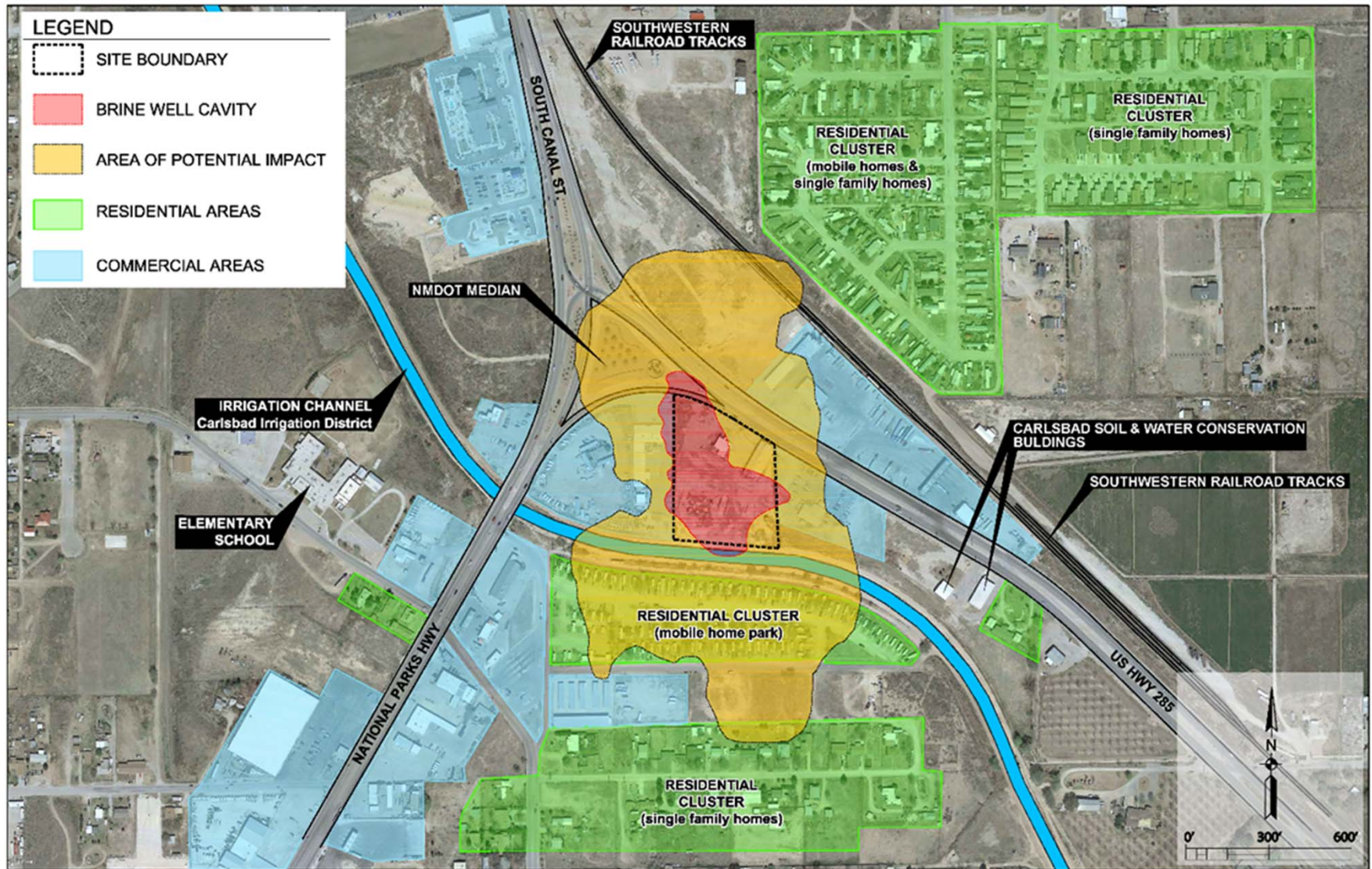


Carlsbad Brine Well Remediation Project Update

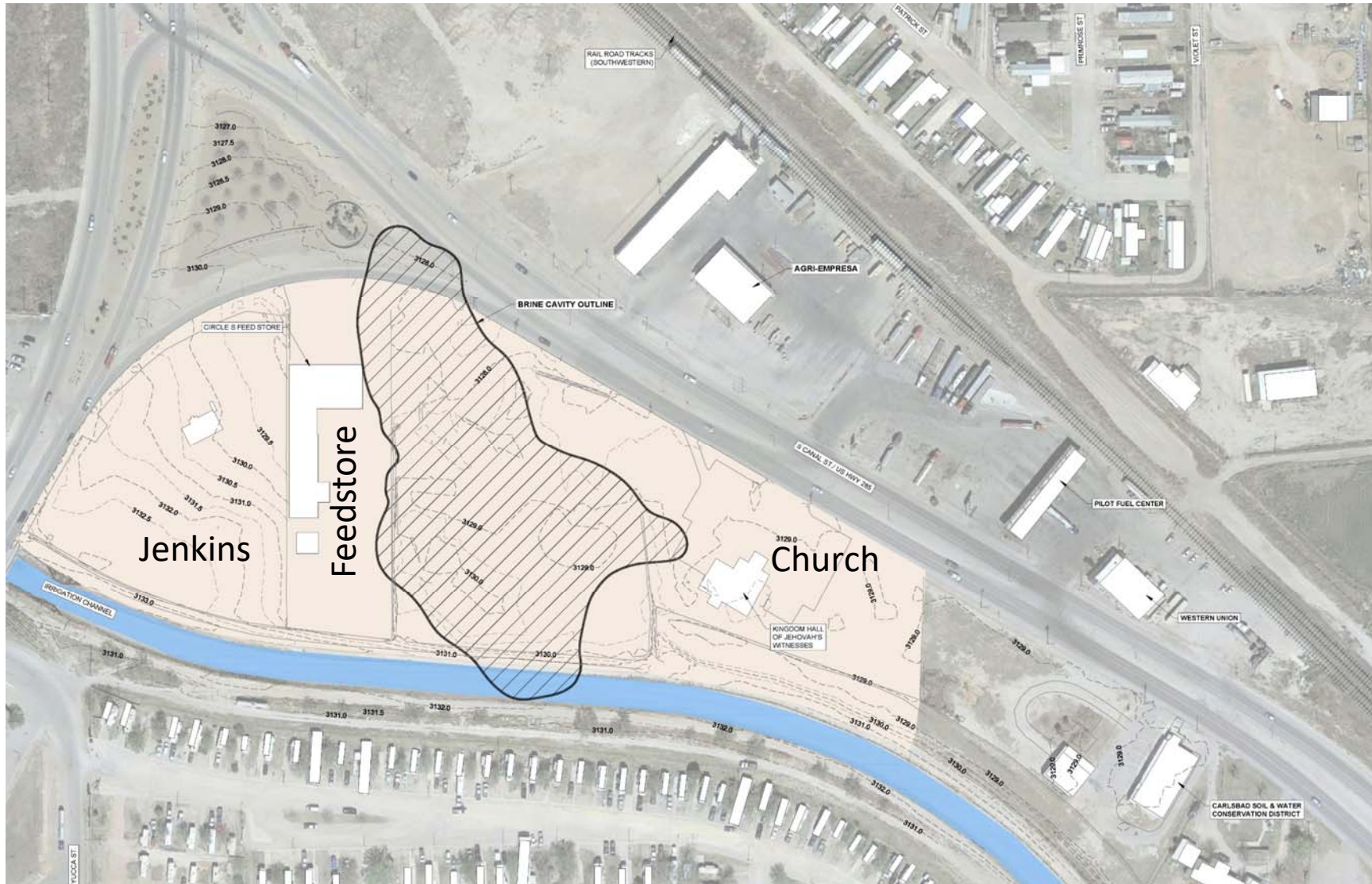
Radioactive & Hazardous Materials Committee

October 21, 2020

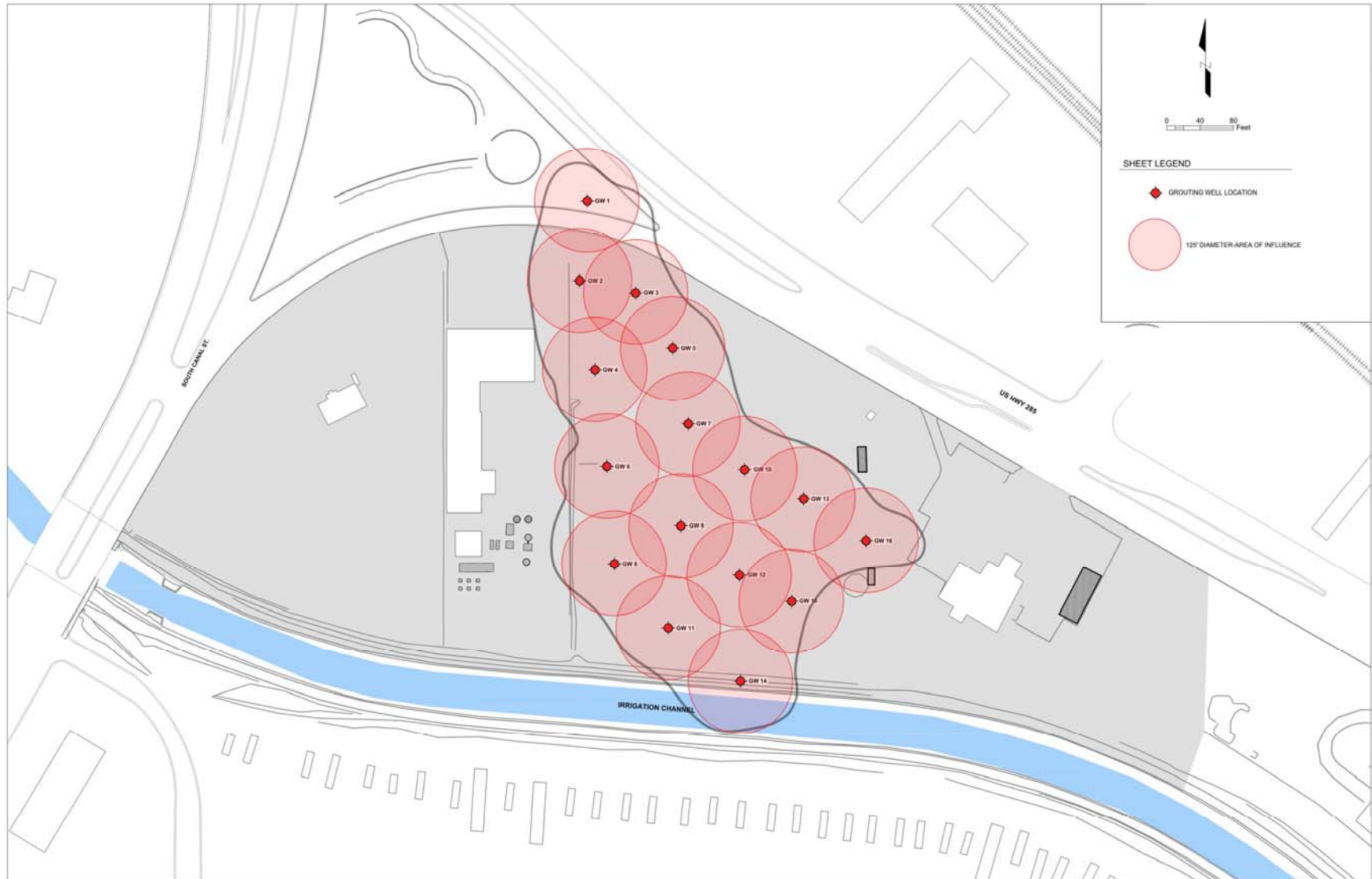
I&W Brine Cavern in Carlsbad



Project Layout



Grout Well Installation



Drilling & Grouting Program



Drilling & Grouting Program



Project Status (1 of 4)

Began stabilization effort one year ago. We have learned as much about the situation underground in the last year as in the decade before it.

The southern portions of the cavern have been successfully stabilized. The canal, the trailer park, and the church are no longer at risk.

As drilling advanced north in December 2019, a large void was encountered that was created by significant cavern failure likely occurring more than 20 years ago. This void extends beneath US 285.

As a result, the backfilling material was changed from grout to sand in the void area. This is more cost-effective while providing equal structural stability.

Infiltration of injected sand into cracks within a rubble pile at the bottom of the cavern which was formed as it failed, has impeded progress.

Project Status (continued, 2 of 4)

Due to impending budgetary constraints, sand injection into the void was suspended and demobilization began on July 24th with 100,563 cubic yards of sand introduced since January.

Demobilization:

- Drilling and injection subcontractors have left the site.
- 11 months of field work with no lost time injuries.
- Master valves on all wells secured
- Wells will be temporarily abandoned.
- Site fencing and traffic control remain.
- Electrical and internet hookups remain.
- Site inspections made every other week with maintenance as needed.
- Bi-weekly updates to Carlsbad police and fire departments.

The automated monitoring system remains in operation.

No unusual ground movement or changes in cavern pressure.

If cavern pressure declines substantially, brine will be transported to the site and injected into the cavern.

Project Status (continued, 3 of 4)

Sonar logging of the void was completed on July 30th. The remaining volume was measured as 59,847 cubic yards with the top of the void at a depth of 338 feet beneath surface. This compares to a void volume of 98,689 cubic yards in January.

The sonar indicates that while there is still a portion of the void which remains under US 285, the lower portion under the highway has been backfilled.

Comparison of the void volumes measured in January, May, and July indicate the percentage of injected sand infiltrating into the rubble is decreasing as expected.

The settlement of sand in the void appears to occur at a predictable rate.

The observed angle of repose (29°) of the sandpiles created will become a limiting factor in filling the entire void.

Project Status (continued, 4 of 4)

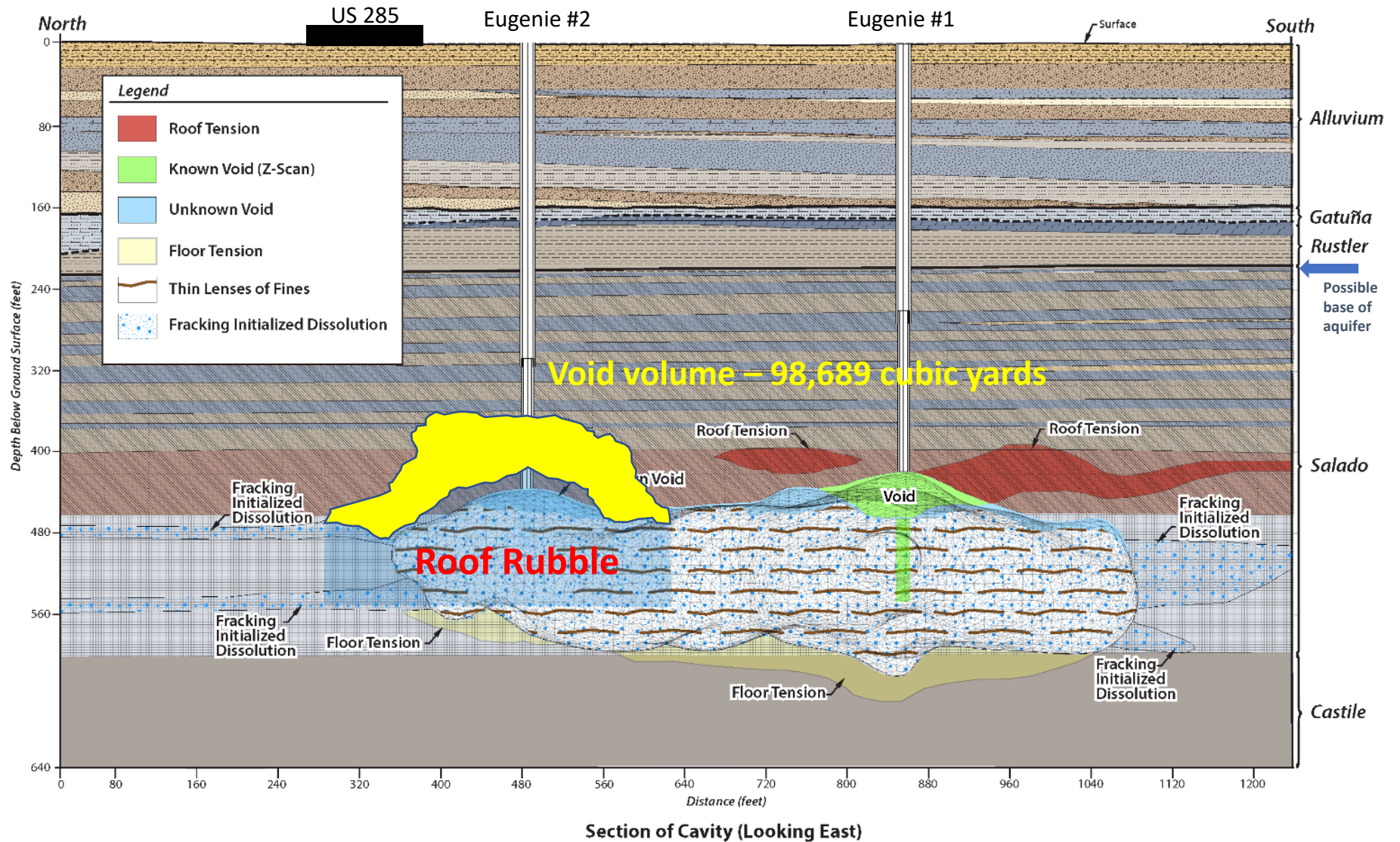
Wood's overall analysis is that the actions accomplished to date are sufficient to prevent a sinkhole from being created at the surface.

However, the continuing failure of the roof of the void still poses a risk to groundwater in the area.

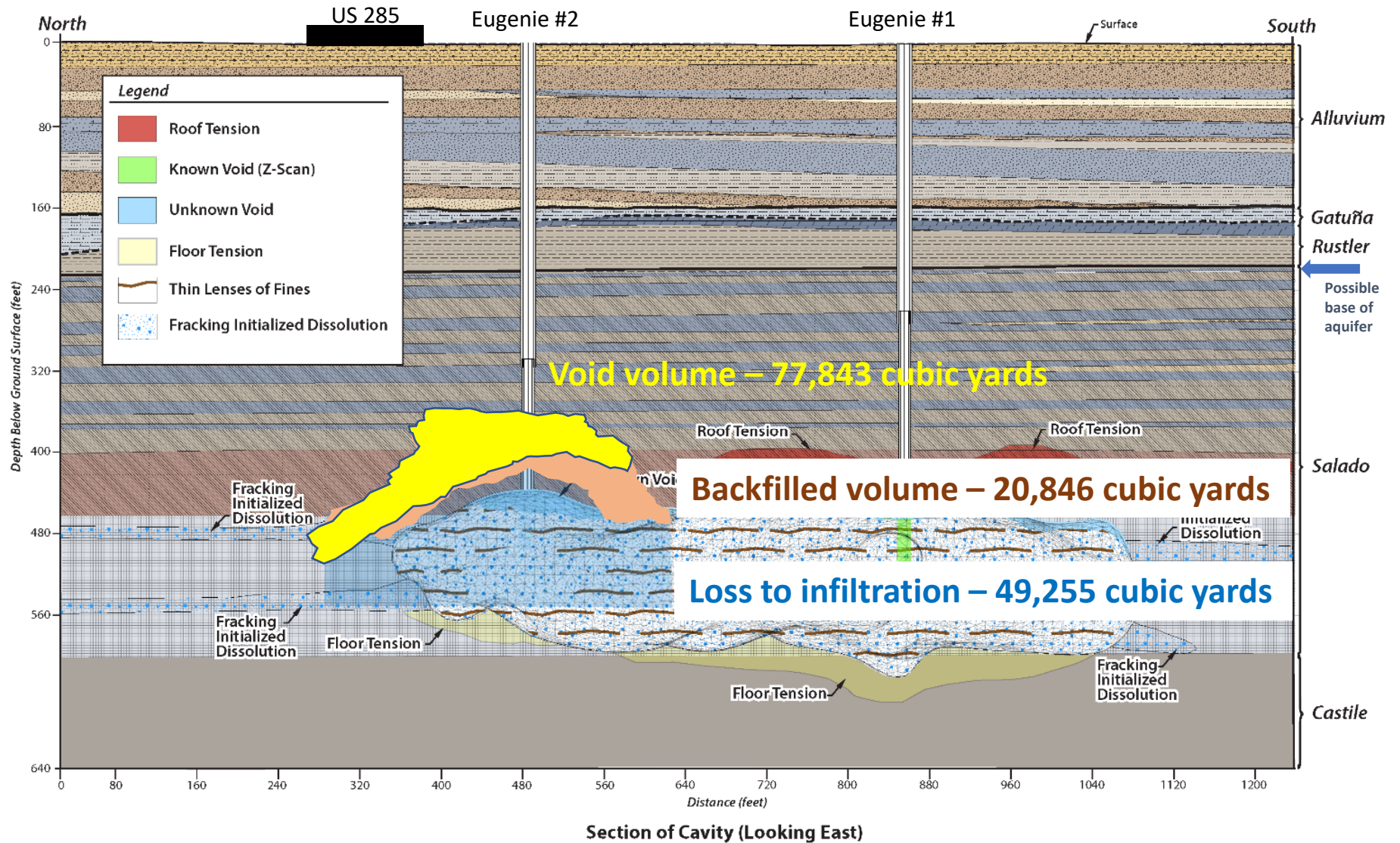
Due to the risk to groundwater, EMNRD's expert review panel recommends additional backfilling of the void.

Efforts are underway to establish concurrence about possible risk acceptance with the OSE, NMED, and NMDoT.

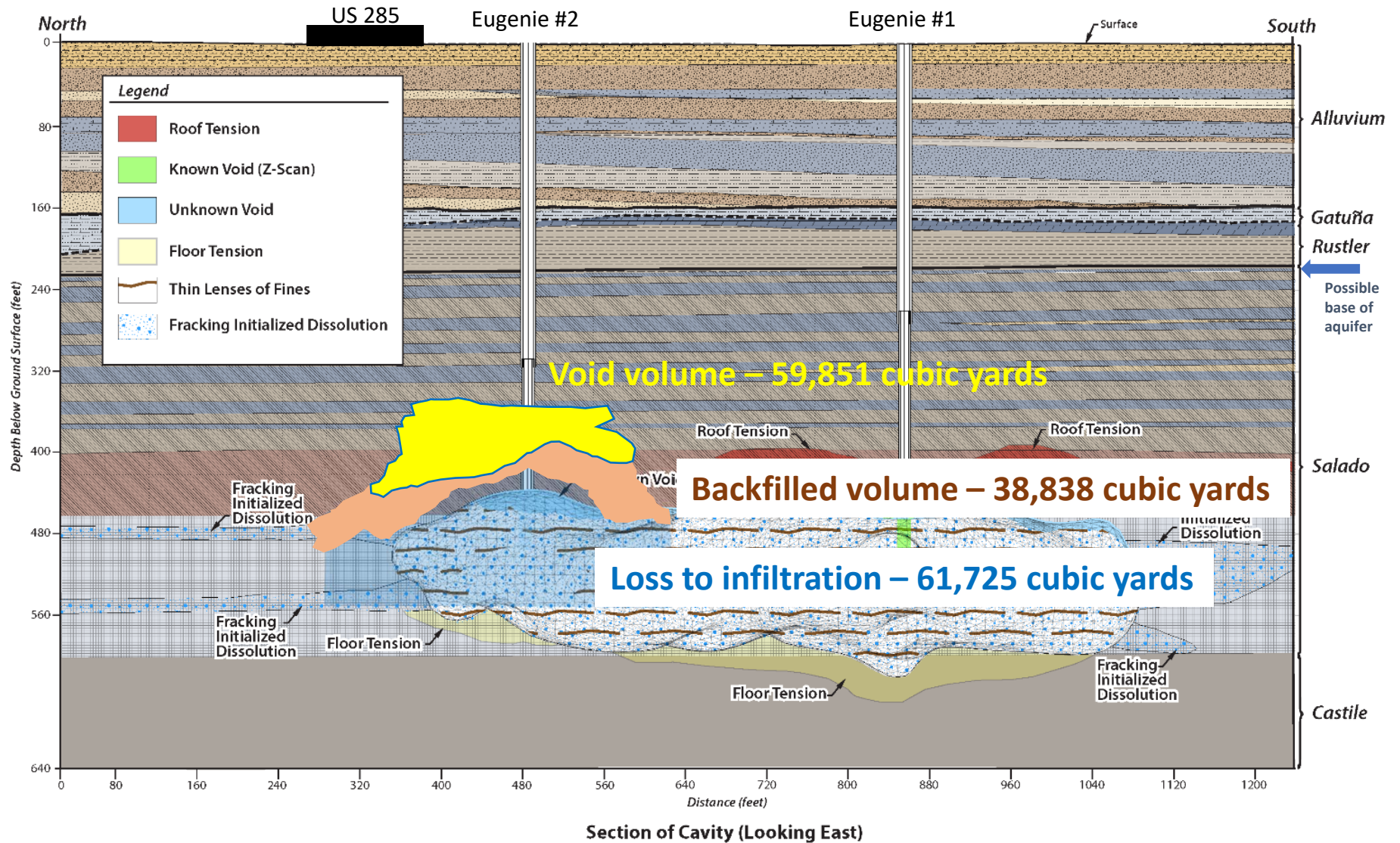
Sonar log of 2/5/20

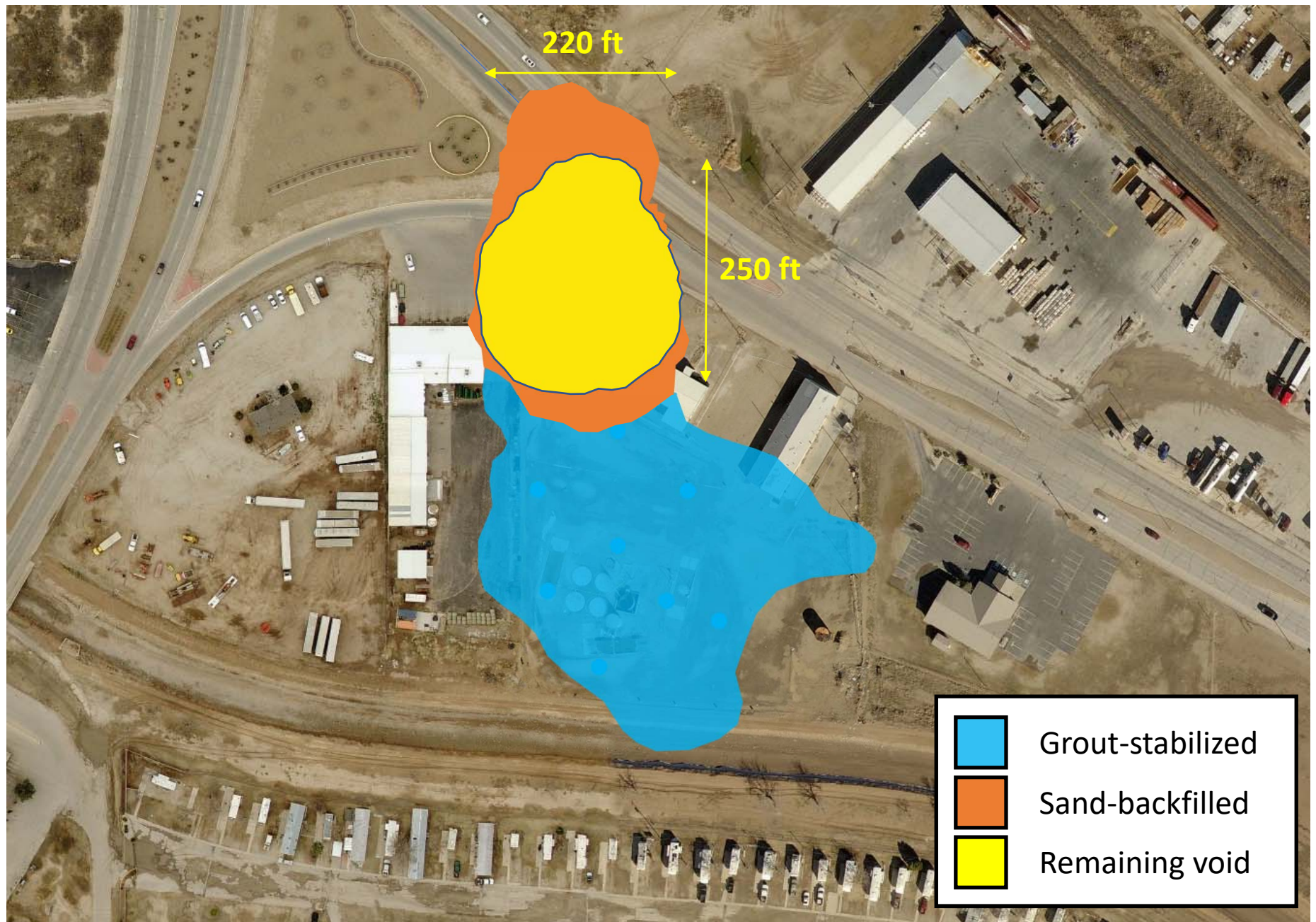


Sonar log of 5/29/20 (after injecting 70,101 cubic yards of sand)



Sonar log of 7/30/20 (after injecting 100,563 cubic yards of sand)





Factors Affecting Future Injection Volume

Wood was tasked with estimating the volume of additional sand that might be needed along with a cost to complete the project.

Remaining void volume measured by sonar	59,900 yds ³
Accuracy of sonar survey (+9%)	+ 5,400 yds ³
Air gap at top of void	+ 2,400 yds ³
Future infiltration into rubble (50% of unaccounted volume)	+ 13,500 yds ³
Sand settlement	+ 1,800 yds ³
Contingency (20%)	+ 16,600 yds ³
Void which cannot be cost-effectively filled	<u>- 23,100 yds³</u>
Estimate of sand needed	76,500 yds³

Brine Well Remediation Fund

Appropriations and Contributions	\$54,098,000
Expenditures thru 8/28/20* <i>(incl. NMGRT)</i>	- \$49,283,267
<u>Estimated Costs thru 8/1/21 <i>(incl. NMGRT)</i></u>	<u>- \$1,317,069</u>
Unobligated Fund Balance	\$3,497,664

*Spreadsheet of all project expenditures provided separately

Estimated Cost

Assuming **76,500 yds³** and a sand injection rate of **800 yds³/day**

No.	Description	Estimated Cost
1	Monitoring System Operations	\$213,746
2	Traffic Control	\$31,378
3	Public Outreach	\$29,067
4	Wood 80% Bond	\$210,796
5	PM/ADMIN & Construction Management	\$3,830,689
6	Sand Slurry Support work	\$1,989,923
7	Plug and Abandon Wells	\$290,900
8	Sand Slurry Deployment	\$7,981,765
9	Sand Material and Delivery & Brine Disposal	\$4,543,201
10	Three Sonar Surveys	\$271,200
11	Wood Mobilization	\$98,769
12	Wood Demobilization	\$182,483
13	Monitoring System Operation for 2 Years after Construction Phase	\$817,690
14	Site Restoration for each of the six involved properties (Church, I&W, Feedstore, Jenkins Property and NMDOT right of way) as below	
14.1	A) Church – Remove Road, Place Topsoil, Re-vegetate, Replace Fencing and Pavement Repair	\$26,620
14.2	B) I&W – Backfill & Compact Ponds and around abandoned Wellheads	\$90,750
14.3	C) Jenkins – Place and Grade Gravel, Replace Damaged Septic Tank	\$60,500
14.4	D) Feed Store – Remove Fencing and Repair Asphalt Paving	\$30,250
14.5	E) NMDOT – Pavement Repair Following Well Cut-offs	\$24,200
14.6	F) CID Right of Way – Demolition Fencing and Reconstruct Canal Berm	\$102,850
15	Final Construction Report and Administrative Closeout of Phase 2	\$66,939
16	Site Maintenance, Site Services, Site Utilities and Equipment Rental	\$151,398
	Subtotal	\$21,045,114
17	OCD 10% Contingency	\$2,104,511
	Total Cost	\$23,149,626
18	NMGRT	\$1,823,033
	Grand Total	\$24,972,659

Possible Cost Reductions

Item	Possible Savings
Bonding Requirements	\$210,796
Plugging & Abandonment of Wells	\$290,900
Reduction in the Number of Sonar Surveys	\$90,400
Post-Backfill Monitoring	\$817,690
10% Budget Contingency	\$2,104,511
<u>NMGRT on Items Above</u>	<u>\$276,752</u>
	Total \$3,791,049

Funding Needed

Wood Cost Estimate	\$24,972,659
Possible Cost Reductions	- \$3,791,049
<u>Unobligated Remediation Fund Balance</u>	<u>- \$3,497,664</u>
	Additional Funds Needed \$17,683,946

Other Cost Considerations

Property Access

<u>Item</u>	<u>Renewal Date</u>	<u>Monthly Cost</u>
Jehovah's Witnesses Church	8/30/21	\$7,700
Jenkins Property	8/30/21	\$4,000
Feedstore	5/14/22	\$13,100

Reduction of estimated infiltration volume

Reduction of volume percentage contingency

COVID Restrictions