

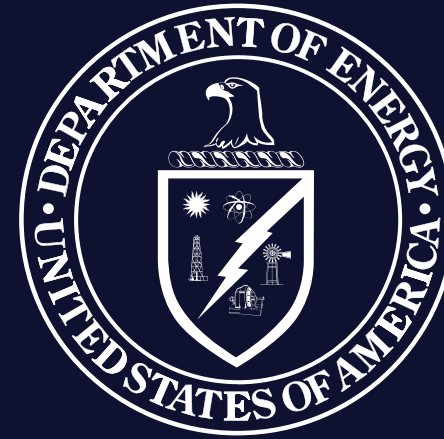
Shiprock, New Mexico, Disposal Site

Water Treatment Unit Project

Joni Tallbull, Department of Energy, Site Manager

Hallie Katz, Department of Energy, Project Manager

Tuesday, June 16, 2026



U.S. DEPARTMENT *of* ENERGY

Office of Legacy Management

Presentation Outline

- Office of Legacy Management Mission
- Site History
- Site Elements and Design
- Groundwater Status
- Current Site Conditions
- Water Treatment Unit Project
- Evaporation Pond Stabilization Project
- Public Resources
- Contact Info

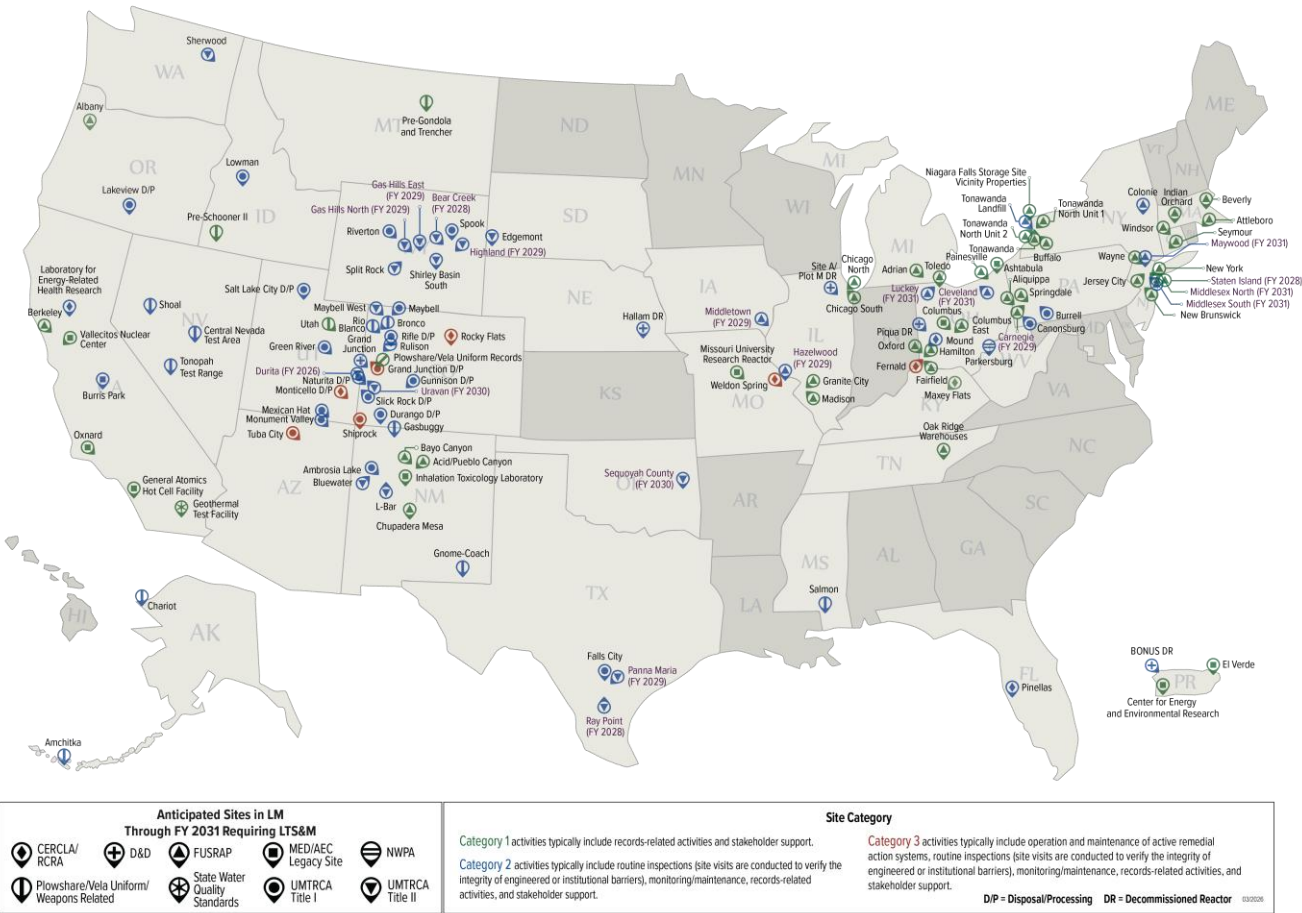


Shiprock disposal cell

Office of Legacy Management

Since 2003, the U.S. Department of Energy (DOE) Office of Legacy Management (LM) has been conducting long-term surveillance and maintenance at sites where nuclear waste has been disposed, where residual contamination remains, and where passive or active treatment of groundwater contaminated by radionuclides or other contaminants of concern is being conducted.

Mission: Safeguard human health, environments, and public properties bound to the nation's post-closure responsibilities at former atomic defense sites.



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LM Authority – defined by U.S. Congress

LM Has Authority To:

- Manage and maintain properties where remediation has been completed
- Address responsibilities associated with former uranium processing sites
- Monitor groundwater and maintain barriers and containment systems
- Preserve and provide access to vast collection of records
- Work with local communities, states, federal agencies, and Tribes



LM Does Not Have Authority To:

- Mine or process uranium (private companies)
- Transport uranium (private companies)
- Remediate, address, or close abandoned uranium mines (EPA)
- Address health-related issues associated with former uranium mining (Indian Health Services and Agency for Toxic Substances and Disease Registry)
- Relocate disposal cells (U.S. Congress)



Site History: Historic Lease Approval and Mill Operation

Navajo Mill Operation

- Lease approval;
BIA/NN approved
- 1954-1963: Kerr-McGee
- 1963-1968: Vanadium Corp
of America
- 1973: Lease expiration



VCA Mill, Shiprock, New Mexico — July 1965

Site History: Site Surface Remediation & Access

- 1978: Uranium Mill Tailings Radiation Control Act (UMTRCA)
- 1978-1986: DOE and EPA cleanup activities
- 1983: DOE entered Cooperative Agreement with NN
- 1996: LM received Transfer of Custody and Custodial Access Agreement
- 2005: Site Right of Way (ROW) issued
- 2026: Updated ROW application with NN Council and RDC



Shiprock disposal cell construction, 1986

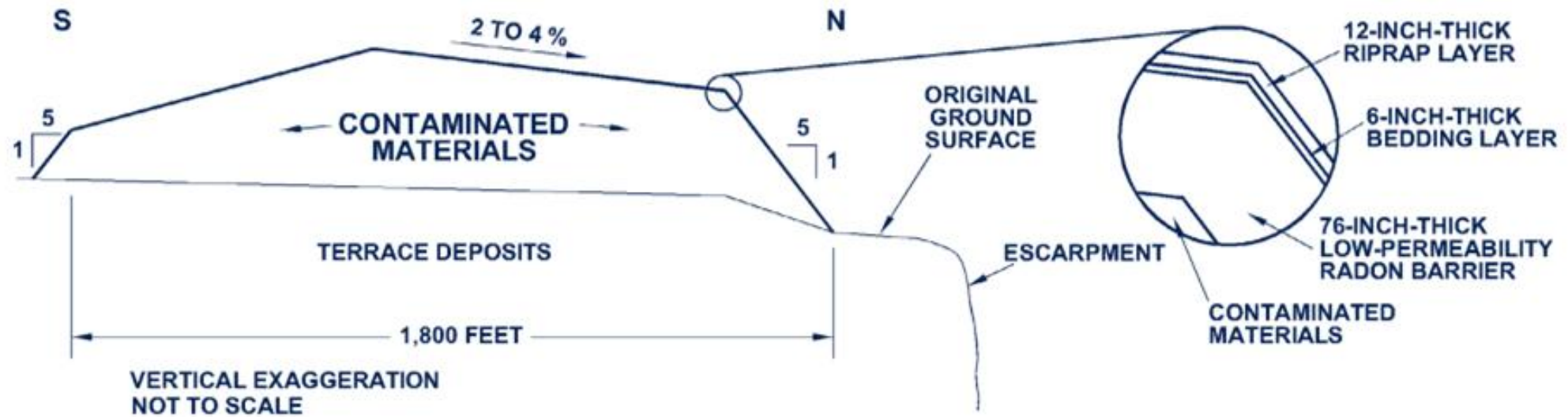


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Site Elements and Design: Disposal Cell

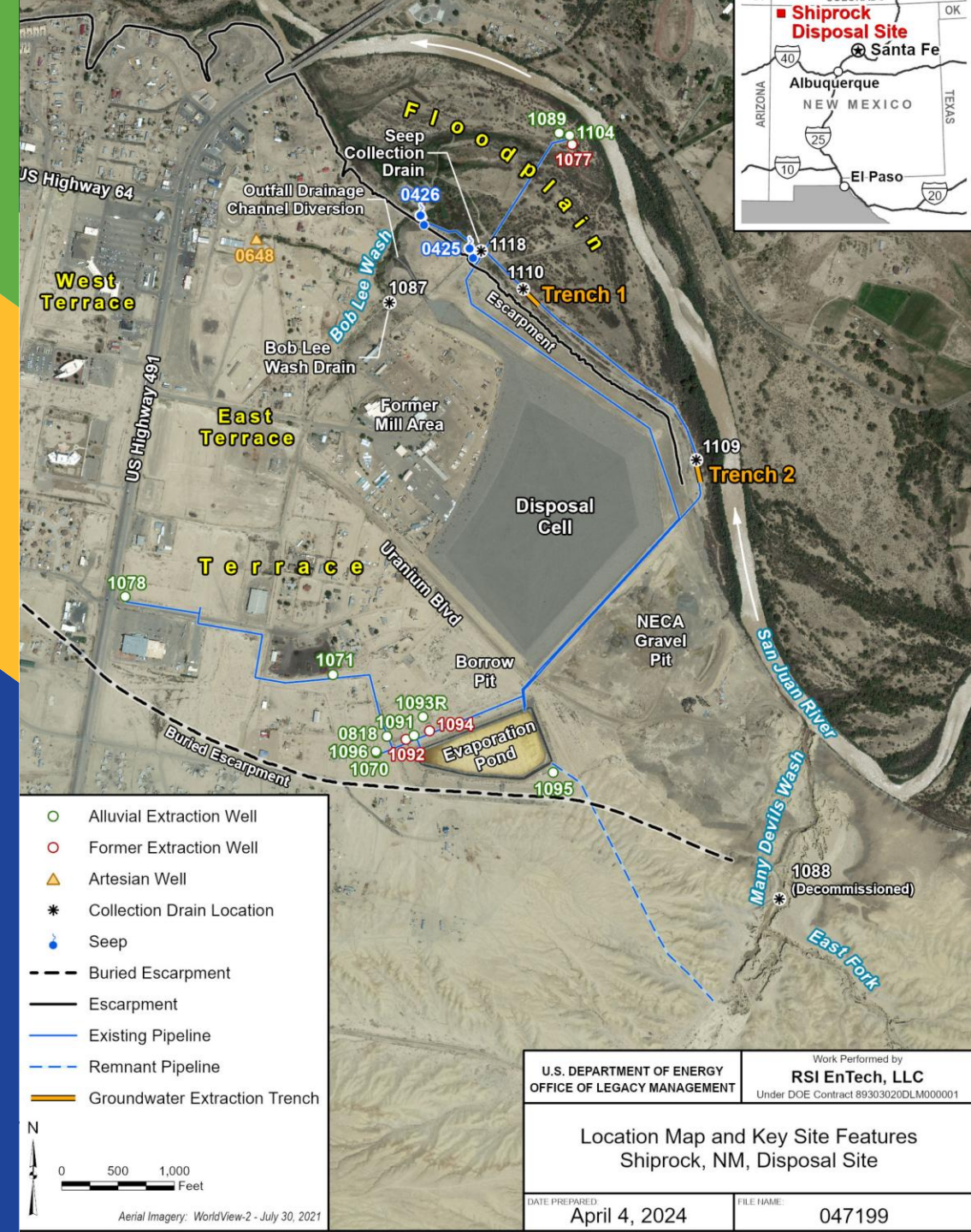
- Disposal cell for mill waste containment
 - Built in 1986
 - 77 acres
 - 2.5 million tons of material inside the cell
 - 200–1,000-year design life
 - Annual inspections of cell integrity



Schematic of Shiprock disposal cell construction

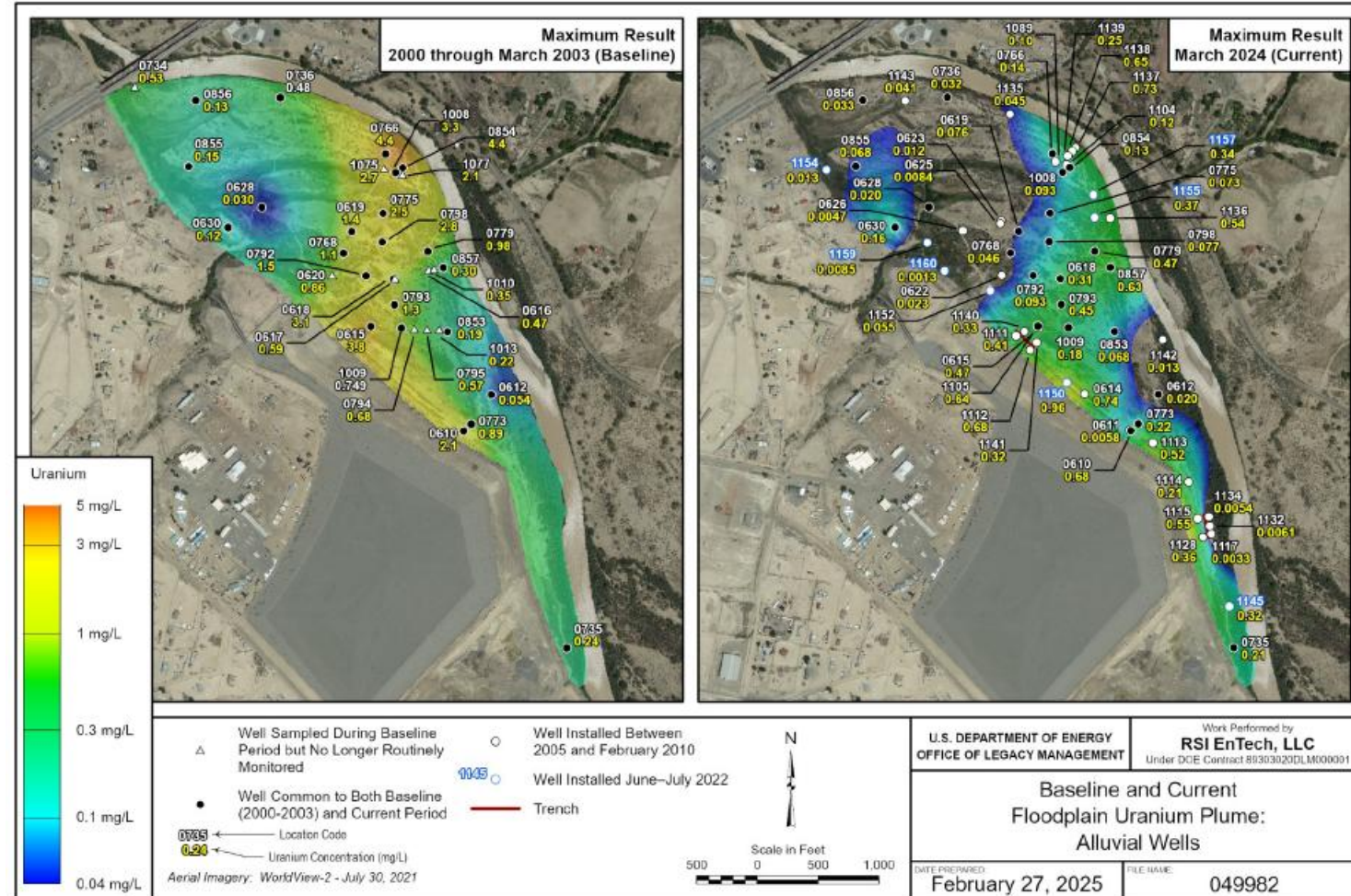
Site Elements and Design: Groundwater Extraction System

- 1950s & 60s mill activities contaminated groundwater at the site
- To address groundwater contamination, LM:
 - Groundwater Compliance Action Plan (GCAP)
 - Active remediation
 - Pump from site extraction locations and treat the groundwater
 - 2003 – 2026: Evaporation Pond
 - 2026 – forward: New Water Treatment Unit
- The town of Shiprock receives its drinking water from Farmington, NM



Current Site Conditions - Uranium

- Uranium plume size and concentrations have decreased at site with active remediation (2003 – current).
- Groundwater is sampled twice a year; data is publicly available.
 - gems.lm.doe.gov
- LM is currently working to better understand time required to reach cleanup concentration goals of site contaminants, including uranium.



Current uranium plume conditions; cleanup goal: 0.044 mg/L



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Operations and Maintenance Work



Site visit with Tribal partners, 2000



First discharges to pond, 2003



Extraction system expansion, 2006



Collecting seep sample, 2010



Public meeting, 2019



Pond maintenance, 2025

Regulatory and Environmental Compliance

Regulatory Compliance

- U.S. Nuclear Regulatory Commission (NRC)
- Code of Federal Regulations
 - 10 CFR Part 40.27
 - 40 CFR Part 192
- Long-Term Surveillance Plan (LTSP)
- Groundwater Compliance Action Plan (GCAP)

Environmental Compliance

- National Environmental Policy Act (NEPA) requirements
- Interagency consultations
- Tribal agency engagements
- Project or field action specific



US Army Corps
of Engineers®



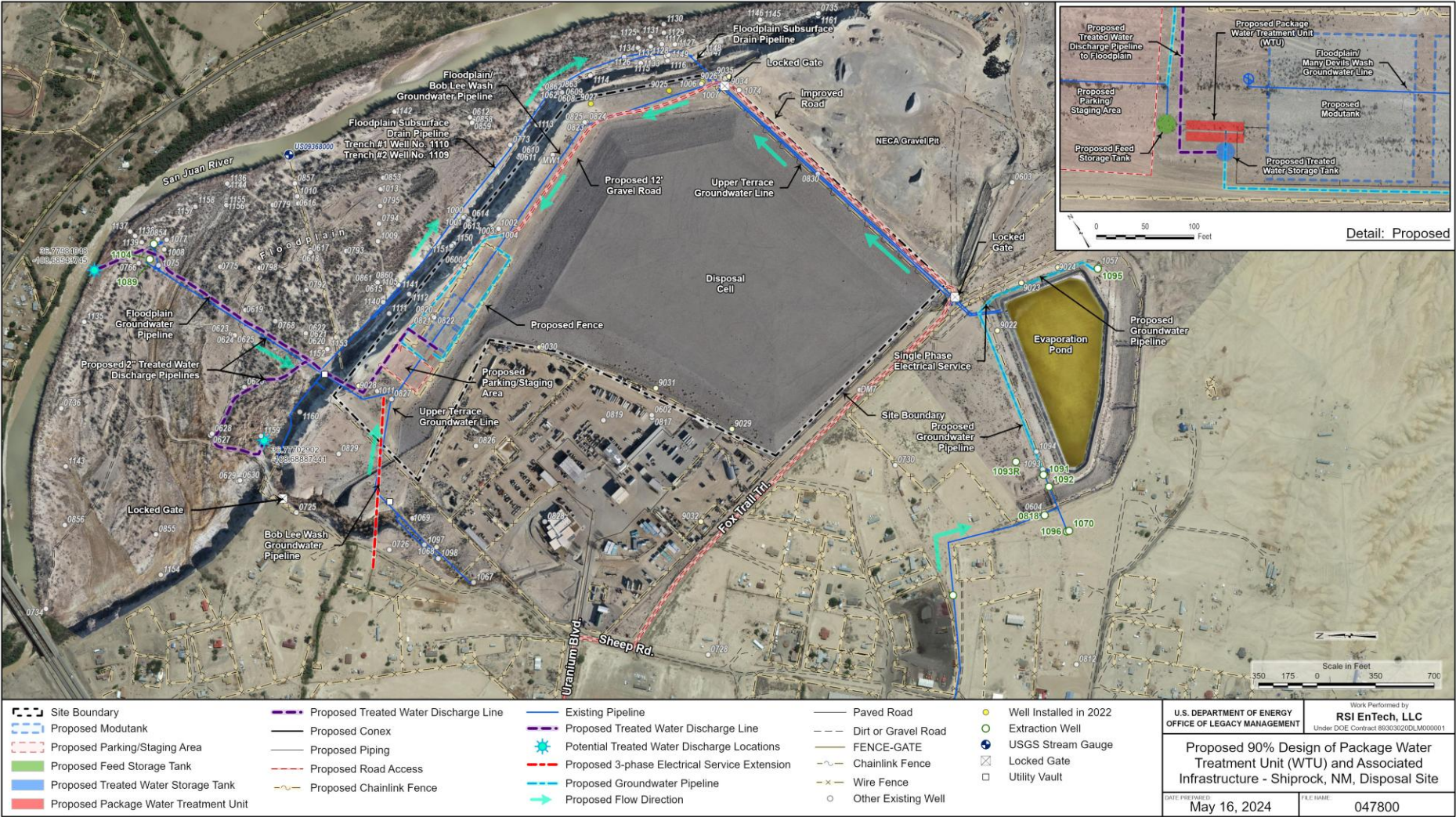
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Water Treatment Unit Project



Water Treatment Unit Project



Infrastructure map



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Water Treatment Unit Project *(continued)*



Road improvements



Bioswale (Navajo AML suggestion)



Modular evaporation pond

Water Treatment Unit

Electrocoagulation

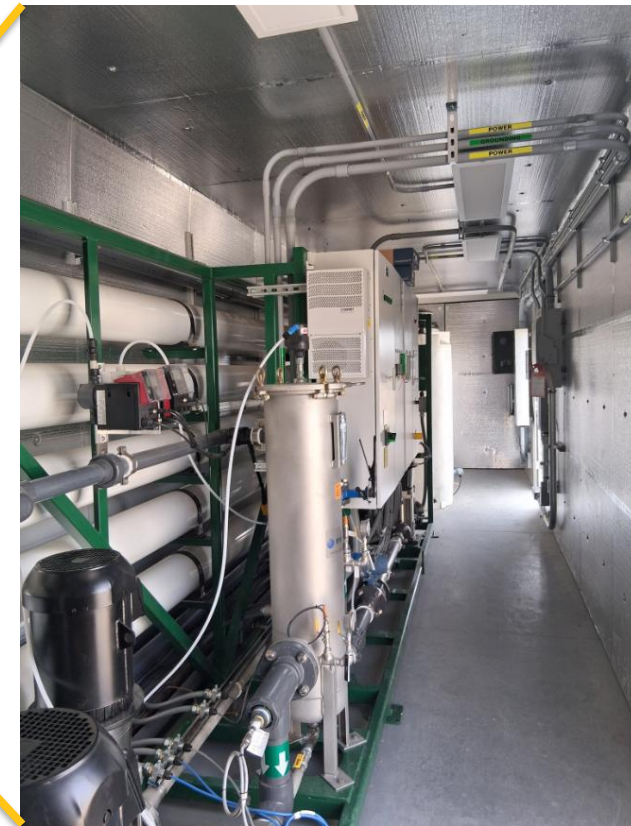
To remove suspended solids



Electrocoagulation system interior

Reverse Osmosis

To remove dissolved solids



Reverse osmosis system interior



Water treatment unit containers

Water Treatment Unit: Compliance and Reporting

- Treated water will be discharged to the environment
- Treated effluent must meet water quality standards set by NN EPA and US EPA
- National Pollution Discharge Elimination System (NPDES) permit
- All reporting is publicly available
 - echo.epa.gov

The screenshot displays the EPA ECHO website. At the top is the EPA logo and navigation links: Environmental Topics, Laws & Regulations, Report a Violation, and About EPA. The ECHO logo and title 'Enforcement and Compliance History Online' are prominently featured. A 'Quick Search' sidebar on the left lists options: Search Options, Analyze Trends, Find EPA Cases, Data Services, Help, and News. The main search area includes a 'Search By' section with buttons for 'Location' and 'Facility Name/ID', a text input field for 'Enter city, state, and/or zip code', and a 'Search' button. Below the search bar, a paragraph explains the tool's purpose: 'Use EPA's Enforcement and Compliance History Online website to search for facilities in your community to assess their compliance with environmental regulations. You can use ECHO to:'. A list of capabilities follows: Search for Facilities, Investigate Pollution Sources, Search for EPA Enforcement Cases, Examine and Create Enforcement-Related Maps, and Analyze Trends in Compliance & Enforcement Data. To the right of this list are three icons with links: 'Read the Quick Start Guide', 'Watch a Video Tutorial', and 'Explore the Tool Guide'.



Evaporation Pond



Shiprock Evaporation Pond

- 11-acre pond
- Installed in 2002
- 45-mil HPDE single liner
- Received over 270 million gallons of water since its installation
- Routine inspections



Shiprock evaporation pond, April 3, 2026

Future Pond Actions

- Planning and design work necessary for permanent closure
- Requires significant level of effort
- Interim stabilization efforts for several years
- Continue to communicate pond status with community



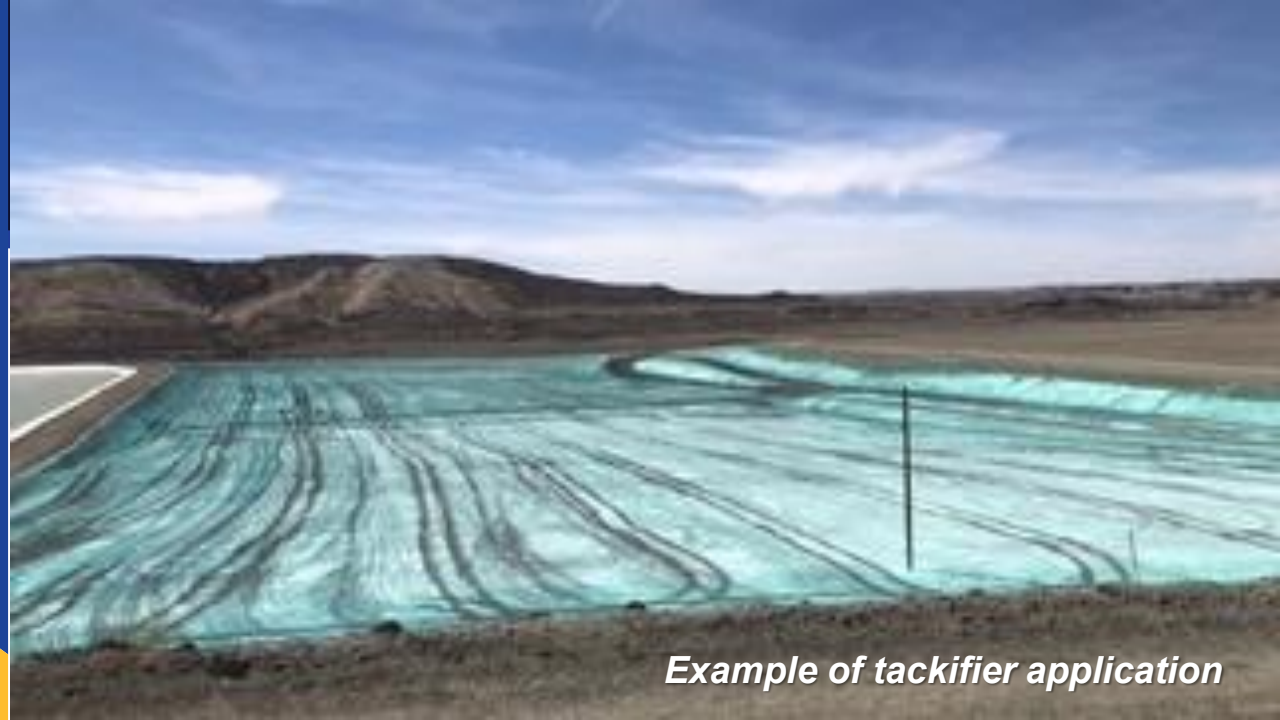
Shiprock evaporation pond, January, 2025

Interim Pond Stabilization

- Tackifier is an adhesive
- Tackifier is applied by spraying the compound to surfaces
- Proven effectiveness in other uses



Example of application process



Example of tackifier application

- Not harmful to the environment (nontoxic)
- The color is added to ensure coverage
- Reapplication every two years
- Interim state during closure planning

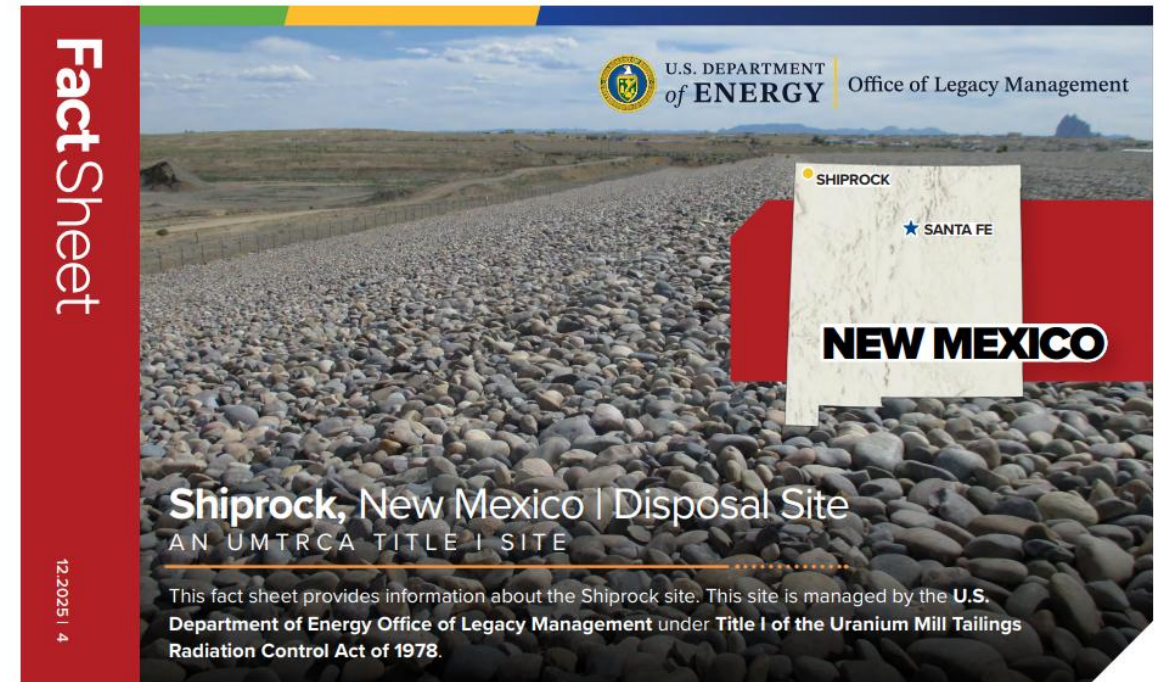


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Public Resources

- Hard copies available for links and resources
- LM website
- Navajo Resource List
- Shiprock disposal site webpage
 - Links to site-specific public documents
 - Site Fact Sheet
- Geospatial Environmental Mapping System



Shiprock fact sheet



Contact Information

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Joni Tallbull





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Questions?

Photo by Jory Vander Galien



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DOE LM | RADIATION EXPOSURE

COMMON ANNUAL EXPOSURES



Approx 21 mrem
from land



Approx 29 mrem
from internal



Approx 33 mrem
from space



Approx 228 mrem
from radon

Average daily dose in the U.S.
from naturally occurring radiation.

Full body exposure for any duration
past this level is harmful and potentially lethal.



DOE limit for
remediation of land
(Annual dose)



From all natural
sources
(Annual dose)



From all natural and
human-made sources
(Annual dose)



DOE radiation worker
dose limit
(Annual dose)

≤25
mrem

310
mrem

620
mrem

5,000
mrem

What is mrem?

The unit of **millirem (mrem)** is a measure of the dose or quantity of radiation energy that could be deposited in our bodies.



LM Sites

(No additional
radiation exposure
above the
region's natural
background.)



Dental
X-ray

(Dose per examination)



Chest
X-ray

(Dose per examination)



Flight
Crews

(Annual increase in
cosmic radiation due
to high altitude)



PET
Scan

(Dose per examination)



CT
Scan

(Dose per examination)



Acute radiation sickness

At 100,000 mrem you will begin feeling nauseous.



Lethal full
body dose



Cancer
radiotherapy
(Dose only at the treated region)

5,000,000
mrem

1,000,000
mrem

100,000
mrem

10,000
mrem

1,000
mrem

100
mrem

10
mrem

0
mrem

Graph is not to scale.

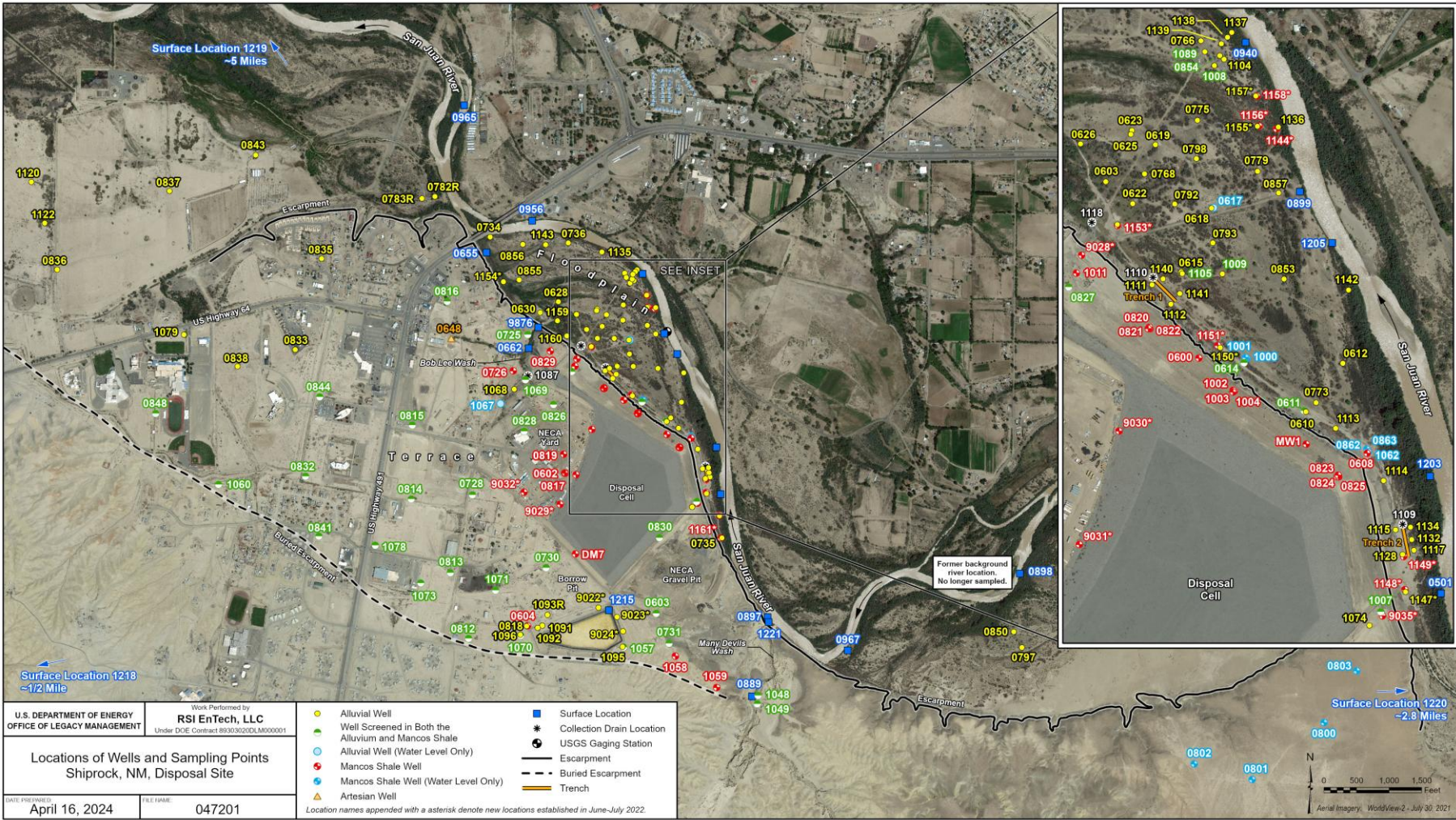
Did you know?

Radiation is around us, all the time, from natural and human-made sources. While radiation is always present, workers and visitors at Legacy Management sites aren't exposed to any measurable radiation above natural background levels.

www.youtube.com/watch?v=FrVUJ2c_Rwc

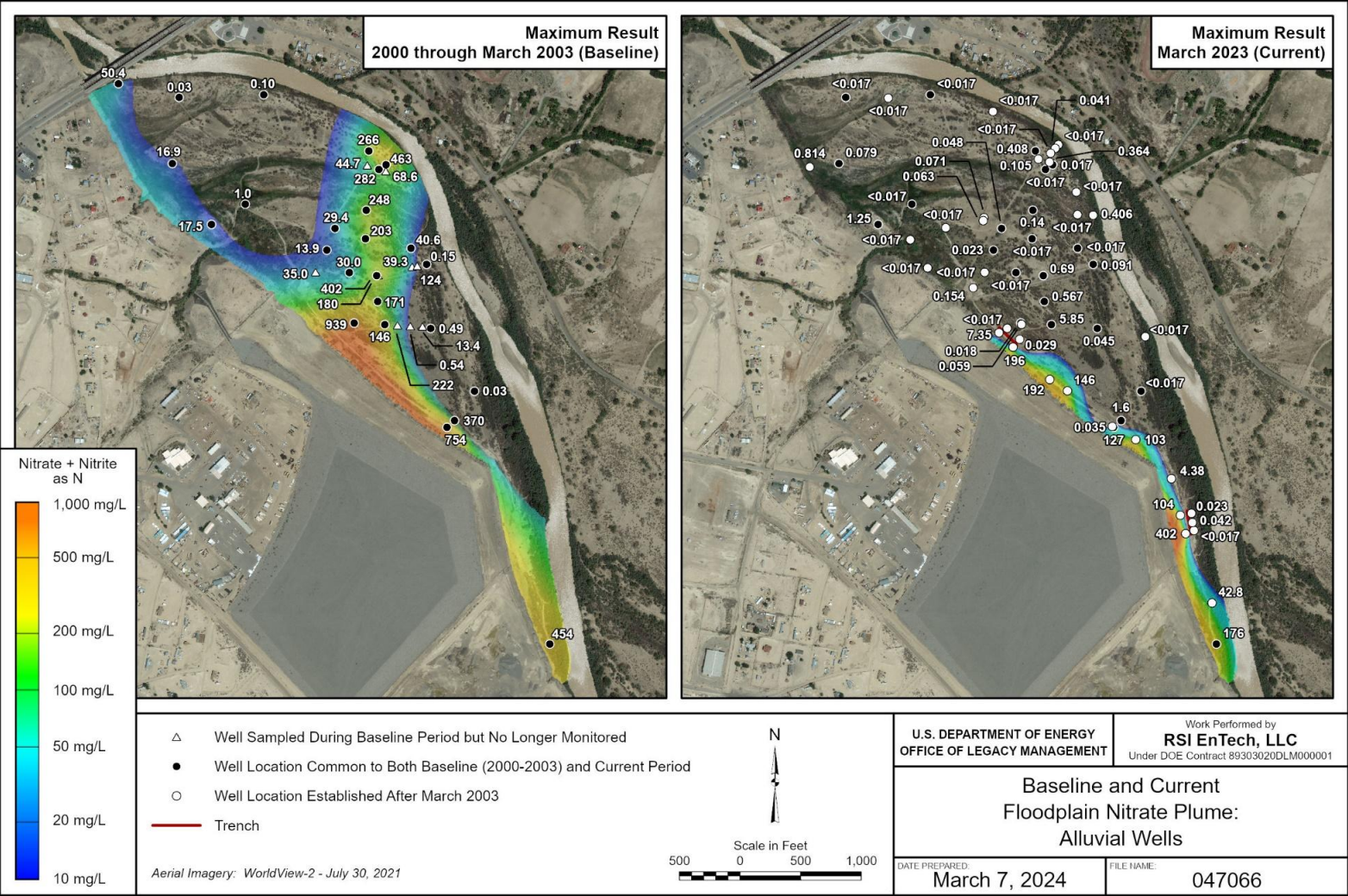


Site Groundwater Monitoring Well Network



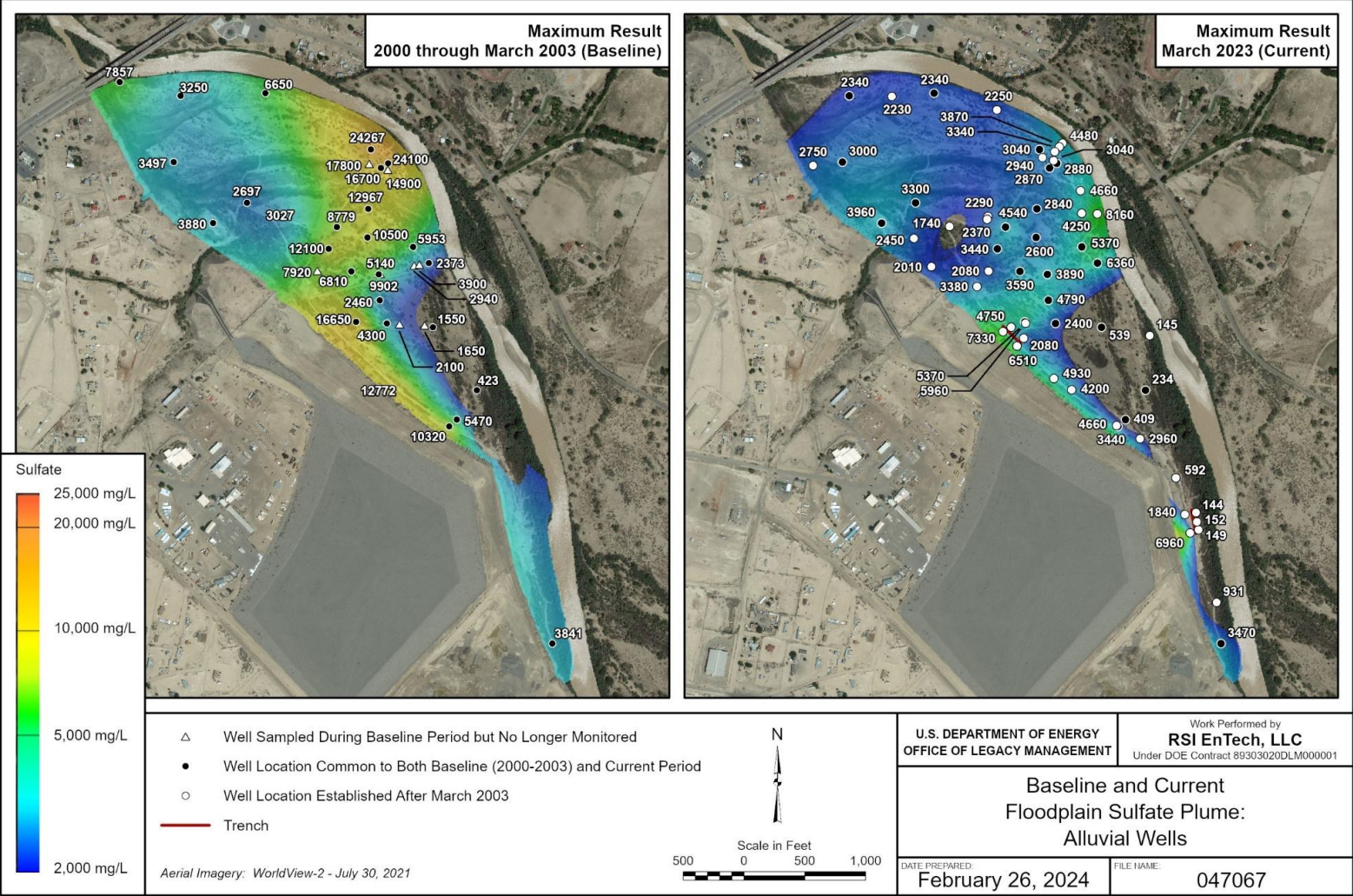
Site Groundwater Remediation Progress: Nitrate

Uranium cleanup
standard =
10 mg/L



Site Groundwater Remediation Progress: Sulfate

Sulfate cleanup
standard =
2000 mg/L



Site Groundwater Monitoring

Search by analyte

Search by site

Collapse

Attributes Table

Find a Site

Sampling Data

Analysis (Beta)

Related Layers

Inspection Photos

Well Logs

Settings

LM Sites

Site Name

Name Mnemonic

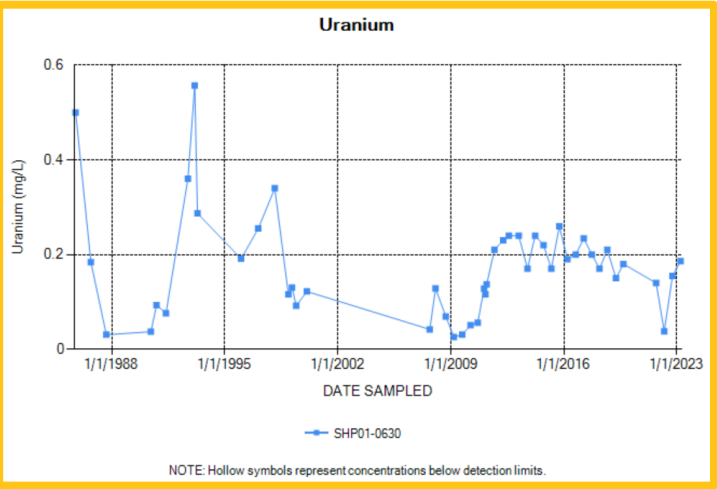
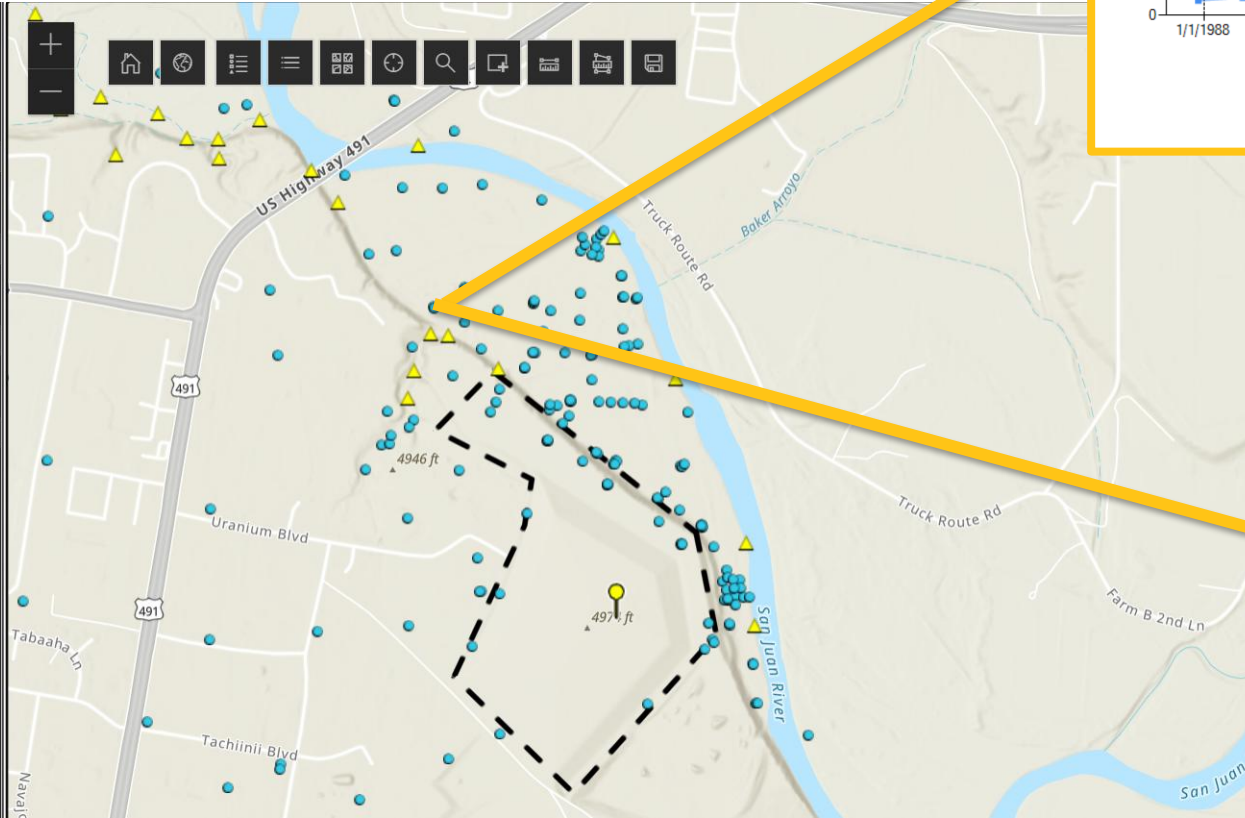
SHP

Regulatory Driver

State Code

Sampling Data

Reset Filters



PROJECT

LOCATION

SITE

DRILLING METHOD

DRILL COMPANY

RG TYPE

SURVEY

ULTRA GROUND WATER

SHIPROCK, NM

Shiprock Disposal Site (Floodplain)

ROTARY MUD

ICC

GARDNER-DENVER

MILLAT, JON, NVO

WELL NUMBER

NORTH COORDINATE

EAST COORDINATE

HOLE DEPTH (FT BGS)

WELL DEPTH (FT BGS)

WATER LEVEL (FT BGS)

WATER LEVEL DATE

SHP01-0630

36.7774202

-106.6866976

13.00

12.00

2.8

10/4/1985

DATE STARTED

WELL ESTABLISHED

SURFACE ELEV (FT)

TOP OF CASING (FT)

MEAS. PT. ELEV. (FT)

SLOT SIZE (IN)

BIT SIZE (IN)

9/9/1985

9/9/1985

4890.26

4890.31

4890.34

0.050

8.75

WELL INSTALLATION

INTERVAL (FT BGS)

DRILLER

LOGGED BY

SAMPLING METHOD

DATE DEVELOPED

BLANK CASING: 4 in. dia. PVC Sch 40 -0.08 to 5.0

WELL SCREEN: 4 in. dia. Machine Slotted PVC 3.0 to 10.0

SUMPRIND CAP: 4 in. dia. PVC Sch 40 10.0 to 12.0

SEAL: Bentonite Pellets 2.0 to 3.5

UPPER PACK: Bentonite Pellets 2.0 to 3.5

LOWER PACK: 8-12 Silica Sand 3.5 to 12.0

R. Crockett

30/4/1985

DEPTH (FEET)

BLOW COUNTS

SAMPLE TYPE

EXTENT

WELL DIAGRAM

LOG

LITHOLOGIC DESCRIPTION

0-10 ft. SAND (SP), little to some silt, fine to medium, occasional gravel, nonplastic, light brown.

10-13 ft. SANDY GRAVEL (SP), with cobbles, poorly graded, occasional boulder size, subrounded, nonplastic, brown to gray.

13-15 ft. MANCOS SHALE, soft, gray.

Total Depth 15.0 ft.

RSI

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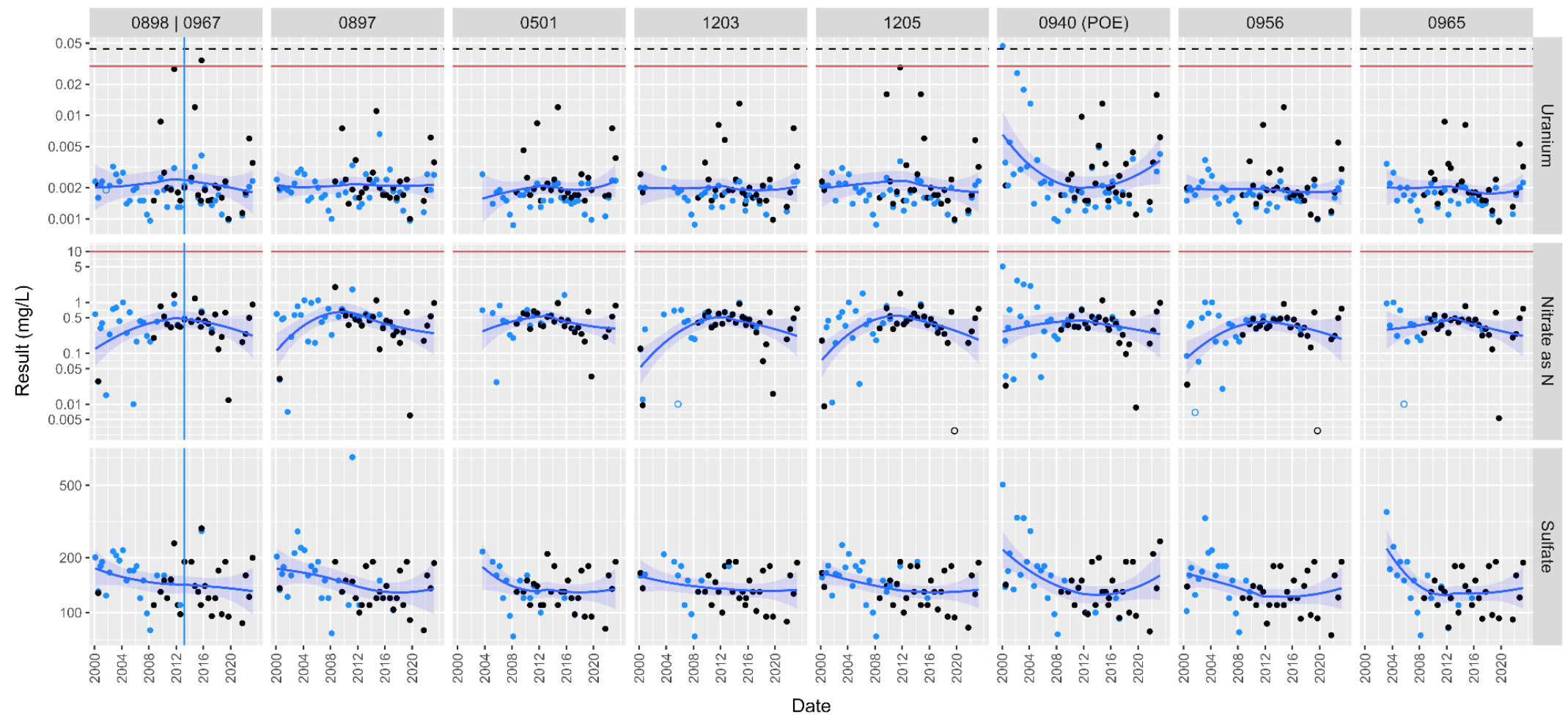
GRAND JUNCTION, COLORADO

PAGE 1 OF 1



River Monitoring

Upstream



Downstream



Site Groundwater Remediation

Primary Contaminants of Concern

Analyte	Standard or Goal (mg/L)
Nitrate (as N)	10
Sulfate	2000
Uranium	0.044

Secondary Contaminants of Concern

Analyte	Standard or Goal (mg/L)
Ammonia (as N)	n/a
Manganese	2.74
Selenium	0.05
Strontium	n/a

Water Treatment Unit Infrastructure

- Modular evaporation ponds
 - Two ponds
 - Modular — easier to remove
 - Segmented — ponds can be isolated for maintenance or repairs
 - Double lined
 - Leak detection built in
 - Smaller footprint inside site boundary

Shiprock modular evaporation ponds

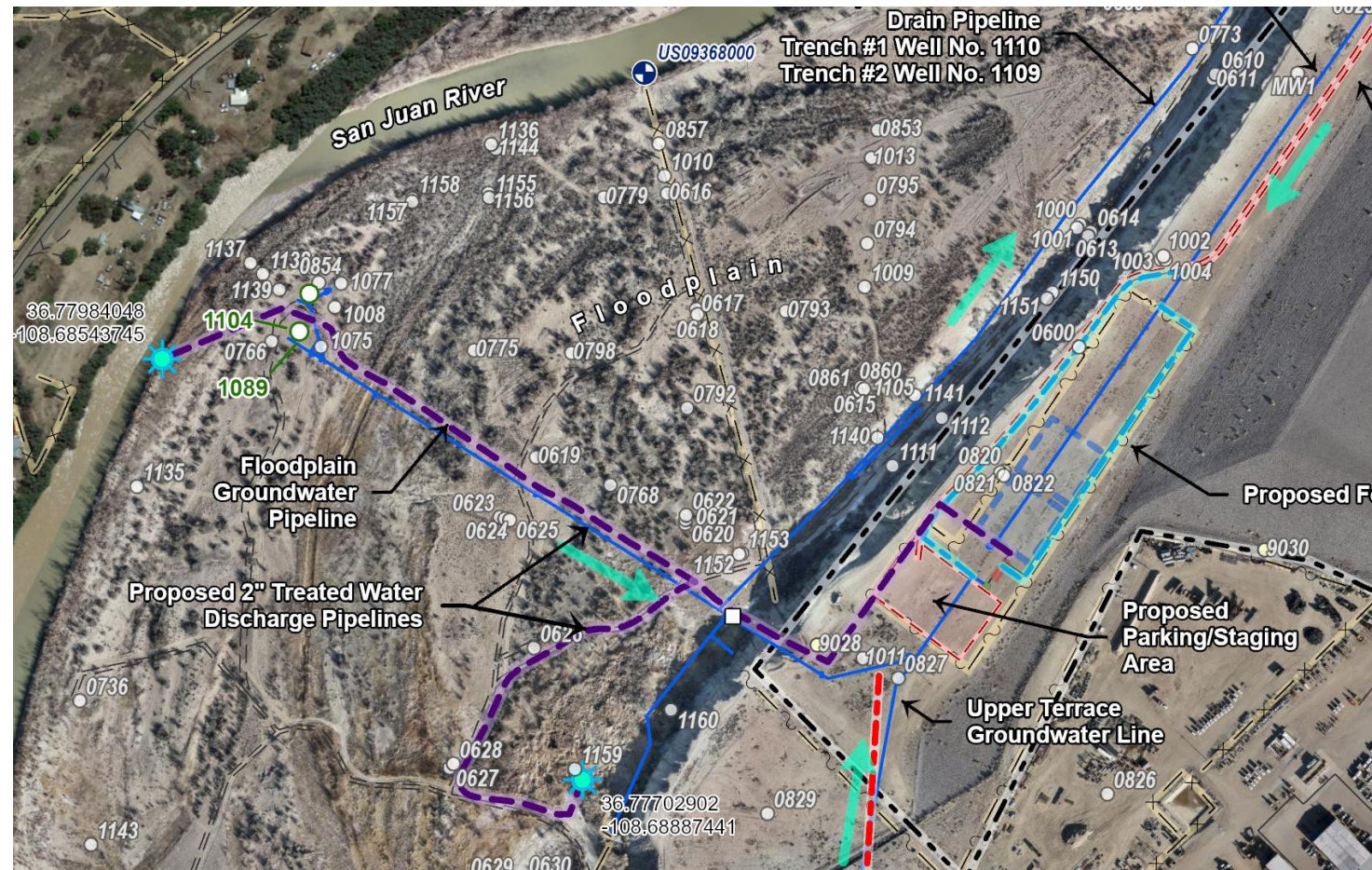


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Water Treatment Unit Infrastructure

- New discharge lines
 - Purple dashed lines = new discharge lines
 - Blue points = discharge points
 - Two discharge points
 - San Juan River (primary)
 - Wetlands on floodplain (secondary)



Shiprock infrastructure map — discharge lines



Environmental Compliance

- Clean Water Act
 - NPDES Individual Discharge Permit
 - Section 401 Certification — NN EPA (2024)
 - Permit to discharge treated water to San Juan River or wetlands
 - Permit defines effluent limits and sampling and reporting requirements
 - NPDES Construction General Permit
 - Regulates stormwater discharge
 - Includes project requirements (such as stormwater plan, notice requirements, inspections)
 - Section 404 Nationwide Permit
 - Section 401 Certification — NN EPA
 - Section 404 regulates discharges of dredge and fill material into WOTUS
 - Section 404 NWP required for construction of outfall structures
- Navajo Nation Water Code
 - Water Use Permits
 - Water required for fugitive dust control and compaction purposes
 - Water will be sourced from two locations



Environmental Compliance *(continued)*

- U.S. Fish and Wildlife (2019 and 2023)
 - Project may affect, but not likely to adversely affect considered species
 - River depletions reduced after transition to WTU (only brine depletion, ~11.29 acre-ft/year)
- NN Fish and Wildlife (2023)
 - Cactus habitat survey — no habitat in area of potential effect
- Floodplain and Wetland Assessment (2024)
 - 10 CFR 1022; public announcement of floodplain action and statement of findings
- Section 106 (2025)
 - Consult with THPO; no objections to work within area of potential effect



Mesa Verde cactus (source: Wikipedia)