

Technical Memorandum



To: Frank Winslow, LHG

From: Scott Miller, P.E.

Company: WA Dept of Ecology

SLR International Corporation

cc: Tom Graham, JELD-WEN, Inc.

Date: June 20, 2025

Project No. 108.020778.00001

**RE: Supplemental Disproportionate Cost Analysis
Jeld Wen Site, Everett, WA (CSID:4402)**

This memorandum has been prepared to present a supplemental disproportionate cost analysis (DCA) for the soil removal component of the Creosote/Fuel Oil Area remedial action alternative presented in the Cleanup Action Plan (CAP) for the Jeld Wen Site located in Everett, Washington.

Background

Feasibility Study (FS) alternatives for the Creosote/Fuel Oil Area were developed by considering distinct areas that require cleanup action: on-property ("property" defined as the legal boundaries of the former E.A. Nord facility; as opposed to the "Site" which includes the extent of contamination caused by the release of hazardous substances) vadose zone; on-property shallow groundwater (to 15 feet bgs); on-property deep groundwater (>15 feet bgs); off-property vadose zone; off-property shallow groundwater (to 15 feet bgs); and, off-property deep groundwater (>15 feet bgs). Based upon the specifics of the assessment area remedial actions retained as FS alternatives for the Creosote/Fuel Oil Area included combinations of remediation technologies. Those technologies included: monitored natural attenuation (MNA), sub-slab depressurization (SSD), air sparging (AS) and soil vapor extraction (SVE), *in-situ* chemical oxidation (ISCO), enhanced *in-situ* bioremediation (BIO), soil removal, thermal treatment (via steam injection), and *in-situ* stabilization / solidification (ISS). The following seven alternatives were evaluated for this area:

- Alternative 1: SSD, Engineering Controls, and Institutional Controls
- Alternative 2: BIO and SSD
- Alternative 3: ISCO and SSD
- Alternative 4: Soil Removal and BIO
- Alternative 5: Thermal Treatment
- Alternative 6: ISS and Thermal Treatment
- Alternative 7: Hot Spot Soil Removal and BIO (with MNA, IC, EC)

Ecology selected Alternative 7 as the preferred cleanup alternative. Alternative 7 includes excavation and offsite disposal of contaminated soil on-property, operation of an enhanced BIO treatment system for deeper on-site groundwater and shallow and deeper off-property groundwater, MNA, and institutional and engineering controls. As noted in the PRDI Work Plan¹, Ecology issued a BIO deferral letter that refines the scope of the BIO treatment system to consist of AS and SVE to target the primary risk mechanism of volatilization of groundwater to on-property workers via vapor intrusion, and the enhanced component of the BIO system described in the FS

¹ SLR International Corp. (SLR). Final Pre-Remedial Design Investigation Work Plan – Upland Areas of Jeld Wen Site. April 3, 2024.

(NNS injections and recirculation) is to be considered the primary Contingency Remedial Action (CRA), pending completion of a Focused Feasibility Study (FFS), if necessary. As stated in the BIO deferral letter, that change is not considered a significant change to the CAP, but rather primarily results in a modification of the sequencing of the cleanup components specified within the CAP. Similarly, the proposed modification to the excavation specifications evaluated in this memo also does not represent a significant change to the CAP.

The Hot Spot soil excavation was included to address soil impacts at depths where direct exposure is most likely (via future construction worker scenario), thus eliminating and/or mitigating the primary exposure pathway. As noted in the CAP, Site conditions could easily lead to flowing sands that could quickly destabilize a shored excavation and therefore additional data was collected during the PRDI to support a detailed design of the shoring system necessary for soil removal. In addition, Ecology has presented concerns with the potential for sea level rise and inundation of portions of the Site during King Tide events which could affect the operation of an SVE system.

Engineering controls (surface cap) and institutional controls (restrictions on soil disturbance) are also elements of the selected remedy due to the acknowledgement that residual soil contamination above CULs will likely remain in-place, particularly prior to full implementation of the BIO system.

Conceptual Site Model

For purposes of this supplemental DCA, the term 'Hot Spot' soil has been defined as the PRDI sample locations which identified observations of NAPL as either 'Product Saturated Soil' or 'Some Product Saturated Soil (blebs)' per the classifications presented in the PRDI Work Plan with examples included in Figure 1. These Hot Spot soil areas are alternately areas selected for mitigation of the direct contact pathway.

The lateral extent of Hot Spot soils has been identified as a discontinuous ganglion, as opposed to a cohesive interval of gross impacts. Clean overburden (i.e., soils without observed presence of NAPL) were primarily up to 4' to 5' bgs, with the exception of a few areas where NAPL was observed in the uppermost 4 feet (see attached Figure 1a to 1f).





NAPL Intervals per PRDI Work Plan			
I. Product Saturated Soil	II. Some Product Saturated Soil (blebs)	III. Significant Grain Staining (>50% soil particles coated in product)	IV. Significant Grain Staining (<50% soil particles coated in product)
 <p>(from CF-P17)</p>	 <p>(from CF-P14)</p>	 <p>(from MW-32D)</p>	 <p>(from MW-26D)</p>
<p>Visible saturation of dense product; Black to gray w/ green sheen Strong creosote-like odor Found more in silty sands before a silty layer.</p>	<p>Visible "blebs" of product; Black to gray w/ green sheen Strong creosote-like odor</p>	<p>No visible product or "blebs"; >50% of soil particles coated in product (dark gray to gray); Moderate to strong creosote-like odor</p>	<p>No visible product or "blebs"; <50% of soil particles coated in product (gray); Faint to moderate creosote-like odor Found more sandy silts (less porous)</p>

Exhibit A: NAPL Classification (from PRDI Data Report)



The alternate POC for the soil cleanup levels presented in the CAP for the Creosote/Fuel Oil Area were throughout the soil column from the ground surface to 9 feet bgs. Further assessment of the shallow groundwater table (groundwater levels at MW-8A consistently stay within 5 feet of the ground surface), and after review of adjacent public utility locations and assumed depths of utility corridors, it is unlikely that construction work could be safely performed down to the standard POC for soil of 15 feet bgs or even the alternate POC of 9 feet. A conservative recommendation for an alternate POC is from the ground surface to 6 feet bgs.

Development of Alternatives

Findings and field observations from the PRDI showed a change in the conceptual understanding of hot spot soil in the Creosote/Fuel Oil Area. There is no consolidated mass of shallow gross impact/NAPL, the PRDI discontinuous areas of NAPL impacted soil, primarily below the groundwater table. This change in the concept of Hot Spot soil coupled with the concerns about seal level rise, King Tide and surface flooding, and the limited vadose zone lead to the development of additional alternatives that supplements the DCA performed in the FS and presented in the CAP.

Cleanup action alternatives for this supplemental DCA were developed and evaluated based on the requirements and the criteria specified in WAC 173-340-360, Selection of Cleanup Actions and WAC 173-340-370, Expectations for Cleanup Action Alternatives, similarly to the process performed for the FS.

This supplemental DCA for the Creosote/Fuel Area includes the following alternatives:

- Alternative #7A: Hot Spot Soil Removal to 9' bgs, backfill and capping at existing ground surface elevation, AS/SVE, EC and IC (as presented in the CAP).
- Alternative #7B: Hot Spot Soil Removal to 6' bgs, backfill and capping at existing ground surface elevation, AS/SVE, EC and IC.
- Alternative #7C: Hot Spot Soil Removal to 4' bgs from current ground elevation, backfill and capping up to 2' above existing ground surface elevation over larger exposure pathway area, AS/SVE, EC and IC.

Figure 2 presents the estimated excavation and treatment outlines for the alternatives.

Cost Assumptions

The costs to implement the cleanup action alternatives were evaluated, including the direct and indirect cost of construction, the long-term monitoring costs, and agency oversight costs that are cost recoverable. Long-term costs include cap maintenance costs, monitoring costs, and the cost of maintaining institutional controls. The design life of the cleanup action has been estimated and the cost of replacement or repair of major elements has been included in the cost estimate. Costs were compared against benefits to assess cost-effectiveness and practicability of the cleanup action alternatives. No weighting factor was applied to this quantitative category.



Scoring

Consistent with MTCA regulations and Ecology guidance, the alternatives were evaluated for the seven criteria listed in WAC 173-340-360(3)(f). These criteria include protectiveness, permanence, effectiveness over the long term, management of short-term risks, technical and administrative implementability, consideration of public concerns, and cost. The minimum requirements for cleanup actions (WAC 173-340-360(2)) were also considered in the evaluation. All the abovementioned alternatives meet the MTCA requirement for permanent solution to maximum extent practicable and reasonable restoration timeframe for cleanup actions.

PROTECTIVENESS

Protection of human health and the environment is a threshold requirement. As such, protectiveness criterion is one of the main criteria in the DCA that weighs the most. MTCA (WAC 173-340-360(3)(f)(i)) provides factors to be considered for overall protectiveness of human health and the environment. These are: the degree to which existing risks are reduced, time required to reduce risk at the facility and attain cleanup standards, on-site and off-site risks resulting from implementing the alternative, and improvement of the overall environmental quality.

Alternative 7A scores highest due to the greater degree of certainty associated with removal and the quicker risk reduction, with the alternatives descending in order of mass removal performed. Alt 7B and Alt 7C have the same depth to remaining contamination, so should be equally protective. Alt 7C leaves more residual mass but includes placement of certified clean fill to top 2' across larger area. In addition, Alternative 7C provides more complete treatment of volatile and semivolatile contaminants (i.e., the vapor intrusion pathway) due to the increase in ground elevation to expand the vadose zone and allow for more continuous operation of the SVE system.

PERMANENCE

Permanence is another principal criteria that defines which alternatives permanently removes contaminants from the site. This criteria is used to select the baseline cleanup alternative (WAC 173-340-360(3)(e)(ii)(B)). MTCA requires using the following factors to evaluate the permanence criteria: the degree to which the alternative permanently reduces the toxicity, mobility or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated.

Each Alternative eliminates or mitigates the direct contact pathway within the associated soil POC; however, similar to Protectiveness, the alternatives score descends in order of mass removal performed. Again, although Alternative 7C provides more permanent treatment of volatile and semivolatile contaminants through mitigating the vapor intrusion pathway, it does include the least mass removal; however, Alternative 7C offers additional protections with the 2' of added clean fill, therefore permanence appears to be equal with Alternative 7B, although Alternative 7B has slightly more mass removal. Although Alternative 7A has a slightly higher permanence score, Ecology considers the overall benefits of Alternative 7C to outweigh that slightly higher permanence score. Vapor mitigation is enhanced through the increase in ground elevation expanding the vadose zone, and allow for expected continuous operation of the SVE system.



EFFECTIVENESS OVER THE LONG-TERM

The following factors are considered to score effectiveness over the long term as provided in MTCA: the degree of certainty that the alternative will be successful, the reliability of the alternative during the period of time hazardous substances are expected to remain on-site at concentrations that exceed cleanup levels, the magnitude of residual risk with the alternative in place, and the effectiveness of controls required to manage treatment residues or remaining wastes. (WAC 173-340-360(3)(f)(iv)). Proven treatment technologies, site-tested treatment technologies, and technologies with a shorter restoration timeframe generally receive a higher ranking. Complex treatment technologies and technologies requiring longer durations generally are ranked lower. Scores reflect MTCA's preferences for (in order) recycling/reuse, destruction/detoxification, immobilization/solidification, off-site disposal, isolation/containment, and institutional and engineering controls.

Alternatives have similarly high scores for long term effectiveness as all contain a proven treatment technology. Alternative 7C scores slightly higher due to the increased operation of the SVE system to address volatile components and control the vapor intrusion pathway.

MANAGEMENT OF SHORT-TERM RISKS

This criterion takes into account the risk to human health and the environment when a particular alternative is implemented and how effectively those risks can be managed during construction. Scoring for management of short-term risks uses a relative scale to evaluate construction risks to human health and safety; larger and more complex projects are considered to carry greater risk than smaller and simple projects. Technology-specific risks have been considered (e.g. thermal treatment has temperature related risks, excavation has cave-in, heave, and shoring risks, ISCO has chemical handling risks, etc.).

Alternative 7A includes the most short-term risk that includes high risks of worker injury that may include excavation failures due to extended depth of the proposed excavation and the need for significant shoring, and injuries associated with building demolition. Alternative 7C includes the least short-term risk due to targeted contaminated soil removal area above the typical groundwater table and that primary soil to be handled is clean fill to raise the elevation and expand the vadose zone.

TECHNICAL AND ADMINISTRATIVE IMPLEMENTABILITY

Scoring evaluates the overall difficulty of implementation for each of the proposed alternatives. MTCA requires to consider the following factors for technical and administrative implementability: 1) whether the alternative is technically possible, 2) availability of necessary off-site facilities, services and materials, 3) administrative and regulatory requirements, 4) scheduling, 5) size, 6) complexity, 7) monitoring requirements, 8) access for construction operations and monitoring, and 9) integration with existing facility operations and other current or potential remedial actions.

All Alternatives use technologies that have been demonstrated to be effective for conditions observed at the Site and comprise projects of moderate size and complexity. However, Alternative 7A requires extensive, high-risk construction (sheet piling, building demo, dewatering system) and therefore scores the lowest.



CONSIDERATION OF PUBLIC CONCERNS

MTCA requires to consider public concerns as to whether the community has concerns regarding the alternative and, if so, the extent to which the alternative addresses those concerns. This process includes concerns from individuals, community groups, local governments, tribes, federal and state agencies, or any other organization that may have an interest in or knowledge of the site. Alternatives were scored based on the balance between public desire for more active clean-up actions and potentially negative impacts to the community that may include economic (prolonged shutdowns or disruption to local business), public safety (e.g. heavy haul traffic on public roads), or other nuisance (e.g. construction noise and duration) considerations. Alternatives were scored based on public concerns related to cleanup projects in the Port Gardner Bay area.

Each Alternative offers removal of contamination with impacts related to active construction, hauling to off-site facilities, and additional traffic. While these alternatives score highest from public point of view due to highest degree of certainty associated with permanent solution, the public concern most likely to affect the scoring involves the handling and transport of extremely pungent creosote-impacted soil. Therefore, the scoring descends based on amount of NAPL-impacted soil requiring transport to an off-site facility (i.e., Alternative 7A is lowest score and Alternative 7C is highest score). In addition, Alternative 7C has the shortest construction schedule and least prolonged disruption to business activity on the Subject Property.

COSTS

Detailed costs for each alternative are provided in the attached cost estimate sheet which provides a summary of the estimated total cost for each alternative, including construction as well as non-construction costs. Alternative 7C was the lowest cost alternative, estimated to cost \$3.7 million to implement. Alternative 7B provides more soil removal with an overall cost of \$5.5 million to implement. The cost for Alternative 7A has the highest cost at \$8.4 million but removes the most contaminated media as compared to the other alternatives. Alternative 7A will also require the most construction support, as the depth requires additional shoring and building demolition.

Supplemental Disproportionate Cost Analysis

The purpose of a DCA is to facilitate the selection of the cleanup alternative that provides the highest degree of permanence to the maximum extent practicable for the conditions identified at the Site, as presented in the above CSM.

A MTCA Composite Benefit Score was calculated for each alternative by summing the product of the criterion score times the assigned weighting factor, the resulting Composite Benefit Score is the measure of human health and environmental benefit that would be realized with implementation for each cleanup alternative (WAC 173-340-360(3)(e)(ii)(C)). DCA scoring is included on the attached table and summarized below.

Creosote/Fuel Oil Area

Alternative 7A uses the most thorough removal within safe and practical boundaries. Alternative 7A has a total Composite Benefit Score of 7.1, representing moderate to good Composite Benefit. The cost per unit of Composite Benefit Score for Alternative 7A is \$1.2 million, which is the highest



of the alternatives. Alternative 7A has a Benefit Score to Cost Ratio of 0.8, the lowest of the three scored alternatives. The scoring is presented in Exhibit B.

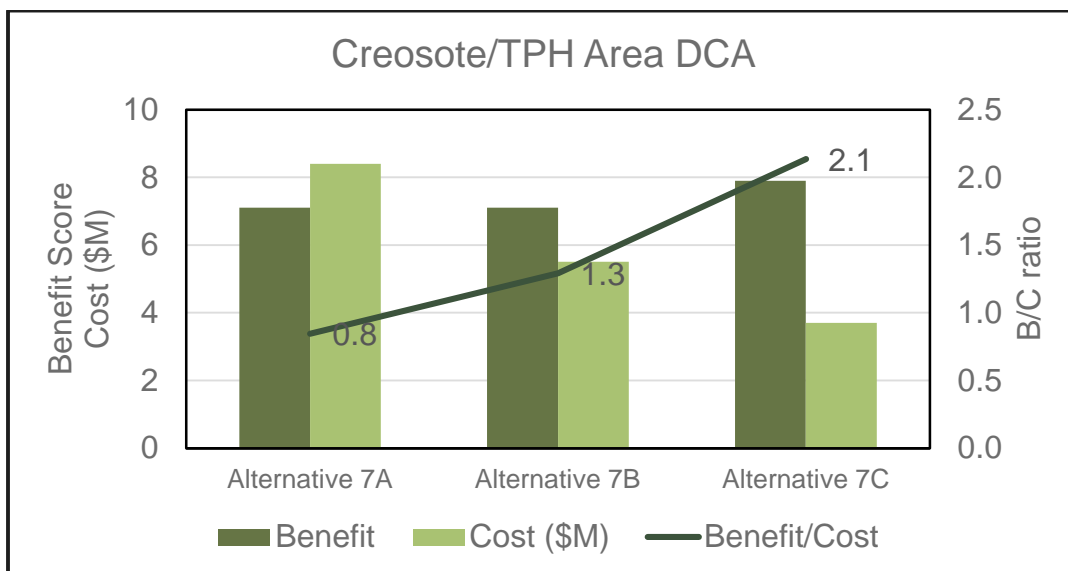
Alternative 7B has a total Composite Benefit Score of 7.1, representing a moderate to good Composite Benefit. Alternative 7B has a unit cost of \$775,000, which is the median of the three Alternatives. The benefit to cost ratio is 1.3. This alternative represents the median with respect to cost, efficacy and length of schedule.

Alternative 7C has the lowest total costs as compared to the other alternatives while maintaining very high Benefit Scores (7.9, representing good Composite Benefit). This Alternative relies on shallow soil removal which results in limited construction costs and allows for more continuous operation of the SVE system, which should reduce time to reach cleanup objectives. This approach receives very high scores for long-term effectiveness, short-term risk management, implementability, and public consideration. The Benefit-Cost Ratio of all three Alternatives is presented below in the following Exhibit C.

Exhibit B: Costs and Benefit Scores

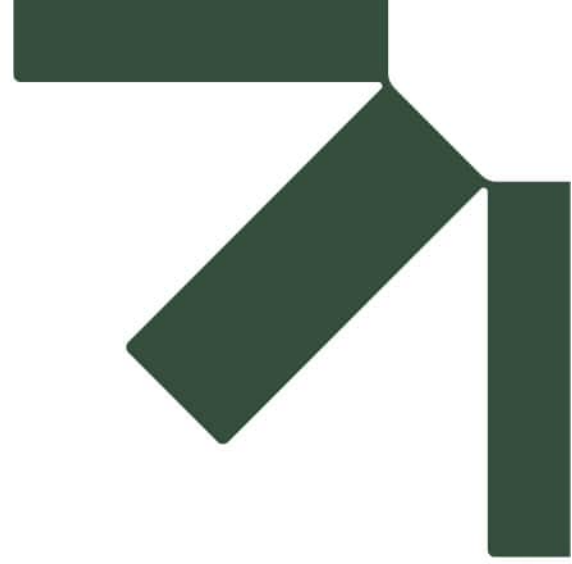
	Alternative 7A	Alternative 7B	Alternative 7C
Total Composite Benefit Score:	7.1	7.1	7.9
Unit Cost (Dollars per Composite Benefit Score Increment):	\$1,184,000	\$775,000	\$469,000
Cost (Millions of Dollars):	\$8.4	\$5.5	\$3.7
Benefit Score to Cost Ratio	0.8	1.3	2.1

Exhibit C: Cost-Benefit Analysis of Alternatives

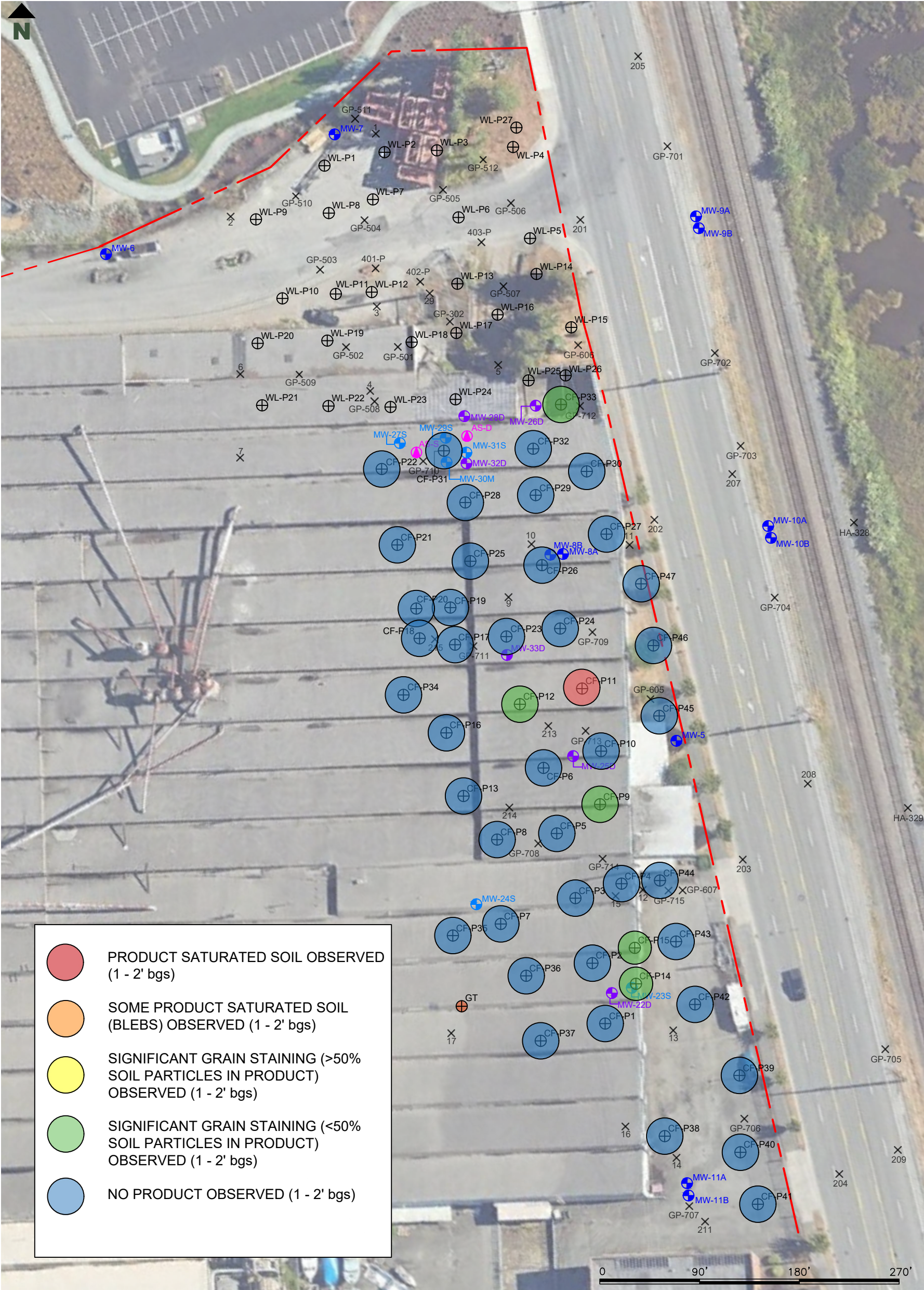


Alternative 7C appears to be the most permanent cleanup to the maximum extent practicable and accomplishes multiple objectives of the cleanup activity, including: protection of human health and the environment, eliminating or mitigating exposure pathway(s), and takes into account the anticipated effects of sea level rise and its effect on permanence of the treatment system in accordance with MTCA (WAC 173-340-360(3)(a)(v) and (5)(d)(iii)(A)(III).





Figures



LEGEND

- APPROXIMATE SUBJECT PROPERTY BOUNDARY
- MW EXISTING GROUNDWATER MONITORING WELL
- MW NEW PRDI SHALLOW GROUNDWATER MONITORING WELL
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JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
SUPPLEMENTAL DISPROPORTIONATE COST ANALYSIS

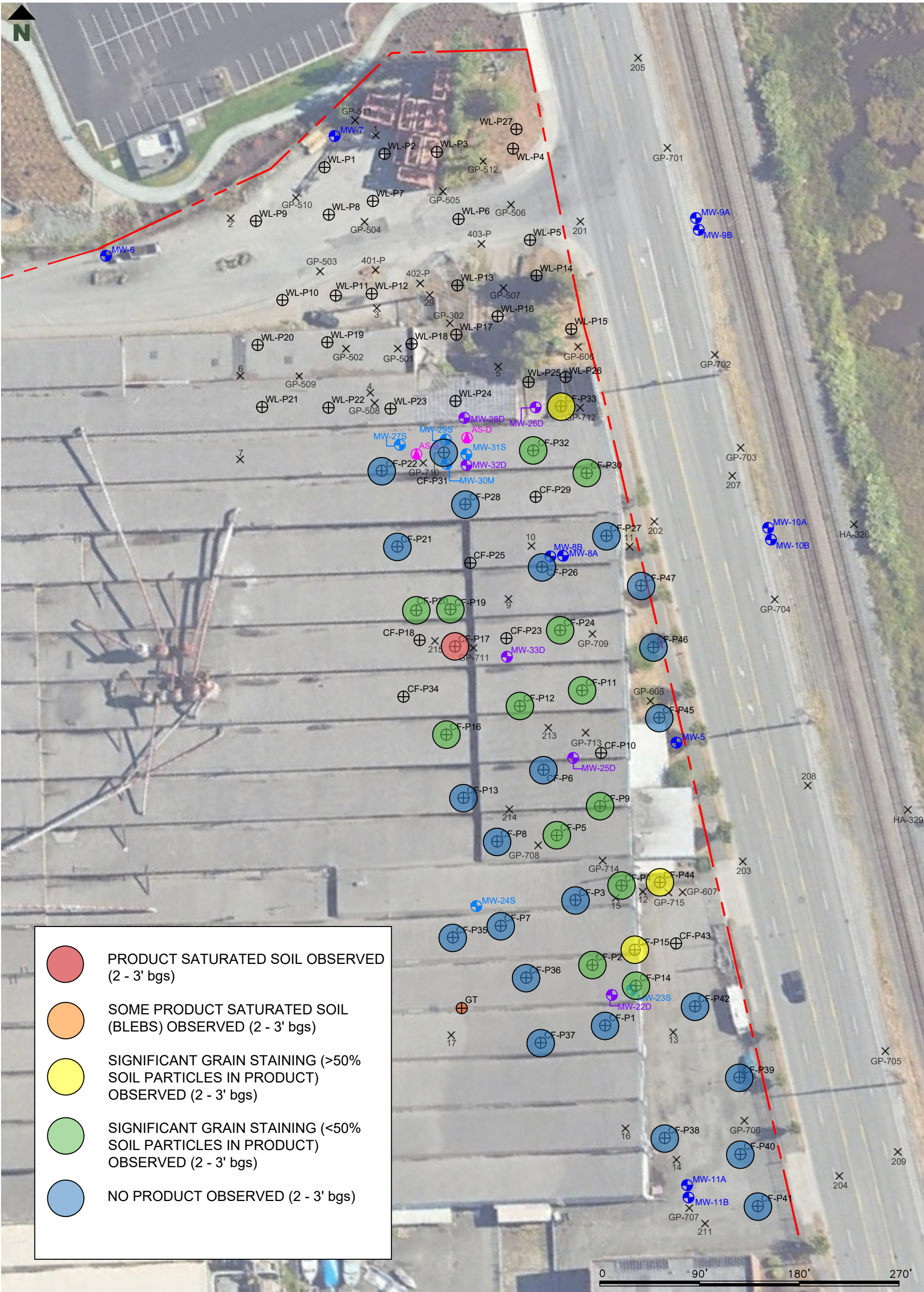
Figure
CREOSOTE/FUEL OIL AREA SOIL REMOVAL DELINEATION
ASSESSMENT - NAPL OBSERVATIONS BY DEPTH

Date MAY 2025
File Name 2024_Nord.dwg

Scale AS SHOWN
Project No. 108.020778.00001

Fig. No.
1a





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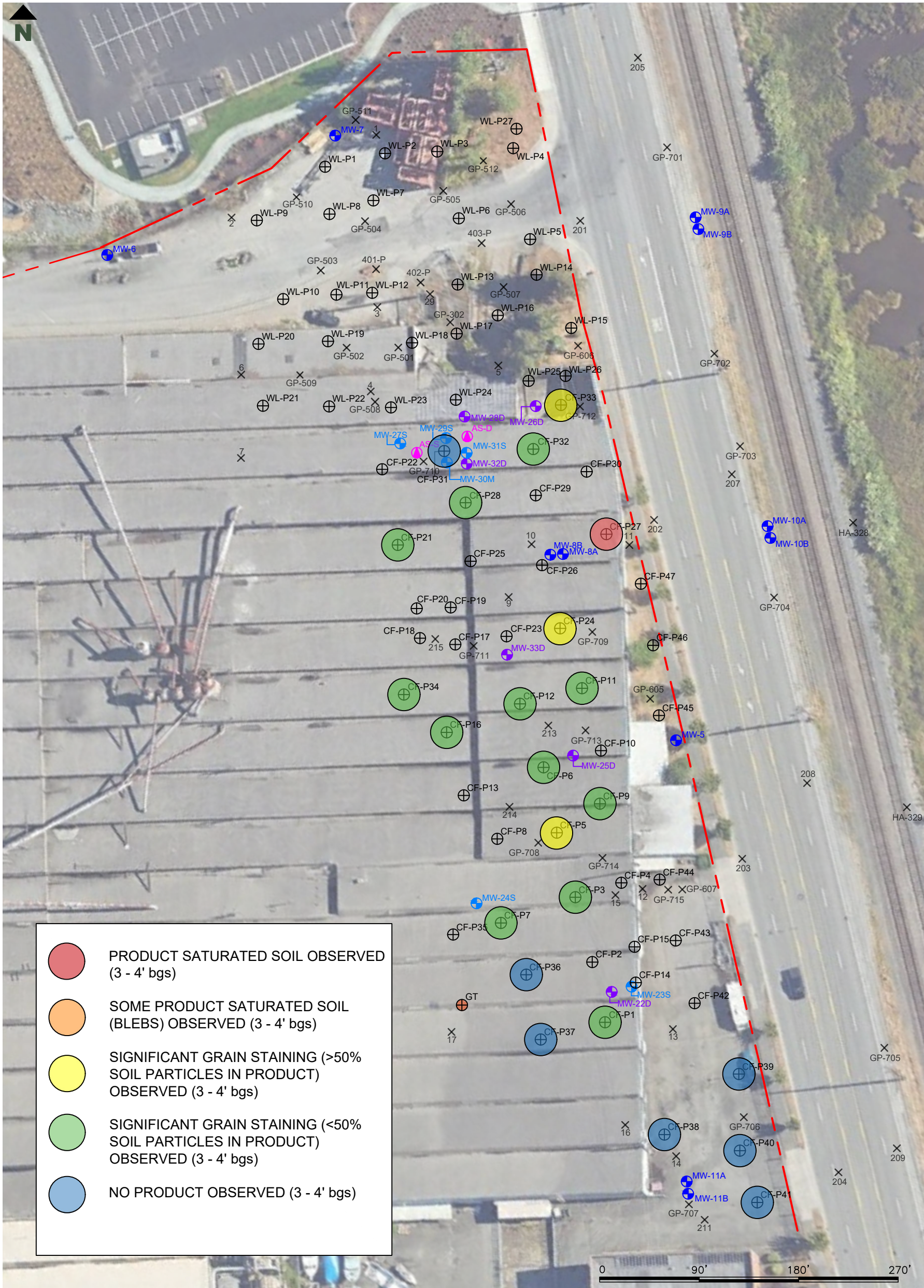
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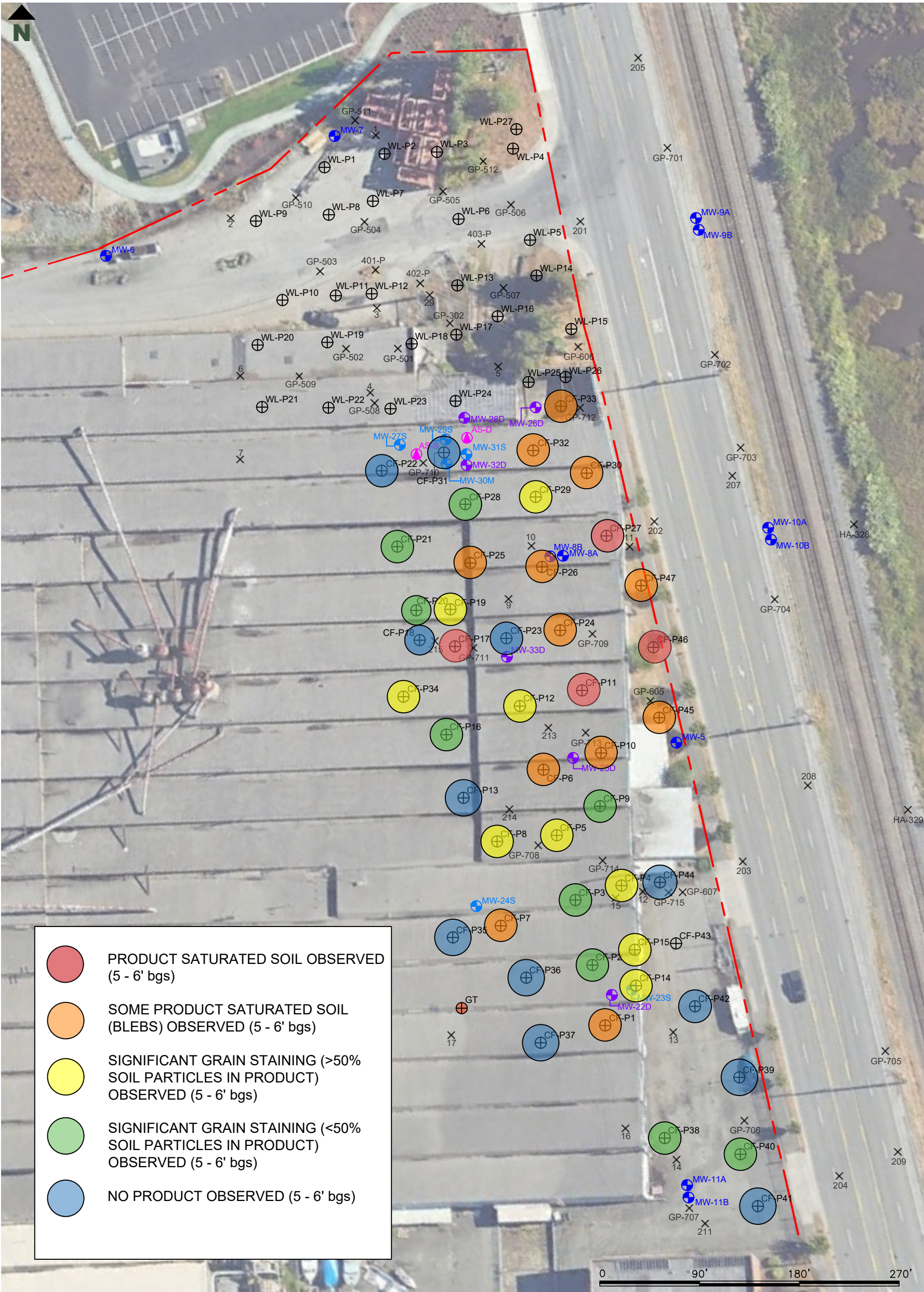
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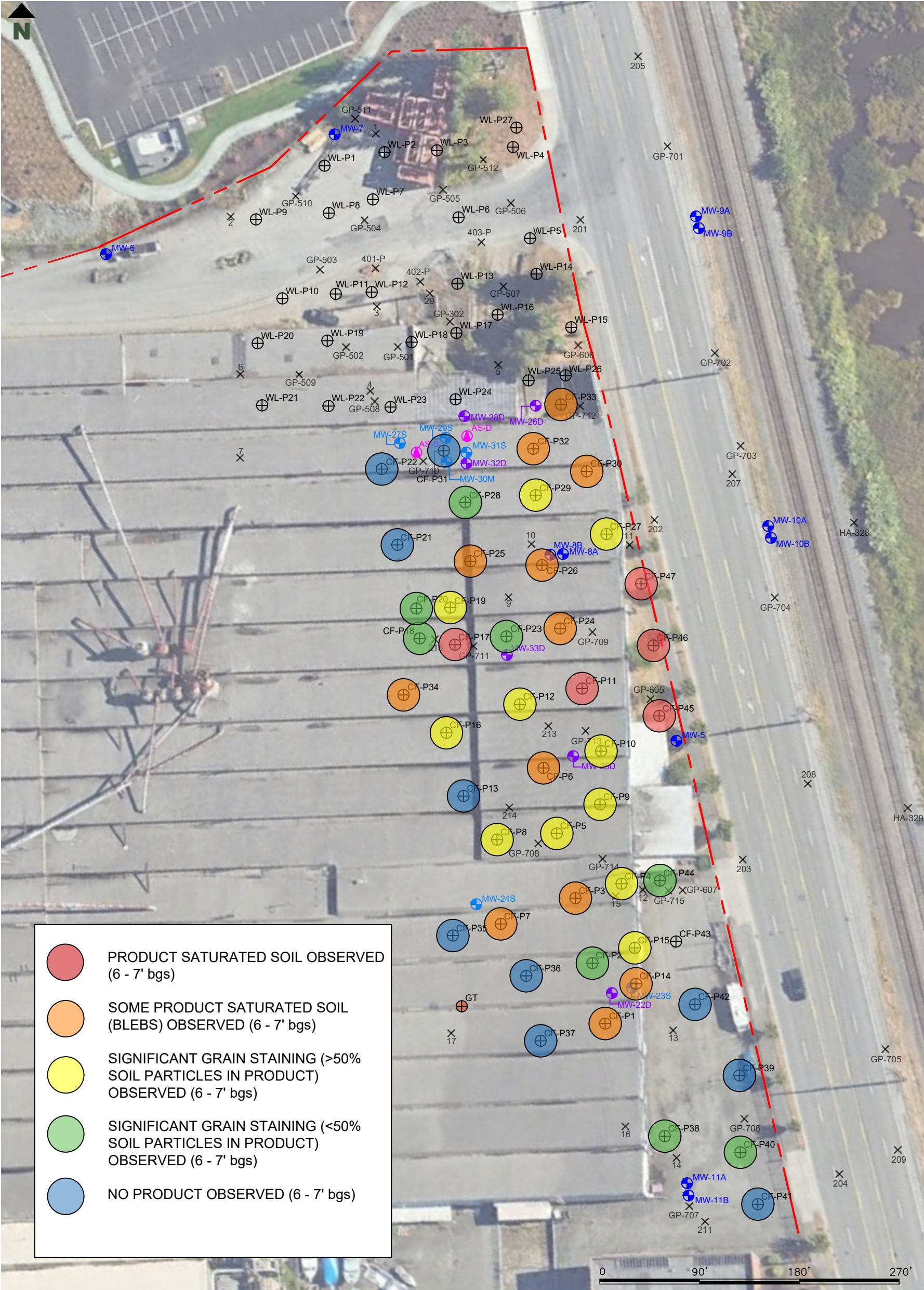
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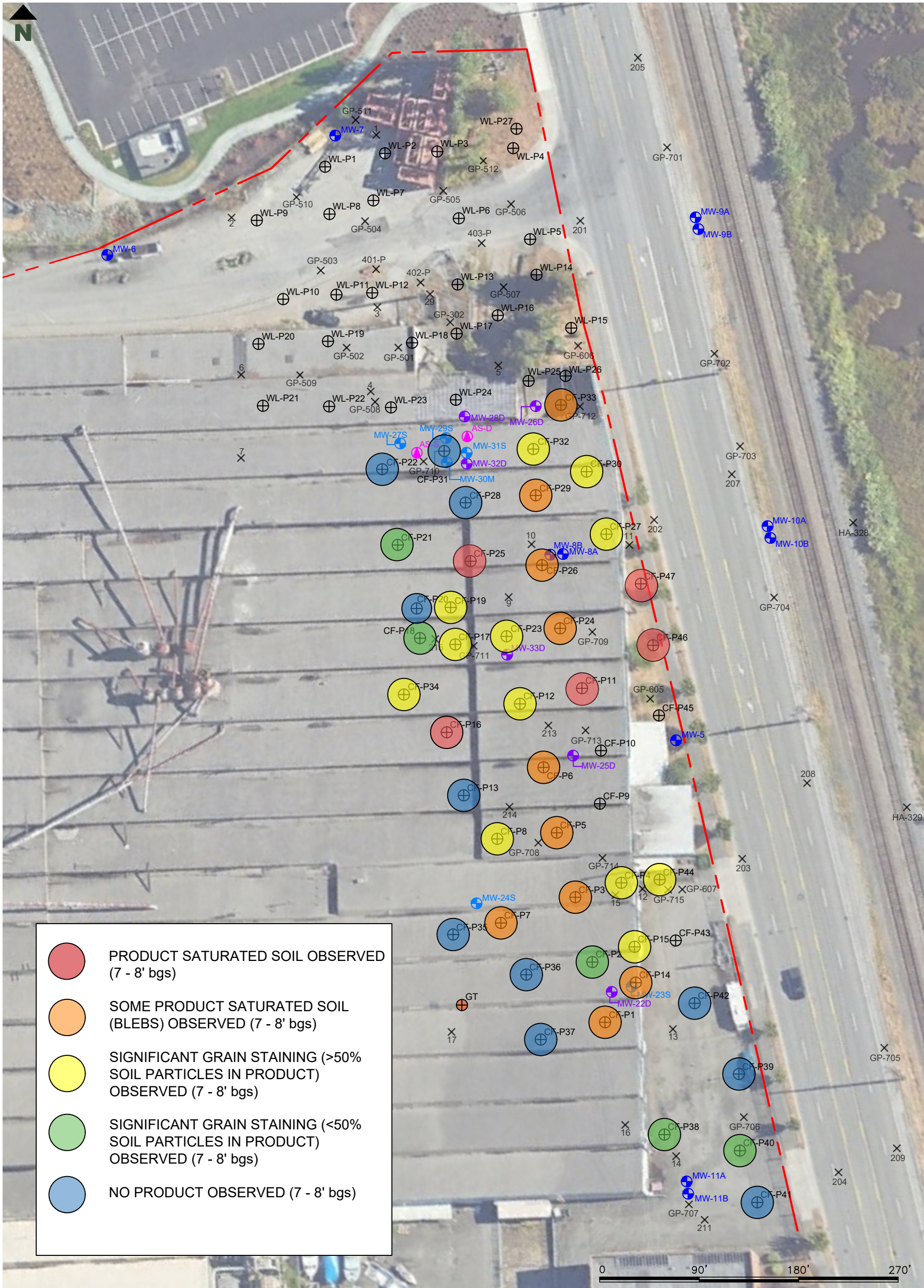
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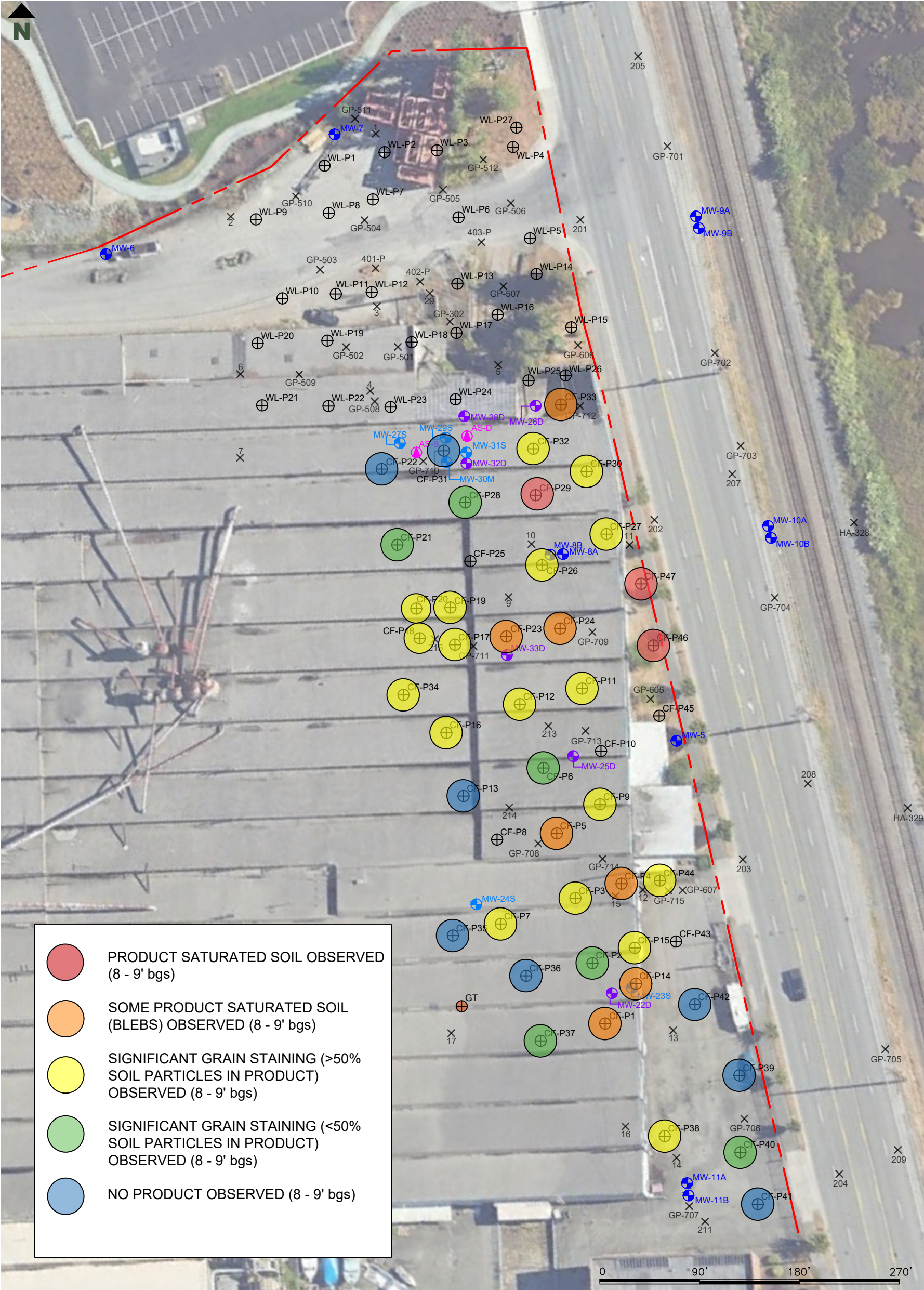
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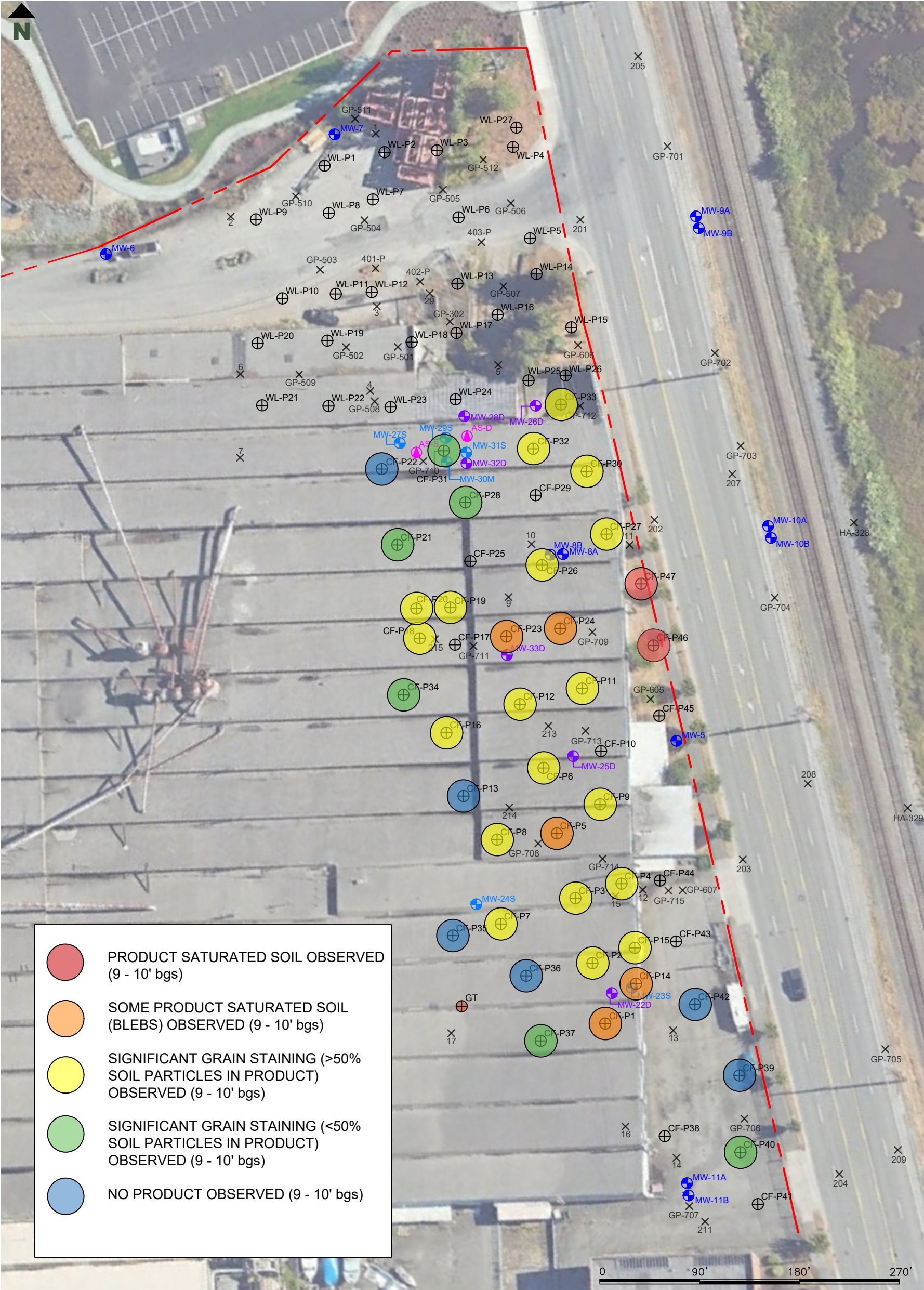
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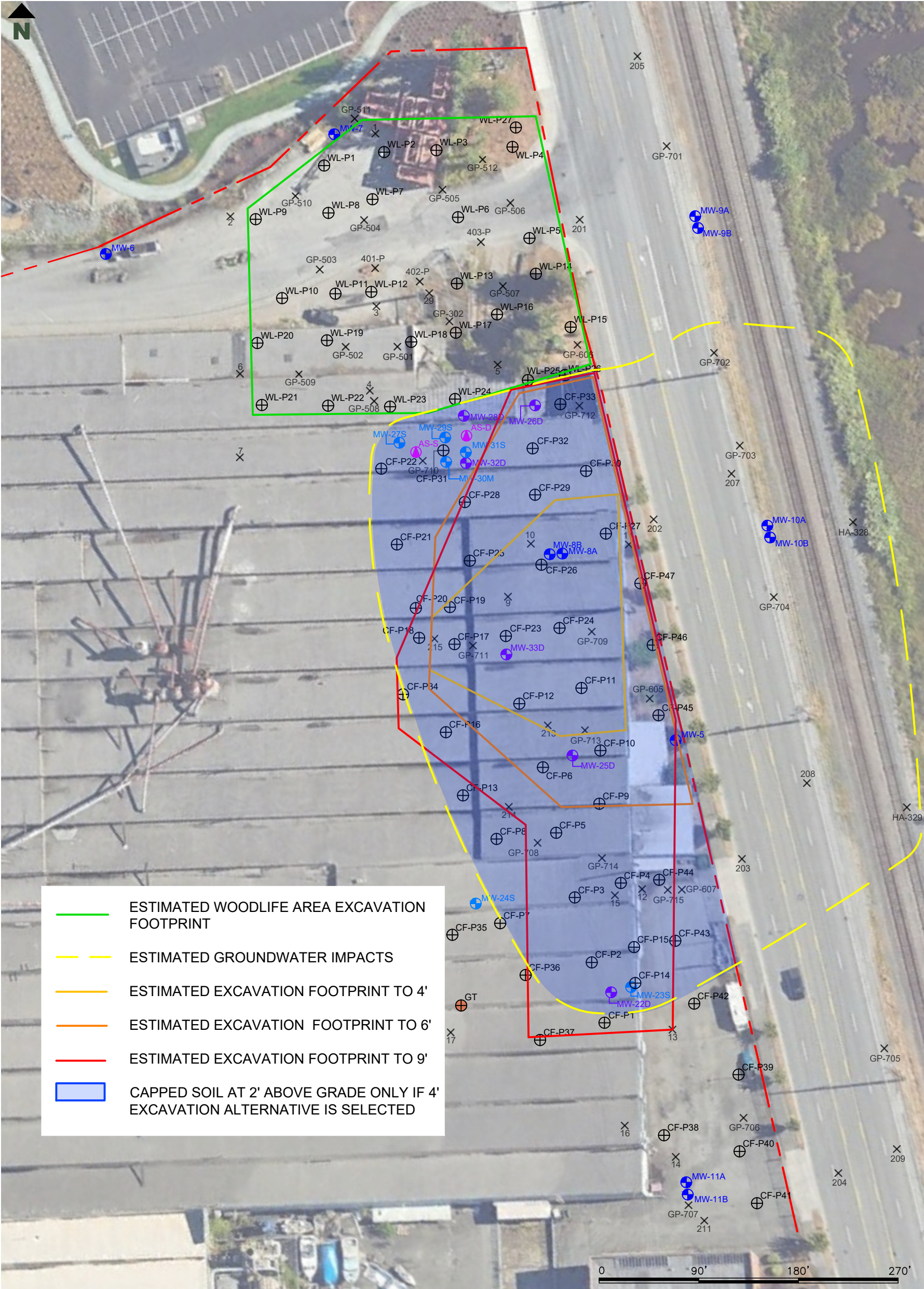
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Fig. No.
1h





ESTIMATED WOODLIFE AREA EXCAVATION FOOTPRINT

ESTIMATED GROUNDWATER IMPACTS

ESTIMATED EXCAVATION FOOTPRINT TO 4'

ESTIMATED EXCAVATION FOOTPRINT TO 6'

ESTIMATED EXCAVATION FOOTPRINT TO 9'

CAPPED SOIL AT 2' ABOVE GRADE ONLY IF 4' EXCAVATION ALTERNATIVE IS SELECTED

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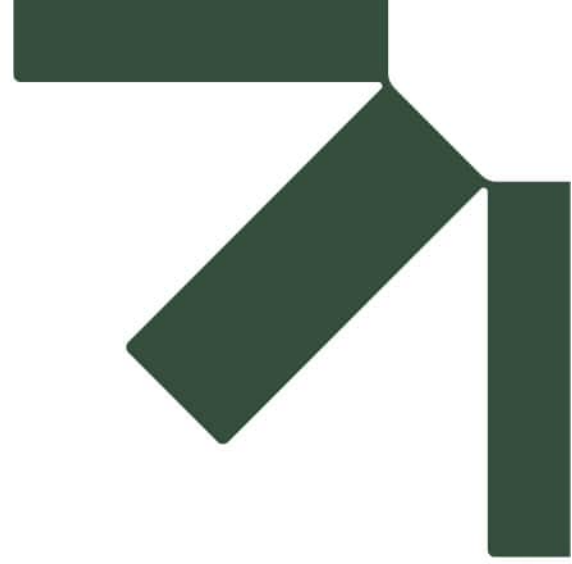
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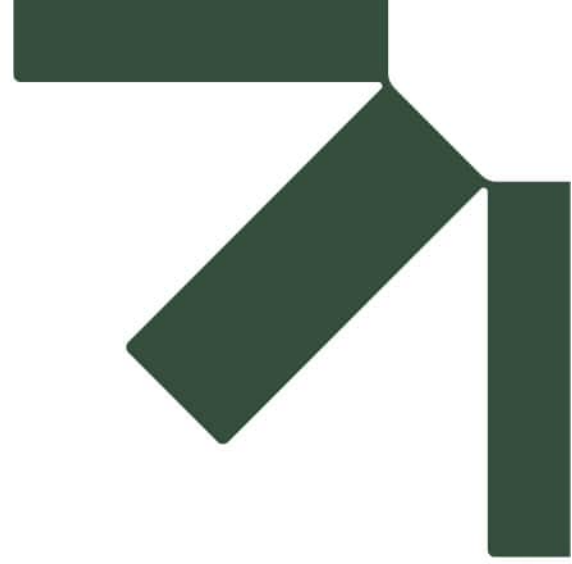


Attachment 1 Scoring Table

Supplemental Disproportional Cost Analysis (DCA) Scoring Matrix

Alternative 7 for Creosote/Fuel Oil Area

Criterion	Weighting	WAC Language	Scoring Criteria	Alternative 7A	Alternative 7B	Alternative 7C
				Hot Spot Soil Removal to 9' bgs	Hot Spot Soil Removal to 6' bgs	Hot Spot Soil Removal to 4' bgs; place 2' clean cap
Protectiveness	30%	Overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, time required to reduce risk at the facility and attain cleanup standards, on-site and offsite risks resulting from implementing the alternative, and improvement of the overall environmental quality.	Protection of human health and the environment is a threshold requirement. The deepest excavation (Alt 7A) would be the most protective. Alt 7B and Alt 7C have the same depth to remaining contamination, so should be equally protective. Alt 7C leaves more residual mass but includes placement of certified clean fill to top 2' across larger area.			
			Score:	9.0	8.0	8.0
Permanence	20%	The degree to which the alternative permanently reduces the toxicity, mobility or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated.	Alternatives are scored based on permanent removal of contaminants with higher scoring provided for alternatives that permanently reduce toxicity, mobility or volume. The most mass removed (Alt 7A) should be the most permanent. Alt 7C offers additional protections with the 2' of added clean fill, therefore permanence appears to be equal with Alt 7B, although Alt 7B has slightly more mass removal. Although Alt 7A has a slightly higher permanence score, Ecology considers the overall benefits of Alt 7C to outweigh that slightly higher permanence score.			
			Score:	8.0	7.0	7.0
Long-Term Effectiveness	20%	Long-term effectiveness includes the degree of certainty that the alternative will be successful, the reliability of the alternative during the period of time hazardous substances are expected to remain on-site at concentrations that exceed cleanup levels, the magnitude of residual risk with the alternative in place, and the effectiveness of controls required to manage treatment residues or remaining wastes.	Proven treatment technologies, site-tested treatment technologies, and technologies with a shorter restoration timeframe generally receive a higher ranking. Complex & less reliable treatment technologies and technologies requiring longer durations generally are ranked lower. Alternative 7C scores highest due to more efficient use of the SVE system (no shutdowns due to elevated water table or site inundation).			
			Score:	7.0	7.0	8.0
Management of Short-Term Risk	10%	The risk to human health and the environment associated with the alternative during construction and implementation, and the effectiveness of measures that will be taken to manage such risks.	Scoring for management of short term risks uses a relative scale to evaluate construction risks to human health and safety; larger more complex projects are considered to carry greater risk than simpler small projects. Alternative 7A has increased construction and transport with more potential for unauthorized releases. Majority of soil handling for Alt 7C is clean fill.			
			Score:	5.0	6.0	8.0
Technical and Administrative Implementability	10%	Ability to be implemented including consideration of whether the alternative is technically possible, availability of necessary offsite facilities, services and materials, administrative and regulatory requirements, scheduling, size, complexity, monitoring requirements, access for construction operations and monitoring, and integration with existing facility operations and other current or potential remedial actions.	Scoring evaluates the overall difficulty of implementation for each of the proposed alternatives. Alternative 7A is most difficult to implement due to shoring and dewatering. Alt 7C is easiest as includes least contaminated soil removal and transport and does not require shoring or dewatering.			
			Score:	4.0	6.0	9.0
Consideration of Public Concerns	10%	Whether the community has concerns regarding the alternative and, if so, the extent to which the alternative addresses those concerns. This process includes concerns from individuals, community groups, local governments, tribes, federal and state agencies, or any other organization that may have an interest in or knowledge of the site.	Alt 7C includes import of 2' of clean cap material to address exposure POC as well as potential sea level rise and climate change concerns. Alt 7A and 7B include transport of larger volume of high-odor material through several communities.			
			Score:	5.0	7.0	8.0
Total Composite Benefit Score:				7.1	7.1	7.9
Unit Cost (Dollars per Composite Benefit Score Increment):				\$1,184,000	\$775,000	\$469,000
Cost (Millions of Dollars):				\$8.4	\$5.5	\$3.7
Benefit Score to Cost Ratio				0.8	1.3	2.1



Attachment 2

Cost Analysis

**Attachment 1
Creosote Area
Supplemental Disproportionate Cost Analysis (DCA)
Alternative 7 for Creosote/Fuel Oil Area**

Remedial Action Component		Units	No. of Units	Unit Cost	Cost	Total Cost	Units	No. of Units	Unit Cost	Cost	Total Cost	Units	No. of Units	Unit Cost	Cost	Total Cost																
Remedial Action							Remedial Action							Remedial Action																		
Alternate 7A: Removal to 9' bgs							Alternative 7B: Removal to 6' bgs							Alternative 7C: Removal to 4', uplift 2'																		
Site Controls / Institutional Controls (off-property)		est	1	\$	20,000	\$	20,000					est	1		\$20,000	\$20,000							est	1		\$20,000	\$20,000					
						\$20,000							\$20,000							\$20,000												
Excavation																																
Concrete Removal and Disposal	sq ft		45,000		\$6	\$270,000																										
Building Demo	ea		1		\$500,000	\$500,000																										
Well abandonment (or upgrade)	ea		8		\$4,000	\$32,000																										
Shoring installation	sq ft		20,000		\$75	\$1,500,000																										
Dewatering system	est		1		\$100,000	\$100,000																										
Relocation of utilities in excavation area	est		1		\$10,000	\$10,000																										
Excavation	bcy		13,000		\$6	\$78,000																										
Disposal regular waste (90%)	ton		10,584		\$55	\$582,120																										
Disposal persistent waste (10%)	ton		1,176		\$400	\$470,400																										
Place and compact clean overburden	bcy		4,600		\$5	\$23,000																										
Provide, place, and compact clean fill	bcy		8,400		\$25	\$210,000																										
Paving	sq ft		45,000		\$4	\$157,500																										
						\$3,933,020							\$1,980,480							\$1,077,970												
Bioremediation System																																
Deep AS wells	each		10		\$5,000	\$50,000																										
Shallow AS wells	each		10		\$3,000	\$30,000																										
SVE Trench wells	each		9		\$13,000	\$117,000																										
Compressor, Blowers and Enclosure	LS		1		\$130,000	\$130,000																										
Trenching and Piping	feet		2000		\$110	\$220,000																										
Road Bore	LS		1		\$40,000	\$40,000																										
Electrical Service	LS		1		\$40,000	\$40,000																										
						\$627,000							\$691,000							\$875,000												
Subtotal						\$4,580,020	Subtotal						\$2,752,100	Subtotal						\$1,972,970												
Project Management		6%				\$274,801					\$165,126																					\$118,378
Design and permitting		10%				\$458,002					\$275,210																					\$197,297
Construction management		8%				\$366,402					\$220,168																					\$157,838
Taxes		10%				\$458,002					\$275,210																					\$197,297
Contingency		25%				\$1,145,005					\$688,025																					\$493,243
Remedial Action Subtotal (Rounded to nearest \$10,000)						\$7,280,000	Remedial Action Subtotal (Rounded to nearest \$10,000)						\$4,380,000	Remedial Action Subtotal (Rounded to nearest \$10,000)						\$3,140,000												
Monitoring and Maintenance																																
Semi-annual groundwater monitoring and sampling	yr		5		\$10,000	\$50,000					\$50,000																					\$50,000
Annual Groundwater monitoring and sampling	yr		15		\$5,000	\$75,000					\$75,000																					\$25,000
Semi-Annual reporting	yr		5		\$10,000	\$50,000					\$50,000																					\$50,000
Annual reporting	yr		10		\$4,000	\$40,000					\$40,000																					\$20,000
Bio systems O&M, electrical, equipment repair	yr		20		\$32,000	\$640,000					\$640,000																					\$320,000
5 year review report	yr		4		\$12,000	\$48,000					\$48,000																					\$24,000
Subtotal NPV (see below)						\$833,000	Subtotal NPV (see below)						\$833,000	Subtotal NPV (see below)						\$833,000												
Taxes		10%				\$83,300					\$83,300																					\$42,700
Contingency		20%				\$166,600					\$166,600																					\$85,400
Monitoring and Maintenance Subtotal (Rounded to nearest \$10,000)						\$1,080,000	Monitoring and Maintenance Subtotal (Rounded to nearest \$10,000)						\$1,080,000	Monitoring and Maintenance Subtotal (Rounded to nearest \$10,000)						\$560,000												
Remedial Action Estimated Total (Rounded to nearest \$100,000)						\$6,400,000	Remedial Action Estimated Total (Rounded to nearest \$100,000)						\$5,500,000	Remedial Action Estimated Total (Rounded to nearest \$100,000)						\$3,700,000												
1 Year 1 value shown							1 Year 1 value shown							1 Year 1 value shown							1 Year 1 value shown											
SUM NPV:		\$108,313	\$540,033	\$45,429	\$32,139	\$106,982	\$833,000	\$108,313		\$540,033	\$45,429	\$32,139	\$106,982	\$833,000	\$61,608		\$241,127	\$28,540	\$35,855	\$60,065	\$427,000											
Year	Monitoring	O&M	Carbon	Decom	Reporting																											
1	\$0	\$0	\$2,000	\$0	\$0																											
2	\$10,000	\$32,000	\$6,000	\$0	\$10,000																											
3	\$10,000	\$32,000	\$6,000	\$0	\$10,000																											
4	\$10,000	\$32,000	\$4,000	\$0	\$4,000																											
5	\$10,000	\$32,000	\$2,000	\$0	\$4,000																											
6	\$10,000	\$32,000	\$2,000	\$0	\$12,000																											
7	\$5,000	\$32,000	\$2,000	\$0	\$4,000																											
8	\$5,000	\$32,000	\$2,000	\$0	\$4,000																											
9	\$5,000	\$32,000	\$2,000	\$0	\$4,000																											
10	\$5,000	\$32,000	\$2,000	\$0	\$4,000																											
11	\$5,000	\$32,000	\$2,000	\$0	\$12,000																											
12	\$5,000	\$32,000	\$2,000	\$0	\$4,000																											
13	\$5,000	\$32,000	\$2,000	\$0	\$4,000																											
14	\$5,000	\$32,000	\$2,000	\$0	\$4,000																											
15	\$5,000	\$32,000	\$2,000	\$0	\$12,000																											
16	\$5,000	\$32,000	\$2,000	\$0	\$4,000																											
17	\$5,000	\$32,000	\$2,000	\$0	\$4,000																											
18	\$5,000	\$32,000	\$2,000	\$0	\$4,000																											
19	\$5,000	\$32,000	\$2,000	\$0	\$4,000																											
20	\$5,000	\$32,000	\$2,000	\$40,000	\$12,000																											
Notes:																																
Discount rate = 1.1%																																
OMB Circular No. A-94 (Executive office of the President, office of Management and Budget, and 2013 Discount Rates memo dated 1-24-2013)																																
Total NPV shown is rounded to nearest \$1,000																																