PORTLAND WATER BUREAU
FROM FOREST TO FAUCET

Bull Run TREATMENT PROJECTS

Technical Memorandum

Subject:	Agricultural Soils Restoration Plan			
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List of Abbreviations

BMPs	Best Management Practices
Growers	growers, farmers, landowners, or tenants
pipelines	Facility Pipelines Project
Plan	Agricultural Soils Restoration Plan

Executive Summary

This Agricultural Soils Restoration Plan (Plan) describes the methods that will be used to reduce, minimize, or mitigate for impacts on agricultural resources associated with construction of the Facility Pipelines Project (pipelines) for the Portland Water Bureau (Water Bureau) as a part of the Bull Run Treatment Program. The Water Bureau and its contractors have adjusted the design to avoid placing pipelines in farm fields where possible and when necessary to do so the area of the disturbance was minimized by using non-cultivated areas (farm roads and field edges). The Water Bureau is committed to using state-of-art practices to return the land to pre-construction productivity as described in this Plan.

A portion of the pipeline routes are constructed on agricultural lands, and the Water Bureau has requested Jacobs Engineering to define these lands and provide recommendations for ensuring that current agricultural operations will be returned to their pre-construction conditions after installation of underground utilities. "Agricultural resources" include crops, soil, and agricultural infrastructure that may be disturbed and would therefore require restoration following the construction of the pipelines. Using these recommendations, the Water Bureau and its construction contractors (collectively, the Contractor) will coordinate with growers, farmers, landowners, or tenants, as applicable, engaged in farm uses in the area of pipeline construction (referred to in this Plan as the "Growers") to minimize impacts to ongoing agricultural operations during construction and to ensure that current agricultural operations will be returned to their pre-construction conditions.

As a part of the restoration process, an agricultural specialist and inspectors will be retained during construction to provide monitoring and oversight of the construction activities and address Growers' concerns as they arise. Mitigation for affected agricultural resources will be implemented as soon as possible after construction is completed to maintain the vitality of the resource. The pipeline corridor and areas temporarily affected by construction will be monitored for 2 years following construction to assess mitigation success. Remedial actions will be implemented as needed based on the monitoring results.

The purpose of this Plan is to define the criteria and methods which the Water Bureau will implement regarding the protection and restoration of the agricultural resources. This Plan describes the pre-planning, construction oversight, and post-mitigation processes to understand the field conditions where the pipeline construction will occur in all agricultural lands and ensure that current agricultural operations there will be returned to their pre-construction conditions. The process commences with identification of the existing soils conditions prior to disturbance. Specific Plan elements include how the growing layer of the soil will be treated during the pipeline installation process, oversight of construction, mitigation measures, and the post installation monitoring of mitigation activities. Information on specific parcels is presented in the final section of this Plan.

1 Plan Development

1.1 Introduction

The Portland Water Bureau (Water Bureau) recognizes that construction of the Facility Pipelines Project (pipelines) will affect agricultural lands and ongoing agricultural operations. Figure 1 (Appendix A) shows agricultural lands to be affected. As such, the Water Bureau has requested that Jacobs Engineering develop this Agricultural Soils Restoration Plan (Plan) which describes the methods and process to be included in the construction contract documents to reduce, minimize, or mitigate impacts on agricultural lands, providing the ability for current agricultural operations to return to their pre-construction conditions. This Plan has been prepared by Denny Mengel, a Certified Professional Soil Scientist with Jacobs. This Plan includes the use of agricultural specialists and inspectors for support and oversight of adhering to the Plan, and the development of an agreement with the growers, farmers, landowners, or tenants (referred in this Plan as the Growers) for post-construction restoration. This Plan will be updated with more detailed site-specific procedures as data become available.

The Water Bureau and its contractors have focused on avoiding farm use parcel impacts. This has been accomplished by placing the pipelines in the road ROW to the maximum extent possible. Consequently, in 3.94 linear miles of pipeline construction, many areas with multiple pipes, there are only four farm parcels (two on the Unfiltered Water side and two on the Filtered Water side) that are impacted by above ground construction activities. Where it is necessary to place pipelines in farm fields, they will be placed in non-cultivated areas (farm roads and field edges), to the extent possible, to avoid land that is in crop production. When cultivated land is disturbed, the Water Bureau is committed to using the best available science and restoration techniques to return the land to pre-construction condition.

1.2 Agricultural Specialists and Inspectors

The Water Bureau will retain the services of an agricultural specialist and inspectors as needed to ensure the plan is implemented as described during construction, providing monitoring and oversight and answering questions and concerns as they arise.

1.3 Growers Coordination

The Water Bureau will coordinate with Growers before, during, and post-construction. Growers will be provided Water Bureau contact information to be used throughout the duration of the project. Coordination discussions will include possible mitigation measures and a determination of who will be responsible for implementation. Minimization of impacts to ongoing agricultural operations will be coordinated throughout the construction period.

1.4 Pre/Post-Construction Inspection of Properties

Pre-construction inspection of the agricultural lands will include the generation of a parcel specific soil report for each land parcel. This will initially include using the United States Department of Agriculture's Natural Resources Conservation Service's (NRCS) Soil Web Survey website to identify soil types on each parcel.

Existing geotechnical borings have been conducted for the pipeline design and will also be used in conjunction with the NRCS soil reports to further characterize affected soils and identify where additional field soil sampling will be needed to fully describe affected soils.

Pre-construction inspections of each parcel and/or soil type to characterize the topsoil composition and chemistry through sampling and analysis to provide a baseline of soil characterization will occur prior to construction on such parcel. In addition to composition and chemistry, depth of topsoil will be evaluated on each parcel to verify topsoil depth, and the location of areas of existing soil compaction will be identified. High-water tables, if found in the topsoil horizon, will be identified. Additionally, the pre-construction inspections will include an inventory of agricultural resources and conditions, including crops and farm improvements such as fences, irrigation systems, and drainage facilities.

Geotextiles and rock used for construction access will be removed prior to post-construction inspections. Post-construction inspections will occur before and following topsoil replacement by the Contractor to determine the in-situ restoration condition of the soils as placed. Impacted areas will be inspected prior to topsoil replacement to determine if compaction remediation is required before the topsoil is placed. This will include sampling and analysis of replaced topsoil to determine whether (1) required pre-construction conditions have been re-established or (2) additional work is necessary to return the topsoil to the required pre-construction conditions. Post-construction inspection may also include a review of the topsoil adjacent to and within undisturbed areas for comparison. Additionally, the post-construction inspections will compare the pre-inventory of agricultural resources and conditions, including crops and farm improvements such as fences, irrigation systems, and drainage facilities so that post-construction matches pre-construction conditions as documented by the pre-construction survey and as agreed by any easement limitations. Any disturbance of agricultural resources by the construction of the pipelines will be restored to pre-construction conditions, as described further in this Plan.

1.5 In Lieu Agreements Process

As described in Section 1.4, a process will be used to document pre- and post-construction conditions. A Grower may request, in its discretion, that the Water Bureau provide a payment in lieu of restoration of agricultural resources and conditions on its land. This in lieu process will include development of a mutually agreed assessment methodology for determining the cost of restoration of the agricultural resources and conditions not performed as part of the pipeline construction because of the Grower's request. An agricultural specialist jointly selected by the Water Bureau and Growers will be used as part of that methodology.

2 Plan Elements

The following sections describe mitigation elements and Best Management Practices (BMPs) applicable to all agricultural properties affected by the project.

2.1 Construction Area Access

2.1.1 Ingress and Egress Routes

Actively farmed agricultural lands will be avoided for access to the extent possible, unless defined and agreed by the landowner. If access ramps or pads are required from public ROWs over agricultural land, measures will be implemented to protect the agricultural land from temporary impacts.

2.1.2 Temporary Access Roads and Laydown Areas

Temporary access road and laydown area locations will be identified with Growers using existing farm roads where possible. Design will consider existing farm roads and drainage, and will facilitate erosion minimization. Access roads and laydown areas will be restored to pre-construction conditions.

2.1.3 Grower Access

The Water Bureau and Contractor will coordinate with Growers to provide farm equipment and livestock access to isolated parcels during construction. Temporary fences and gates to facilitate this access will be constructed as part of the construction activities as needed.

2.2 Depth of Pipeline Cover

The pipelines will be installed at depths sufficient to maintain separation between the pipeline and agricultural operations, allowing those operations to continue without affecting the pipeline. At a minimum the new pipelines will have seven (7) feet of soil over top of the pipeline. Warning tape will be placed above the new pipelines to be constructed. Existing agricultural drain tiles will be impacted by installation of the new pipelines and will be replaced in a manner that does not impact the new pipelines and restores the function of the drain tiles. Growers will be contacted to determine depth, location, and size of drain tiles on their specific land parcels prior to the commencement of construction.

2.3 Soil Preservation and Restoration

2.3.1 Segregation and Replacement of Topsoil

The Contractor will salvage and segregate topsoil on agricultural lands that will be impacted from the construction activities, where grading or filling will occur, and where excavations or construction disturbance are made beyond the trench width. The following topsoil salvage mitigation measures are to be implemented:

- Prior to the commencement of construction on a parcel, crops will be harvested or removed to facilitate clean topsoil handling.
- The Contractor will disc well-sodded lands prior to stripping to facilitate topsoil salvaging activities.
- Topsoil will be stripped to the bottom of the "A" horizon, defined as the topsoil profile, as determined by pre-construction inspection and soil sampling and review of existing data. Subsoil will not be stored with the topsoil.
- The topsoil will not be allowed to mix with other materials or be used for any purposes other than placement within the same parcel the topsoil was removed from. The returned topsoil shall be the last layer backfilled over the trench and disturbed areas.
- The topsoil will not leave the parcel from where it was removed.
- Storage methods to minimize an increase in soil water content will be used as determined by the Contractor, and topsoil will not be stored where livestock and farm equipment need to cross.
- The Contractor will determine the methods used to prevent wind erosion.
- Topsoil will be returned to its original parcel and graded to original contours with allowance for settling. Topsoil of a similar type from other pipelines construction locations may be required to compensate for settling. Soil amendments will be considered, as appropriate.
- Post-construction inspection (Section 1.4) will be used to determine if amendments are required to restore any pre-construction soil properties.

2.3.2 Topsoil Storage

- The Contractor will consider the excavation equipment (such as excavator vs. wheel trencher) to be used, depth and width of the trench, local topography, drainage, and the

susceptibility of the trench walls to sloughing when determining the location of salvaged topsoil windrows.

- The Contractor will store salvaged topsoil prior to grading, taking into consideration space requirements for grade and trench spoil, local topography, construction access requirements, and drainage.
- The Contractor will place topsoil piles on the high side of grade cuts, where practical, to prevent overlap with the grade spoil piles.
- The Contractor will store and grade spoil on the work side along the construction easement boundary unless needed for local fill. The Contractor will take into consideration local topography and drainage when determining spoil storage locations and maintain a minimum of 3 feet separation between grade spoil storage piles and topsoil windrows.
- The Contractor will place a barrier (such as approximately 6-inch-thick straw barrier, tarps, or other material) at localized areas where a 3 feet (minimum) separation cannot be maintained between topsoil and subsoil piles due to workspace limitations.
- The Contractor will monitor topsoil windrows for wind and water erosion and weed growth until the soils are replaced.
- The Contractor will implement remedial measures to control erosion and prevent weed growth.
- Topsoil will be segregated from trench spoil to minimize/eliminate introduction of subsoil materials and rock into the topsoil.

2.3.3 Soil Compaction and Rutting Mitigation

Soil compaction and rutting is to be minimized by the Contractor to the extent practicable. Where not avoidable, the following mitigation measures will be implemented:

- Construction traffic will be restricted to the trench areas or the work side of the construction and within the temporary access easements in areas prone to soil compaction, where feasible. These include, but are not limited to, Borges Silty Clay Loam, 0-8% slopes, and Wollent Silt Loam soil types.
- The Contractor will be required to avoid or reduce grading throughout the route, especially at slopes to reduce the width of grading, in order to limit the potential for erosion and subsoil compaction.
- Swamp mats, matting, geotextiles or other best management practices will be installed by the Contractor where rutting and compaction could pose a problem during

installation of the pipelines during wet conditions. All soil types in the pipeline corridor have a severe rutting hazard classification.

- Rutted areas will be re-graded by the Contractor prior to topsoil replacement.
- If needed to return the land to pre-construction condition, subsoil compaction will be relieved in areas where topsoil was salvaged using a subsoiler or similar equipment. A disc or harrow will be used where necessary to smooth the subsoil surface.
- Compacted agricultural lands will be treated using a noninversion, deep-tillage agricultural subsoiler. The subsoiler will be designed for soil decompaction and to minimize surface disturbance and mixing of topsoil and subsoil. Multiple passes may be required to return the land to pre-construction condition as determined by the agricultural specialist.
- Deep tillage will be conducted following final grading and topsoil placement in agricultural lands only to the depth of topsoil replacement.
- Subsoil and topsoil will be de-compacted on all disturbed areas when the soils are as dry as possible to achieve desired soil fracturing.

2.4 Wet Conditions Construction

2.4.1 Impact Avoidance

Construction on agricultural land, to the extent practicable, will be scheduled to avoid the months with the greatest precipitation, i.e., winter. Certain construction activities, such as heavy equipment operation, will be avoided on excessively wet soils.

2.4.2 Trench Dewatering

Trench dewatering will be conducted in a way to avoid damage to agricultural land and systems. The following measures will be implemented:

- The Contractor will deploy methods to control trench dewatering, which may include limiting the extent of open trench.
- If the trench requires dewatering before pipeline installation, water will be pumped into settling ponds, filter bags, or onto stable, well-vegetated areas, tarpaulins, sheeting, rocks, sandbags, or other appropriate sediment filtering devices in a manner that does not cause erosion or allow sediment to enter a water body.
- Dewatering operations will comply with all regulations and permits.

2.5 Protection and Repair of Irrigation and Drainage Systems

The locations of irrigation systems, drain tiles, and wells that may be affected by construction will be identified by the Grower and flagged. Irrigation pipelines, where disturbed, will be reinstalled with at least the same depth of cover, and tiles will be replaced in kind to maintain the drainage system.

2.5.1 Irrigation Systems

Irrigation flow for the Grower will be maintained during construction, or if not possible, supplemental irrigation will be provided as needed to maintain crop health. Irrigation systems will be repaired as soon as possible by the Contractor if disrupted.

2.5.2 Drainage Systems

The Contractor will repair drain tiles disturbed during construction. If water is flowing in the tile line when disturbed, a temporary repair will be made. Permanent repairs will be made during the construction backfill process with the replacement section extending a minimum of 2-feet into previously undisturbed soil.

2.6 Dust Control

The Contractor will coordinate with the Grower to provide dust control where specialty crops are susceptible to damage from dust.

2.7 Soil Erosion and Sediment Control

Erosion prevention and sediment control will be in accordance with the Oregon Department of Environmental Quality's National Pollutant Discharge Elimination System General Construction Stormwater Discharge Permit (1200-C). Non-cultivated cropland will be reseeded and mulched or repaired by the Contractor. If the affected land is a farm road, it will be repaired to a condition equal or better than the pre-construction condition. Where feasible, construction will be coordinated so that cultivated cropland will be impacted during periods when it is not planned to be planted with crops, but instead with cover crops. The Contractor will reseed disturbed cultivated cropland in cover crops approved by the Grower. Temporary weed-free mulch will be applied by the Contractor if there is a seasonal shutdown or construction is delayed for an extended time period. The pre-construction flow path of stormwater will not be changed.

2.8 Weed Control

The location of noxious weeds in the project area will be identified prior to construction in consultation with the Oregon Department of Agriculture and the Growers who know the location of any noxious weed infestations. Measures to minimize spread of noxious weeds will be implemented. Construction equipment will be cleaned with a high-pressure washing prior to being transported to the project area. Mulch will be certified weed-free, and Oregon certified seed or equivalent will be used for revegetation. Any new weed species introduced due to construction will be treated by the Contractor.

2.9 Post-Construction Monitoring and Follow-Up Measures

The Water Bureau agricultural specialist and inspectors will actively monitor soil restoration, crop production, tile drainage, irrigation systems, and other agricultural infrastructure for two years following the completion of backfill in the construction area. Follow-up restoration or mitigation will be implemented as identified during the monitoring period in order to ensure agricultural operations return to their pre-construction conditions.

2.9.1 Drain Tiles

Drain tile repairs made during Construction that fail will be corrected. If wet areas are created by construction or the presence of the pipeline, drainage will be provided to restore those areas to their pre-construction conditions.

2.9.2 Trench Settlement

The Contractor will repair trench settlement, as necessary to ensure agricultural operations return to their pre-construction conditions. If minor grading will not repair trench settlement, topsoil of a similar type from other pipelines construction areas will be used and amended as appropriate.

2.9.3 Irrigation Systems

If irrigation systems are disturbed during construction activities, they will be repaired as necessary to ensure agricultural operations return to their pre-construction conditions.

2.9.4 Crop Monitoring

The agricultural specialist will make visual observations of crop plant vigor, density, height, color, and uniformity twice during each growing season throughout the 2-year monitoring period and compare to adjacent crops not affected by construction. The agricultural specialist will recommend mitigation measures as necessary to ensure agricultural operations return to their pre-construction conditions.

2.9.5 Noxious Weeds

The construction area will be monitored for noxious weed infestations not identified in the pre-construction inspections. New infestations will be controlled mechanically or chemically, during the 2-year monitoring period, in consultation with the appropriate agencies and the Grower.

3 Site Specific Plan Elements

The following sections describe mitigation elements applicable to all of the specific agricultural properties affected by the project. This information is based on NRCS soil survey data. All information identified in this section will be confirmed in the site-specific pre-construction inspection described in section 1.4. Site-specific mitigation measures will be based on cultivation type, agricultural infrastructure, and soil type. Table 3-1 displays the soil types present in agricultural parcels in the pipeline construction area.

Table 3-1 Summary of Soil Characteristics

Soil Symbol	Soil Name	Parent Material	Texture Class	Drainage Class	Topsoil Depth (in)	Depth to Water Table (in)	Erosion Hazard		Resistance to Soil Compaction	Rutting Hazard
							Wind	Water		
Unfiltered Water Line (Southeast)										
9B	Bull Run, 3-8% slopes	Volcanic Ash over Silty Material	Silt Loam	Well Drained	0-20	>80	Moderate	Moderate	Moderate	Severe
20F	Haplumbrepts, very steep	Colluvium from basalt and andesite mixed with loess, volcanic ash and old alluvium	Silt Loam	Well Drained	0-14	>80	Moderate	Moderate	Moderate	Severe
Filtered (Finished) Water Line (Northwest)										

Soil Symbol	Soil Name	Parent Material	Texture Class	Drainage Class	Topsoil Depth (in)	Depth to Water Table (in)	Erosion Hazard		Resistance to Soil Compaction	Rutting Hazard
							Wind	Water		
10C	Cornelius, 8-15% slopes	Silty Materials over Old Alluvium	Silt Loam	Moderately Well Drained	0-20	27-37	Low	Moderate	Moderate	Severe
27B	Mershon, 0-8% slopes	Loess/Old Alluvium	Silt Loam	Moderately Well Drained	0-15	36-60	Low	Moderate	Moderate	Severe
27C	Mershon, 8-15% slopes	Loess/Old Alluvium	Silt Loam	Moderately Well Drained	0-15	36-60	Low	Moderate	Moderate	Severe
34A	Powell Silt Loam, 0-3% slopes	Loess over old silty alluvium	Silt Loam	Somewhat Poorly Drained	0-8	18-24	Low	Moderate	Moderate	Severe
34B	Powell Silt Loam, 3-8% slopes	Loess over old silty alluvium	Silt Loam	Somewhat Poorly Drained	0-8	18-24	Low	Moderate	Moderate	Severe
57	Wollent Silt Loam	Old Alluvium	Silt Loam	Poorly Drained	0-10	0-12	Low	Moderate	Low	Severe

3.1 Unfiltered Water Pipeline

3.1.1 Parcel SS - 1S4E23C 01400

Where the pipeline crosses this parcel, the parcel's soil type is Bull Run Silt Loam, 3 to 8 percent slopes (Appendix A, Figure 2). Based on NRCS soil survey data, topsoil depth averages 20 inches and will be confirmed during the pre-construction inspection. The soil is moderately resistant to compaction but has a severe rutting hazard, so rutting BMPs will be required (Section 2.3.3). Wind and water erosion potential is moderate, so wind and water erosion BMPs will be required on bare ground, slopes, and topsoil spoil piles to prevent erosion (Sections 2.2, 2.3, 2.4 and 2.7). In general, NRCS soil survey data indicate a depth to the water table greater than 80 inches. However, on the ground observations

indicate there may be a high-water table in this area. Perched water exists where inadequate vertical drainage due to soil conditions tend to hold water.

Soil restoration for pasture is the goal for this parcel. There are two cows on the parcel. Mitigation measures discussed in Sections 2.3 (Soil Preservation and Restoration), 2.4 (Wet Conditions Construction), 2.5 (Protection and Repair of Irrigation and Drainage Systems), 2.6 (Dust Control), 2.7 (Soil Erosion and Sediment Control), and 2.8 (Weed Control) are applicable to this parcel, and others will be used as needed. Based on USDA soil survey data, topsoil stripping depth would be expected for up to 20 inches but will be more specifically defined by the pre-construction inspection. Subsoil and surface soil will be de-compacted, topsoil will be replaced, and the surface prepared for planting appropriate vegetation. Rutting, if present, will be re-graded prior to topsoil replacement. Impacted drainage and irrigation systems will be restored to pre-construction conditions. Soil protection BMPs need to be in place prior to winter construction on this parcel due to potential wet soil conditions. Trench dewatering procedures (Section 2.4.2) will most likely be necessary on this parcel.

3.1.2 Parcel TT - 1S4E23C 01500

Where the pipeline crosses this parcel, the parcel's soil type is Bull Run Silt Loam 3 to 8 percent slopes (Appendix A, Figure 2). Based on NRCS soil survey data, topsoil depth averages 20 inches and will be confirmed during the pre-construction inspection. The soil is moderately resistant to compaction but has a severe rutting hazard. Wind and water erosion potential is moderate, so wind and water erosion BMPs will be required on bare ground, slopes, and topsoil spoil piles to prevent erosion (Sections 2.2, 2.3, 2.4, and 2.7). In general, NRCS soil survey data indicate a depth to the water table greater than 80 inches and should not pose a problem for topsoil restoration.

The pipeline then passes into the Haplumbrepts, very steep soil series (Appendix A, Figure 2). This mapped soil series is entirely within the tunneled section of pipeline, with no proposed ground surface disturbance. Therefore, no soil restoration is necessary or proposed.

Soil restoration for pasture is the goal for this parcel. There are two cows on the parcel. Mitigation measures discussed in Sections 2.3 (Soil Preservation and Restoration), 2.4 (Wet Conditions Construction), 2.5 (Protection and Repair of Irrigation and Drainage Systems), 2.6 (Dust Control), 2.7 (Soil Erosion and Sediment Control), and 2.8 (Weed Control) are applicable to this parcel, and others will be used as needed. Based on USDA soil survey data, topsoil stripping depth would be expected for up to 20 inches but will be more specifically defined through the pre-construction inspection. Subsoil and surface soil will be de-compacted, topsoil will be replaced, and the surface prepared for planting appropriate vegetation. Rutting, if present, will be re-graded prior to topsoil replacement. Impacted drainage and irrigation systems will be restored to pre-construction conditions. Soil protection BMPs need to be in place prior to winter construction on this parcel due to potential wet soil conditions. Trench dewatering procedures (Section 2.4.2) will most likely be necessary on this parcel.

3.1.3 Parcel VV - 1S4E23C-02200

Two 72-inch diameter pipelines will pass beneath this parcel within a casement at a depth of more than 150 feet below ground. There will be no surface disturbance and hence no restoration required.

3.2 Filtered Water Pipeline

3.2.1 Parcel BBBB - 1S4E21A 00900

Easements on this parcel include 1) a permanent water pipeline easement, 2) permanent access easement, 3) permanent water facility easement for the Finished Water Intertie on SE Lusted Rd, and 4) temporary construction easements for stockpiling topsoil during construction, construction access, and staging.

From the south as the pipeline enters the parcel from SE Dodge Park Blvd, it crosses a small area of Wollent Silt Loam (Appendix A, Figure 3). Based on NRCS soil survey data, topsoil depth averages 10 inches and will be confirmed during the pre-construction inspection. The soil has low resistance to compaction and a severe rutting hazard, so compaction and rutting BMPs will be required (Section 2.3.4). Wind erosion potential is low and water erosion potential is moderate, so water erosion BMPs will be required on bare ground, slopes, and topsoil spoil piles to prevent water erosion (Sections 2.2, 2.3, 2.4, and 2.7). In general, NRCS soil survey data indicate depth to the water table of 0 to 12 inches and will require mitigation measures (Section 2.4) if pre-construction inspection find a high-water table. No geotechnical borings conducted for the design of the project were installed in this soil type to verify water table depth. The southeast portion of the parcel becomes very wet in the winter because this area collects a large area of surface runoff from SE Dodge Park Blvd. Stormwater drainage infrastructure at this location will be restored as a part of the construction work.

Further to the north on this parcel, the pipeline then passes through a large area of Mershon Silt Loam, 0 to 8 percent slopes (Appendix A, Figure 3). Based on NRCS soil survey data, topsoil depth averages 15 inches and will be confirmed during the pre-construction inspection. The soil has moderate resistance to compaction but has a severe rutting hazard, so rutting BMPs will be required (Section 2.3.4). Wind erosion potential is low and water erosion potential is moderate, so water erosion BMPs will be required on bare ground, slopes, and topsoil spoil piles to prevent water erosion (Sections 2.2, 2.3, 2.4, and 2.7). In general, NRCS soil survey data indicate a depth to the water table of 36 to 60 inches and may require mitigation measures (Section 2.4) for a high-water table. Three geotechnical borings were conducted for the design of the project in this soil type. Only one boring (installed midway through this soil type) showed the groundwater table to be 12.3 feet below the ground surface. The remaining 2 borings did not record groundwater. Therefore, although reported by NRCS, the groundwater may not be an issue in this soil type.

Further north in the alignment, the soil type then changes to a small area of Mershon Silt Loam, 8 to 15 percent slopes (Appendix A, Figure 3). The soil has moderate resistance to compaction but has a severe rutting hazard, so rutting BMPs will be required (Section 2.3.4). Wind erosion potential is low and water erosion potential is moderate, so water erosion BMPs will be required on bare ground, slopes,

and topsoil spoil piles to prevent water erosion (Sections 2.2, 2.3, 2.4, and 2.7). In general, NRCS soil survey data indicate a depth to the water table of 36 to 60 inches and may require mitigation measures (Section 2.4) for a high-water table. No geotechnical borings conducted for the design of the project were installed in this soil type to verify water table depth. Soil surface conditions do not indicate a highwater table. Therefore, groundwater may not be an issue in this soil type.

Near the northern extents of the pipeline route on this parcel, the soil type changes to Cornelius Silt Loam, 8 to 15 percent slopes (Appendix A, Figure 3). Based on NRCS soil survey data, topsoil depth averages 20 inches and will be confirmed during the pre-construction inspection. The soil has moderate resistance to compaction but has a severe rutting hazard, so rutting BMPs will be required (Section 2.3.4). Wind erosion potential is low and water erosion potential is moderate, so water erosion BMPs will be required on bare ground, slopes, and topsoil spoil piles to prevent water erosion (Sections 2.2, 2.3, 2.4, and 2.7). In general, NRCS soil survey data indicate a depth to the water table of 27 to 37 inches which may require mitigation measures (Section 2.4) for a high-water table. There is an area of lower elevation which may have a higher water table.

Soil restoration for bareroot and balled and burlap nursery production is the goal for this parcel which passes through the four different soil profiles. Mitigation measures discussed in Sections 2.3 (Soil Preservation and Restoration), 2.4 (Wet Conditions Construction), 2.5 (Protection and Repair of Irrigation and Drainage Systems), 2.6 (Dust Control), 2.7 (Soil Erosion and Sediment Control), and 2.8 (Weed Control) are applicable to this parcel, and others will be used as needed. Based on USDA soil survey data, topsoil stripping depth would be expected for up to 15 to 20 inches but will be more specifically defined by the pre-construction inspection. Subsoil and surface soil will be de-compacted, topsoil will be replaced, and the surface prepared for planting of bareroot or ball and burlap seedlings. Rutting, if present, will be re-graded prior to topsoil replacement. Impacted drainage and irrigation systems will be restored to pre-project conditions. Soil protection BMPs need to be in place prior to winter construction on this parcel due to potential wet soil conditions. Trench dewatering procedures (Section 2.4.2) will most likely be necessary on this parcel.

A drainage ditch along the north side of Dodge Park collects water, which is then piped to the west under the parcel with a discharge to Beaver Creek. Where the ditch meets the pipe, a second pipe from the south side of Dodge Park discharges before also draining to the pipe to the west. The ditch and pipes will be restored to pre-construction condition.

3.2.2 Parcel AAAA - 1S4E21A -00802

A temporary access easement will be acquired over this parcel to use the existing farm road for temporary construction purposes and no pipelines will be installed on this parcel.

From the south as the easement enters the parcel, it crosses a small area of Wollent Silt Loam (Appendix A, Figure 3). Based on NRCS soil survey data, topsoil depth averages 10 inches and will be confirmed during the pre-construction inspection. The soil has low resistance to compaction and a severe rutting hazard, so compaction and rutting BMPs will be required (Section 2.3.4). Wind erosion potential is low and water erosion potential is moderate, so water erosion BMPs will be required on bare ground, slopes. No excavation for pipeline construction is proposed on this parcel. The plan is to

construct and leave an improved road surface for use by the contractor and the landowner in this area that is not planted, and a farm road exists currently. Topsoil stock piling will not be conducted on this parcel as the impact is only to improve the existing farm road. The southeast portion of the parcel is reported to become very wet in the winter. Stormwater drainage infrastructure at this location will be restored after construction is complete as needed.

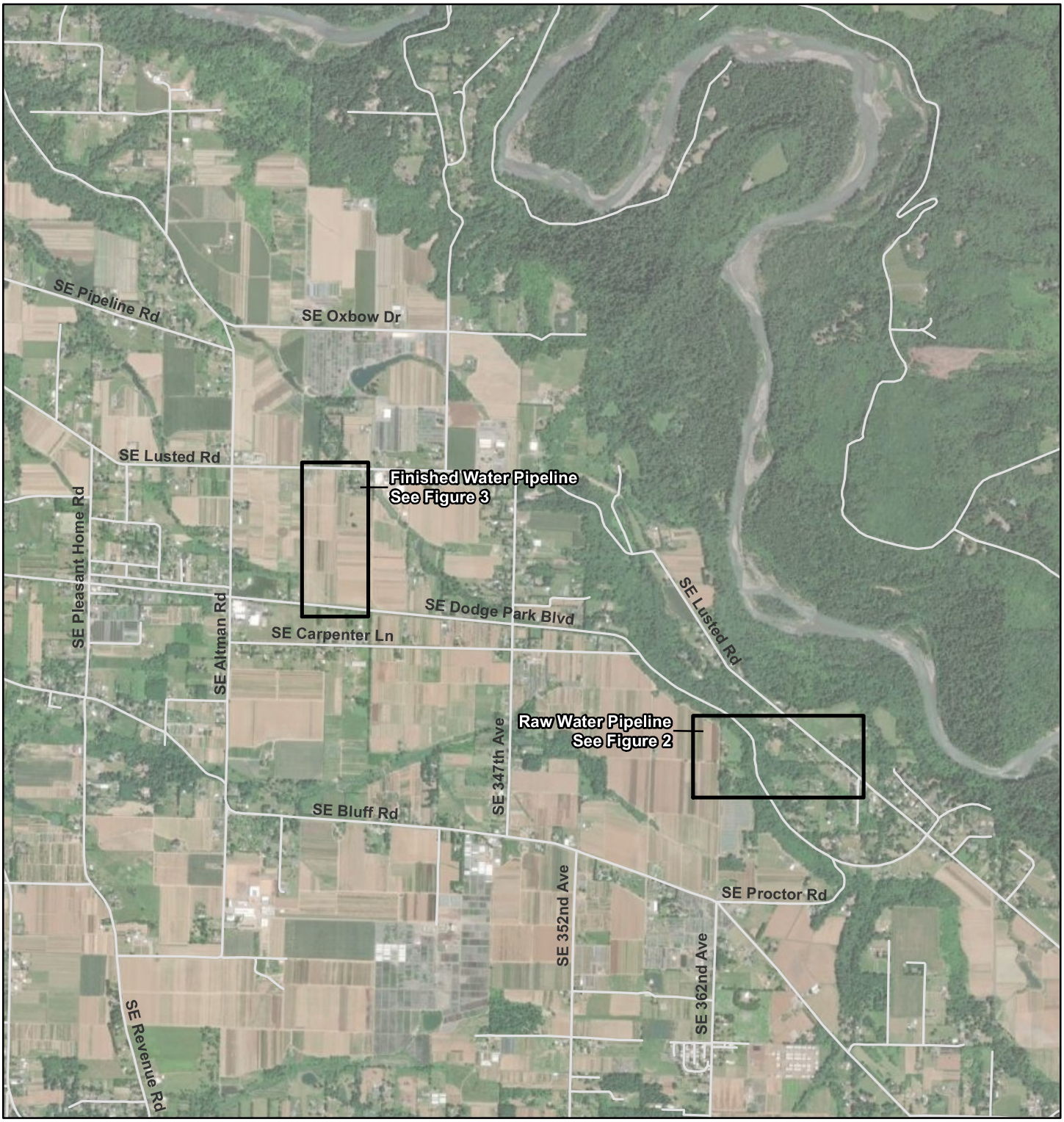
Further to the north, the easement passes through a large area of Mershon Silt Loam, 0 to 8 percent slopes (Appendix A, Figure 3). Based on NRCS soil survey data, topsoil depth averages 15 inches. The soil has moderate resistance to compaction but has a severe rutting hazard, so rutting BMPs will be required (Section 2.3.4). Wind erosion potential is low and water erosion potential is moderate, so water erosion BMPs will be required on bare ground, slopes to prevent water erosion (Sections 2.2, 2.3, 2.4, and 2.8). In general, NRCS soil survey data indicate a depth to the water table of 36 to 60 inches. Three geotechnical borings were conducted for the design of the project in this soil type. Only one boring (installed midway through this soil type) showed the groundwater table to be 12.3 feet below the ground surface. The remaining 2 borings did not record groundwater. Therefore, groundwater may not be an issue in this soil type. No excavation for pipeline construction is proposed on this parcel. The plan is to construct and leave an improved road surface for use by the contractor and the landowner in this area that is not planted, and a farm road exists currently. Topsoil stock piling will not be conducted on this parcel as the impact is only to improve the existing farm road.

4 Conclusion

Implementation of avoidance measures, minimization measures, BMPs, mitigation measures, and monitoring discussed in the Plan will result in agricultural lands and agricultural infrastructure disturbed by the project being returned to their pre-project conditions.

Appendix A

Figure 1 – Project Vicinity
Figure 2 – Landowner Identifiers and Soil Types for the Raw Water Pipelines
Figure 3 – Landowner Identifiers and Soil Types for the Finished Water Pipelines



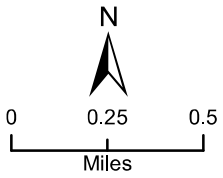


Figure 1
Project Vicinity
PWB Facilities Pipeline Project

Jacobs

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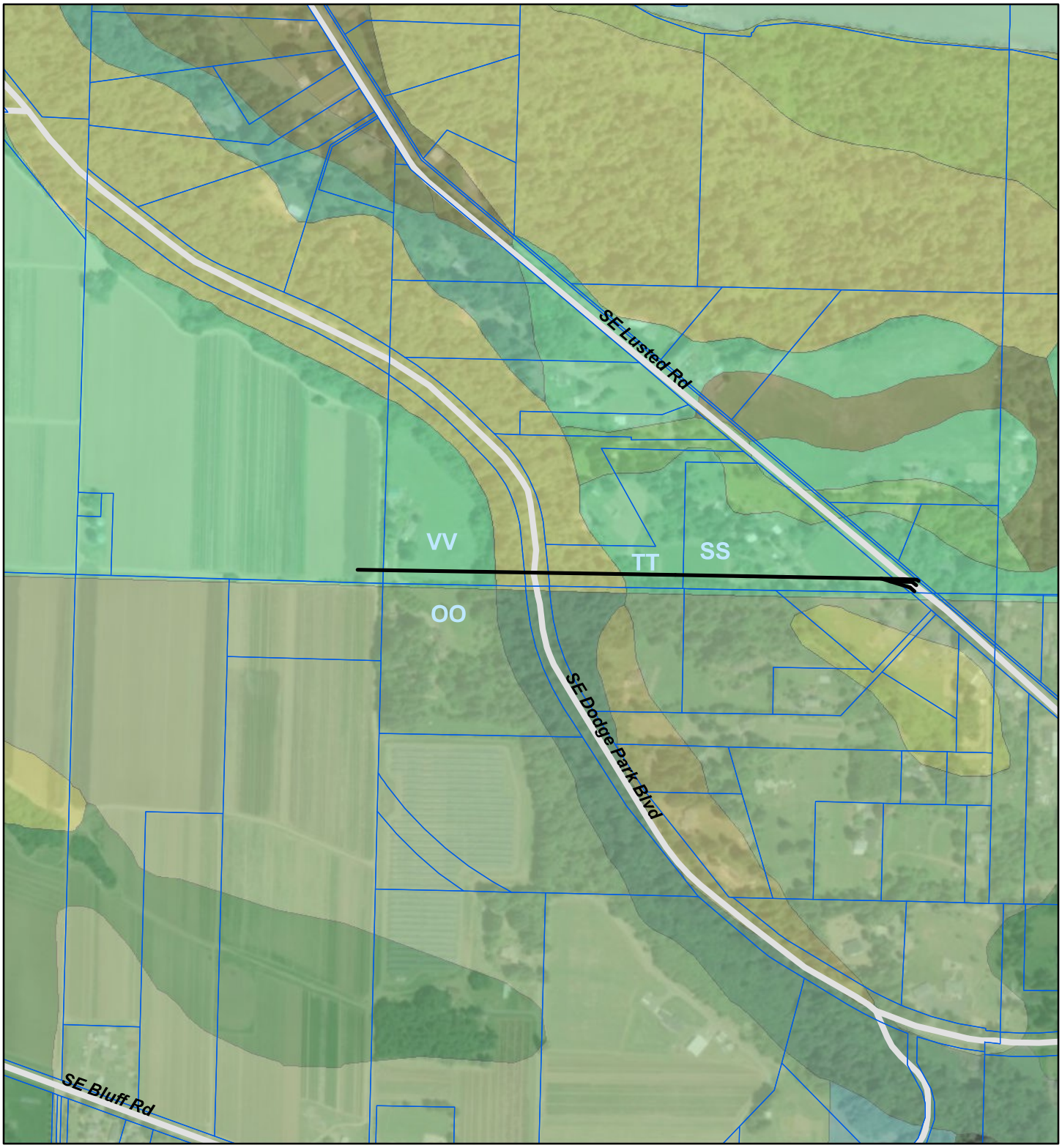

- Raw Water Pipeline
- Tax Lot Boundary
- 7B: Borges silty clay loam, 0 to 8 percent slopes
- 9B: Bull Run silt loam, 3 to 8 percent slopes
- 9C: Cazadero silty clay loam, 8 to 15 percent slopes
- 9D: Bull Run silt loam, 8 to 30 percent slopes
- 13: Dabney loamy sand
- 15B: Cazadero silty clay loam, 0 to 7 percent slopes
- 15C: Cazadero silty clay loam, 7 to 12 percent slopes
- 20C: Haplumbrepts, moderately steep
- 20F: Haplumbrepts, very steep
- 24B: Cottrell silty clay loam, 2 to 8 percent slopes
- 27B: Mershon silt loam, 0 to 8 percent slopes
- 31F: Dystrochrepts, very steep
- 57: Wollent silt loam
- W: Water

0 300 600
Feet

N

Figure 2
Landowner Identifiers and Soil Types for the Raw Water Pipeline
PWB Facilities Pipeline Project

Jacobs

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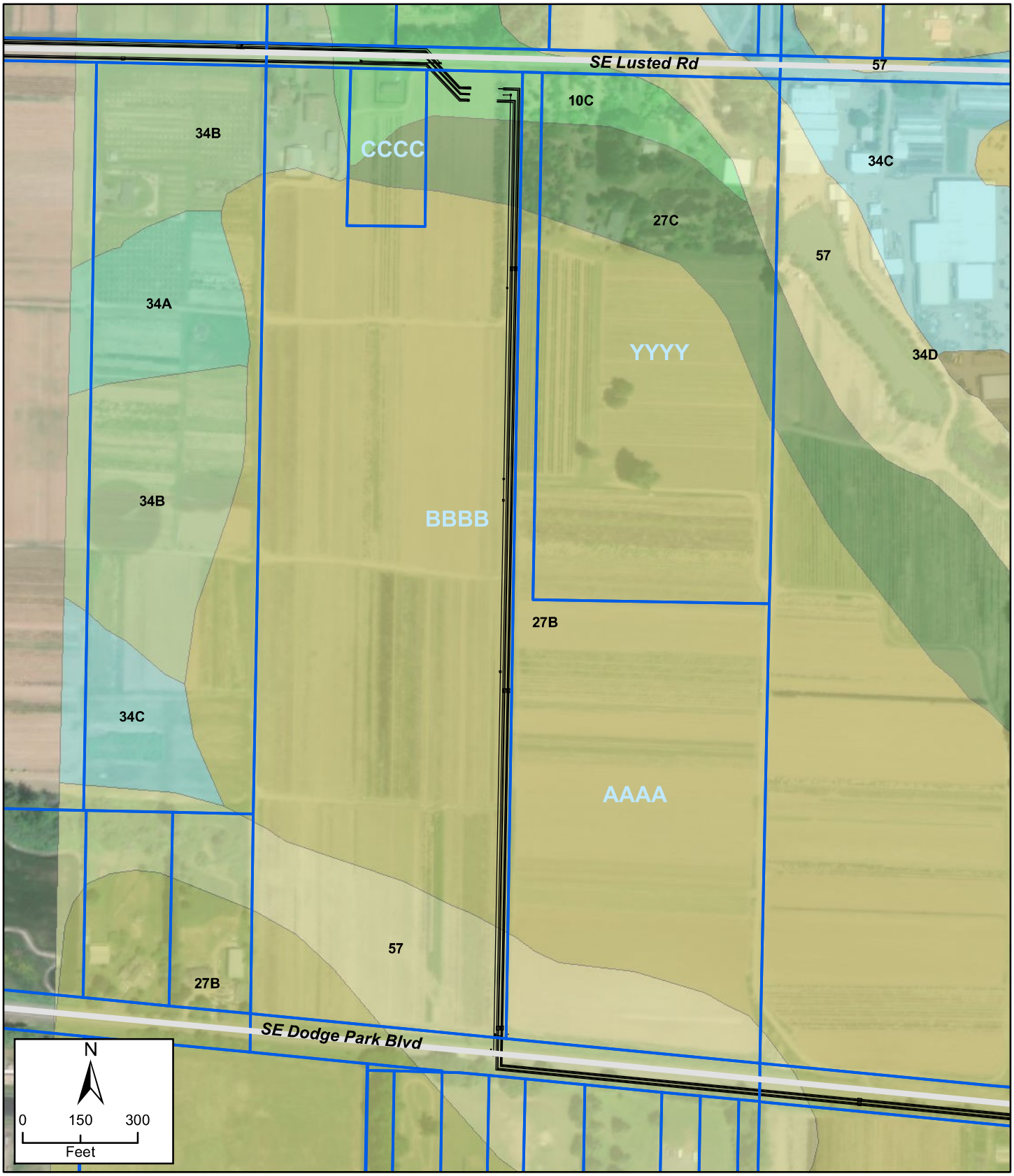

Finished Water Pipeline

Tax Lot Boundary

Soils

10C: Cornelius silt loam, 8 to 15 percent slopes

27B: Mershon silt loam, 0 to 8 percent slopes

27C: Mershon silt loam, 8 to 15 percent slopes

34A: Powell silt loam, 0 to 3 percent slopes

34B: Powell silt loam, 3 to 8 percent slopes

34C: Powell silt loam, 8 to 15 percent slopes

34D: Powell silt loam, 15 to 30 percent slopes

57: Wollent silt loam

Figure 3
Landowner Identifiers and Soil Types for the Finished Water Pipeline
PWB Facilities Pipeline Project

Jacobs

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