



Sustainability assessment of groundwater remediation options using the SURE tool

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Bright ideas.
Sustainable change.



30.01.2024

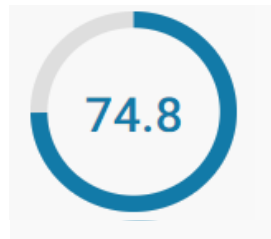
Agenda

1. The strangeness of this presentation
2. Sustainable remediation – what is it?
3. SURE by Ramboll
4. Case Study: Groundwater contamination with CHC

Sustainability index Germany

Overall Performance

Index score



Index Rank

Germany

6

SDG Dashboards

SDG = Sustainable development goals



■ Major challenges
 ■ Significant challenges
 ■ Challenges remain
 ■ SDG achieved
 ■ Information unavailable

Europe Sustainable
Development Report 2022









Sustainability index Denmark

▼ Overall

▼ SDG Dashboards

SDG = Sustainable development goals

Rank	Country	Score	Performance by SDG
1	 Finland	81.68	
2	 Sweden	80.63	
3	 Denmark	79.17	
4	 Austria	78.17	
5	 Norway	77.15	
6	 Germany	74.84	

*Europe Sustainable
Development Report 2022*



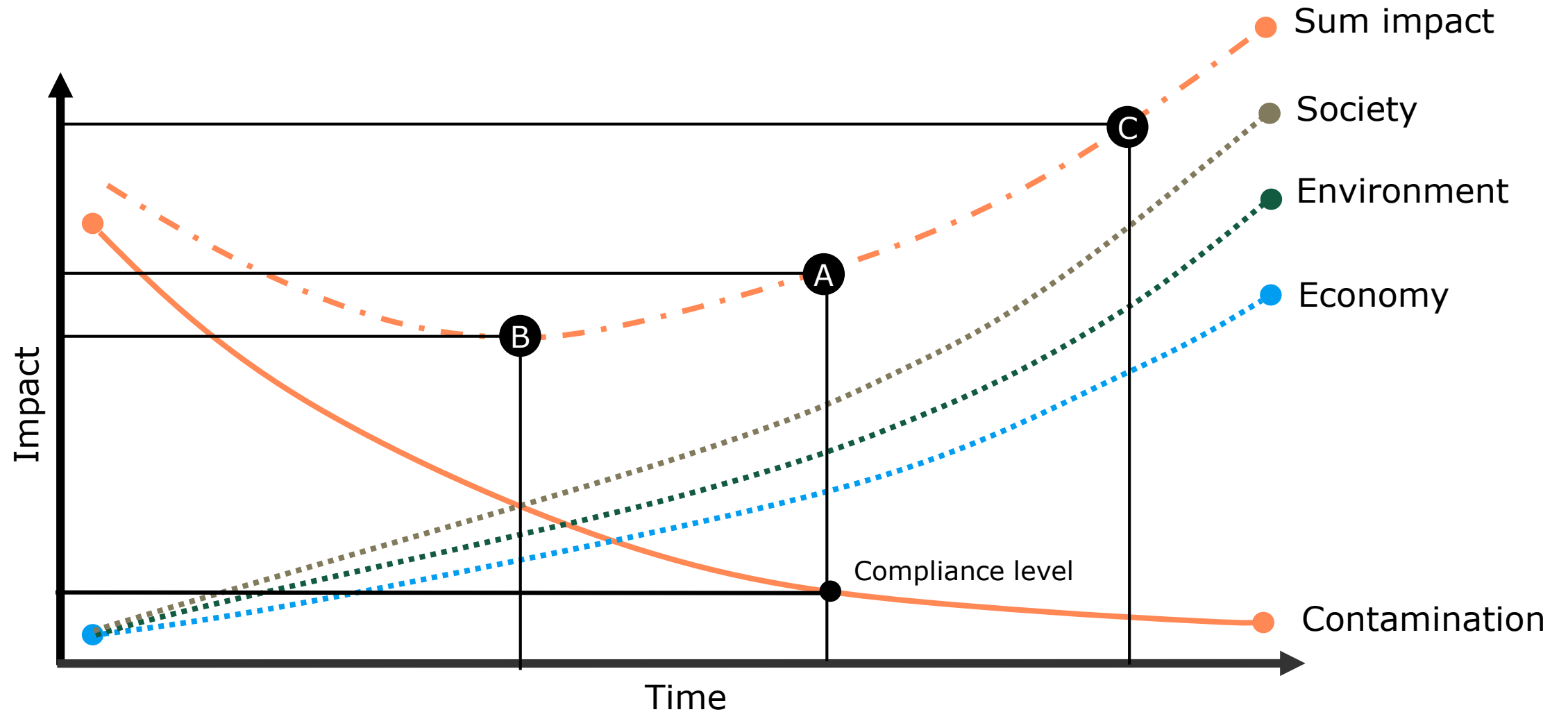
2. Sustainable remediation

Sustainable remediation elimination and/or control of unacceptable risks in a safe and timely manner whilst optimising the environmental, social and economic value of the work.













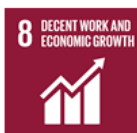

ISO 18504:2017

Germany: since the update of the Soil Protection Ordinance in summer 2023, sustainability must be regarded in assessment of remediation alternatives

Risk reduction \neq increased sustainability



Sustainability-Indicators in contaminated land management

AIR	<ul style="list-style-type: none"> Greenhouse gas (CO₂, CH₄, N₂O) Criteria air pollutants (NO_x, SO_x, PM) Volatile Organic Compounds (VOCs) 	
LAND	<ul style="list-style-type: none"> Surface soil consumption Land and soil quality Geotechnical properties 	  
ECOLOGY	<ul style="list-style-type: none"> Effects on biota Ecosystem changes Landscape effects 	   
HEALTH & SOCIETY	<ul style="list-style-type: none"> Long term risk management performance Risks to site workers Risks and impacts to site users and public 	   
COST & BENEFIT	<ul style="list-style-type: none"> Cost of remediation and associated works Other direct financial costs Changes in site / property values 	
FLEXIBILITY	<ul style="list-style-type: none"> Duration of remediation Ability to respond to changing circumstances Requirements for institutional controls 	

**SUSTAINABLE
DEVELOPMENT
GOALS**

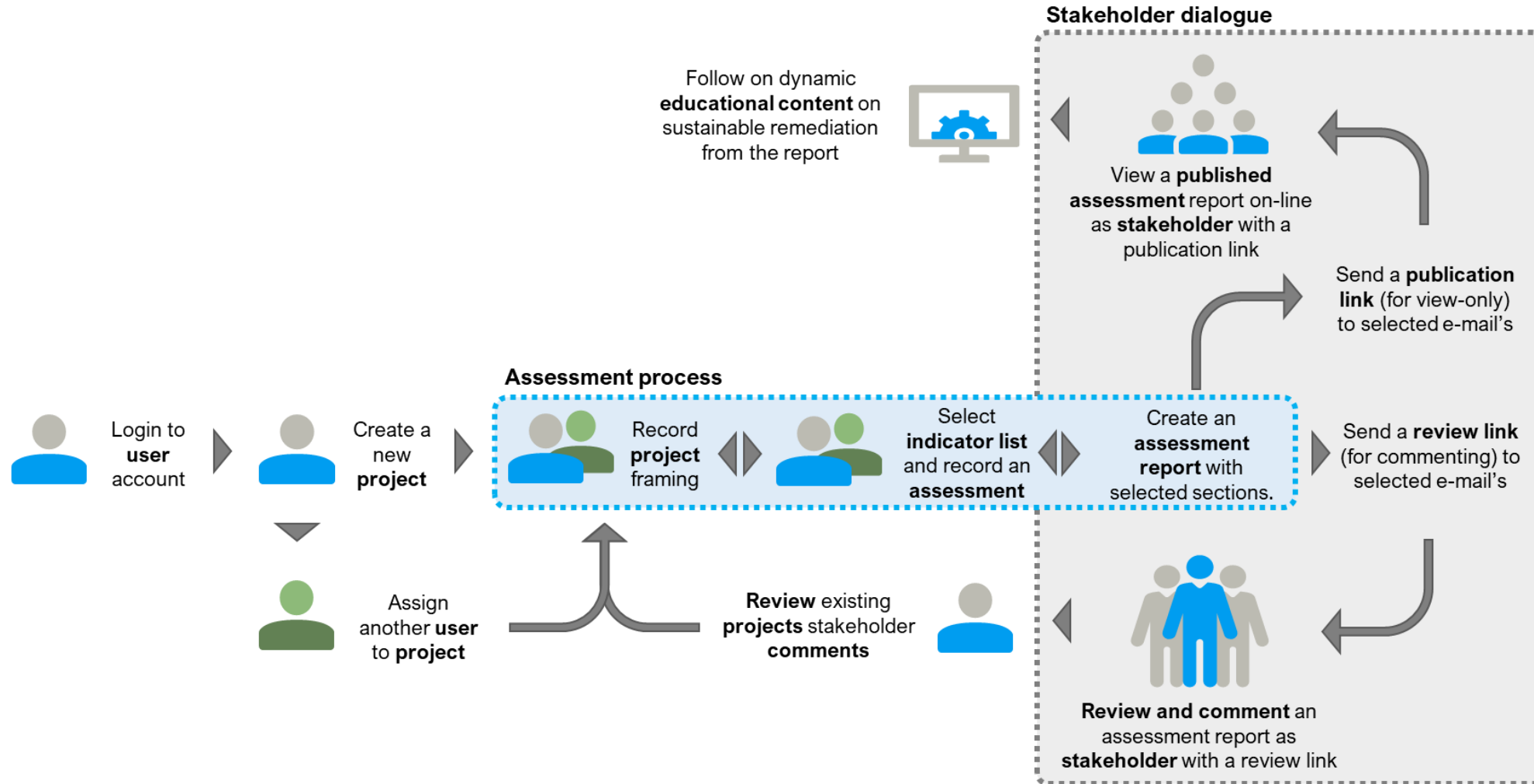
3. SURE by Ramboll

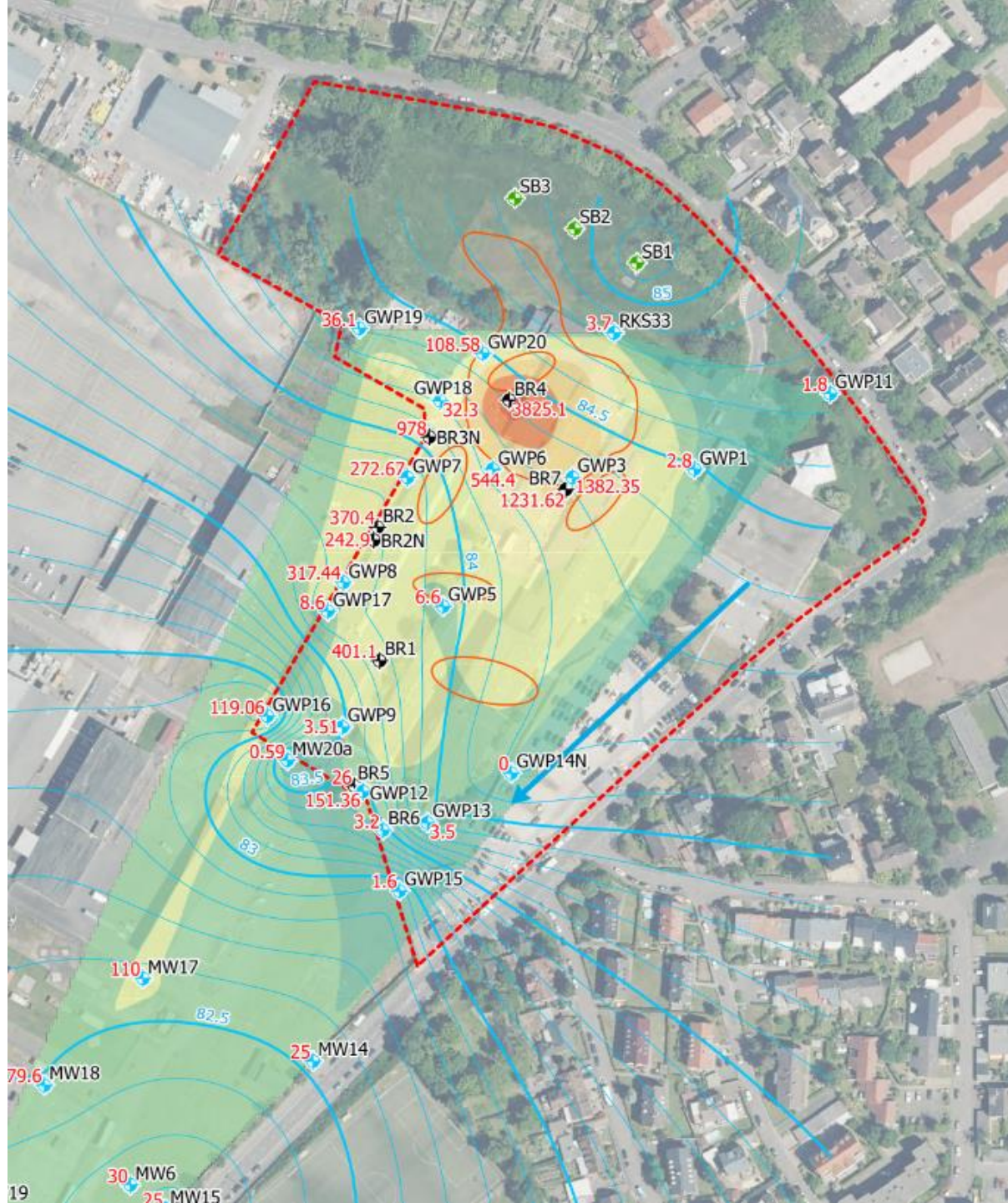
Online-tool for the assessment of Sustainability in Remediation option appraisal

- Enables an comprehensive sustainability assessment
- Documenting the whole assessment process
- Supports the Communication between stakeholders
- For free (well, it costs a registration)



SURE – The process





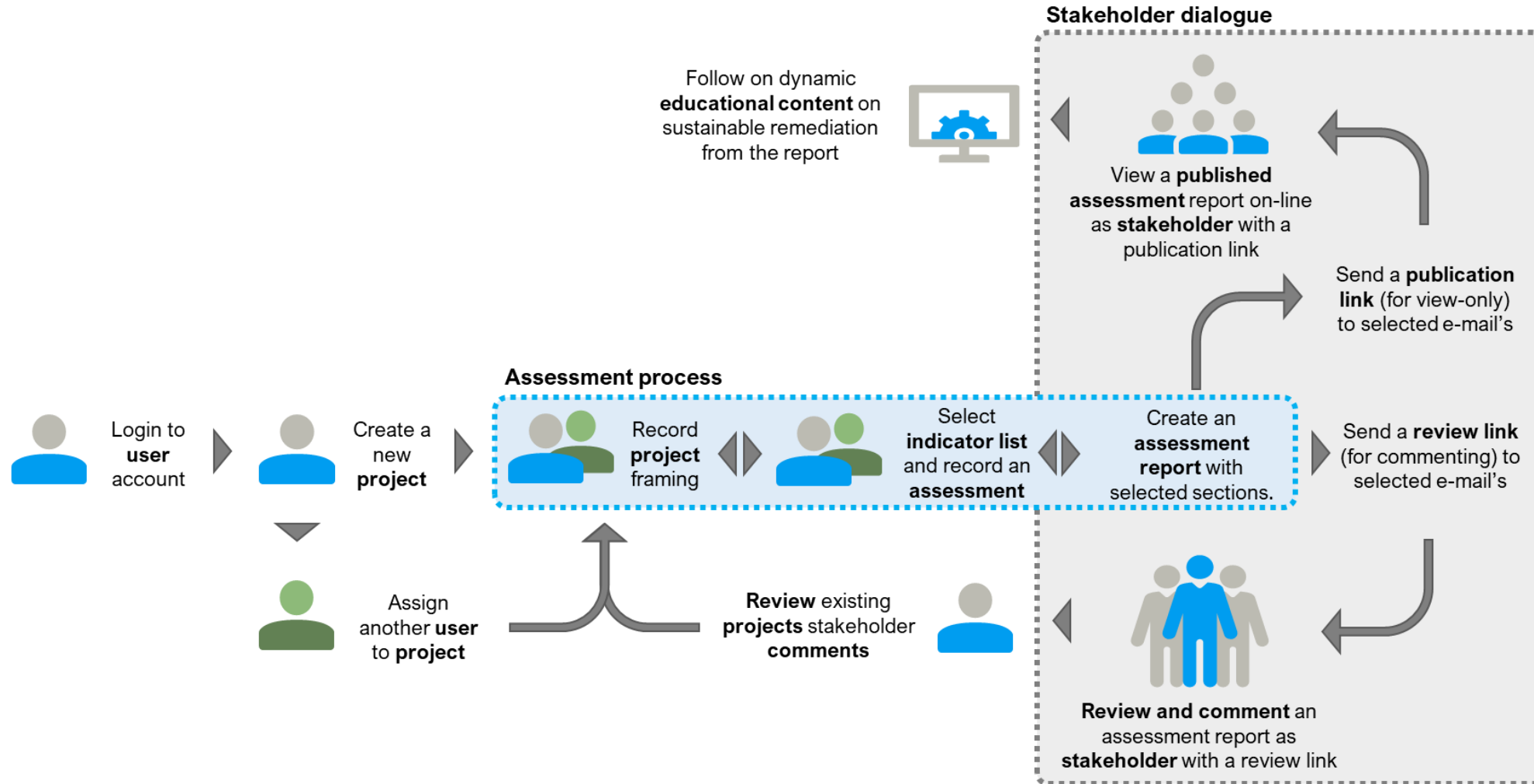
Three scenarios

→ Site divestment

→ Remediation during production

→ Site development to housing

SURE – The process



SURE – The assessment

- ✓ 3 Domains Environment, Society and Economy, 5 categories per domain
- ✓ Over 70 indicators are available for assessing the selected options
- ✓ Weighing according to relative importance on a 1 -5 scale.

Environment	Society	Economy
<u>Emissions to Air</u> <ul style="list-style-type: none"> • Green House Gases • Acid Rain • Ground Air Quality • <u>Ozone Depleting Substances</u> 	<u>Human Health &</u> <ul style="list-style-type: none"> • Long Term Risk Reduction • <u>Direct Risks</u> • Risk Management • Health Effects 	<u>Direct Costs & Benefits</u> <ul style="list-style-type: none"> • <u>Direct Costs & Benefits</u> • Other Costs • Uplift in Site Value • <u>Liability Discharge</u>
<u>Groundwater & Surface Water</u>	<u>Ethics & Equality</u>	<u>Indirect Costs & Benefits</u>
<u>Soil & Ground Conditions</u>	<u>Neighbourhood & Locality</u>	<u>Employment</u>
<u>Ecology</u>	<u>Community & Community Involvement</u>	<u>Induced Costs & Benefits</u>
<u>Natural resources & Waste</u>	<u>Uncertainty & Evidence</u>	<u>Project Life Span & Flexibility</u>

SURE – The outcome

- ✓ For each option a total normalised weighted score (Fig. 1) for each category of indicator and each domain.
- ✓ Resulting in a final score
- ✓ SURE also evaluates the relative contribution of each option to each of the 17 SDGs (Fig. 2).

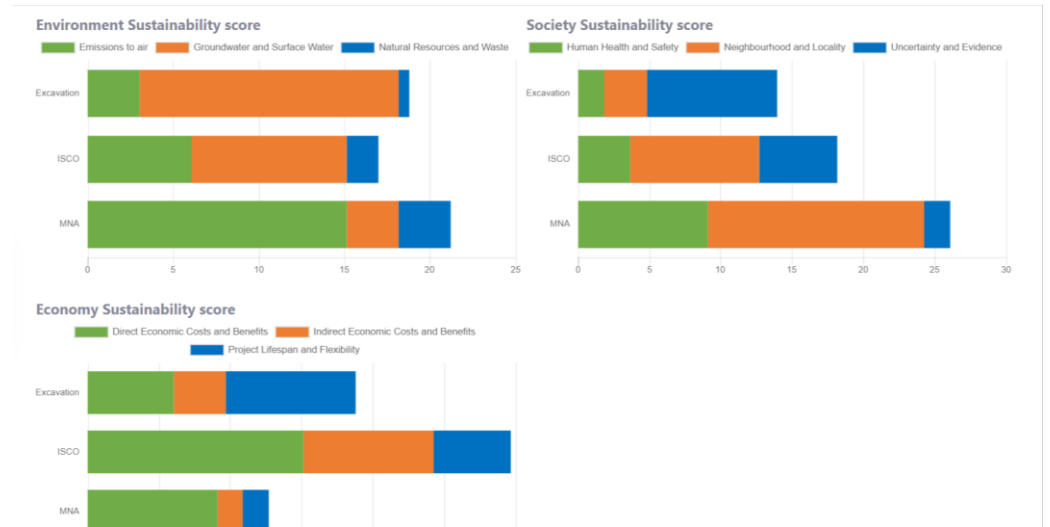


Fig. 1

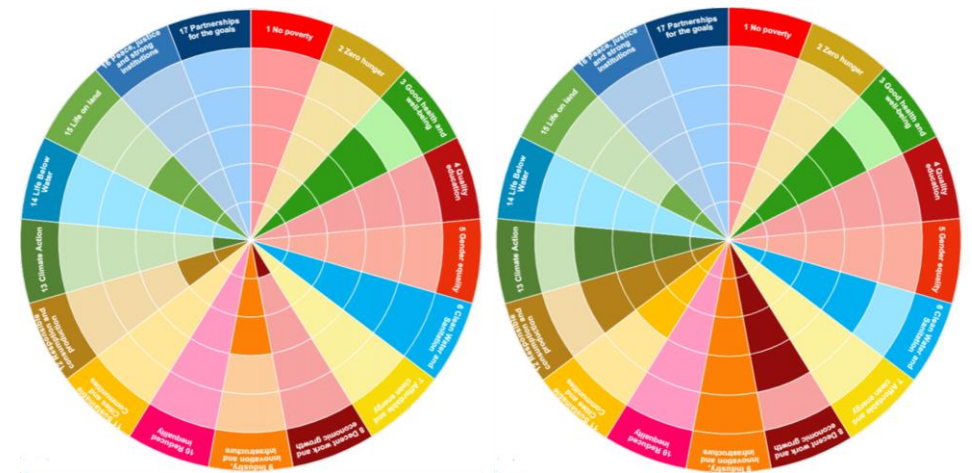


Fig. 2

4. Case study – Groundwater contamination with CHC

Background:

- Closure and development of an industrial site
- Soil and groundwater contaminated with CHC

Project aims:

- Reduce existing contamination
- Stop migration of contamination over the site border

Priorities of site owner:

- Compliance with environmental regulations
- Remove Liabilities off site
- Site fit for residential use

Case study – Groundwater contamination with CHC

	Weight	Excavation & upgraded hydraulic confinement	In situ bio/chemical reduction (source) and upgraded hydraulic confinement for plume	In situ bio/chemical reduction (source and plume)	Thermal desorption (source) and hydraulic confinement
Environment ⁵	3.5	2.4	3.5	3.3	
Society ⁵	3.3	1.7	3.2	3.4	
Human Health and Safety ²	5	1	3	4	
Ethics and Equality ¹	1	1	4	4	
Neighbourhood and Locality ²	5	1	5	5	
1. Nuisance impacts	5	1	5	5	
2. Wider impacts	5	1	5	5	


Indicator Description And Guidance [X]

Indicator : Nuisance impacts

Description : Consider effects from dust, light, noise, odour and vibrations during works and associated with traffic, including both working-day and night-time/weekend operations.

How to Compare : Compare remedial options in terms of their impact on the neighbourhood and locality through the various nuisance issues identified.

Links to SDG's



Case study – Groundwater contamination with CHC

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Society ⁵	3.3	1.7	3.2	3.4	2.8
Human Health and Safety ²	5	1	3	4	2
Ethics and Equality ¹	1	1	4	4	5
Neighbourhood and Locality ²	5	1	5	5	3
1. Nuisance impacts	5	1	5	5	3
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Society - Neighbourhood and Locality - Nuisance impacts ✕

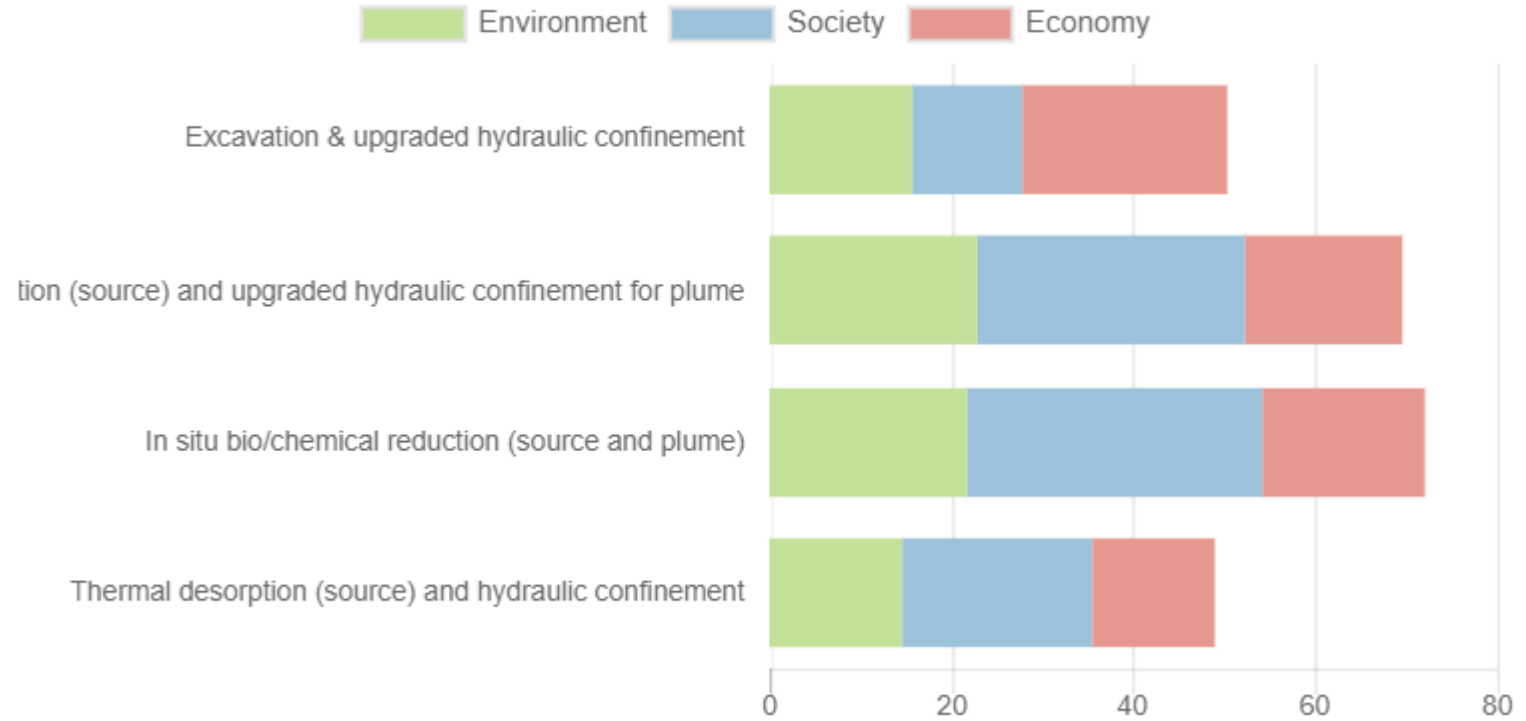
In situ bio/chemical reduction (source and plume)

Since the products promoting biological degradation and chemical reduction are applied by direct push applications or by infiltration in wells, the nuisance is kept to a minimum.

Save

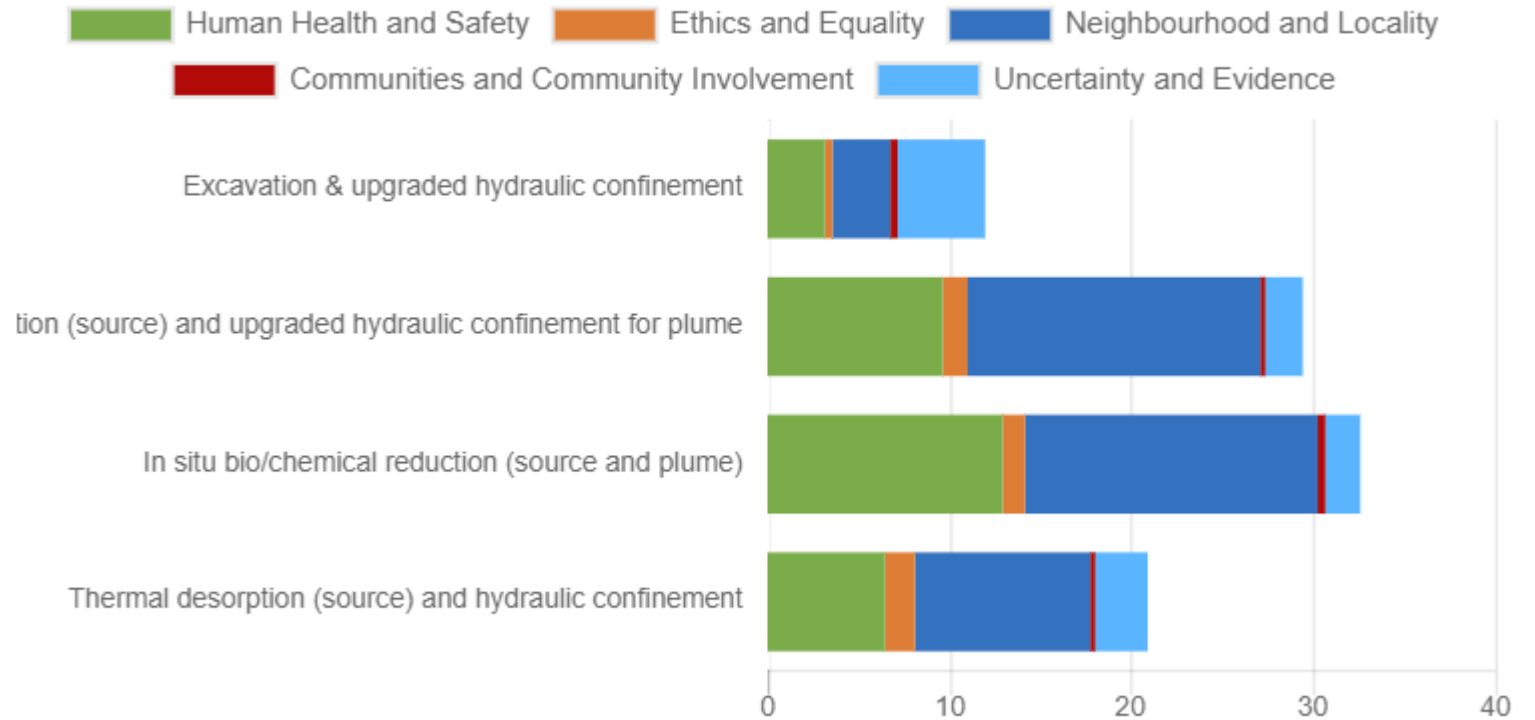
Case Study Results

Total Assessment Sustainability Score



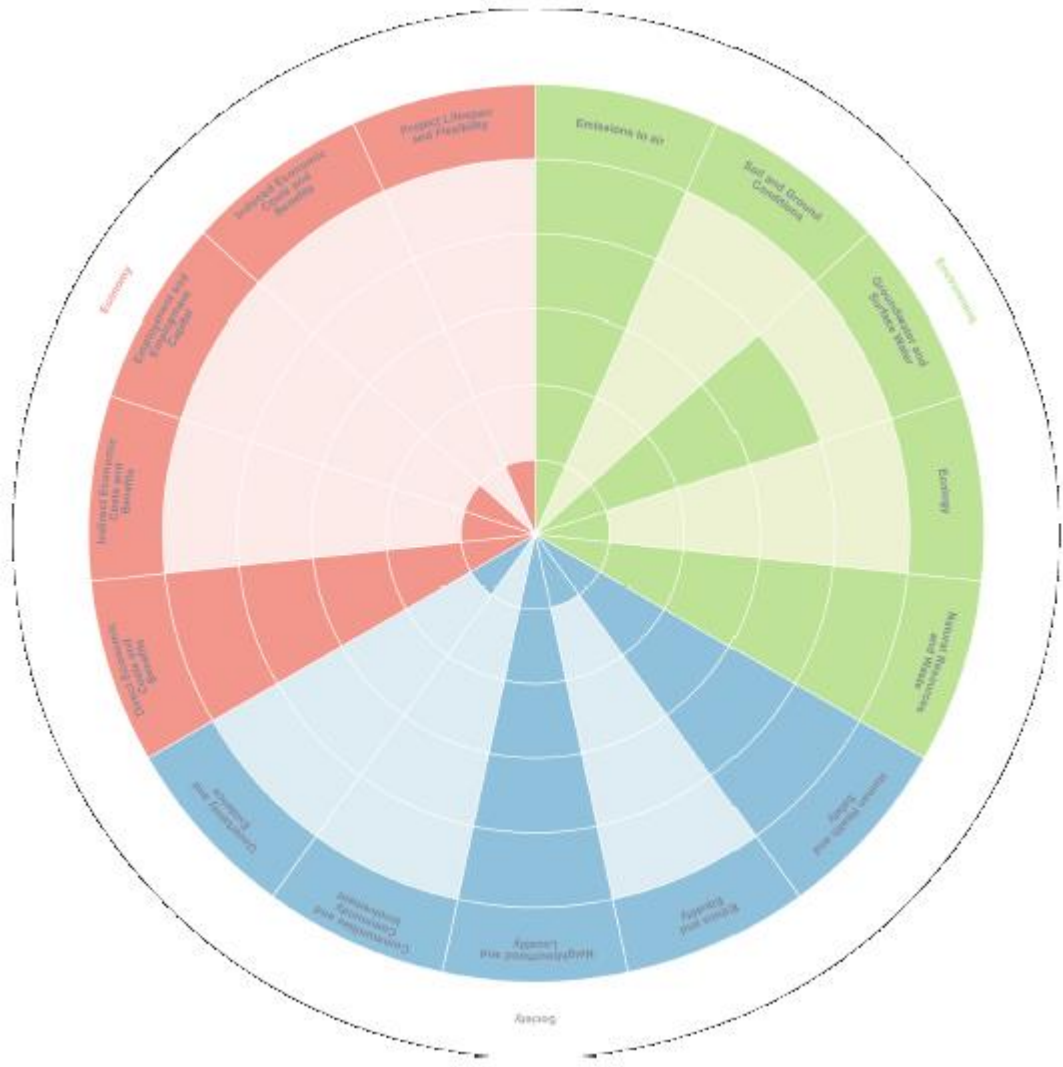
Case Study Results

Society Sustainability score



Score per technology

Distribution of Scores



Case study – Groundwater contamination with CHC

- Cover page
- About Ramboll & Disclaimers
- Introduction
- Background
- Methodology
- Project Framing
- Details of Assessment
- Results Overview
- Assessment details
- Results for options
- Stakeholder comments
- Revision history

 **Generate Report**

Ramboll Deutschland GmbH
Am Marktplatz 5
65779 Kelkheim
Germany

SUSTAINABILITY ASSESSMENT

CHC Contamination: Site Closure - Residential

Date
May 2023

Reference no

Site Address
[REDACTED]

Lead Assessor:
Marlon Schlawin

 RAMBOLL GROUP

SURE – key aspects

- Agreement with stakeholders on indicators to consider and weighing of indicators
- Calculation of the total score as well as scores for each domain
- Digital transfer of assessments to stakeholders
- Possibility for stakeholders to comment on assessment and subsequent adjustment of assessment
- Several report options, e.g. graphical report or full detailed report
- Register at <https://sure.ramboll.com/>

For more informationen:
www.sure.ramboll.com



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Bright
ideas.
Sustainable
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