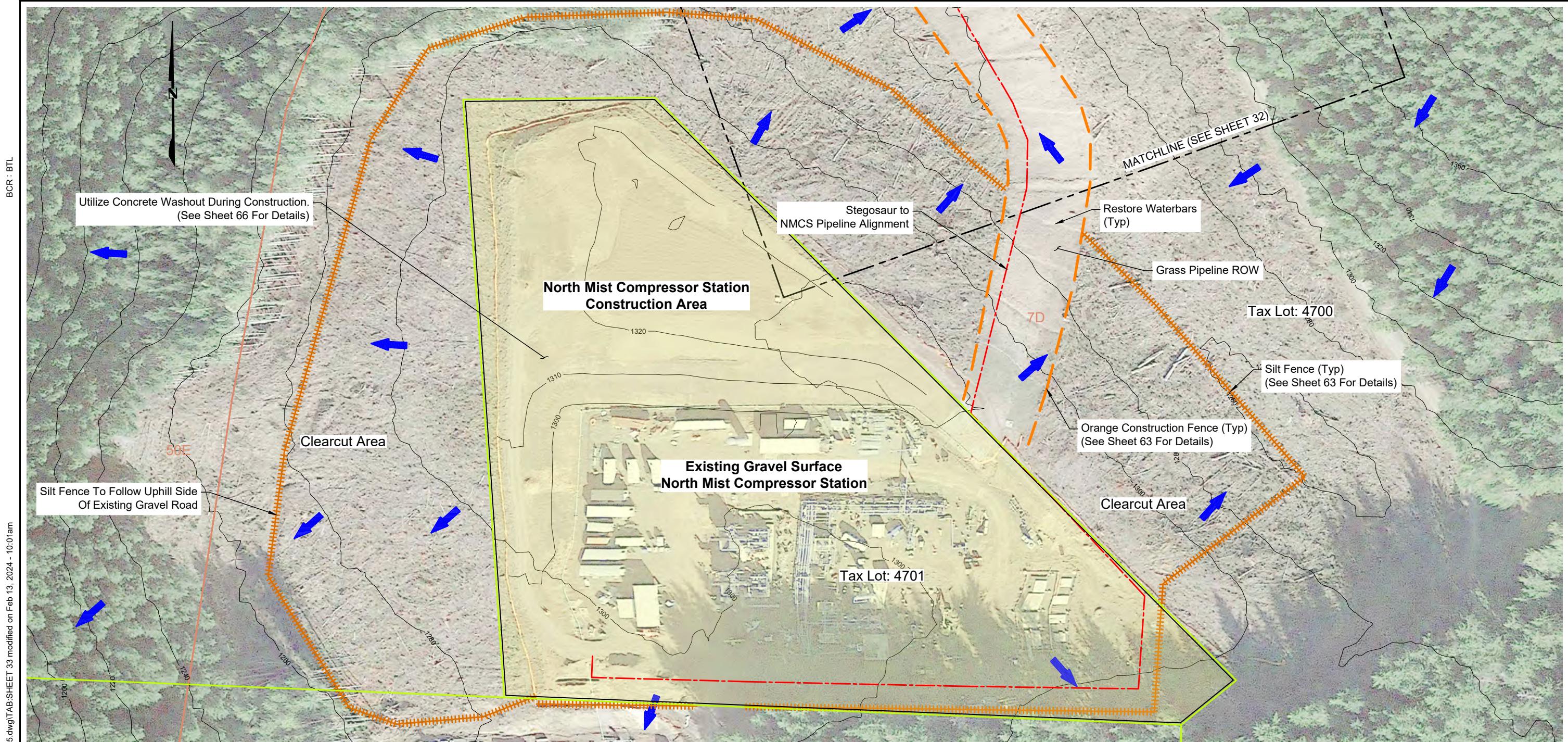
Revision	Description	Date	By	Chk	Rev	Design
						DESIGN
						DRAWN
						CHECKED

A horizontal scale bar with three segments. The left segment is labeled '100' at both ends. The middle segment is labeled '0' at both ends. The right segment is labeled '100' at both ends. Below the scale bar, the text 'Scale in Feet' is centered.

Legend

Legend

- 7D** NRCS Soil Map Unit Boundary And ID (See Sheet 4)
-  NWI Riverine Habitat
-  Drainage Direction
-  Pipeline Alignment
-  Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
-  Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
-  Well Pad / Compressor Station
-  Property Line
-  Major Contour - 20' Interval



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7. Edited Lidar data downloaded from <https://coast.noaa.gov/>. Aerial photos from Google Earth Pro © 2024, licensed to GeoEngineers, Inc., image dated 10-12-2018.
8. Project specific waterbodies, culverts and wetlands provided by Tetra Tech.

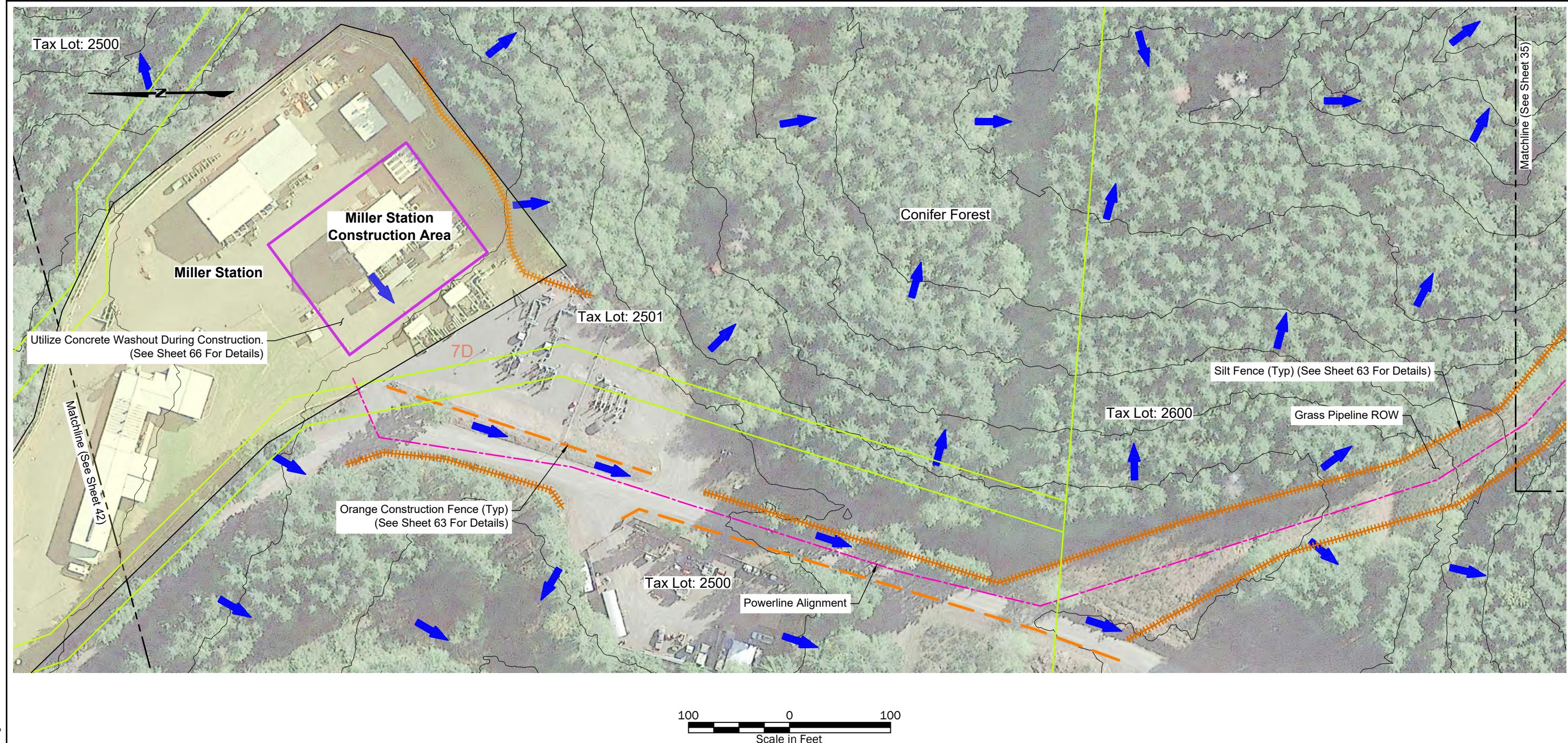
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Scale in Feet

Legend

- 7D NRCS Soil Map Unit Boundary And ID (See Sheet 4)
- Drainage Direction
- Pipeline Alignment
- Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
- Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
- North Mist Compressor Station
- Property Line
- Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

DESIGNED:	BCR	SCALE:	AS NOTED
DRAWN:	BTL	DATE:	02/13/24
CHECKED:	BCR	FILE:	6024-308-00



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Legend

	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	Drainage Direction
	Powerline Alignment
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
	Construction Limits
	Miller Station
	Property Line
	Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

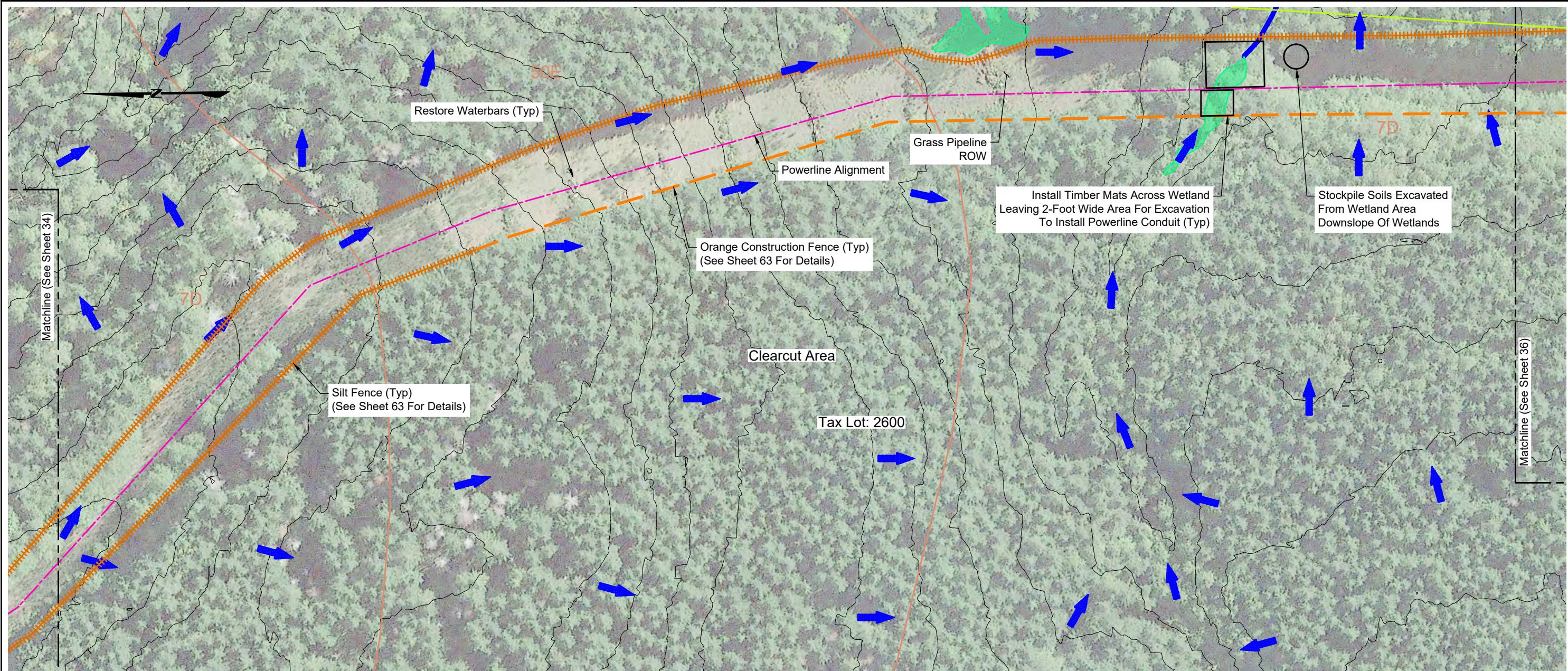
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DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>
CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>



4000 KRUSE WAY, BUILDING 3
SUITE 200
LAKE OSWEGO, OREGON 97035
P: 503/624-9274
F: 503/620-5940

NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON
EROSION AND SEDIMENT CONTROL PLAN
UTILITY INSTALLATION/EROSION CONTROL BMPs PLAN

Drawing No.
SHEET 34
Sheet
37 of 70



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100 0 100

Scale in Feet

Legend

	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	Drainage Direction
	Powerline Alignment
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
	Project Specific Mapped Waterbodies
	Project Specific Mapped Wetlands
	Property Line
	Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>
DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>
CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>

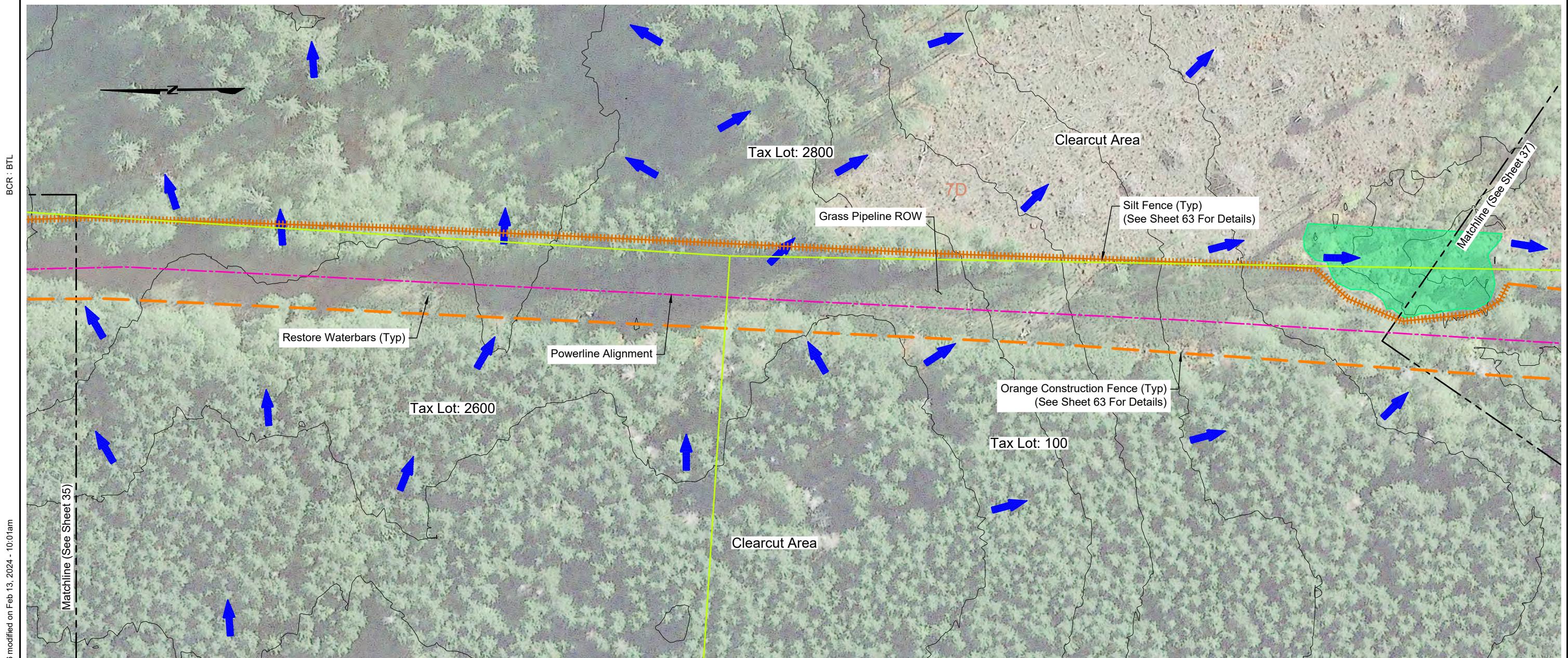


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NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON

EROSION AND SEDIMENT CONTROL PLAN
UTILITY INSTALLATION/EROSION CONTROL BMPs PLAN

Drawing No.
SHEET 35
Sheet
38 of 70



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Legend

- 7D NRCS Soil Map Unit Boundary And ID (See Sheet 4)
- Drainage Direction
- Powerline Alignment
- Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
- Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
- Project Specific Mapped Wetlands
- Property Line
- Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

DESIGNED:	BCR	SCALE:	AS NOTED
DRAWN:	BTL	DATE:	02/13/24
CHECKED:	BCR	FILE:	6024-308-00

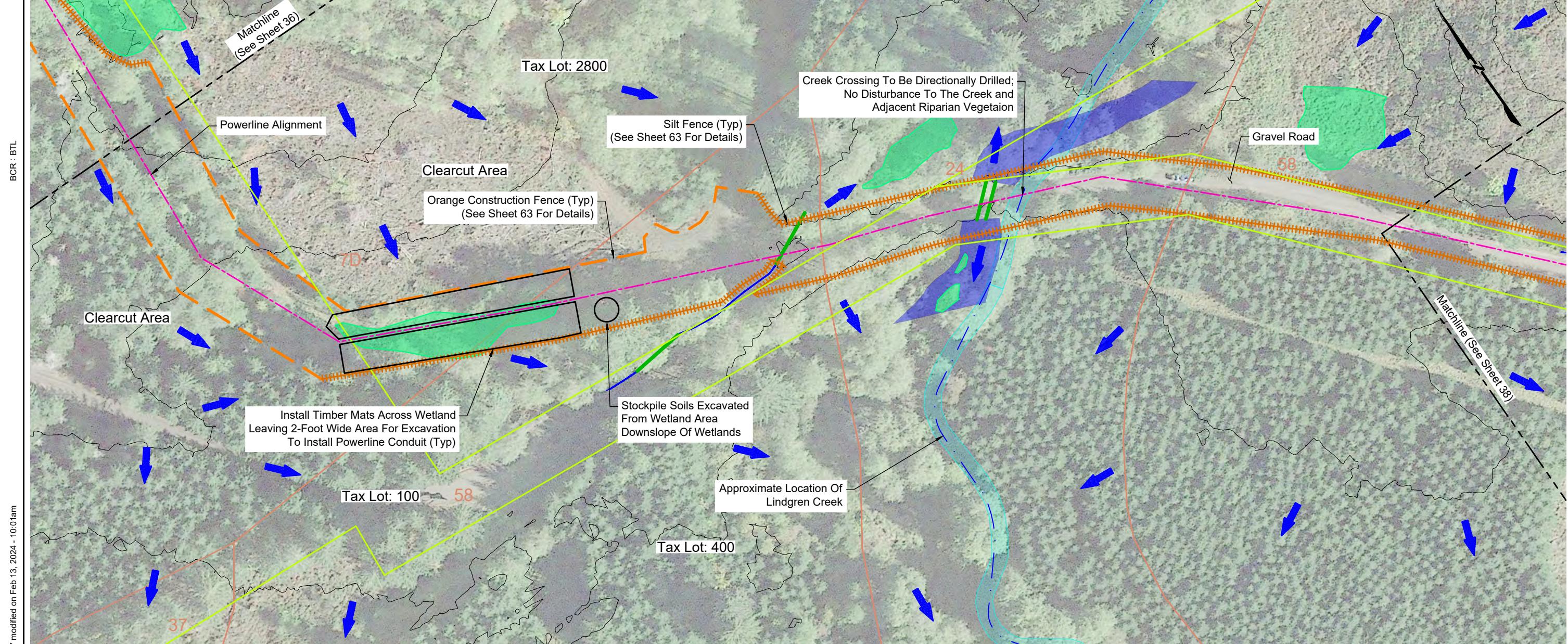


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LAKE OSWEGO, OREGON 97035
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NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON

EROSION AND SEDIMENT CONTROL PLAN
UTILITY INSTALLATION/EROSION CONTROL BMPs PLAN

Drawing No.
SHEET 36
Sheet
39 of 70



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Scale in Feet

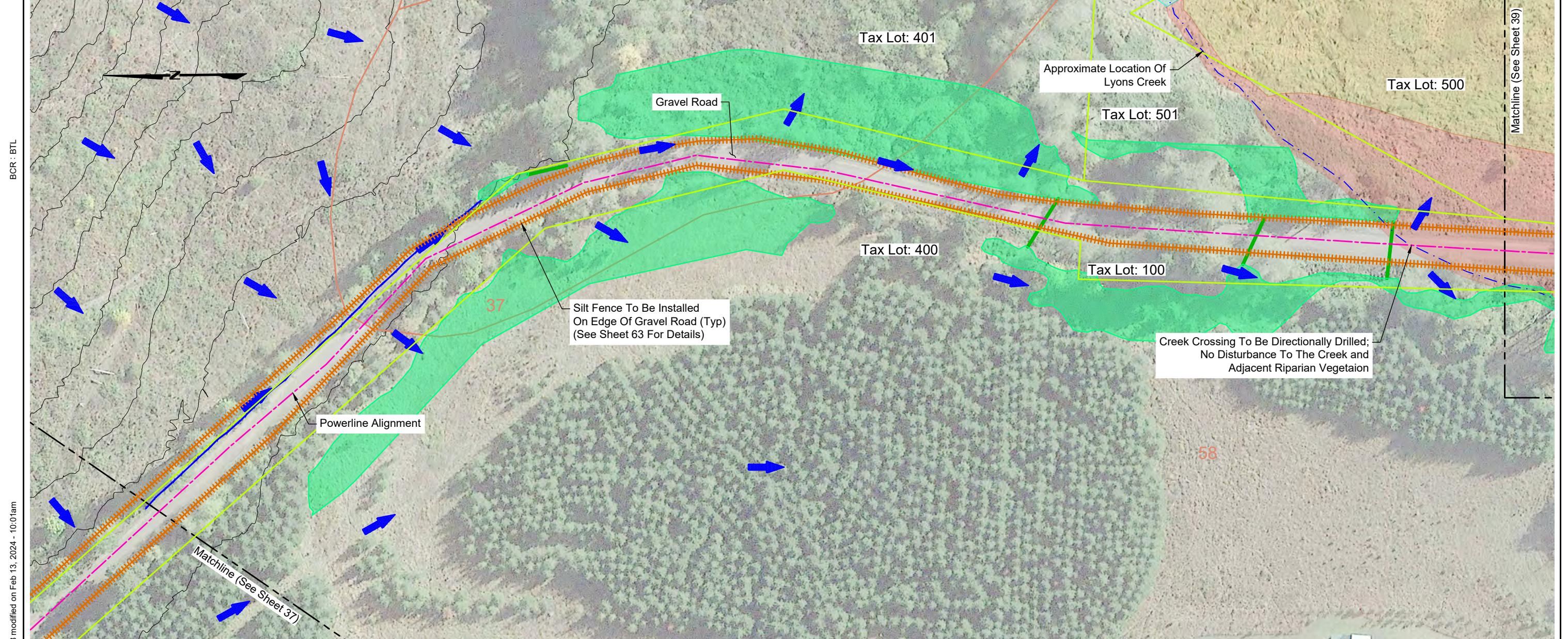
Legend

58	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	NWI Riverine Habitat
	Drainage Direction
	Powerline Alignment
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
	Creek Centerline
	Project Specific Mapped Waterbodies
	Project Specific Mapped Culverts
	Project Specific Mapped Wetlands
	Property Line
	Major Contour - 20' Interval

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Revision	Description	Date	By	Chk	Rev	DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>		NW NATURAL MIST RESILIENCY PROJECT COLUMBIA COUNTY, OREGON	Drawing No.
						DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>			SHEET 37
						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>			
									4000 KRUSE WAY, BUILDING 3 SUITE 200 LAKE OSWEGO, OREGON 97035 P: 503/624-9274 F: 503/620-5940	Sheet 40 of 70



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100 0 100
Scale in Feet

Legend

58	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	NWI Riverine Habitat
	NWI Forested Shrub Wetland
	NWI Emergent Wetland
	Drainage Direction
	Powerline Alignment
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
	Creek Centerline
	Project Specific Mapped Waterbodies
	Project Specific Mapped Culverts
	Project Specific Mapped Wetlands
	Property Line
	Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

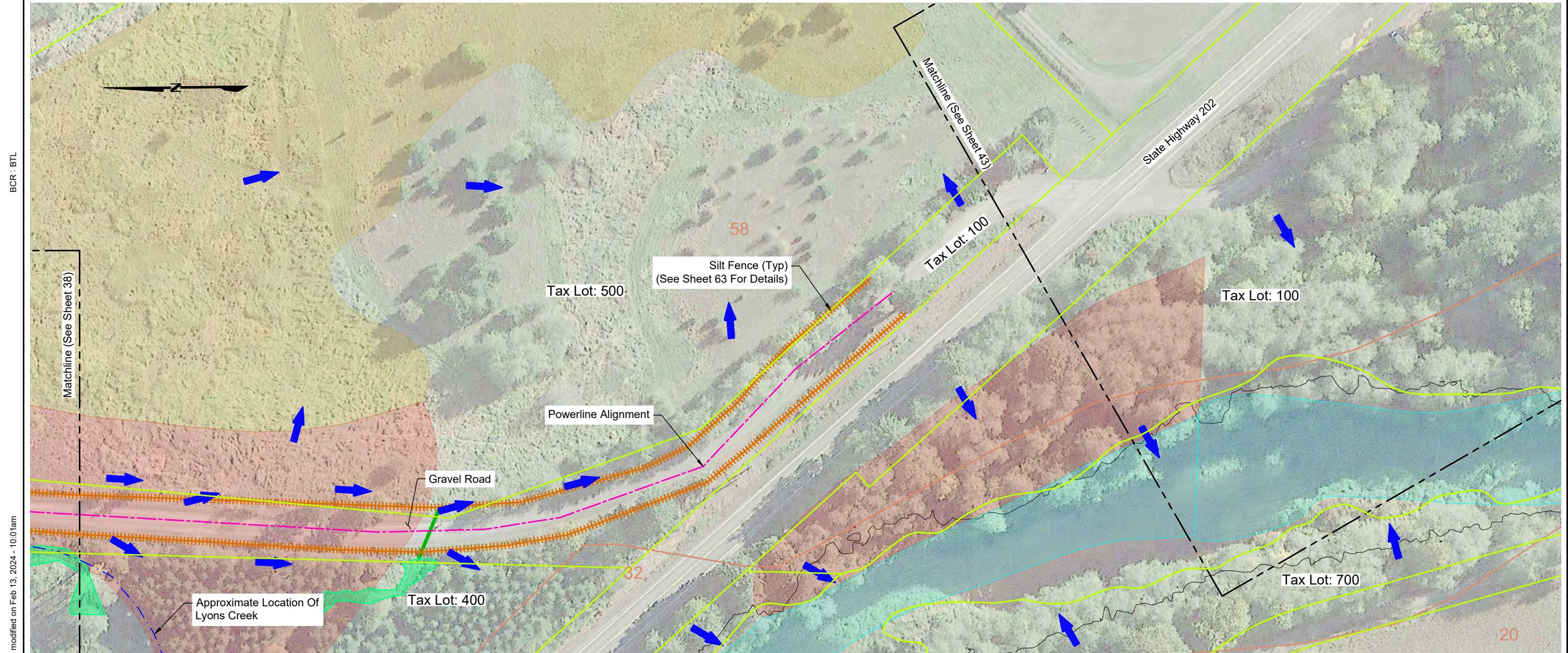
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CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>

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NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON

EROSION AND SEDIMENT CONTROL PLAN
UTILITY INSTALLATION/EROSION CONTROL BMPs PLAN

Drawing No.
SHEET 38
Sheet
41 of 70



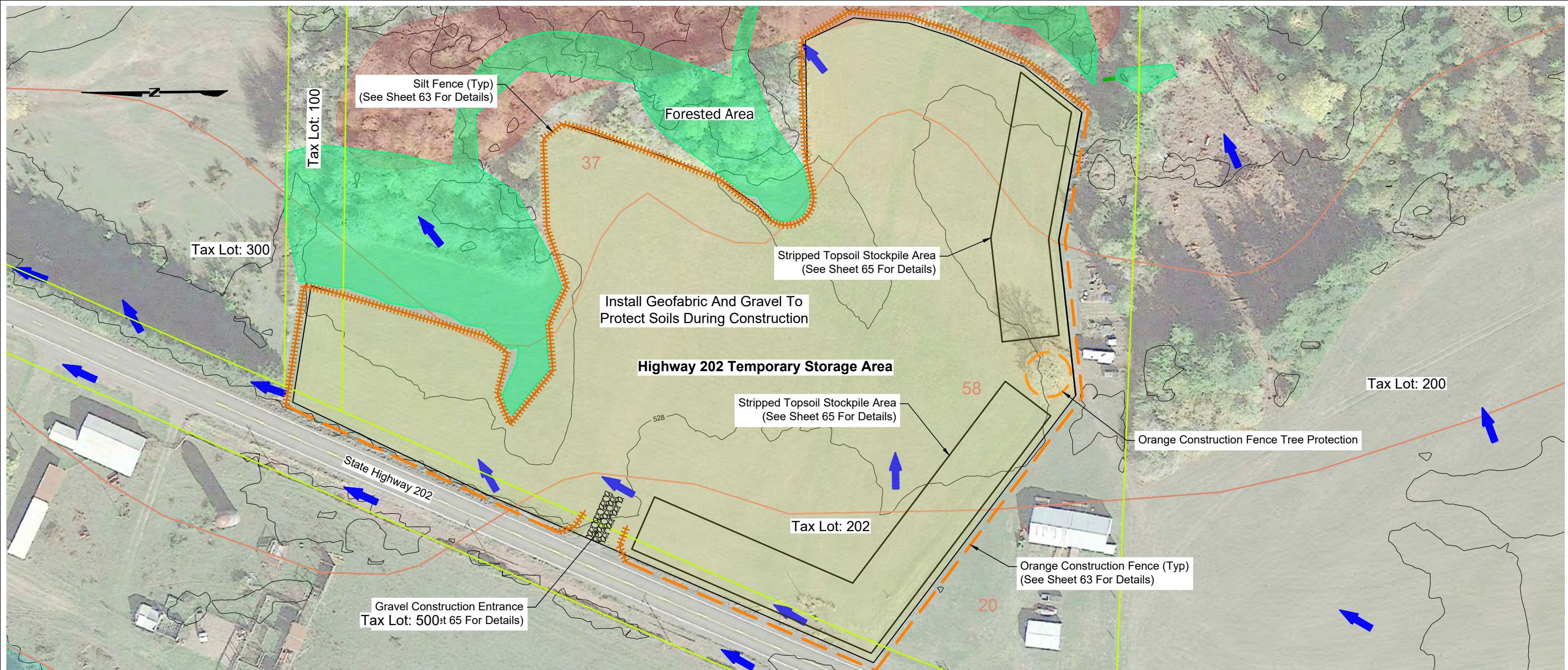
Legend

58	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	NWI Riverine Habitat
	NWI Forested Shrub Wetland
	NWI Emergent Wetland
	Drainage Direction
	Powerline Alignment
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
	Creek Centerline
	Project Specific Mapped Culverts
	Project Specific Mapped Wetlands
	Property Line
	Major Contour - 20' Interval

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Revision	Description	Date	By	Chk	Rev	DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>		NW NATURAL MIST RESILIENCY PROJECT COLUMBIA COUNTY, OREGON	Drawing No. SHEET 39
						DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>			
						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>			
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Legend

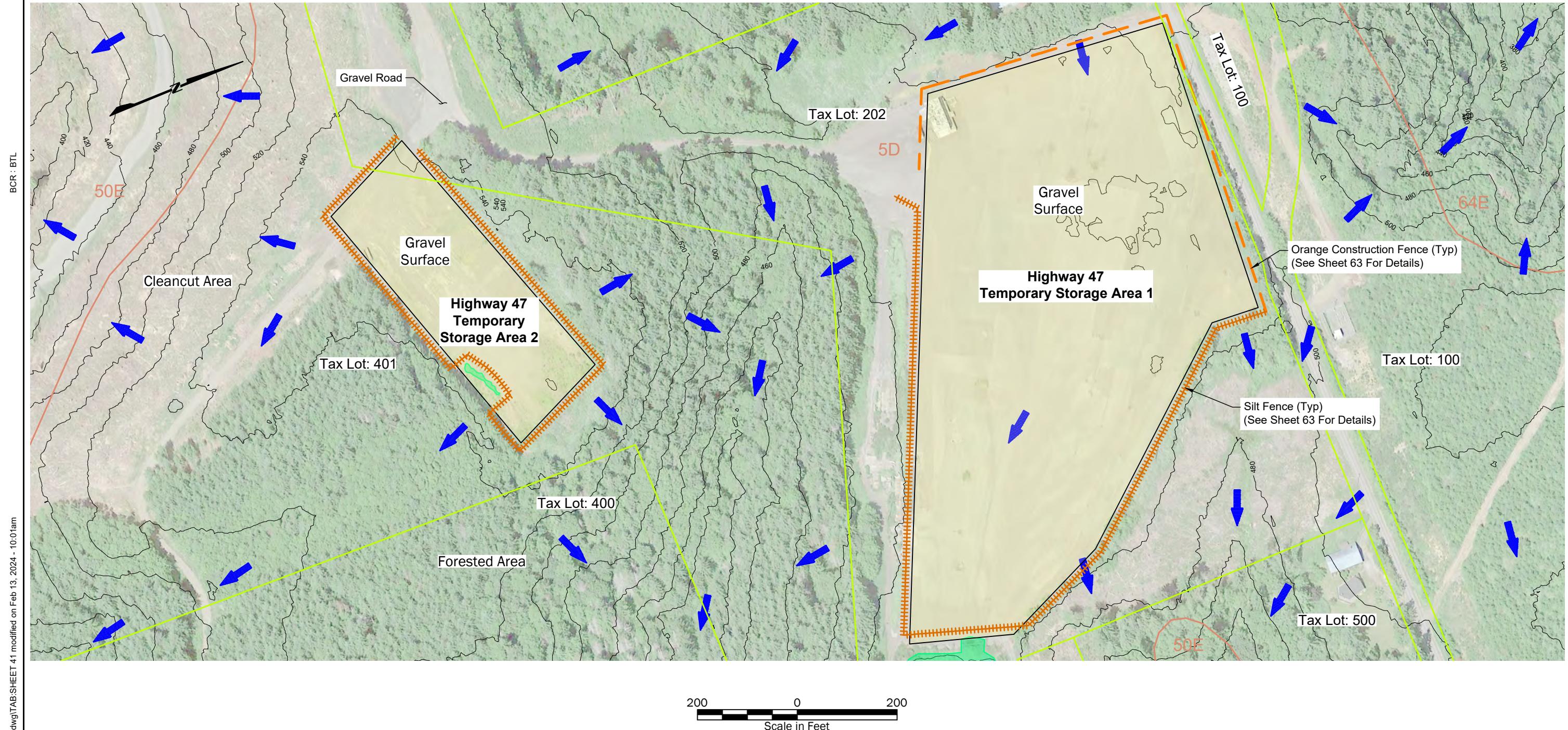
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■	NWI Forested Shrub Wetland
■	Drainage Direction
■	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
—	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
—	Project Specific Mapped Culverts
■	Project Specific Mapped Wetlands
■	Highway 202 Storage Area
—	Property Line
—	Major Contour - 20' Interval

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Revision	Description	Date	By	Chk	Rev

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CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>



General Notes:

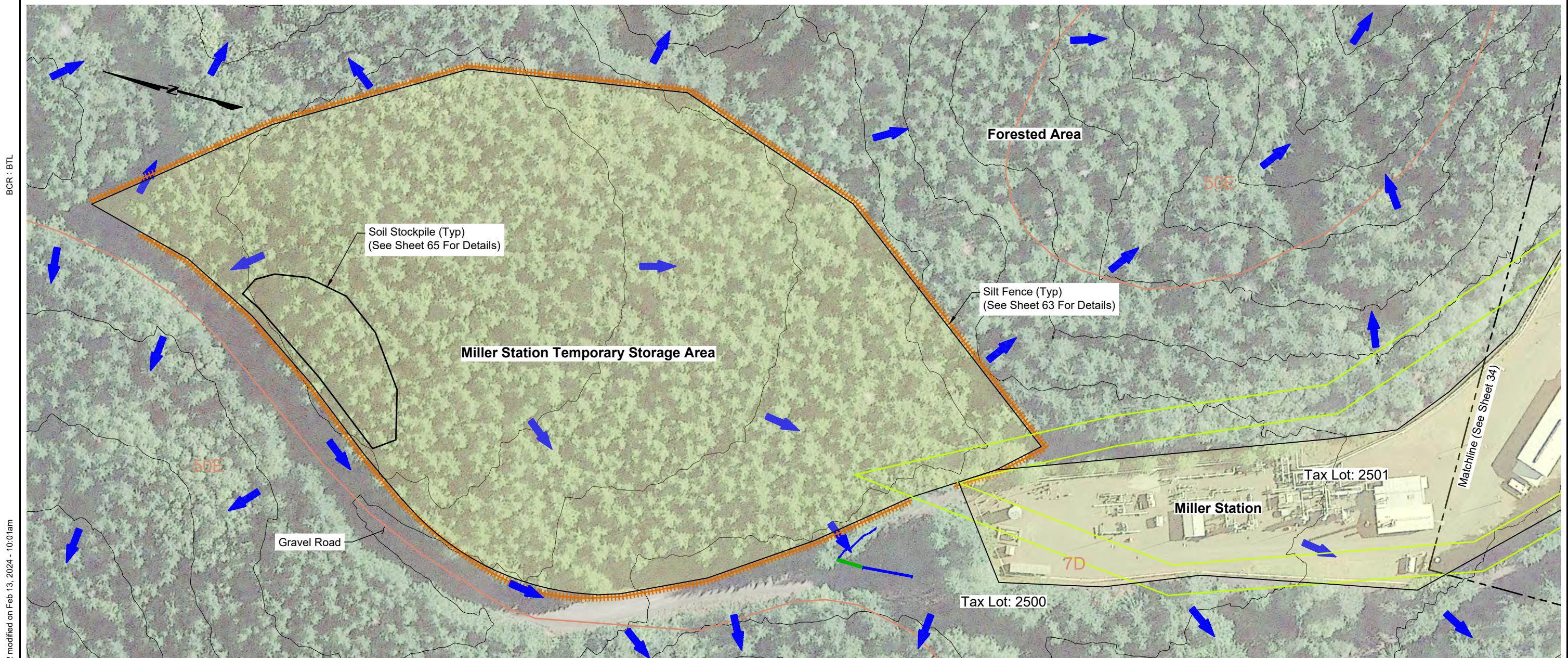
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Legend

	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	Drainage Direction
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
	Project Specific Mapped Wetlands
	Highway 47 Storage Yards
	Property Line
	Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

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Legend

- 5D NRCS Soil Map Unit Boundary And ID (See Sheet 4)
- Drainage Direction
- Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
- Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
- Project Specific Mapped Waterbodies
- Project Specific Mapped Culverts
- Miller Station And Storage Area
- Property Line
- Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

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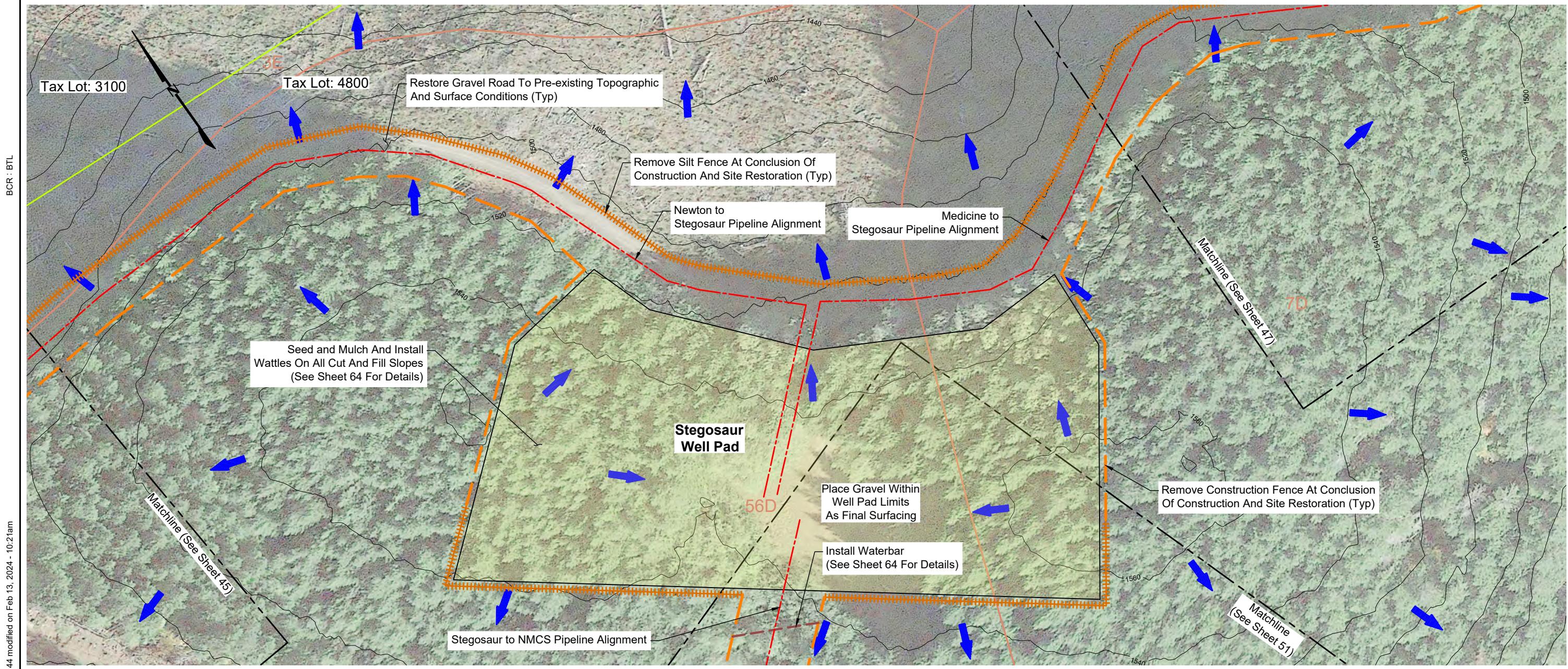
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Legend

5D	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	NWI Riverine Habitat NWI Forested Shrub Wetland
	Drainage Direction Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details) Project Specific Mapped Waterbodies
	Project Specific Mapped Wetlands Bark-and-Haul Storage Area
	Property Line Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>	
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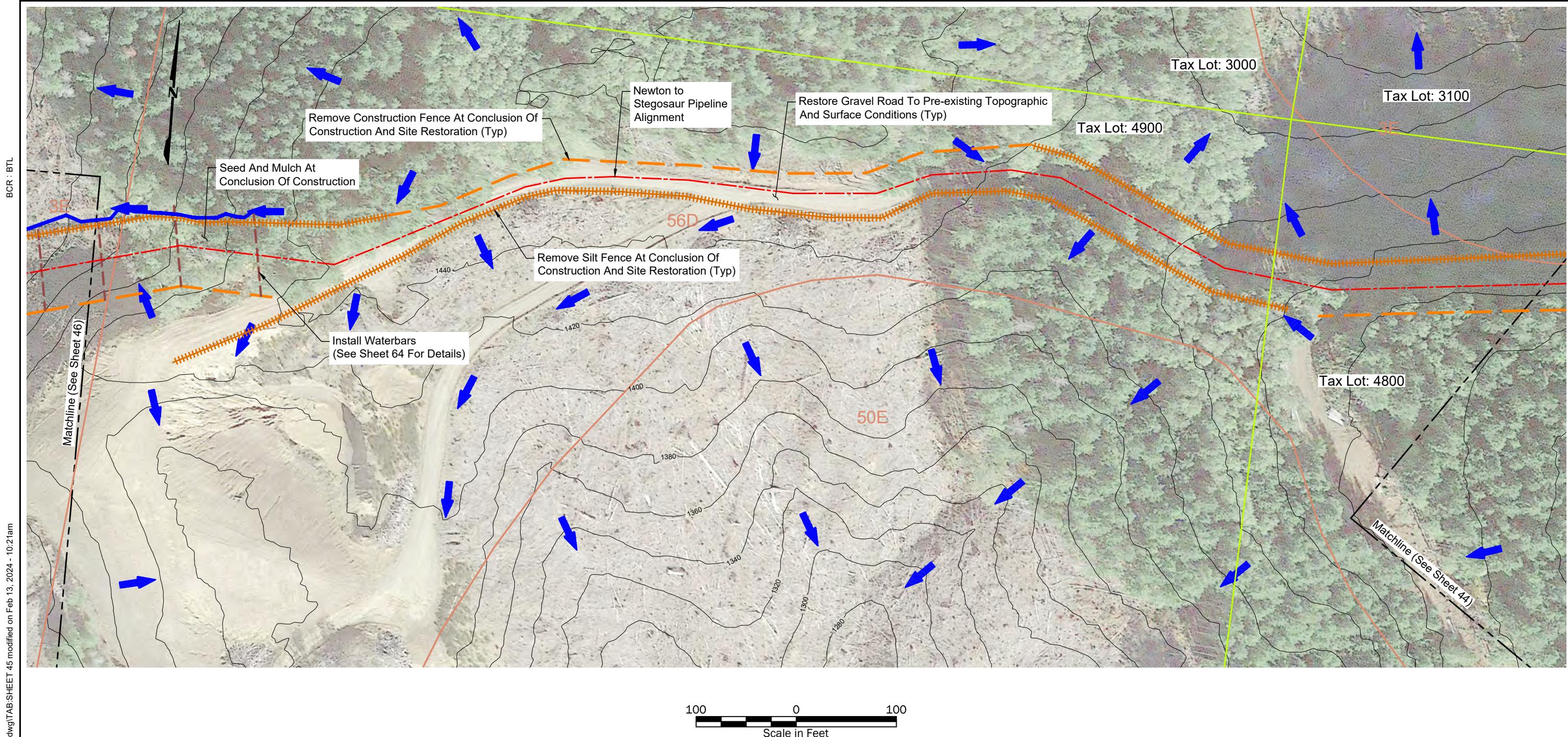
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Legend

7D	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
→	Drainage Direction
—	Pipeline Alignment
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
—	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
—	Waterbar (See Sheet 64 For Details)
■	Well Pad
—	Property Line
—	Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>	
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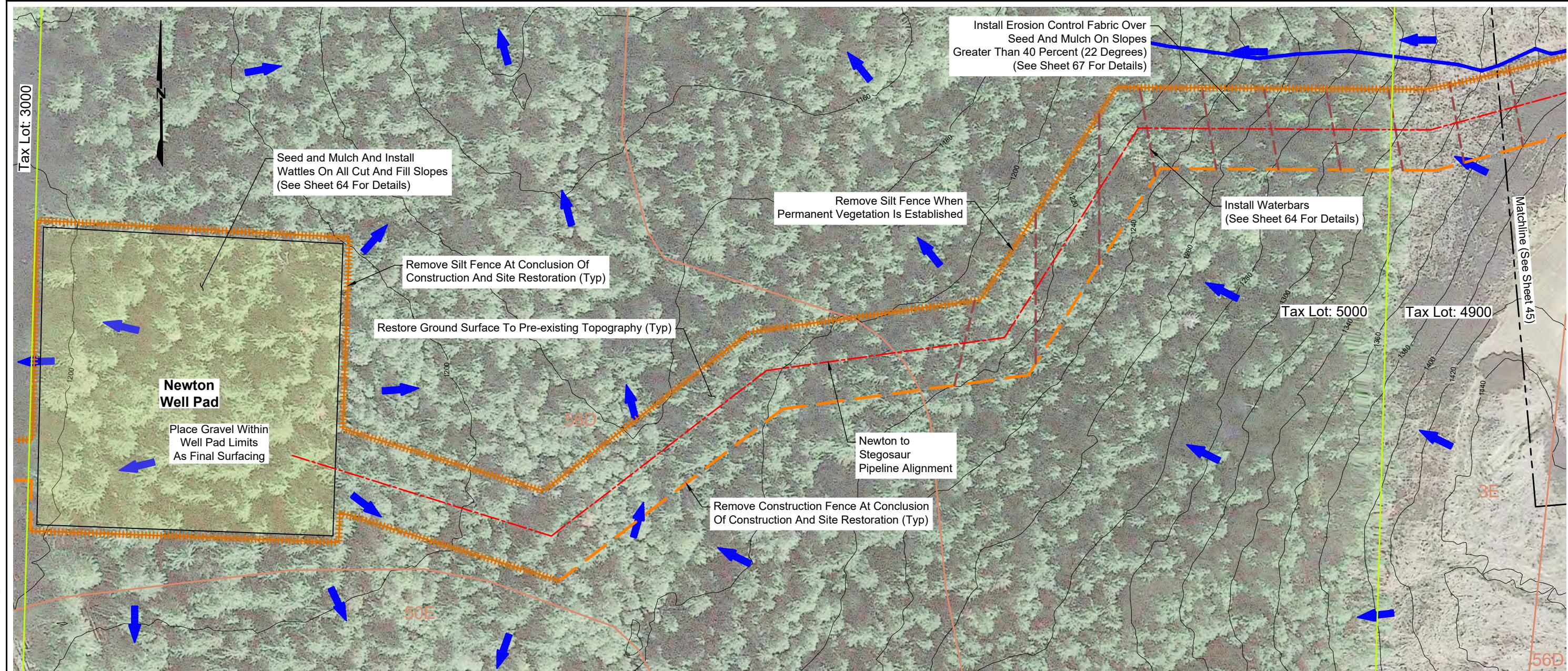
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Legend

- NRCS Soil Map Unit Boundary And ID (See Sheet 4)
- Drainage Direction
- Pipeline Alignment
- Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
- Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
- Waterbar (See Sheet 64 For Details)
- Project Specific Mapped Waterbodies
- Property Line
- Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

DESIGNED:	BCR	SCALE:	AS NOTED
DRAWN:	BTL	DATE:	02/13/24
CHECKED:	BCR	FILE:	6024-308-00



100 0 100
Scale in Feet

Legend

3E	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
►	Drainage Direction
—	Pipeline Alignment
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
—	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
—	Waterbar (See Sheet 64 For Details)
—	Project Specific Mapped Waterbodies
Well Pad	
Property Line	
Major Contour - 20' Interval	

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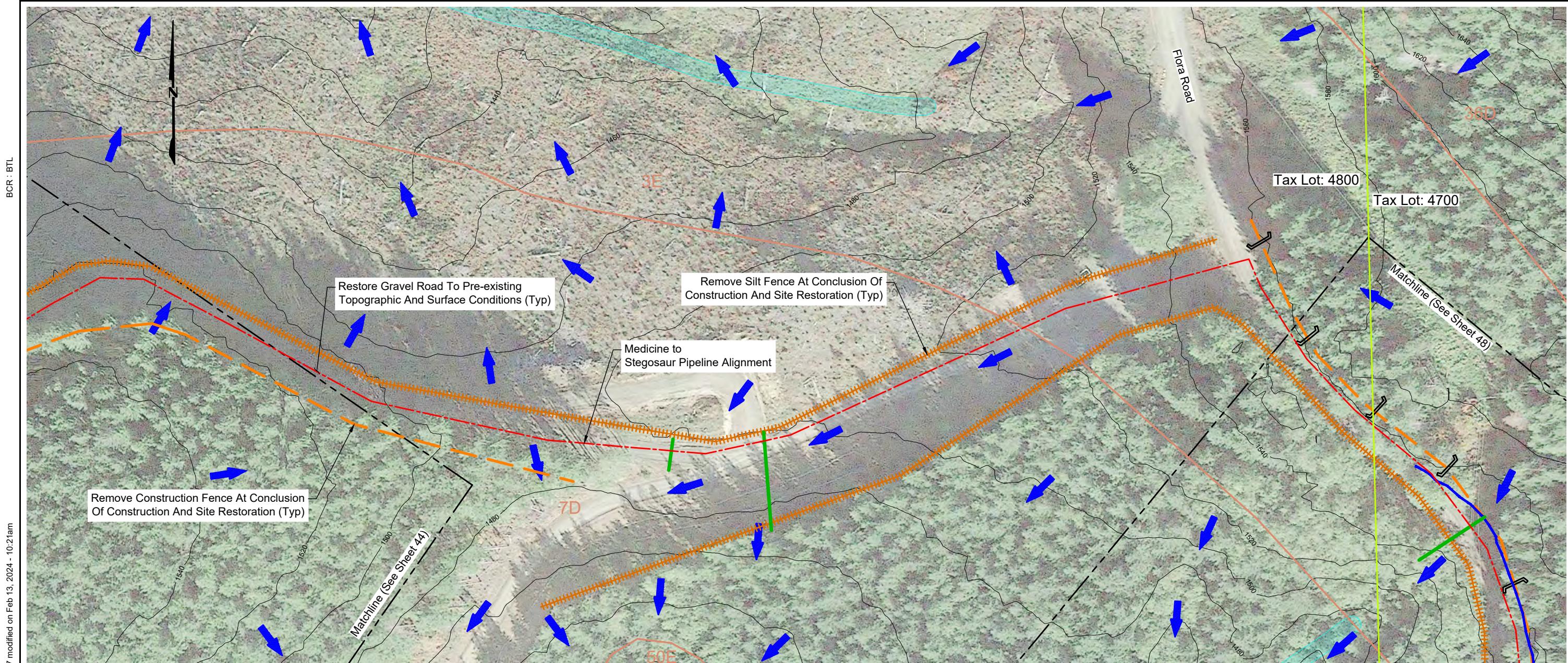
Revision	Description	Date	By	Chk	Rev

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GEOENGINEERS
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SUITE 200
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NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON
EROSION AND SEDIMENT CONTROL PLAN
SITE RESTORATION PLAN

Drawing No.
SHEET 46
Sheet
49 of 70



100 0 100
Scale in Feet

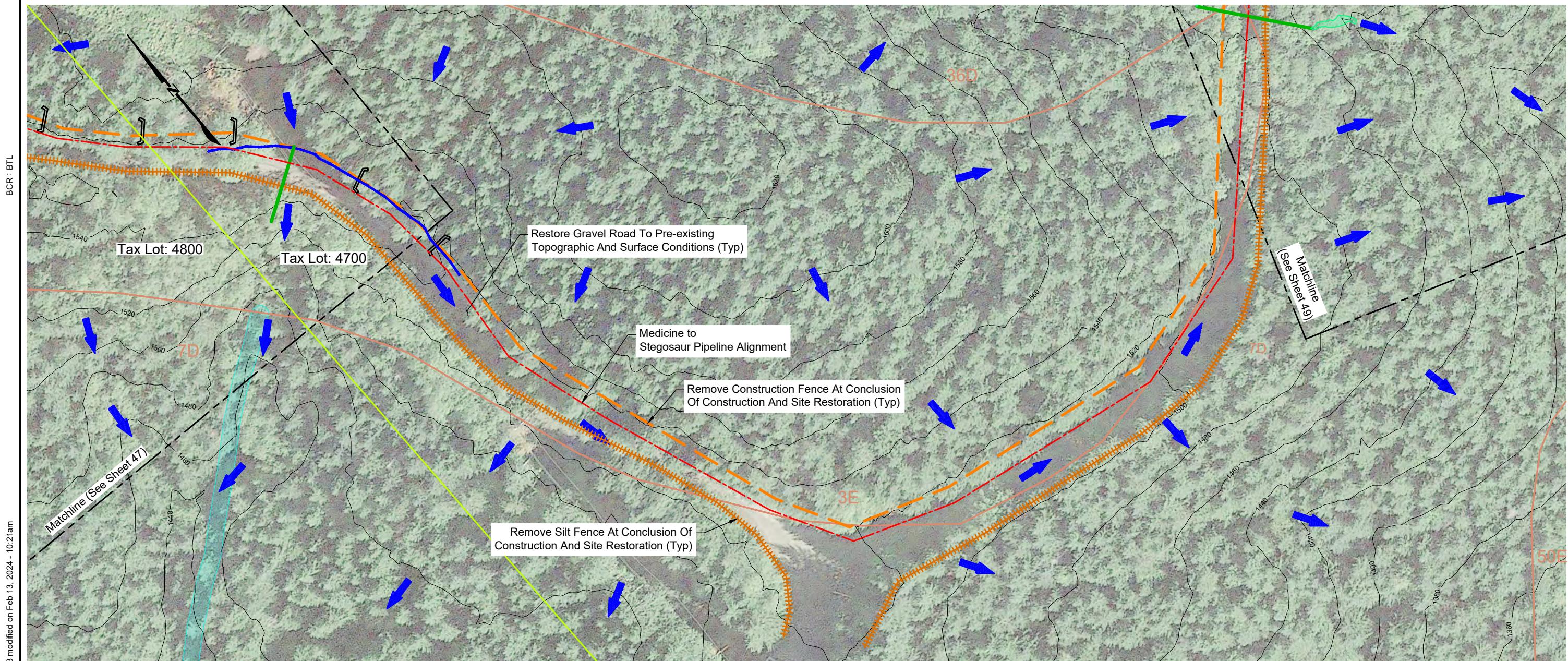
Legend

7D	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	NWI Riverine Habitat
	Drainage Direction
	Pipeline Alignment
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
	Check Dam (See Sheet 65 For Details)
	Project Specific Mapped Waterbodies
	Project Specific Mapped Culverts
	Property Line
	Major Contour - 20' Interval

General Notes:

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7. Edited Lidar data downloaded from <https://coast.noaa.gov/>. Aerial photos from Google Earth Pro © 2024, licensed to GeoEngineers, Inc., image dated 10-12-2018.
8. Project specific waterbodies, culverts and wetlands provided by Tetra Tech.

Revision	Description	Date	By	Chk	Rev	DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>		NW NATURAL MIST RESILIENCY PROJECT COLUMBIA COUNTY, OREGON	Drawing No.	
						DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>			SHEET 47	
						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>			Sheet	
						GEOENGINEERS		4000 KRUSE WAY, BUILDING 3 SUITE 200 LAKE OSWEGO, OREGON 97035 P: 503/624-9274 F: 503/620-5940			
								EROSION AND SEDIMENT CONTROL PLAN SITE RESTORATION PLAN			
								50 of 70			



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100 0 100

Scale in Feet

Legend

7D	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
NWI Riverine Habitat	
Drainage Direction	
Pipeline Alignment	
Orange Silt Fence / Construction Limits (See Sheet 63 For Details)	
Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)	
Check Dam (See Sheet 65 For Details)	
Project Specific Mapped Waterbodies	
Project Specific Mapped Culverts	
Project Specific Mapped Wetlands	
Property Line	
Major Contour - 20' Interval	

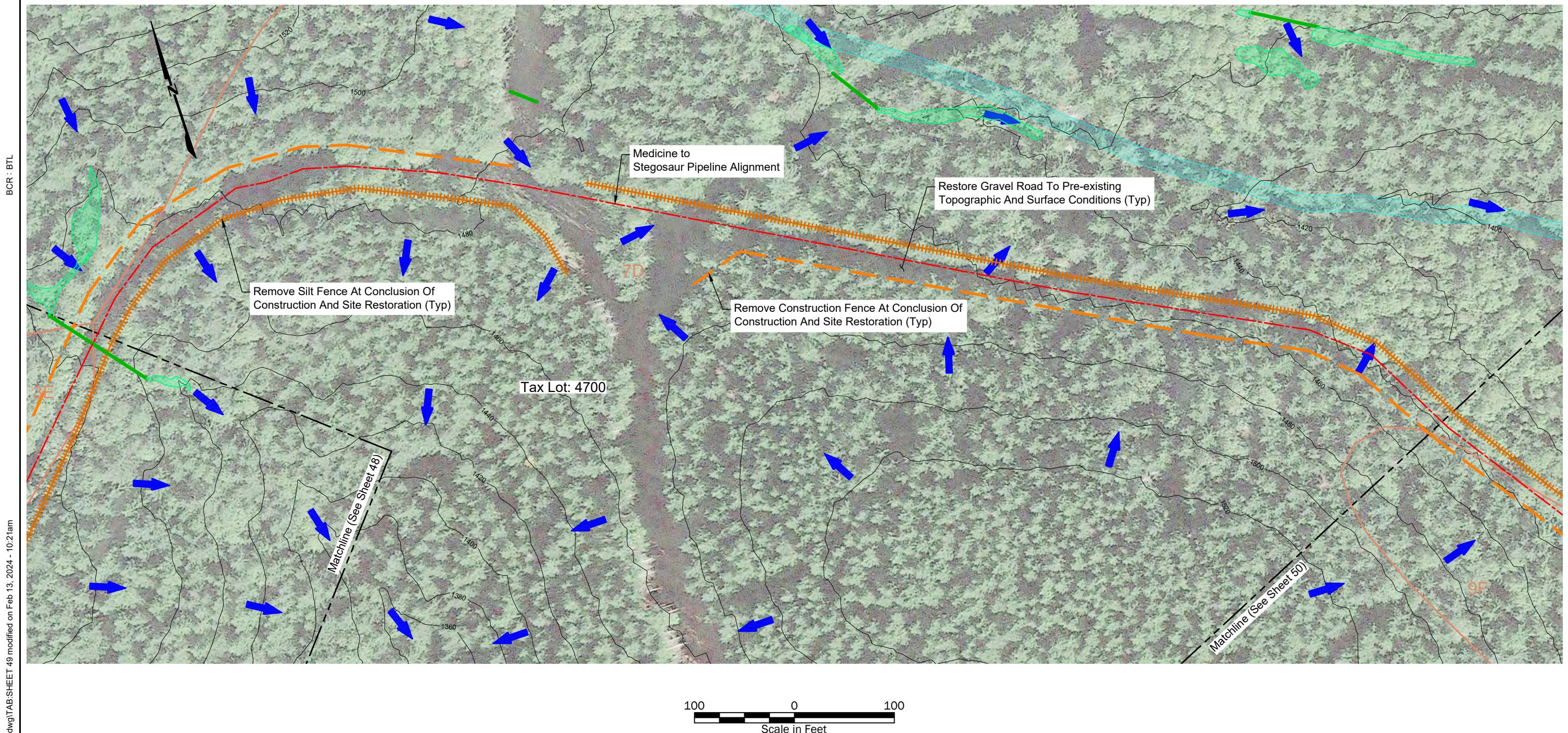
Revision	Description	Date	By	Chk	Rev

DESIGNED: <u>BCR</u>	SCALE: <u>AS NOTED</u>
DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>
CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>

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4000 KRUSE WAY, BUILDING 3
SUITE 200
LAKE OSWEGO, OREGON 97035
P: 503/624-9274
F: 503/620-5940

NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON
EROSION AND SEDIMENT CONTROL PLAN
SITE RESTORATION PLAN

Drawing No.
SHEET 48
Sheet
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General Notes:

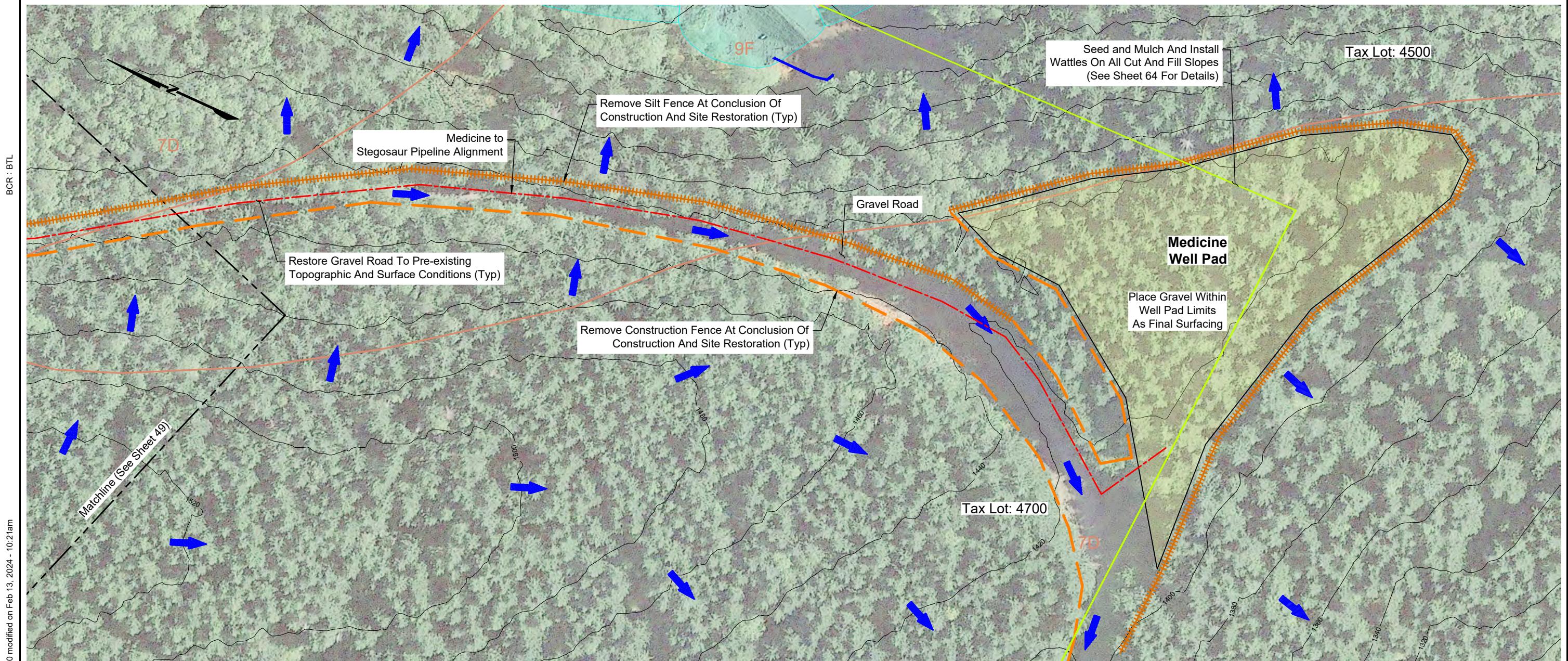
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Legend

	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	NWI Riverine Habitat
	Drainage Direction
	Pipeline Alignment
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
	Project Specific Mapped Culverts
	Project Specific Mapped Wetlands
	Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

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CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>



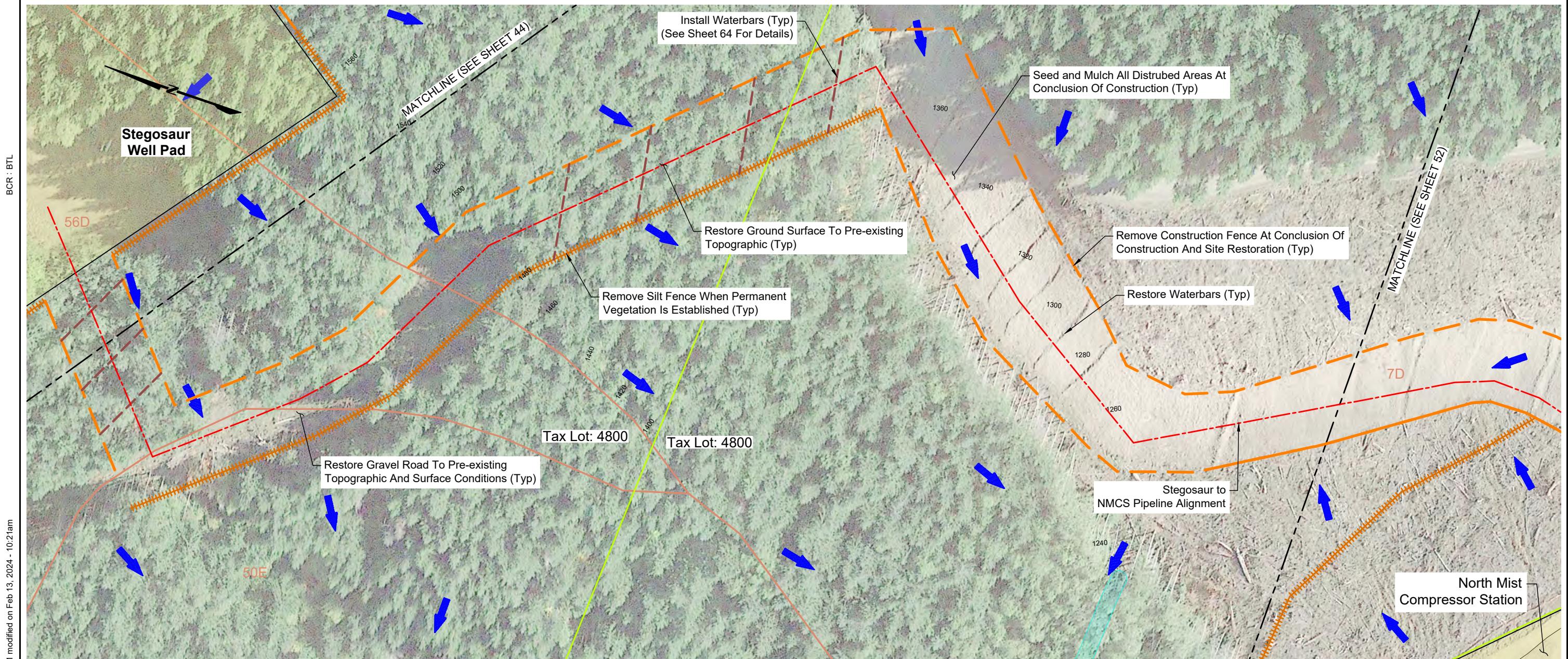
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7D	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
NWI Riverine Habitat	
Drainage Direction	
Pipeline Alignment	
Orange Silt Fence / Construction Limits (See Sheet 63 For Details)	
Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)	
Project Specific Mapped Waterbodies	
Well Pad	
Property Line	
Major Contour - 20' Interval	

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						DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>			SHEET 50
						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>			Sheet 53 of 70
									4000 KRUSE WAY, BUILDING 3 SUITE 200 LAKE OSWEGO, OREGON 97035 P: 503/624-9274 F: 503/620-5940	



Legend

7D	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
NWI Riverine Habitat	
Drainage Direction	
Pipeline Alignment	
Orange Silt Fence / Construction Limits (See Sheet 63 For Details)	
Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)	
Waterbar (See Sheet 64 For Details)	
Well Pad / Compressor Station	
Property Line	
Major Contour - 20' Interval	

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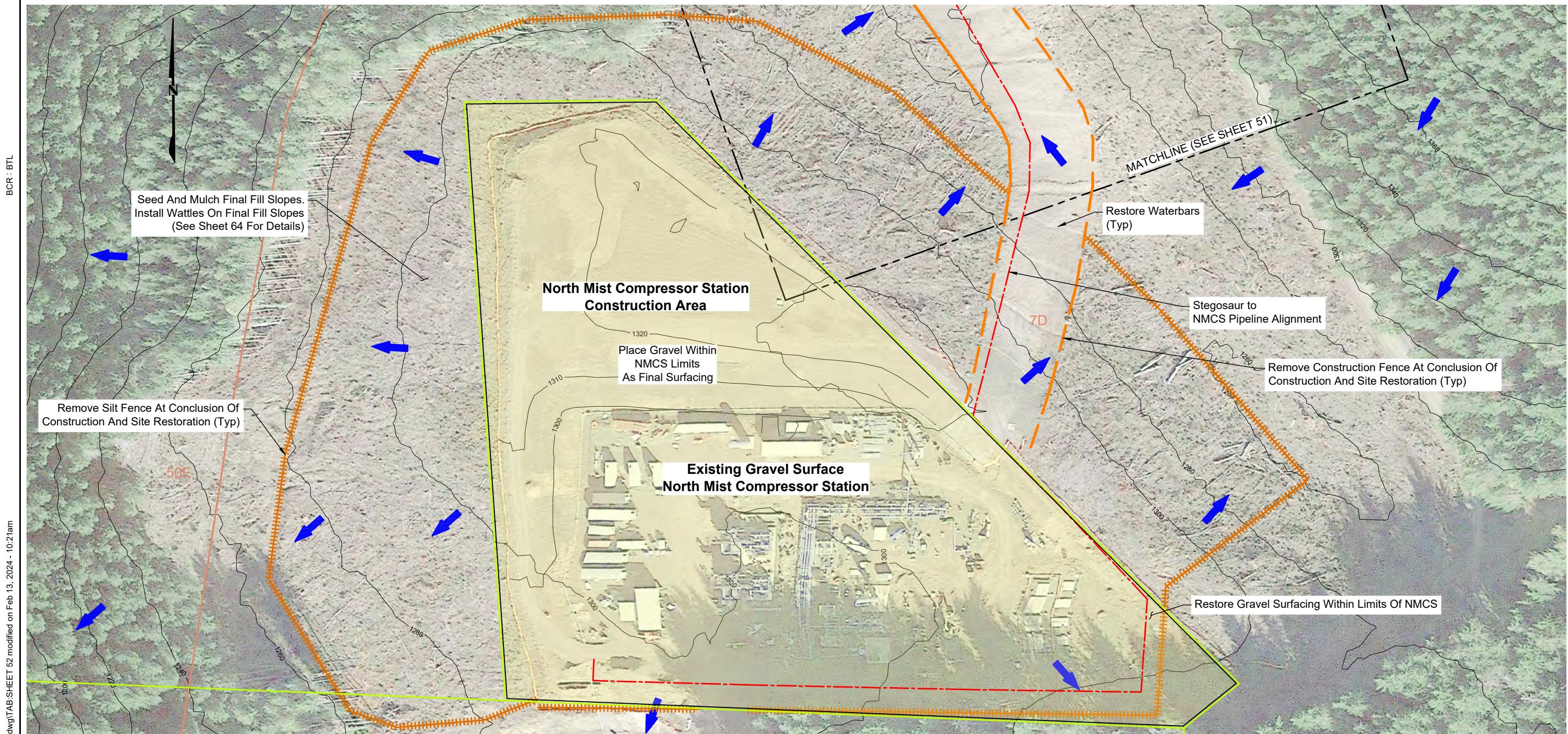
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CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>



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NW NATURAL
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COLUMBIA COUNTY, OREGON
EROSION AND SEDIMENT CONTROL PLAN
SITE RESTORATION PLAN

Drawing No.
SHEET 51
Sheet
54 of 70



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8. Project specific waterbodies, culverts and wetlands provided by Tetra Tech.

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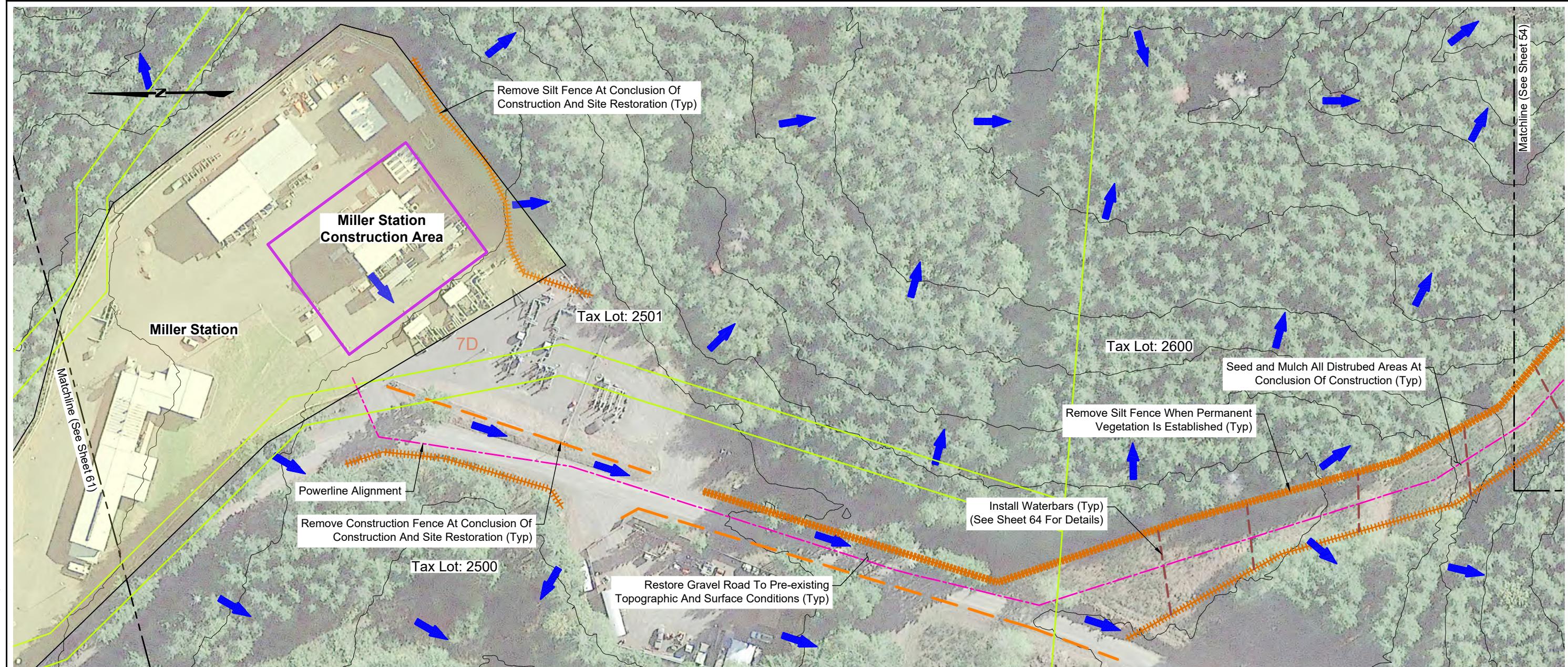
Scale in Feet

Legend

- 7D NRCS Soil Map Unit Boundary And ID (See Sheet 4)
- Drainage Direction
- Pipeline Alignment
- Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
- Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
- Compressor Station
- Property Line
- Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

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Scale in Feet

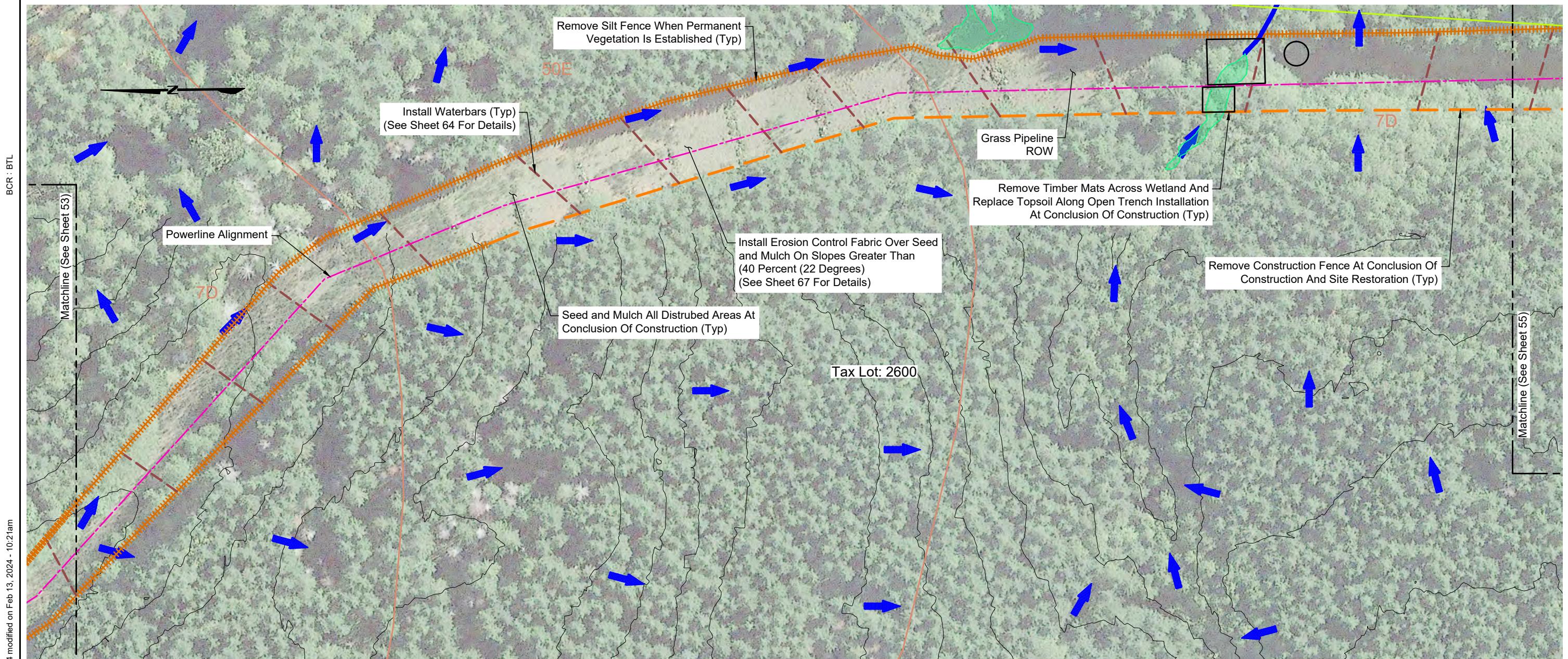
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7D	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
►	Drainage Direction
—	Powerline Alignment
 	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
—	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
—	Construction Limits
—	Waterbar (See Sheet 64 For Details)
■	Miller Station
—	Property Line
—	Major Contour - 20' Interval

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8. Project specific waterbodies, culverts and wetlands provided by Tetra Tech.

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						DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>				SHEET 53
						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>				Sheet 56 of 70



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100 0 100

Scale in Feet

Legend

7D	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
►	Drainage Direction
—	Powerline Alignment
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
—	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
—	Waterbar (See Sheet 64 For Details)
—	Project Specific Mapped Waterbodies
■	Project Specific Mapped Wetlands
—	Property Line
—	Major Contour - 20' Interval

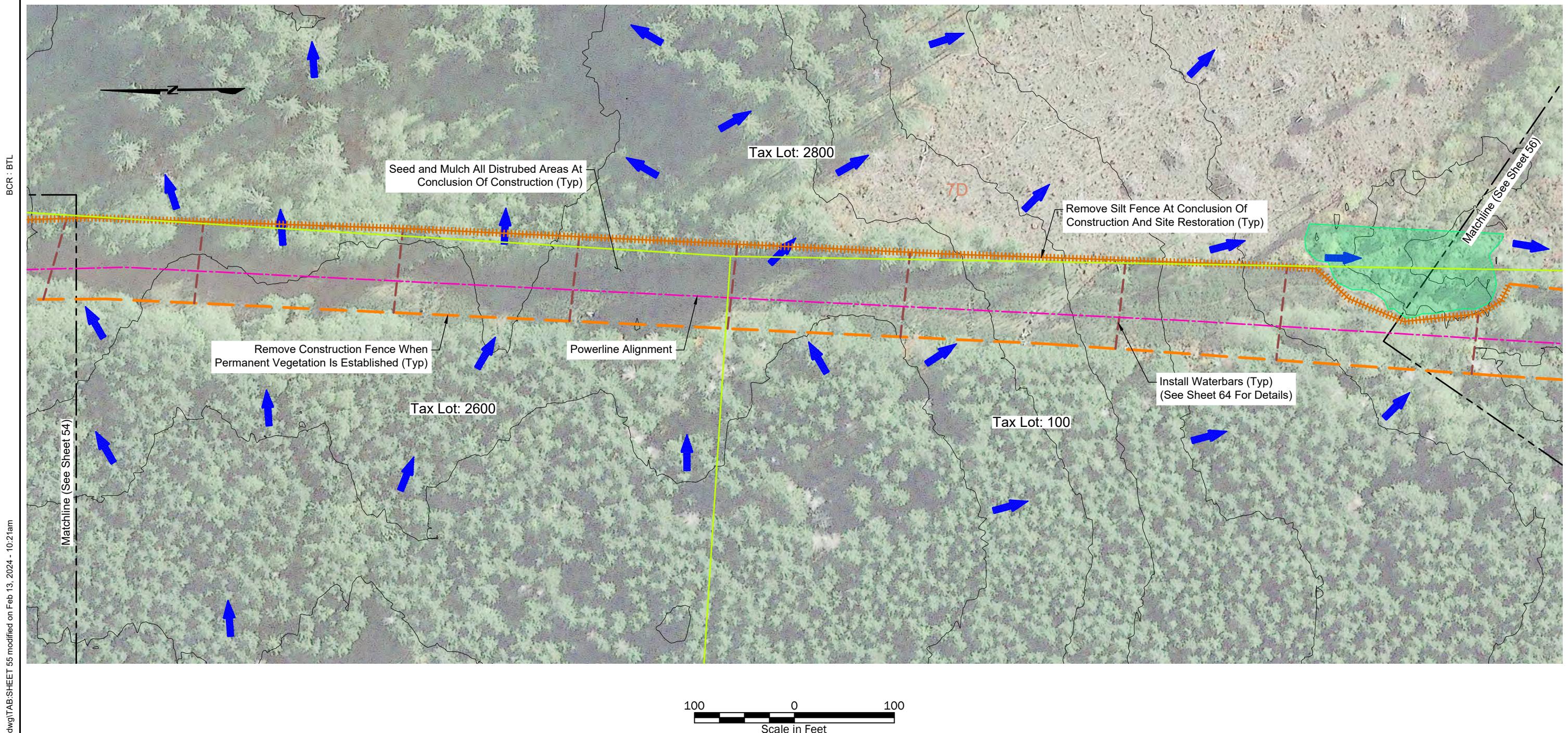
Revision	Description	Date	By	Chk	Rev

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COLUMBIA COUNTY, OREGON
EROSION AND SEDIMENT CONTROL PLAN
SITE RESTORATION PLAN

Drawing No.
SHEET 54
Sheet
57 of 70



General Notes:

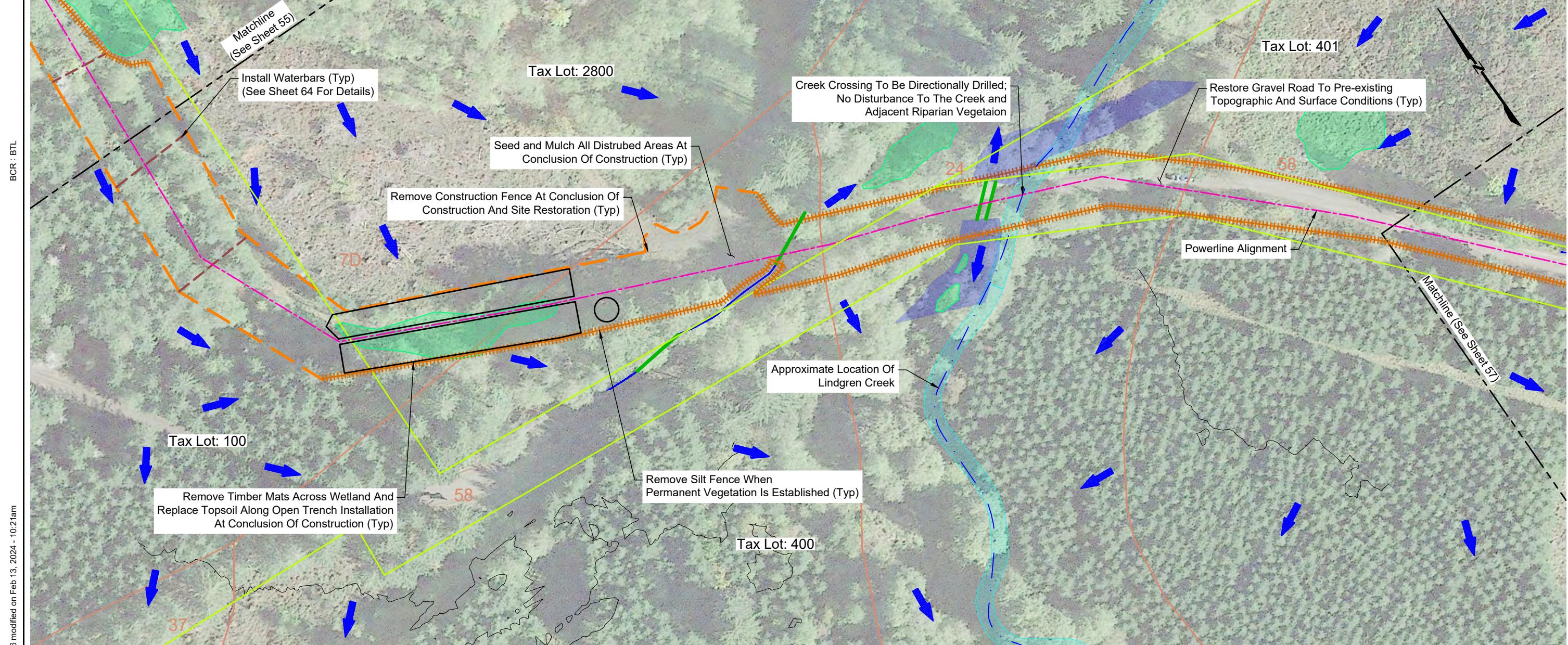
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Legend

- 7D NRCS Soil Map Unit Boundary And ID (See Sheet 4)
- Drainage Direction
- Powerline Alignment
- Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
- Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
- Waterbar (See Sheet 64 For Details)
- Project Specific Mapped Wetlands
- Property Line
- Major Contour - 20' Interval

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Legend

58	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	NWI Riverine Habitat
	Drainage Direction
	Powerline Alignment
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
	Creek Centerline
	Waterbar (See Sheet 64 For Details)
	Project Specific Mapped Waterbodies
	Project Specific Mapped Culverts
	Project Specific Mapped Wetlands
	Property Line
	Major Contour - 20' Interval

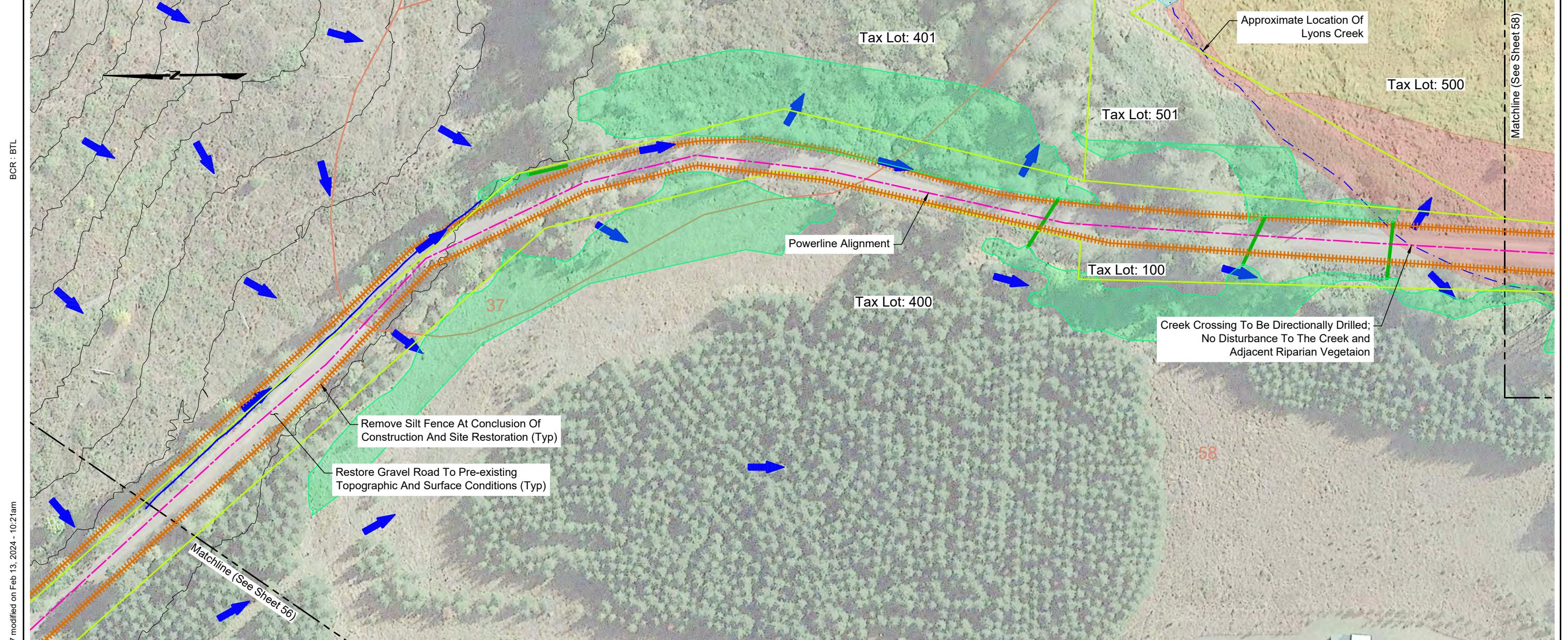
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						DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>			SHEET 56
						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>			Sheet
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4000 KRUSE WAY, BUILDING 3
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EROSION AND SEDIMENT CONTROL PLAN
SITE RESTORATION PLAN



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100 0 100
Scale in Feet

Legend

58	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	NWI Riverine Habitat
	NWI Forested Shrub Wetland
	NWI Emergent Wetland
	Drainage Direction
	Powerline Alignment
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
	Creek Centerline
	Project Specific Mapped Waterbodies
	Project Specific Mapped Culverts
	Project Specific Mapped Wetlands
	Property Line
	Major Contour - 20' Interval

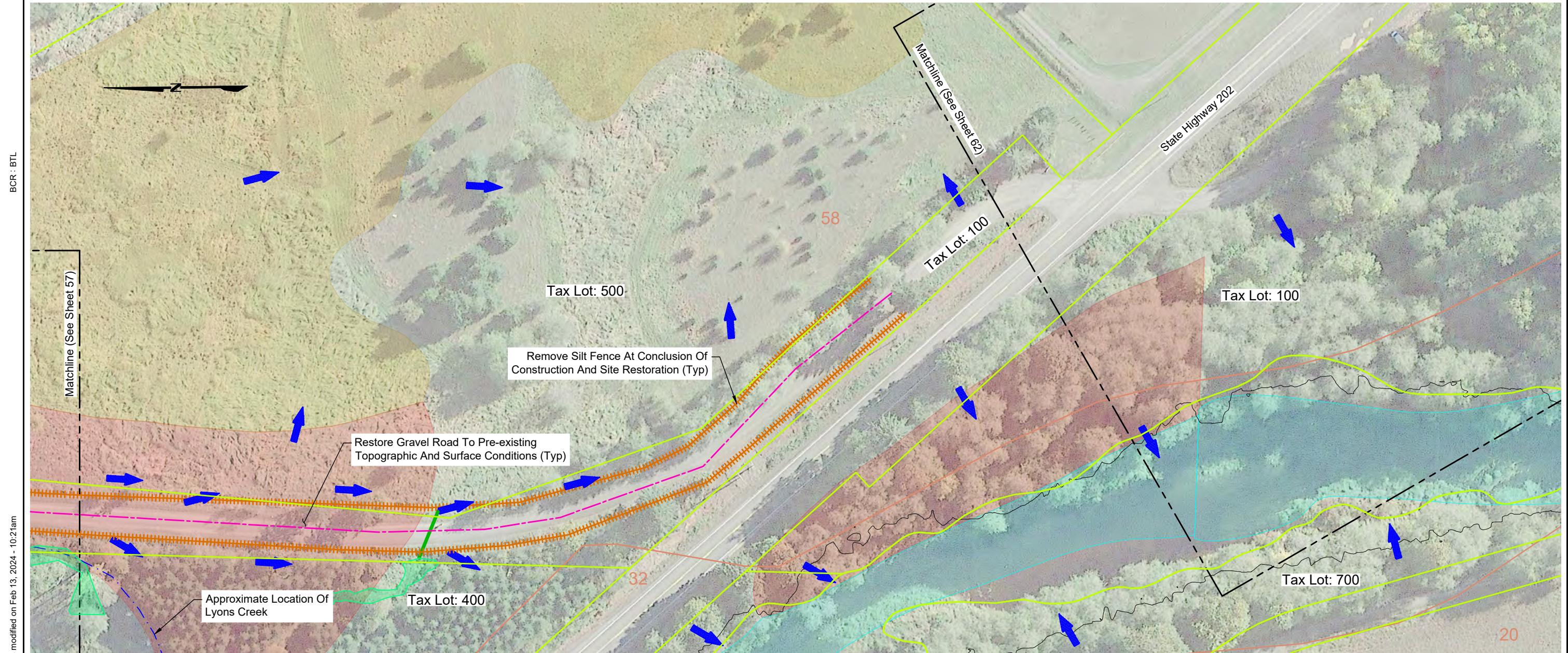
Revision	Description	Date	By	Chk	Rev

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CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>	

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COLUMBIA COUNTY, OREGON
EROSION AND SEDIMENT CONTROL PLAN
SITE RESTORATION PLAN

Drawing No. **SHEET 57**
Sheet **60 of 70**

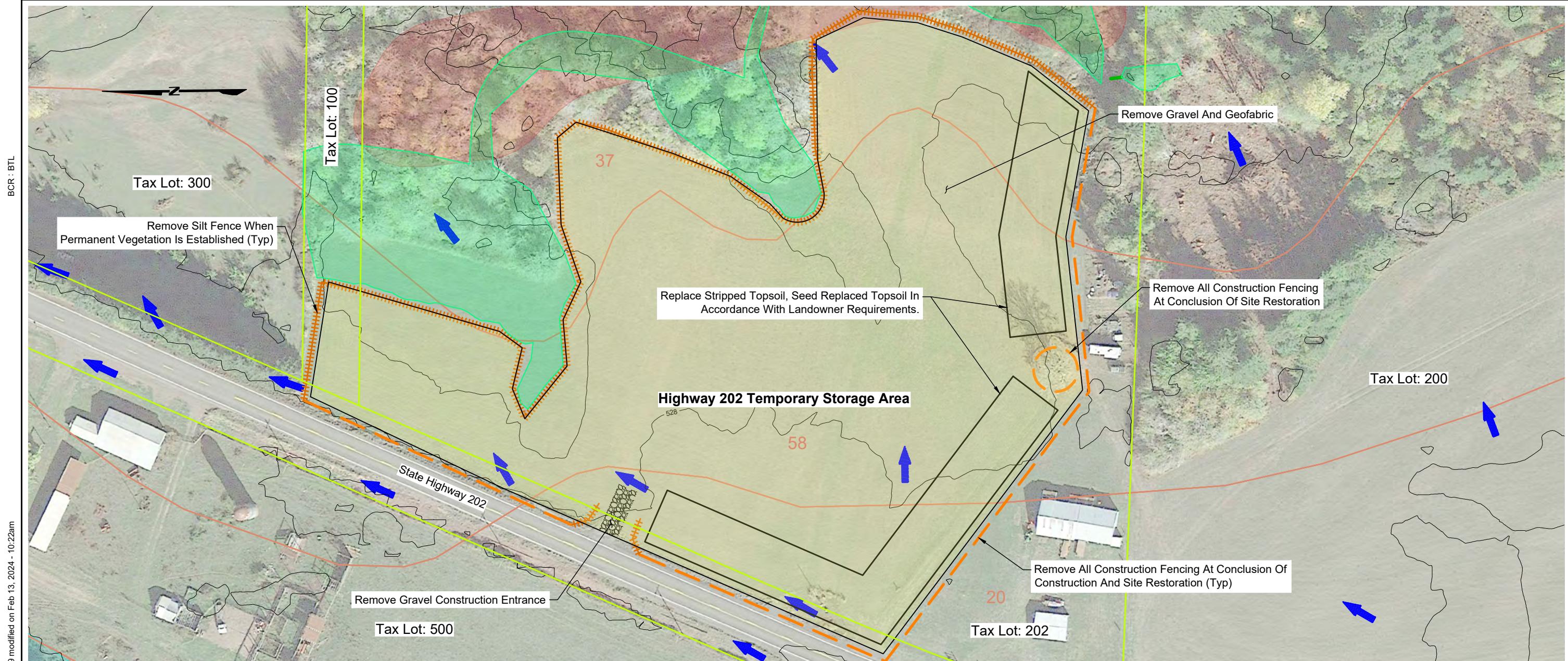


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						DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>			SHEET 58	
						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>			Sheet 61 of 70	
										EROSION AND SEDIMENT CONTROL PLAN SITE RESTORATION PLAN	



Legend

20	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
■	NWI Forested Shrub Wetland
■	Drainage Direction
■	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
—	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
—	Project Specific Mapped Culverts
■	Project Specific Mapped Wetlands
■	Highway 202 Storage Area
—	Property Line
—	Major Contour - 20' Interval

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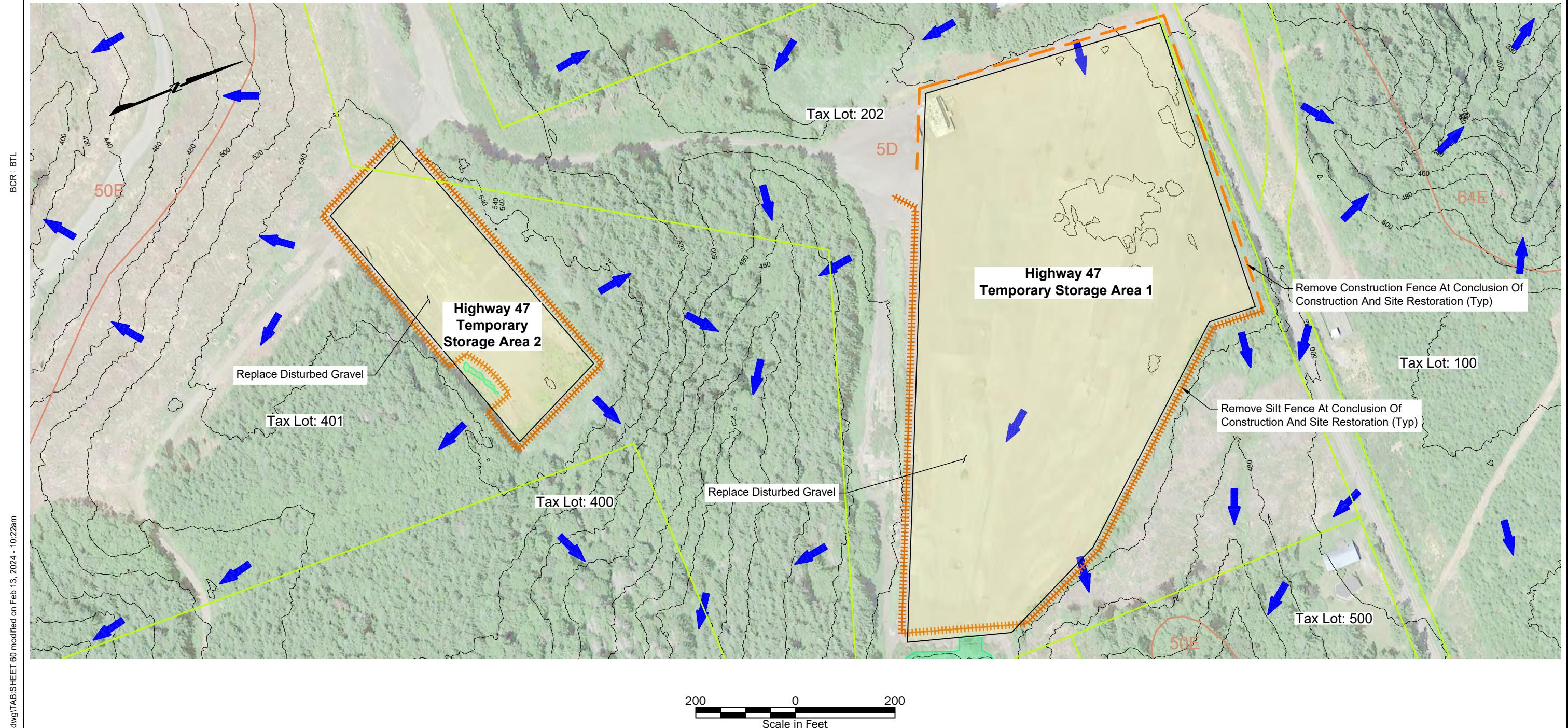
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SITE RESTORATION PLAN

Drawing No. **SHEET 59**
Sheet **62 of 70**



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Legend

- 5D NRCS Soil Map Unit Boundary And ID (See Sheet 4)
- Drainage Direction
- Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
- Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
- Project Specific Mapped Wetlands
- Highway 47 Storage Yards
- Property Line
- Major Contour - 20' Interval

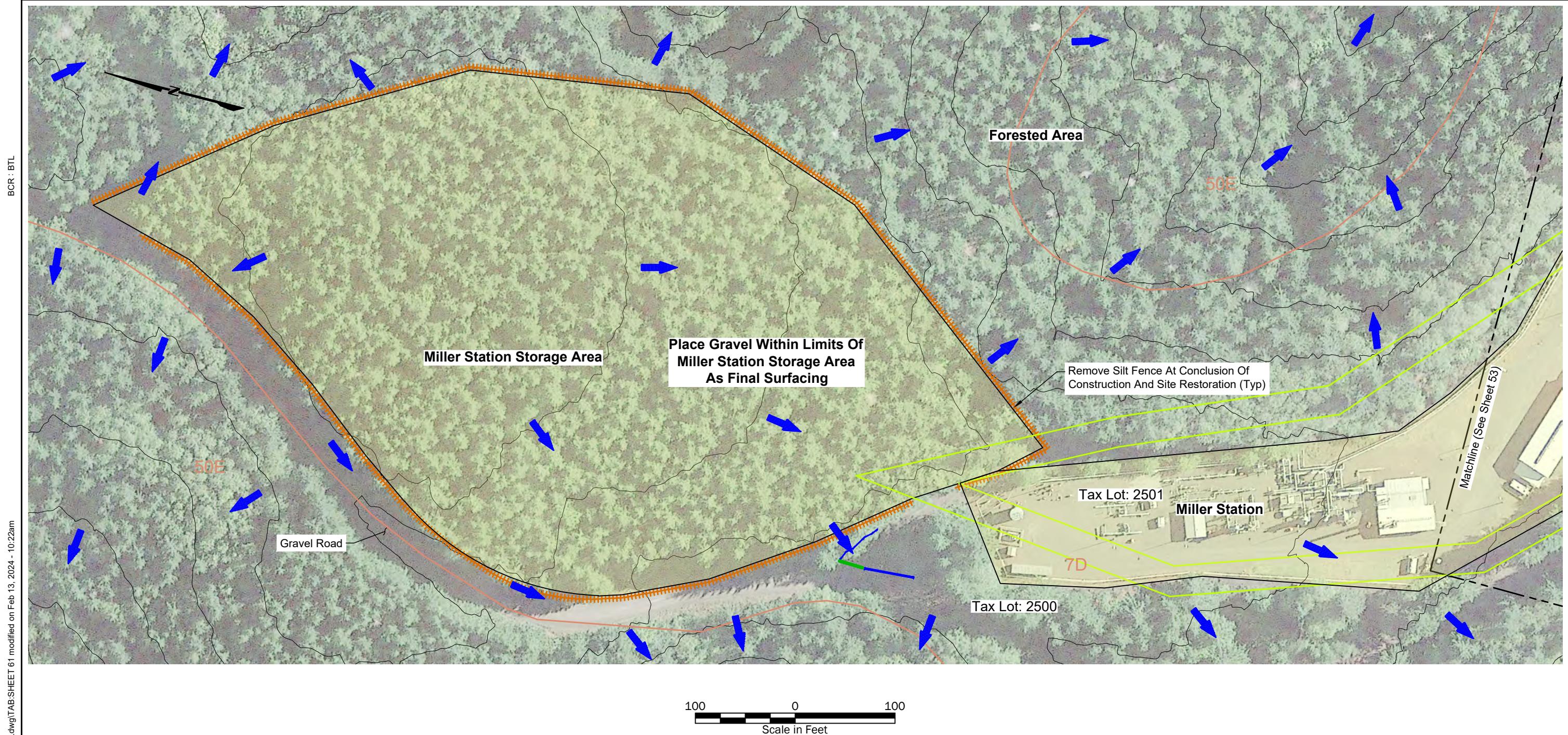
Revision	Description	Date	By	Chk	Rev

DESIGNED:	BCR	SCALE:	AS NOTED
DRAWN:	BTL	DATE:	02/13/24
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SUITE 200
LAKE OSWEGO, OREGON 97035
P: 503/624-9274
F: 503/620-5940

NW NATURAL
MIST RESILIENCY PROJECT
COLUMBIA COUNTY, OREGON
EROSION AND SEDIMENT CONTROL PLAN
SITE RESTORATION PLAN

Drawing No.
SHEET 60
Sheet
63 of 70



General Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. No septic drain fields were documented by the site survey.
4. No drinking water wells on site or adjacent to the site were documented by the site survey.
5. No detention ponds were documented within the construction limits by the site survey.
6. The proposed NRCS soil map unit boundaries are based on GIS shapefiles from ESRI ArcGIS Data Online.
7. Edited Lidar data downloaded from <https://coast.noaa.gov/>. Aerial photos from Google Earth Pro © 2024, licensed to GeoEngineers, Inc., image dated 10-12-2018.
8. Project specific waterbodies, culverts and wetlands provided by Tetra Tech.

Legend

- 5D NRCS Soil Map Unit Boundary And ID (See Sheet 4)
- Drainage Direction (blue arrow)
- Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
- Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
- Project Specific Mapped Waterbodies
- Project Specific Mapped Culverts
- Miller Station And Storage Area
- Property Line
- Major Contour - 20' Interval

Revision	Description	Date	By	Chk	Rev

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General Notes:

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7. Edited Lidar data downloaded from <https://coast.noaa.gov/>. Aerial photos from Google Earth Pro © 2024, licensed to GeoEngineers, Inc., image dated 10-12-2018.
8. Project specific waterbodies, culverts and wetlands provided by Tetra Tech.

100 0 100

Scale in Feet

Legend

	NRCS Soil Map Unit Boundary And ID (See Sheet 4)
	NWI Riverine Habitat
	NWI Forested Shrub Wetland
	Drainage Direction
	Orange Silt Fence / Construction Limits (See Sheet 63 For Details)
	Construction Limits / Orange Construction Fencing (See Sheet 63 For Details)
	Project Specific Mapped Waterbodies
	Project Specific Mapped Wetlands
	Bark-and-Haul Storage Area
	Property Line
	Major Contour - 20' Interval

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MIST RESILIENCY PROJECT
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EROSION AND SEDIMENT CONTROL PLAN
SITE RESTORATION PLAN

Drawing No.
SHEET 62
Sheet
65 of 70

Table 1
Barrier Spacing For General Application

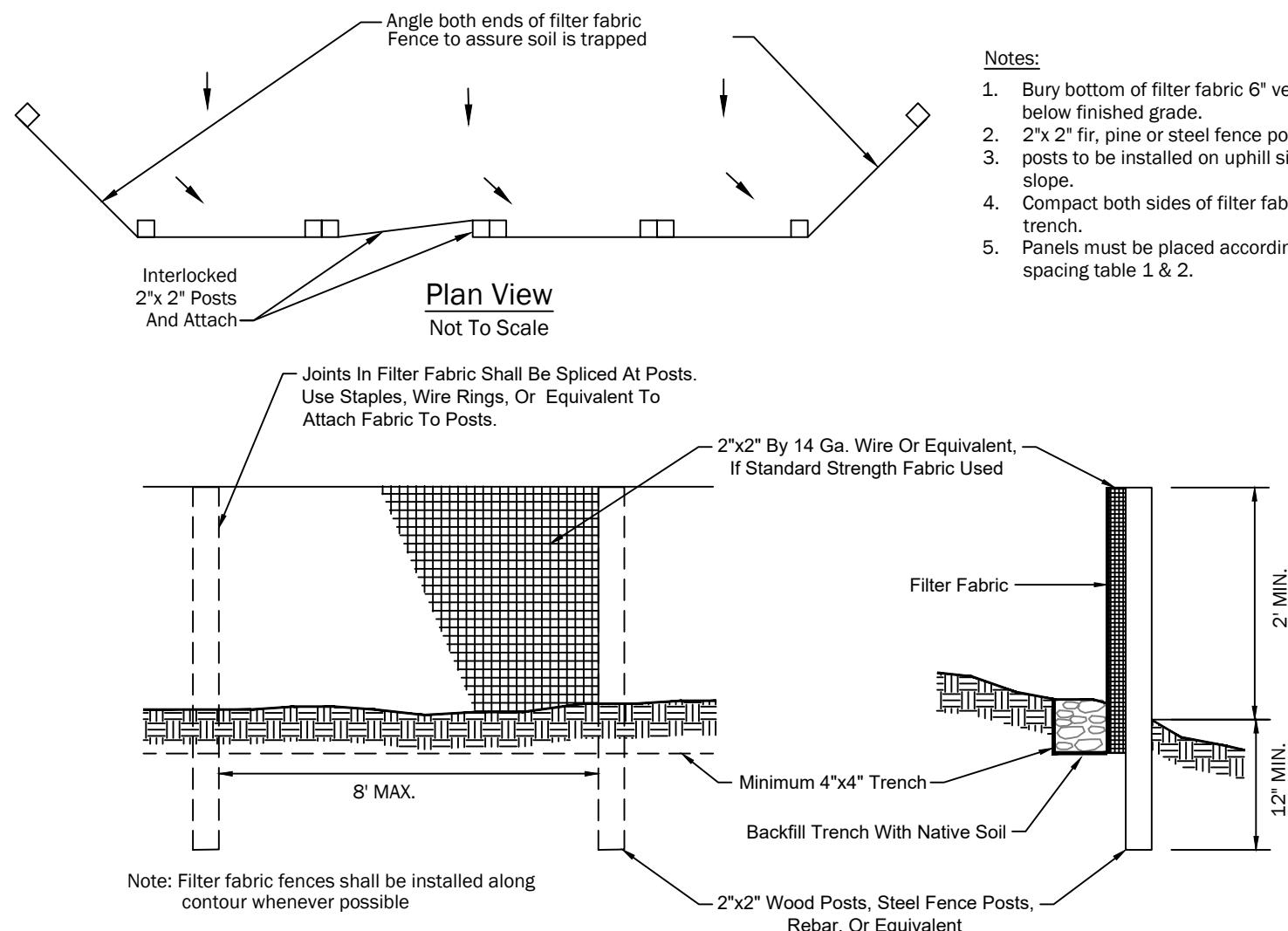
Install Parallel Along Contours as Follows		
% Slope	Slope	Maximum Spacing on Slope
10% Flatter	10H:1V or Flatter	300 feet
10 > %	<15 10H:1V > x < 7.5H:1V	150 feet
15 > %	<20 7.5H:1V > x < 5H:1V	100 feet
20 > %	<30 5H:1V > x < 3.5H:1V	50 feet
30 > %	<50 3.5H:1V > x < 2H:1V	25 feet

Table 2
Sediment Fence Fabric Specifications

Woven Polypropylene Sediment Fence Fabric		
Property	Test Procedure	Minimum Fabric Value
Grab Tensile Strength	ASTM D 4632	180 lbs. Grab
Elongation	ASTM D 4632	15%
Trapezoid Tear	ASTM D 4533	70 lbs. Mullen
Burst	ASTM D 3786	300 psi
Puncture	ASTM D 4833	80 lbs.
Permitivity	ASTM D 4491	.07 sec-1
Permeability	ASTM D 4491	.005 cm/sec.
A.O.S.	ASTM D 4751	50 U.S. Standard Sieve
UV Resistance (500 hours)	ASTM D 4355	90%

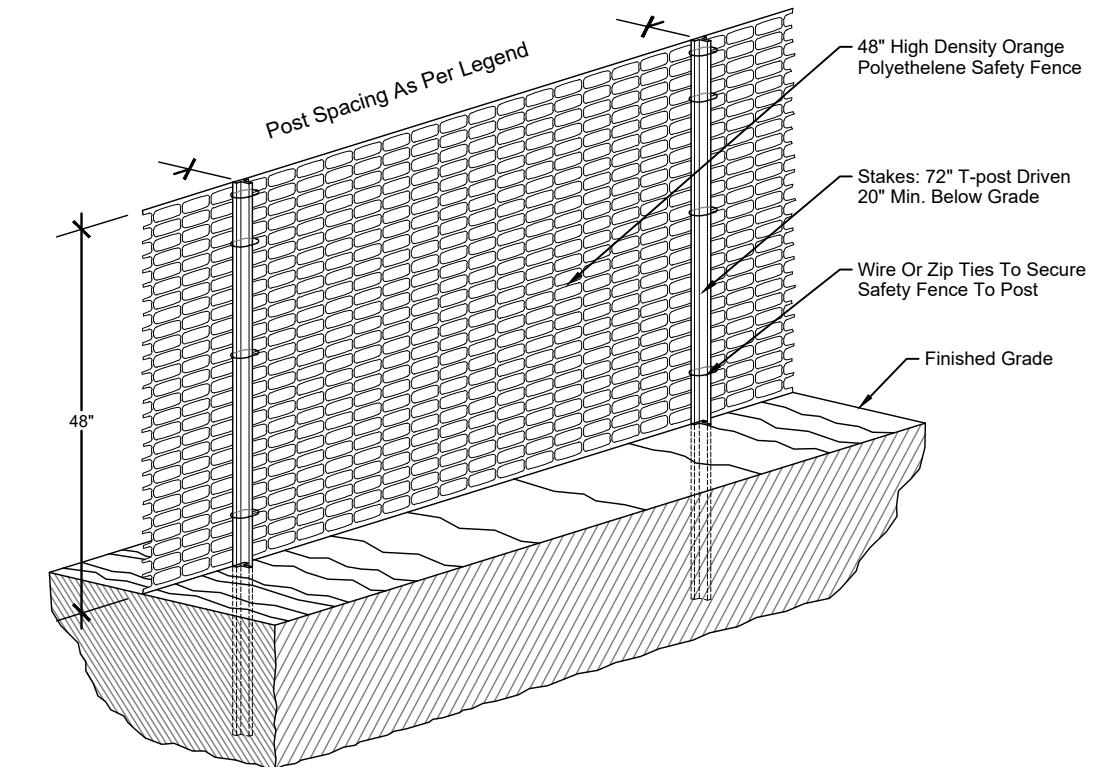
Legend

SAF12	48" Orange Fence, 12 Feet O.C.
SAF11	48" Orange Fence, 11 Feet O.C..
SAF10	48" Orange Fence, 10 Feet O.C.
SAF9	48" Orange Fence, 9 Feet O.C.
SAF8	48" Orange Fence, 8 Feet O.C.
SAF7	48" Orange Fence, 7 Feet O.C.
SAF6	48" Orange Fence, 6 Feet O.C.



Temporary Orange Sediment/Silt Fence Details

Not To Scale



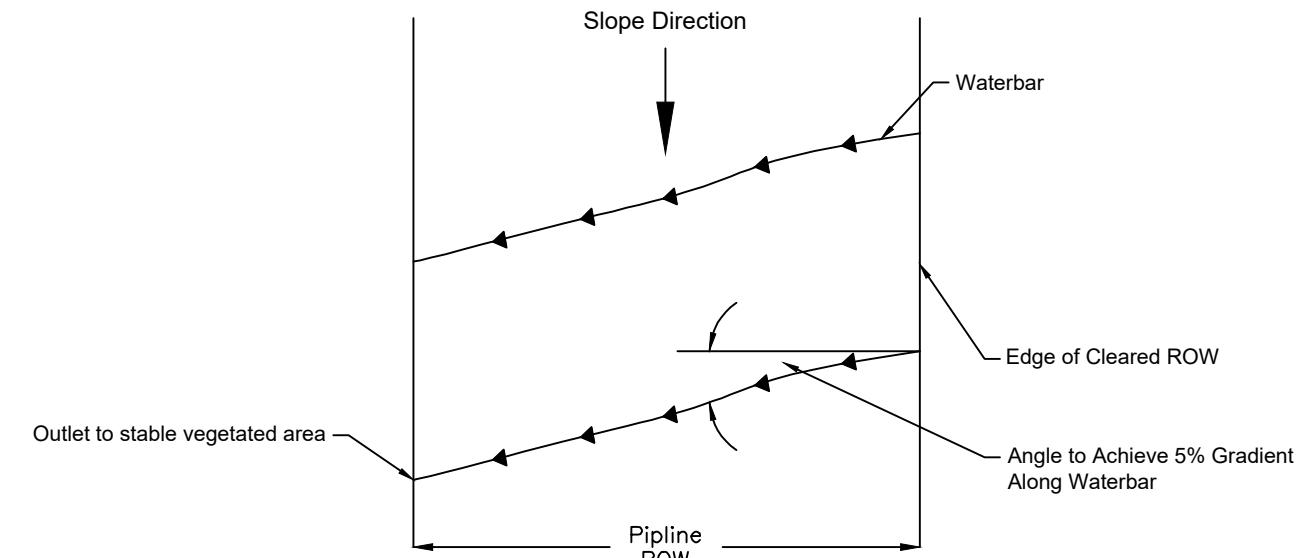
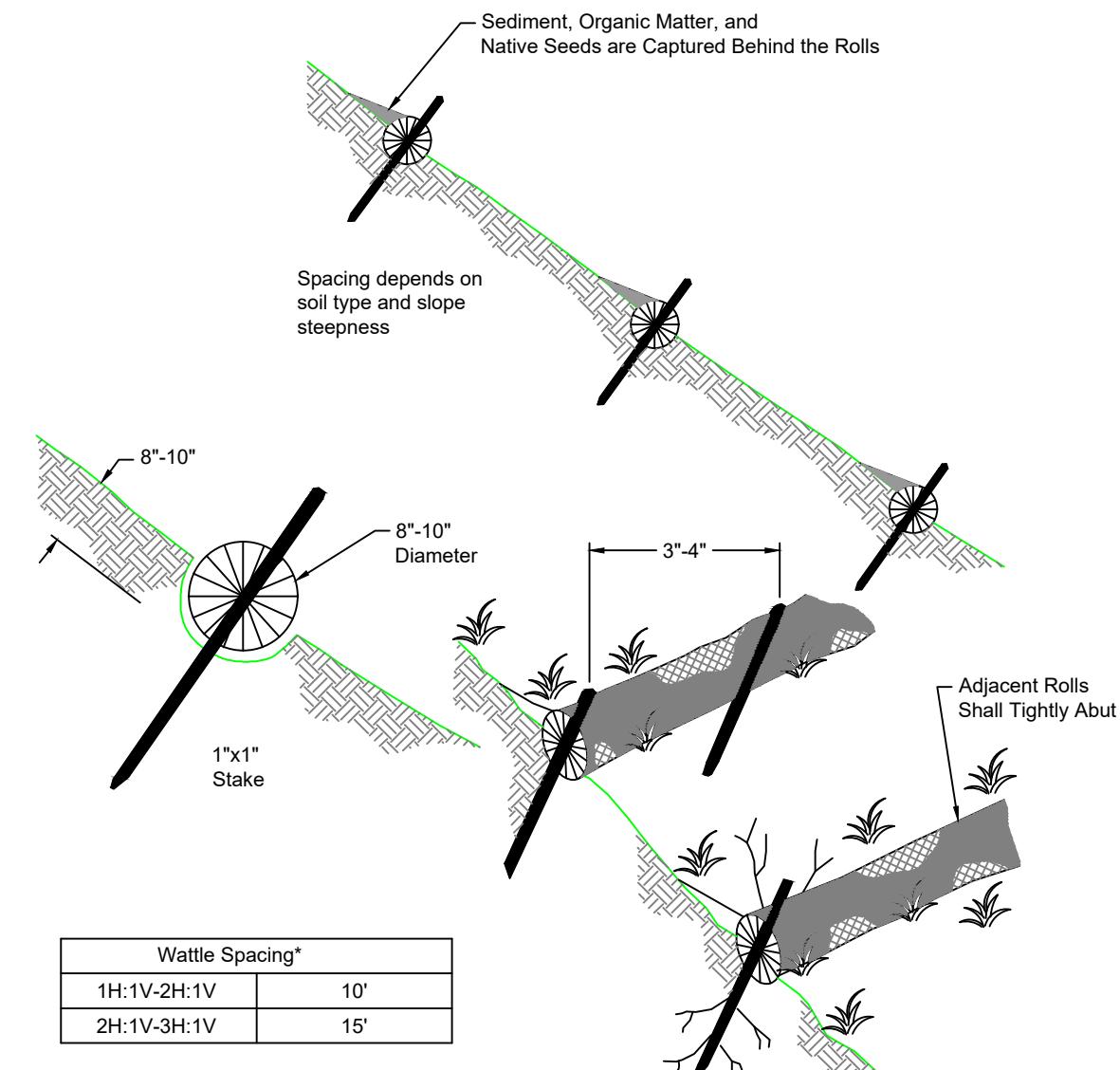
Notes:

1. Construction safety fence shall be used to mark the limits of construction. Fence shall be put up before any ground disturbing activity occurs.
2. Construction safety fence shall be signed "Construction Area Limit" except on sided facing wetland areas. On those sides, the sign shall say "Protected Resource - Do Not Enter".
3. Fence shall be removed only after all ground disturbing activity on the project (or project area) ceases and the site is ready for permanent revegetation.
4. On paved areas, perimeter of work area can be marked with fence supported by pylons, sawhorse barricades, traffic cones, or equivalent.

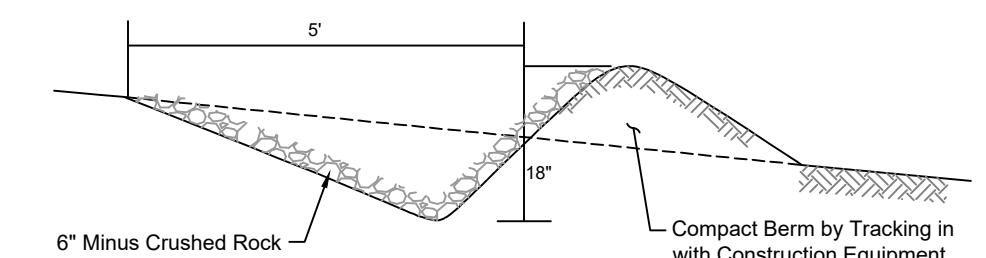
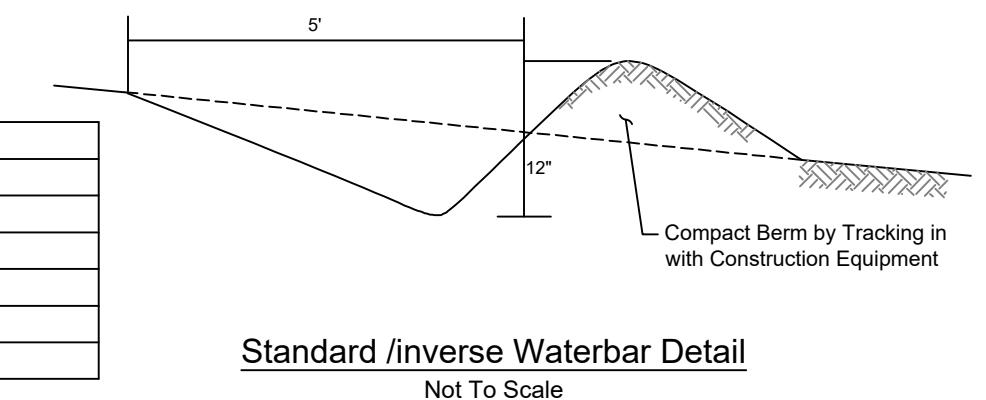
Construction Limits Fence (Orange) Detail

Not To Scale

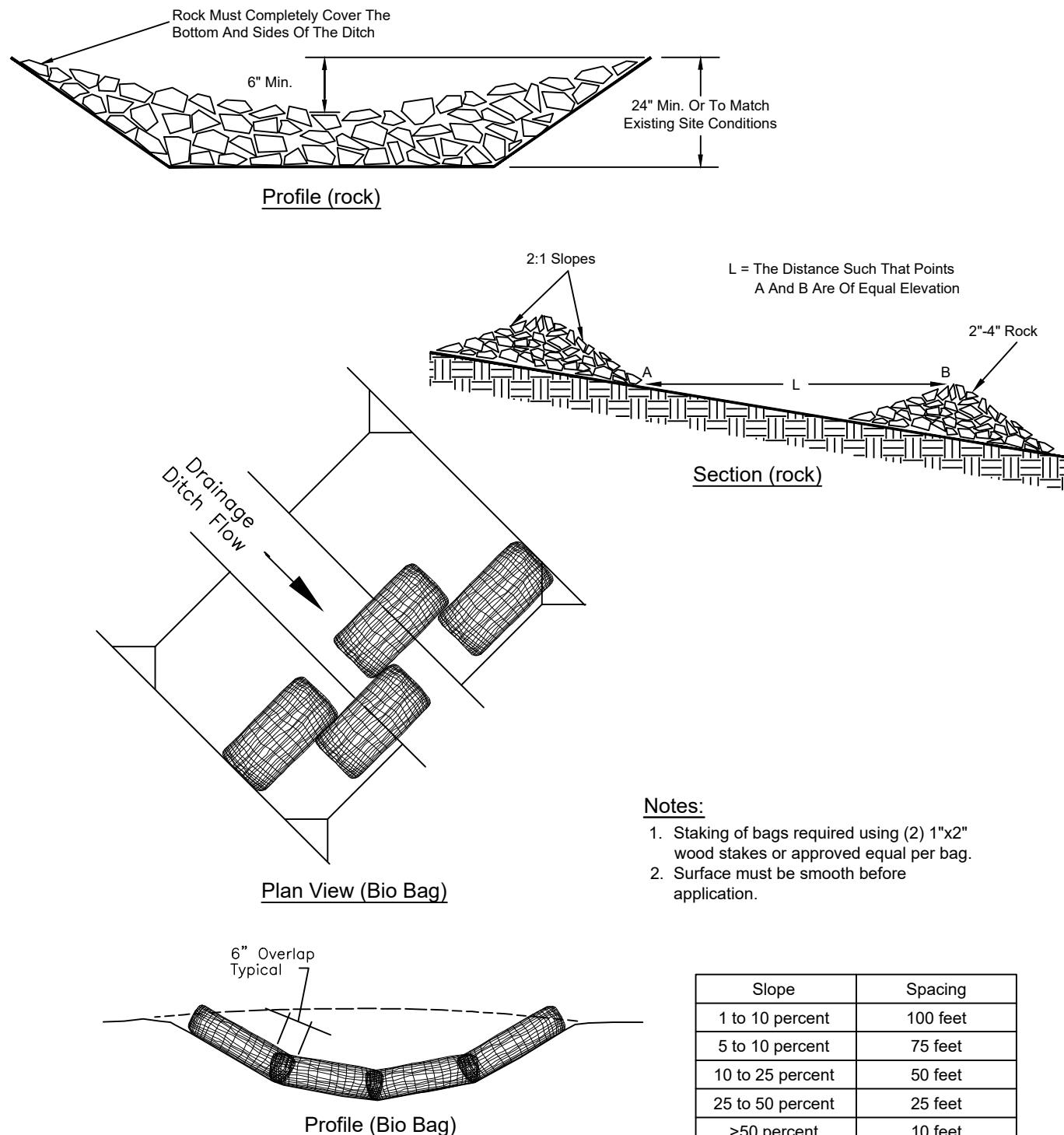
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						DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>			SHEET 63
						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>			Sheet
									4000 KRUSE WAY, BUILDING 3 SUITE 200 LAKE OSWEGO, OREGON 97035 P: 503/624-9274 F: 503/620-5940	66 of 70
									EROSION AND SEDIMENT CONTROL PLAN BMP DETAILS	



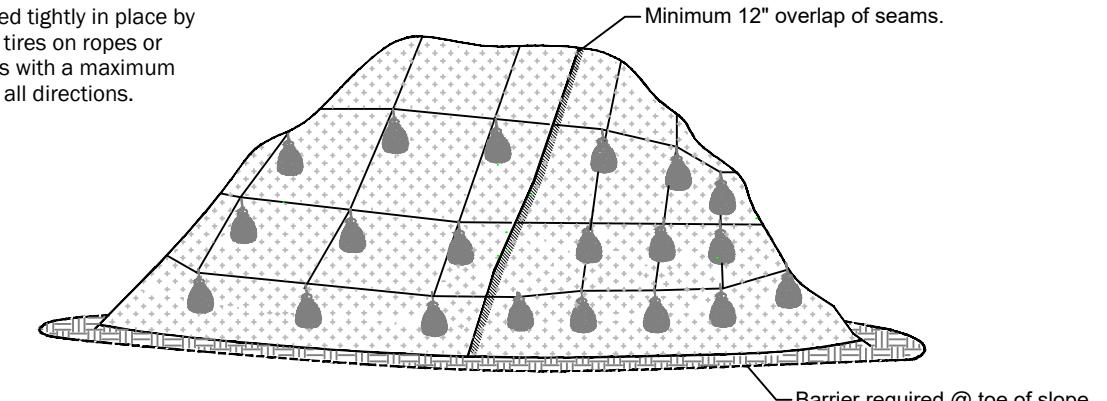
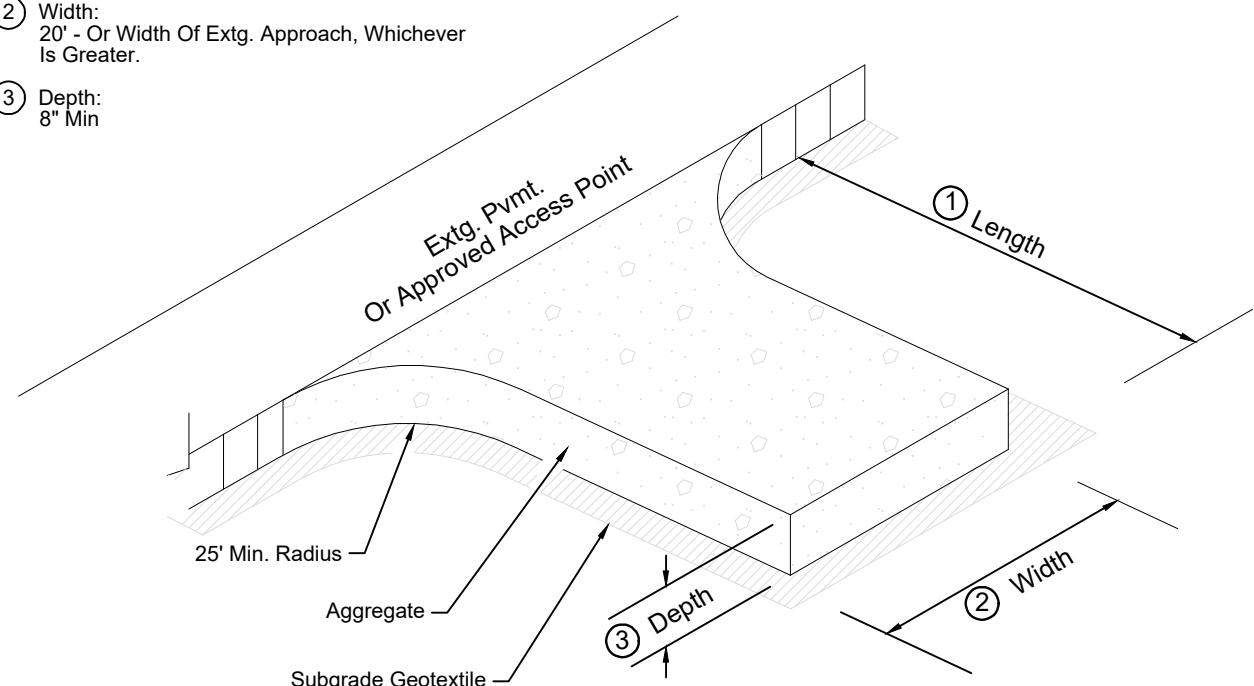
Waterbar Spacing	
Slope %	Spacing
< 5	125'
5 - 10	100'
10 - 20	75'
20 - 35	50'
> 35	25'



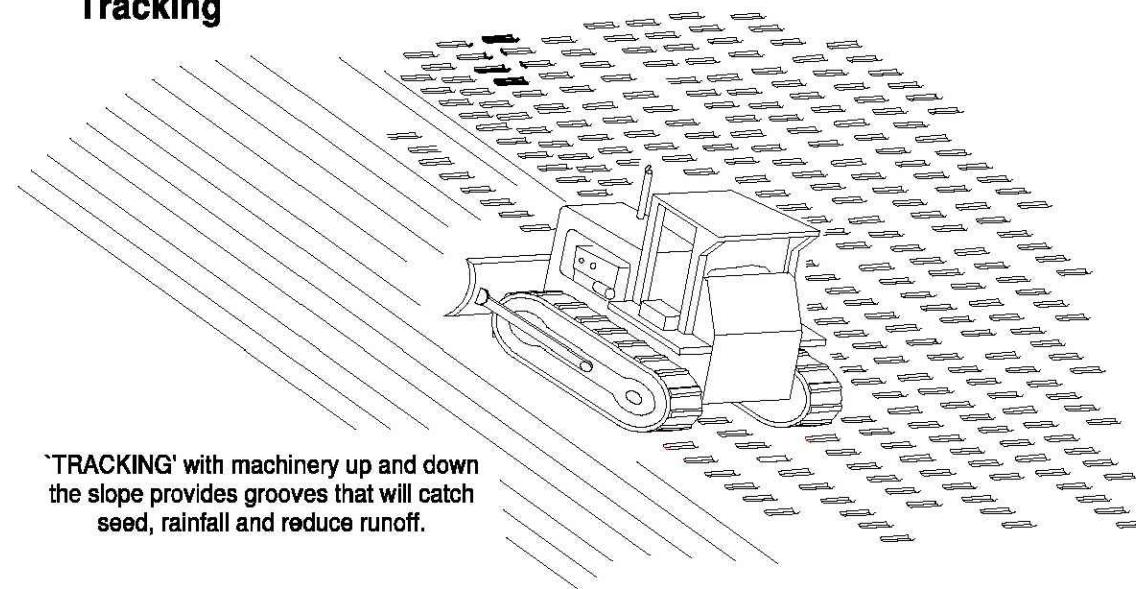
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						DRAWN: <u>BTL</u>	DATE: <u>02/13/24</u>			SHEET 64
						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>			Sheet 67 of 70
									4000 KRUSE WAY, BUILDING 3 SUITE 200 LAKE OSWEGO, OREGON 97035 P: 503/624-9274 F: 503/620-5940	



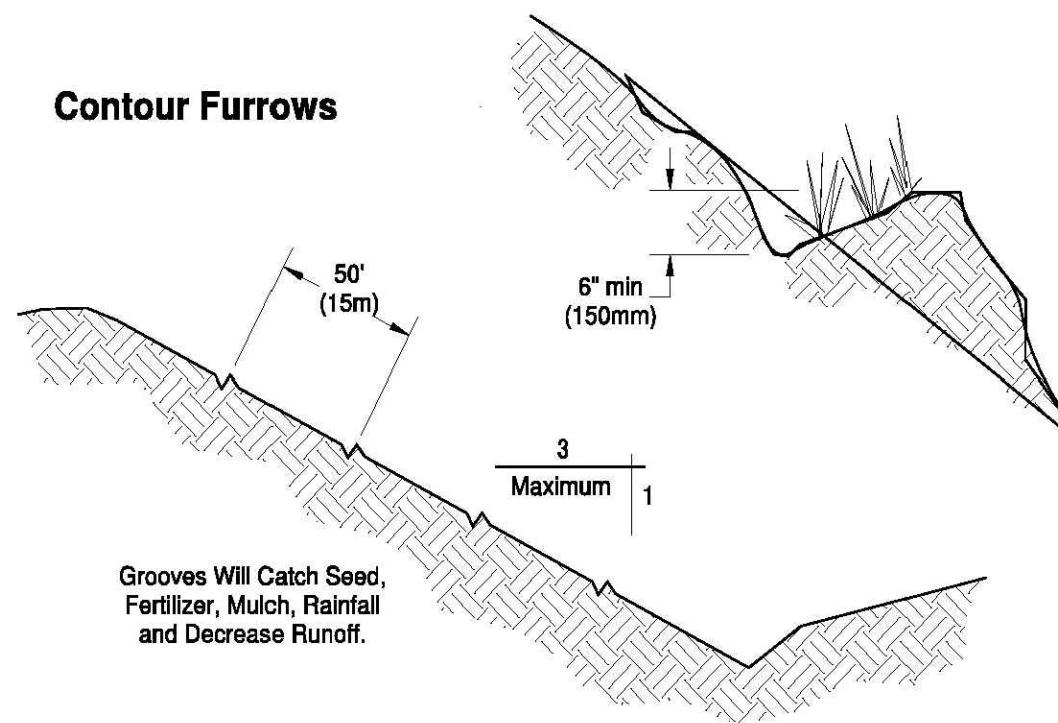
Bio Bag Or Rock Check Dam Installation Detail
Not To Scale

Notes:**Notes:**

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						CHECKED: <u>BCR</u>	FILE: <u>6024-308-00</u>			Sheet 68 of 70
									4000 KRUSE WAY, BUILDING 3 SUITE 200 LAKE OSWEGO, OREGON 97035 P: 503/624-9274 F: 503/620-5940	

Tracking

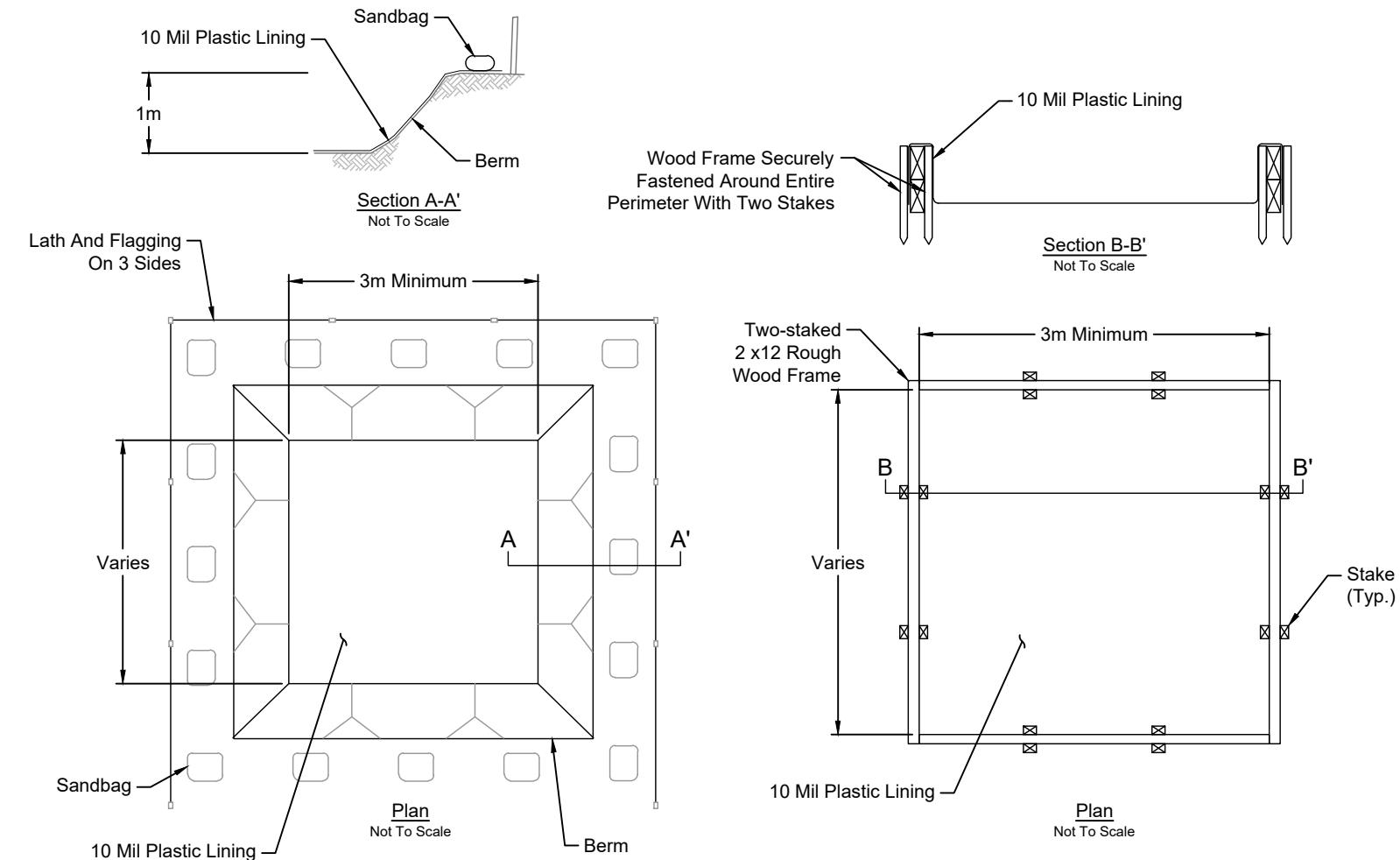
'TRACKING' with machinery up and down the slope provides grooves that will catch seed, rainfall and reduce runoff.

Contour Furrows

Grooves Will Catch Seed, Fertilizer, Mulch, Rainfall and Decrease Runoff.

Surface Roughing Detail

Not To Scale

**NOTES**

1. Actual Layout Determined In The Field.
2. The Concrete Washout Sign Shall Be Installed Within 10m Of The Temporary concrete Washout Facility.
3. A Pre-manufactured Concrete Washout Tub Or Bucket May Be Used In Lieu Of This Washout. Use Pre-manufactured Concrete Washout In Accordance With Manufacturers Recommendations.

Concrete Washout Detail

Not To Scale

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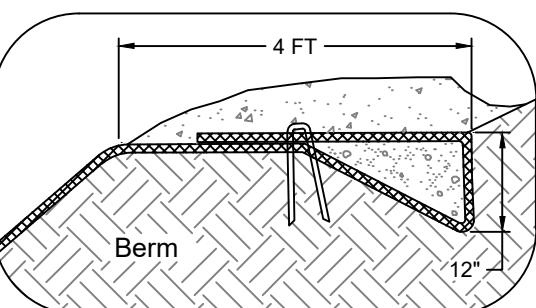
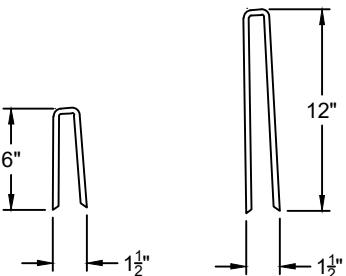
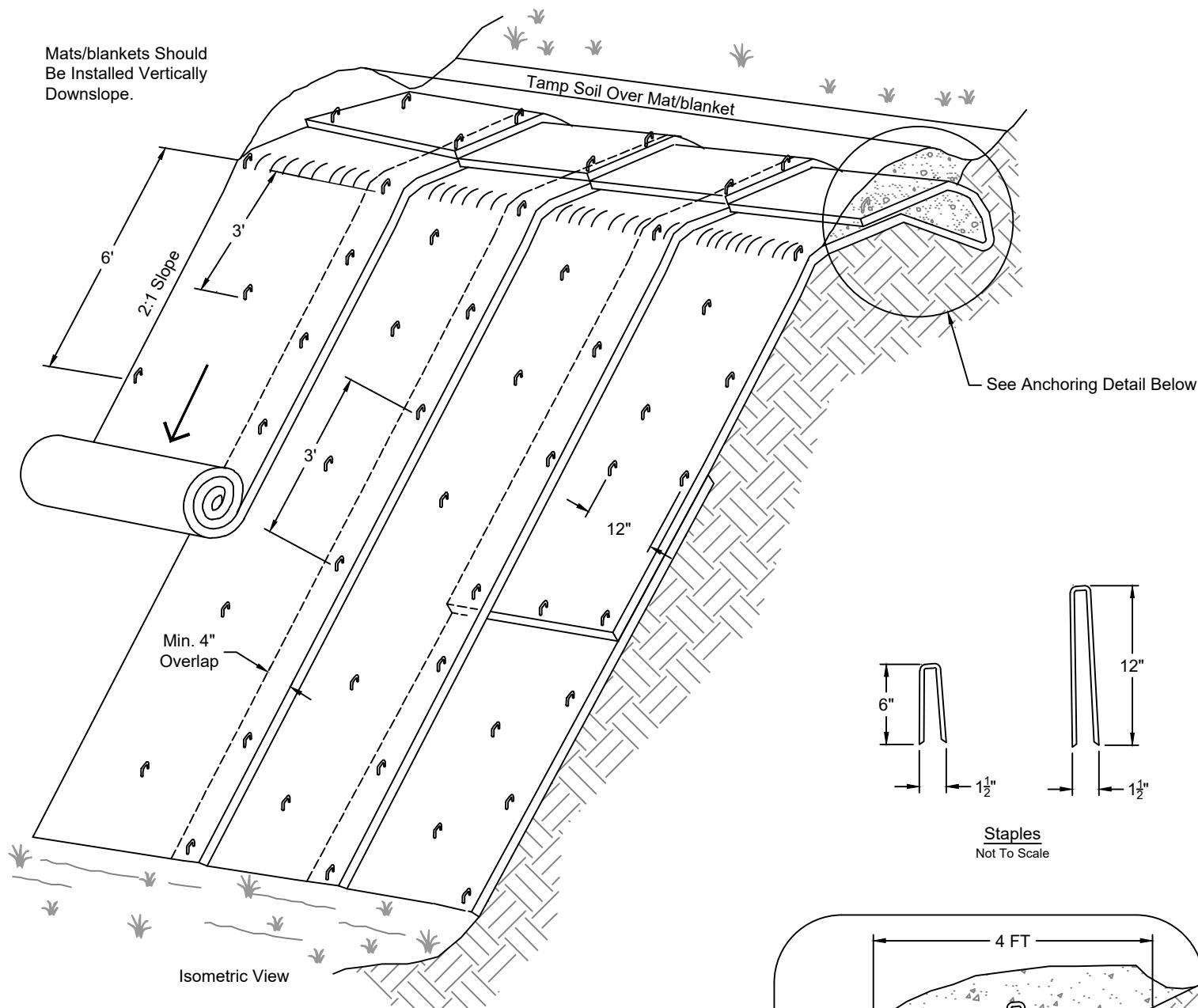
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Typical Slope Soil Stabilization
Not To Scale

Anchoring Detail
Not To Scale

Typical Erosion Blankets

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