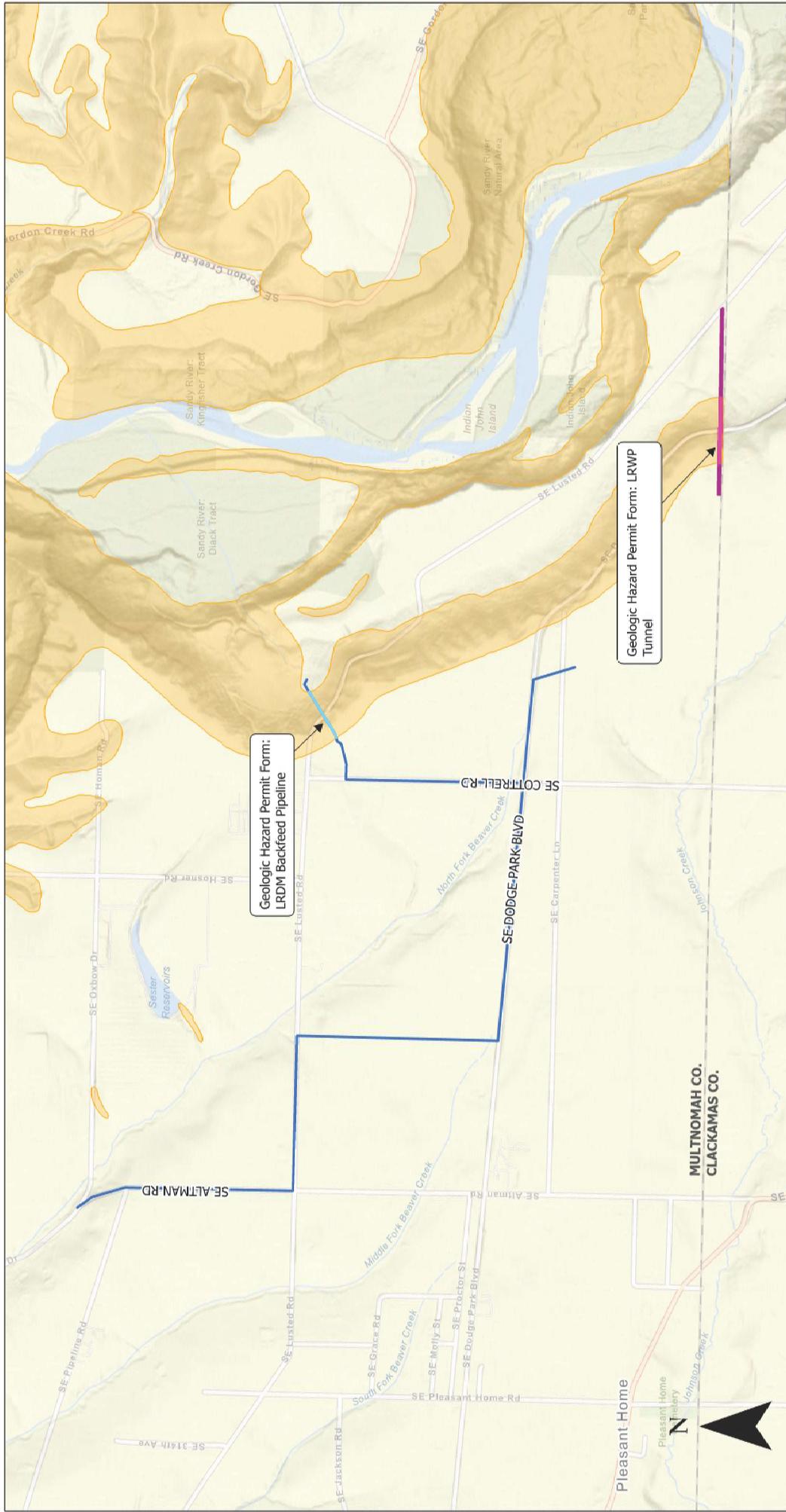




Geologic Hazards Permit (GHP) Form 1 Filtration Pipelines Project

September 2022

Key Plan for Forms



Notes:

1. Slope hazard data from Multnomah County GIS.
2. Raw and Finished Water Pipeline alignments based on 60% Design Submittal.

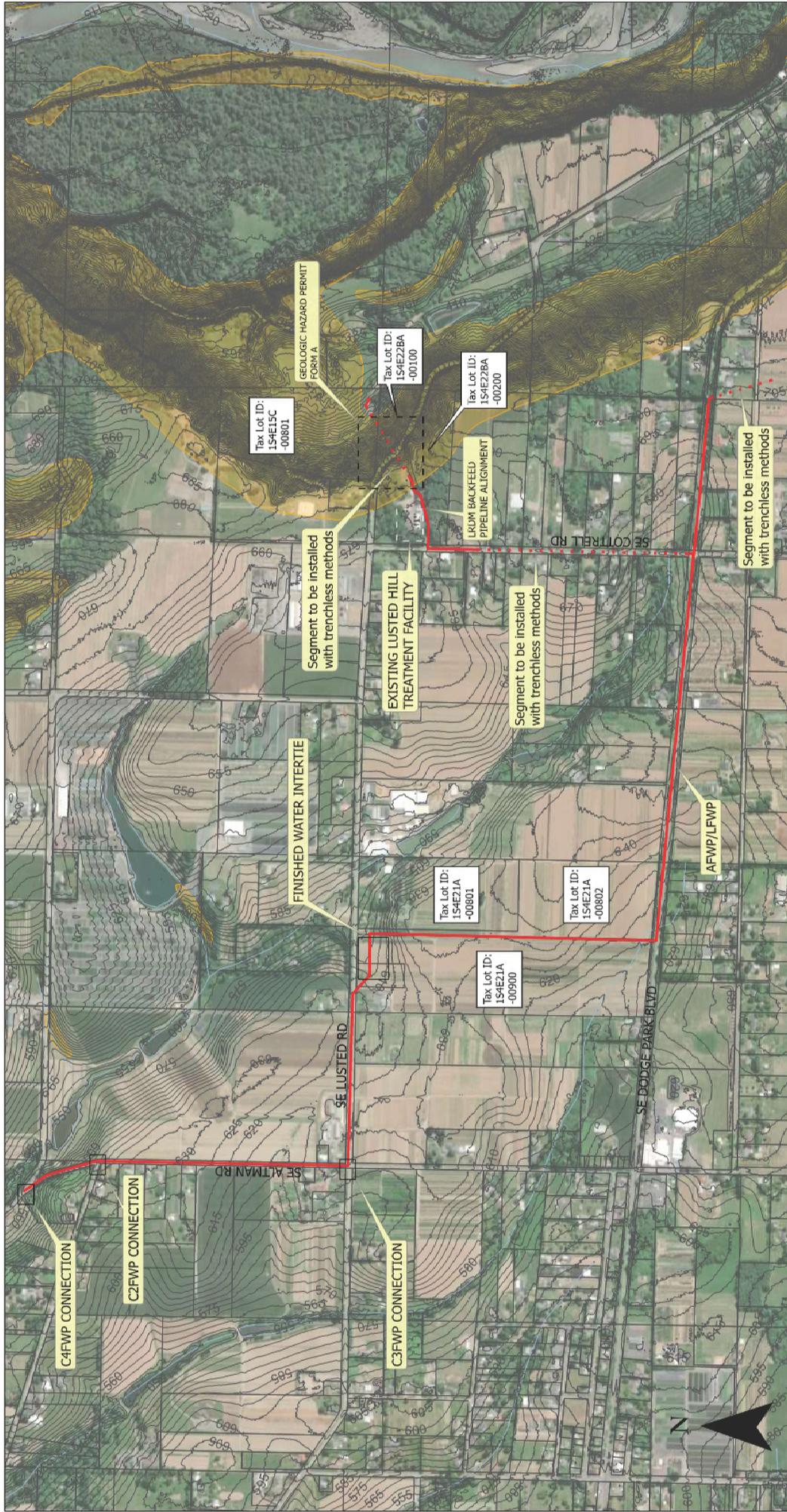
Legend

- Multnomah County Geologic Hazard Zone
- Finished Water Alignment - Outside Geologic Hazard Zone
- Finished Water Pipeline within Hazard Zone (Geologic Hazard Permit Form A)
- Raw Water Alignment - Outside Geologic Hazard Zone
- Raw Water Pipeline within Hazard Zone (Geologic Hazard Permit Form B)



PORTLAND WATER BUREAU
 FILTRATION PIPELINES PROJECT
 GEOHAZARD PERMIT APPLICATION
 KEY PLAN

SEPT 2022

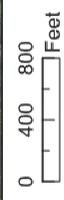


Notes:

1. Slope hazard data from Multnomah County GIS.
2. Finished Water Pipeline alignments based on 60% Design Submittal.
3. Elevations are given in Portland Vertical Coordinate System (PVCS=NAVD88-2.1 ft).

Legend

- Multnomah County Geologic Hazard Zone
- Tax Lots
- Finished Water Alignment - Trenched
- Finished Water Alignment - Trenchless



Jacobs

PORTLAND WATER BUREAU

FILTRATION PIPELINES PROJECT

GEOHAZARD PERMIT APPLICATION
SITE PLAN

SEPT 2022

Finished Water Pipeline - LRDM within Geologic Hazard Zone - Form A



Land Use Planning Division
1600 SE 190th Ave, Ste 116
Portland OR 97233
Ph: 503-988-3043 Fax: 503-988-3389
multco.us/landuse

GEOLOGIC HAZARDS PERMIT (GHP) Form 1: GEOTECHNICAL RECONNAISSANCE AND STABILITY PRELIMINARY STUDY

Note: Response to each question below must be completed or verified by a Certified Engineering Geologist or Geotechnical Engineer, including a State of Oregon Registration Stamp and Number in the space provided on page four. The GHP Form 1 addresses Multnomah County Code Section 39.5085(C)(3)(c); 38.5515(C)(3)(c), Geologic Hazards Permits.

Site Address: 1. 6704 SE Cottrell Road, Gresham, 970 2. Levy Code 416, Gresham, 97080
3. 34747 SE Lusted Rd, Gresham, 97080 * See Filtration Pipeline Project Geohazard Permit Application Site Plan

Legal Description: 1. 1S4E22BA -00200 2. 1S4E22BA -00100
3. 1S4E15C -00801

Property Owner's Name: 1. City of Portland 2. City of Portland
3. Lusted Road Farms LLC

Firm Preparing Report: Jacobs Engineering

Address: 2020 SW Fourth Avenue, Suite 300

City: Portland State: Oregon Zip: 97201

Preparer's Name: Todd Cotten

Phone Number: 503.803.4148

GENERAL PROPERTY INFORMATION

1. a. Maximum Slope on Property: 1: 1H:1V (horizontal:vertical) 2: 1H:1V Area in which it is located: 1: Near SE Lusted Rd. 2: Near SE Lusted Rd
3: 1H:1V 3: Western margin
Average Slope of Property: 1: Approximately 10H:1V 2: Approximately 3H:1V
3: Approximately 3.5H:1V

b. Are there any wetlands or streambeds on the property? (Please Circle) Yes No
If yes, please show on topographical survey or sketch.

c. Volume of soil or earth material disturbed, stored, disposed of or used as fill: See page 5 of this application for the response.

d. Total area of proposed ground disturbance:

Approximately 1,400 (square feet) Less than 0.1 (acres)

See page 5 of this application for additional information on ground disturbance.

Exhibit A.89.c

Were building plans considered when completing this form? (Please Circle) Yes No

If yes, please note the author and date the plans were prepared.

Bull Run Filtration Pipelines, Finished Water Pipeline 60 percent design package. Jacobs Engineering, September 2022.

2. What is the general topography of the property? Please attach a topographic survey or sketch with pertinent notes.

The ground at the west end of the proposed Lusted Road Distribution Main (LRDM) pipeline within the geohazard zone is flat to gently sloping (~2% and 5%) for approximately 300 feet at the west end. The ground surface starts to slope to the east about 160 feet east of the start of the trenchless pipeline and slopes down to SE Lusted Road at about 25% slope. The ground is approximately level across SE Lusted Road, then continues downhill on the east side of SE Lusted Road at about 35% slope. The slope becomes more gentle (<10% slope) at the east end of the trenchless installation within the geologic hazard zone. See attached drawings GH-05 and GH-06.

3. Are there any visible signs of instability or other potentially adverse site features (Landslides, slumps, mud flow, creep, ravines, fills, cuts, seeps, springs, ponds, etc.) within the surrounding area for a minimum distance of 100 feet beyond the subject property boundaries? Describe and indicate on attached topographic survey or sketch.

No signs of instability or adverse site features were observed within 300 feet of the proposed LRDM pipeline, which will be installed using trenchless methods (primarily) on the north side and adjacent to existing pipelines routed up and down the relatively steep slopes described above (Question 2). One of the existing pipelines was installed in 1925, almost 100 years ago, and there has been no slope movement along the pipeline that has resulted in damage or the need to repair the pipe or mitigate slope movement.
Two inactive landslides slumps were previously documented south of the existing buried pipeline.

4. Is any earthwork proposed in connection with site development?

(Please Circle) Yes No

If yes, please indicate depth and extent of cuts/fills; describe fill types.

The proposed 12-inch diameter LRDM pipe will be installed using trenchless installation methods through the majority of the geologic hazard overlay zone. It will be installed using open-cut methods through the western limits of the geologic hazard overlay zone, where the ground surface becomes more gentle. The open cut pipe installation will require temporary excavations that will be brought back existing grade with properly compacted structural backfill and native material at the surface. Site grading will not be required. See page 5 of this application for information on proposed structural fill to be used within the geologic hazard area.

5. In your opinion, will the proposed earthwork cause potential stability problems for the subject and/or adjacent properties?

(Please Circle) Yes No

The pipeline will primarily be installed using trenchless methods. A short segment, approximately 140 feet long, of open-cut installation will be backfilled and the ground brought back to pre-construction grades. See attached drawings GH-04 through GH-06.

IF YES, EXPRESS PROBABILITY:

(Please Circle) Very Probable Possibly Possible, but remote

If Very Probable or Possibly, please explain.

6. In your opinion, will the proposed development (structures, foundations, parking area, streets, etc.) create potential stability problems for the subject and/or adjacent properties?

(Please Circle)

Yes

No

There are no new developments for this portion of the project other than a 12-inch diameter LRDM pipeline that will primarily be constructed using trenchless installation methods.

IF YES, EXPRESS PROBABILITY:

(Please Circle)

Very Probable

Possibly

Possible, but remote

If Very Probable or Possibly, please explain.

7. In your opinion would the subsurface disposal of sewage effluent on the site (i.e., drain fields) have an adverse affect on stability of the site or adjacent area?

(Please Circle)

Yes

No

NOT APPLICABLE: This project does not involve sewage effluent or drain fields.

IF YES, EXPRESS PROBABILITY:

(Please Circle)

Very Probable

Possibly

Possible, but remote

If Very Probable or Possibly, please explain.

8. If answer is Very Probable or Possibly to questions 4 or 5, is it your opinion, on the basis of a visual evaluation, that adequate stability might be achieved by preferred siting of the development, alternative foundation support, earthwork, drainage, etc.?

(Please Circle)

Yes

No

If yes, please explain.

9. Do you recommend additional geotechnical studies (i.e., mapping, testing pits or borings, stability analysis, etc.) prior to site development?

(Please Circle)

Yes

No

No. Geotechnical explorations and studies have been completed along the alignment that sufficiently provide subsurface information for hazard evaluation and design.

If yes, please explain.

By signing and affixing the required stamp below, the Certifying Engineering Geologist or Geotechnical Engineer certifies that the site is suitable for the proposed development.

Signature Todd E. Cotten

Date September 29, 2022



GEOLOGIC HAZARDS PERMIT (GH) APPLICATION:

Additional Responses

Response to General Property Information Question 1.c

The volume of earth material excavated along the LRDM within the geologic hazard overlay area will be approximately 581 yds³. Of this, about 529 yds³ will be removed from the site and disposed of offsite. About 63 yds³ of soil will be disturbed in the trenchless installation area within the geologic hazard area assuming a 24-inch diameter bore will be used for the proposed pipeline. About 519 yds³ of soil will be disturbed in the open cut segment of the pipeline that is within the geologic hazard overlay area. The volume assumes a trench will be excavated that is about 20 feet deep and 5 feet wide. The calculations of excavated, stockpiled, transported, and fill quantities and the area of disturbance within the geologic hazard area is provided on the following page. The open-cut section will be backfilled using properly compacted granular material around the pipe and native material at the surface. A discussion of the structural backfill materials to be used within the geologic hazard overlay area is provided below.

Response to General Property Information Question 1.d

Construction within the geologic slope hazard overlay zone will consist of a horizontal direction drill for a 12-inch diameter pipeline. A reamed hole diameter of 24-inches is conservatively assumed. The entry point at the east end will be outside the slope hazard overlay zone. The west end of the trenchless installation is within the geologic hazard overlay zone. Approximately 140 feet of the open cut portion of the pipeline will be within the geologic hazard overlay zone.

Structural Fill for Finish Water Pipeline within Geohazard Zone.

Structural fill will not be used to backfill the portion of the LRDM pipeline that will be installed using trenchless installation methods.

Structural fill and native fill will be used to backfill the open-cut portion of the 12-inch diameter LRDM pipeline. The proposed structural backfill to be used within the geologic hazard overlay zone consists of the following:

- 1) Pipe Zone Material will consist of 1-inch - minus or 3/4-inch - minus crushed aggregate, also known as dense-graded aggregate fill. Pipe zone material will be used below, around, and to approximately 12 inches above the pipeline. These materials will conform to the requirements of Section 02630 of the City of Portland Standard Construction Specifications, 2020 version.
- 2) Gravel or crushed rock consisting either of dense-graded aggregate fill or a pit run or bar run material, well-graded from coarse to fine with a maximum dimension of 3 inches will be used as backfill between the pipe zone material and native topsoil that will be placed at the surface.

See attached Bull Run Filtration Pipeline drawings: GH-000, GH-001, GH-04, GH-05, GH-06, ESC-201, and ESC-202.

City of Portland

Facility Pipelines Geohazard Permit Quantities

Prepared by: McMillen Jacobs / Jacobs Eng

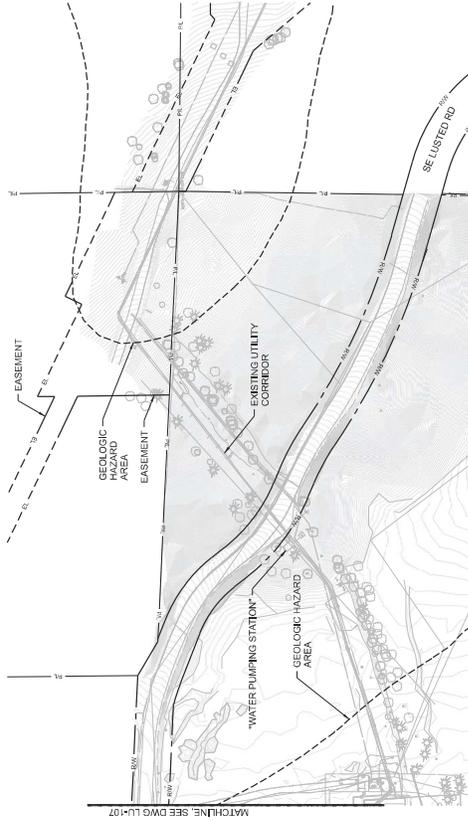
Revision No. 3 prepared by Todd Cotten and Jeff Quinn, 09/26/2022.

* Processed Material - defined as asphalt, aggregate, class 8 backfill, engineered fill, non-native road fill, concrete, CDF, CLSM, cellular concrete

Item #	Description	Length (feet)	diameter or width (feet)	Depth (feet)	Located in ROW / V/N	Excavation Volumes, CY			Stockpiled Material Quantities, CY			Transportation Quantities, CY			Total Volume per I.L.			Area of Disturbance		Notes		
						A Total Excavated Volume (Earth Material & Existing Processed Material)	B Volume Excavated Outside of Right-of-Way	C Volume Earth Material Excavated	D Earth Material stockpiled on-site to be reused	E Excavated Processed Material to be reused	F Earth Material Hauled Offsite	G Excavated Processed Material Hauled Offsite	H Material Hauled Offsite	I Impurities Processed Material*	J Volume of soil or earth material disturbed, stored, disposed or used as fill	K Square Feet of Area of Disturbance	L Square Feet of Area of Disturbance					
1	Bedded Pipeline - Open Cut Section	142	51	20	V	513	0	513	52	0	467	0	467	513	1400	0.03	12'	0.03	12'	0.03	12'	
2	Bedded Pipeline - Horizontal Directional Drill Trenchless install.	540	2	1	V	63	0	63	0	0	63	0	63	63	0	0.00	12'	0.00	12'	0.00	12'	0.00
	Totals					381	0	381	52	0	521	0	521	381	1,400	0.03	12'	0.03	12'	0.03	12'	0.03

LEGEND

- ☼ CONIFEROUS TREE
- DECIDUOUS TREE
- COUNTY LINE
- P/L — PROPERTY LINE
- RW — RIGHT-OF-WAY
- EL — EASEMENT
- - - - - GEOHAZARD AREA



DATE PLOTTED: 08/20/2022
 SHEET NO: 3765
 PROJECT NO: GH-04

Bull Run Filtration Pipelines
FINISHED WATER PIPELINE
 EXISTING CONDITIONS
 GRID 16



XXX,XXX
 XXX,XXX



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Prepared By	Program Mgr	XXX
Checked By	Date	08/22
Project Mgr	XXX	

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 CONSTRUCTION**

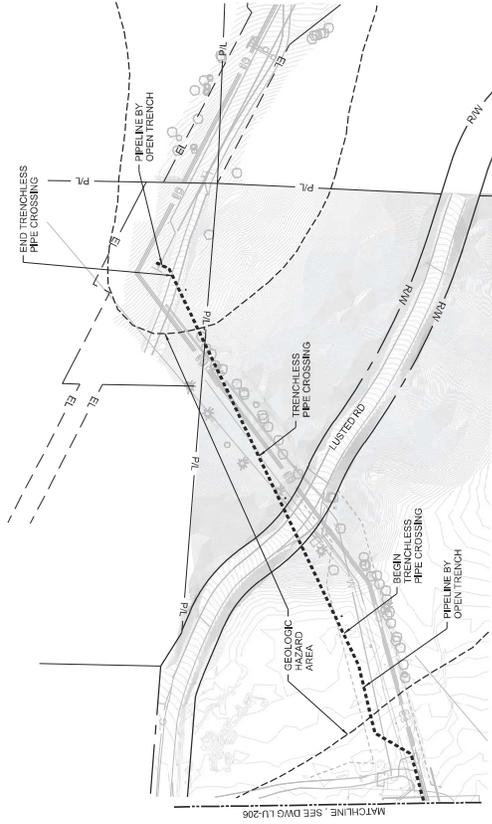
No.	Date	Revised	ADP
Survey			

GENERAL SHEET NOTES

1. ALL WORK AREAS RESTORED TO EXISTING GRADE
2. REFER TO SEC LH-01 (APPENDIX A.3) FOR DETAILS
3. SEE WORK GENERAL SCHEDULE FOR LANDSCAPE PLANT SCHEDULE AND SPEC. 32.00 FOR SEEDING INFORMATION.

LEGEND

- EXISTING STRUCTURES
- CONTOURS
- PIPELINE
 - CONFEROUS TREE
 - DECIDUOUS TREE
 - EASEMENT
 - PROPERTY LINE
 - R/W - RIGHT OF WAY
 - GEOHAZARD AREA



KEY PLAN

Bull Run Filtration Pipelines
FINISH WATER PIPELINE
 PROPOSED CONDITIONS PLAN
 GRID 16



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Designed By	Program Mgr	XXX
Checked By	Drawn Mgr	XXX
Project Mgr	Design Mgr	XXX
	Date	03/22

**PRELIMINARY
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 CONSTRUCTION**

No.	Date	Revised
1		ADP

Survey

DATE PLOTTED: 03/22/22
 SHEET NO: GH-05
 PROJECT NO: W02563
 DRAWN BY: XXXXXX
 CHECKED BY: XXXXXX
 PROJECT MGR: XXXXXX
 DATE: 03/22/22
 REVISIONS: NONE
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