July 11, 2024
File No. 04224030.19

Mr. Mike Davis
Ms. Tina Kendall
Clark County Public Health
Solid Waste Operations
1601 E. Fourth Plain Blvd. Building 17
Vancouver, WA 98661

Subject: Work Plan for Additional Landfill Liner Investigation to Address Surface Water Management Issues, Northeast Corner of Closed Leichner Landfill, Clark County, Washington

Dear Mike and Tina:

On May 16th and June 19th and 20th, 2024, SCS Engineers (SCS) completed liner investigation activities at the northeast corner of the Closed Leichner Landfill (Landfill) in Clark County, Washington. The activities were performed consistent with SCS's May 17, 2024 Work Plan for Additional Landfill Liner Investigation to Address Surface Water Management Issues, Northeast Corner of Closed Leichner Landfill, Clark County, Washington.

Information gathered during this investigation was intended to be used to (1) develop methods to manage the various sources of water in the northeast portion of the Landfill so that the integrity of the Landfill's cover system is preserved and (2) support repair options to the stormwater control system in this area of the Landfill.

The results from the investigation activities included:

- Location and approximate depth information for a buried 6-inch diameter drainage pipe was obtained using non-invasive ground penetrating radar (GPR). The GPR survey identified the buried drainage pipe south of the drainage structure installed during the 99th Street extension project. The GPR also clearly showed within the investigation area the presence and depth of the original Landfill cover system geomembrane and the geomembrane installed during the 99th Street extension project.

- Using hand excavations, the Landfill cover geomembrane was exposed in six locations. The ground surface and the geomembrane elevation was surveyed at each location.

- Using hand excavations, the geomembrane installed for the 99th Street extension project was exposed in four locations. The ground surface and the geomembrane elevation was surveyed at each location.

- Three test pits were mechanically excavated to expose the drainage pipe identified by the GPR survey. At each test pit, the drainage pipe was observed immediately above the Landfill

cover geomembrane. The elevation of the ground surface, drainage pipe and the underlying Landfill cover geomembrane was surveyed at each location.

No damage to either geomembrane occurred during the investigation activities. After the surveying was completed, the excavations and test pits were backfilled.

The attached Figure 1 shows the location of each hand excavation and test pit. The above information will be used to create profile drawings through the investigation area that will be used to evaluate possible remedies to the drainage issues observed during the 2023-2024 winter season.

Planned Additional Work

The buried 6-inch diameter drainage pipe was first observed during the installation of the geomembrane for the 99th Street extension project. While excavating the anchor trench, two 6-inch diameter drainage pipes were encountered. The deeper of the two pipes appeared partially crushed and filled with soil. Drainage rock was installed to facilitate drainage from the pipes, the geomembrane was extended over the installed rock, and the area was backfilled. The attached photographs show the two exposed pipes in the anchor trench and the installed rock drainage and geomembrane.

The investigation described above clearly identified the location and elevation of the shallow drainage pipe south of the anchor trench. Additional investigation is planned to expose the deeper drainage pipe and attempt to identify the pipe depth and location.

The location where the two drainage pipes were originally observed in the anchor trench will be excavated to expose the deeper drainage pipe. The approximate location of the planned excavation is shown on Figure 1. The edge of the geomembrane will be exposed within the anchor trench. Since the geomembrane for the 99th Steet extension was not welded to the original cover geomembrane, the 99th Steet extension geomembrane will be pulled back to expose the installed drainage rock. It may be necessary to cut the 99th Steet extension geomembrane to excavate the anchor trench area and expose the deeper drainage pipe.

A camera will be inserted into the deeper drainage pipe to attempt to identify the depth and location of the pipe run. It is assumed that the deeper pipe runs southerly above the Landfill cover geomembrane. Additional test pits will be excavated as appropriate to confirm the presence and depth of the deeper drainage pipe. Consistent with the approach described in the May 17th work plan, the Landfill cover geomembrane will not be cut during test pitting to expose the deeper drainage pipe.

Alternatively, if the deeper pipe cannot be accessed with the camera because it is crushed or filled with soil, the deeper pipe will likely be abandoned with bentonite and a cap fitting. The approach for managing the deeper pipe will be made based on field observations.

Reporting

If the additional work described above provides the desired information, SCS will prepare a memorandum outlining next steps for an interim solution and evaluate how well it works during the fall/winter 2024-25. Clark County Public Health (CCPH) will submit the memorandum to the Washington Department of Ecology (Ecology) and Clark County Solid Waste Enforcement for review/approval, and then CCPH will share the document with Clack County Public Works.

Sincerely,

Gregory D. Helland, LHG
Project Director
SCS Engineers

Louis Caruso, LG, LHG
Project Director
SCS Engineers

Attachments: Figure 1 – Site Plan
Anchor Trench and Drainage Pipe Photographs

ATTACHMENTS

TYPE 4 DITCH DETAIL 1

TYPE 3 DITCH DETAIL 2

DRAINAGE AREA BOUNDARY

N.E. 99TH ST.

NE-13

NE-19

NE-18

NE-15

NE-17

NE-16

"E-DITCH LINER"
EL 222.13
℄ OF DITCH EL 221.04
BASE LINER EL 219.93

"D2"
BASE LINER EL 219.85
SURFACE EL 222.91

"D1"
BASE LINER EL 218.05
SURFACE EL 221.36

"C2"
BASE LINER EL 220.60
SURFACE EL 224.00

"C1"
BASE LINER EL 218.74
SURFACE EL 221.93

"B2"
BASE LINER EL 220.75
SURFACE EL 224.12

"B1"
BASE LINER EL 218.67
SURFACE EL 221.61

"A-TEST PIT-SOUTH"
WEST BASE LINER EL 223.50
TOP OF 8" PIPE EL 223.88
EAST BASE LINER EL 223.49
SURFACE EL 226.36

"A-TRENCH"
WEST BASE LINER EL 222.33
TOP OF 8" PIPE EL 221.98
℄ OF DITCH EL 221.32
EAST BASE LINER EL 221.61
SURFACE EL 223.70

CONDENSATE
SUMP TOP EL 224.58
TOP OF 6" PIPE
EL 223.32

"A-TEST PIT-NORTH"
BASE LINER EL 217.29
TOP OF 8" PIPE
EL 218.46
SURFACE EL 221.06

A1
A2
A3

A
B
C
D
E

"E-ANCHOR TRENCH"
EL 217.51
SURFACE EL 218.95

"D-ANCHOR TRENCH"
EL 218.84
SURFACE EL 219.97

"C-ANCHOR TRENCH"
EL 219.27
SURFACE EL 220.25

"B-ANCHOR TRENCH"
EL 218.58
SURFACE EL 219.61

TOP OF 24" STEEL PIPE
EL 219.72
IE 217.81
SURFACE EL 217.19

GP-40

LB-22S

TYPE 2 DITCH DETAIL 3

PLANNED ADDITIONAL INVESTIGATION

GP-32

LB-22SR

GP-19S

GP-19D

GP-31

225

220

229

LEGEND:

- Area to be Excavated
- Trench "A1, A2 & A3"
- Test Pit
- Property Boundary
- Contour Lines
- Drainage Path
- Drainage Area Boundary
- Stormwater Drain (Design Layout)
- GP-32 — Compliance Landfill Gas Monitoring Probe Location
- LB-22S — Decommission Landfill Gas Monitoring Probe Location
- NE-19 — Vertical Landfill Gas Extraction Well
- Spot Elevation
- Condensate Sump
- Gas Collection Piping
- Condensate Piping
- Extent of New Liner
- Condensate Drain Line
- 6" Underdrain Line

NOTES:

1. Topography taken from Clark County GIS, December 2023.

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SCALE
0 50 100 FEET

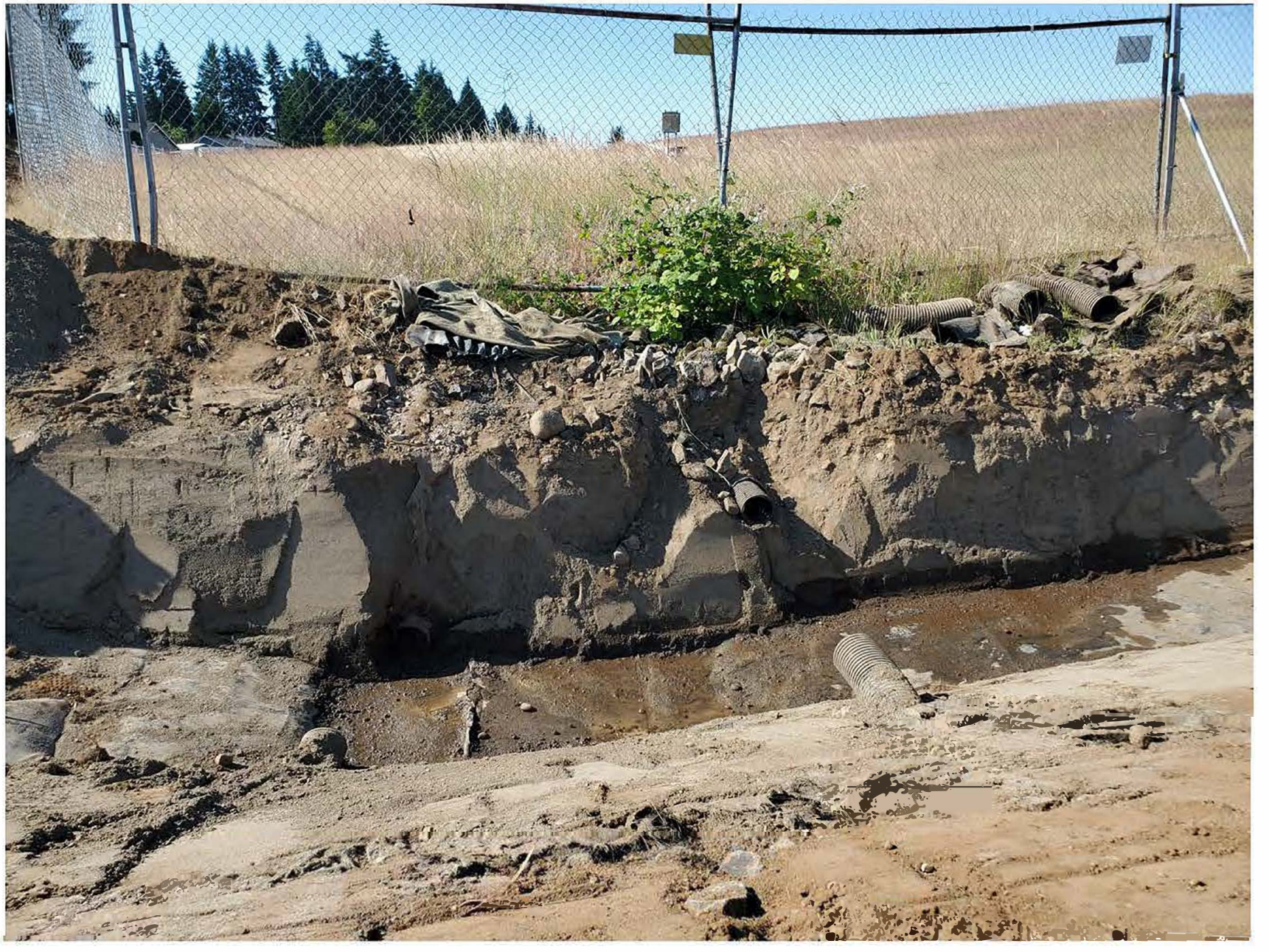
PROJECT NO. 04223030.19	DES BY B.R.
SCALE AS SHOWN	CHK BY B.L.
CAD FILE FIGURE 1	APP BY L.C.

SITE MAP

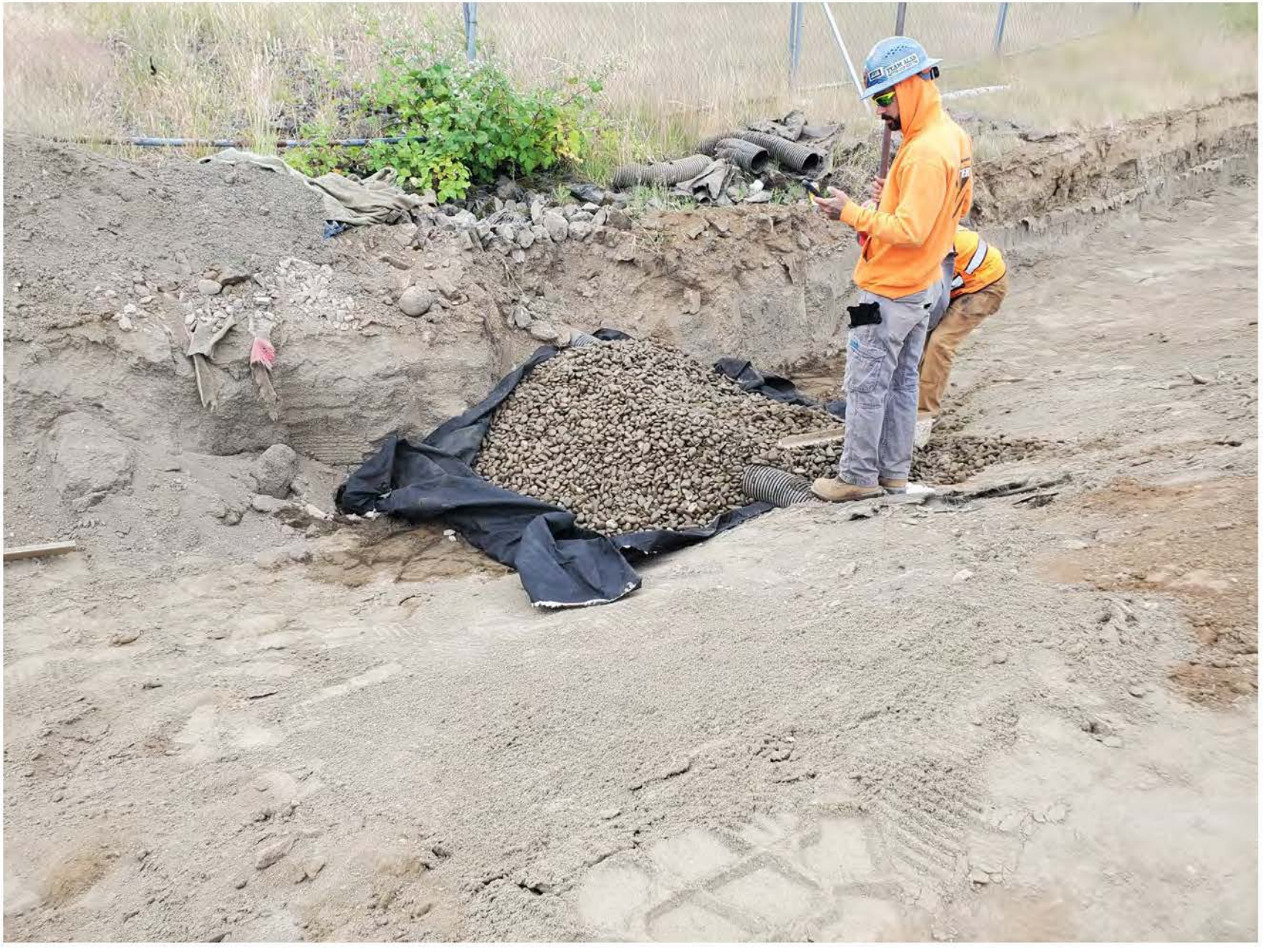
LEICHNER LANDFILL
VANCOUVER, WASHINGTON

DATE JULY 2024

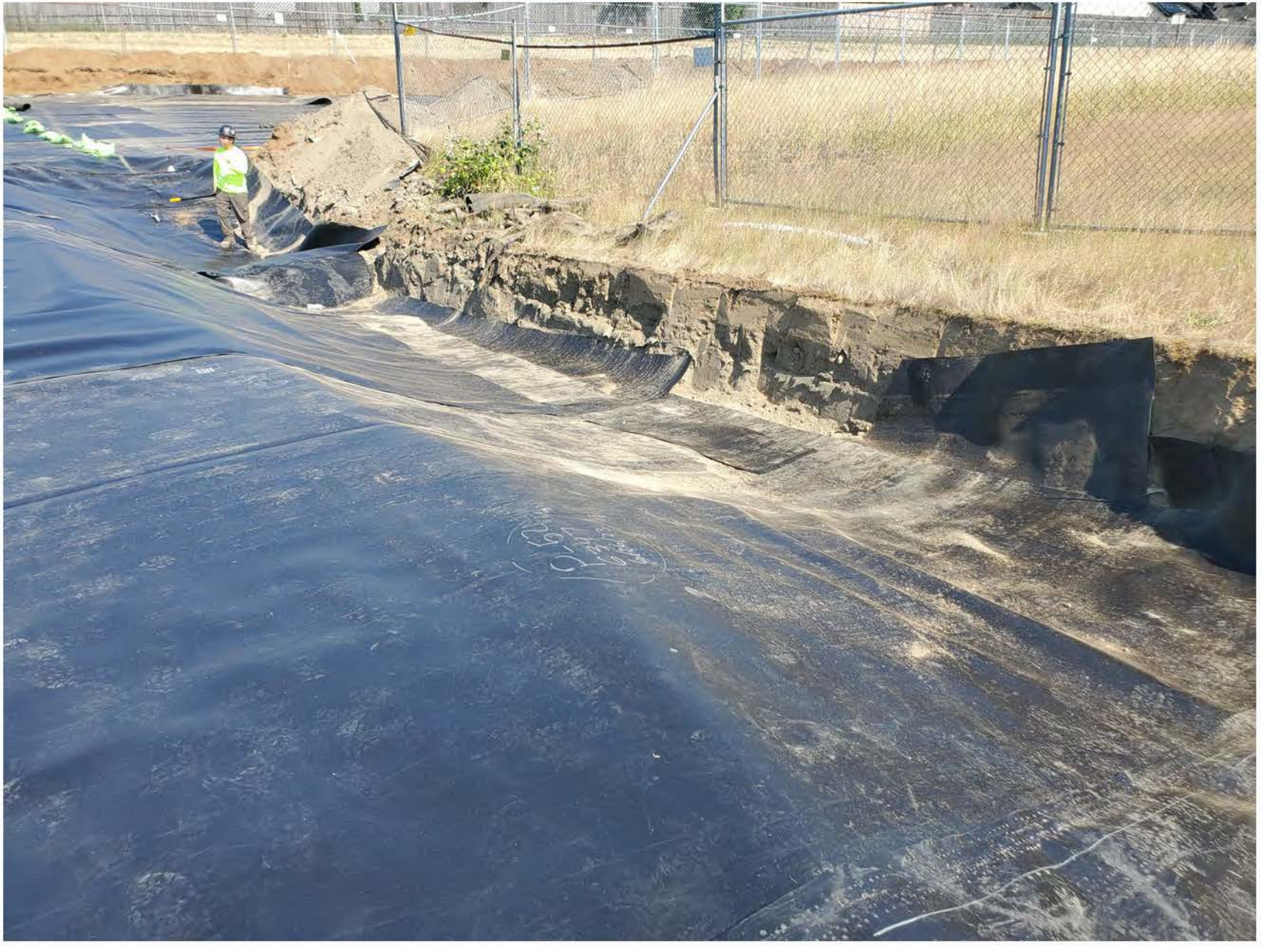
FIGURE 1



View looking south at the anchor trench. Note the shallow drainage pipe on both sides of the anchor trench, and the deeper drainage pipe (in the shadow) to the east.



View of drain rock installed to transmit water from the shallow drainage pipe.



View looking east along the anchor trench. The shallow drainage pipe and drain rock are below the mound this side of the worker.