



# **Sustainable Remediation Experiences**

## **Sustainable Remediation Forum**

Federal Remediation Technologies Roundtable

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# Order of Presentation



- Lessons Learned from SR Implementation
- Case Studies
  - Gilbert-Mosley
  - Oakland Army Base
  - Sustainable Return on Investment
- Conclusions: the Value of SR



# Lessons Learned from SR Implementation



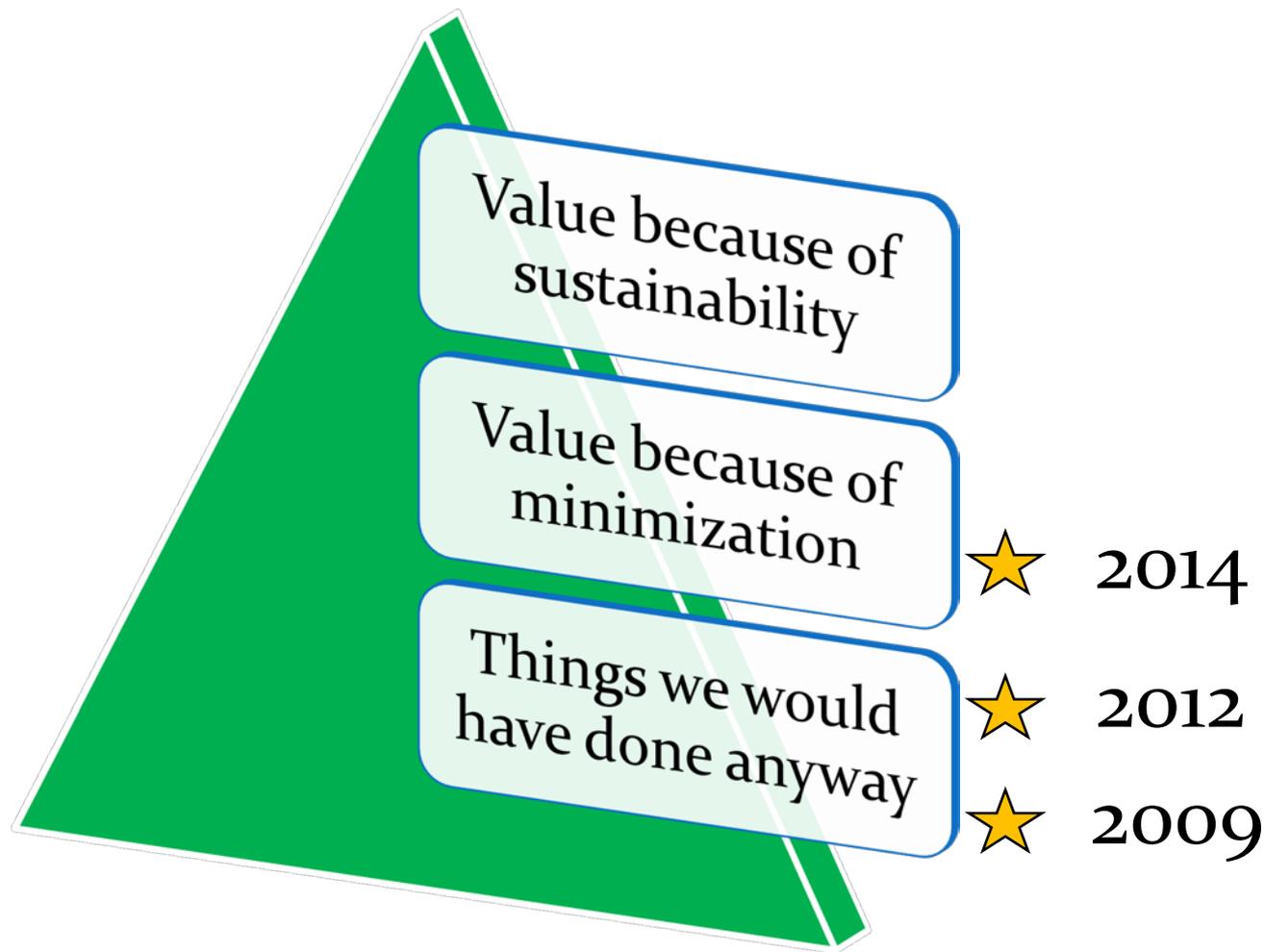
# Successful Projects



- Cost Savings – New means to identify cost reductions
- SR underpins planning - Big projects with high visibility
- Site owner believes in SR value - Project to make a statement
- Sustainability in organizational decision making



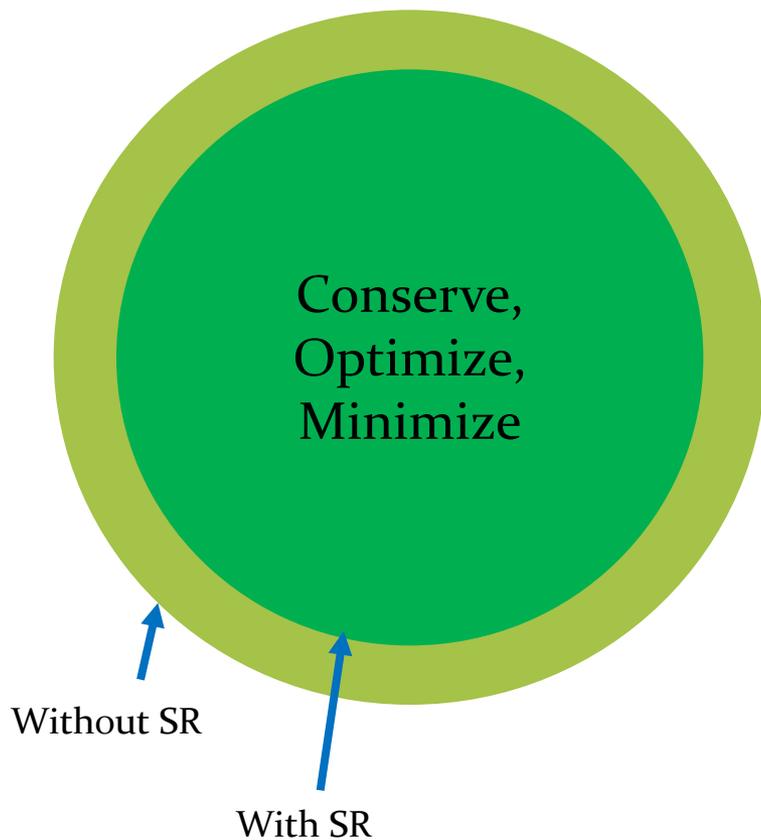
# Early and Better SR Integration



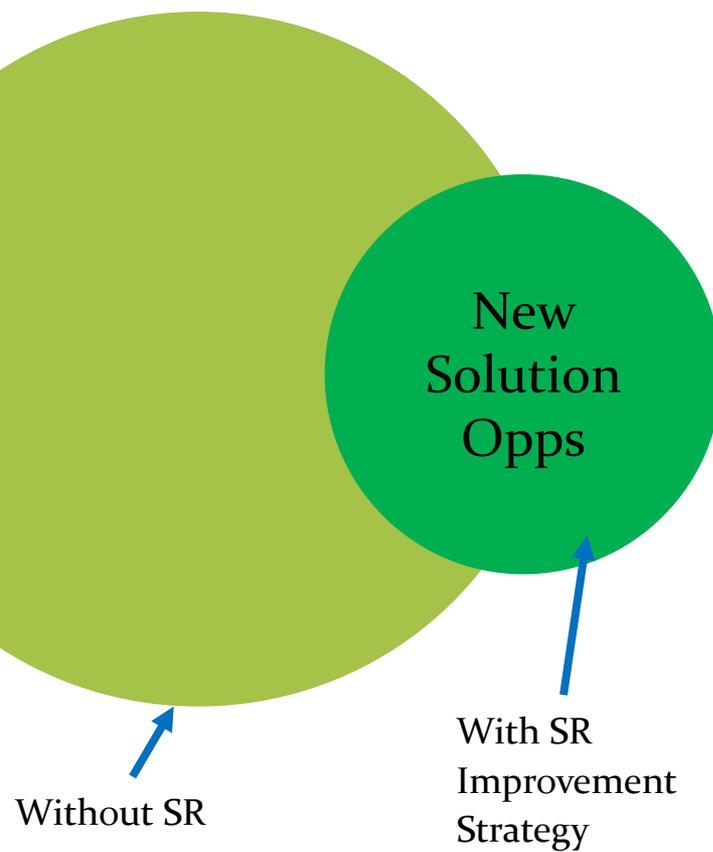
# SR identifies new solution space



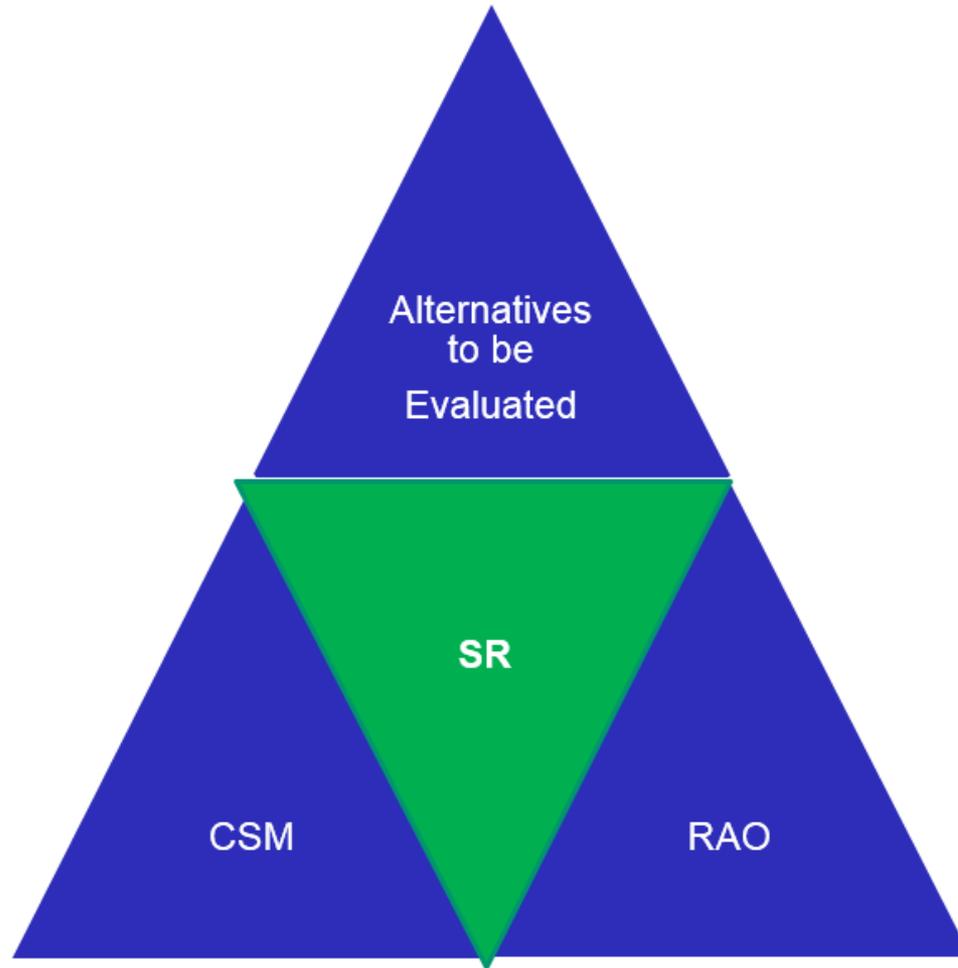
## Good



## Better



# SR should underpin technologies and alternatives developed





**the corner of ...**

# **Gilbert & Mosley Streets**





## Project overview:

- 3,850-acre site in Wichita, Kansas
- Innovative approach to remediate contaminated groundwater
  - Chlorinated solvents
  - 4-mile long plume
- Protected public health, while promoting economic development

## When SR considered:

- Before RI/FS



BEFORE



AFTER



## What was done:

- Collaborated with regulators to devise a preemptive voluntary cleanup approach
- Worked with the city to pursue:
  - Tax increment financing of remediation
  - Liability waivers for property owners
  - Property loans
  - Cost sharing formula with major PRP
- RI/FS
- Designed/constructed groundwater P&T
  - Treated water reuse



## Estimated value derived:

- Risk-based approach → alternate cleanup levels
  - Reduced volume of groundwater requiring treatment by 40%
  - Saved ~\$8 million
- Helped promote > \$300 million in economic development through fast, aggressive cleanup





## Estimated value derived (continued):

- Treatment building
  - Includes environmental education center
  - Reused treated groundwater for water features





# Oakland Army Base



# OAB Redevelopment



## Project Overview

- Former Oakland Army Base (OAB) decommissioned in 1999
  - ~7,000 jobs lost
- Public-Private partnership
- #1 priority from pre-development stage: social, economic, and environmental well-being of West Oakland residents
- Remediation initiated before and integrated with redevelopment



BAY AREA NEWS GROUP

# OAB Redevelopment



## Pre-Planning

- Plans evaluated for:
  - Economic benefits to City/community, environmental impacts, and land use compatibility
  - All involved extensive trade-offs and public-private partnerships to fund infrastructure improvements
- Best land use → extension of Port services
- Local labor/employment rated as higher benefit than tax revenue

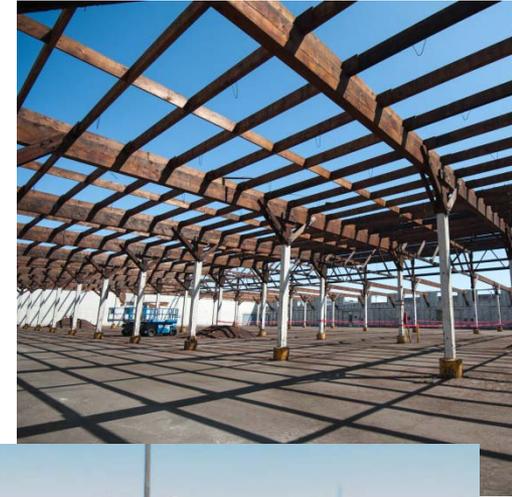


# OAB Redevelopment



## Sustainability + Redevelopment

- Long-term quality-of-life benefits
  - Recycling operations out of West Oakland
  - Divert truck operations to rail (↓ VMT/emissions, injury, cost)
  - Local labor, job training, “banned the box”
  - Conformance with City’s ECAP
- RAP + RMP for construction/operations
- >600 compliance and mitigation measures
  - Major focus: **air quality**

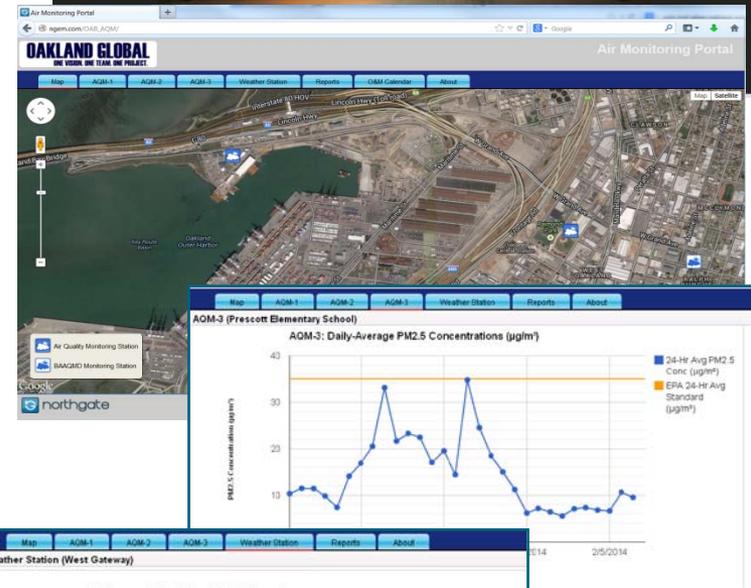
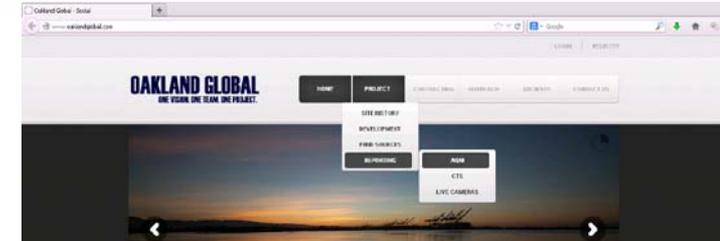


# OAB Redevelopment



## Transparency + Communication

- Air quality plans developed with broad stakeholder input (developer, City, Port, regulators, community)
- Web-based data portal for air monitoring results in near-real time
  - Interactive, easy-to-use maps and graphs
  - Basis for transparent and productive stakeholder discussions
- Quarterly meetings for reporting, feedback, and collaboration on future plans





# Sustainable Return on Investment

Landfill Mining Project

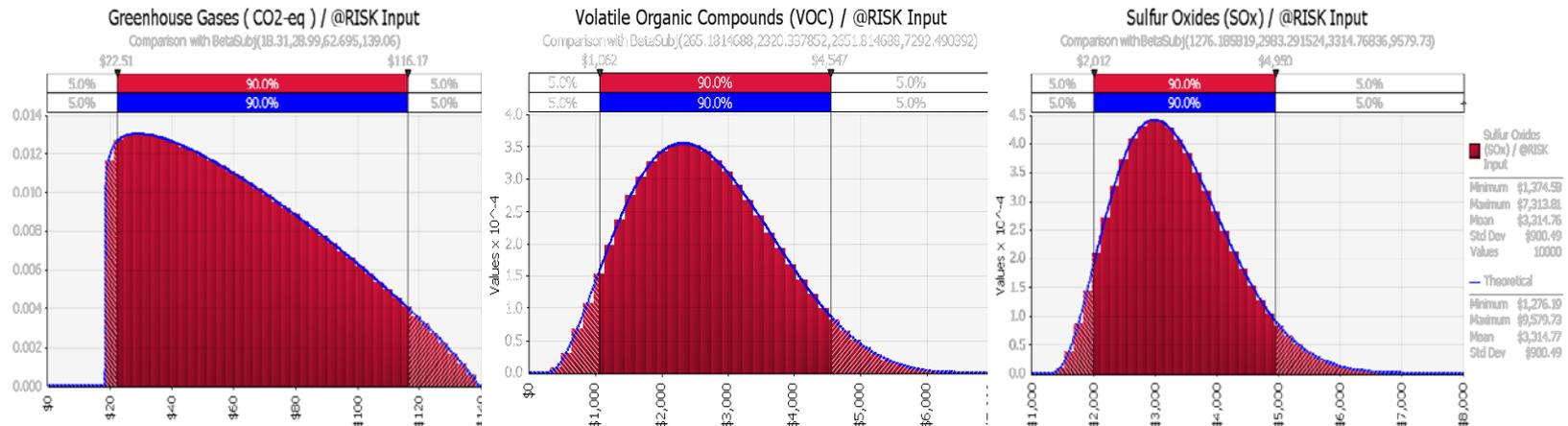


# Social Damage Estimates



## SOCIAL DAMAGE ESTIMATES - AIR EMISSIONS OF ENVIRONMENTAL EXTERNALITIES (2013\$ per metric ton of air emissions)

Pollutant	Studies	Min	Median	Mean	Max
Carbon Dioxide (CO <sub>2</sub> -eq)	5	\$18	\$29	\$63	\$139
Sulfur Oxide (SO <sub>x</sub> )	10	\$1,276	\$2,983	\$3,315	\$9,580
Particulate Matter (PM)	12	\$1,575	\$4,641	\$7,127	\$26,850
Volatile Organic Compounds (VOC)	5	\$265	\$2,320	\$2,652	\$7,292



# Sustainable Economics

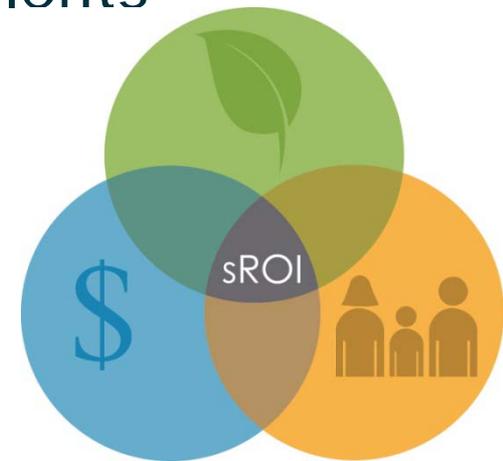


Impact category	Incremental Impact (MT)	Value 2013\$
Economic Benefit		\$2,233,442
Climate change (CO2-eq)	14,426	\$904,447
Particulate Matter Formation (PM)	(368)	(\$2,619,934)
Terrestrial acidification (SOx)	(10)	(\$32,830)
Photochemical oxidant formation (VOC)	(0.06)	(\$166)
<b>Net Benefit</b>		<b>\$484,959</b>
<b>FROI</b>		<b>500%</b>
<b>sROI</b>		<b>109%</b>

# sROI Summary



- Provides a more comprehensive picture of investments
- Translates social and environmental impacts into economic terms
- Includes an uncertainty analysis to demonstrate the likelihood of realizing costs and benefits
- Combines objective data and expert judgment
- Generates results that are defensible and transparent



# Conclusions



- Sustainable remediation best considered early and throughout project
- Social & economic benefits are reachable through environmental considerations
- Sustainable remediation provides broad and cost effective solutions
- sROI (environmental, economic, social) → single index

# Questions?



## Additional Contributors:

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- Melissa Harclerode, CDM Smith
- Barbara Maco, Wactor & Wick
- Amanda McNally, AECOM

Practices demonstrated through case studies:

<http://www.sustainableremediation.org/>