TECHNICAL MEMORANDUM

DATE April 30, 2020 **Project No.** 923-1000-006.1019

TO Mr. Jerome Cruz
Washington State Department of Ecology

CC Landsburg PLP Group

FROM Golder Associates Inc. **EMAIL gzimmerman@golder.com**

30% DESIGN ENGINEERING DESIGN REPORT - CONTINGENT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM, LANDSBURG MINE SITE

1.0 INTRODUCTION

The Landsburg Mine Site (Site) is a Washington State Model Toxics Control Act (MTCA) listed site, administered by the Washington State Department of Ecology (Ecology). The history of the Site, summary of the remedial investigation (RI), feasibility study (FS) and additional environmental investigations completed at the Site, and the remedial actions selected by Ecology are detailed in the Final Cleanup Action Plan (CAP; Ecology 2017a). The Site is shown on Figure 1. Prior to the start of the selected remedial actions, low concentrations of 1,4-dioxane were detected in three Site groundwater monitoring wells located at the north end of the Site. 1,4-dioxane has not been detected in samples collected from any of the other 10 Site wells or in samples collected from groundwater monitoring wells installed downgradient of the north end of the Site.

In response to the 1,4-dioxane detection, several investigations, risk evaluations, and response actions were completed to determine the nature and extent of the 1,4-dioxane. These actions were completed under Ecology's approval, and the data that was collected and determinations made from the investigations were provided to Ecology in various reports. On April 3, 2020, Ecology requested submittal of a 30% design Engineering Design Report (EDR) for a Contingent Groundwater Extraction and Treatment System. The 30% design provides a conceptual depiction of a groundwater extraction and treatment system that could be constructed to inhibit the migration of 1,4-dioxane beyond the Site compliance boundary, if such a system were determined necessary to protect human health and the environment. This technical memorandum provides a conceptual description of the 1,4-dioxane contingent groundwater extraction and treatment system. The 30% design drawings are provided in Attachment 1.

2.0 EXISTING GROUNDWATER EXTRACTION AND TREATMENT INFRASTRUCTURE

The approved Final CAP (Ecology 2017a) for the Site contains provisions for a contingent groundwater extraction and treatment system. The requirements for the Contingent Groundwater Extraction and Treatment Plan are detailed with Exhibit D, Part C of the Consent Decree (Ecology 2017b).

To allow for prompt implementation of the Contingent Groundwater Extraction and Treatment Plan, if warranted in the future, some of the components of the treatment system infrastructure that have long lead times have already been installed. Infrastructure installed in 2008 near the north portal (Portal #2), consists of the following:

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- A gravel pad for the treatment equipment
- Underground electrical service to a panel to provide power for the treatment equipment
- Light poles and fixtures at several locations around the pad to provide adequate illumination for night work
- A chain-link fence around the perimeter of the pad for security
- A gravel road from the Summit Landsburg road to provide vehicle access
- A 3-inch diameter high density polyethylene (HDPE) discharge pipe was installed extending from the treatment pad, west towards the nearest municipal sewer line. The line was extended up to the Palmer Coking Coal property boundary and flanged to allow further extension and connection to the nearest sewer line if ever required. The nearest sewer line is the Soos Creek Sewer District line located approximately 1,000 feet west of the location where the 3-inch discharge line was terminated.

This technical memorandum and the attached 30% design drawings conceptually present the additional components that could be added to the existing infrastructure to reduce the migration of 1,4-dioxanebeyond the Site compliance boundary.

3.0 CONCEPTUAL 1,4-DIOXANE EXTRACTION AND TREATMENT DESIGN

To design the Contingent Groundwater Extraction and Treatment System specified in the CAP, the assumption must be made that the system will be constructed to capture impacted groundwater that is migrating within the mine workings. This is achieved by extracting groundwater at a sufficient rate to capture the impacted groundwater at a selected point along the groundwater flow path that is located prior to the compliance wells. The extraction well establishes an inward groundwater gradient around the extraction well that captures impacted groundwater and inhibits migration of that impacted groundwater within the mine workings beyond the point of the extraction well. This section describes the Site-specific characteristics that were used in the 30% design EDR.

3.1 Nature and Extent of 1,4-Dioxane at the Site

Groundwater beneath the waste disposal area within the former Rogers mine seam flows to the north to northeast along the strike of the Rogers coal seam and within the mine workings. The new sentinel wells LMW-12 and LMW-13R are screened in the Rogers seam, hydrologically downgradient of the former waste disposal area and upgradient of the compliance wells LMW-2 and LMW-4, which are also screened in the Rogers seam. Figure 2 shows a cross-section of the Site and depicts the groundwater monitoring well locations and screened intervals.

1,4-Dioxane has been detected in LMW-2, LMW-4, and LMW-12, but has never been detected in LMW-13R or LMW-10. The distribution of 1,4-dioxane detection in the north end wells bounds the vertical extent of

1,4-dioxane. The lateral extent is limited to the width of the Rogers seam, which is approximately 15 feet wide. The low concentrations of 1,4-dioxane that are being detected in the three north end wells at steady to potentially slightly decreasing concentrations are flowing to the north within the Rogers seam. The vertical extent of 1,4-dioxane detected at the location of LMW-12 is less than the top of the screen of LMW-13R (i.e., less than 115 feet below ground surface [bgs]). The absence of 1,4-dioxane detections in LMW-13R confirms this vertical extent. As such, a groundwater extraction well installed downgradient of LMW-12/LMW-13R would need to create inward groundwater gradients capable of capturing the entire vertical zone of 1,4-dioxane containing groundwater extending no deeper than LMW-13R.

3.2 Initial Estimate of Groundwater Capture and Pumping Rate

To support the 30% design of the groundwater remedy, a cross-section numerical groundwater flow model was constructed of the Landsburg coal seam. The model was built in MODFLOW-2005 using the Groundwater Vistas graphical user interface. This basic level of groundwater modeling is appropriate at this 30% conceptual design stage and can be refined and augmented in the full design if necessary.

Current Condition Model

A current-condition model was constructed along the coal seam strike from the Cedar River upgradient to LMW-15, representative of the groundwater divide. Key features of the model include:

Grid was designed with 23 layers and 450 columns. The large number of layers were used to allow testing of future groundwater remedial design approaches.

Boundary conditions were included to represent no flow boundaries at LMW-15 and the bedrock depth at about 250 feet (ft) above mean sea level (msl) elevation. The Cedar River was modeled using River boundary conditions with conductance approximating Quaternary Outwash anticipated at the base of the River. Average annual recharge was approximated based on the catchment area of the seam and is equal to 33 gallons per minute (gpm).

Material properties were applied to four hydrostratigraphic units as summarized in Table 1.

Table 1: Hydrostratigraphic Units and Assigned Hydraulic Conductivity Values

Hydrostratigraphic Unit	Hydraulic Conductivity (ft/day)	Explanation
Mine Workings/Coal Seam	80	The primary flow pathway at the Site.
Bedrock	11	Low permeability bedrock.
Shallow Fill	1,000	Coarse sand and gravel overlying the terrace where LMW-4, LMW-2, and LMW-10 are installed.
Till	0.5	Mapped Quaternary till (Qvt) encountered on steep slopes in Site boreholes.

Calibration data included groundwater elevations measured at all Wells LMW-4, LMW-2, LMW-12, LMW-13R, LMW-1, and LMW-14 on December 10, 2019. Measured groundwater elevations within the model domain ranged from 644.53 ft at the upgradient boundary to 610.69 ft at LMW-2.

This simplified groundwater flow model of the coal seam is able to approximate observed groundwater elevations and match hydraulic gradients.

Remedy Scenario Model

A groundwater remedy model was constructed using current-condition model with the addition of one groundwater extraction well and two groundwater performance monitoring wells. Based on iterative tests of extraction well locations and rates, a representative scenario was selected for capture zone analysis (Table 2).

Table 2: Selected Groundwater Remedy Scenario

Remedy Options	Description
Extraction Well Location	100 ft downgradient of LMW-12
Extraction Well Depth	105 ft below ground surface
Extraction Well Screen*	90 to 100 ft below ground surface
Pumping Rate	15 gpm
Performance Well 1	20 ft downgradient of extraction well
Performance Well 2	40 ft downgradient of extraction well

Note: *screen length may be increased during later design stages with minimal change to anticipated capture.

The selected groundwater remedy capture zone was computed using MODPATH 5. Particles were uniformly placed along the upgradient boundary condition within the mine workings/coal seam. Particle paths were computed by tracking forward from one cell to the next until the particles reaches a discharge point (i.e., proposed extraction well or the Cedar River). Based on inspection of the particle tracks, all upgradient flow paths across the seam where 1,4-dioxane has been observed are captured in the Proposed Extraction Well (Figure 3). Because of the limited extent of the hydraulically conductive materials, groundwater elevations are expected to decline almost 50 ft at steady-state pumping (Figure 4). Based on the numerical model drawdown calculation, two proposed performance wells were located within the capture zone of the extraction well (Figure 4 and Figure 5). Based on the 30% design described here, these wells would be installed to 100 ft below ground surface and located 20 and 40 ft downgradient of the extraction well, respectively.

3.3 Conceptual Installation and Operation of the Contingent Groundwater Extraction and Treatment System

The conceptual design of the Contingent Groundwater Extraction and Treatment System described in this section is presented in the 30% design drawings that are included in Attachment 1 to this technical memorandum. The design includes the following major components:

- A 6 to 8-inch diameter extraction well will be installed approximately 100 feet downgradient of LMW-12 and will be screened within the Rogers Seam across a depth interval of approximately 90 to 100 feet bgs.
- A submersible pump will be installed in the extraction well to serve as an extraction pump. The extraction pump will have a pumping rate that creates a hydraulic capture of groundwater across the entire horizontal and vertical depth of the impacted groundwater within the Rogers seam. The extraction pump will be appropriately sized following well installation and pump testing.

- The performance monitoring wells will be installed within the Rogers coal seam 20 feet and 40 feet downgradient of the extraction well and will be screened across a similar depth interval as the extraction well. The performance wells measure hydraulic gradients that would demonstrate inward gradients towards the extraction well.
- The 3-inch diameter HDPE pipe extension and connection to the Soos Creek Sewer Line will be completed.
- An approximate 20,000-gallon surge tank will be installed within the fenced treatment pad. The surge tank will allow for settling of suspended solids and allow metering of the water pumped to the Soos Creek sewer line. The surge tank will also provide the storage to allow discharge to the sewer line during hours of the day or night when Soos Creek has adequate capacity to receive the extracted water.
- Float switches and or timer switches within the surge tank will activate a booster pump to transfer water from the surge tank to the sewer line via the 3-inch diameter HDPE discharge line.

From the Soos Creek sewer line, discharge is piped to the South Plant, commonly known as the Renton wastewater treatment plant, which is part of the King County – Industrial Waste Program. Communications with Mr. Bruce Tiffany, an engineer with the King County – Industrial Waste Program, confirmed that water containing 1,4-dioxane concentrations detected at the Site (i.e., approximately 1 to 2.5 µg/L) would be acceptable for discharge to the King County sanitary sewer system. Mr. Tiffany indicated that King County – Industrial Waste Program had accepted a discharge limit of 2,000 µg/L for another project.

4.0 ANTICIPATED PROCESS FOR INSTALLATION OF THE CONTINGENT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

The following primary steps are anticipated to complete the North Contingent Groundwater Extraction and Treatment System installation:

1) Obtain approvals from King County Industrial Waste and Soos Creek to connect the discharge line to their sewer line and obtain access approval from King County to extend the discharge line across King County property and under Summit Landsburg Road. Identify and obtain or meet the substantive requirements of any other permits required for the installation.
2) Complete the extension of the discharge pipe from the north contingent treatment pad to connect to the Soos Creek sewer line.
3) Drill and install the extraction well.
4) After extraction well installation, conduct a pump test to accurately determine the hydraulic properties of the aquifer.
5) The hydraulic properties will then be used to size and install an extraction pump suitable to capture groundwater across the entire horizontal and vertical depth of the impacted groundwater within the Rogers seam. The hydraulic properties will also be used to refine the locations and screened intervals of the two performance monitoring wells that will be used to confirm inward vertical gradients are established by the extraction well.
6) Drill and install the 2-inch diameter performance monitoring wells and install the permanent extraction pump in the extraction well.

7) Install the 20,000-gallon surge tank, booster pump, and all associated electrical components and piping connections

It is important to note that the conceptual design for the Contingent Groundwater Extraction and Treatment system described in this 30% design EDR is specific to the 1,4-dioxane currently detected at the Site. The system as conceptually described would not necessarily be applicable or appropriate if other contaminants were ever detected above a trigger level concentration in the future. The specific nature and extent of the contaminant(s), if ever detected, would dictate the design parameters of the Contingent Groundwater Extraction and Treatment system.

5.0 REFERENCES

Environmental Simulations Inc. (ESI). 2017. Groundwater Vistas version 7Harbaugh, A.W., Langevin, C.D., Hughes, J.D., Niswonger, R.N., and Konikow, L. F., 2017, MODFLOW-2005 version 1.12.00, the U.S. Geological.

Survey modular groundwater model: U.S. Geological Survey Software Release, 03 February 2017, http://dx.doi.org/10.5066/F7RF5S7G.

Pollock, D.W. 1994. User's Guide for MODPATH/MODPATH-PLOT. Version 5: A Particle Tracking Post-Processing Package for MODFLOW, the US Geological Survey Finite-Difference Ground-Water Flow Model.

Washington State Department of Ecology (Ecology). 2017a. Exhibit B of the Consent Decree - Final Cleanup Action Plan Landsburg Mine Site MTCA Remediation Project, Ravensdale, Washington. Prepared by Golder Associates Inc. June 7.

Ecology. 2017b. Exhibit D of the Consent Decree – Compliance Monitoring Plan Landsburg Mine Site MTCA Remediation Project, Ravensdale, Washington. Prepared by Golder Associates Inc. June 7.

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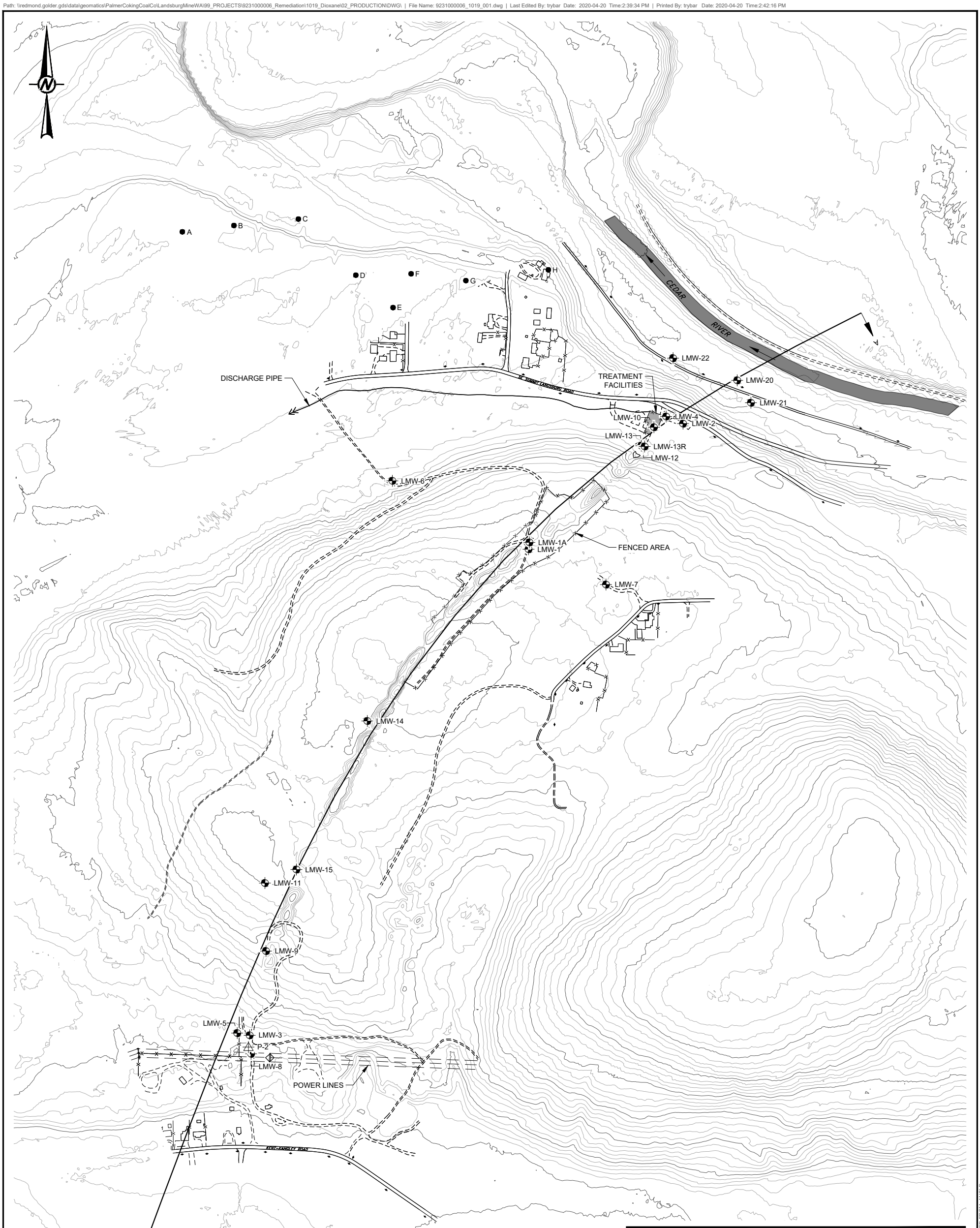
Figures



LEGEND

- MONITORING WELLS
- PRIVATE WELLS
- PIEZOMETER
- PROTECTIVE FENCE
- UNPAVED ROAD
- BUILDING

NOTE(S)

1. LMW-4 AND LMW-7 WERE DRILLED AT A 20° INCLINE; LMW-14 WAS DRILLED AT 15° INCLINE.
2. PRIVATE WELL LOCATIONS ARE APPROXIMATE.

0 300 600
1" = 300' FEET

CLIENT
LANDSBURG MINE SITE PLP GROUP

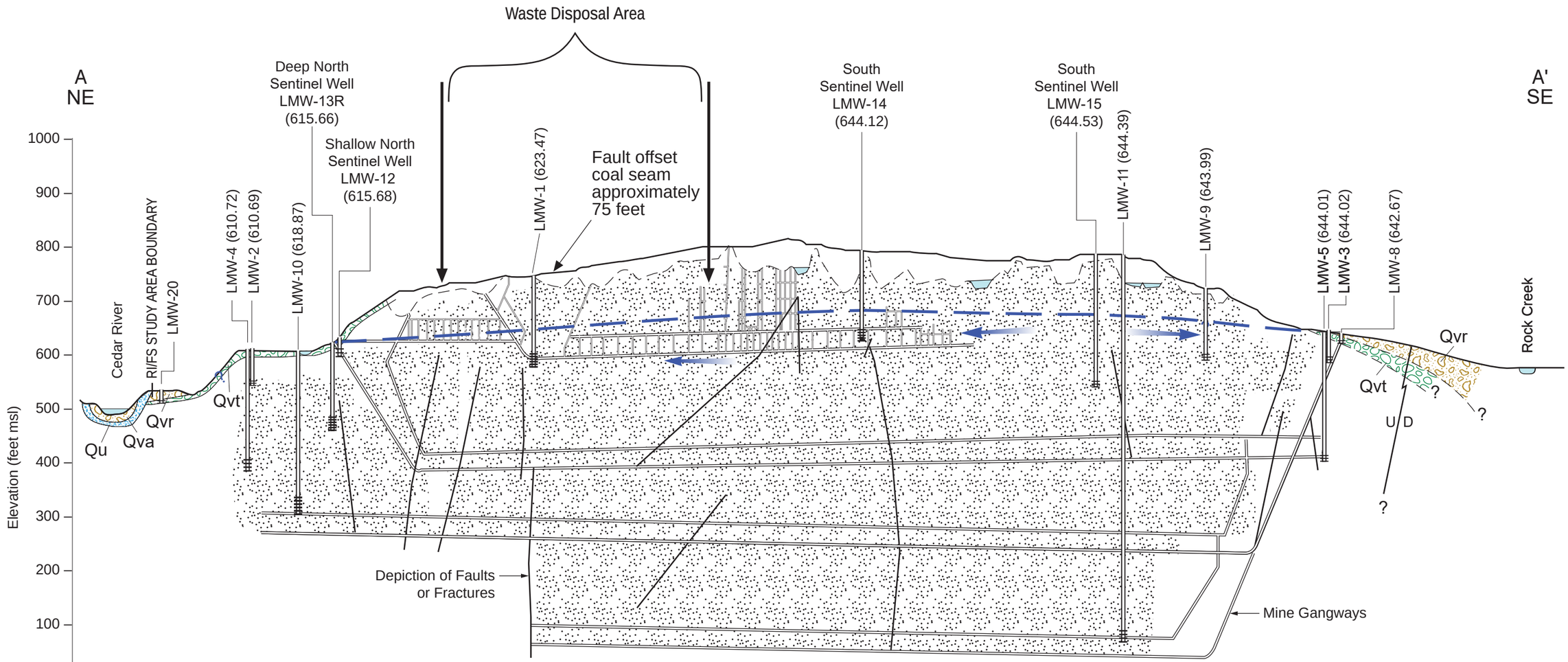
CONSULTANT
GOLDER

YYYY-MM-DD	2020-04-20
DESIGNED	-
PREPARED	REDMOND
REVIEWED	GZ
APPROVED	GZ

PROJECT
LANDSBURG MINE SITE
MTCA REMEDIAL ACTION

TITLE
SITE MAP

PROJECT NO.	PHASE	REV.	FIGURE
9231000006	1019	A	1



EXPLANATION

- Potentiometric surface
- Outline of trench bottom
- LMW-2 (610.69) Well ID (water level in ft. amsl)
- Qvt Till, compact mixture of gravel occasional boulders in clayey silty sand matrix
- Sandstone
- Surface water feature
- Anticipated collapsed zone within mine
- Qu Drift, till, fluvial sand and gravel, lacustrine sand, silt, clay and peat
- Qvr Recessional outwash, well sorted sand and pebble-cobble
- Qva Advanced outwash pebble-cobble gravel may include very fine sand
- Monitoring Interval
- Groundwater Flow Direction

0 500
FEET

Sources for the Geology and Mine Information:
J.E. Luzier 1969; surficial geology
State of Washington, Water Well reports
Mine Superintendant's Records
Landsburg Well Logs

NOTE: Vertical to horizontal scale ratio is 2.5:1
Wells are project normal into the strike of the Cross-Section A-A'

Groundwater elevation obtained 12/10/2019

CLIENT
LANDSBURG PLP GROUP

CONSULTANT
GOLDER

YYYY-MM-DD	2020-03-16
PREPARED	REDMOND
DESIGN	
REVIEW	
APPROVED	

PROJECT
LANDSBURG MINE SITE

TITLE
CROSS-SECTION ALONG STRIKE AT COAL SEAM
CROSS-SECTION A-A'

PROJECT No. 923-1000
PHASE 1200
FIGURE 2

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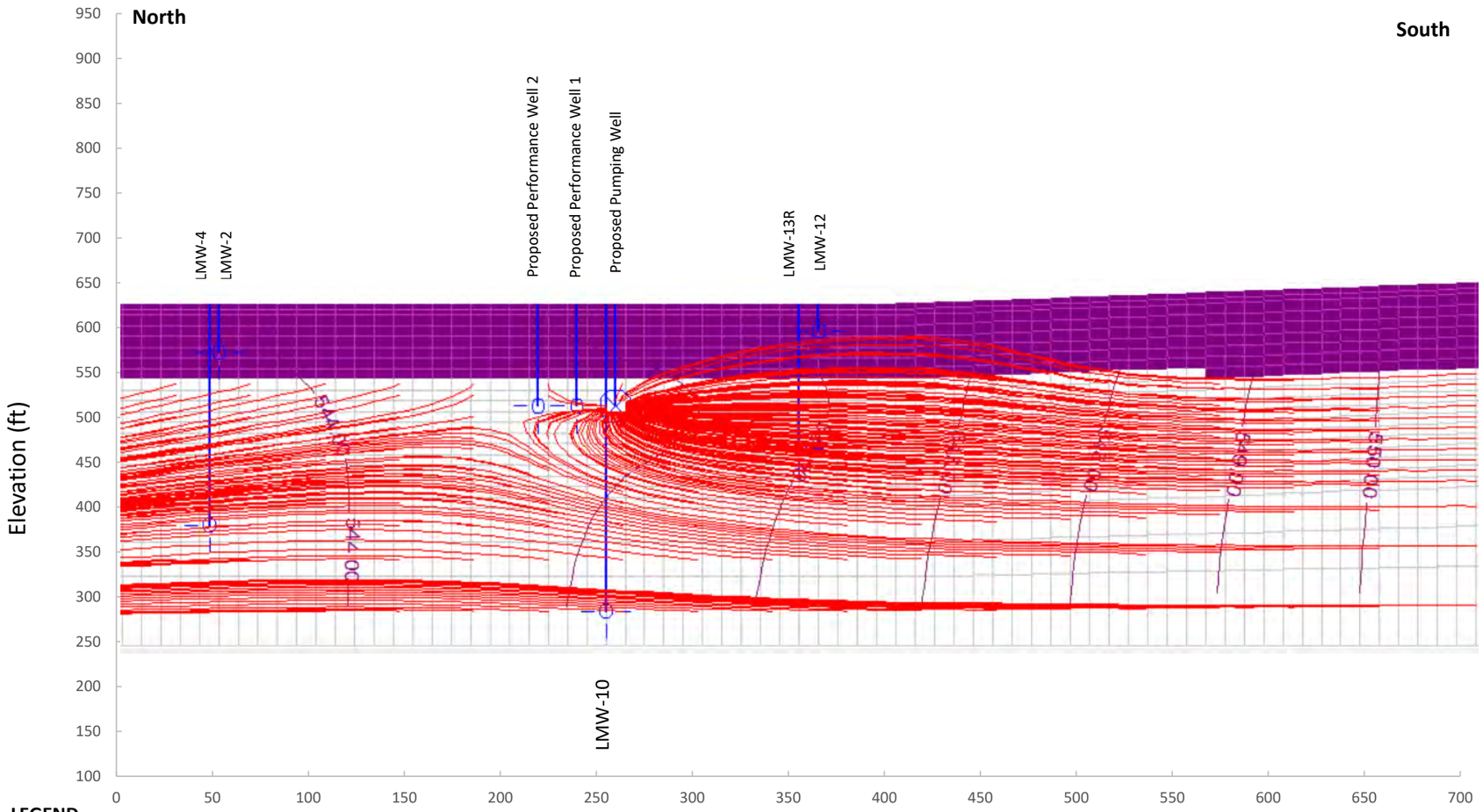

LEGEND

- Model Cell
- Particle Tracking Pathline
- Groundwater Contour
- 545 Groundwater Elevation (ft)
- Unsaturated Zone

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CONSULTANT
GOLDER

YYYY-MM-DD	4/21/2020
DESIGNED	EP
PREPARED	JX
REVIEWED	GLZ
APPROVED	GLZ

PROJECT
LANDSBURG MINE SITE
MTCA REMEDIAL ACTION
N CONTINGENT GW EXTRACTION AND TREATMENT SYSTEM

TITLE
GROUNDWATER CAPTURE MODEL

PROJECT NO.	CONTROL	REV.	FIGURE
9231000005		A	3

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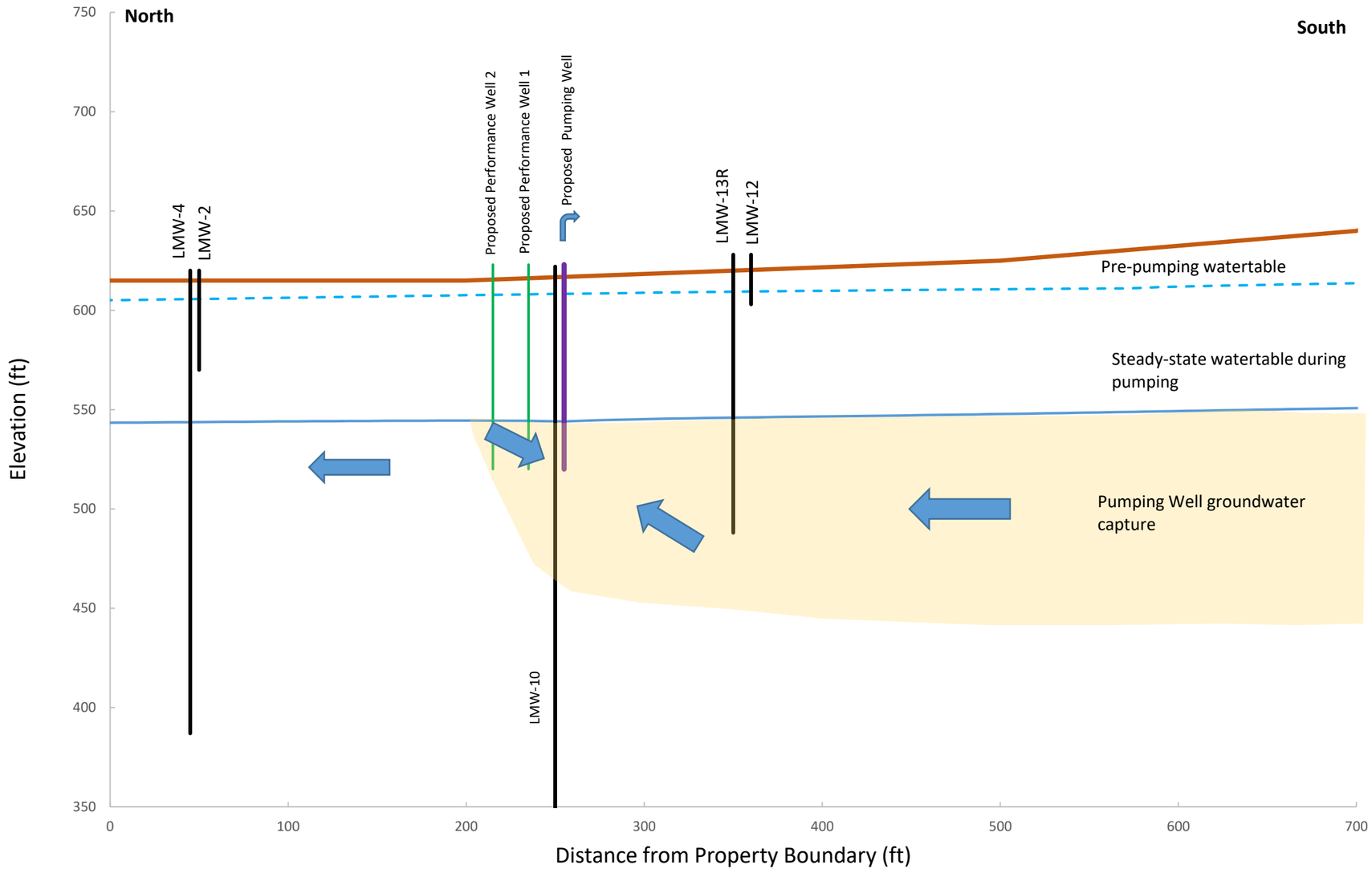

Note:
Blue Arrows: Conceptual depiction of groundwater flow during active pumping
Yellow Shaded Area: Conceptual depiction of the groundwater that would be captured by the pumping well during active pumping

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GOLDER

YYYY-MM-DD	4/21/2020
DESIGNED	EP
PREPARED	JX
REVIEWED	GLZ
APPROVED	GLZ

PROJECT
LANDSBURG MINE SITE
MTCA REMEDIAL ACTION
N CONTINGENT GW EXTRACTION AND TREATMENT SYSTEM

TITLE
CONCEPTUAL GROUNDWATER CAPTURE

PROJECT NO.	CONTROL	REV.	FIGURE
9231000005		A	4

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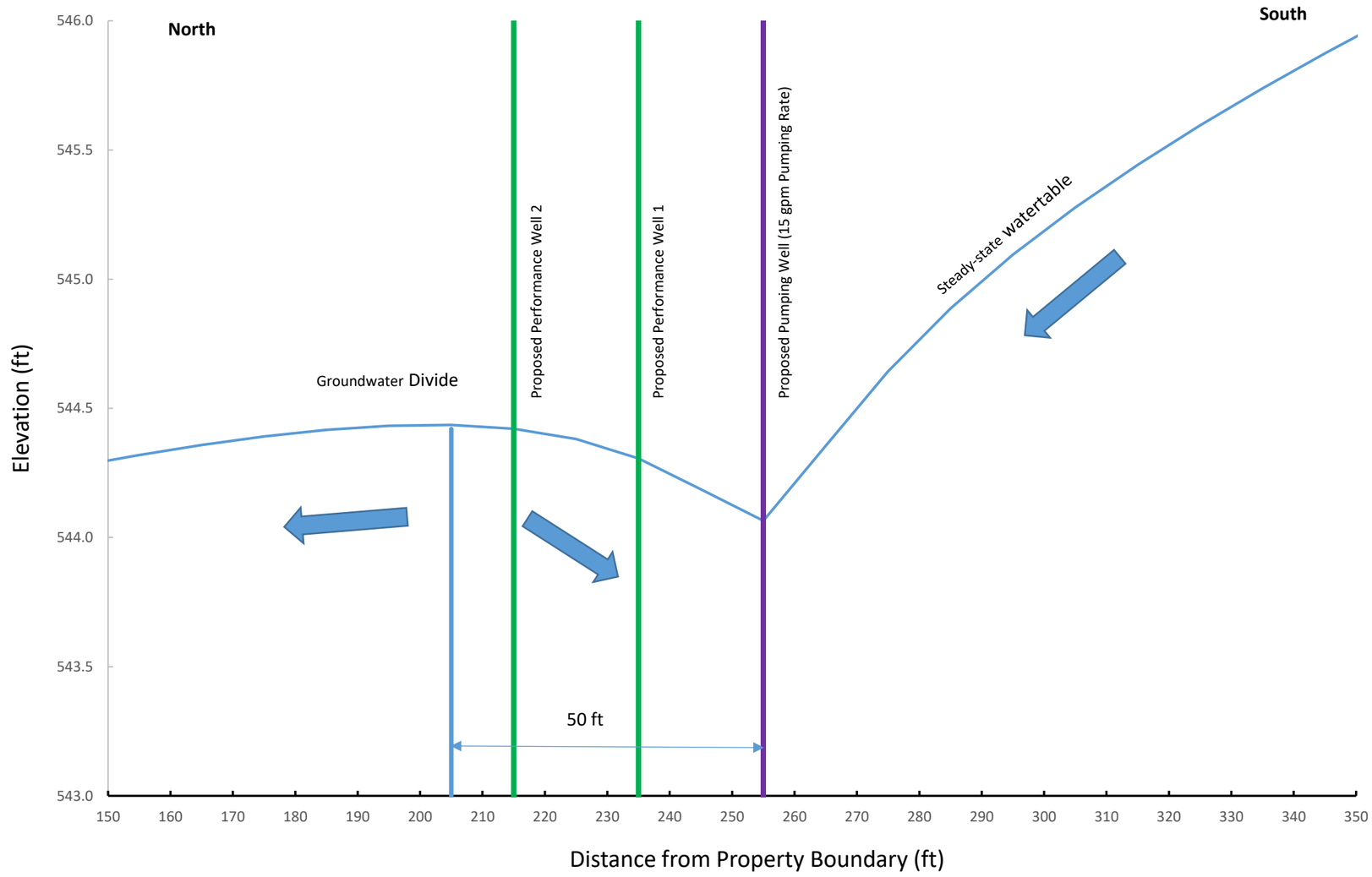

CLIENT
LANDSBURG MINE SITE PLP GROUP

CONSULTANT
GOLDER

YYYY-MM-DD	4/21/2020
DESIGNED	EP
PREPARED	JX
REVIEWED	GLZ
APPROVED	GLZ

PROJECT
LANDSBURG MINE SITE
MTCA REMEDIAL ACTION
N CONTINGENT GW EXTRACTION AND TREATMENT SYSTEM

TITLE
CONCEPTUAL GROUNDWATER CAPTURE - CLOSE UP

PROJECT NO.	CONTROL	REV.	FIGURE
9231000005		A	5

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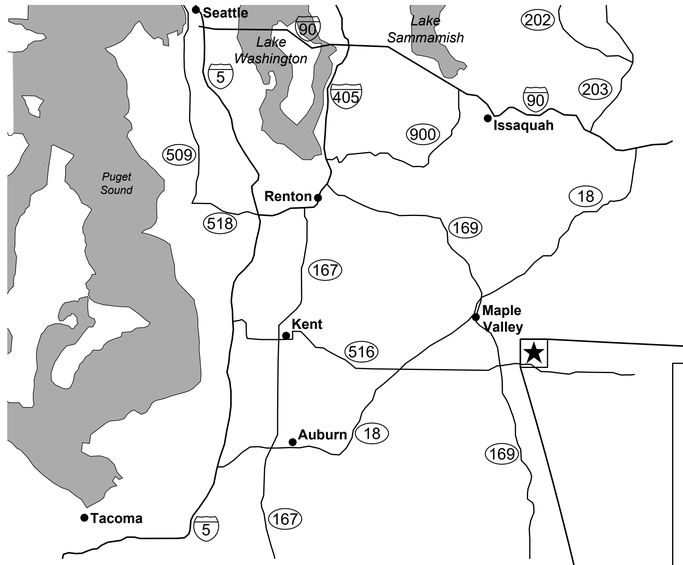
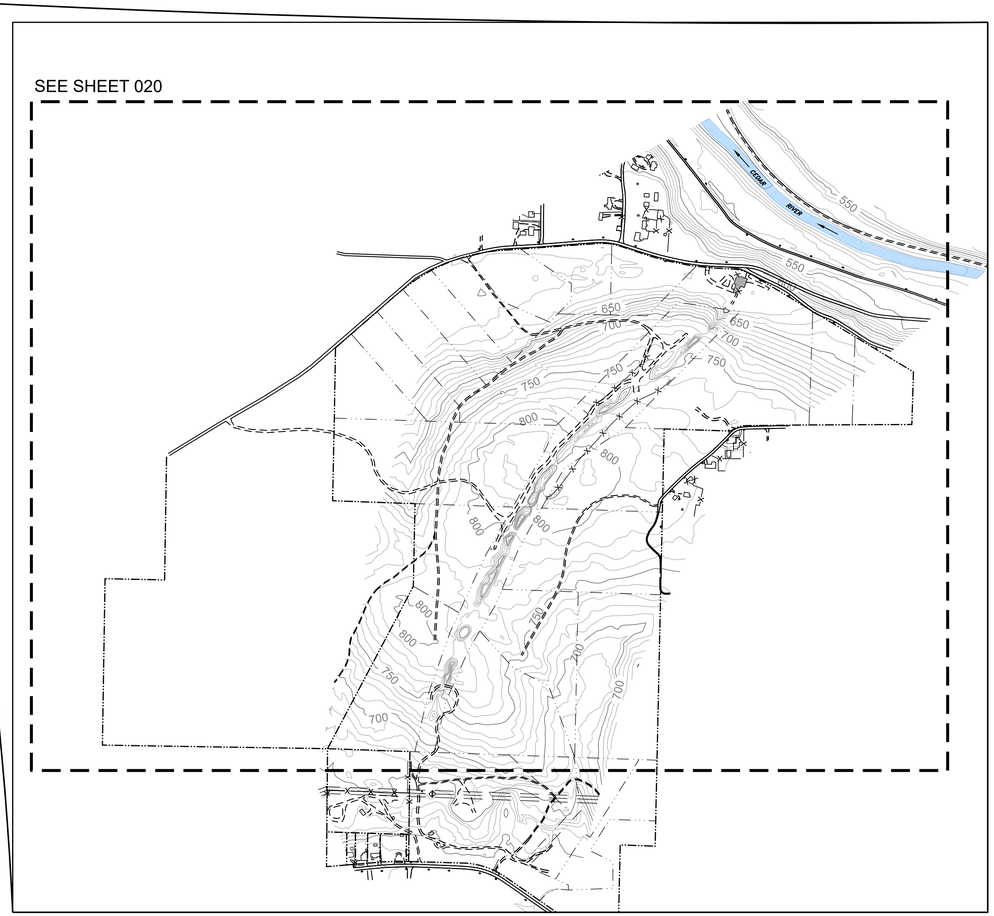
ATTACHMENT 1

30% Design Drawings, North Contingent Groundwater Extraction and Treatment System

LANDSBURG MINE SITE
MTCA REMEDIAL ACTION
NORTH CONTINGENT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

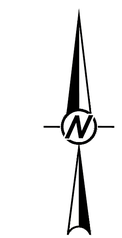


LOCATION MAP



VICINITY MAP

DRAWING LIST	
SHEET NUMBER	SHEET TITLE
010	COVER SHEET
020	SITE OVERVIEW
030	DISCHARGE PIPE PLAN
040	TREATMENT FACILITIES PLAN
050	TREATMENT FACILITIES ELEVATION VIEW
060	DETAILS



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1" = 600' FEET

30% DESIGN

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
A	2020-04-20	30% DESIGN	VMN	MLB	FSS	GZ

SEAL

CLIENT
LANDSBURG MINE SITE PLP GROUP

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PROJECT
LANDSBURG MINE SITE
MTCA REMEDIAL ACTION
N CONTINGENT GW EXTRACTION AND TREATMENT SYSTEM

TITLE
COVER SHEET

PROJECT NO.	PHASE	REV.		SHEET
9231000005	5000	A	1 of 6	010

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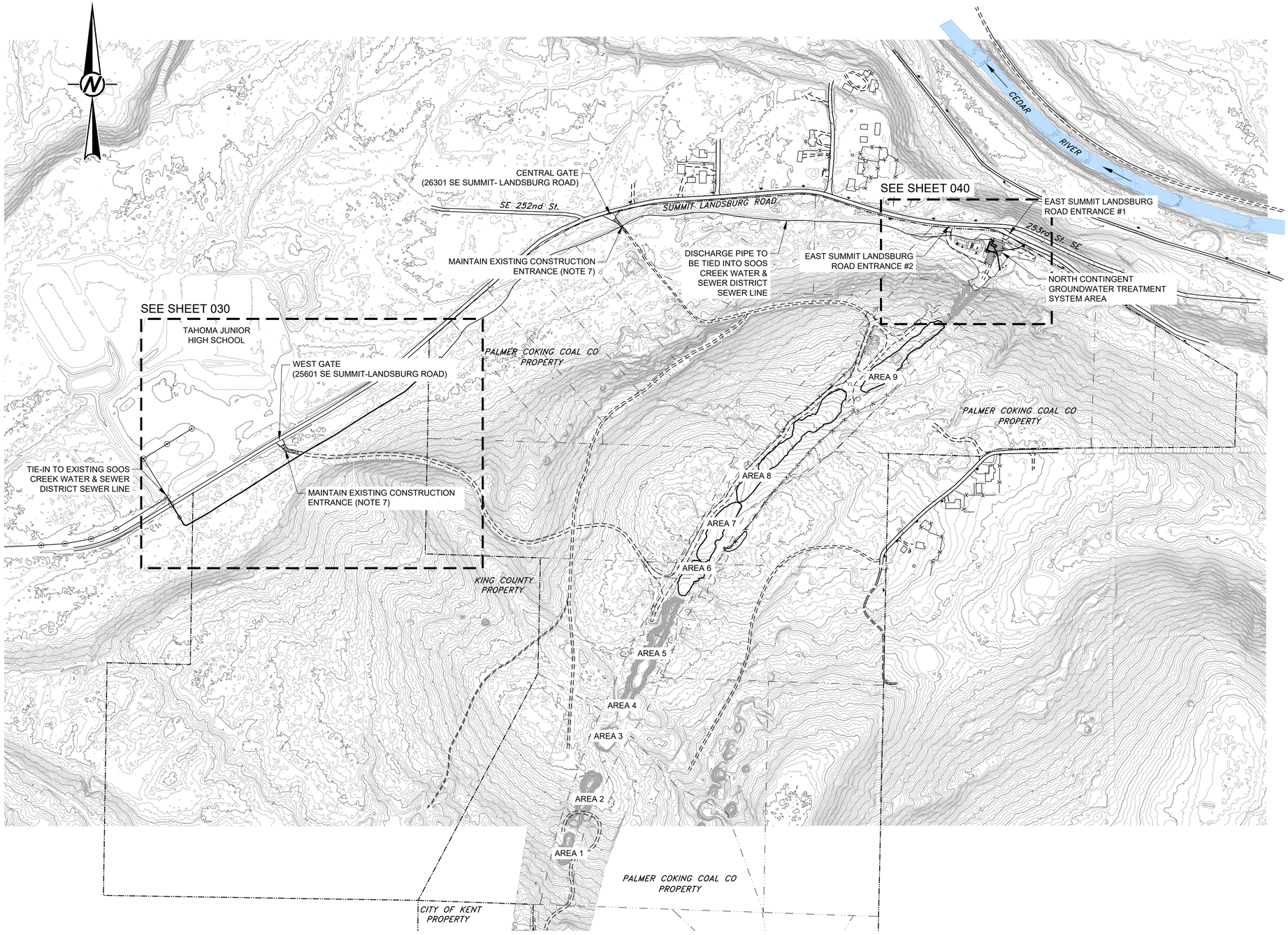

REFERENCE NOTES

1. BASE TOPOGRAPHY IN TRENCH AREA (WITHIN INTERIOR SURVEY LIMITS SHOWN) FROM SURVEY BY DAVID EVANS AND ASSOCIATES, DATED 02/24/20 (POST-STAGE 2 REMEDIAL ACTION - TRENCH BACKFILL). BASE TOPOGRAPHY IN TRENCH AREA (WITHIN EXTERIOR SURVEY LIMITS AND OUTSIDE OF INTERIOR LIMITS SHOWN) FROM SURVEY BY DAVID EVANS AND ASSOCIATES, DATED 01/08/19 (POST-STAGE 1 REMEDIAL ACTION - TRENCH CLEARING).
   - HORIZONTAL DATUM: NAD 83/2011
   - VERTICAL DATUM: NAVD 88 (ELEVATIONS DERIVED FROM GPS MEASUREMENTS USING GEOID MODEL 12B)
   - CONTOUR INTERVAL: 2 FT
2. BASE TOPOGRAPHY OUTSIDE OF TRENCH AREA (OUTSIDE OF EXTERIOR SURVEY LIMITS SHOWN) FROM PUGET SOUND LIDAR CONSORTIUM DELIVERY #3 (KING COUNTY EAST), ACQUIRED IN MARCH 2016. EXCEPT, BASE TOPOGRAPHY OUTSIDE OF THE EXTERIOR SURVEY LIMITS ON THE EAST SIDE OF THE AREA 9 TRENCH AND THE SOUTH END OF THE AREA 6 TRENCH WAS MODIFIED TO PORTRAY TRENCH BACKFILLING THAT WAS PERFORMED IN 2019 BUT WAS NOT CAPTURED BY THE 2020 SURVEY.
3. AS-BUILT LOCATIONS OF NORTH CONTINGENT GROUNDWATER TREATMENT AREA FEATURES FROM SURVEY BY PACIFIC GEOMATIC SERVICES, INC., DATED 09/16/08.
4. PROPERTY BOUNDARIES FROM KING COUNTY GIS DATA PORTAL, ACCESSED 3/20/18.
5. LOCATIONS OF ROADS OUTSIDE OF THE TRENCH AREA ARE APPROXIMATE.
6. SITE CONDITIONS PRESENTED IN THESE DRAWINGS MAY HAVE CHANGED SINCE THE DATE OF SURVEY. PROJECT FEATURE LOCATIONS, CONFIGURATIONS, AND LAYOUTS ARE TO BE DETERMINED IN THE FIELD AT THE TIME OF CONSTRUCTION BASED ON THE CONDITIONS ENCOUNTERED. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES ENCOUNTERED.
7. CONSTRUCTION ENTRANCES WERE INSTALLED TO SERVE AS VEHICLE TRACK-OUT CONTROLS. CONSTRUCTION ENTRANCES WERE COMPLETED WITH 4- TO 8-INCH QUARRY SPALLS. CONSTRUCTION ENTRANCES SHALL BE CLEANED AND MAINTAINED AS NEEDED TO CONTROL POTENTIAL SEDIMENT TRACK-OUT ON VEHICLES LEAVING THE SITE.

LEGEND

- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- EXISTING UTILITY POLE
- EXISTING CHAINLINK FENCE
- EXISTING BUILDING
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD

30% DESIGN

0 300 600
1" = 300' FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
A	2020-04-20	30% DESIGN	VMN	MLB	FSS	GZ

SEAL

CLIENT
LANDSBURG MINE SITE PLP GROUP

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PROJECT
LANDSBURG MINE SITE
MTCA REMEDIAL ACTION
N CONTINGENT GW EXTRACTION AND TREATMENT SYSTEM

TITLE
SITE OVERVIEW

PROJECT NO.	PHASE	REV.	SHEET
9231000005	5000	A	2 of 6 020

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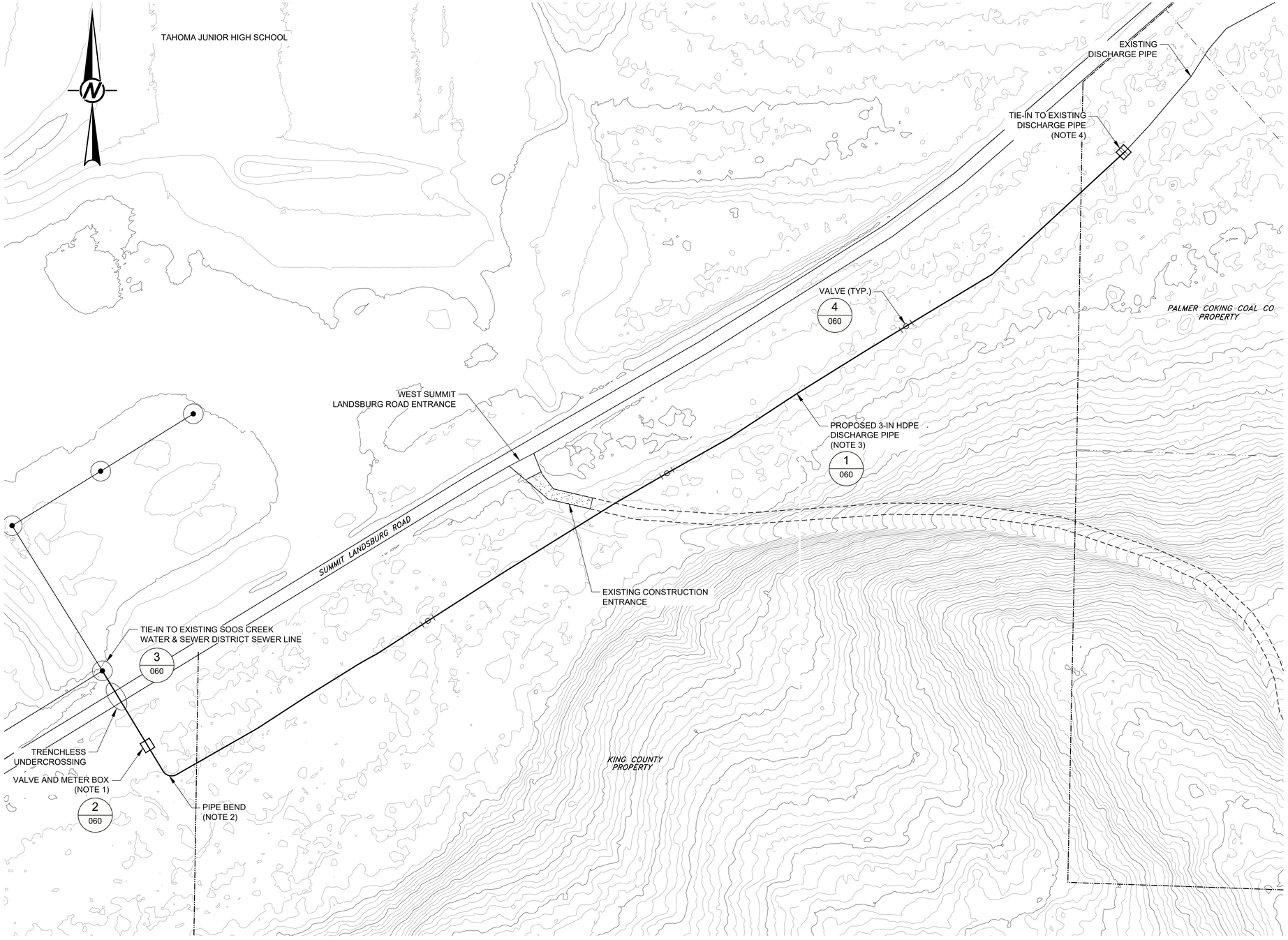

NOTES

1. LOCATION MAY BE MODIFIED IN FIELD AS DIRECTED OR APPROVED BY ENGINEER.
2. MINIMUM RADIUS PER PIPE MANUFACTURER'S RECOMMENDATIONS.
3. LOCATION OF DISCHARGE PIPELINE TO BE STAKED BY OWNER PRIOR TO PRE-BID SITE WALK-THROUGH. CLEAR 8-FOOT TOTAL WIDTH FOR DISCHARGE PIPE ALIGNMENT, OR AS DIRECTED BY THE ENGINEER.
4. UPSTREAM PORTION OF DISCHARGE PIPE CONSTRUCTED IN 2008. IT WAS TERMINATED AT THIS LOCATION WITH A VALVE BOX WITH BLIND FLANGE ON DOWNSTREAM END OF VALVE.

LEGEND

- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD

30% DESIGN

0 80 160
1" = 80' FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
A	2020-04-20	30% DESIGN	VMN	MLB	FSS	GZ

SEAL

CLIENT
LANDSBURG MINE SITE PLP GROUP

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REDMOND, WA
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www.golder.com

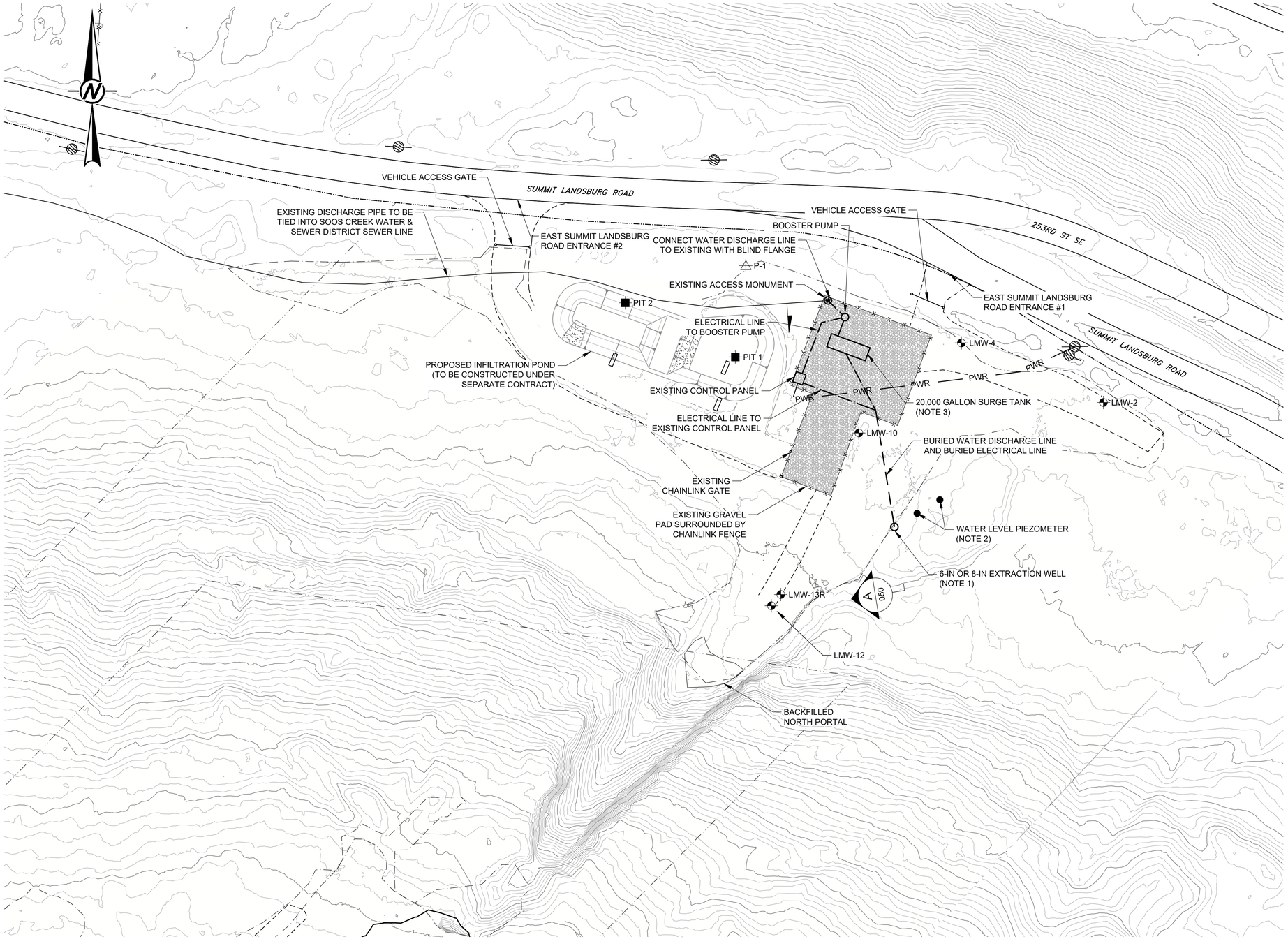
PROJECT
LANDSBURG MINE SITE
MTCA REMEDIAL ACTION
N CONTINGENT GW EXTRACTION AND TREATMENT SYSTEM

TITLE
DISCHARGE PIPE PLAN

PROJECT NO.	PHASE	REV.	3 of 6	SHEET
9231000005	5000	A		030

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

0 1 in



NOTES

1. SCREENED INTERVAL TO BE APPROXIMATELY 80 TO 100 FT BGS, SUBJECT TO MODIFICATION. PUMP SIZE TO BE DETERMINED FOLLOWING WELL INSTALLATION AND PUMP TESTING.
2. EXACT LOCATIONS AND DEPTHS TO BE DETERMINED.
3. TANK TO HAVE HIGH-LOW FLOAT SWITCH FOR OPERATIONS AND SEPARATE HIGH-LOW FLOAT SWITCH FOR EMERGENCY PUMP SHUTOFF.

LEGEND

- LMW-2 — EXISTING MONITORING WELL
- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- EXISTING CHAINLINK FENCE
- PWR — EXISTING UNDERGROUND POWER AND TELEPHONE LINES
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD

30% DESIGN

0 40 80
1" = 40' FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
A	2020-04-20	30% DESIGN	VMN	MLB	FSS	GZ

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PROJECT
LANDSBURG MINE SITE
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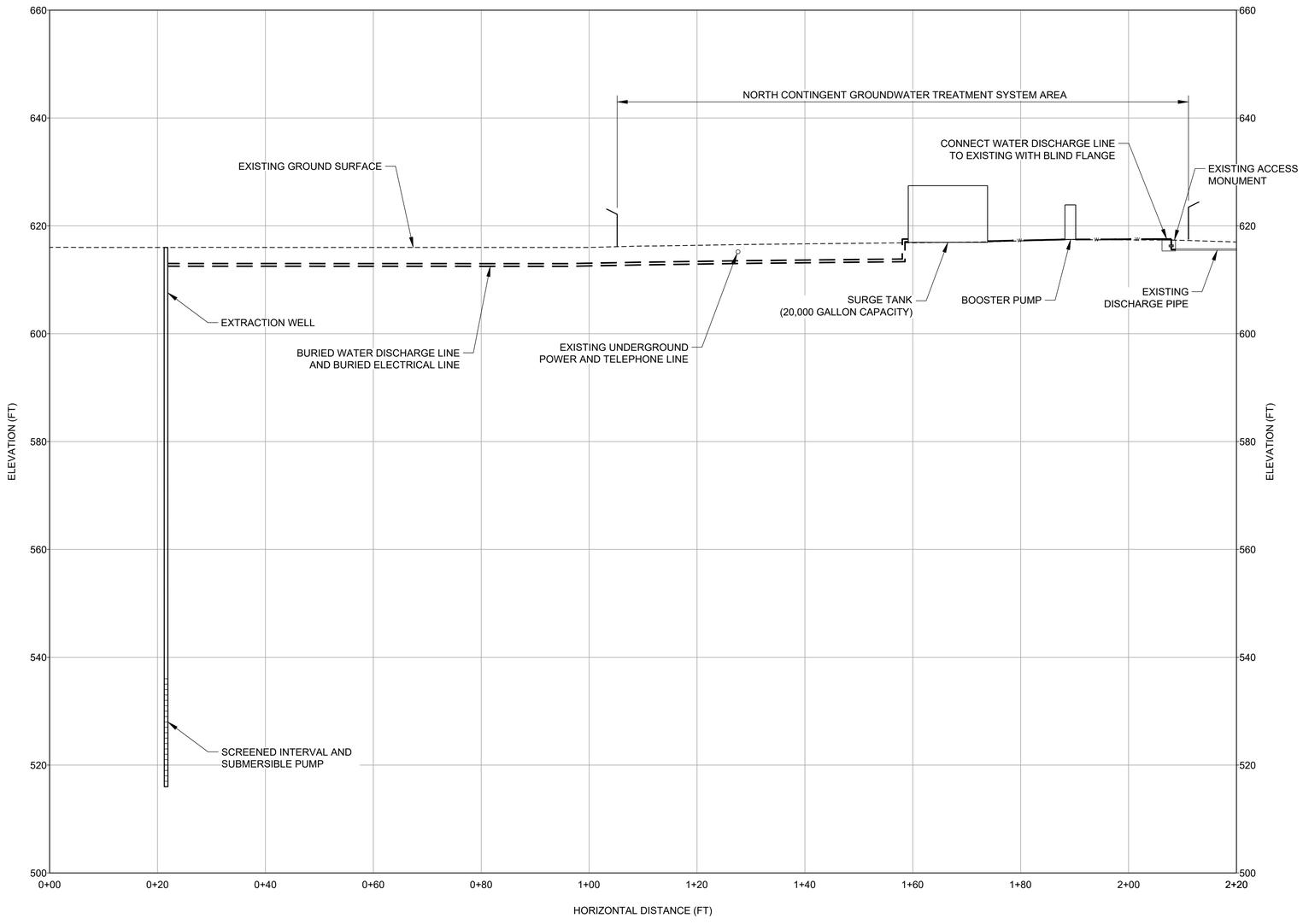
N CONTINGENT GW EXTRACTION AND TREATMENT SYSTEM

TITLE
TREATMENT FACILITIES PLAN

PROJECT NO.	PHASE	REV.		SHEET
9231000005	5000	A	4 of 6	040

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

0 1in



SCALE 1" = 12' / VERT. SCALE 1:1 — A / 050 — TREATMENT FACILITIES ELEVATION VIEW

30% DESIGN

0 12 24
1" = 12' FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
A	2020-04-20	30% DESIGN	VMN	MLB	FSS	GZ

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PROJECT
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N CONTINGENT GW EXTRACTION AND TREATMENT SYSTEM

TITLE
TREATMENT FACILITIES ELEVATION VIEW

PROJECT NO.	PHASE	REV.	5 of 6	SHEET
9231000005	5000	A		050

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

1 in
0

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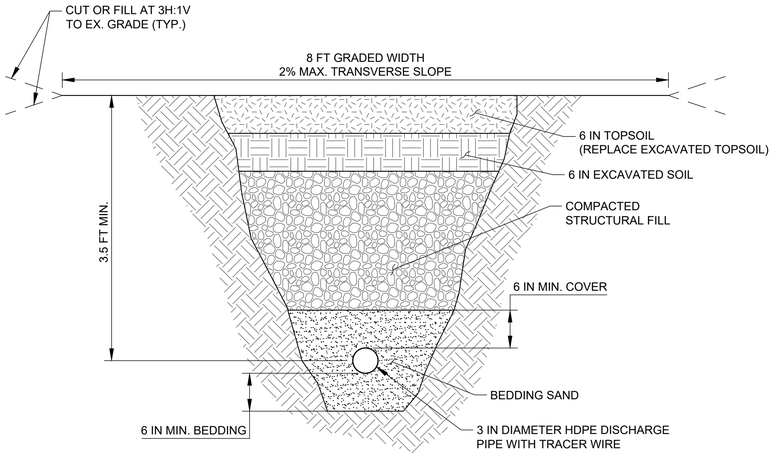
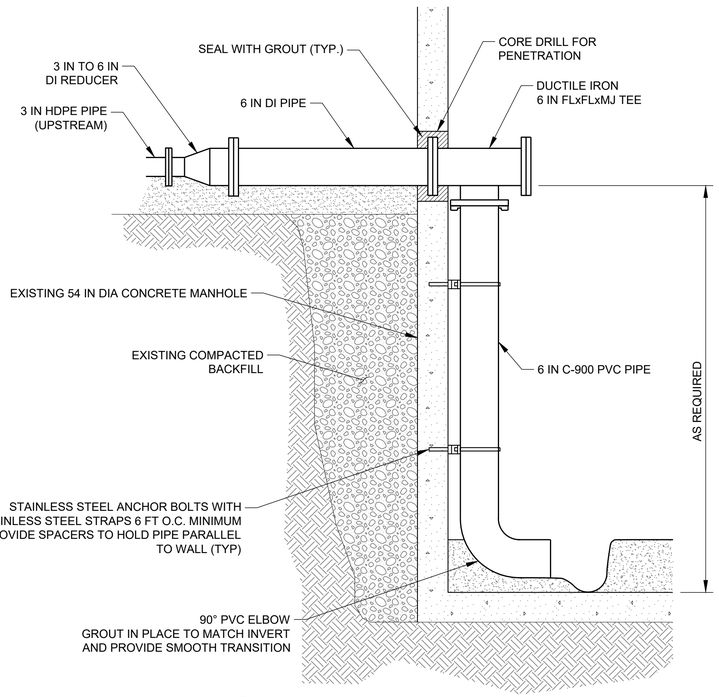
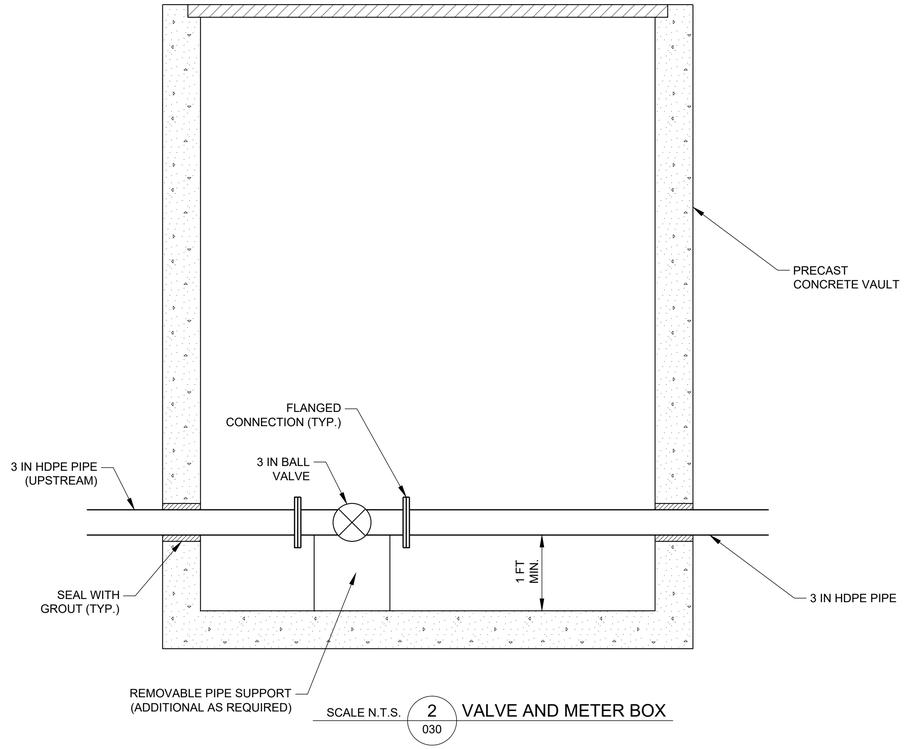


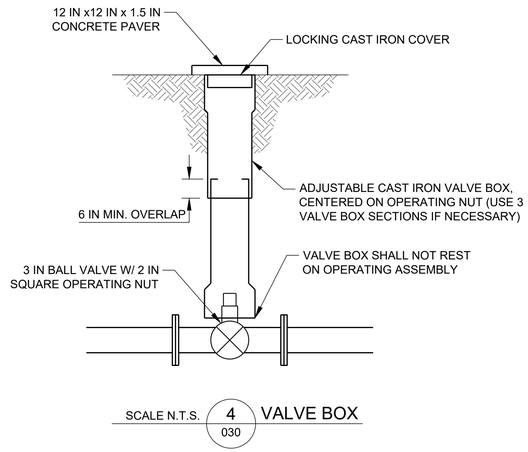
SCALE N.T.S. 1/030 TYPICAL DISCHARGE PIPE TRENCH SECTION



SCALE N.T.S. 3/030 SANITARY SEWER CONNECTION DETAIL



SCALE N.T.S. 2/030 VALVE AND METER BOX



SCALE N.T.S. 4/030 VALVE BOX

30% DESIGN

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
A	2020-04-20	30% DESIGN	VMN	MLB	FSS	GZ

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PROJECT
LANDSBURG MINE SITE
MTCA REMEDIAL ACTION
N CONTINGENT GW EXTRACTION AND TREATMENT SYSTEM

TITLE
DETAILS

PROJECT NO.	PHASE	REV.	6 of 6	SHEET
9231000005	5000	A		060