Incorporation of GSR into Army Environmental Remediation

Environment, Energy & Sustainability Symposium and Exhibition (E2S2)

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Report Documentation Page

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Overview

US Army Corps of Engineers

- OSD GSR Policy
- Headquarters GSR Overview
- Corps of Engineers GSR Study
- Army Headquarters Next Steps

A former DERP site, Fort Bragg promotes public access to the installation by providing a number of recreational opportunities, such as bird-watching, on its 18-mile All-American Trail, a registered North Carolina Birding Trail, located on remediated land.

Photo: Elizabeth Evans, Fort Bragg

www.army.mil/-images/2010/04/20/70522/

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OSD GSR Policy

US Army Corps of Engineers

- August 2009 Office of the Secretary of Defense (OSD) Policy Memo:
  - Consider and implement Green and Sustainable Remediation (GSR) practices “where and when they make sense” (August 10, 2009)
  - DoD Components requested to brief OSD on current efforts, strategies, and future plans

Green and Sustainable Remediation

Minimize the overall environmental footprint through the following activities:

- Evaluate sustainability during remedy selection
- Evaluate sustainability of existing remediation systems
- Preserve natural resources
- Minimize energy use and increase energy efficiency
- Minimize emissions
- Use passive sampling
- Minimize fresh water consumption and maximize water reuse
- Maximize recycling, reuse, and reduction of materials
- Consider use of environmental remediation technologies with inherently sustainable aspects

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Headquarters GSR Overview

US Army Corps of Engineers

- Army GSR Strategy:
  - Sustainability concepts addressed in the 2004 Army Strategy for the Environment
  - Green remediation specifically included in FY10-11 Army Environmental Cleanup Strategic Plan
- Ongoing efforts:
  - Participate and partner with other agencies
  - Conduct Pilot Projects
  - Optimize Existing Remedies
  - Utilize Sustainability Tools

Colorado Gov. Bill Ritter Jr. and Maj. Gen. Mark A. Graham, commanding general, Division West, First Army and Fort Carson, prepare to cut the ribbon on the 15-acre Fort Carson solar array.

Photo: Michael J. Pach

www.army.mil/-images/2008/01/17/12170/

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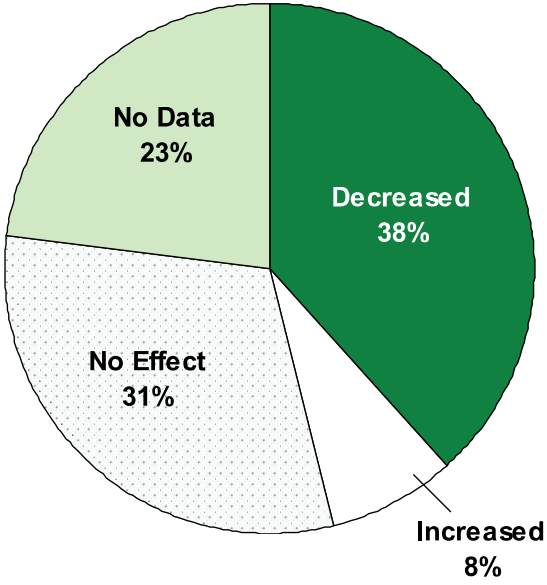
GSR In Practice: Field Survey

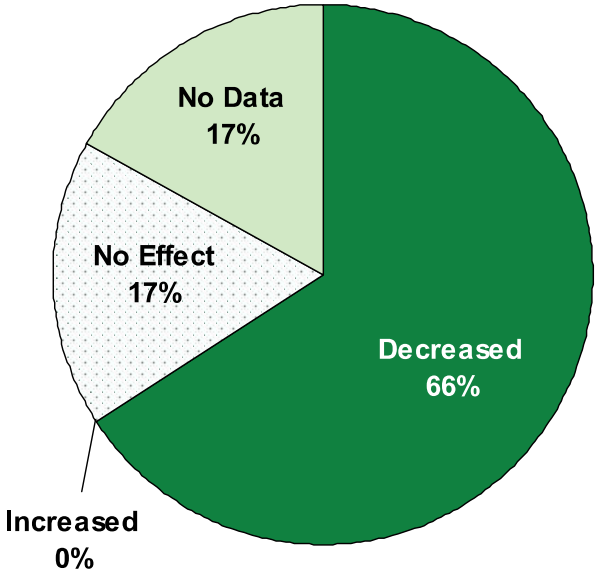
US Army Corps of Engineers

- Army HQ developed a field survey to capture the broad nature and scope of Army GSR practices
- Initial scope: Tasked to all Army Commands (AEC, BRAC-D, HQUSACE, NGB) for distribution to field.
- Received 47 survey responses from 28 installations
- Installations: 12 Active, 8 BRAC, 6 FUDS, 2 NGB

Effect on Site Closeout Time

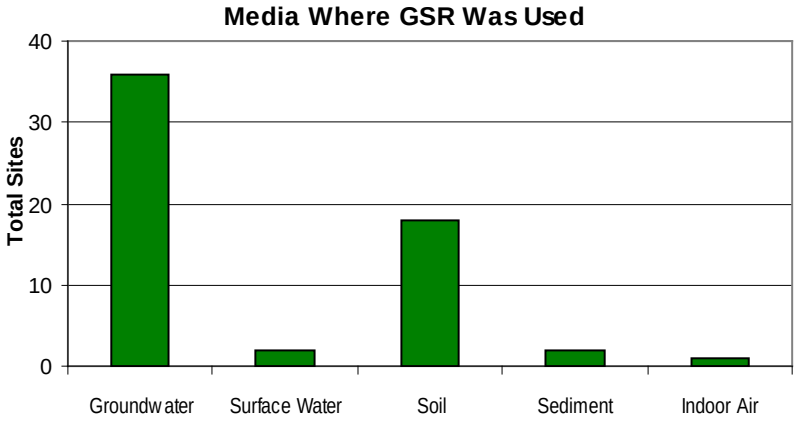


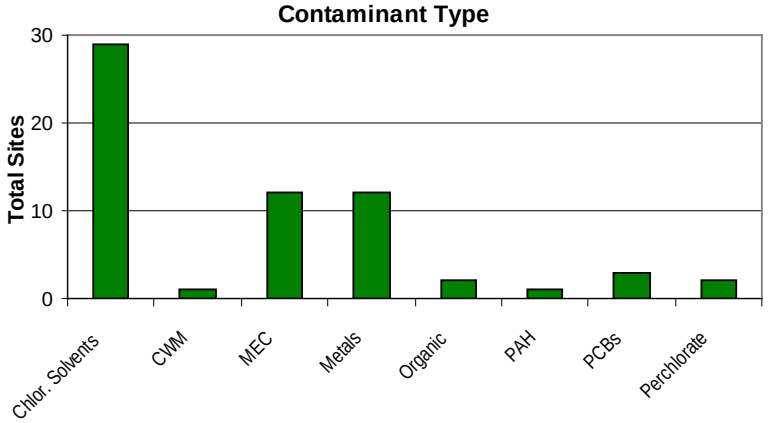
Effect on Project Cost

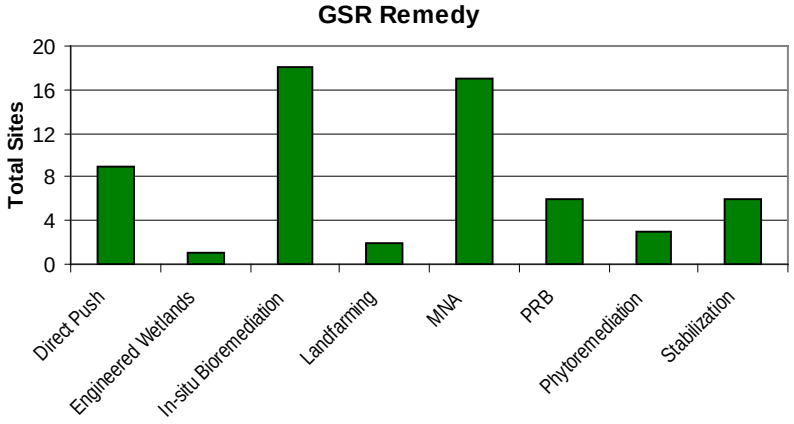


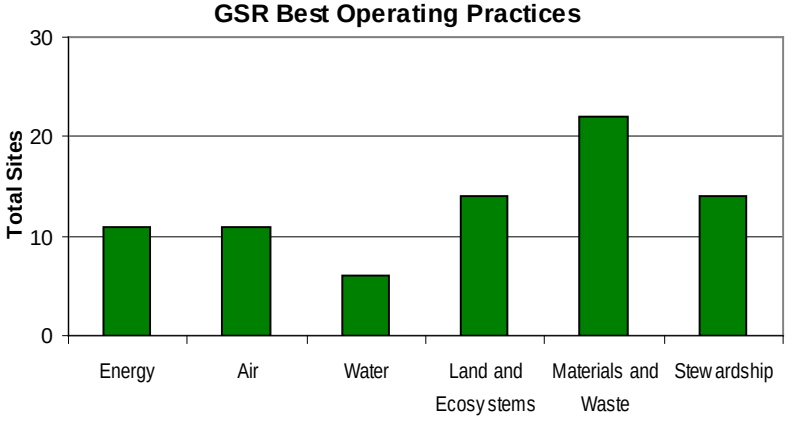
GSR Remedies and Best Practices

US Army Corps of Engineers









* Survey respondents were asked to check all that apply, so the sum within each table may be higher than the total number of surveys received.

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Active and BRAC Sites, Army Database Analysis

US Army Corps of Engineers

- Most widely used GSR Remedies include the following:
  - On-Site Treatment
    - In-Situ Soil Treatment (133 sites)
    - Ex Situ Soil Treatment (114 sites)
    - Solidification/Stabilization (58 sites)
    - Soil Washing (9 sites)
  - Treatment that Mimics a Natural Process
    - Natural Attenuation (501 sites)
    - Bioremediation (154 sites)
    - Bioremediation – In Situ Groundwater (126 site)
    - Bioremediation – In Situ (62 sites)
    - Bioventing (41 sites)
    - Passive Treatment Wells (33 sites)
    - Composting (32 sites)
    - Landfarming (12 sites)
    - Alternate Habitat (3 sites)
    - Slurry-Phase Bioremediation (3 sites)

Because of limited GSR data reported in current data systems, not all sites using green or sustainable remedies are reflected in this list

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GSR Study

US Army Corps of Engineers

- Army funded a study with the Corps of Engineers to provide the information necessary and the recommendations for the consideration and/or development of Army-wide Green and Sustainable Remediation (GSR) guidance and policy
- Study Description:
  - Follow the consideration and incorporation of GSR practices into Army environmental remediation projects
  - Ascertain the effectiveness of the GSR practices that are considered and incorporated
  - Provide procedures by which GSR practices that are shown to be effective can be identified, considered, implemented and documented by Project Teams working on Army sites
  - Study starting with the USACE GSR Interim Guidance (http://www.environmental.usace.army.mil/pdf/IG%2010-01%2003_05_10%20doc.pdf.) and will revise the procedures per the Study results

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Study Team

US Army Corps of Engineers

OACISM
- Kevin Roughgarden

USACE Environmental and Munitions CX
- Carol Dona (PM)
- Nick Stolte and Deborah Walker (MMRP)

Tetra Tech (Contractor to USACE)
- Rob Greenwald (project manager)
- Doug Sutton (IRP GSR lead)
- Michelle Caruso (MMRP GSR lead)

Others
- Army National Guard Bureau (NBG)
- Army Environmental Command (AEC)
- Deputy Assistant Secretary of the Army for Environment, Safety, and Occupational Health [DASA(ESOH)]
- Formerly Used Defense Sites (FUDS)
- Military Munitions Support Services (M2S2)
- USACE Engineering and Support Center, Huntsville
- Army Environmental Policy Institute (AEPI)

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Study Process

US Army Corps of Engineers

- 12 Army environmental remediation projects/pilots: GSR practices identified and the consideration, incorporation, and documentation by the PT followed
- Projects chosen across Army components (FUDS, BRAC, IRP, National Guard), across IRP and MMRP programs, and across remedial phase (planning to site closeout)
- GSR evaluation report identifying potential GSR opportunities supplied to project team
- Study team follows and documents project team GSR consideration and incorporation – what makes sense and when and where

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Pilot GSR Projects for Study

US Army Corps of Engineers

Project Description	Program	Phase
Pump and Treat (P&T) with MNA	IRP – FUDS	RD
P&T Replacement (PRB and/or MNA)	IRP – BRAC	FS/ESD/RD
Consolidation/Capping of Landfill	IRP – FUDS	RD
Petroleum Soil Remediation	IRP – NGB	RA
Munitions Remediation	MMRP – NGB	RI/FS
In-situ Bio/MNA	IRP – Active Army	FS
Munitions Remediation	MMRP – Active Army	FS
Chemical Warfare Material Remediation	MMRP – FUDS	RI/FS
Optimization P&T's, Source Removal	IRP – Active Army	RA-O
MNA w, w/o Source Removal	IRP – FUDS	Post FS (PP)
SI/RI Planning	IRP – FUDS	SI/RI

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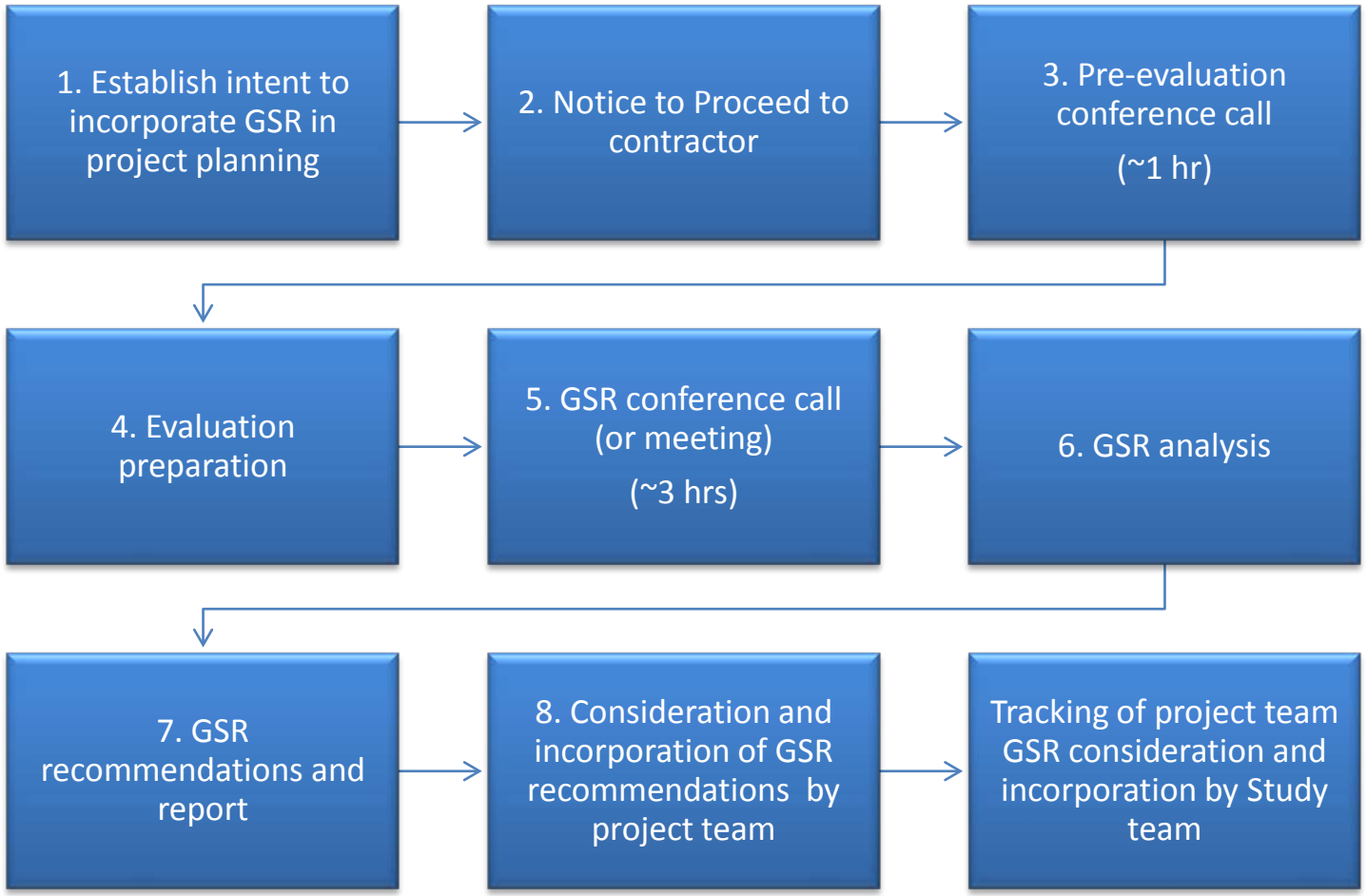
GSR Approach (Steps) Implemented in the Study



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Schedule for Each Pilot

US Army Corps of Engineers

Task	Duration of Task	Days from "Step 5" Call/Meeting
Introductory Teleconference (Step 3 Call)	~1 hour	N/A
Kick-off Teleconference (Step 5 Call/Meeting)	~3 hours	0
Draft GSR Evaluation	21 days	21
Comments from USACE	10 days	31
Draft Final GSR Evaluation	10 days	41
Comments from USACE, ACSIM, Project Team	21 days	62
Final GSR Evaluation	10 days	72

For some of the pilots an expedited schedule without the first draft has been requested so that the GSR findings can be available sooner

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Ways GSR Can Be Incorporated

US Army Corps of Engineers

- Methodologies
  - Systematic Planning
  - Dynamic and multi-criteria decision making
  - Independent Review
  - Stakeholder Involvement
  - Maximize Site Reuse/Materials
- Best Management Practices
- GSR Quantitative Footprints for Comparison of Different Options

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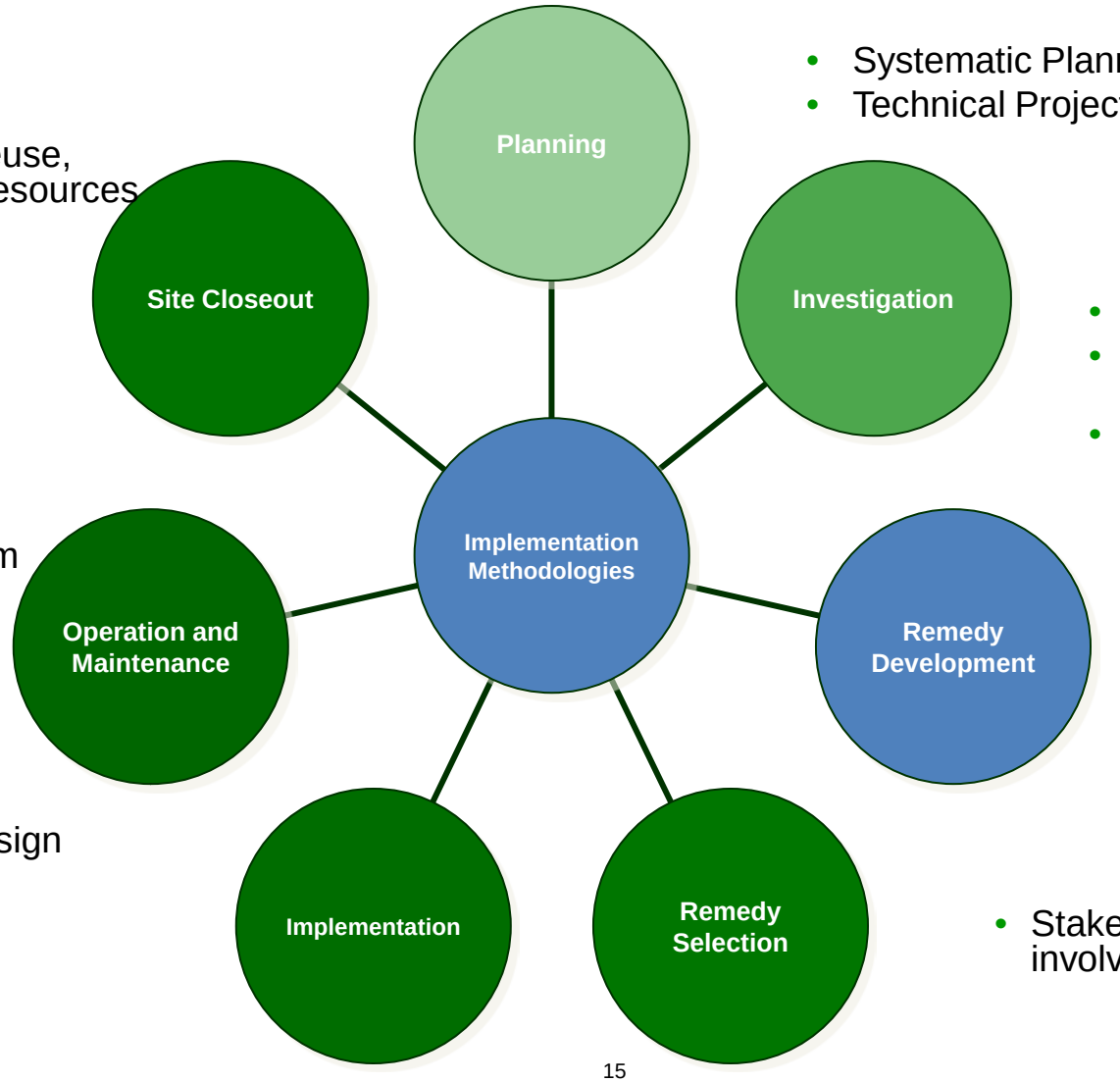
Methodologies

US Army Corps of Engineers

- Systematic Planning
- Technical Project Planning

- Maximize site reuse, materials, and resources



- Dynamic work strategies
- Field-based investigation
- TRIAD

- Remedial system optimizations

- Multiple decision-making criteria

- Independent design review

- Stakeholder involvement

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Pilot Example of Methodology Application: Independent Design Review

US Army Corps of Engineers

Recommendation

Design P&T to address two plume lobes with separate treatment plants rather than one centrally located treatment plant, plus implement VFDs for extraction pumps

Basis for Recommendation

Eliminates ~20,000 ft of piping and associated piping. Lowers electrical use due to reduced pumping head plus use of VFDs. Provides greater treatment flexibility. Requires an extra building and some duplicate equipment.

Resources Conserved

Reduces footprints over remedy lifetime (30 years) such as:

- Electricity usage – 12 million kWh
- Energy – 120,000 MMBtu
- CO2e – 10,000 metric tons
- NOx - 20 metric tons
- SOx - 30 metric tons
- HDPE – 600,000 lbs

Estimated Costs/Savings

Up-Front Savings ~$609,500	Payback Period: Immediate
Annual Savings ~$27,000/yr	Lifecycle Savings ~$1,100,000 NPV

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GSR BMPs

US Army Corps of Engineers

- Many different categories of BMPs
  - Planning
  - Characterization and/or Remedy Approach
  - Energy/Emissions - Transportation
  - Energy/Emissions - Equipment Use
  - Materials & Off-Site Services
  - Water Resource Use
  - Waste Generation, Disposal, and Recycling
  - Land Use, Ecosystems, and Cultural Resources
  - Safety and Community
  - Other Site-Specific BMPs
- Example BMPs
  - Reduce idling time for construction equipment
  - Select transportation routes for trucks and heavy equipment that minimize impacts to residential areas to maximize safety and minimize noise and other aesthetic impacts

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Pilot Example of BMP Application: Electronic Deliverables

US Army Corps of Engineers

Recommendation	
Submit report appendices and lab reports on CD	
Basis for Recommendation	
• Annual report is distributed in both hard copy and electronic forms • Recommended that lab data and other appendices be distributed electronically instead of hard copy	
Resources Conserved	
Saves paper, shipping, storage space Qualitatively reduces hazardous air pollutants, criteria pollutants, GHG emissions, energy, materials, and water (not specifically quantified)	
Qualitative Cost Impact Over 5 Years	**Level of Up-Front Investment**
Cost Savings	Negligible

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Quantitative GSR Footprints

US Army Corps of Engineers

- Need GSR Evaluation Tool
  - Publicly Available tools
    - Air Force Sustainable Remediation Tool (SRT), developed by AECOM, GSI, and CH2MHill
      http://www.afcee.af.mil/resources/technologytransfer/programsandinitiatives/sustainableremediation/srt/index.asp
    - SiteWise™ Green and Sustainable Remediation (GSR) Tool, co-developed by Battelle, the Navy, the Army, and the USACE
      www.ert2.org/t2gsrportal/tools.aspx
- SiteWise™ primary tool used in Study
  - Information such as material use, vehicles and distances for transportation, and equipment use is obtained from the project
  - The information is entered into tables on an "input sheet" by typing values and using drawdown menus
  - SiteWise™ uses conversion factors to calculate GSR parameters based on the input
  - For metrics not in SiteWise™ manual calculations are performed, including upfront cost, discounted and undiscounted total costs, and payback periods

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Example of Quantitative GSR Footprint: Use of Variable Frequency Drives

US Army Corps of Engineers

Recommendation
Include VFDs for air stripper blower motor
Basis for Recommendation
Reduces footprints for energy use, CO2e, criteria pollutants, and water used to generate electricity. Requires minimal up-front cost, and has a payback period of approximately 3 years. Does not appear to have any significant negative impacts.
Resources Conserved
Reduces footprints over remedy lifetime (30 years) by the following amounts: • Electricity Usage - 1.5 million kWh • Energy - 16,000 MMBtu • CO2e - 1,300 metric tons • NOx - 2.6 metric tons • SOx - 4.5 metric tons • Water - 770,000 gallons
Estimated Costs/Savings

Up-Front Cost ~$7,500	Payback Period <3 yrs
Annual Savings ~$3,300/yr	Lifecycle Savings ~$57,000 NPV

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Overall Study Schedule

US Army Corps of Engineers

Task	FY10	FY11				FY12
	Q4	Q1	Q2	Q3	Q4	Q1
Develop Process for Applying GSR						
GSR Evaluations for 12 Pilot Projects						
Draft and Final Study Report						

- One combined GSR process for IRP and MMRP projects; process will be applied/tested for pilot projects
- Process will be modified and finalized in Study Report based on findings from pilot projects
- Study Report will have recommendations for Army-wide guidance and policy, also revisions to USACE GSR interim guidance

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Current Study Status

US Army Corps of Engineers

Current Project Status	
Draft Final Study Approach Completed (will be modified with Study Results for approach to be used by Army project teams)	
Projects	
Project Stage	No. of Projects
Project teams agree to participate in Study	12
Introductory Step 3 calls completed	11
Step 5 calls scheduled/completed	6/5
Draft GSR evaluation reports completed, in review by project teams	5
GSR incorporation complete	1

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Army HQ Next Steps

US Army Corps of Engineers

Guidance

- Incorporate GSR guidance into the Army DERP manuals
- Evaluate need for specific Army GSR guidance
- Determine applicability of USACE Decision Framework to larger Army environmental remediation program

Resources and Case Studies

- Create a information exchange through Army Sustainability Web site housing GSR guidance, practices, tools and other available resources
- Continue to develop and test process for GSR consideration and implementation
- Develop and standardize GSR contract language

Performance Measures

- Continue developing standardized performance measures (metrics)
- Incorporate metrics in revised and new Army databases

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Questions?

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