Table 1 - Preliminary Cost Estimate
Alternative 2 - Limited Excavation
Tulelake, California

PRELIMINARY COST ESTIMATE - Alternative 2

	DESCRIPTION OF ITEM	SUBTOTAL Low Estimate	SUBTOTAL High Estimate	COST Range	
I.	**Limited Excavation and Oversight**				
	A. Pre-Excavation Characterization Sampling	$15,000	$30,000		
	B. Excavation Activities		$60,000		
	C. Backfill Material	$5,000	$10,000		
	D. Disposal and Off-haul	$10,000	$15,000		
	E. Langan Oversight of Excavation and Backfill (assumes 10 days of oversight)		$20,000		
	F. Excavation Confirmation Sampling (Analytical Fees)	$15,000	$20,000		
	G. Additional Excavation Costs	$20,000	$30,000		
			SUBTOTAL	**$145,000**	**$185,000**
V.	**Groundwater Dewatering**				
	A. Permit (e.g., NPDES) Application	-	$15,000		
	B . Treatment System Services (system mobilization and demobilization, one month rental)	-	$15,000		
	C. Self Monitoring Reports	$5,000	$20,000		
	D. Treatment System (O&M and Permit Compliance) Sampling	$5,000	$15,000		
	E. Treatment System Analytical Fees	$5,000	$15,000		
	F. Regulatory Coordination	-	$5,000		
	G. Consultation and Meetings	-	$5,000		
			SUBTOTAL	**$55,000**	**$90,000**
VI.	**Remedial Completion Report**				
	A. Completion Report	-	$20,000		
			SUBTOTAL	**$20,000**	**$20,000**
VIII.	**Environmental Consulting Services During Design and Construction**				
	A. Project Team Meetings (up 8 meetings)	-	$10,000		
	B. Regulatory Meetings (up to 8 meetings)	-	$10,000		
			SUBTOTAL	**$20,000**	**$20,000**
			TOTAL COST	**$240,000**	**$320,000**
			Contingency (15%)	**$40,000**	**$50,000**
			Total with Contingency	**$280,000**	**$370,000**

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Table 1 - Preliminary Cost Estimate
Alternative 2 - Limited Excavation
Tulelake, California

Notes:

1. This cost estimate is a preliminary and subject to change. The estimated costs reflects available cost information for construction located in California. The estimate is preliminary and based on engineering judgement. No formal quotes or proposals were obtained during development of this estimate.

2. This cost estimate represents an opinion of the probable costs of construction, within a reasonable degree of certainty. This estimate does not guarantee the cost of labor, material, or equipment, nor the means, methods and procedures of third-party or contractor work as determined by contractor(s) and/or Owner, nor the competitive bidding submissions.

3. This cost estimate is based on our experience and qualifications as an engineer and shall be deemed to represent our opinion and judgment. No formal quotes or proposals were obtained during development of this estimate. This estimate cannot and does not guarantee that proposals, bids or actual costs will be the same as or within a specific percentage of the total costs presented in this table.

4. This cost estimate was prepared in advance of regulatory agency input, approvals and established cleanup goals. Inherent in soils, foundations, groundwater, and other investigations, actual conditions may vary from those assumed. Due to these uncertainties, changed or unanticipated conditions may arise during construction activities at the project site subsequent to the initial investigation(s) that could potentially affect project scope and cost. Therefore, this estimate, with respect to potential construction costs, including environmental mitigation costs, shall not be deemed a guaranteed maximum price or cost of the project.

5. This cost estimate does not include costs associated with commercial space repairs (e.g., business shut down time or restoration of interiors) that may become necessary due to site mitigation or remediation measures.

6. Costs provided should be verified based on results of further investigation and design efforts.

7. Transport and disposal costs included in this estimate are subject to change based on landfill, fuel and tax rates. These costs exclude removal of utilities, surveying, traffic control plans and/or compaction testing, if needed.

Assumptions

Pre-excavation characterization sampling assumes one week of soil sampling at up to 24 locations and 48 samples, subcontractor driller and analytical fees.

Costs associated with limited excavation activities assumes that the excavation depths may range from 1.5 to 3 feet below ground surface. Langan estimates that a total of approximately 60 cubic yards will be excavated from the six excavation areas. These costs include subcontractor fees to conduct excavations and install shoring, if needed. This task includes Langan time to coordinate with the excavation subcontractor. This task also includes demolition and removal of slab or foundational features prior to conducing the excavations at areas 1, 2 and 3.

Backfill material assumes up to 60 cubic yards of clean backfill material will be needed to backfill the six excavation areas.
Estimated costs associated with soil off-haul assumes non-hazardous soil. This estimate assumes approximately 45 cubic yards of material will be excavated from the six excavation areas. Assumes a conversion factor of 1.4 from cubic yards to tons. Assumes a transport and disposal fee of $100/ton of non-hazardous material.

Additional costs associated with the limited excavation areas may include obtaining a grading permit, traffic control plans, temporary fencing, utility locate, odor control and/or compaction testing.

Groundwater Treatment System services costs estimated based on a similar project, assumes $15,000 equipment rental per month.

Dewatering treatment system self-monitoring reporting includes $5,000 of labor for one to three self monitoring reports, per permit requirements.

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Table 2 - Preliminary Cost Estimate
Alternative 3 - Cap and ICs Cost Estimate
Tulelake, California

PRELIMINARY COST ESTIMATE - Alternative 3

	DESCRIPTION OF ITEM	SUBTOTAL Low Estimate	SUBTOTAL High Estimate	COST Range	
I.	**Grading, Oversight, and Capping**				
	A. Pre-Capping Characterization Sampling	$20,000	$25,000		
	B. Capping Areas Design	$10,000	$20,000		
	C. Grading, Capping, Disposal and Off-haul	-	$40,000		
	D. Langan Oversight of Capping (assumes 12 days of oversight)	-	$23,000		
	E. Deed Restriction/Land Use Covenant Development	$20,000	$25,000		
	F. Additional Capping Costs	$10,000	$20,000		
			SUBTOTAL	**$123,000**	**$153,000**
II.	**Intuitional Controls**				
	A. IC Inspections - Assumes half days with one staff for annual inspections over 30 years	$30,000	$40,000		
	B. Annual OM&M Reporting - Assumes will include a summary of IC inspections, as-needed building repairs, and monitoring completed during the prior year to be submitted to DTSC annually over 30-years	$20,000	$30,000		
			SUBTOTAL	**$50,000**	**$70,000**
III.	**Remedial Completion Report**				
	A. Completion Report	-	$20,000		
			SUBTOTAL	**-**	**$20,000**
IV.	**Environmental Consulting Services During Design and Construction**				
	A. Project Team Meetings (up 12 meetings)	-	$10,000		
	B. Regulatory Meetings (up to 12 meetings)	-	$10,000		
			SUBTOTAL	**-**	**$20,000**
			TOTAL COST	**$220,000**	**$270,000**
			Contingency (15%)	**$40,000**	**$50,000**
			Total with Contingency	**$260,000**	**$320,000**

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Table 2 - Preliminary Cost Estimate
Alternative 3 - Cap and ICs Cost Estimate
Tulelake, California

Notes:

1. This cost estimate is a preliminary and subject to change. The estimated costs reflects available cost information for construction located in California. The estimate is preliminary and based on engineering judgement. No formal quotes or proposals were obtained during development of this estimate.

2. This cost estimate represents an opinion of the probable costs of construction, within a reasonable degree of certainty. This estimate does not guarantee the cost of labor, material, or equipment, nor the means, methods and procedures of third-party or contractor work as determined by contractor(s) and/or Owner, nor the competitive bidding submissions.

3. This cost estimate is based on our experience and qualifications as an engineer and shall be deemed to represent our opinion and judgment. No formal quotes or proposals were obtained during development of this estimate. This estimate cannot and does not guarantee that proposals, bids or actual costs will be the same as or within a specific percentage of the total costs presented in this table.

4. This cost estimate was prepared in advance of regulatory agency input, approvals and established cleanup goals. Inherent in soils, foundations, groundwater, and other investigations, actual conditions may vary from those assumed. Due to these uncertainties, changed or unanticipated conditions may arise during construction activities at the project site subsequent to the initial investigation(s) that could potentially affect project scope and cost. Therefore, this estimate, with respect to potential construction costs, including environmental mitigation costs, shall not be deemed a guaranteed maximum price or cost of the project.

5. This cost estimate does not include costs associated with commercial space repairs (e.g., business shut down time or restoration of interiors) that may become necessary due to site mitigation or remediation measures.

6. Costs provided should be verified based on results of further investigation and design efforts.

7. Transport and disposal costs included in this estimate are subject to change based on landfill, fuel and tax rates. These costs exclude removal of utilities, surveying, traffic control plans and/or compaction testing, if needed.

Assumptions

Pre-grading and cover application characterization sampling assumes one week of soil sampling at up to 24 locations, subcontractor driller and analytical fees.

Costs associated with limited grading prior to cap/cover placement include subcontractor fees to conduct grading the six areas without shoring. This task includes Langan time to coordinate with the grading subcontractor.

Estimated costs assume $14 per square foot of clean soil cover/cap. Langan assumes a total of 600 square feet of clean soil cover will be required for the six areas.

Backfill material assumes up to 10 cubic yards of clean backfill material will be needed to backfill the six areas.
Estimated costs associated with soil off-haul assumes approximately 20% of soil handled during surface preparation and cover application will require off-haul and disposal. Based on the volume of the six areas, this estimate assumes approximately 10 cubic yards of material will be removed from the six areas. Assumes a conversion factor of 1.4 from cubic yards to tons. Assumes a transport and disposal fee of $100/ton of non-hazardous material.

Additional costs associated with the limited grading areas may include obtaining a grading permit, traffic control plans, temporary fencing, utility locate, odor control and/or compaction testing.

Dewatering and groundwater monitoring are is assumed to not be required.

Table 3 - Preliminary Cost Estimate
Alternative 4 - Soil Solidification and Stabilization
Tulelake, California

PRELIMINARY COST ESTIMATE - Alternative 4

	DESCRIPTION OF ITEM	SUBTOTAL Low Estimate	SUBTOTAL High Estimate	COST Range	
I.	**Solidification, Stabilization and Oversight**				
	A. Pre-Solidifiation and Stabilization Characterization Sampling	$25,000	$30,000		
	B. Soil Solidification and Stabilization Design	-	$30,000		
	C. Solidification and Stablization Reagents	-	$12,000		
	D. Solidification and Stabilization Mixing Application - Assumes up to five days	-	$60,000		
	E. Langan Oversight of Solidification and Stabilization Application		$10,000		
	F. Deed Restriction/Land Use Covenant Development	$20,000	$25,000		
	G. Post-Application Sampling	$20,000	$25,000		
	H. Additional Solidification and Stabilization Costs	$10,000	$20,000		
			SUBTOTAL	**$187,000**	**$212,000**
II.	**Remedial Completion Report**				
	A. Completion Report	-	$20,000		
			SUBTOTAL	**-**	**$20,000**
III.	**Environmental Consulting Services During Design and Construction**				
	A. Project Team Meetings (up 12 meetings)	-	$10,000		
	B. Regulatory Meetings (up to 12 meetings)	-	$10,000		
			SUBTOTAL	**-**	**$20,000**
			TOTAL COST	**$230,000**	**$260,000**
			Contingency (15%)	**$35,000**	**$39,000**
			Total with Contingency	**$265,000**	**$299,000**

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Table 3 - Preliminary Cost Estimate
Alternative 4 - Soil Solidification and Stabilization
Tulelake, California

Notes:

1. This cost estimate is a preliminary and subject to change. The estimated costs reflects available cost information for construction located in California. The estimate is preliminary and based on engineering judgement. No formal quotes or proposals were obtained during development of this estimate.

2. This cost estimate represents an opinion of the probable costs of construction, within a reasonable degree of certainty. This estimate does not guarantee the cost of labor, material, or equipment, nor the means, methods and procedures of third-party or contractor work as determined by contractor(s) and/or Owner, nor the competitive bidding submissions.

3. This cost estimate is based on our experience and qualifications as an engineer and shall be deemed to represent our opinion and judgment. No formal quotes or proposals were obtained during development of this estimate. This estimate cannot and does not guarantee that proposals, bids or actual costs will be the same as or within a specific percentage of the total costs presented in this table.

4. This cost estimate was prepared in advance of regulatory agency input, approvals and established cleanup goals. Inherent in soils, foundations, groundwater, and other investigations, actual conditions may vary from those assumed. Due to these uncertainties, changed or unanticipated conditions may arise during construction activities at the project site subsequent to the initial investigation(s) that could potentially affect project scope and cost. Therefore, this estimate, with respect to potential construction costs, including environmental mitigation costs, shall not be deemed a guaranteed maximum price or cost of the project.

5. This cost estimate does not include costs associated with commercial space repairs (e.g., business shut down time or restoration of interiors) that may become necessary due to site mitigation or remediation measures.

6. Costs provided should be verified based on results of further investigation and design efforts.

7. Transport and disposal costs included in this estimate are subject to change based on landfill, fuel and tax rates. These costs exclude removal of utilities, surveying, traffic control plans and/or compaction testing, if needed.

Assumptions

Pre-solidification and stabilization characterization sampling assumes one week of soil sampling at up to 24 locations, subcontractor driller and analytical fees.

Langan assumes that the six areas will be solidified with a product such as Portland Cement. Langan assumes the cost of Portland cement is $0.20 per pound. Langan assumes the fraction dosage by weight of Portland cement is 0.1. Langan assumes the density of soil mixed is 116 pounds per cubic feet.

Langan assumes that areas with petroleum hydrocarbon impacts (areas 1, 2 and 5) will also be treated with chemical oxidation reagants (e.g., Klozur: https://active-oxygens.evonik.com/en/products-and-services/persulfates/klozur-persulfates). Langan assumes the cost of the chemical oxidation reagants is $2.40 per pound. Langan assumes the fraction dosage by weight of chemical oxidation reagants is 0.02.

Langan assumes that areas with lead impacts (area 6) will also be treated with stabilization reagants (e.g., MetaFix: https://active-oxygens.evonik.com/en/products-and-services/soil-and-groundwater-remediation/metafix-reagents). Langan assumes the cost of the lead stabilization reagants is $3.10 per pound. Langan assumes the fraction dosage by weight of lead stabilization reagants is 0.01.

Langan assumes that areas with PFAS impacts (areas 3 and 4) will also be treated with stabilization reagants (e.g., Fluorosorb: https://www.mineralstech.com/cetco/water-and-remediation/fluoro-sorb-adsorbent). Langan assumes the cost of the stabilization reagants is $3.10 per pound. Langan assumes the fraction dosage by weight of stabilization reagants is 0.01.

Costs associated with soil solidification and stabilization application include subcontractor fees (of $5,000 per day) to apply reagants to six impacted areas. This task includes Langan time to coordinate with the application subcontractor. Langan assumes application of solification and stablization reagents will require up to three days in the field to complete.

Estimated costs associated with soil off-haul assumes approximately 20% of soil handled during surface preparation and cover application will require off-haul and disposal. Based on the volume of the six areas, this estimate assumes approximately 15 cubic yards of material will be removed from the six areas. Assumes a conversion factor of 1.4 from cubic yards to tons. Assumes a transport and disposal fee of $100/ton of non-hazardous material.

Additional costs associated with the limited grading areas may include obtaining a grading permit, traffic control plans, temporary fencing, utility locate, odor control and/or compaction testing.

Dewatering and groundwater monitoring are is assumed to not be required.