

Assessing Social Sustainability in Contaminated Site Investigations

Gitte Lemming Søndergaard (Rambøll)

Johannes Dandanell Niemann, Anne Marie Fabricius, Kim Sørensen (Capital Region of Denmark)

Anne Tipsmark Ottosen, Anne Marie Schondelmaier (Region of Southern Denmark)

Anne Bomann Henriksen, Camilla Barron Würtz Pedersen (North Denmark Region)

Ida Dyrlund Damgaard, Susanne Arentoft (Central Denmark Region)



Social, environmental and economic sustainability

Social sustainability

Safeguarding human health, well-being, human rights, and equality

LESS TANGIBLE

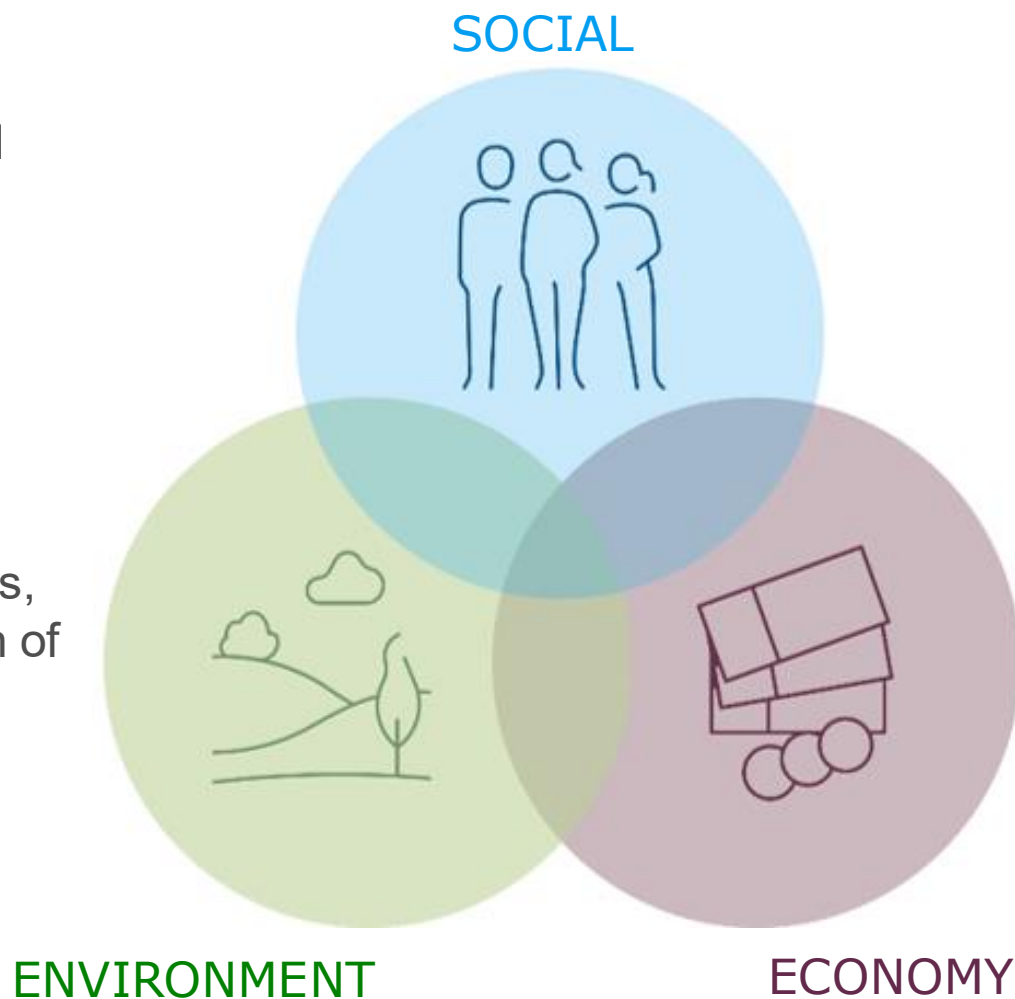
Harder to quantify

Environmental sustainability

Protection of natural resources, nature and climate. Reduction of contamination and waste

MORE TANGIBLE

Easier to quantify



Economic sustainability

Economic growth that does not come at the expense of the environment or society

MORE TANGIBLE

Easier to quantify

Two complementary projects about sustainability

Assessing Social Sustainability in Contaminated Site Investigations

Objective:

- Identify relevant sustainability indicators for assessing the social sustainability of site investigations
- Establish a methodology for social sustainability assessment
- Apply the methodology to two case sites



Region
Hovedstaden



REGION
NORDJYLLAND



RAMBOLL

SOCIAL



Evaluating Environmental Impacts in Contaminated Site Investigations

Ida Dyrlund Damgaard, Wednesday, September 16, 11:45 - 12:05



Region
Hovedstaden



RAMBOLL

ENVIRONMENT



ECONOMY



Sustainability indicators

Sustainability indicator

“A single characteristic that represents a sustainability effect, whether benefit or negative impact, which may be compared across alternative ~~remediation~~ strategies ... to evaluate their relative performance.”

site investigation

ISO 18504:2017, Soil quality - Sustainable remediation



Sustainability indicators are grouped into 15 headline indicators → categories

SuRF-UK headline indicators; ISO 18504:2017, Soil quality — Sustainable remediation

Economic	Social	Environmental
ECON1 Direct economic costs and benefits	SOC1 Human health and safety	ENV1 Emissions to air
ECON2 Indirect economic costs and benefits	SOC2 Ethics and equality	ENV2 Soil and ground conditions
ECON3 Employment and employment capital	SOC3 Neighbourhoods and locality	ENV3 Groundwater and surface water
ECON4 Induced economic costs and benefits	SOC4 Communities and community involvement	ENV4 Ecology
ECON5 Project lifespan and flexibility	SOC5 Uncertainty and evidence	ENV5 Natural resources and waste

Social sustainability indicators

01 LITERATURE REVIEW

Build the gross list



Sources:

- Site remediation (ISO, SuRF-UK, SCORE etc.)
- Water supply
- Social wellbeing in neighbourhoods
- CSRD and UN SDGs
- Etc.



02 SCREEN & VALIDATE

Select the relevant indicators

Gross list → selected list

- *Is the indicator relevant for contaminated site investigations?*
- *Testing relevance on case studies*



03 FINAL OUTPUT

Final list of indicators

Ready for use in the framework

- *Final definitions/descriptions of indicators*
- *Development of relevant questions and scales for scoring the indicator*

Participatory process



Kick-off meeting
October 2025



Teams meeting
January 2026

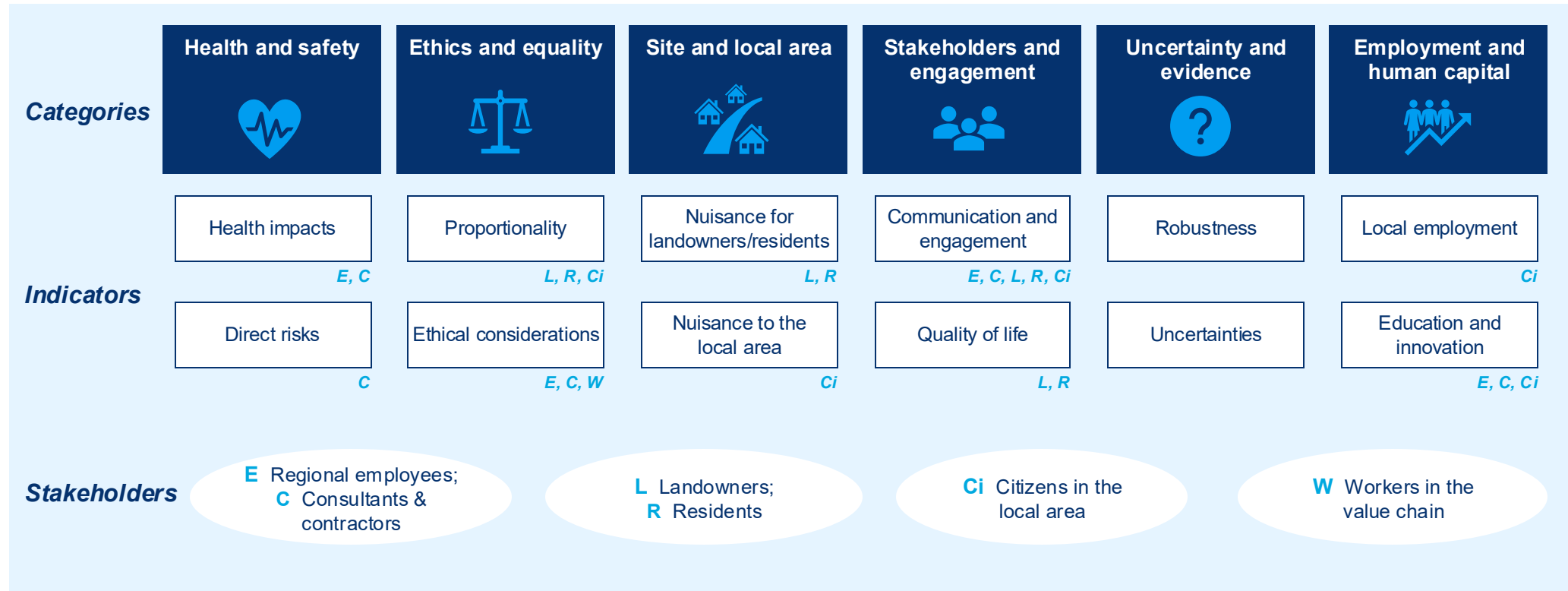


ATV Winter meeting workshop
March 2026



Project workshop
April 2026

Multi-criteria assessment method



Score, v : 0–5
Weight, w : 0–5

Weight × Score → social sustainability score:
$$v(x) = \sum_{i=1}^n w_i v_i(x_i)$$

Excel calculator enables a structured workflow

01 Define scenarios

Compare alternatives—or assess one investigation.

02 Score 12 indicators

Answer tailored questions; record each rationale.

03 Set optional weights

Use equal weighting or apply specific weighting sets

04 Identity actions

Read the pattern → use low indicators to identify actions.

Assignment of scores and weights				Assigned weights	Weighting comments	Assigned scores (0-5) See scoring guidance in the sheet "Skalaer for tildelel af scorer"				Comments on score assignment
Indicator	Total criterion weight	Indicator weight (0-5)	Comment	Option 1	Option 2	Option 3	Option 4	Comment		
				Option 1	Option 2	Option 3	Option 4			
Social	Health and safety (working environment)	9,00	0: Excluded							
	Health impacts		5,0		4,0	2,0				
	Direct risks		4,0		3,0	2,0				
	Ethics and equality	10,00								
	Proportionality		5,0		4,0	3,0				
	Ethical considerations		5,0		5,0	5,0				
	Site and local area	6,00								
	Nuisance to landowners/residents		3,0		3,0	2,0				
	Nuisance to the local area		3,0		2,0	1,0				
	Stakeholders and engagement	10,00								
	Communication and engagement		5,0		3,0	3,0				
	Quality of life		5,0		4,0	4,0				
Economy	Uncertainty and evidence	8,00								
	Robustness		4,0		4,0	3,0				
	Uncertainties		4,0		4,0	3,0				
Economy	Employment and employment capital	7,00								
	Local employment and skills		3,0		4,0	3,0				
	Education, innovation and knowledge building		4,0		4,0	3,0				

Excel calculator enables a structured workflow

01 Define scenarios

Compare alternatives—or assess one investigation.

02 Score 12 indicators

Answer tailored questions; record each rationale.

03 Set optional weights

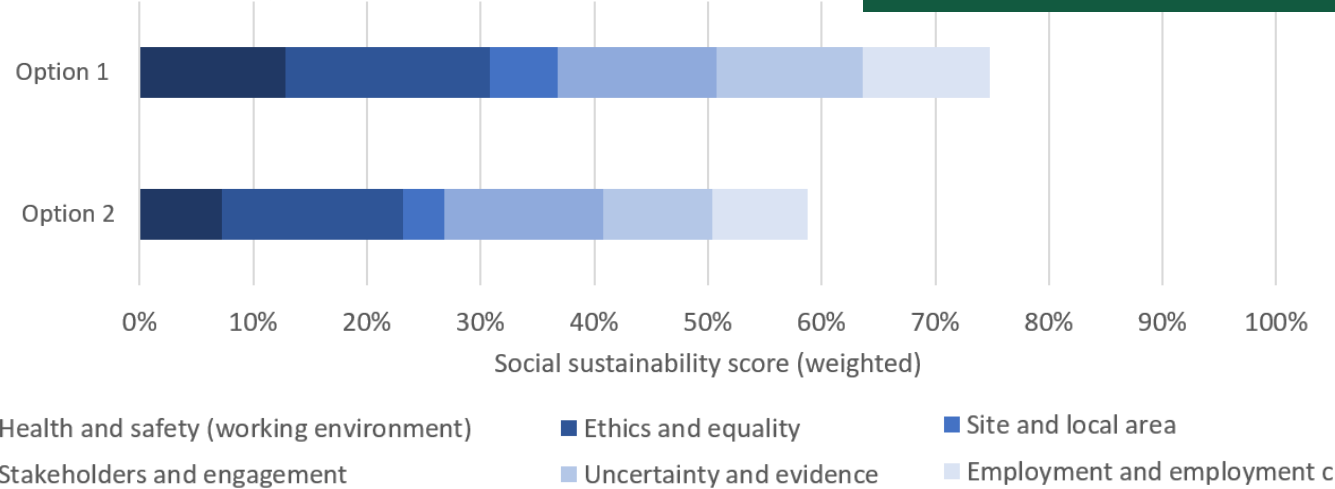
Use equal weighting or apply specific weighting sets

04 Identity actions

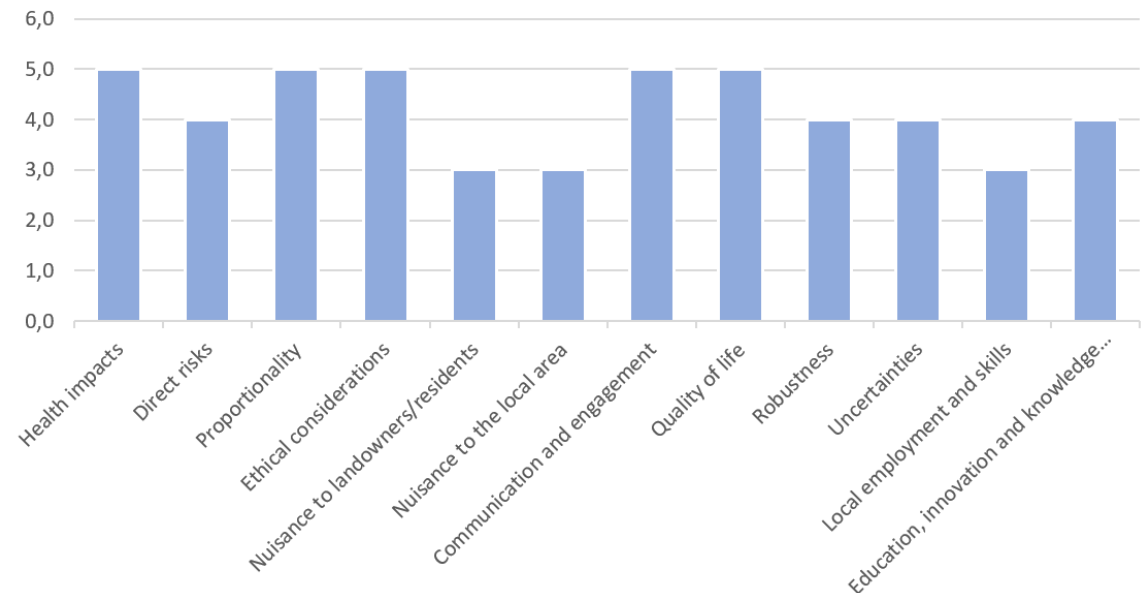
Read the pattern → use low indicators to identify actions.

Higher score = better performance
100% = maximum score

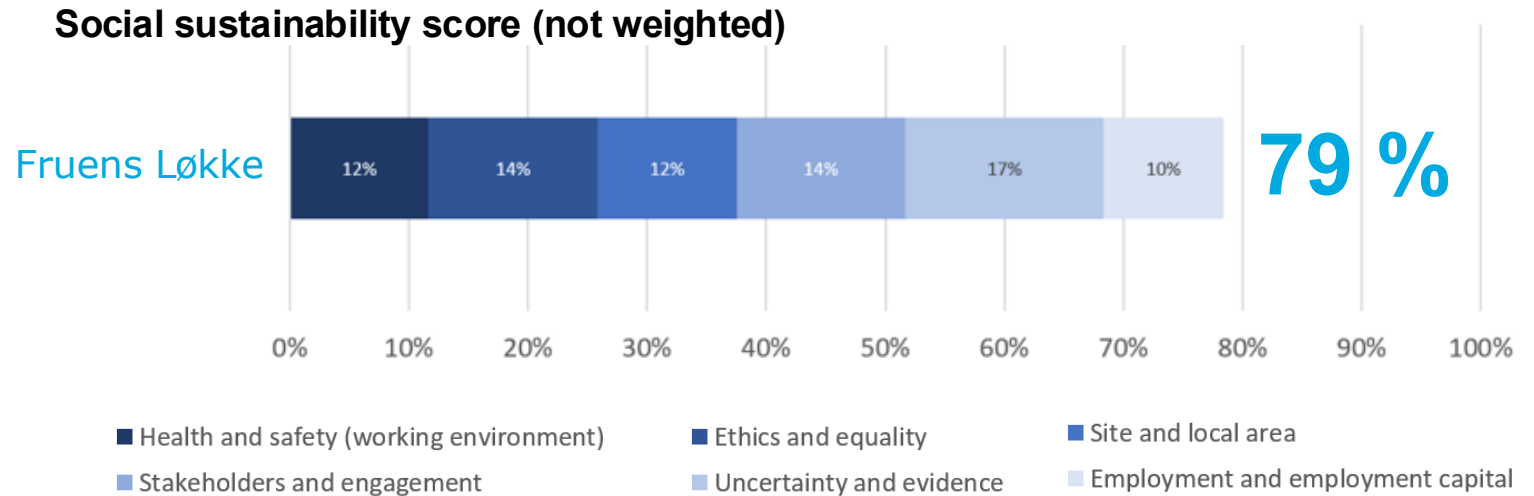
Total social sustainability score



Distribution of weights across indicators



Case study 1: Fruens Løkke



THE CASE

Former tannery → 60-home residential cooperative

- Hydrocarbon-contaminated soil was removed before construction; the site was deregistered
- Initial and detailed PFAS investigations were completed in under two years
- The housing association was actively involved throughout

RESULT

76–81%

social sustainability score

Communication and resident involvement were key strengths

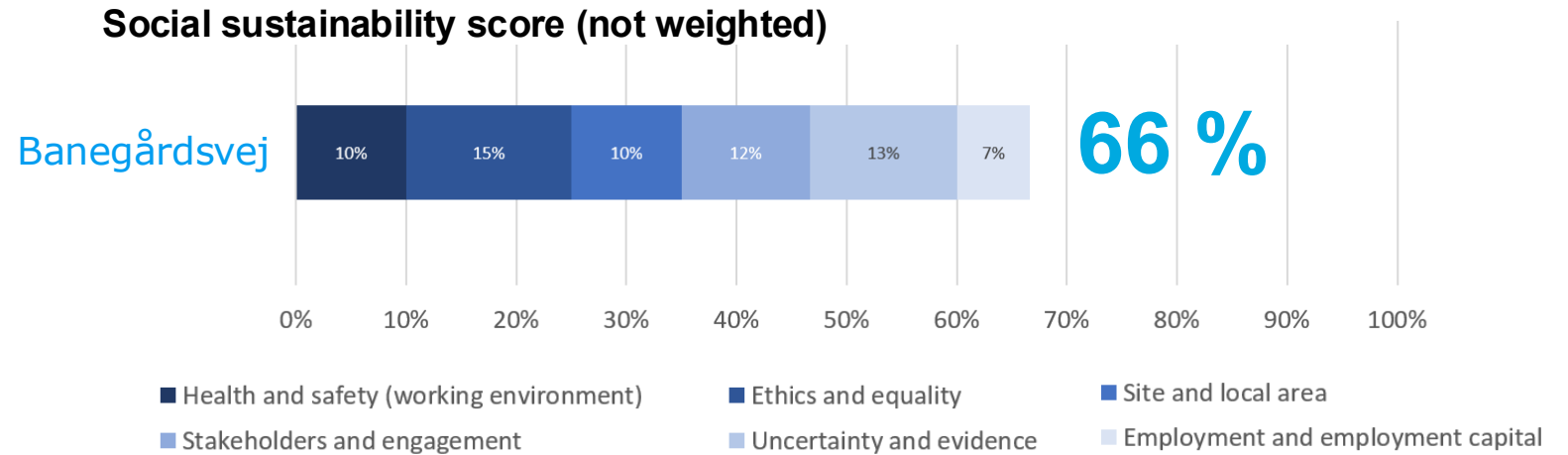
IMPROVEMENT POTENTIAL

- Consider electric drilling rigs to reduce emissions and local nuisance
- Create more local value by involving local labour
- Involve junior staff to build practical experience and support knowledge transfer

Note: Retrospective assessment

Prospective use is where the method can impact decisions

Case study 2: Banegårdsvej



THE CASE

Former dry cleaner → urban contaminant plume

- A more complex, long-running investigation in an urban setting.
- Several sites were investigated, some with continued monitoring and active remediation (ventilation)
- The hotspot is located next to a school

RESULT

66–67%

social sustainability score

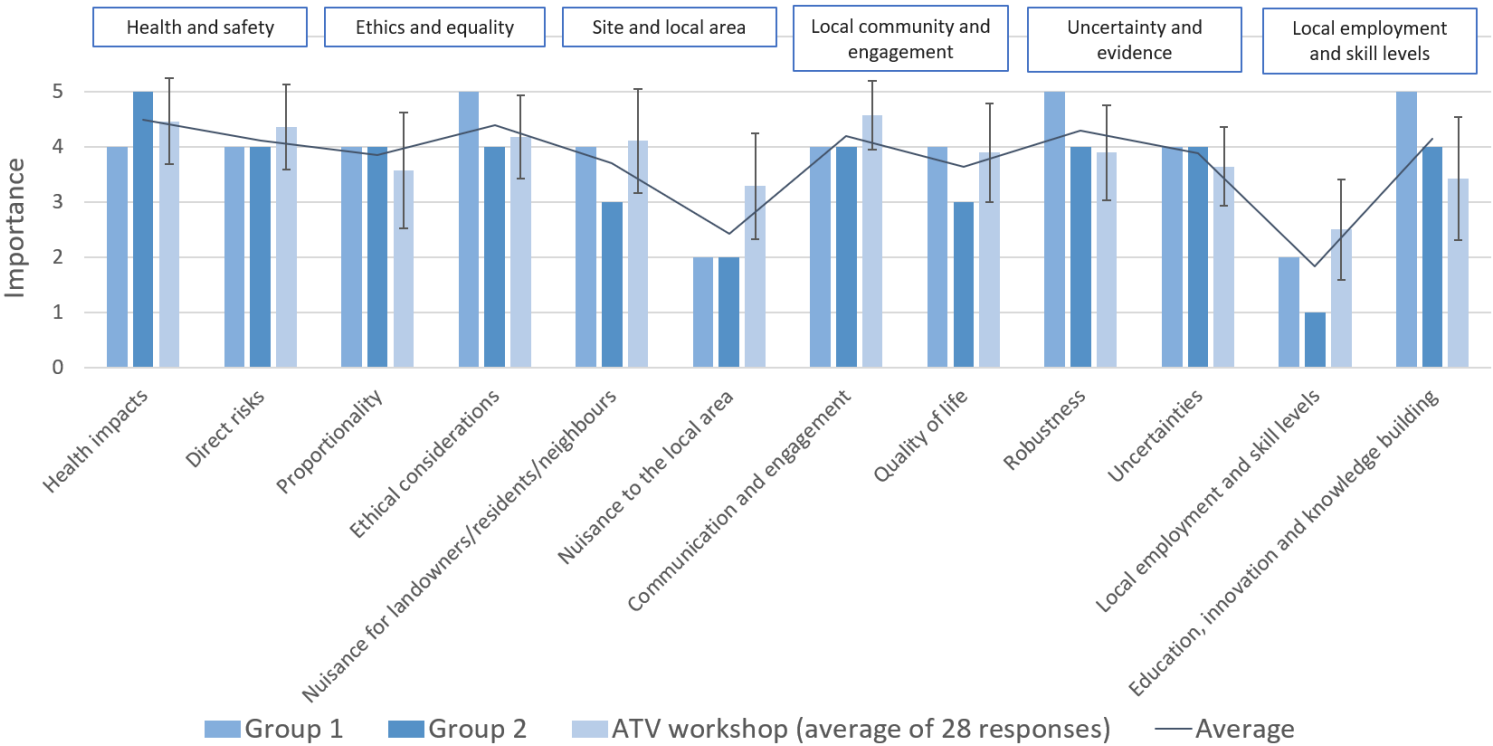
Robust investigation and focus on rapid clarification for landowners, when possible

IMPROVEMENT POTENTIAL

- Long running process – especially for landowners with continued monitoring and active remediation → even more focus on communication and engagement
- Consider electric drilling rigs to reduce emissions and local nuisance
- Create local value by involving the neighbouring school in learning and outreach
- Involvement of junior to support knowledge transfer

Importance of indicators (weights)

- Three indicator weighting sets were developed
- Most indicators were rated highly important (4 - 5), with good agreement across the sets
- Two indicators received lower weights: **Nuisance to the local area** and **Local employment and skill levels**



- Indicators may be weighted according to their importance

Importance / weight	Qualitative scale
0	Not relevant
1	Very low importance
2	Low importance
3	Medium importance
4	High importance
5	Very high importance

- For the two case sites, the application of weights didn't influence the result significantly

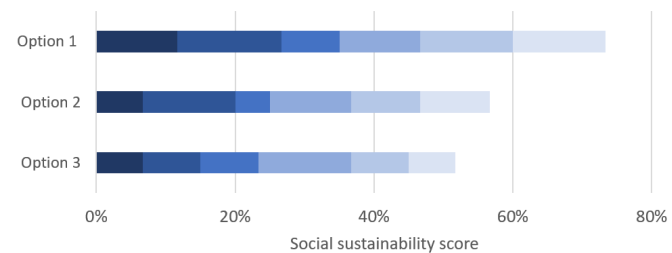
Applying the framework in practice

Semi-quantitative assessment

- Assign scores and optional weights
- Calculate an overall score

Purpose: Compare alternatives or improve a single investigation

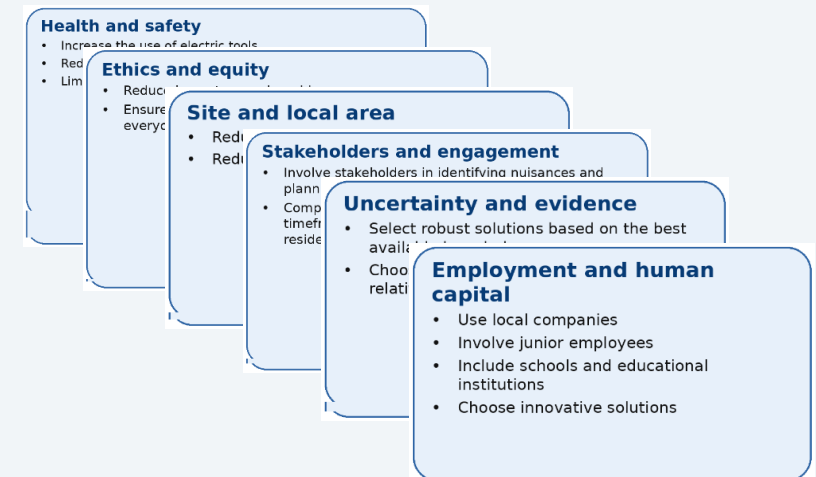
Total social sustainability score



Dialogue tool/checklist

- Review indicators and best practices

Purpose: Improve a single investigation through structured dialogue



Best management practices for site investigations

Employment and employment capital

- Use local companies and involve young employees
- Engage educational institutions and support innovation

Uncertainty and evidence

- Use robust solutions based on the best available knowledge
- Choose solutions likely to fulfil the purpose

Stakeholders and engagement

- Engage stakeholders in identifying nuisances and planning
- Execute investigation rapidly
- Clear and continued communication with affected citizens



Human health and safety

- Use electric tools where practicable
- Reduce exposure risks, heavy lifting and poor ergonomics

Ethics and equality

- Reduce impacts on vulnerable groups
- Ensure equal access to investigations

Site and local area

- Minimise nuisance for landowners and residents
- Reduce disruption to the local area

Conclusions

A practical framework for assessing social sustainability for site investigations.

01 Practical framework

12 indicators across six categories provide a structured basis for assessing social sustainability.

02 Flexible application

Use it as a multicriteria assessment or as a dialogue tool/checklist, depending on the project.

03 Integrated assessment

Combine with environmental and economic sustainability indicators for a full sustainability assessment

03 Start early

Consider social sustainability during tendering and planning, while the investigation can still be shaped.

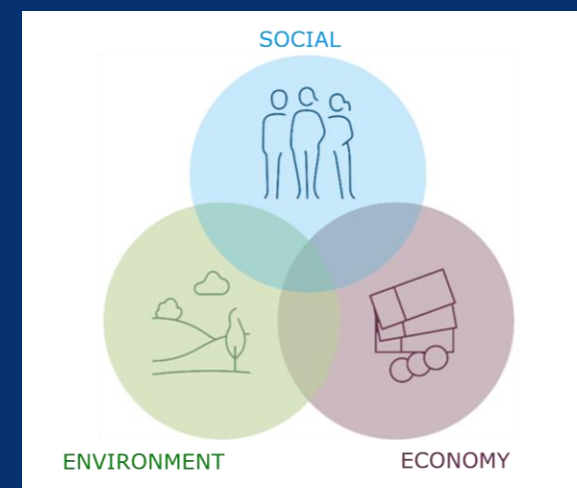
04 Communication and engagement is a key issue

Clear, continuous and accessible communication helps manage expectations and concerns.

Evaluating Environmental Impacts in Contaminated Site Investigations

Ida Dyrland Damgaard, Wednesday, September 16,
11:45 - 12:05

Assignment of scores and weights		Assigned weights	Weighting comments	Assigned scores (0-5) See scoring guidance in the sheet "Matrix for weighting of scores"			
Indicator	Total criterion weight	Indicator weight (0-5)	Comment	Option 1	Option 2	Option 3	Option 4
				Option 1	Option 2	Option 3	Option 4
Health and safety (working environment)	10,00	5,0	Excluded				
Health impacts		5,0		4,0	3,0		
Direct risks		5,0		3,0	5,0		
Ethics and equality	10,00						
Proportionality		5,0		4,0	4,0		
Ethical considerations		5,0		5,0	5,0		
Site and local area	10,00						
Nuisance to landowners/residents		5,0		3,0	4,0		
Nuisance to the local area		5,0		2,0	4,0		
Stakeholders and engagement	10,00						
Communication and engagement		5,0		3,0	4,0		
Quality of life		5,0		4,0	4,0		
Uncertainty and evidence	10,00						
Robustness		5,0		4,0	3,0		
Uncertainties		5,0		4,0	3,0		
Employment and employment capital	10,00						
Local employment and skills		5,0		2,0	3,0		
Education, innovation and knowledge building		5,0		3,0	3,0		



Thank you!

Gitte Lemming Søndergaard

gils@ramboll.dk

RAMBOLL

Bright ideas.
Sustainable change.



Region
Hovedstaden



REGION
NORDJYLLAND



Region Syddanmark

midt
regionmidtjylland