

**PASCO SANITARY LANDFILL
NPL SITE-ZONE A REMOVAL ACTION REMEDIATION PROJECT
SURF Case Study #017**

This case study highlights how sustainable remediation practices and carbon emissions tracking during the removal of 35,000 drums of hazardous materials at a former landfill provided benefits to the surrounding community.

BACKGROUND

The Industrial Waste Area Zone A at the Pasco Landfill National Priorities List (NPL) Site is one of Washington State’s most challenging cleanup sites due to the large amount of industrial waste disposed at Zone A in the 1970s.

During the project’s design phase, the project team, including the contractor, worked closely with the regulators to incorporate remediation strategies to safely remove the buried drums and protect the nearby community. Green and Sustainable Remediation (GSR) tenants and the development of a carbon footprint tracking process were also included in the design. Because of the nature of remediation work, an adaptive management process was implemented to address the uncertainty of removing buried drums containing hazardous waste disposed of more than 50 years ago.

Remediation activities occurred between October 2020 and August 2022 for one of the largest buried drum landfill cleanups in Washington state. More than 35,000 buried drums and 23,800 tons of waste were removed, excavated, categorized via HazCat® Chemical Identification, segregated by hazardous waste class, manifested, and transported to two out-of-state Resource Conservation and Recovery Act (RCRA) disposal facilities.



The Structure over Zone A During Drum Removal Activities



Example of Drum Carcass Placement in Zone A Landfill.

The sustainability strategy was comprised of two elements:

1. environmental sustainability considerations
2. the implementation of sustainable remediation elements of the work, including the confirmation, tracking, and aggregation of materials, supplies, and services, is provided below.

Environmental Sustainability Considerations

- Early stakeholder engagement
- Operating in an ethical & compliant manner
- Reducing greenhouse gas emissions
- Sourcing alternative fuels and renewable energy
- Reusing and recycling materials
- Purchasing materials with recycled content
- Reusing clean soil for backfill and road grading
- Identifying excavated materials that can be recycled and repurposed (asphalt, concrete, steel)



[Click here](#) for a time lapse video of remediation activities inside the structure.

- Capturing, treating, and reusing stormwater
- Limiting idling time for waste-hauling trucks
- Prioritizing biodiesel as the primary fuel source for heavy equipment
- Sourcing local materials/subcontractors
- Using EarthCam camera network for remote oversight, reducing travel for agency visits
- Community engagement (communication, sourcing)

Sustainable Remediation Activities

- Custom carbon tracking spreadsheet used to aggregate materials, supplies, and services to calculate Scope 1, Scope 2, and Scope 3 carbon emissions as defined by EPA
- Used EPA's SEFA (Spreadsheets for Environmental Footprint Analysis) to verify the project's greenhouse gas output
- Installed over 18,000 square feet of sheet pile with a 20% recycled content
- Used 551 MWh of electricity from renewable energy sources, including wind, hydroelectric, solar, and nuclear



ABI Mobile Ram installing sheet pile.

- Recycled 229 tons of concrete, 10 tons of steel, 1,000 tons of asphalt; and repurposed 329 tons of concrete ballast
- Substituted 23,220 gallons of biodiesel for off-road diesel
- Used EPA-approved Tier 4 equipment when available
- Treated and reused approximately 175,000 gallons of contact water for dust suppression
- 43% of materials and services purchased were located within 50 miles of the project site
- Reused onsite fill materials from the RCRA cover system rather than importing fill from local sources

It was determined that the best way to assess the data accurately was groupings into the following categories: energy, fuel consumption, transportation, and materials. From there, the groups were subdivided into trackable work elements, resulting in a framework that included the following:

Energy	Fuel	Transportation	Materials
Electricity	Biodiesel	Equipment	Asphalt
Natural Gas	Diesel	Materials	Aggregate
	Gasoline	Disposal	Concrete
Airline Travel		Disposal	
Commutes		HDPE recyclables	
		Steel	
		Water	

Project controls allowed tracking job costs, materials, and supplies using project spreadsheets and accounting reports. The project material tracking spreadsheets were modified to include items that were not routinely tracked, for example, electricity usage, natural gas consumption, transportation of materials and equipment, air travel, commutes, lodging, and FedEx shipping. Additional project site control mechanisms were implemented to capture the data documented in the material tracking spreadsheet and the applied emission factors.

New or additional items were added to the tracking list and aggregated from the project inception. Some items not initially identified include PPE, lodging, water consumption and treatment, social aspects such as purchasing materials and supplies within 50 miles of the project, safety, employee training, and charitable contributions.

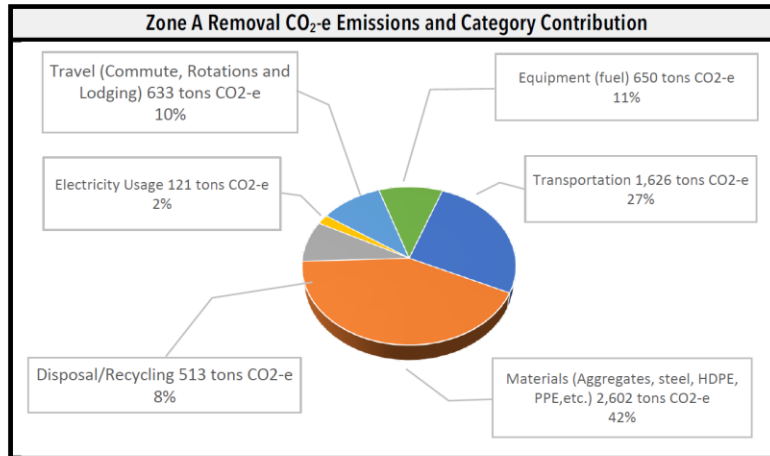
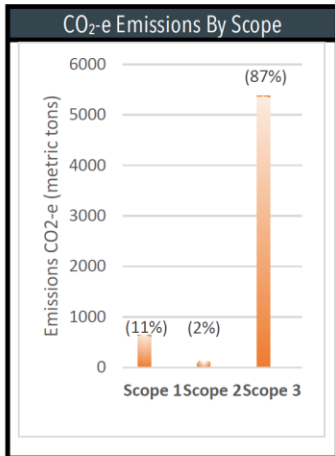
The Carbon Footprint Summary Report (CFSR) highlights key metrics tracked during the work, including the project's carbon emissions, a comparison of the estimated carbon footprint of the closest competing alternative, and social aspects of the work, such as safety metrics, training, and charitable efforts.

The work emitted approximately 6,145 tons of CO₂-e, which were further refined as described below.

- Scope 1 emissions, which included emissions released from directly controlled assets, accounted for 650 tons of CO₂-e or slightly more than 11% of project emissions.
- Scope 2 emissions, which included indirect emissions from purchased or acquired electricity, steam, heat, or cooling, accounted for 121 tons of CO₂-e or slightly less than 2% of project emissions.
- Scope 3 emissions, which included indirect emissions from purchased goods and services, employee commute, business travel, transportation, etc., accounted for approximately 5,374 tons of CO₂-e or about 87% of all project emissions.



SUSTAINABLE REMEDIATION SUMMARY REPORT Pasco Sanitary Landfill NPL Site Zone A Removal



GOOD HEALTH & WELL-BEING

3 GOOD HEALTH AND WELL-BEING
Employee Hours: 108,000
OSHA Recordables: 0 Lost Time Incidents: 0

4 QUALITY EDUCATION
On average, project employees had received over 5,000 hours of specializing training

- Level B
- CPR/First Aid
- DOT Haz Material
- HazCat
- Equipment
- Safety Meetings

PROTOCOLS

Calculations were based on as-bid scope of work with estimated quantities, average efficiencies, and published emission factors. Key limiting factor of report accuracy of published emission factors for purchased soils, aggregate, fuels, and additives-estimates were based on materials with known emissions factors. Please contact ENTACT Scott Chafin for questions on methodology.

Project Carbon Footprint 6,145 CO₂-e (tons)

RESPONSIBLE CONSUMPTION AND PRODUCTION

11 SUSTAINABLE CITIES AND COMMUNITIES
Alternative Selection: Avoided 40,000 tons CO₂-e
Materials: ENTACT used steel with 20% recycled content, B20 Biodiesel: 23,321 gallons used.
Concrete Recycled: 269 tons
Asphalt Recycled: 1,328 tons
On site Backfill Used: 35,000 cy
Steel Recycled: 16 tons

12 RESPONSIBLE CONSUMPTION AND PRODUCTION
Fuel: Diesel emissions contributed 650 tons of CO₂-e
Energy: Electricity contributed 121 tons of CO₂-e-90% renewables
Transportation: contributed 1,626 tons of CO₂-e
Disposal: contributed 513 tons of CO₂-e
Compliance: There were no violations of local, state, and federal regulations

DECENT WORK & ECONOMIC GROWTH

8 DECENT WORK AND ECONOMIC GROWTH
Average wage/benefits paid was over seven times local minimum wage.

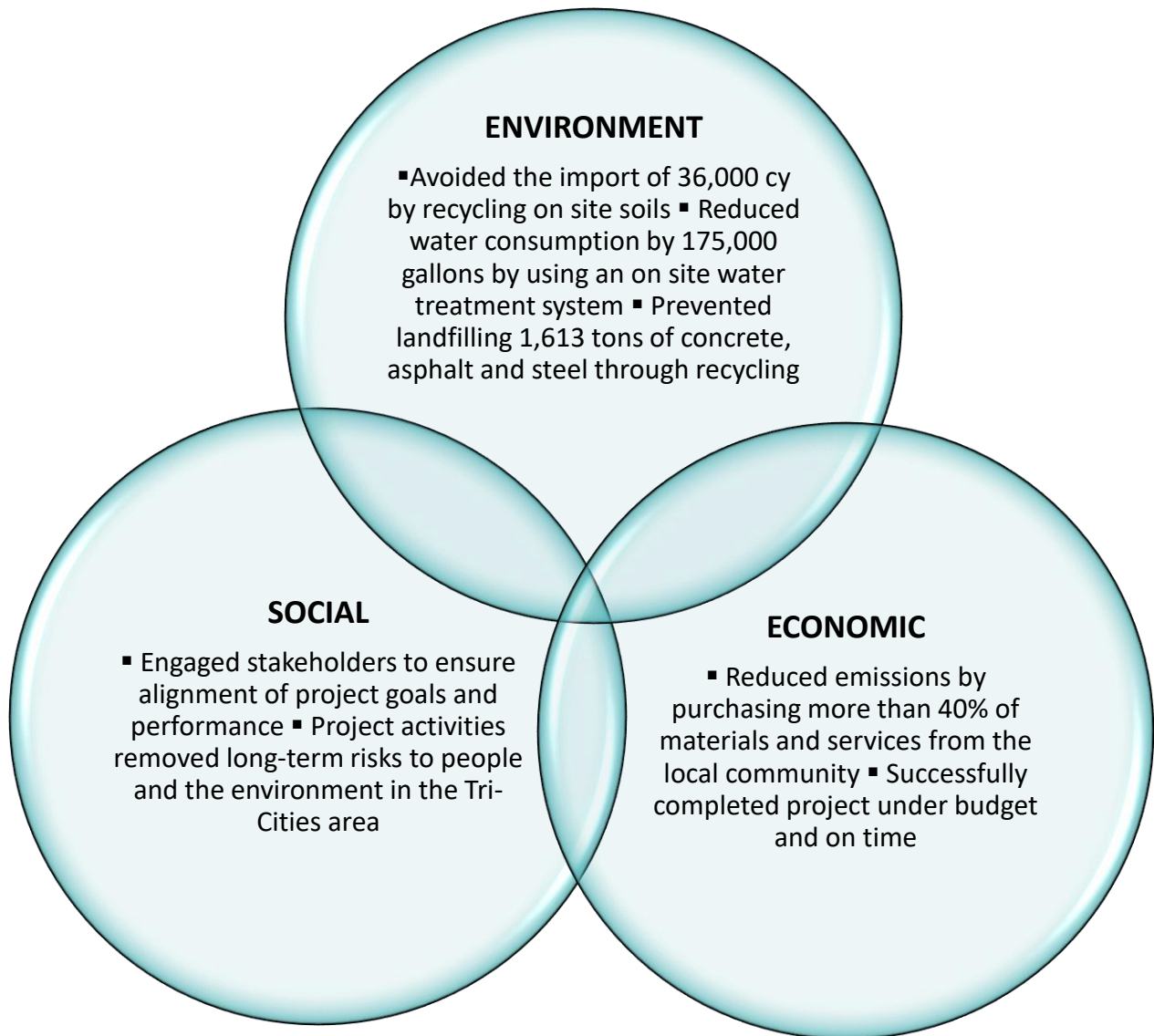
- Approximately 43% of purchases were from locations within 50 miles of jobsite.
- ENTACT donated to Tri-Cities Food Bank, Second Harvest Food Bank, and St. Vincent DePaul Food on behalf of the project.
- City added lights and restriped Commercial and Kholotus Roads.

Stakeholder engagement was crucial to successful implementation and was incorporated into the design and project administration. The project team included state regulators, local officials, emergency and health services, Idaho and Oregon regulators, businesses, landowners, and civic groups. Positive outcomes included:

- Positive community impact by sourcing local services, supplies, and materials for drum removal and utilizing local knowledge and expertise in the Tri-Cities Area.
- Donated to local food banks and emergency response organizations.
- Encouraged stakeholder involvement by having open houses before the start of work with regular touch points at project milestones and project completion.
- No community complaints were received during the execution of the work.
- Safely transporting all removed wastes to two disposal facilities without any incidents. Completed over 100,000 labor hours without an OSHA incident.
- During COVID, prevention practices resulted in no on-site outbreaks or project delays.
- Zone A removal Action completion paved the way for the next phase of work, in-situ thermal desorption of impact soils.



SUSTAINABLE REMEDIATION TRIPLE BOTTOM LINE



Several challenges successfully addressed during project design and implementation provide lessons applicable to other remediation projects. These include efficient navigation and application of complex waste regulations, upfront considerations of adaptive management practices to address unforeseen field conditions, and proactive and early engagement with disposal facilities, multiple state agencies, and local emergency response personnel. Key lessons learned during the project are discussed below.

- Sustainability goals can be customized based on project requirements and stakeholder input.
- The contractor's early engagement during the design process led to the efficient implementation of GSR strategies and project carbon emissions tracking.
- The collaborative engagement among state regulators, the Potentially Liable Persons (PLPs), the consulting teams, and the general contractor was critical to the planning process, leading to realistic and optimized construction and waste-handling approaches.
- Adaptive management strategies were instrumental in the innovative waste management approaches, including recycling and reusing materials to help reduce transportation and disposal volumes.
- Standardizing material tracking sheet format, making data input intuitive, and leveraging the accounting system, APIs, or third-party software to simplify data entry.
- A comparison of the project estimate and proposed design with actual project data provided additional insight for future projects.



FOR MORE INFORMATION...

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