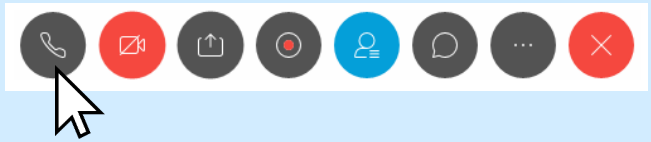
Welcome to Ecology's Online Public Meeting

No sound? We will unmute soon for sound checks.

Please connect your audio.

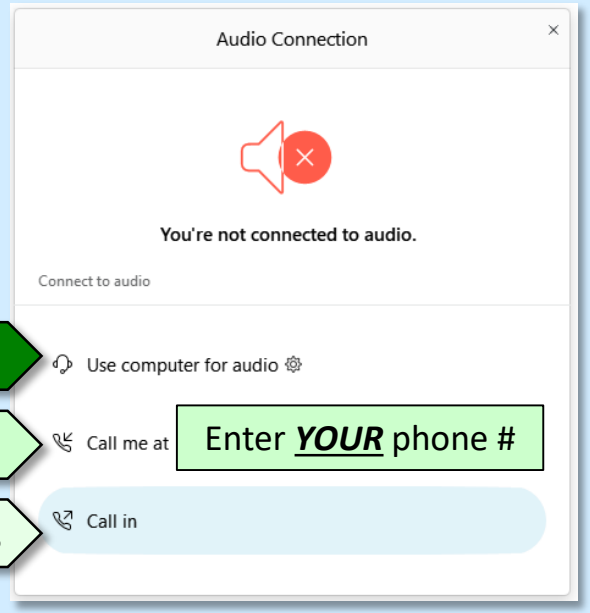
1 ➡ 2 ➡ 3

1 **Move your cursor to the bottom of your screen to show Webex controls.**



2 **Select "Connect to Audio" icon.**

3 **Select Audio Connection**



A **Best Option: Use computer for audio**

B **If computer audio does NOT work…**

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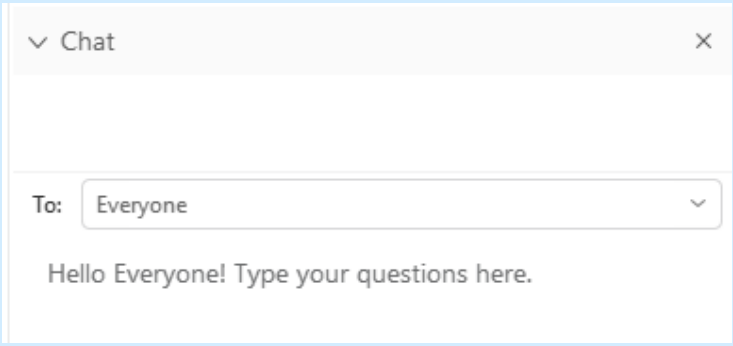


Facilitators will read your typed questions

We will either:

1. Answer your questions throughout the presentation.

--OR--

2. Collect your questions for the Q/A session at the end.

DEPARTMENT OF ECOLOGY
State of Washington

Image icons : Garcia Gallego (questions) and Adrien Coquet (presenter) from Noun project

Online Meeting Presentation Team

DEPARTMENT OF ECOLOGY
State of Washington

Jerome Cruz
Site Manager

Brad Petrovich
Ian Fawley
Outreach Specialists

GOLDER
MEMBER OF WSP

Gary Zimmerman
Principal Scientist

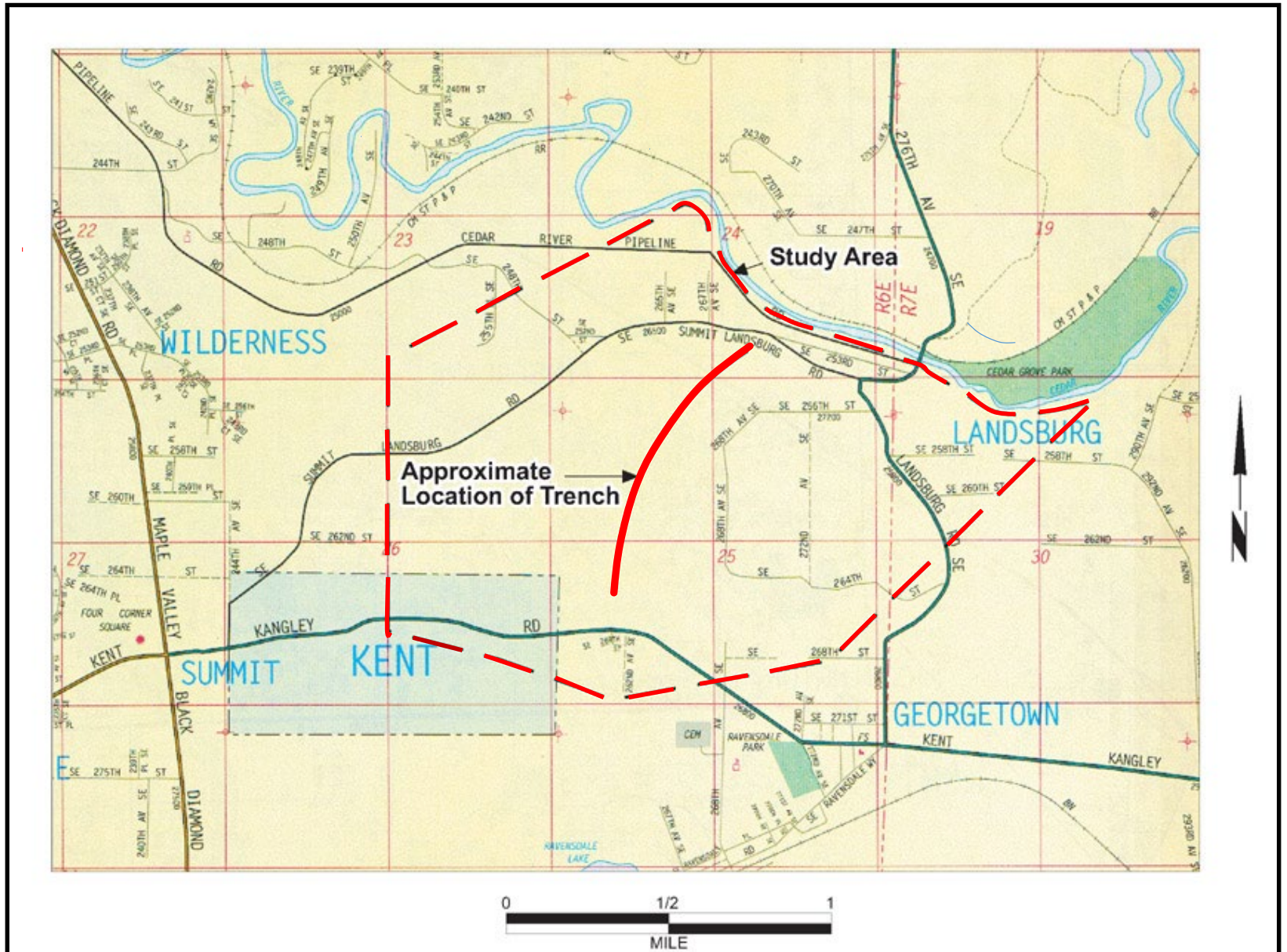
PUBLIC MEETING
MAY 19, 2021
6-7PM; Q&A 7PM

Consent Decree Amendment

Landsburg Mine Site,
Ravensdale, Washington

DEPARTMENT OF
ECOLOGY
State of Washington

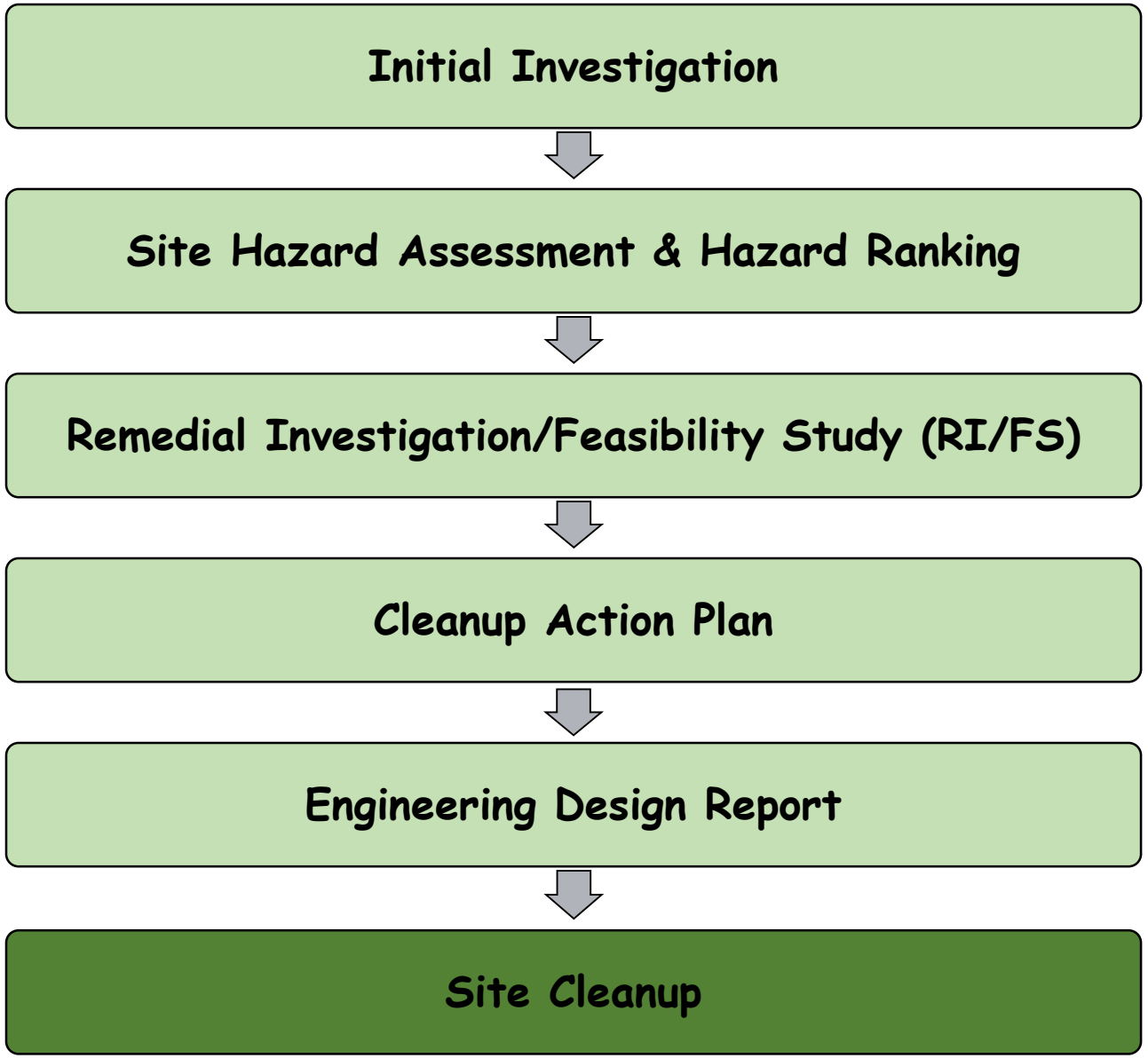
Site Location and Background

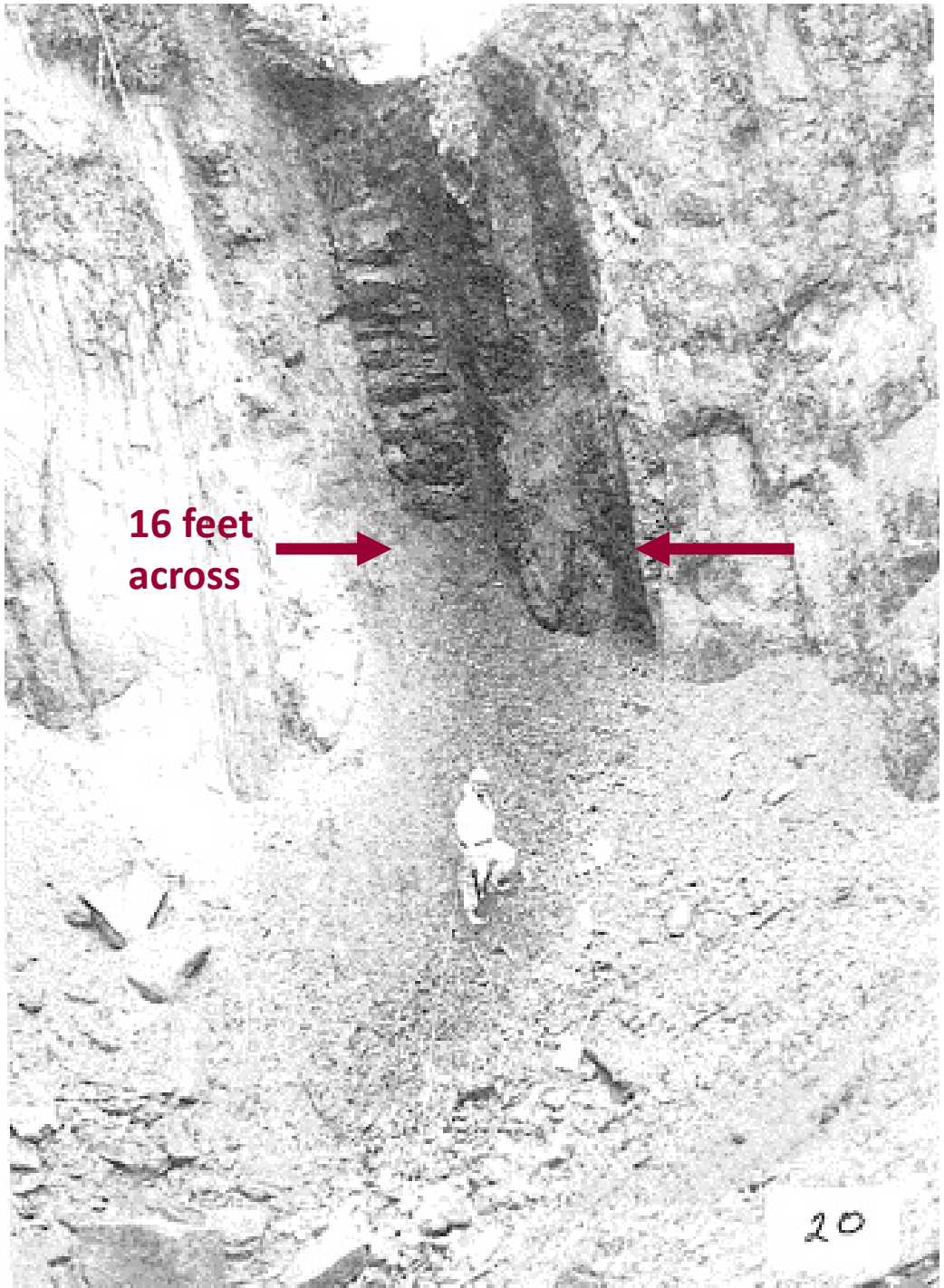


LANDSBURG MINE SITE CLEANUP
RAVENSDALE

- Underground coal mine, now MTCA cleanup site
- Mining caused land surface to subside, forming trench
- In late 60s and late 70s, ~ 4500 drums of industrial wastes and oily sludge disposed into northern part of trench
- 1993 MTCA Agreed Order (RI/FS)
- 2017 Consent Decree (Cleanup)

FORMAL CLEANUP PROCESS UNDER THE MODEL TOXICS CONTROL ACT

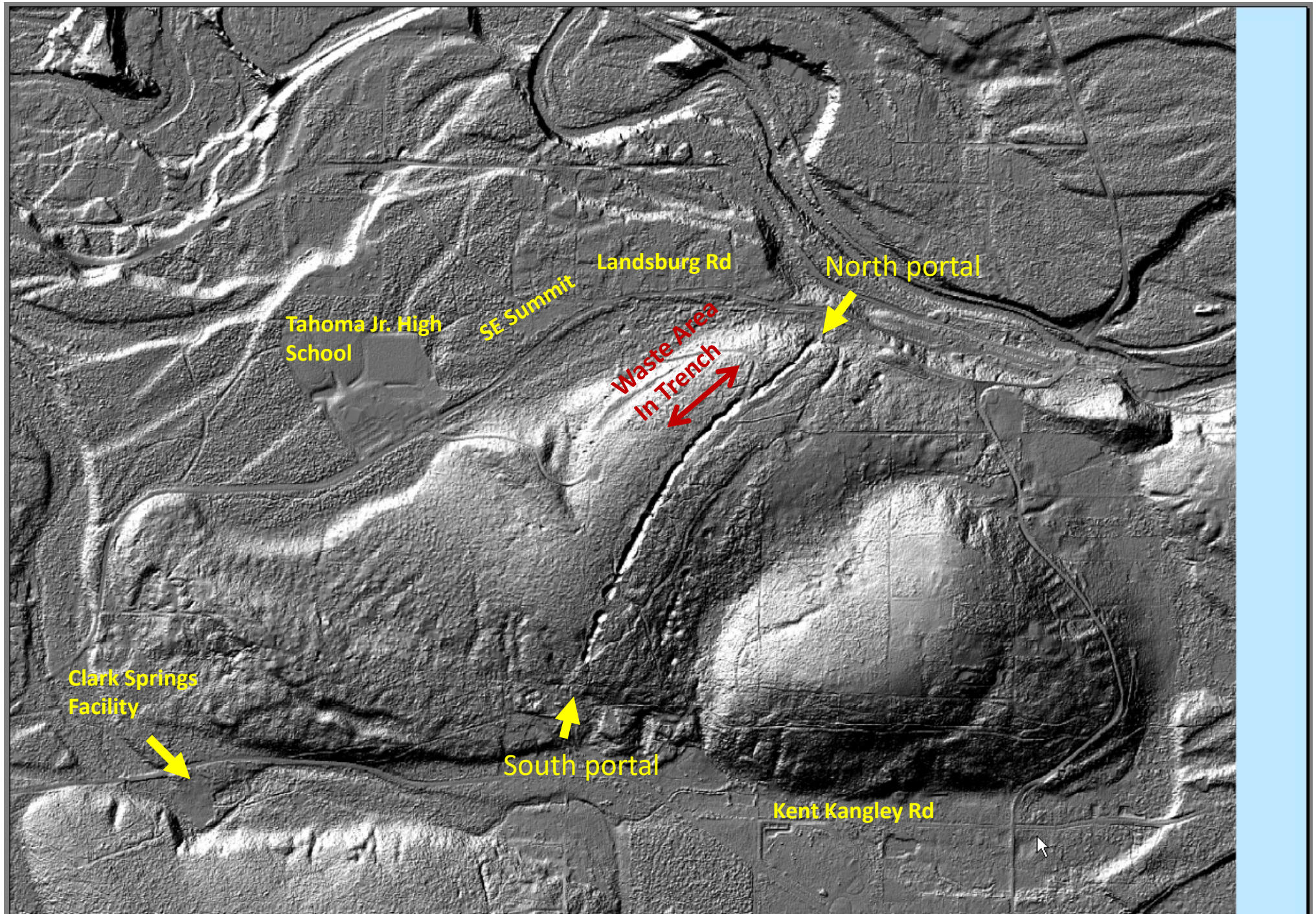



16 feet
across
20

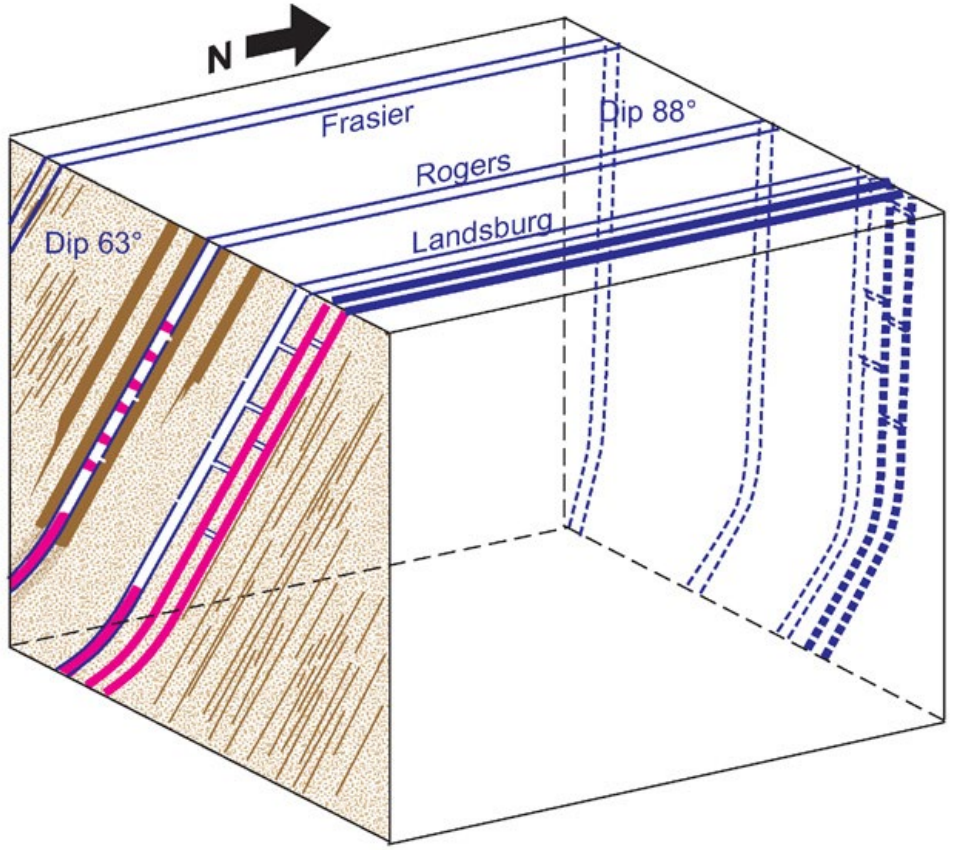
LANDSBURG MINE SITE CLEANUP
RAVENSDALE

- No contamination of groundwater except recent 1,4-Dioxane in some wells

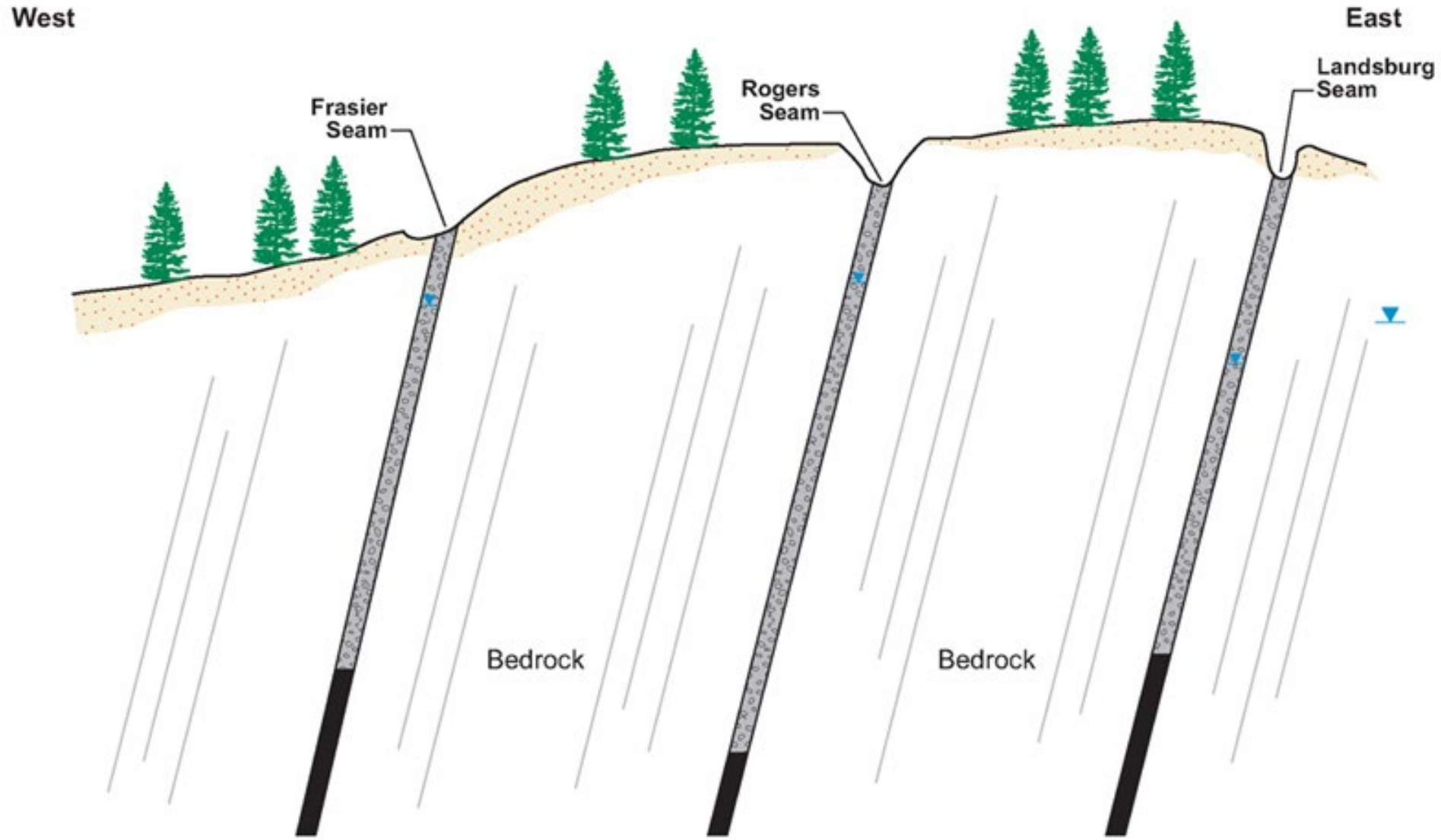
- Fill in trench and cap wastes – COMPLETED EARLIER THIS YEAR


Landsburg Rd
North portal
SE Summit
Tahoma Jr. High School
Waste Area In Trench
Clark Springs Facility
South portal
Kent Kangley Rd

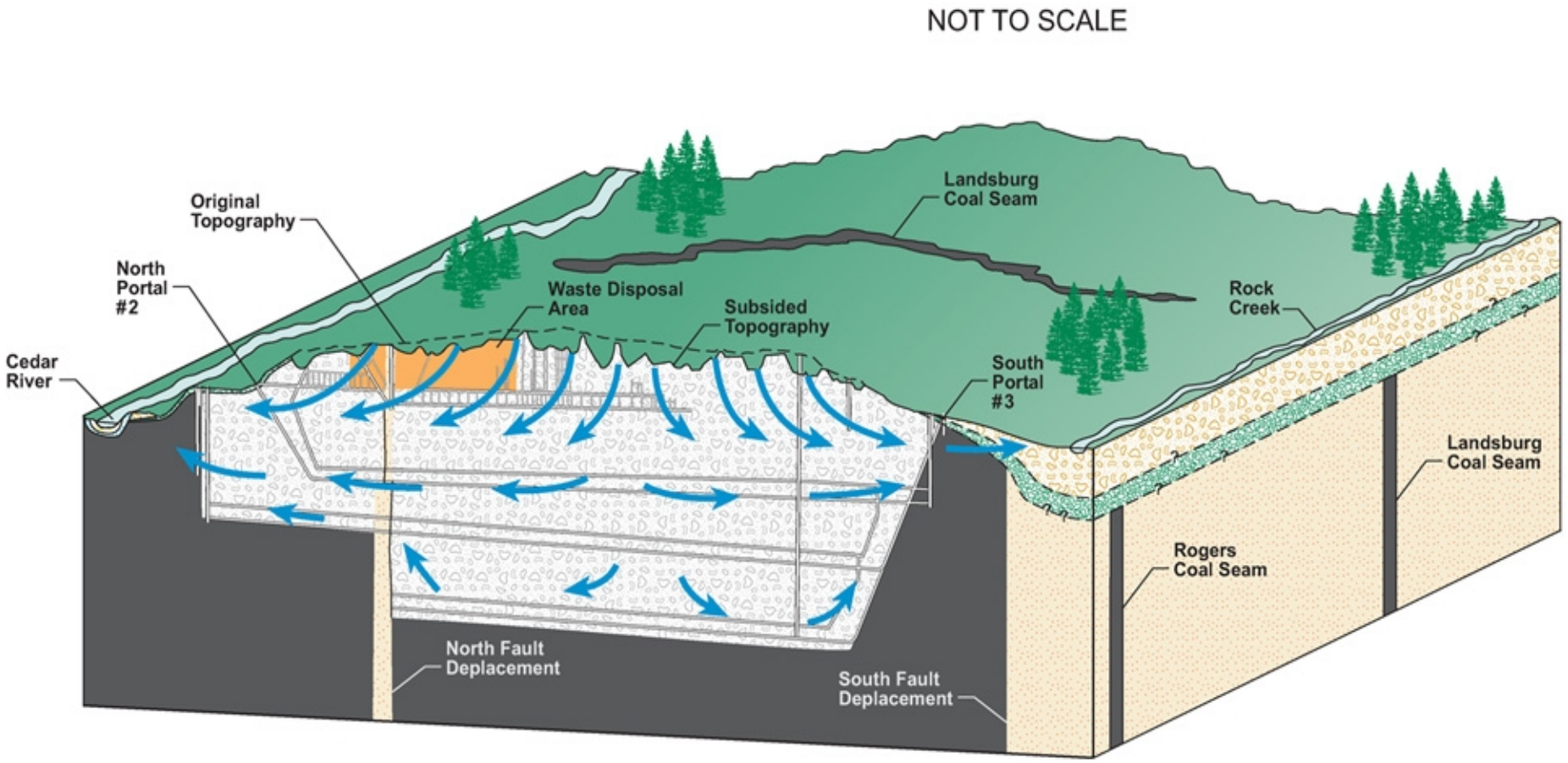
3-D Geologic Model

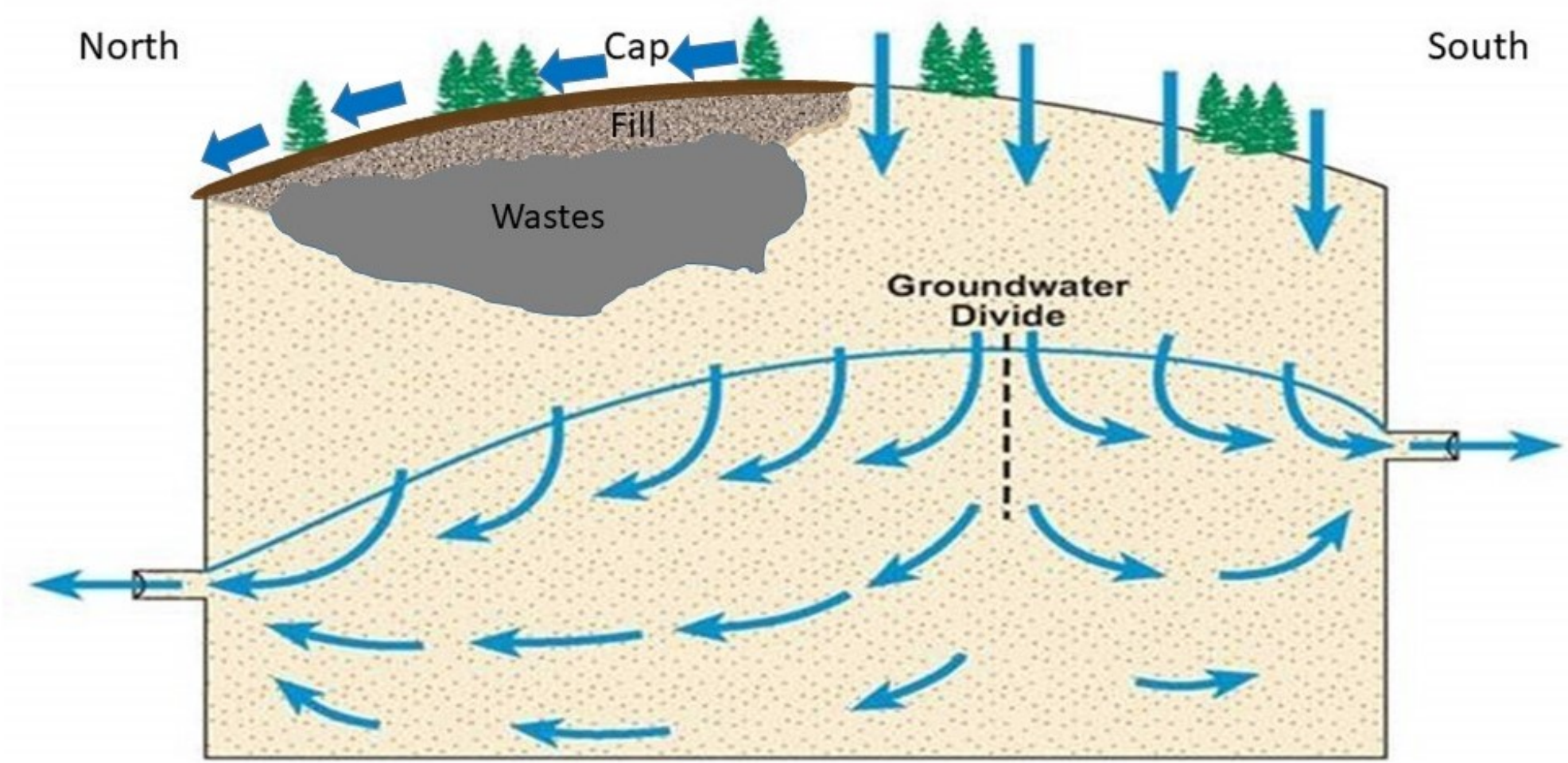


Cross Section of Mines



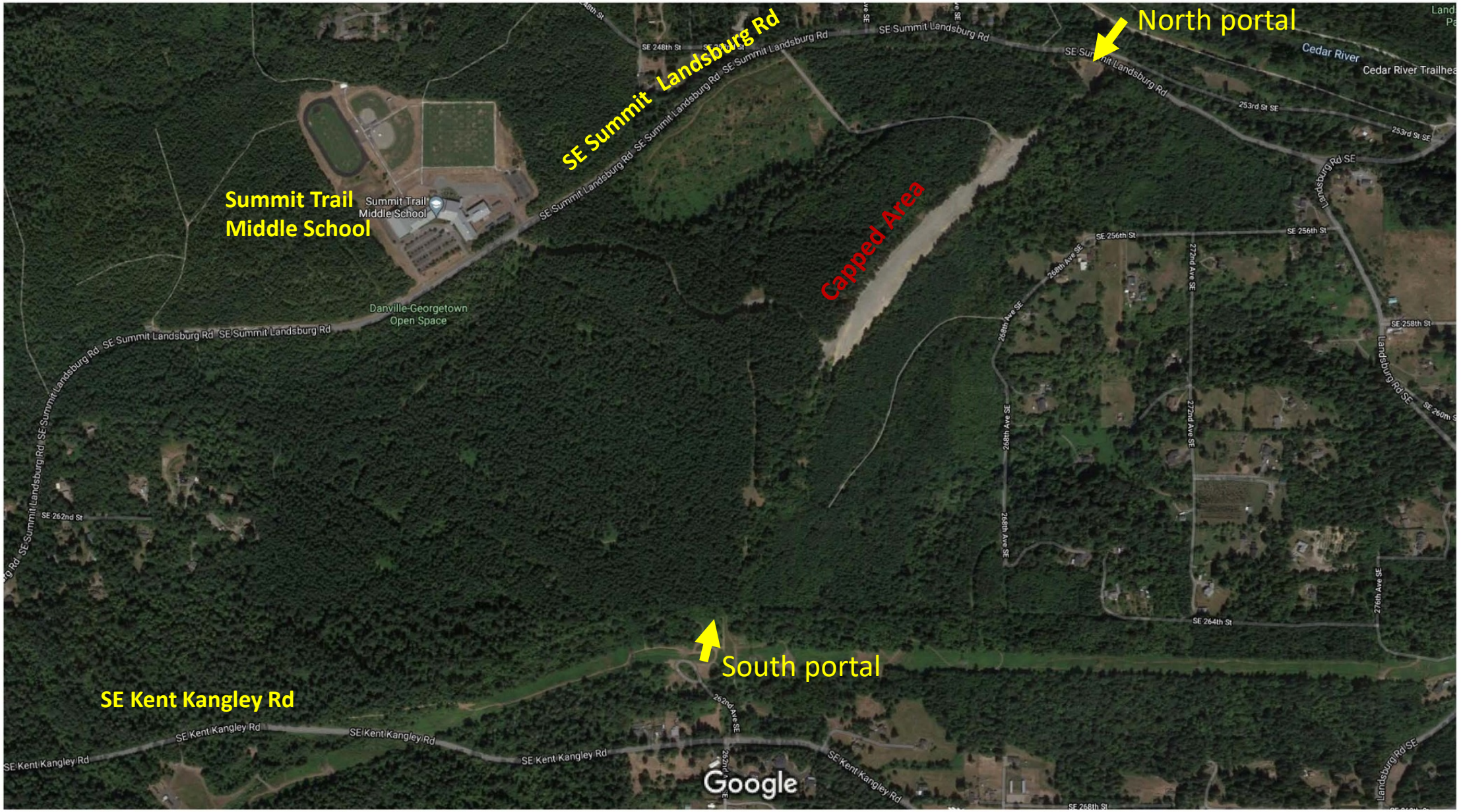
Groundwater Movement in Rogers Coal Mine





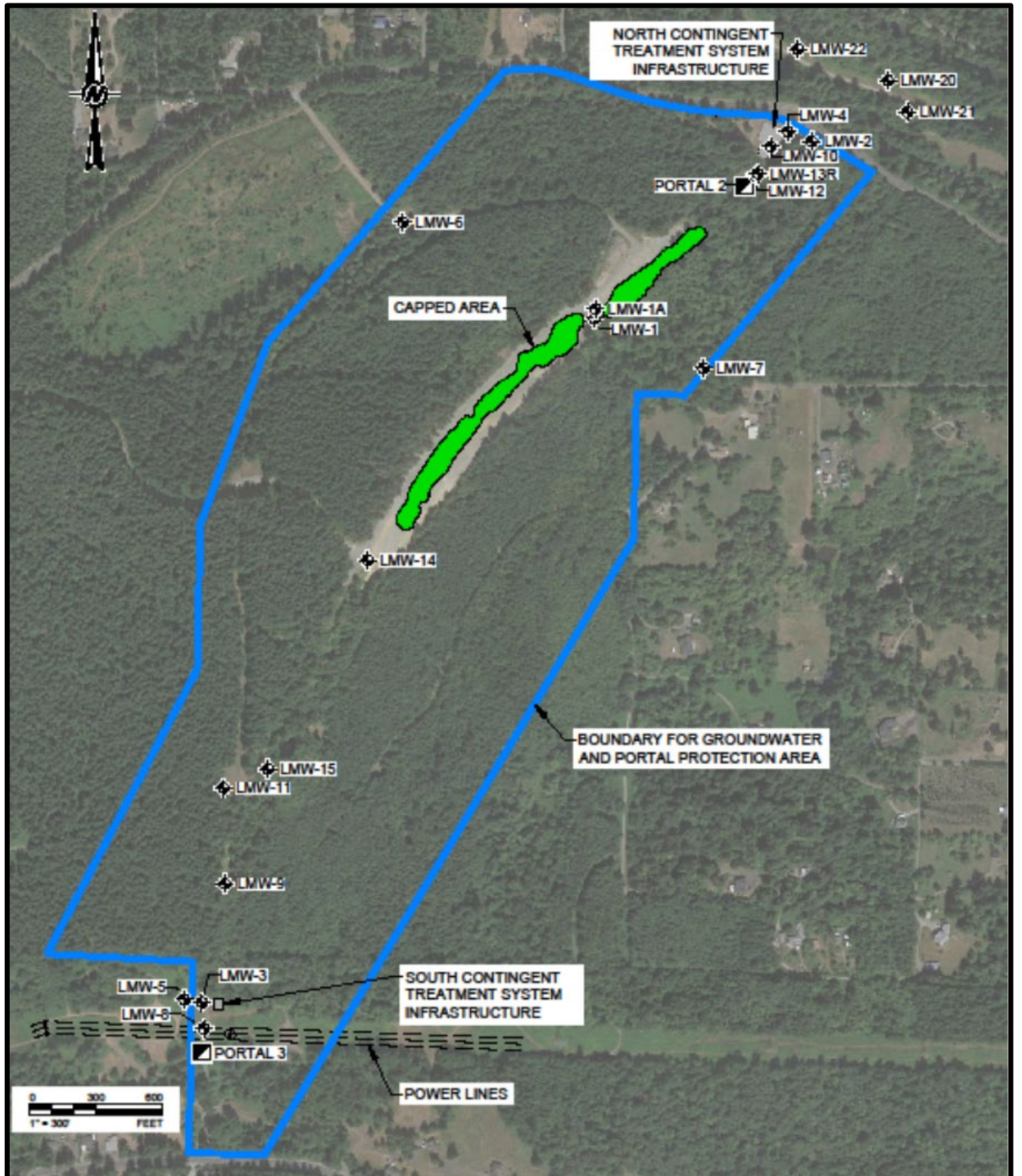
Not Drawn to Scale

Google Maps Ravensdale



 500 ft

Site wells are located to monitor groundwater within the coal seam/mine workings, in the coal seams located east and west of the Site, and in the groundwater north of the Site.



Remedial Actions

2018 – Wooded and Heavily Vegetated

2018 – After Tree and Brush Removal

2019 – Backfilling with Soils from Microsoft Excavation

2019 – Backfilling with Soils from Microsoft Excavation

2020 – Cap Installation (Photo shows Geomembrane Welding)

2020 – Cap Installation (Photo shows Geomembrane Welded Seams)

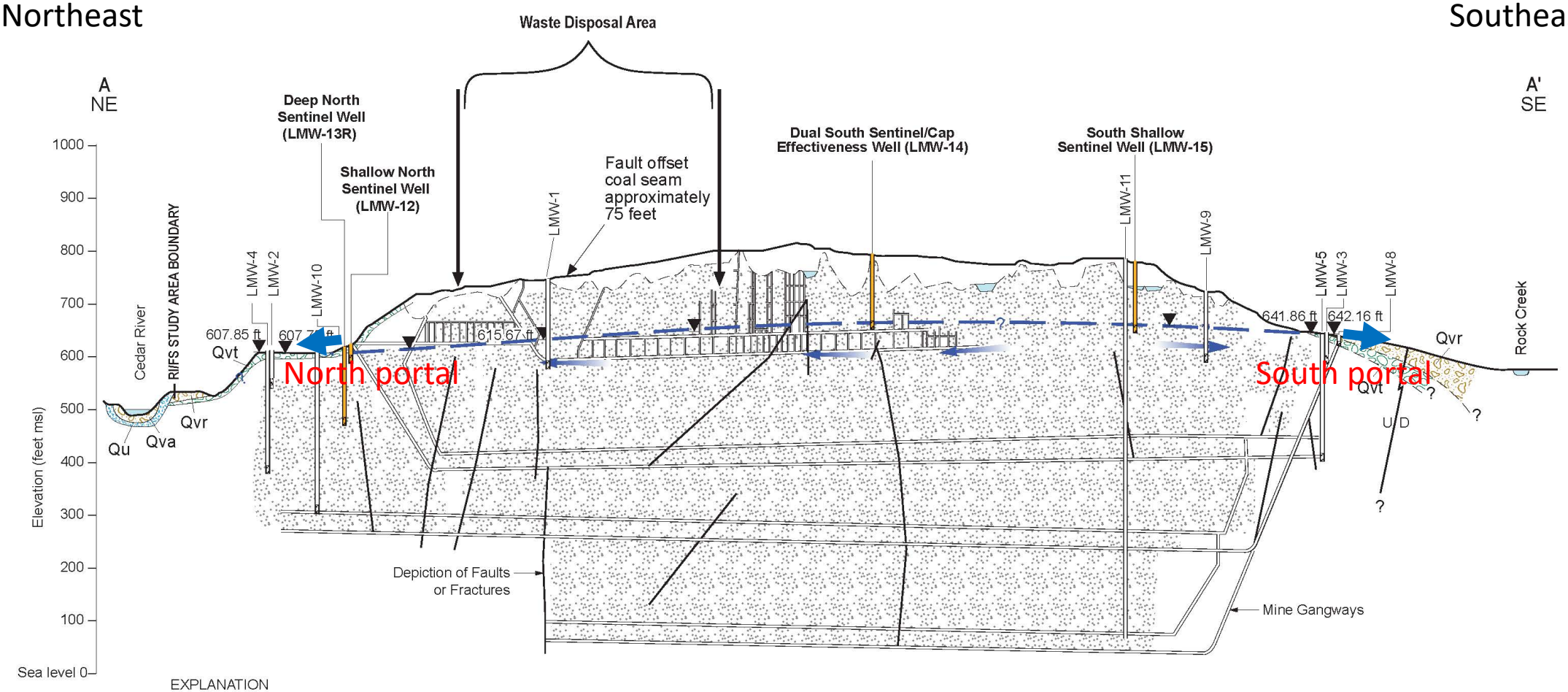
2020 – Cap Installation (Photo shows Geomembrane and Geocomposite Installed)

2020 – Cap Installation (Photo shows Soils Placed on top of the Cap and a Rock-Lined Ditch on the side of the Capped Area)

2020 – Stormwater Diversion (Photo shows Grass on the Capped Areas, and Rock Lined Ditches conveying water to Infiltration Ponds

2020 – Stormwater Diversion (Photo shows Infiltration Ponds at North End After Heavy Rain Event)

2021 – Completed Cap (Photos shows Grass growing on the Capped Areas



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'

Assuming groundwater discharge at the north and south end of mine.

CLIENT
LANDSBURG MINE SITE PLP GROUP

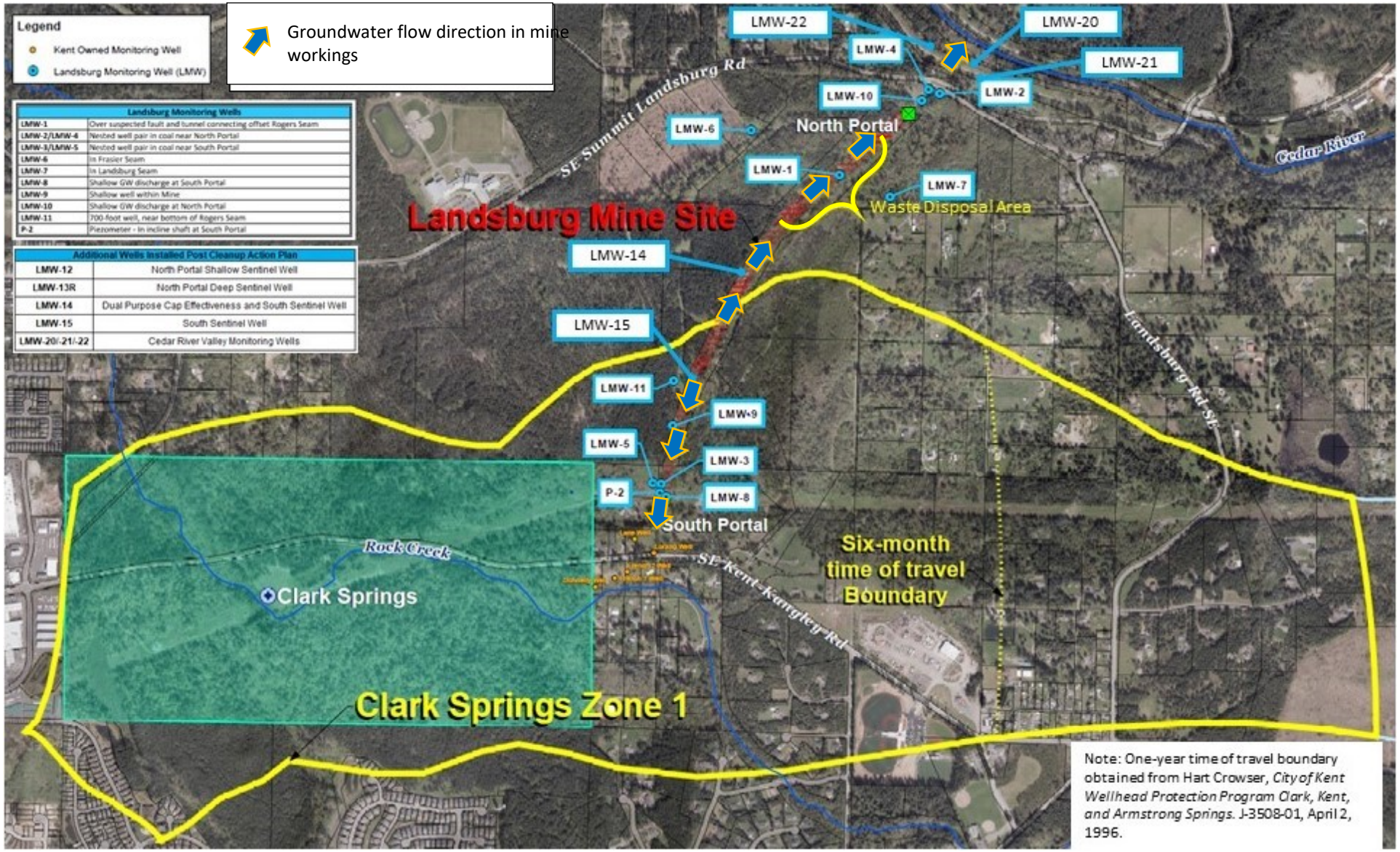
CONSULTANT
GOLDER

YYYY-MM-DD	2018-08-03
PREPARED	REDMOND
DESIGN	
REVIEW	

PROJECT
LANDSBURG MINE SITE

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

PROJECT No. PHASE FIGURE


Legend
Kent Owned Monitoring Well
Landsburg Monitoring Well (LMW)
Groundwater flow direction in mine workings
Landsburg Monitoring Wells
LMW-1 Over suspected fault and tunnel connecting offset Rogers Seam
LMW-2/LMW-4 Nested well pair in coal near North Portal
LMW-3/LMW-5 Nested well pair in coal near South Portal
LMW-6 In Frasier Seam
LMW-7 In Landsburg Seam
LMW-8 Shallow GW discharge at South Portal
LMW-9 Shallow well within Mine
LMW-10 Shallow GW discharge at North Portal
LMW-11 700-foot well, near bottom of Rogers Seam
P-2 Piezometer - in incline shaft at South Portal
Additional Wells Installed Post Cleanup Action Plan
LMW-12 North Portal Shallow Sentinel Well
LMW-13R North Portal Deep Sentinel Well
LMW-14 Dual Purpose Cap Effectiveness and South Sentinel Well
LMW-15 South Sentinel Well
LMW-20/-21/-22 Cedar River Valley Monitoring Wells
LMW-22
LMW-4
LMW-20
LMW-21
LMW-10
LMW-2
LMW-6
North Portal
LMW-1
LMW-7
Waste Disposal Area
SE Summit Landsburg Rd
Cedar River
Landsburg Mine Site
LMW-14
LMW-15
LMW-11
LMW-9
LMW-5
LMW-3
P-2
LMW-8
South Portal
Landsburg Rd SE
Rock Creek
Clark Springs
SE Kent-Kangley Rd
Six-month time of travel Boundary
Clark Springs Zone 1
Note: One-year time of travel boundary obtained from Hart Crowser, City of Kent Wellhead Protection Program Clark, Kent, and Armstrong Springs. J-3508-01, April 2, 1996.

Consent Decree Cleanup Action Plan Elements

- **Fill in and cap trench where wastes are located**
- **Install additional monitoring wells**
- **Institutional controls for groundwater, mine site, and capped areas at property**
- **Funding indefinitely by Potentially Liable Persons**
- **Contingency plan and infrastructure: Pump, contain, treat, and discharge any contaminated groundwater to sewer.**

WHERE ARE WE NOW?

- Consent Decree for Cleanup- DONE
- Cleanup Construction (infilling and capping trench where wastes are located)- DONE (NOVEMBER 2020)
- 1,4-Dioxane groundwater investigation – DONE (May 2019, ongoing)
- Groundwater Monitoring – CONTINUING PROCESS

BACKGROUND: 1,4-DIOXANE AT SITE

- Based on request during public comment period for CAP, 1,4-dioxane was added to analytical suite used for groundwater monitoring.
- This resulted in some detections at three northern wells (LMW-2, LMW-4, and LMW-12).
- Not detected in any other site wells.
- It was not expected to be found outside of the former mine, in keeping with original lack of any detections of contaminants.

1,4-DIOXANE

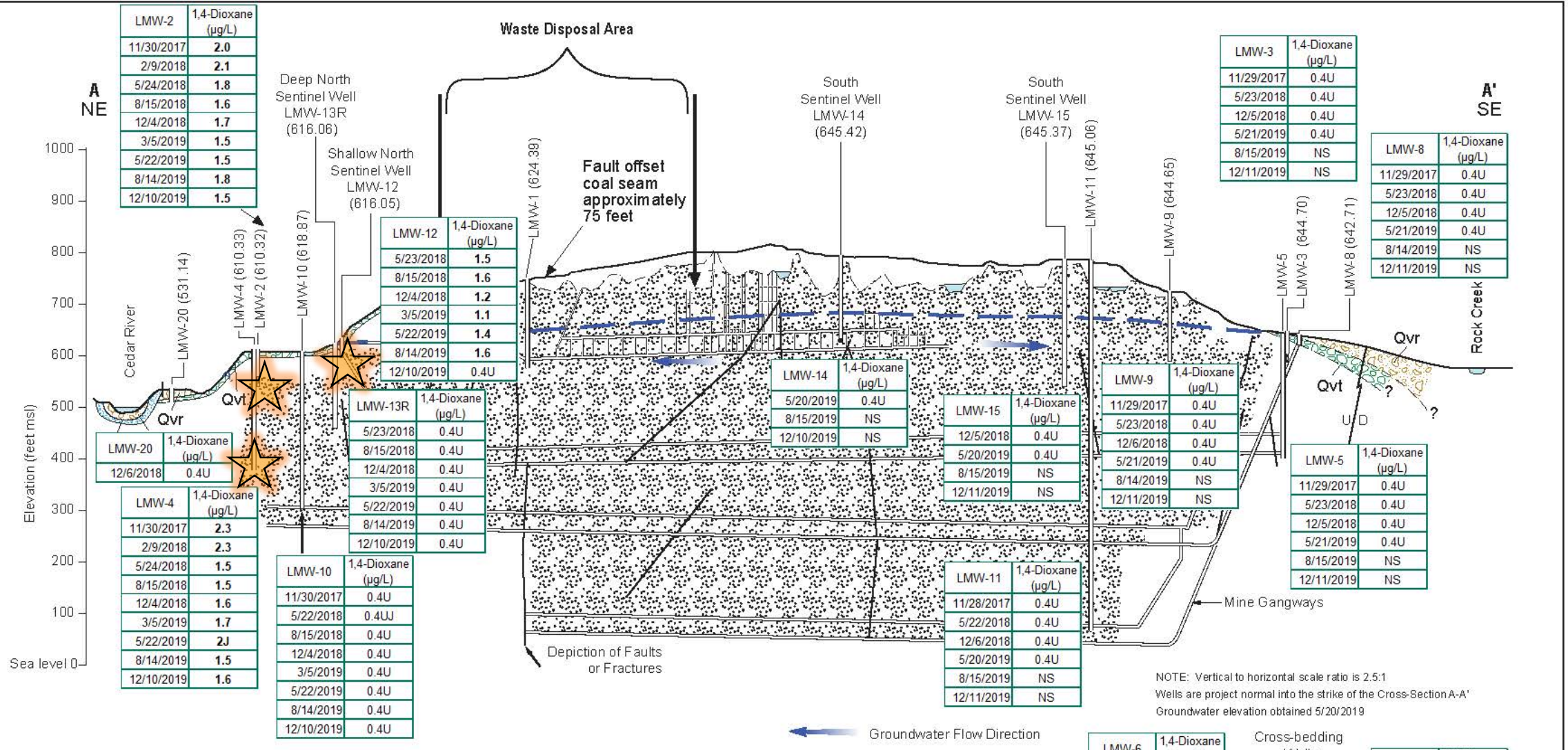
- Man-made industrial chemical formerly used as a stabilizer for chlorinated solvents during manufacturing processes; other products (paint strippers, dyes, greases, varnishes, waxes).
- Byproduct in consumer products such as deodorants, shampoos, and cosmetics.
- Likely human carcinogen
- Low aquatic toxicity since it does not accumulate, magnify, or concentrate biologically in the food chain

1,4-DIOXANE

- 1,4-dioxane was not routinely investigated at solvent release sites until relatively recent analytical methods were able to achieve lower detection limits.
- 1,4-dioxane is highly soluble in water ("loves water")
- Highly mobile; low tendency to volatize from water or absorb to organic carbon.

1,4-DIOXANE

- Recalcitrant to microbial degradation
- Cleanup level is 0.440 µg/L (protective of drinking water). MTCA Method B for surface water was calculated to be 130 µg/L (protective of human health from consumption of organisms)
- It can be difficult to treat and remediate.



LMW-2	1,4-Dioxane (µg/L)
11/30/2017	2.0
2/9/2018	2.1
5/24/2018	1.8
8/15/2018	1.6
12/4/2018	1.7
3/5/2019	1.5
5/22/2019	1.5
8/14/2019	1.8
12/10/2019	1.5

LMW-12	1,4-Dioxane (µg/L)
5/23/2018	1.5
8/15/2018	1.6
12/4/2018	1.2
3/5/2019	1.1
5/22/2019	1.4
8/14/2019	1.6
12/10/2019	0.4U

LMW-13R	1,4-Dioxane (µg/L)
5/23/2018	0.4U
8/15/2018	0.4U
12/4/2018	0.4U
3/5/2019	0.4U
5/22/2019	0.4U
8/14/2019	0.4U
12/10/2019	0.4U

LMW-20	1,4-Dioxane (µg/L)
12/6/2018	0.4U

LMW-4	1,4-Dioxane (µg/L)
11/30/2017	2.3
2/9/2018	2.3
5/24/2018	1.5
8/15/2018	1.5
12/4/2018	1.6
3/5/2019	1.7
5/22/2019	2J
8/14/2019	1.5
12/10/2019	1.6

LMW-10	1,4-Dioxane (µg/L)
11/30/2017	0.4U
5/22/2018	0.4UJ
8/15/2018	0.4U
12/4/2018	0.4U
3/5/2019	0.4U
5/22/2019	0.4U
8/14/2019	0.4U
12/10/2019	0.4U

LMW-14	1,4-Dioxane (µg/L)
5/20/2019	0.4U
8/15/2019	NS
12/10/2019	NS

LMW-15	1,4-Dioxane (µg/L)
12/5/2018	0.4U
5/20/2019	0.4U
8/15/2019	NS
12/11/2019	NS

LMW-11	1,4-Dioxane (µg/L)
11/28/2017	0.4U
5/22/2018	0.4U
12/6/2018	0.4U
5/20/2019	0.4U
8/15/2019	NS
12/11/2019	NS

LMW-9	1,4-Dioxane (µg/L)
11/29/2017	0.4U
5/23/2018	0.4U
12/6/2018	0.4U
5/21/2019	0.4U
8/14/2019	NS
12/11/2019	NS

LMW-3	1,4-Dioxane (µg/L)
11/29/2017	0.4U
5/23/2018	0.4U
12/5/2018	0.4U
5/21/2019	0.4U
8/15/2019	NS
12/11/2019	NS

LMW-8	1,4-Dioxane (µg/L)
11/29/2017	0.4U
5/23/2018	0.4U
12/5/2018	0.4U
5/21/2019	0.4U
8/14/2019	NS
12/11/2019	NS

LMW-5	1,4-Dioxane (µg/L)
11/29/2017	0.4U
5/23/2018	0.4U
12/5/2018	0.4U
5/21/2019	0.4U
8/15/2019	NS
12/11/2019	NS

LMW-6	1,4-Dioxane (µg/L)
11/28/2017	0.4U
5/22/2018	0.4U
8/15/2018	0.4U
12/5/2018	0.4U
5/22/2019	0.4U
8/15/2019	NS
12/10/2019	NS

LMW-7	1,4-Dioxane (µg/L)
11/28/2017	0.4U
5/22/2018	0.4U
12/3/2018	0.4U
5/21/2019	0.4U
8/14/2019	NS
12/11/2019	NS

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

CLIENT
LANDSBURG PLP GROUP

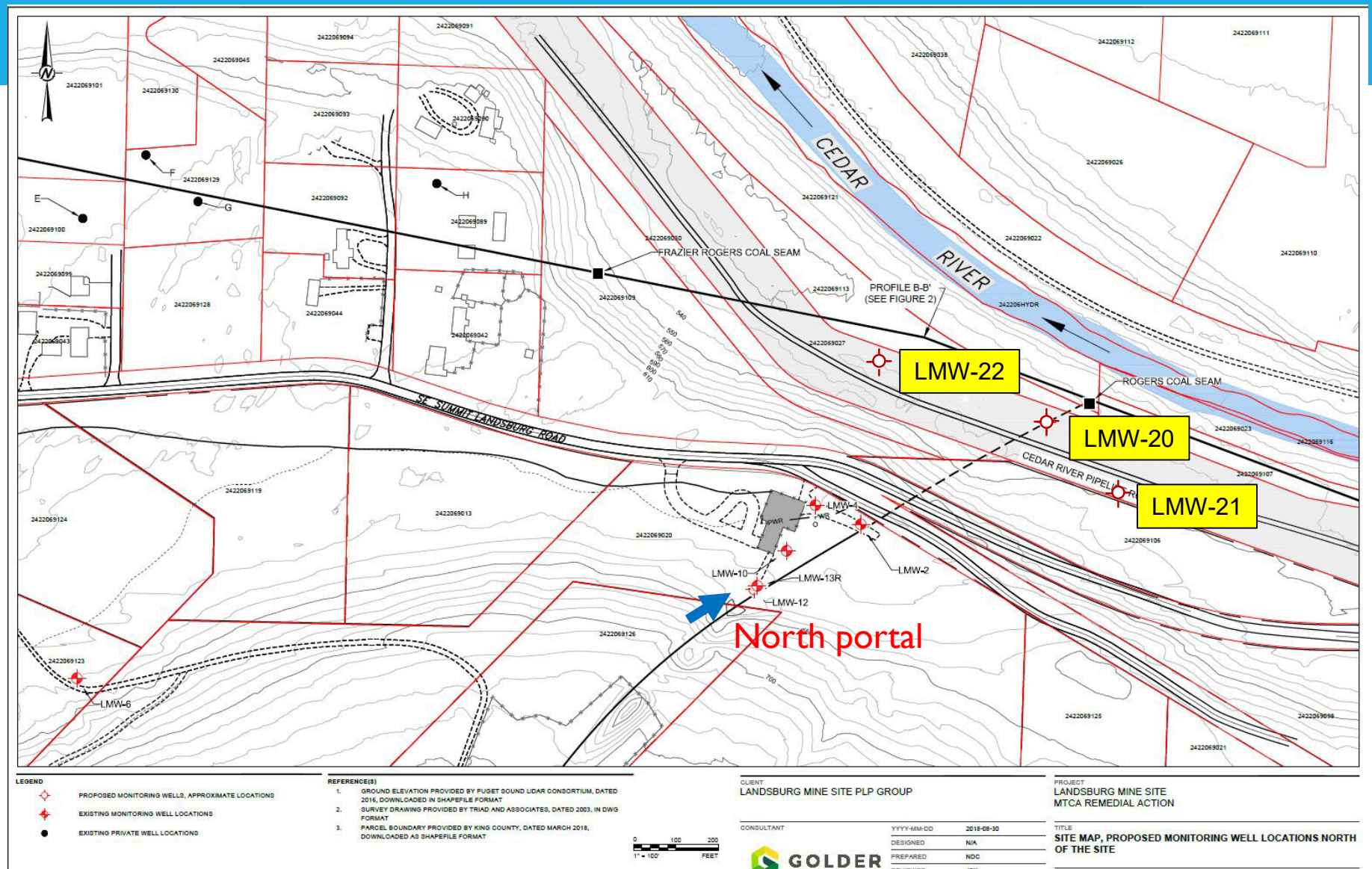
PROJECT
LANDSBURG MINE SITE

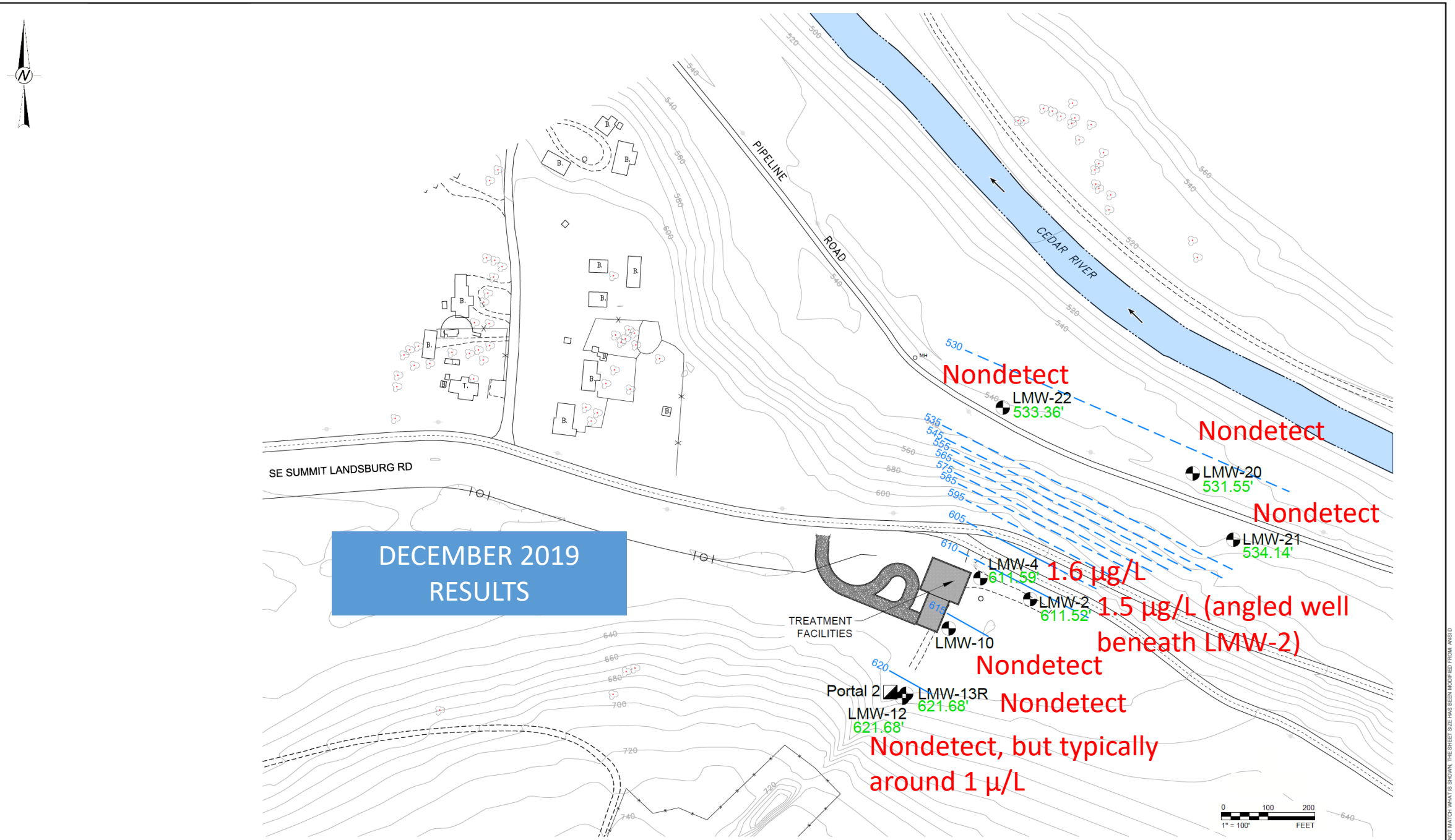
CONSULTANT

YYYY-MM-DD 2019-04-29
PREPARED REDMOND

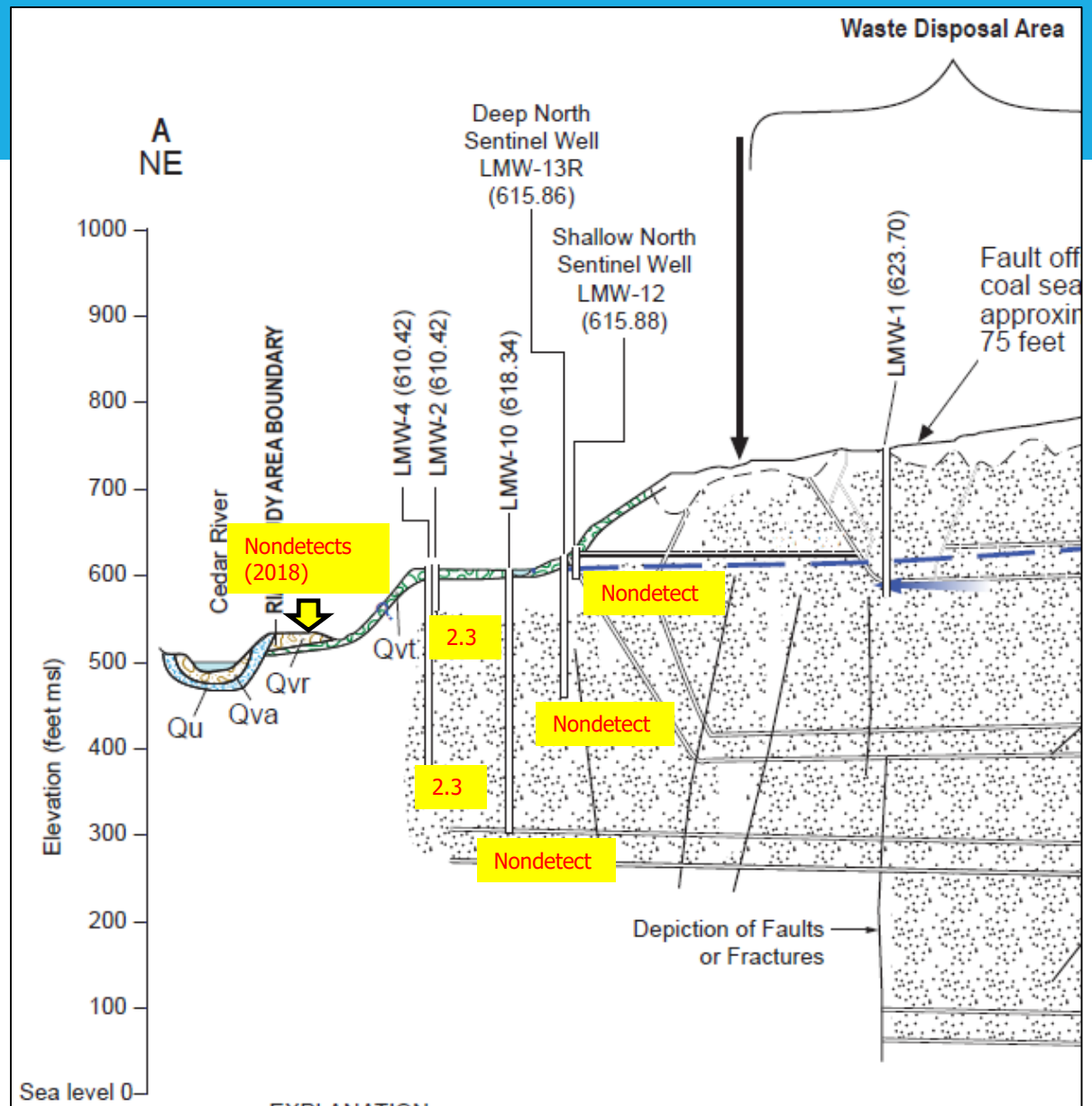
TITLE
CROSS-SECTION ALONG STRIKE AT COAL SEAM
CROSS-SECTION A-A'

1,4-DIOXANE GROUNDWATER INVESTIGATION




PIPELINE ROAD
CEDAR RIVER
SE SUMMIT LANDSBURG RD
DECEMBER 2019
RESULTS
TREATMENT
FACILITIES
LMW-22
533.36'
Nondetect
LMW-20
531.55'
Nondetect
LMW-21
534.14'
Nondetect
LMW-4
611.59'
1.6 µg/L
LMW-2
611.52'
1.5 µg/L (angled well
beneath LMW-2)
LMW-10
Nondetect
Portal 2
LMW-13R
621.68'
Nondetect
LMW-12
621.68'
Nondetect, but typically
around 1 µ/L
0
100
200
1" = 100'
FEET

1,4-DIOXANE NOVEMBER 2020



RESULTS OF 1,4-DIOXANE GROUNDWATER INVESTIGATION

- Trace amounts ranging from nondetect to 2.3 parts per billion and localized to three northern area wells
- No apparent risk to private wells, Clark Springs Water Supply, and Cedar River.
- Rest of the site has no contaminants traceable to wastes in trench
- Adaptive management response that is appropriate/calibrated to 1,4-dioxane detections

RESPONSE TO 1,4-DIOXANE DETECTIONS

- Given apparent lack of contamination in groundwater (1994 to 2017) the FCAP was written to include contingency pump and treat in order address possible future release from mine wastes. It was not designed for discovered existence outside of Mine interior and POC.
- Ecology initially asked PLPs to begin implementing the contingent groundwater extraction and treatment plan (pump and treat) in order to comply with the consent decree, while investigation and evaluation was going on.

PLPS SUBMITTED WHITE PAPER EVALUATING 1,4-DIOXANE REMEDIAL APPROACH

- ISCO (In Situ Chemical Oxidation) to treat 1,4-dioxane not a good option due to introduction of caustic chemicals and possibly more toxic by-products.

- PLP's paper concludes pump and treat to have significant environmental impacts and financial costs, with "minimal to no reduction in risk" based on low levels and limited extent of the 1,4-dioxane.

IMPLEMENTING CONTINGENCY PLAN WOULD BE A WASTEFUL AND EXCESSIVE RESPONSE

- The estimated cost to build the pump-and-treat system:
  - $900,000 without any on-Site treatment. *
  - $2.15 million if on-Site treatment is added.
- The estimated annual cost for operation and maintenance:
  - $147,000 if no on-Site treatment is required
  - $200,000 if on-Site treatment is required prior to discharging water to the sewage

*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. A discharge limit of 2,000 µg/L was accepted for another project.

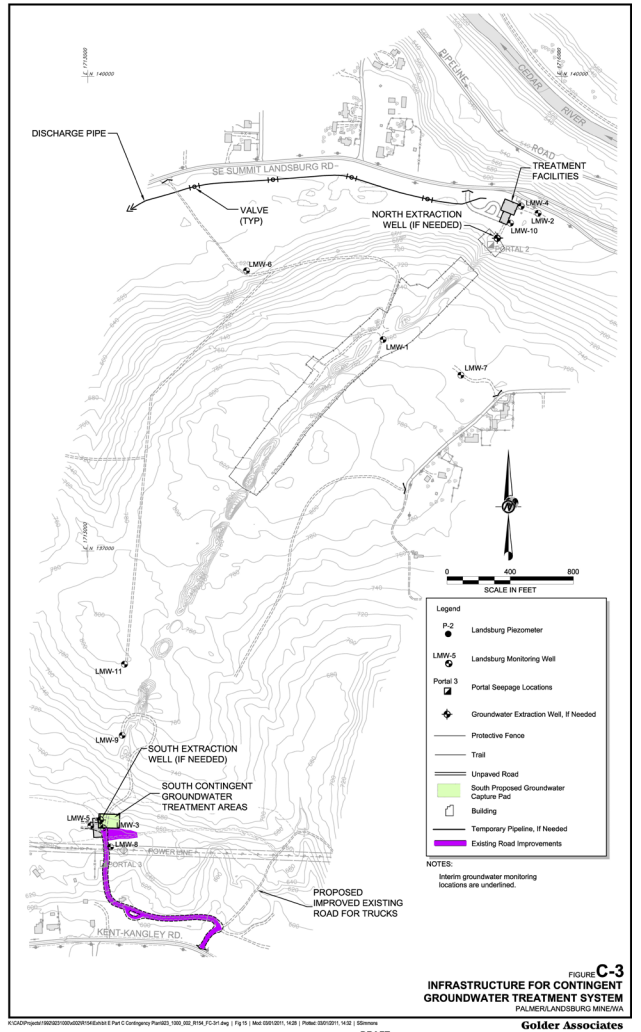
WHITE PAPER'S PROPOSED ACTIONS

- Trench Backfilling and Capping with impermeable geomembrane
- Quarterly monitoring of the northern area groundwater monitoring wells
- At the completion of remedial actions, continue with increased groundwater monitoring that will include analyzing for 1,4-dioxane, volatile chemicals, and petroleum

WHITE PAPER'S PROPOSED ACTIONS

- Annual sampling of LMW-20 (monitoring well downgradient of hits) for 1,4-dioxane

- Complete the extension of the Contingency Plan discharge pipe from the north contingent treatment pad to connect to the nearest municipal sewer line, Soos Creek sewer line located west of the Site.



ECOLOGY ADDED SOME ACTIONS IN WHITE PAPER

- ISB (In Situ Bioremediation) including cometabolic bioremediation should be explored. Widely mentioned as possible remediation technology especially for low concentrations.
- Expand sampling to include LMW-20, LMW-21, and LMW-22 (monitoring wells downgradient of hits)
- Inventory of contaminants (separate from amendment actions)

SUMMARY PATH FORWARD (CLEANUP ACTIONS)

- Originally planned remedial actions will continue:
  - Groundwater monitoring, including nearby private well monitoring
  - Wastes are capped
  - Institutional controls
  - Contingency plan (CGETS) if other contamination emerges in future at any site wells above trigger levels or if 1,4-dioxane show increasing trends and 20 ug/L trigger reached at north end wells

SUMMARY PATH FORWARD (CLEANUP ACTIONS)

- Amended CAP response specific to 1,4-dioxane detections:
  - Increase groundwater monitoring of north portal wells
  - Connect discharge pipe to sewer
  - In Situ Bioremediation (ISB), including bioaugmentation and cometabolic bioremediation to clean up the 1,4-dioxane contamination.

SUMMARY PATH FORWARD (ADMINISTRATIVE)

- CONSENT DECREE: Amend CD and CAP ("Exhibit G") for specific adaptive management approach to 1,4-Dioxane

- A 60-day Public Comment period for CD amendments will be held.

How to Comment: May 10 – July 8, 2021

1) Comment Online

www.bit.ly/EcologyLandsburgComment2021
www.bit.ly/EcologyLandsburgMine

2) Contact Site Manager

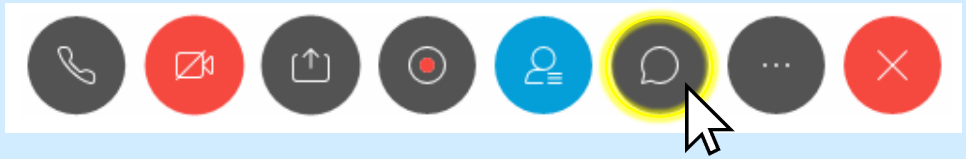
Jerome Cruz – Site Manager
15700 Dayton Avenue North
Seattle, WA 98133

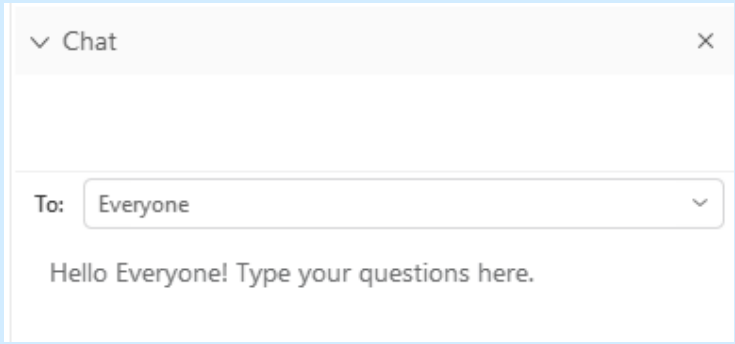
Jerome.Cruz@ecy.wa.gov

DEPARTMENT OF ECOLOGY
State of Washington

Questions?

You can ask questions via the chat function





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DEPARTMENT OF ECOLOGY State of Washington

Image icons : Garcia Gallego (questions) and Adrien Coquet (presenter) from Noun project

QUESTIONS?