

PUBLIC INFORMATION MEETING

Mammoth Mill Site Cabin Area CERCLA Investigation Status Update

**Inyo National Forest
Summit Ranger District
Mammoth Lakes, CA**

November 16, 2019

Noelle Graham-Wakoski, P.E.
On-Scene Coordinator
USDA Forest Service, Pacific Southwest Region



PRESENTATION OUTLINE

- CERCLA OVERVIEW
- MAMMOTH STAMP MILL HISTORY
- PREVIOUS MAMMOTH SITE INVESTIGATIONS
- TIME CRITICAL REMOVAL ACTION MEMORANDUM
- CABIN AREA BOUNDARY DELINEATION
- HUMAN HEALTH RISK ASSESSMENT
- FOCUSED HUMAN HEALTH RISK ANALYSIS
- 2018 EXPANDED CABIN AREA SITE INVESTIGATION EFFORTS
- RESPONSE ACTION ALTERNATIVES ANALYSIS
- RECOMMENDED ALTERNATIVE
- MOVING FORWARD



CERCLA OVERVIEW

Terminology and Process



CERCLA

**COMPREHENSIVE ENVIRONMENTAL RESPONSE,
COMPENSATION, AND LIABILITY ACT OF 1980**

AKA “SUPERFUND”



LEAD AGENCY AUTHORITY

The **Forest Service** has Lead Agency Authority under CERCLA and is responsible for conducting site investigations and selecting clean up actions for hazardous waste sites on National Forest System lands.



RELEASE OF HAZARDOUS SUBSTANCES

A **Response Action** (ie. a **Removal Action under CERCLA**) is triggered by a release or threat of release of a hazardous substance to the environment which may present an imminent and substantial danger to the public health. A release may follow a pathway through surface water, groundwater air, and/or soil. Targets of releases include people and/or the environment.



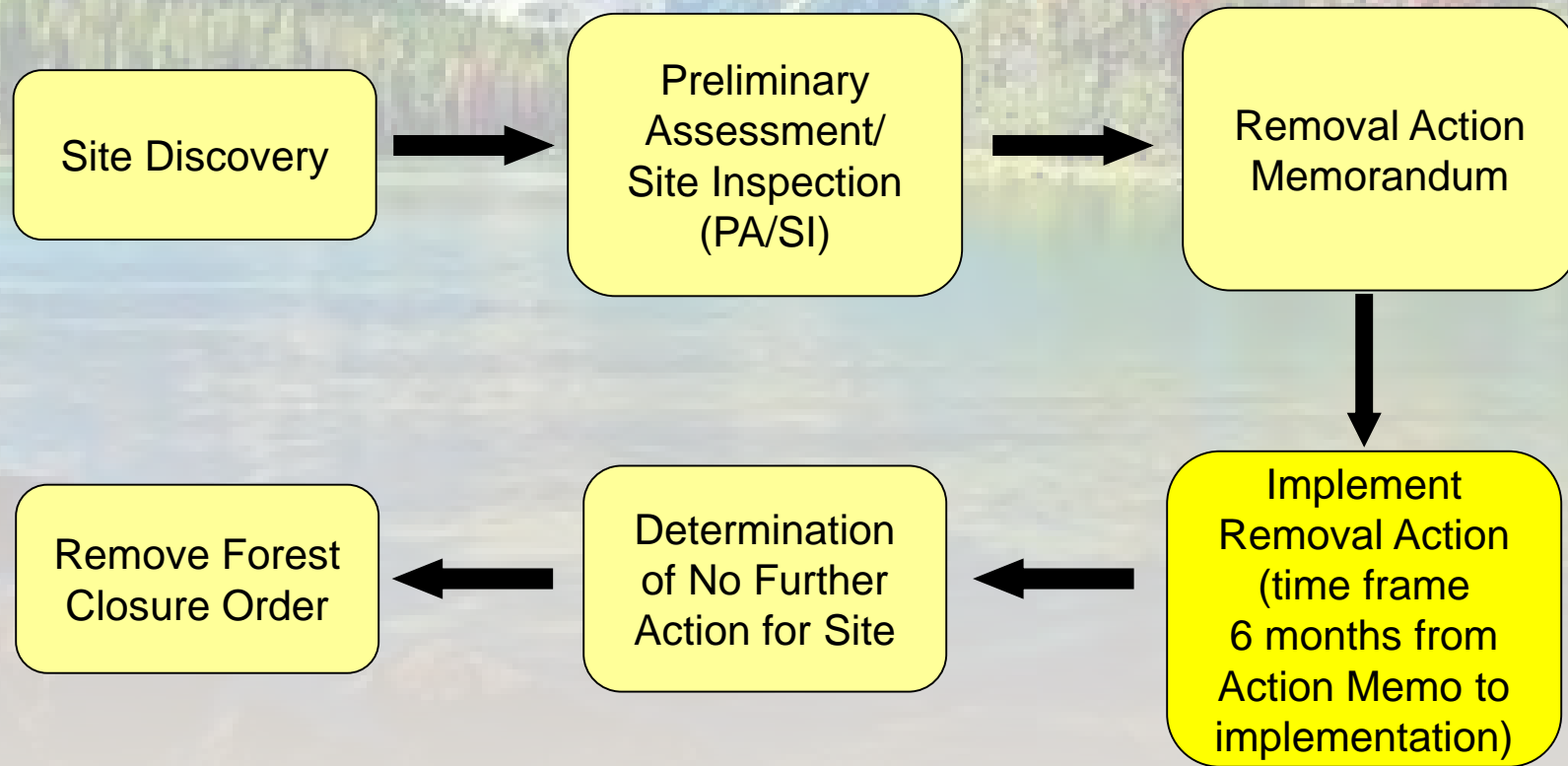
Mammoth: Pathway is soil and Target is humans.

CERCLA RESPONSE OPTIONS

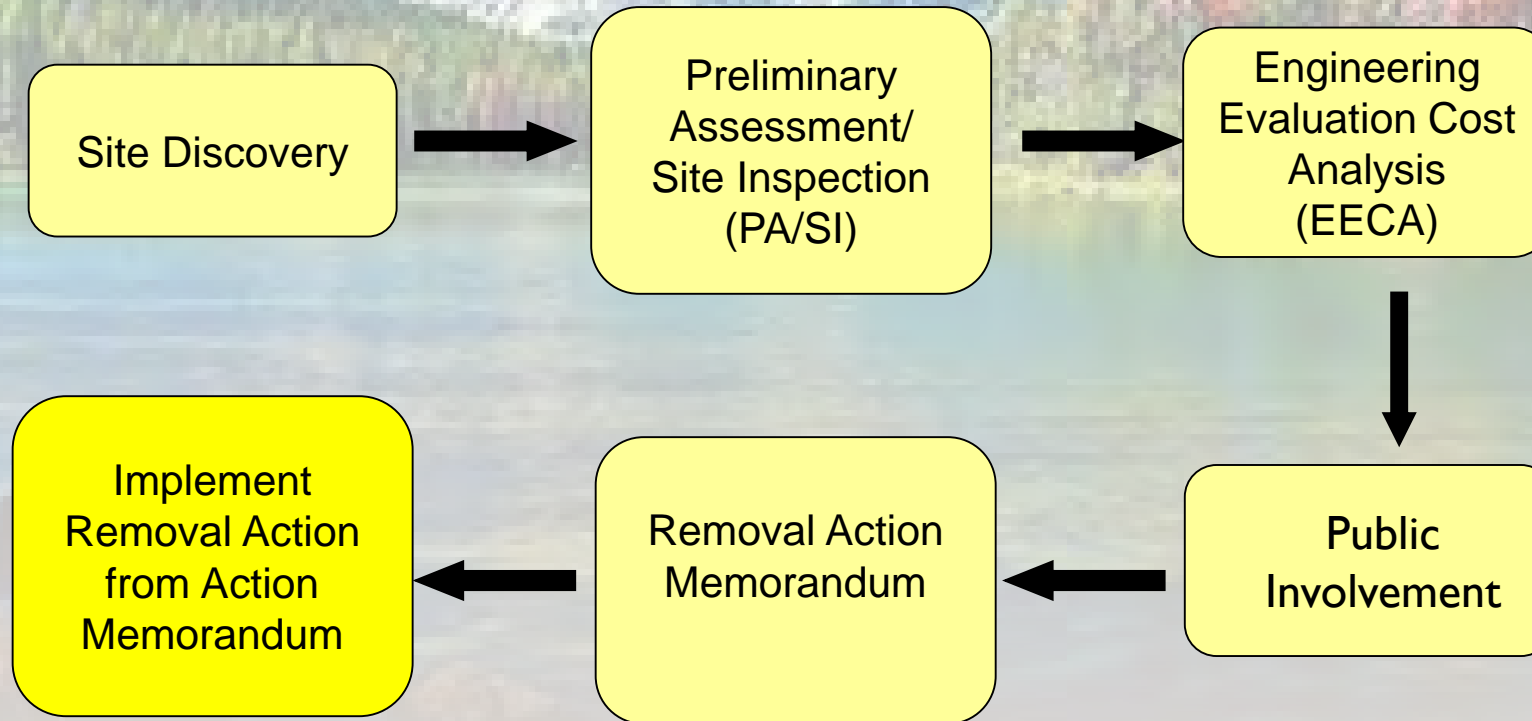
- Emergency Response Action – Emergency Cleanup with rapid spread (EPA and Coast Guard)
- Removal Action
 - Time Critical – Higher risk, Cleanup initiated within short timeframe and completed within 1-2 years.
 - Non-Time Critical – Lower risk, Longer cleanup duration and has additional investigative landmarks (PA/SI, EECA, PRP Search, Public Involvement, RAM) and completed within 3-6 years.
- Remedial Action – Large complicated sites with persistent contamination. Long-term process.



TIME CRITICAL REMOVAL ACTION PROCESS



NON-TIME CRITICAL REMOVAL ACTION PROCESS



MAMMOTH STAMP MILL HISTORY



Historical Photo of Stamp Mill & Flywheel
Photo provided by Mammoth Museum



MAMMOTH STAMP MILL HISTORY



**Recent photo of Stamp Mill
Flywheel facing west**



- Mercury used to separate gold from ore that had been crushed.
- Ore particles were suspended in water and mercury was added and passed over a corrugated surface.
- Gold and mercury would amalgamate to form a paste and upon heating would evaporate to recovery mercury and leave gold behind.
- Tailings remained following this process and were allowed to dry and deposited near mill site.
- Mercury not recovered or reused during processing is present in high concentrations in tailing materials.

PREVIOUS MAMMOTH SITE INVESTIGATIONS

Date	Investigative Report Title	Scope and Findings
January 2014	Removal Preliminary Assessment	Sampling focus on the Mill Site itself and on the main mill tailings and waste rock. Investigation found elevated arsenic, lead and mercury in immediate Mill area
April 2014	Upper Owens River Water Quality Project – Final Technical Report	Cal Trout discovered elevated concentrations of metals (including mercury) in the unnamed tributary to Mammoth Creek near Mammoth Mill
April 2015	Technical Memorandum for PA/SI at Mammoth Mill	Presented initial findings of PA/SI investigation for the purpose of identifying if additional sampling is needed for the PA/SI report. As part of the initial PA/SI investigation, USFS contractor collected soil, sediment and surface water samples.
November 2016	Final PA/SI Report for Mammoth Mining Company Stamp Mill Site	USFS contractor site recon of mill area, waste piles and some downgradient areas south of Cabin 7. HHRA and additional sampling to establish background levels.



PREVIOUS MAMMOTH SITE INVESTIGATIONS

Date	Investigative Report Title	Scope and Findings
January 2017	Technical Memorandum for Refinement of Streamlined HHRA, Mammoth Mining Company Stamp Mill Site	Adjusted assumptions made in original risk evaluation to assess risks to human health. Cabin occupation timeframes increased and updated toxicity criteria
April 2017	Time Critical Removal Action Memorandum	Selected response action to address human health risks was excavation and offsite disposal of approximately 9,554 cy of contaminated material from the mill site and Cabins Area (based on initial characterization data, Cabin Area was initially limited to approximately 3 acres in size).
January 2018	Focused Site Inspection for the Cabins Area	USFS contractor performed sampling in 2017 to further delineate outer boundaries/extent of contamination in the Cabin Area. Sampling found wider spread contamination than previous known and recommended further soil sampling.

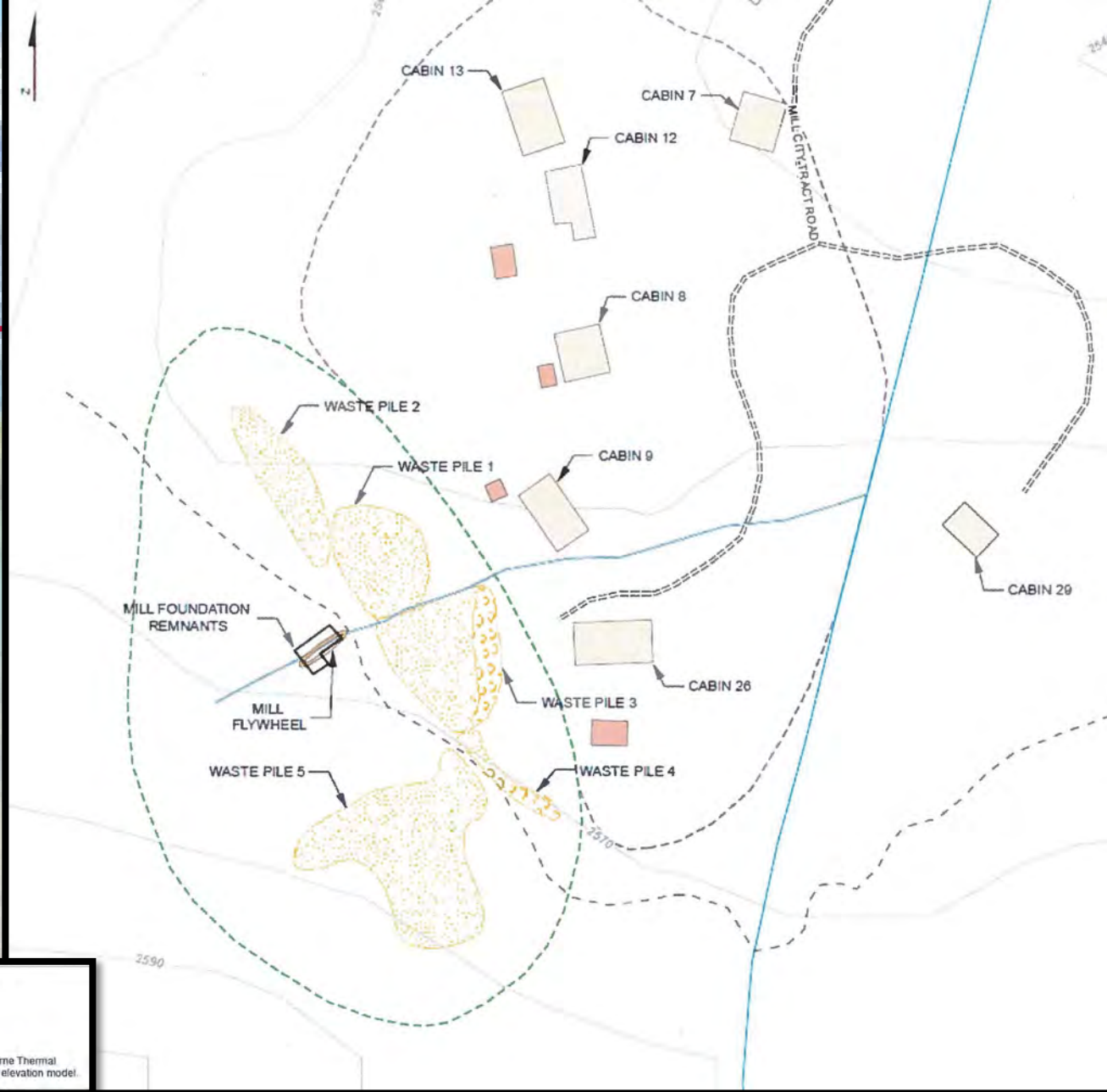
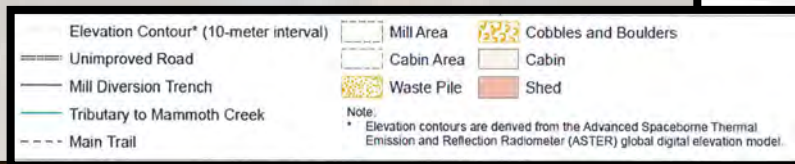


TIME CRITICAL REMOVAL ACTION (TCRA) MEMORANDUM

- April 14, 2017 Time Critical Removal Action Memorandum signed.
- Selected response action to address the release of hazardous substances from the historic mill operations was excavation and offsite disposal of approximately 9,554 cy of contaminated material from the Mill Site Area and the Cabins Area .
- If contamination is not addressed, it will continue to present an imminent and substantial endangerment to public health, welfare or the environment.

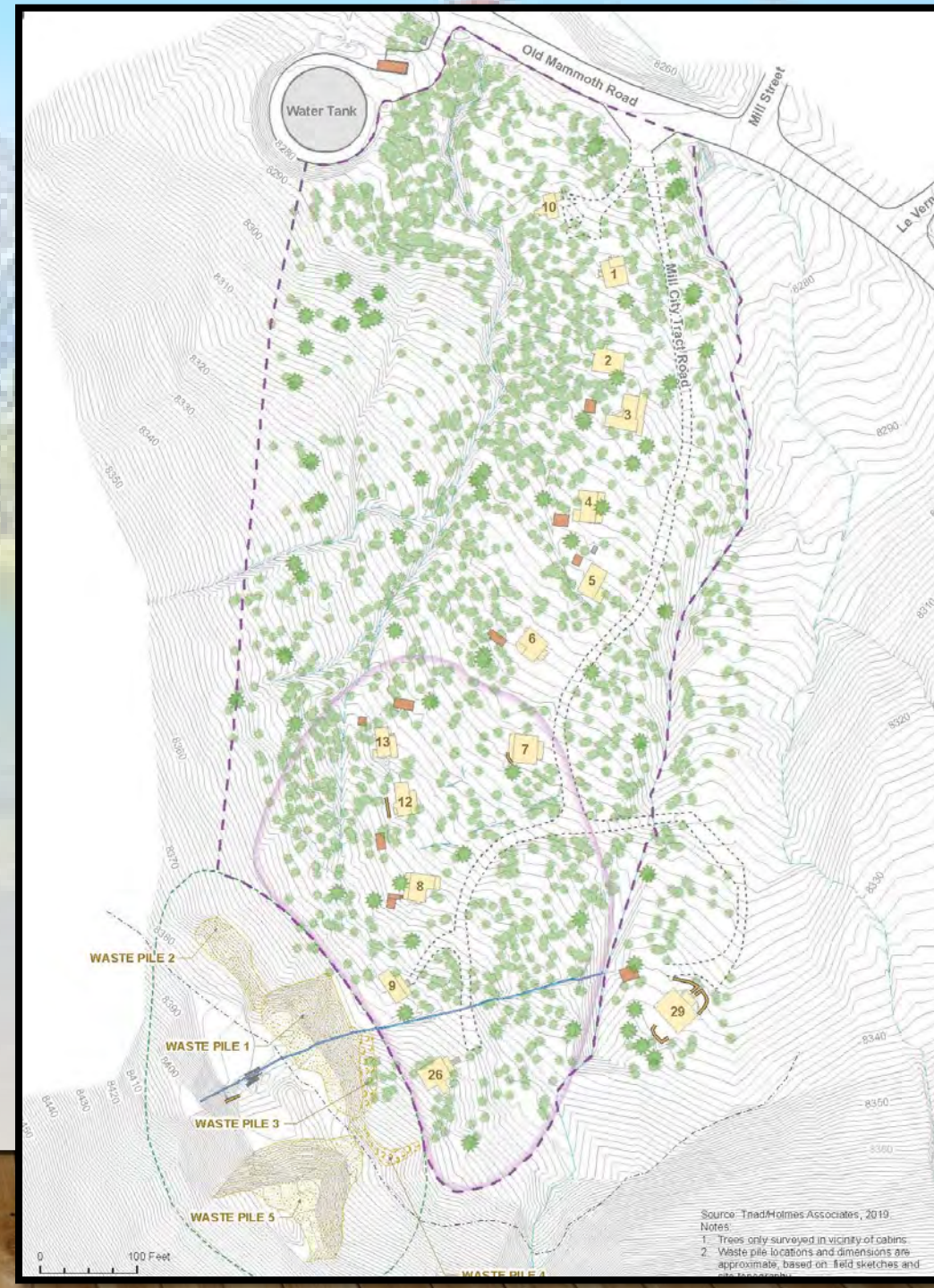


Time Critical Removal Action Site Map



Cabin Area Boundary Delineation

- April 2017 - TCRA
 - Initial 3 acres in size
 - Approximately 3,300 cy of contaminated material
- 2018 Investigations
 - Wider spread contamination (arsenic and mercury)
 - Aerial extent of contamination approximately 5 acres.
 - Approximately 14,430 cy of contaminated material



Human Health Risk Assessment

- Contamination at the Site poses a human health risk to recreational visitors and cabin occupants.
- Health risks posed by site contamination are driven by arsenic and mercury in surface and subsurface soils and mill waste
- Exposure Pathways – incidental ingestion, dermal, inhalation
- Risk analysis is based on a cabin occupancy of 100 days/year for 40 years



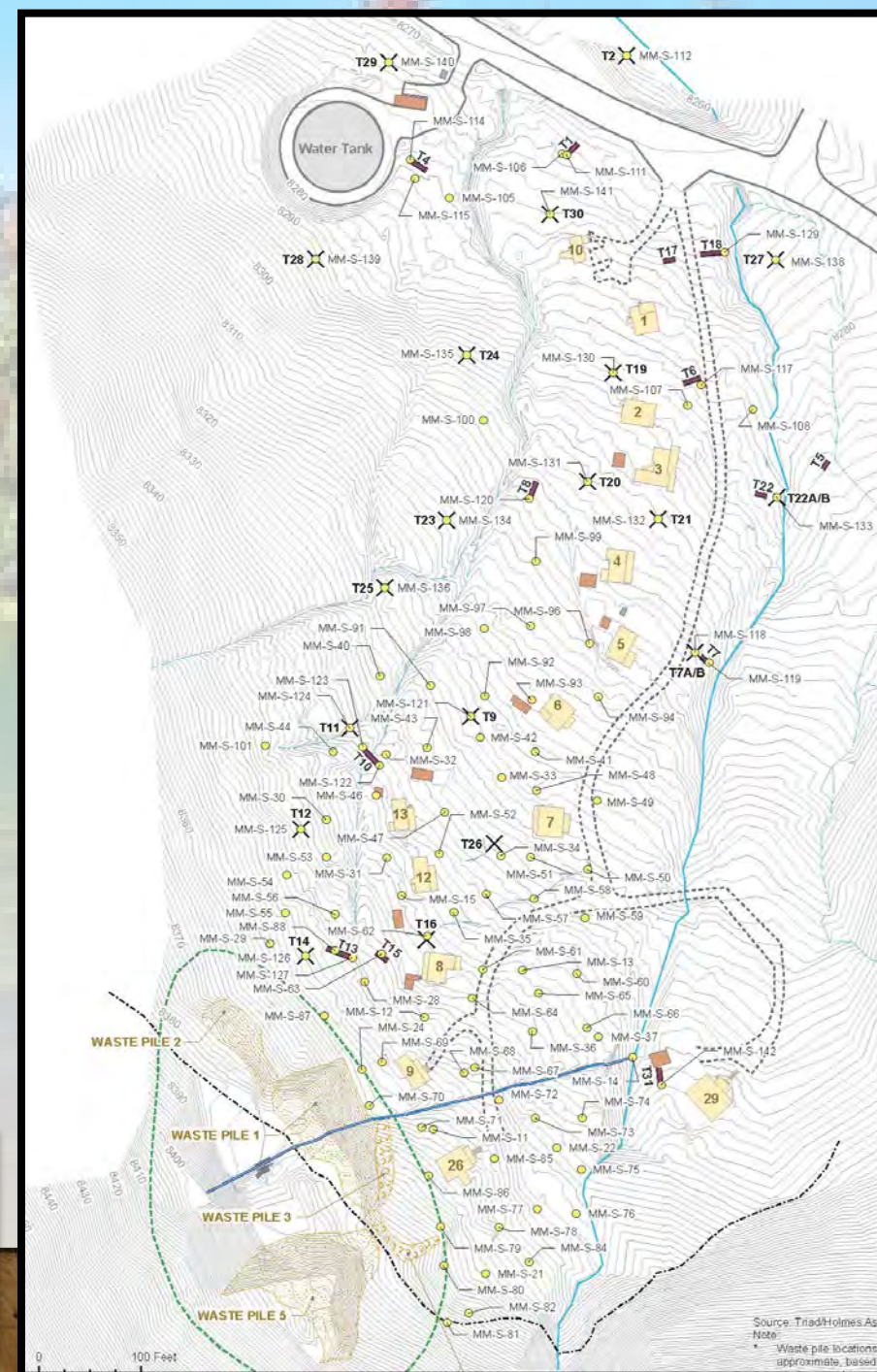
Updated/Focused Human Health Risk Analysis

- Analysis focused on contamination present in the expanded Cabin Area, with current and future cabin occupants as the primary receptors
- Analysis excluded Mill Area, diversion ditch and area east of the unnamed tributary to Mammoth Creek
- If no cleanup was performed in the Cabin Area, the updated risk analysis found cabin occupants could only be allowed on site for no more than 5 days per year in order to mitigate health risks posed by site contamination



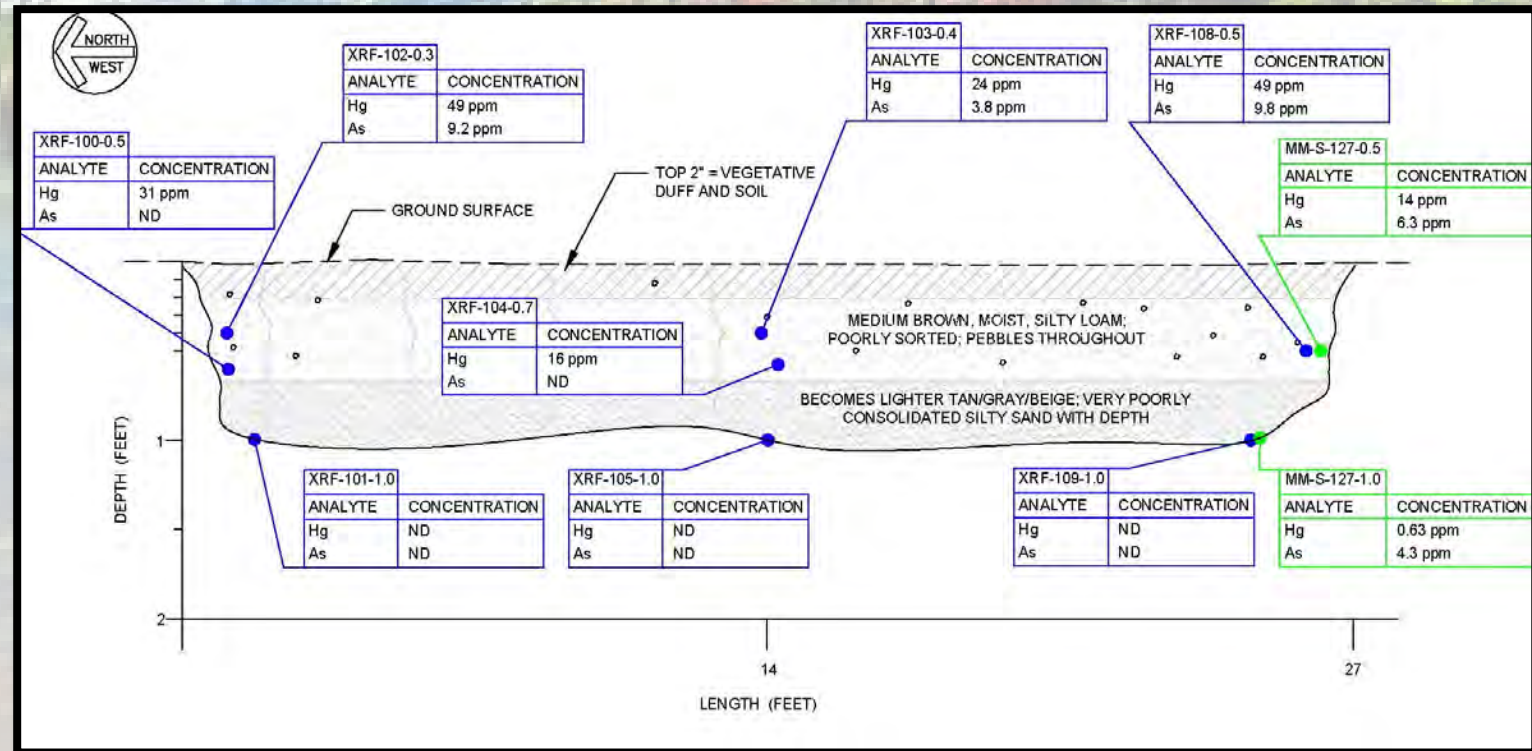
2018 Expanded Cabin Area Site Investigation Efforts

- Goal to further define the horizontal and vertical delineation of contamination present in the Cabin Area
- Primary Focus to define the outer boundary of contamination in the area
- Investigation efforts included:
 - Excavation of test pits and trenches
 - XRF sampling and collection of soil samples

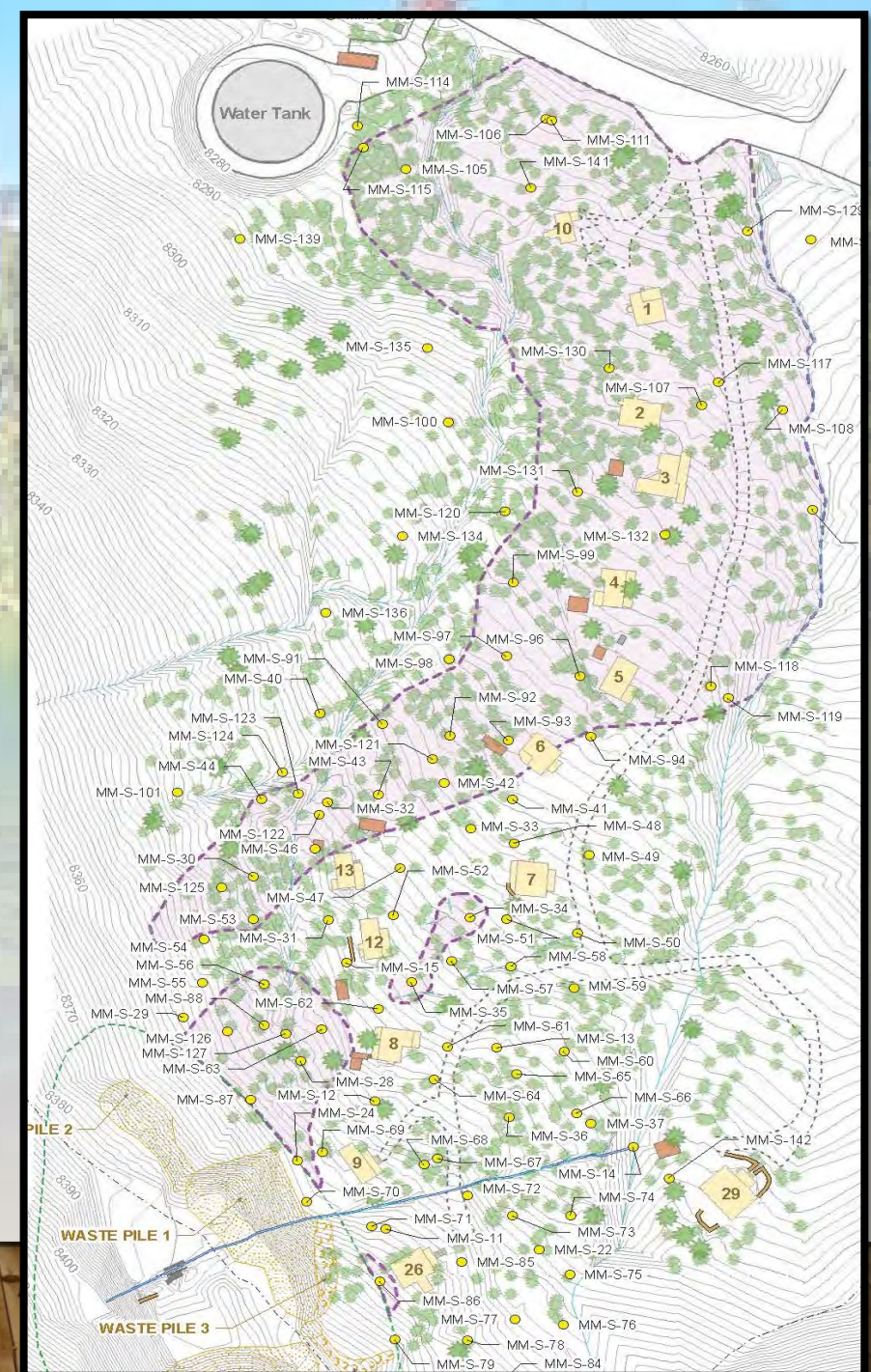


Typical Trench Excavation

- Trenches varied in depth to approximately 12 inches.
- Soils varied greatly in contaminant thickness.
- Handheld X-Ray Fluorescent (XRF) analyzer was used for screening and sample collections for lab analysis confirmed range accuracy.

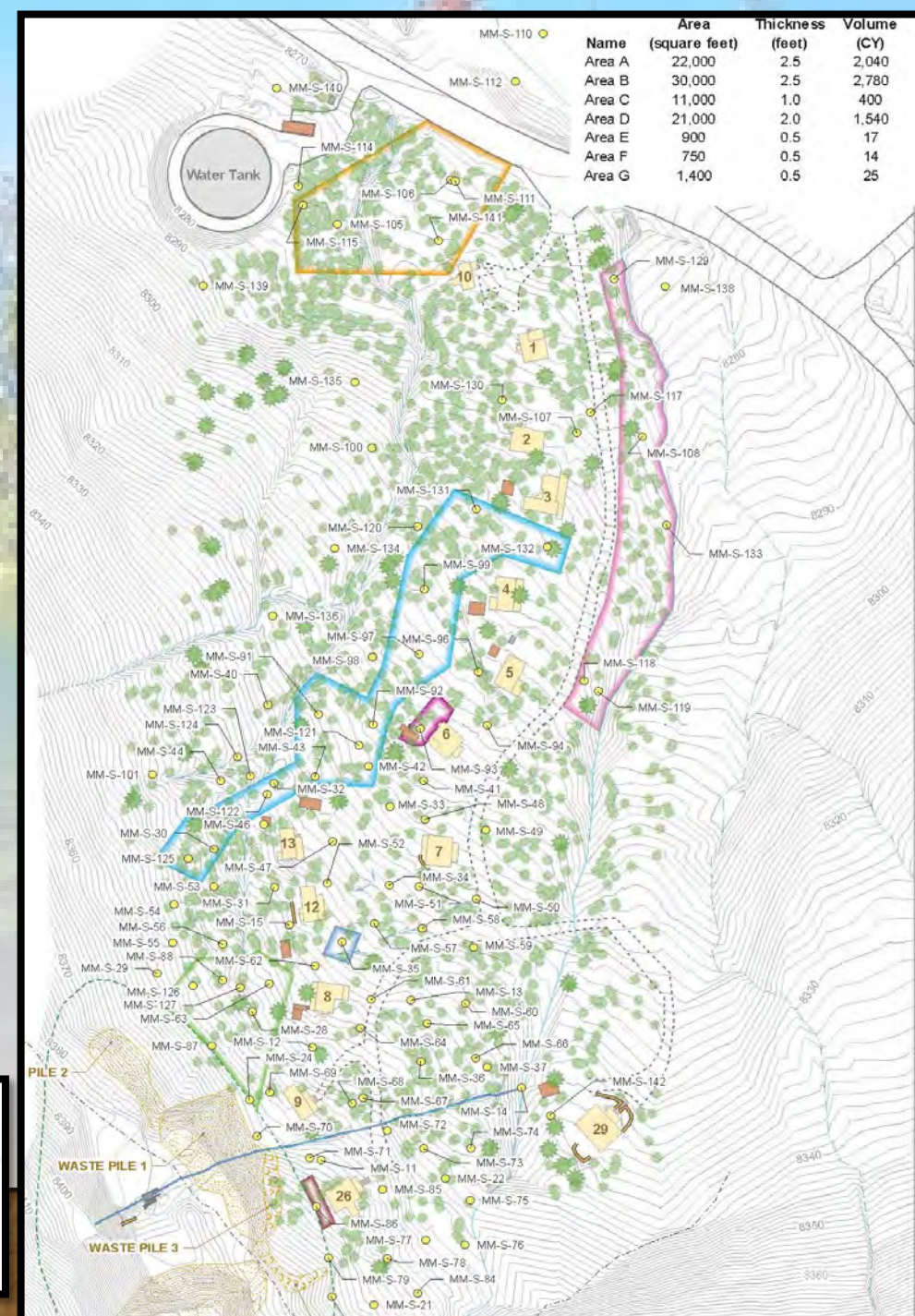


Updated Extent of Site Contamination in Cabin Area



Cabin Area Hot Spot Areas Identified

- Areas with highest concentration of contaminants identified and delineated
- Based on the delineation of hot spots the Forest Service tasked its contractor to evaluate additional remedy alternatives for the Cabin Area
- Hot Spot removal alternatives involve a precise excavation of these hot spot areas, while leaving lower concentrations of contaminants on site.
- Sensitivity analysis examined combinations of groupings with goal of reducing exposure risks while allowing for the highest number of days on site.

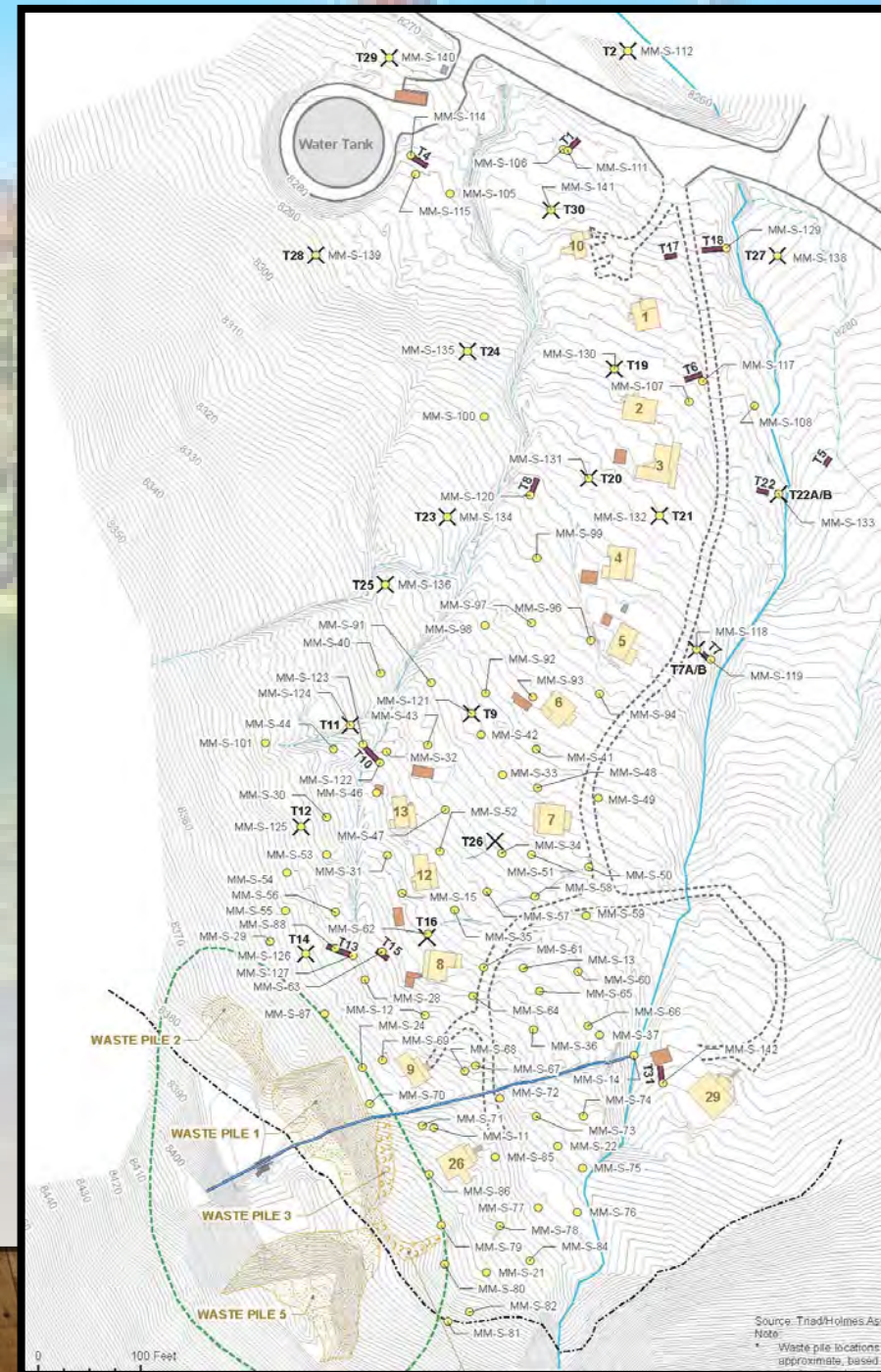


Hotspots	● Sample Location	----- Main Trail	■ Cabin	■ Mill Area
■ Area A	● Tree ¹ ≤ 24"	— Mill Diversion Trench	■ Other Building	■ Waste Pile ²
■ Area B	● Tree ¹ > 24"	— Tributary to Mammoth Creek	■ Concrete Pad	■ Cobbles and Boulders ²
■ Area C	— 5-foot Elevation Contour	— Dry Gully	○ Water Tank	
■ Area D	— 1-foot Elevation Contour	— Rock Wall		
	— Paved Road	— Mill Foundation Remnants		
	----- Unimproved Road			



Sampling East of Unnamed Tributary to Mammoth Creek (Cabin 29 Area)

- Site investigation found great variability in chemical makeup and appearance in the soils and materials around Cabin 29 (chemically and physically different from other contaminated material at the site).
- Based on this variability, USFS Contractor believes the contaminated material surrounding Cabin 29 may have come from a separate source.
- Additional investigation efforts are planned for this area.



Source: TriadHomes App
 Note:
 * Waste pile locations approximate, based on...

Response Action Alternatives Analysis
GOAL to eliminate or minimize risks
posed to human from heavy metals
present in the soil



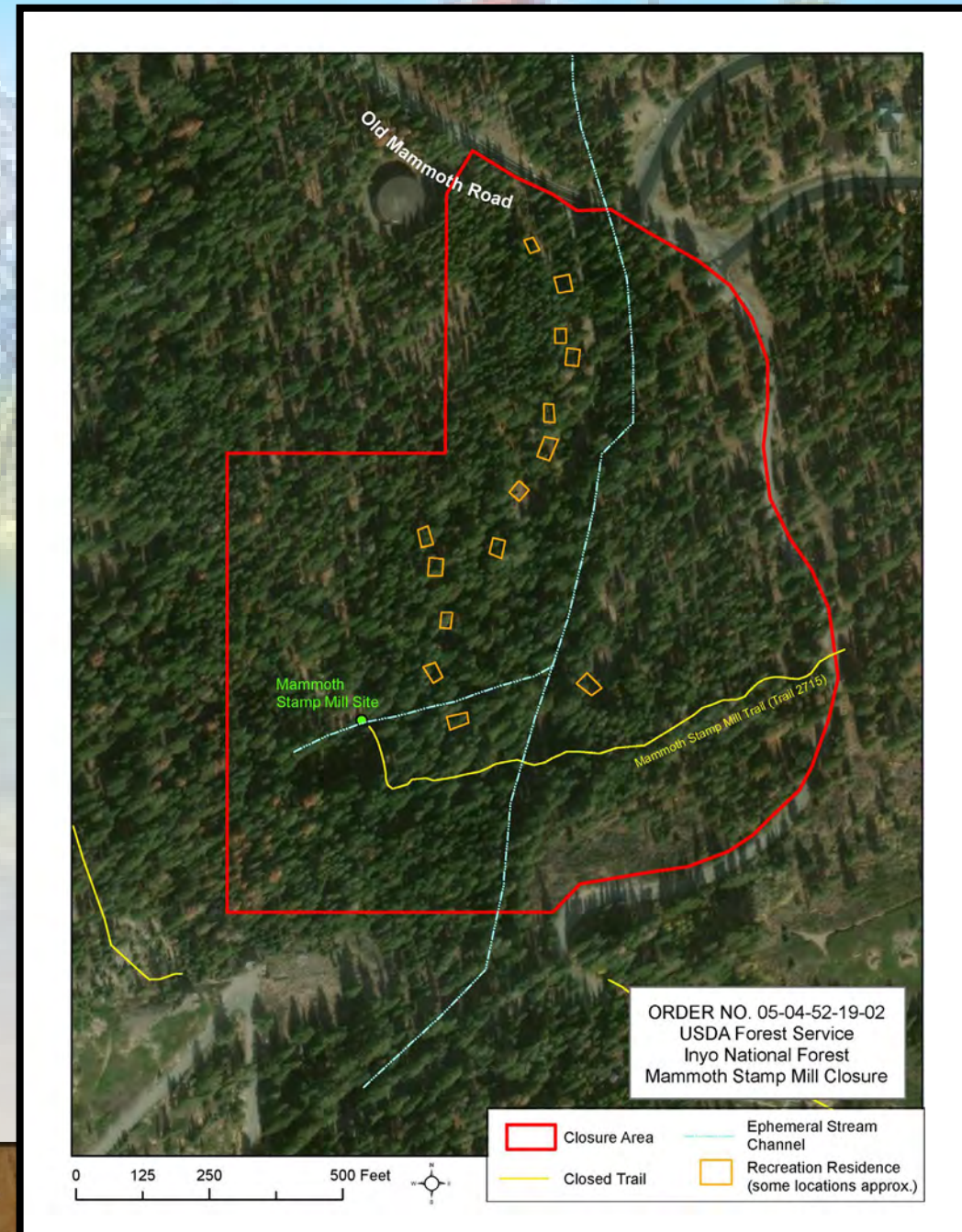
Tree removal and protection

- Initial alternatives analysis include excavation and offsite disposal, onsite encapsulation or combinations of the two options.
- To perform any excavation activities, tree removal will be necessary.
- In one alternative, the protection of trees with larger trunks is included.
- Tree protection can include:
 - Dry well around base
 - Brick or stone barrier wall at 18' radius
 - 2 inch rock



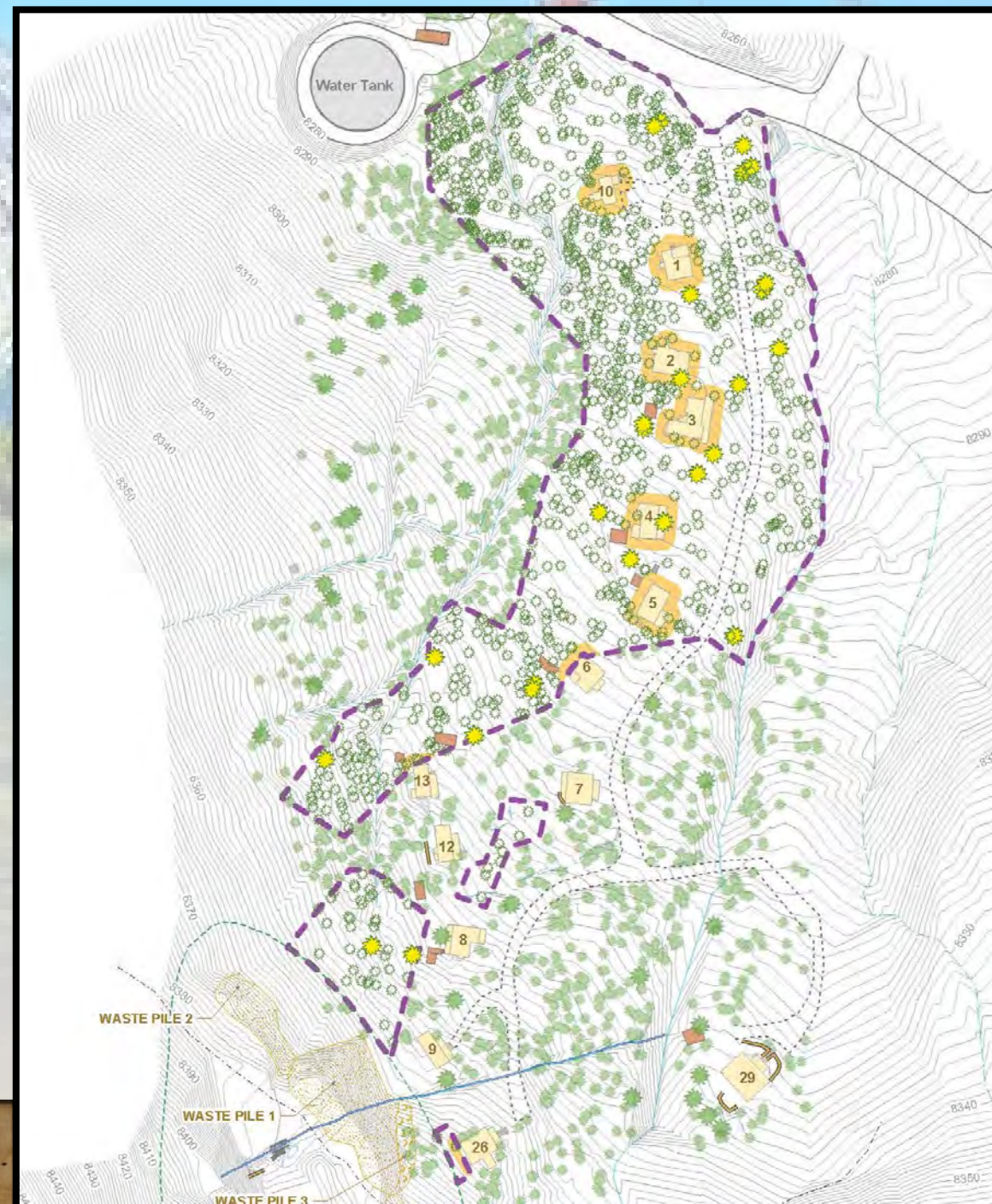
Alternative I – No Action

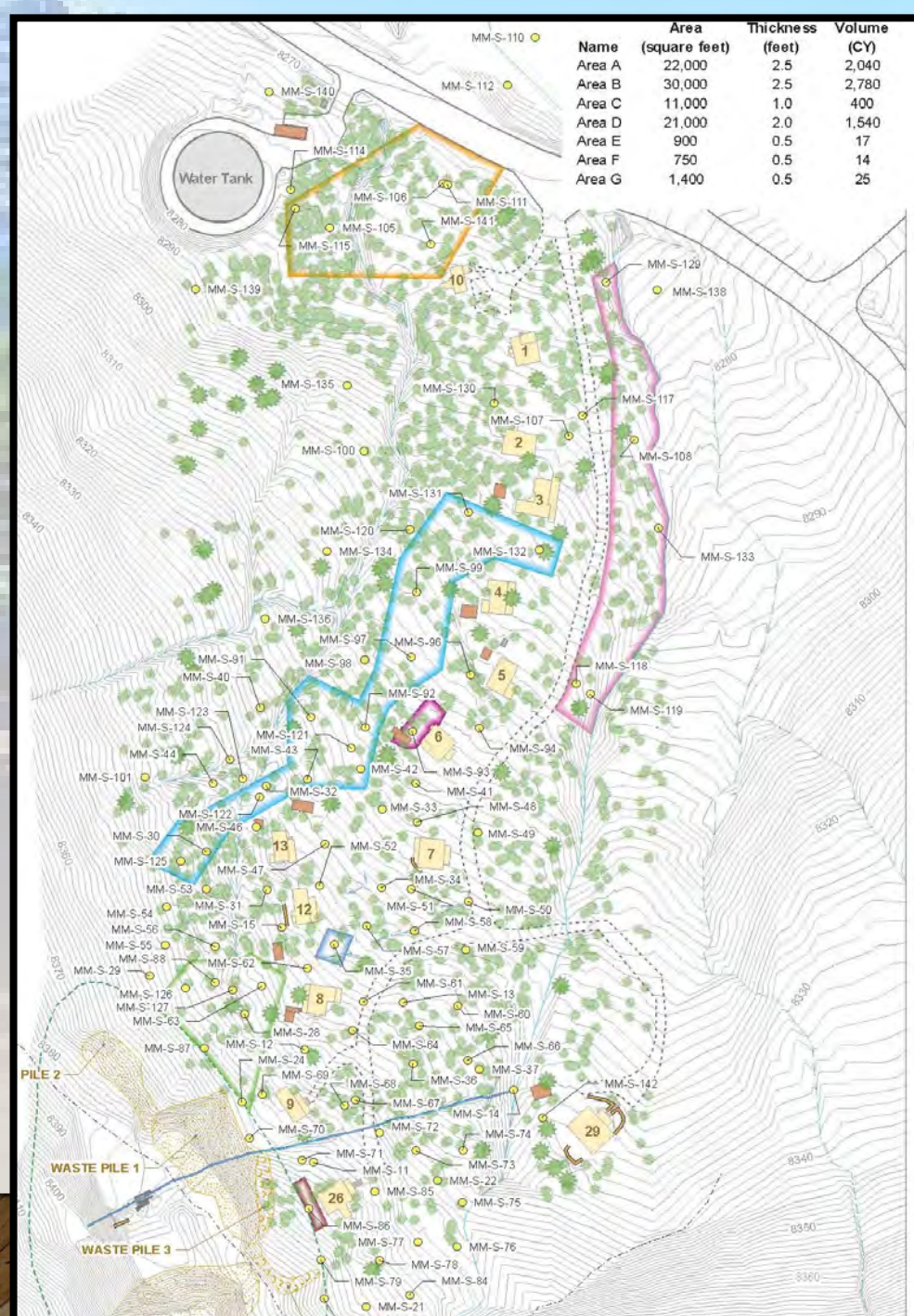
- Site contamination not addressed
- Land Use Controls (LUCs) implemented to prohibit access
- Cabin occupants would be restricted to 5 days/year occupancy
- Alternative includes fencing, gate, signage, O&M and administrative costs
- Not protective of human health or the environment
- Estimated 30 YR Cost - \$609,491



Alternative 2 – Minor grading and Onsite Encapsulation

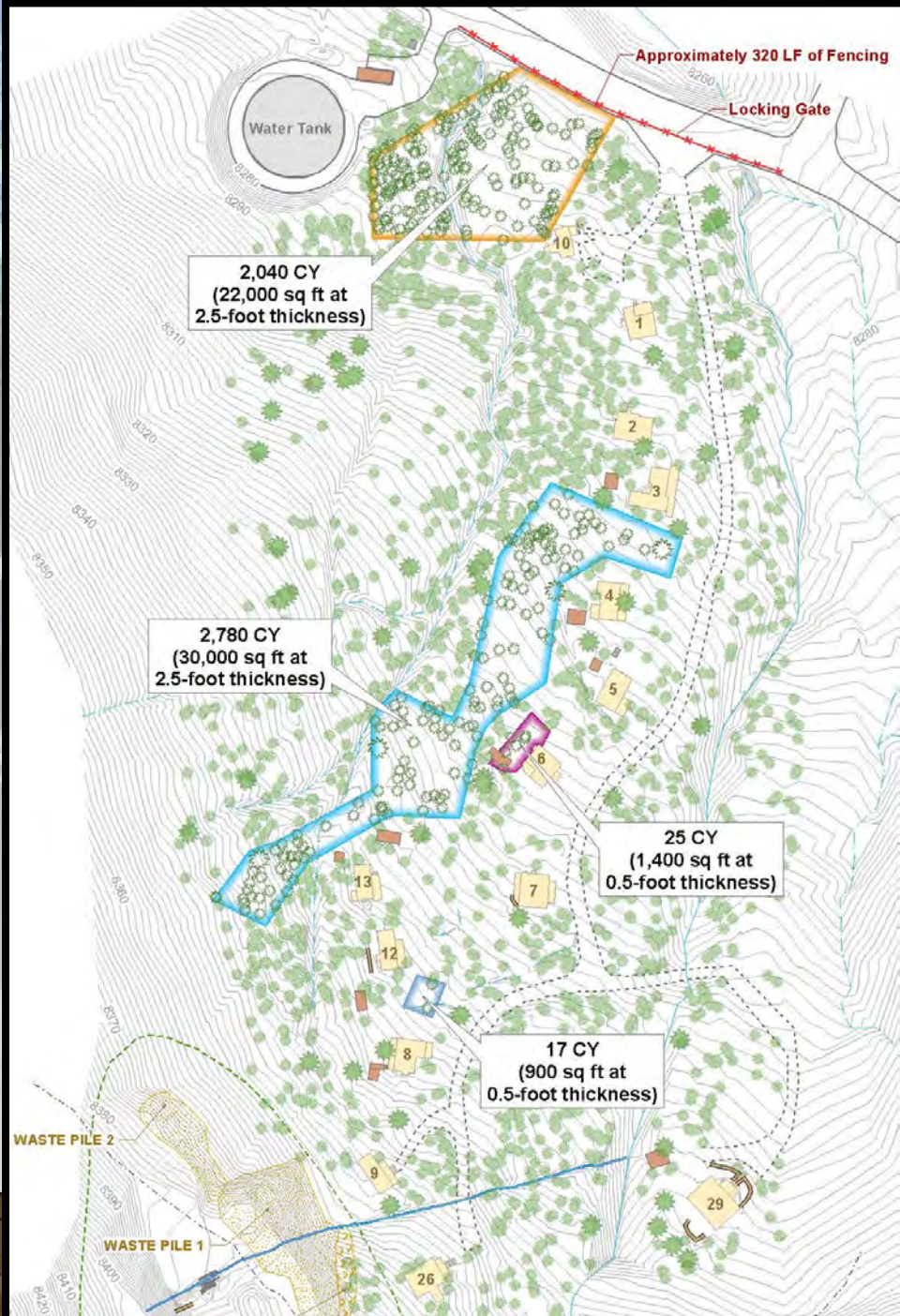
- Importing 2 feet of clean soil material on all metal impacted areas and encapsulating contaminants in place (Geotech design)
- Grading around cabins in areas with elevated metals to meet existing elevation grades at affected cabins (Cabins 1,2,3,4,5,6,10,13 and 26)
- No excavation work in encapsulated area allowed
- Removal of 935 trees and protection of 26 trees.
- Estimated 30 YR Cost \$ 5,750,000





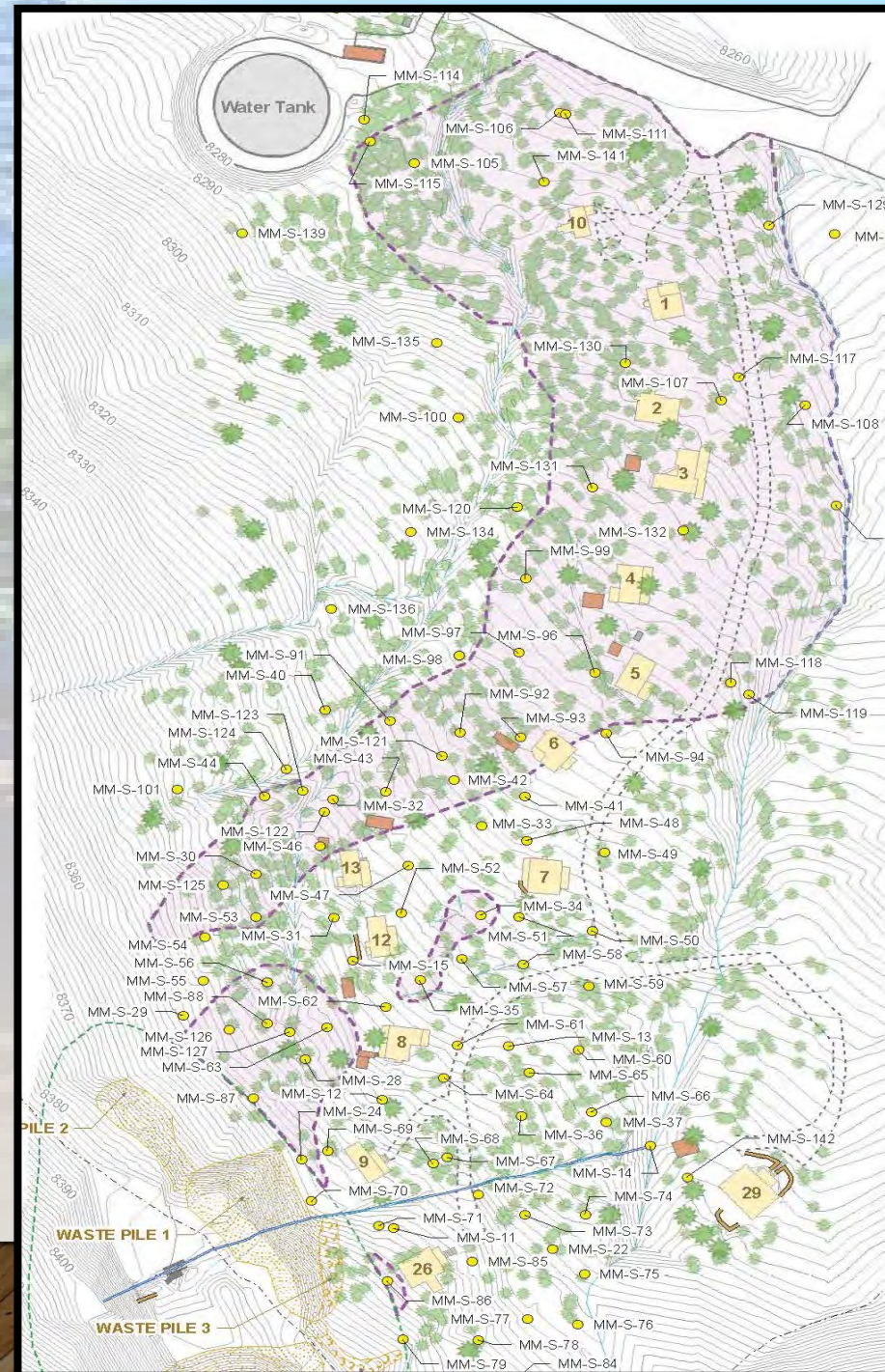
Alternative 3A – Selective Hotspot Excavation and Onsite Repository

- Excavation of Area A, B, E and G Hot spots and placement into an onsite repository
- Backfilling of excavated areas with clean, imported soil.
- Digging would be restricted in repository area and other areas where known contaminants remain. Cap protected and maintained by FS.
- Long Term Land Use Controls - Fencing, Gates and signage
- Includes removal of approximately 637 trees
- Occupancy limit of 182 days to maintain low risk to human health
- Estimated 30 YR Cost - \$4,404,587



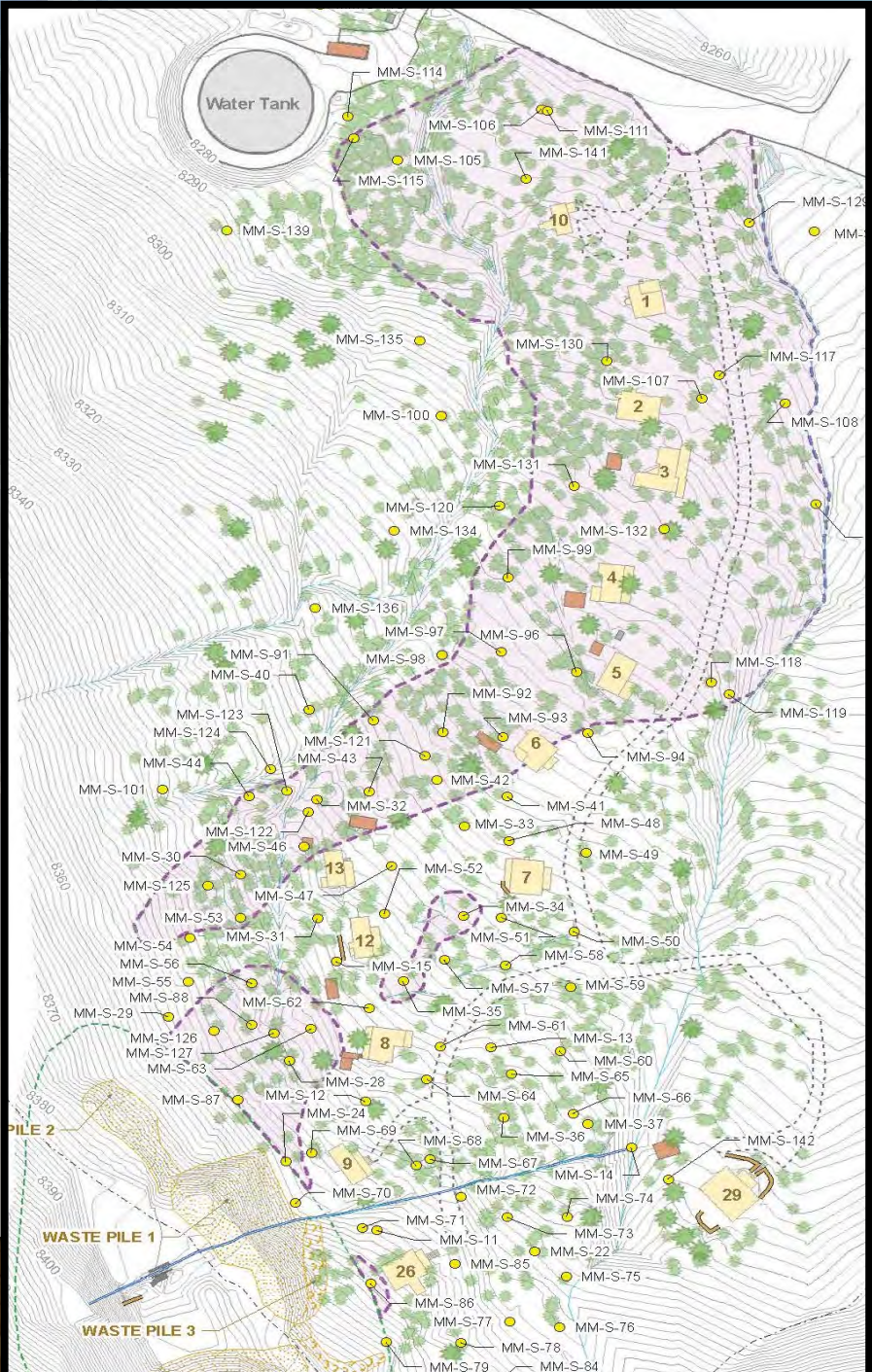
Alternative 3B – Selective Hotspot Excavation and Offsite Disposal

- Excavation of Area A, B, E and G Hot spots and transporting soils to an offsite facility
- Backfilling of excavated areas with clean imported soil.
- Digging would be restricted in areas where contaminants remain.
- Long Term Land Use Controls - Fencing, Gates and signage where contaminants remain
- Includes removal of approximately 362 trees
- Occupancy limit of 182 days to maintain low risk to human health
- Estimated 30 YR Cost - \$3,346,576



Alternative 4A – Complete removal of metals impacted soil and Onsite Repository

- Excavation of all metals-impacted soil shown and consolidation in an Onsite Repository
- Backfilling of excavated areas with clean imported soil.
- Digging would be restricted in repository area
- Long Term Land Use Controls - Fencing, Gates and signage in repository area
- Inspection and maintenance of repository by FS
- Includes removal of approximately 1,483 trees
- Estimated 30 YR Cost - \$ 9,263,878



Alternative 4B – Complete removal of metals impacted soil and Offsite Disposal

- Excavation of all metals-impacted soil shown and offsite transportation to a licensed facility
- Backfilling of excavated areas with clean imported soil and site restoration.
- No long term maintenance or land use controls
- Includes removal of approximately 96 I trees
- Estimated Cost - \$ 8,786,587

Preliminary Evaluation of Alternatives

Ranked and evaluated for:

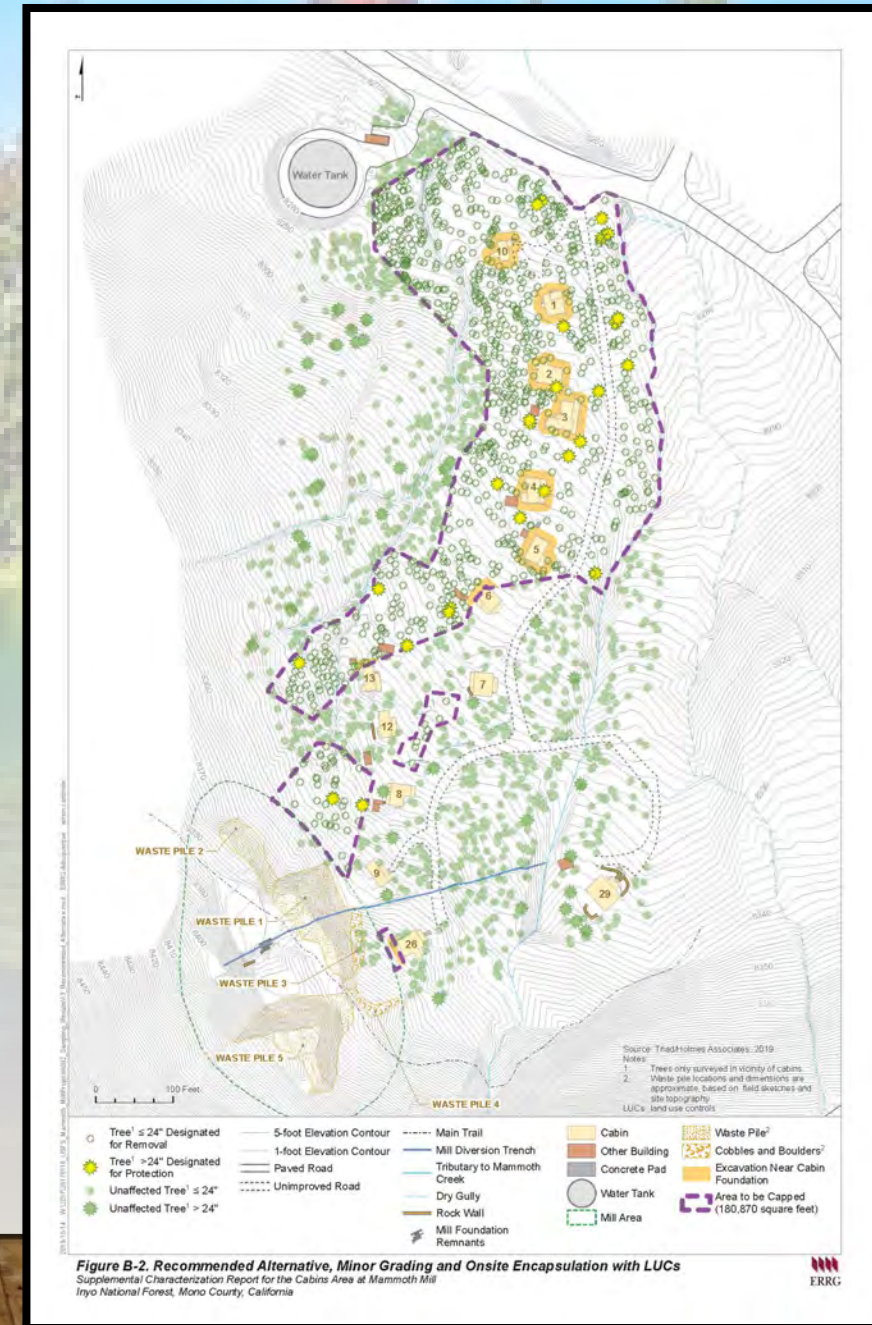
- Effectiveness of protection
- implementability of construction/feasibility
- Services and materials and equipment available/accessible to site
- Community, stakeholder and regulatory agency acceptance
- level of tree removal
- LUCs and
- Cost – initial capital, annual O&M and periodic

Alternative Number	Description	Limited Use Control	Assumptions	Estimated Cost
1	Complete Limited Use Controls (LUCs) - prohibited access	Fencing, road gate and signage	On-going patrol to enforce; Amend Forest LMP; No migration of contaminated soils	\$ 609,491
2	Minor grading around cabins and Onsite Encapsulation of all metals-impacted soil in Cabins Area beneath 2 feet of clean fill	No excavation work allowed without meeting strict enforcement criteria and coordination with Forest/Region. Inspection and maintenance of cap in perpetuity.	Removal of approx. 935 trees and protect 26 trees (>24" dba) Excavation (10' swath assumed) around cabin foundations necessary to meet capped grade in adjacent area (with professional structural/geotechnical support evaluation.) Soil beneath cabins to remain.	\$ 5,750,000
3A	Selective Hotspot (Scenario 11) excavation and onsite repository; backfill excavated areas.	182-day limit of occupancy per year; Digging restrictions in repository area. Fencing, gate & signage required. Inspection and maintenance of cap in perpetuity.	Removal of approx.. 637 trees; Some design effort and additional sampling on boundary delineation.	\$ 4,404,587
3B	Selective Hotspot (Scenario 11) excavation and offsite disposal; backfill excavated areas.	182-day limit of occupancy per year; Digging restrictions on Site. Fencing, gate & signage required.	Removal of approx. 362 trees. Some design effort and additional sampling on boundary delineation. Assumes landfill will accept Bevel-exempt waste.	\$ 3,346,576
4A	Complete removal of metals-impacted soil from Cabin Area and onsite repository construction; backfill removal areas.	Digging restrictions on Site. Fencing, gate & signage required. Inspection and maintenance of cap in perpetuity.	Removal of approx. 1,483 trees	\$ 9,263,878
4B	Complete removal of metals-impacted soil from the Cabins area and offsite Disposal; backfill removal areas.		Removal of approx. 961 trees. Estimated impacted volume is 14,300 bank cubic yards. Assumes landfill will accept Bevel-exempt waste.	\$ 8,786,587



Forest Service Contractor's Preliminary Recommended Alternative for Cabin Area: **Alternative - 2 Minor grading and Onsite Encapsulation**

- Meets goal of effectively eliminating or minimizing the risk of exposure to both cabin occupants and recreational users.
- Most conservative and protective of human health.
- Will require long term inspection and maintenance if selected.
- Soil beneath cabins expected to remain.
- NOT a selected Alternative, only recommended given data collected to date



Other Preliminary Cabin Area Remedy Alternatives NOT Recommended

- Alternative 1 – Complete LUCs was not protective and did not address the release or prevent further migration or exposure
- Alternatives 3 – Not as protective as it leaves uncontained contaminants on site
- Alternatives 4 – Cost prohibitive and almost 1,000 trees would need to be removed.



Moving Forward

- Mammoth Mill Site – Continue to pursue a settlement with Potential Responsible Party (PRP) via Office of General Counsel and Department of Justice.
- Perform additional sampling in the immediate Cabin Area to resolve data gaps related to contamination immediately adjacent and beneath the cabins.
- Based on the results of the additional Cabin Area sampling, prepare an updated and refined remedy alternative analysis and select a final remedy for the Cabin Area.
- Important Factor for Cabin Area cleanup: Before any cleanup can occur in the Cabin Area, the contamination at the upgradient Mill Site cleanup must occur. This can either occur prior to the Cabin Area remediation or concurrently. Recontamination of the downslope Cabin Area can occur if the upslope source of contamination is not addressed.
- Perform a PA/SI in area east of the creek to determine source and extent of contamination and associated risk to Cabin 29 occupants and recreational users.



Earliest Estimated Timeframes

All Timeframes are dependent on Funding Allocations

Mill Area CERCLA Cleanup		Cabin Area CERCLA Cleanup	
Unknown	PRP Settlement Negotiations (highly variable)	1-2 years	Additional Cabin Area sampling to refine Removal Action/Design alternatives and ensure not missing Site contaminants; Perform PA/SI on the east side of Creek (Includes Contract preparation, advertising and award)
1-2 years	Removal Design	unknown	PRP Settlement Negotiations (highly variable)
1-3 years	Removal Action Implementation	2 years	Remedy Selection and Amended CERCLA Action Memorandum for the Cabin Area; Removal Design (Includes Contract preparation, advertising and award)
2-3 years		2-3 years	Removal Action Implementation



Questions



For Further Information, please contact:

For technical questions about the site and the site investigation and cleanup efforts:

Noelle Graham-Wakoski – On-Scene Coordinator

noelle.graham@usda.gov

(858)674-2990

For questions about the Cabin Area, cabin access and special use permit issues:

Gordon Martin – Mammoth RD District Ranger

gordon.martin@usda.gov

(760) 924-5553





Mammoth Mill CERCLA Site Cabins Area Fact Sheet

Mammoth Mill, Inyo National Forest, Mono County, CA

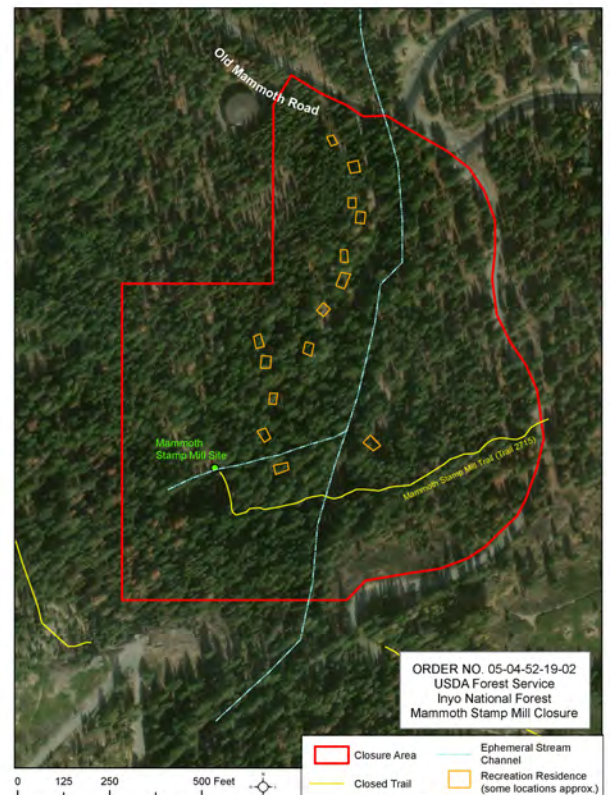
Background: The Mammoth Mill is an 1870s-era former gold processing facility located in the town of Mammoth Lakes, within the Inyo National Forest, in Mono County, California. Most of the surface features associated with the former mill have been removed. The iron flywheel from the former mill, mill-waste piles, and a dry diversion ditch connecting the flywheel to a tributary of Mammoth Creek remain in the what is referred to as the "Mill Area". The Forest Service permitted Mill City recreational cabin tract is located immediately adjacent to and down slope of the Mill Area. There are currently fourteen recreational cabins within the cabin tract.

Investigations: Site investigations conducted by the Forest Service pursuant to its authority under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) found that the tailings and soils at the Mill Area and in the recreation cabin area have elevated levels of heavy metals (primarily mercury and arsenic) as a result of the historic operation of the Mammoth Mill. Subsequent investigations of the cabin tract area has found more widespread contamination than what was originally defined. Thirteen of the fourteen recreation cabins are now known to be within the lateral extent of mill-waste impacted soils. These thirteen cabins and the surrounding area comprise what is referred to as the "Cabin Area".

The presence of heavy metals in the Mill and Cabin Areas pose a human risk to the cabin occupants and recreational visitors to the area. In response to the risk to human health, the Forest issued a Forest Closure Order in April 2017 to close access to the area until the human health and environmental threats can be mitigated. The Forest Closure Order was renewed in May 2019 and will remain in effect until site cleanup efforts are completed. See attached map for the Forest Closure Order area.

Based on initial site investigations, on April 14, 2017, the Forest Service signed a CERCLA Time Critical Removal Action (TCRA) Memorandum to address the contamination in the Mill Area and in the Cabin Area.

Since the signing of the TCRA Memorandum, the Forest Service initiated additional site characterization efforts in the Cabin Area to further define the nature and extent of contamination. These efforts found that the contamination present in the Cabin Area is far more widespread than was initially thought. Based on initial site characterization efforts it was thought that there was approximately 3,360 cubic yards of contaminated material present in the Cabin Area. Subsequent sampling efforts to further define the extent of contamination found that the volume of contaminated material in the Cabins Area to be in excess of 11,430 cubic yards.



Current Forest Closure Order Area



**Soil Sampling at
Mammoth Mill Site &
Cabin Area**



XRF Sampling

Investigations (continued): As a result of this three fold increase in the volume of contaminated material, the Forest Service instructed its environmental contractor to conduct a more comprehensive remedy evaluation for the Cabin Area.

CERCLA remedy alternatives which were evaluated for the Cabin Area ranged from a "No Action" alternative to complete removal and off-site disposal of the entire volume of heavy metal impacted soils. The "No Action" alternative would include site access controls to restrict cabin occupants to be present on the site for no more than 5 days per year to mitigate health risks. The "No Action" alternative is unacceptable for a number of reasons as it would still allow for potential migration of contamination and for ecological exposure threats to remain. The complete removal and off-site disposal alternative is projected to cost \$8.8 million to remove over 14,000 cubic yards of impacted soil.

The Forest Service's contractor is recommending a preliminary remedy which consists of capping the entire heavy metals impacted Cabin Area. This alternative would include minor grading around the cabins and installing a 2-foot cap of clean imported material on the impacted Cabin Area. This alternative has a projected cost of \$5.6 million and is protective to human health and the environment and has a lower impact on the ground. Additional site characterization must occur before the Forest Service can make a formal remedy selection for the Cabin Area. Key data gaps include what contamination is present beneath the cabins and whether they will need to be move or dismantled.

CERCLA Next Steps :

Additional site characterization and sampling will be conducted in the Cabin Area to further define the extent of contamination and if contamination exists beneath and immediately adjacent to the cabins.

A Preliminary Assessment/Site Inspection will be conducted in the area east of the creek to determine lateral extent of contamination and associated risk to Cabin 29 occupants and recreational users and if the source is connected to Mammoth Mill CERCLA Site.

Future Public Meetings And Site Investigation Data:

As they become available, the Forest Service will be posting site investigation reports on the Forest website listed below.

Additional public meetings may be scheduled, if deemed necessary, as the CERCLA action progresses.

Please contact Noelle Graham-Wakoski to be added to the mailing list for this project.



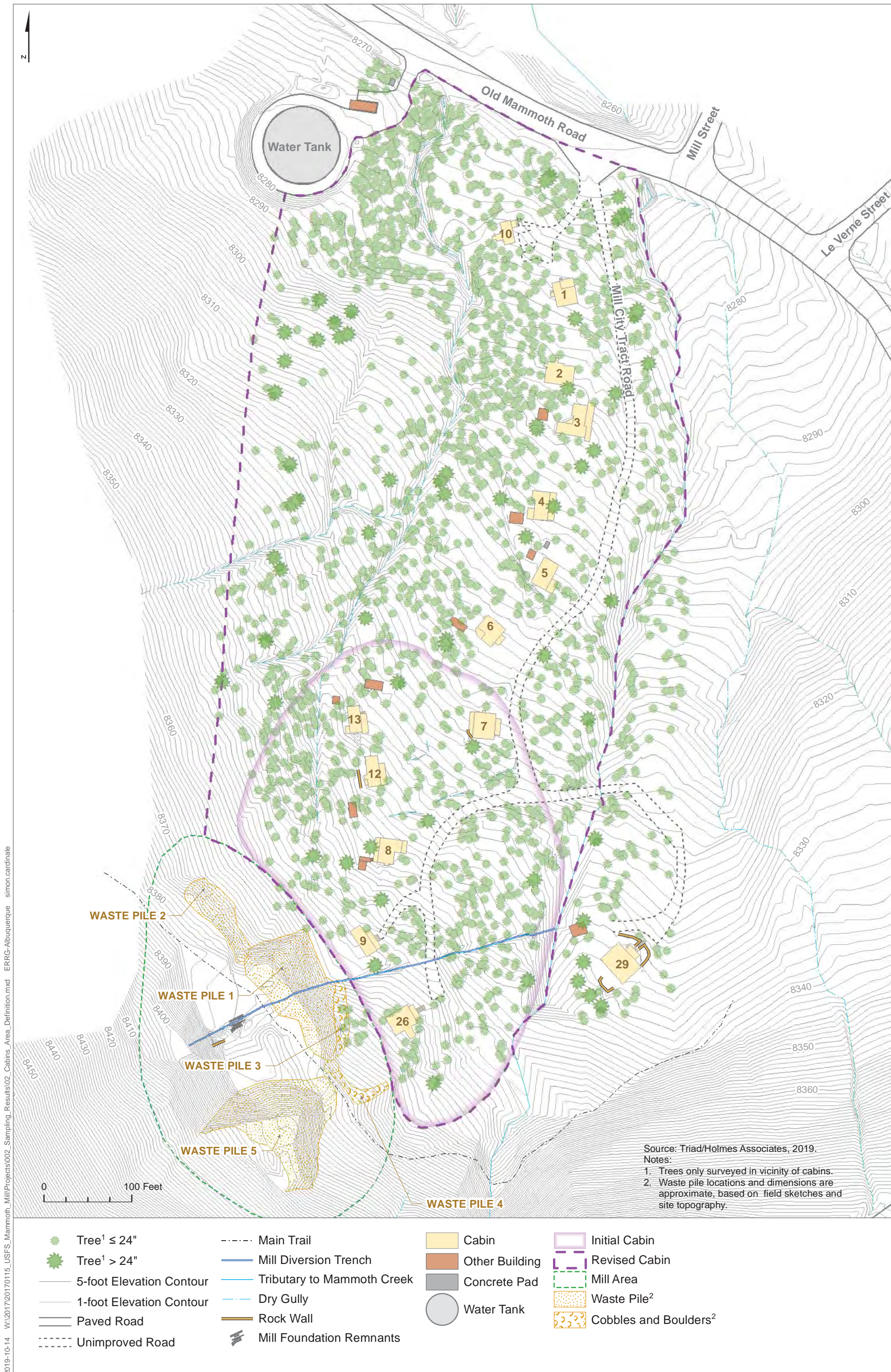
Historic Mill Flywheel

If you have any questions or concerns about the contamination at the site, please contact the On Scene Coordinator:

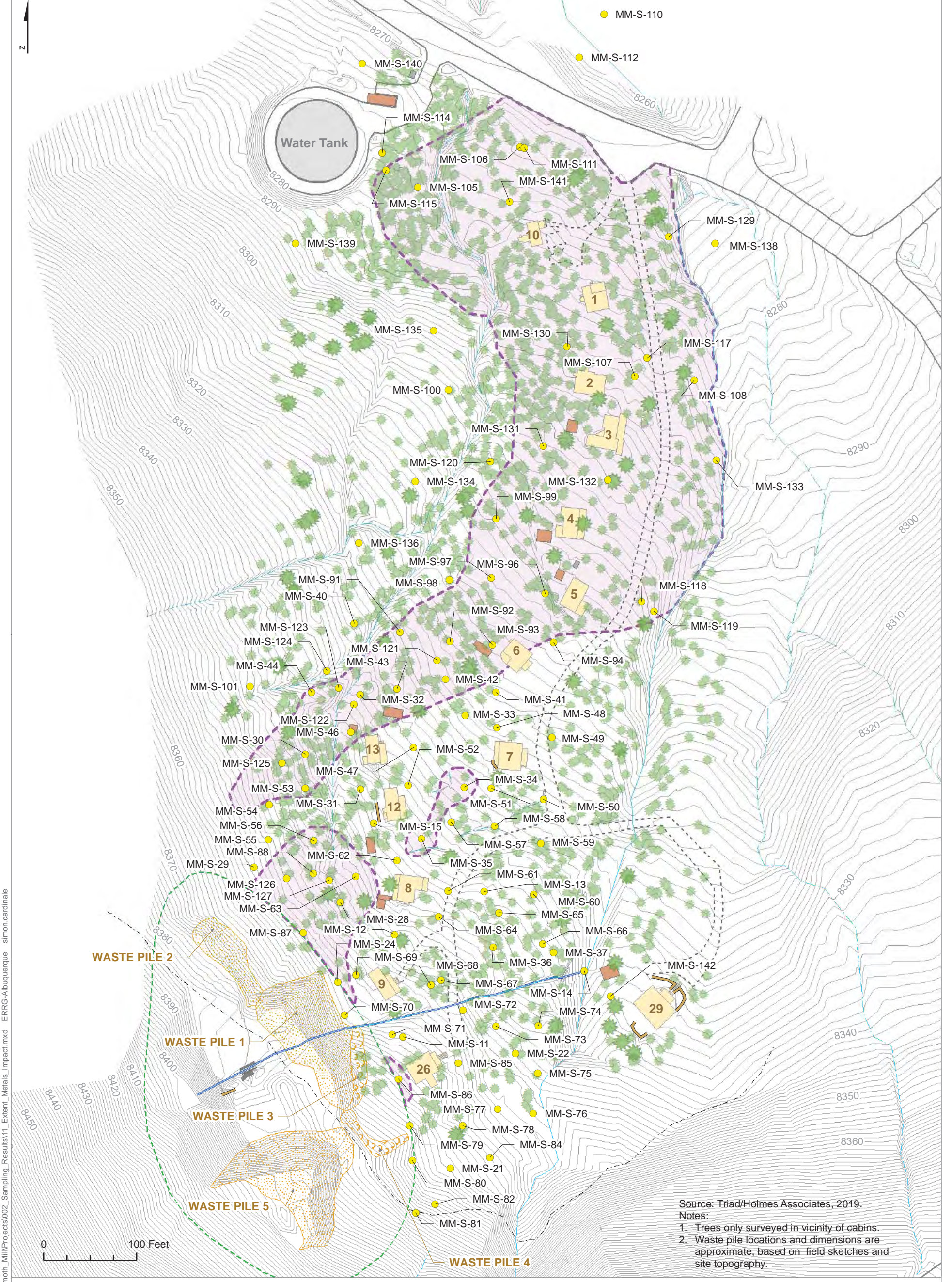
Noelle Graham-Wakoski, PE,
USDA Forest Service
10845 Rancho Bernardo Road, Ste 200
San Diego, CA 92127-2107
(858) 674-2990
noelle.graham@usda.gov

A copy of the completed Reports can be obtained at the following website:

<https://www.fs.usda.gov/detail/invo/home/?cid=FSEPRD588929>



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Source: Triad/Holmes Associates, 2019.
 Notes:
 1. Trees only surveyed in vicinity of cabins.
 2. Waste pile locations and dimensions are approximate, based on field sketches and site topography.

- | | | | | |
|---------------------------|----------------------------|------------------------------|------------------|-------------------------------------|
| ● Sample Location | — 5-foot Elevation Contour | - - - Main Trail | ■ Cabin | ▭ Mill Area |
| ● Tree ¹ ≤ 24" | — 1-foot Elevation Contour | — Mill Diversion Trench | ■ Other Building | ▭ Waste Pile ² |
| ● Tree ¹ > 24" | — Paved Road | — Tributary to Mammoth Creek | ■ Concrete Pad | ▭ Cobbles and Boulders ² |
| | - - - Unimproved Road | — Dry Gully | ○ Water Tank | ▭ Extent of Metals-Impacted Soil |
| | | — Rock Wall | | |

Extent of Metals-Impacted Soil in Cabins Area
 Supplemental Characterization Report for the Cabins Area at Mammoth Mill Foundation Remnants
 Inyo National Forest, Mono County, California

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