



Case Study: Sustainability assessment for plume management

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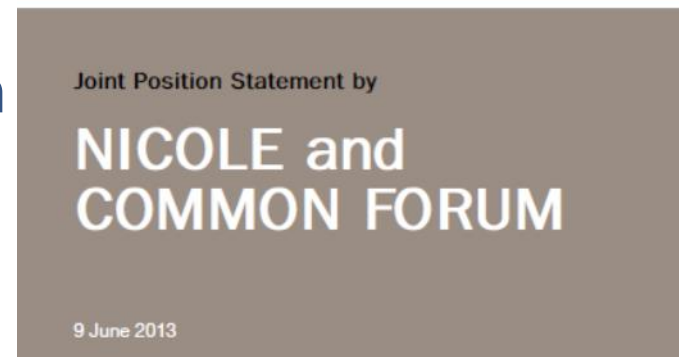
Aims of this exercise

- To take thinking developed during the World Café to a site context and comparison with other options
- Discussion of management options based on qualitative assessment against indicators
- Consensus/differences across skill sets?
- Consensus on which indicators are most important in differentiating between options?

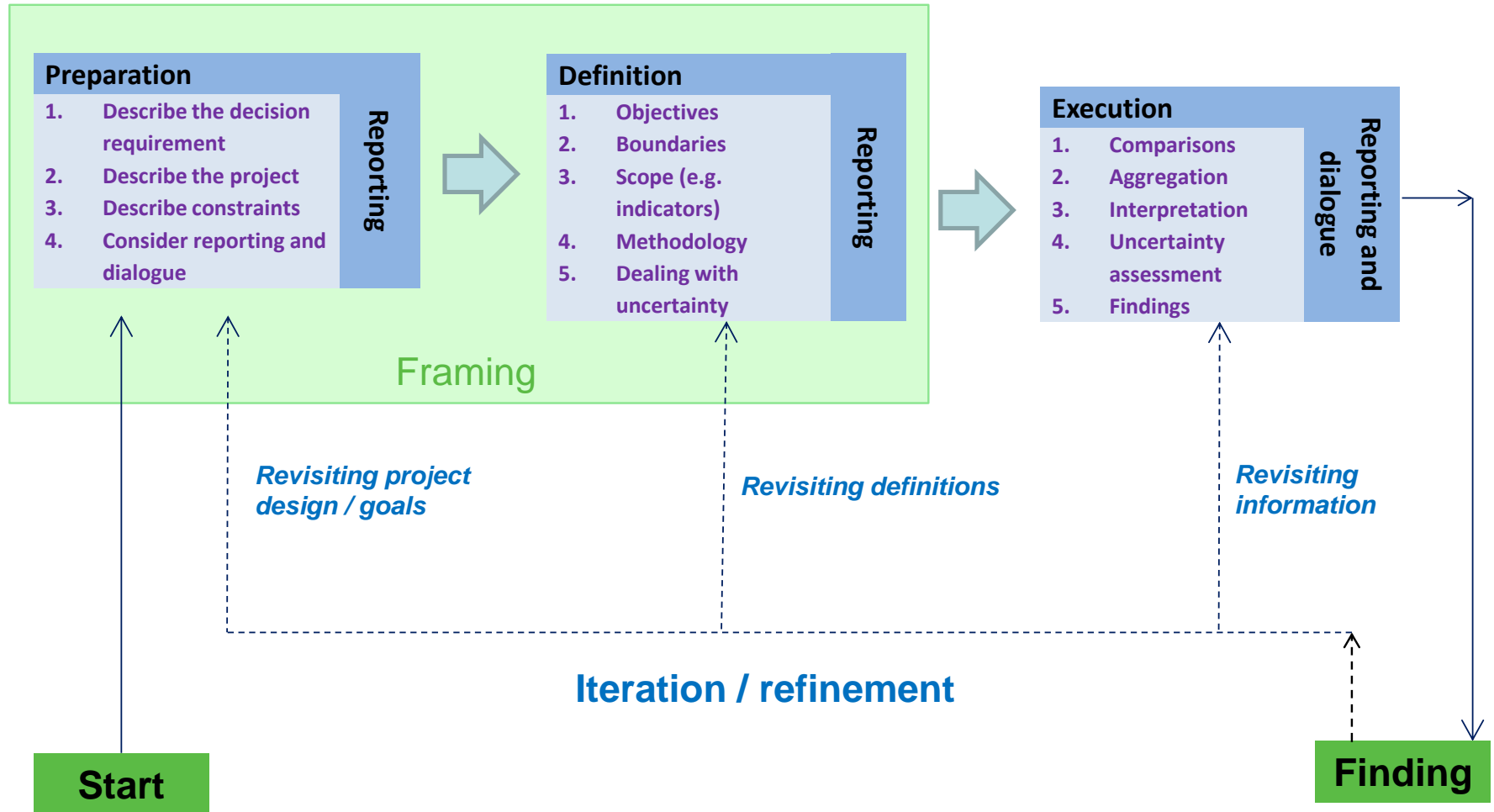
What is covered?

- The NanoRem sustainability assessment process - summarised
- Case study summary information
 - Based on a NanoRem pilot test site
- Tasks to be performed
- Group activities
- Questions?

- Simple qualitative and site specific approach
- Based on NICOLE Road Map as the best / only EU wide model
- Applies the SuRF-UK tools for qualitative assessment within the NICOLE Road Map
- Consistent with the NICOLE and COMMON FORUM Joint position on Risk Informed and Sustainable Remediation
- Retrospective options appraisal – sites already selected for pilot tests



Sustainability assessment process



Project framing

Preparation	Description
Describe decision to be made (strategic or site options appraisal?)	Objectives (pull together project goals from preparation)
Describe the project	Boundaries (spatial, temporal, life cycle?)
Engagement – who, when, how?	Scope (which criteria and level of detail?)
Describe constraints	Methodology (how will options be compared?)
Consider reporting and dialogue	Dealing with uncertainty

All indicators are retained for discussion during assessment

Environment	Social	Economic
Emissions to Air	Human health & safety	Direct economic costs & benefits
Soil and ground conditions	Ethics & equality	Indirect economic costs & benefits
Groundwater & surface water	Neighbourhoods & locality	Employment & employment capital
Ecology	Communities & community involvement	Induced economic costs & benefits
Natural resources & waste	Uncertainty & evidence	Project lifespan & flexibility

Qualitative outputs

	Option 1	Option 2
Environment	Better	Worse
Society	Equal	Equal
Economics	Worse	Better



Example using sustainability elements as criteria → options summarised across one table

Environment	Option 1	Option 2
Emissions to Air	Trivial	Trivial
Soil and ground conditions	Significant impacts	Trivial impacts
Groundwater & surface water	Trivial impacts	Significant impacts
Ecology	None	None
Natural resources & waste	Significant	Trivial

Example using individual indicators as criteria → multiple tables will be needed



SOC 1 Human Health & Safety	Option 1	Option 2
Long term risk management performance	Meets targets	Exceeds targets
Short term risks from accidents	Does not meet targets	Meets targets
Health impacts of remediation process emissions	Exceeds targets	Meets targets



Example using headline categories as criteria → at least three tables will be needed

Case study - summary details (1)

- Based on a NanoRem pilot test site
- Former industrial site (electrical component manufacturing plant) until 1990s – use of chlorinated ethenes as degreasing agents
- Source site now abandoned
- Contaminated groundwater plume 11 – 18 m under site owned by local government
- Geology mainly sand & gravel with impersistent clay layers
- Site used for recreation – football and market

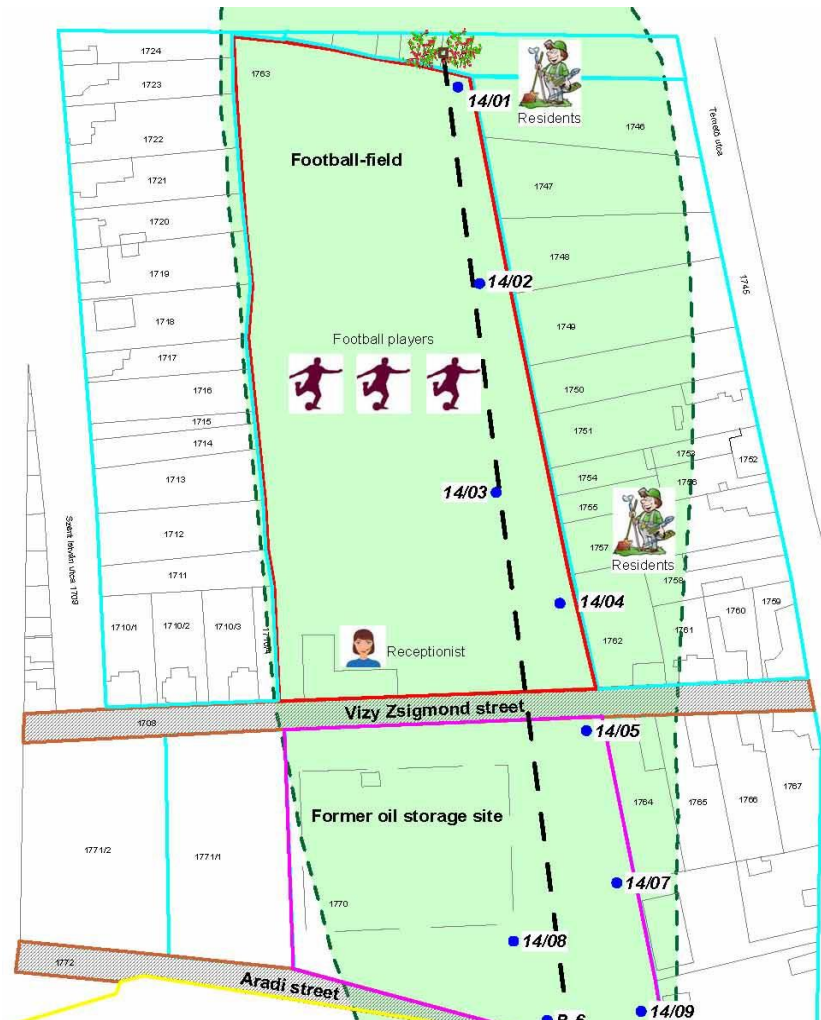
Case study - summary details (2)



Source: Golder Associates

Source	Pathway	Receptor
Chlorinated ethenes	Transport in aquifer	Groundwater Irrigation wells
Chlorinated ethenes	Ingestion of local fruit & vegetables	Residents
Chlorinated ethenes	Inhalation of indoor air	Residents, workers and site users
Chlorinated ethenes	Inhalation of outdoor air	Residents, workers and site users

- Receptors
 - Groundwater
 - Irrigation wells
 - Residents
 - Site workers
 - Site users & visitors
- Objective:
 - Consider options for sustainable plume management to protect receptors



Source: Golder Associates

- Baseline – receptor management, periodic monitoring. No natural degradation of contaminants
- Pump and treat – an *ex situ* technique that removes the contaminants from the ground for treatment
- Enhanced bioremediation – an *in situ* technique that treats contaminants in the ground via injection of reagents to optimise conditions for biodegradation

Next steps with the pilot test site

- What we have done:
 - Initial project framing, including identification of stakeholders
 - Carried out by core group
- What we will do next:
 - Carry out sustainability assessment on site with wider stakeholders (post-injection; March-April 2015)
 - Report on outcomes (May 2015)
 - Contribute to generic report on sustainability of nanoremediation

Group activities

- Groups are selected to have a diverse range of skills
- Each group has at least one NanoRem participant
- Each group has at least one specialist in remediation
- Each participant has a handout of information:
 - Tasks
 - Site summary
 - Project framing summary
 - Indicator sets

How will the SA be carried out?

- Task 1
 - Each group to nominate a rapporteur (non-NanoRem)
- Task 2 (~ 30 – 40 min)
 - Discuss sustainability assessment for the site using the headline indicator sets and with comparators identified for your group

	Option 1	Option 2
Environment	Better	Worse
Society	Equal	Equal
Economics	Worse	Better

Environment	Option 1	Option 2
Emissions to Air	Trivial	Trivial
Soil and ground conditions	Significant impacts	Trivial impacts
Groundwater & surface water	Trivial impacts	Significant impacts
Ecology	None	None
Natural resources & waste	Significant	Trivial



Environment	Social	Economic
Emissions to Air	Human health & safety	Direct economic costs & benefits
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- Keep it headline
- Do not get bogged down in too much detail
- How important is each indicator?
 - Justify
- Can the options be differentiated?
- Are there strong areas of disagreement between participants?
- Are there strong areas of agreement between participants?

- AFTER Task 2:
 - Discuss the 5 indicators within the Indicator Set allocated to your group
 - Either Environment or Social or Economic
 - Sub-divide into individual criteria if considered relevant

SOC 1 Human Health & Safety	Option 1	Option 2
Long term risk management performance	Meets targets	Exceeds targets
Short term risks from accidents	Does not meet targets	Meets targets
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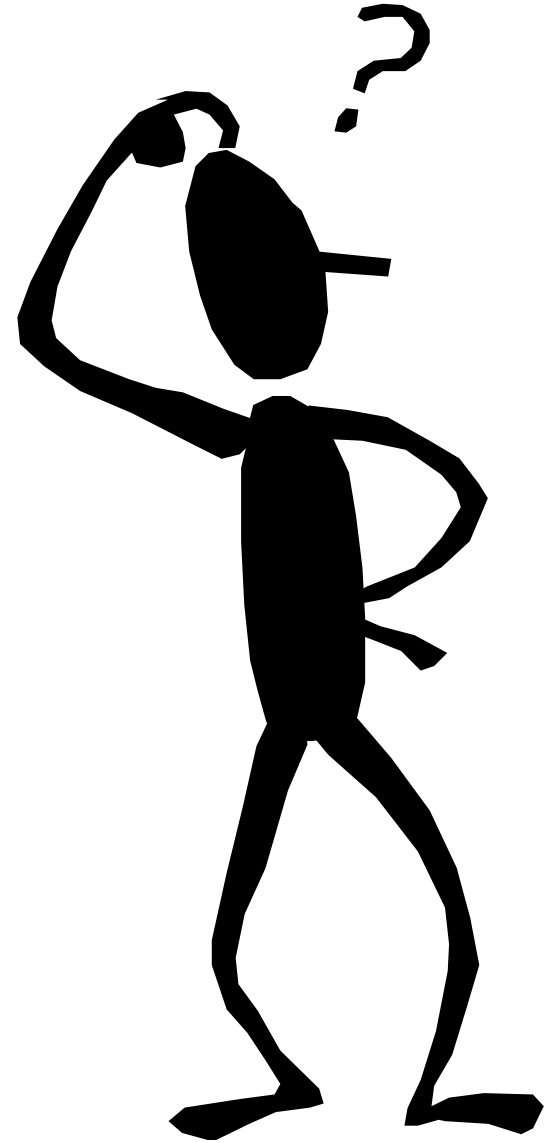
- Identify specific criteria that are likely to differentiate between the options compared
- Identify any areas of strong agreement and disagreement between participants
- Has this level of detail changed the opinion of the group?

- AFTER Tasks 2-4:
 - Individually, on a separate piece of paper:
 - Identify your skill set
 - Rank the criteria discussed in tasks 3-4 in terms of order of importance (subjective)
 - Have your views changed since the World Café this morning?

Aims of this exercise

- To take thinking developed during the World Café to a site context and comparison with other options
- Do not get hung-up on detail
- The outcome (which is best?) is much less important than the thought process and how dialogue changes perspective
- Have you changed your views since World Café?
- Enjoy the discussion

Any questions?



Group 1	Environment	Group 4	Environment
Juergen Braun - NanoRem	Baseline	Judith Nathanail - NanoRem	Baseline
Wojciech Irminski	Pump & treat	Thomas Asprey	enhanced bio
Dominique Darmendrail		Jeremy Birnstingl	
Eugeniu Martac		Yevgeniya Tomkiv	
Waduge Anil		Petr Brucek	
Erik Joner		Julian Bosch	
Group 2	Social	Group 5	Social
Elsa Limasset - NanoRem	Baseline	Deborah Oughton - NanoRem	Baseline
Brian Wynne	Pump & treat	Christian Mueller-Wagner	enhanced bio
Laurent Bakker		Sarah Hartley	
Hans-Peter Koschitzky		Johannes Bruns	
Merethe Kleiven		Audun Heggelund	
		Rick Parkman	
Group 3	Economic	Group 6	Economic
Paul Bardos - NanoRem	Baseline	Nicola Harries - NanoRem	Baseline
Alan Thomas	Pump & treat	Astrid Verheyen	enhanced bio
Peter Vanneck		Rolf Gerhardt	
Dietmar Mueller		Craig Hampson	
Claire Coutris		Stephan Bartke	
Steffen Bleyl		Steve Edgar	



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