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SuRF Assessment

Case Study

Steve Edgar

Project Background

- This Surf Assessment has been undertaken for the remediation works at RAF Upper Heyford.
- The remediation works included the decommissioning of the Petrol, Oil and Lubrication dispensing system (POL System).
- The POL system comprises a network of some 13km of pipework and approximately 74 tanks, with a capacity of approximately 30 million litres.

Remediation Objectives

- Based on an agreed Risk Based Remediation Strategy.
- **Objective 1** - The removal of any potential liquid, sludge, emulsion, solid, vapour and gaseous sources of contamination that are currently within and/or associated with the POL system.
- **Objective 2** - Breaking of the internal and external potential pathways for contaminants to enter the environment.
- **Objective 3** - Ensuring that the system cannot become a future source of POL related contamination or pathway for any contamination.

Site Constraints

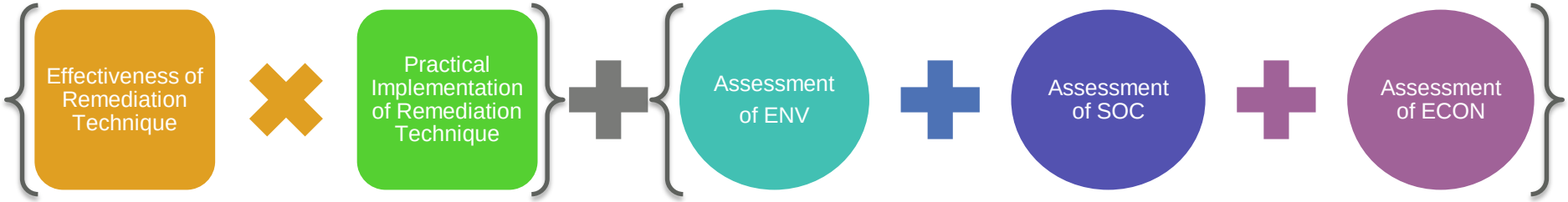
- Sustainability requirements built in via planning.
- The protection of the sensitive grasslands and ecosystems required.
- Preserving the heritage of the POL system in accordance with English Heritage.
- Ensure that measures are put in place to minimise disruption to other Site users.
- Minimise disruption to neighbours.
- Comply with all restrictions and recommendations related to the potential for Unexploded Ordnance (UXOs) on Site.

Why SURF?

- Tender requested a demonstration of commitment to sustainability.
- Our proposals were “out of the ordinary” required regulator and consultant support and reasons for them to say YES.
- We identified a number of questions, decisions or problems where SURF could assist in demonstrating our options to be the most suitable.

Stage 1 – Initial Assessment

- Remediation Options Appraisal and Semi Quantitative Sustainability Assessment During Tender. Developed scoring system.



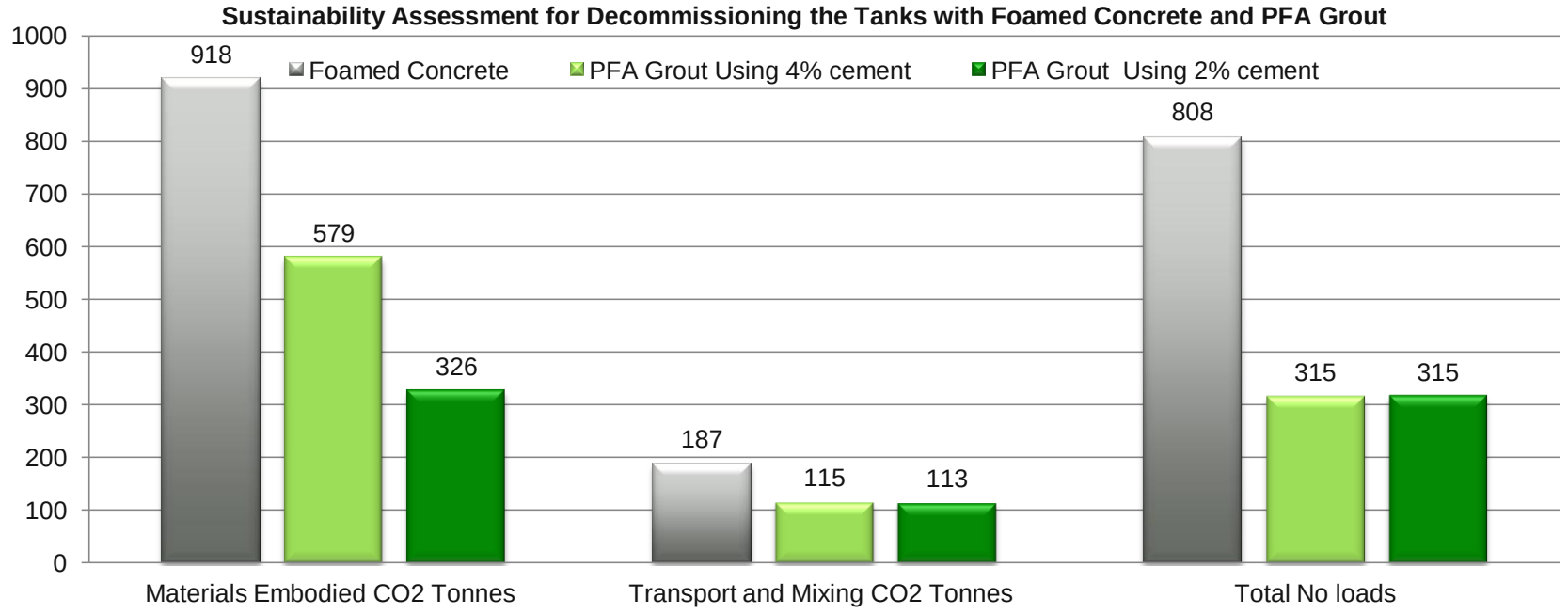
- The remediation options identified were assessed semi quantitatively based on their effectiveness and ease of implementation / practicality from our experience and knowledge.
- The remediation options were then assessed for their sustainability using the sustainability indicator parameters identified in the SuRF framework. A score was given for each group of parameters ENV, SOC and ECON.
- The scoring system was equally distributed between the effectiveness and practical Implementation of Remediation Technique Vs the Sustainability.

Scoring the Assessment

Remedial Technology Description	Effectiveness	Practical Implementation	Environmental	Social	Economic	Overall Score
Option T1 Clean and vent only	2	3	1	2	2	11
Option T2 Confirm absence of contamination outside the tanks, 'drill' tanks and allow groundwater equilibrium within tanks	2	4	2	2	2	14
Option T3 Fill with foamed concrete	5	4	3	4	3	30
Option T4 Fill with PFA Grout	5	4	5	3	4	32
Option T5 - Break into side of tanks and bulk fill with Fill with Crush	3	2	3	3	3	15
Option T6 - Break into side of tanks and bulk fill with conditioned PFA only	4	3	3	2	4	21
Option T7 - Foam fill (Bacel hard foam)	5	4	2	3	1	26
Option W1 - On site water treatment and disposal to foul sewer	5	0	N/A	N/A	N/A	0
Option W2 - Off site disposal via tanker to treatment facility	5	4	2	2	1	25
Option W3 - On site water treatment and disposal to controlled waters	5	4	4	4	4	32
Option P1 - Foam fill (Bacel hard foam)	5	4	4	4	4	32
Option P2 Fill with foamed concrete	4	3	3	3	4	22
Option P3 Fill with PFA Grout	4	4	4	3	4	27

Stage 2 – Environmental

CO2 Element. Easily measureable and calculable thus most often used!!



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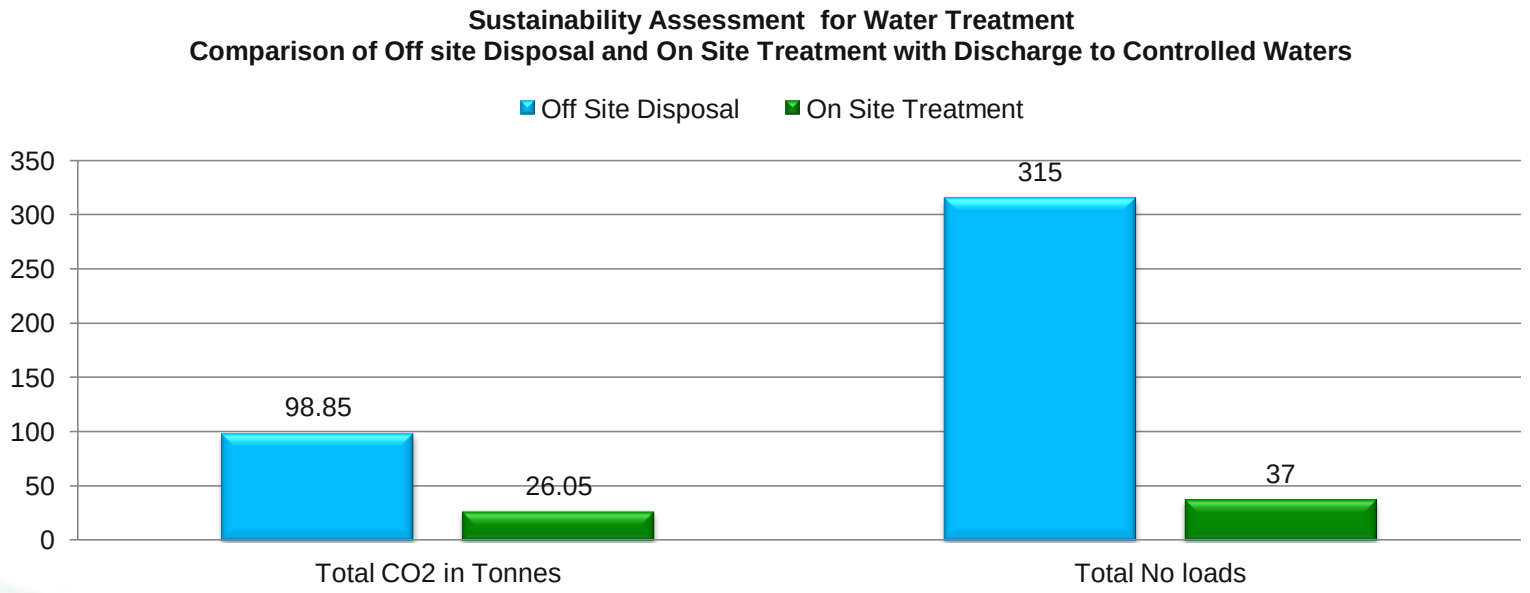
Stage 2 Environmental Cont...

Water Treatment

The remediation options appraisal and initial sustainability assessment (Stage 1) concluded that the two best options for the water treatment were on site treatment and offsite disposal.



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Stage 2 Social

We examined each choice, task or activity : e.g. Foamed concrete or PFA grout?

- Human Health and Safety: Very similar few differences.
- Ethics and Equality: Again similar with no real separation.
- Neighbourhood & Locality: both have similar impact traffic wise. PFA had potential for more dust and more complex site operations. Manufacturing grout or concrete on site identified as a benefit for either option due to reduced lorry movements over import .
- Communities: Both require engagement and difficult to separate.
- Wider Project: The remediation and improving the site for future generations and preservation of the heritage was integral to the project. Some options ruled out on this basis.

Water Treatment

- Greater differences in terms of traffic impacts for water treatment where there was a far greater impact off site via traffic.

Social Aspects on this project (remediation) were not a major complicating factor and preferred options scored similarly. Other projects for example ex-situ biological treatment have more significant social aspects and would require much deeper assessment.

Stage 2 Economic

Remedial Technology Description	Effectiveness	Practical Implementation	Environmental	Social	Economic	Overall Score
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Option T6 - Break into side of tanks and bulk fill with conditioned PFA only	4	3	3	2	4	21
Option T7 - Foam fill (Bacel hard foam)	5	4	2	3	1	26

Stage 2 Economic

Foamed concrete or PFA grout? PFA scored more highly than concrete.

- Cost comparison revealed that PFA grout was 3 to 5 times less expensive than foamed concrete.
- Lifetime costs also considered. If PFA was to be removed in future it is easier (no breaking required), cheaper and can be re-used simply.
- Labour factors also considered. PFA Labour intensive and on site thus employing local labour. Foamed concrete from batching plant no additional labour required. Labour would also benefit from some training and gain skills.
- Also induced economic factors. By utilising PFA we were saving costs for power station also in diverting from landfill.
- Opportunity for others also; in paving the way for innovative use of PFA and WRAP Protocol.

Water treatment. On or Off Site?

- Cost comparison: Off site tankered disposal costs prohibitive.
- On site treatment provided employment opportunity for project.

Stage 2 – Used Exactly how

“How shall we decommission the tanks?”

Fixed strategy no SuRF input:

- Removal of source, contaminated water and residual fuel from the tanks.
- Confined space entry to clean all the residues from the tanks.
- Prevent contaminated groundwater and vapour re-entering the tanks.
- Should the tanks be removed in the future fill must be suitable for re-use on site.

SuRF Hhelped with how was best to do it e.g.

Foamed Concrete or PFA?

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Tank Decommissioning: PFA Vs Concrete

“We used the framework to help with our decision” Some of the Outcomes:

- **ENV+SOC**: Grout manufacture on site reduced vehicle movements by 493 trips, which reduced the traffic impact on local residents and reduced CO2.
- **ENV**: Using PFA as the main constituent of the grout reduced its carbon footprint significantly through a lower cement content and approximately 8,000 tonnes of PFA was diverted from landfill.
- **ENV** : The PFA was been sourced from a nearby power station which reduced the carbon emissions generated through haulage.
- **SOC+ENV+ECON:** The PFA grout is suitable for recycling in the future if, should the tanks be removed from site.
- **ECON:** Local people employed to man the batching plant and work on site.
- **ECON:** PFA Less cost than Cement .
- **SOC:** Reduced the number of lorry movements and impact on neighbourhood.

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Other Activities……Water Treatment

- **SOC+ENV+ECON:** Contaminated tank water treated on site in mobile WWTP units, would save 630 tanker movements to and from site as well as significant disposal costs.
- **ENV:** On site treatment of water would save 84 tonnes of CO_2 emissions, primarily through the reduced number of traffic miles.
- **ENV+ECON:** Treated tank water can be used in the manufacture of grout, saving the use of 2,000 - 3,000 m^3 of mains water.
- **ENV:** Treated tank water was discharged to land providing recharge to the local aquifer, which is currently depressed due to drought conditions in the area.
- **ENV+ECON:** Oils and sludges were recovered for offsite recycling normally as a secondary fuel.
- Also helped agreeing this with EA.

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Pipe Line Decommissioning

The remediation options appraisal and initial sustainability assessment concluded that the two best options for decommissioning the pipelines on site were either using hardfoam or a PFA grout.

- **ECON:** A comparison of material costs shows that PFA grout is the cheapest option, with costs being 6 to 8 times less per m^3.
- **ECON:** However a comparison of the operational and programme costs including excavating 2 to 3 times more access pits for PFA grout, shows the cost difference was significantly reduced.
- Additional benefits offered by hardfoam:
- **ENV:** reduces the impact on the ecology and site users as fewer access pits are dug.
- **SOC** Less impact on amenity.
- **SOC:** reducing the risk to health and safety from UXO.
- Better Technical Solution as any residues are either pushed out by the liquid or locked in as it cures.

This resulted in use of foam over other despite extra cost

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Summary and Discussion

- Incorporating the SuRF in the Remediation Options Appraisal for the site allowed for sustainability to be a key part of the project from tender stage.
- We used it to demonstrate our expertise to the client and our commitment to the Sustainability of the development.
- It allowed us to maximize commercial opportunity at tender and during the contract refining our stage 1 assessment to bring greater value.
- We used SuRF as one of our tools to increase confidence of regulator for “alternative designs”
- Reduced Red Tape with Regulator in reaching agreements.
- Carbon Foot-printing is the easiest element but only an element!
- Limited data was available for some parts of the Carbon Assessment i.e. hardfoam, emissions from off site water treatment.
- At present lots of professional judgment and experience required to complete assessments.
- Very Useful Tool Commercially and Practically.

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Questions?

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