



**British  
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

Gateway to the Earth

# BGS Geoscience in the Redevelopment of UK Brownfields: Knowledge Exchange and Innovation

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**SiLC Annual Forum**



UK Research  
and Innovation

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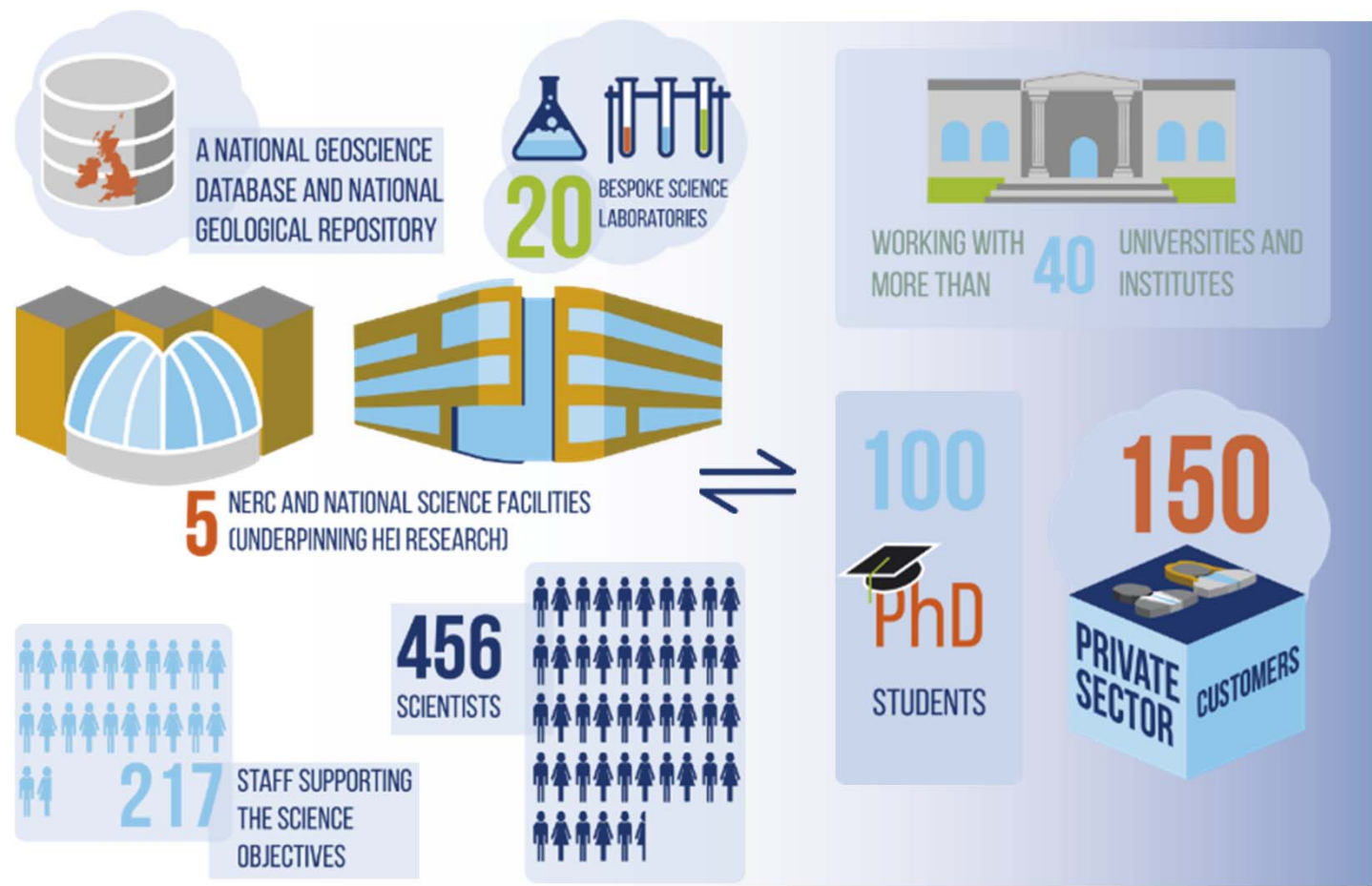
@BGSBrownfields

# Who we are

## UK Research and Innovation



# Who we are



# Who we are



What we do

## SCIENCE PROGRAMMES



What we do



**SCIENCE PROGRAMMES**



**SCIENCE & TECHNOLOGY TRANSFER**



**What we do**

**SCIENCE PROGRAMMES**



**OPERATIONS**



**SCIENCE & TECHNOLOGY TRANSFER**



**What we do**



SCIENCE PROGRAMMES

CROSS-CUTTING SCIENCE



OPERATIONS



SCIENCE & TECHNOLOGY TRANSFER



What we do



What we do





## What is BGS geoscience?

Knowledge and understanding of the Earth's subsurface derived through the application of the scientific method



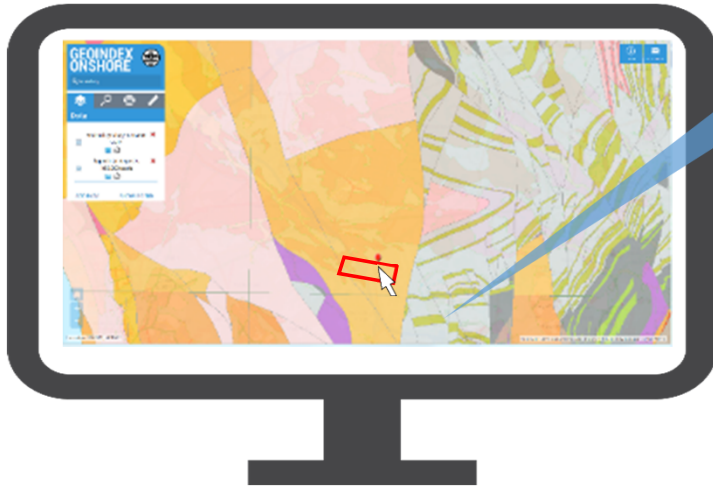
Data

Products



Scientific knowledge Technology

# Geology and hydrogeology



## Further details

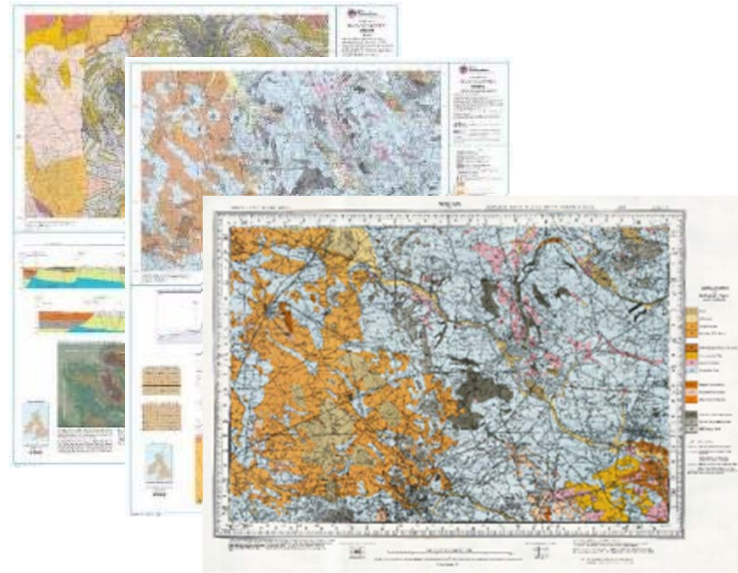
- Age range
- Lithological description
- Definition of upper boundary
- Definition of lower boundary
- Geographical limits
- Parent unit
- Previous names
- Stratotypes
- References



# Geology and hydrogeology



Geological data



# Geology and hydrogeology



Geological data



Maps

**Golden ASSOCIATES** Site Investigation

Project: **Site Investigation** Borehole ID: **CA06/22**  
Sheet: **1 of 1**

Client: **Ronshil Insoil Supplies** Project No.: **0558302**

Equipment & Methods: **Terrier 2000** Order by: **CC Ground Investigations** Ground Level: **38.22**

Date started: **01/02/2006** Completed: **06/02/2006** Co-ordinates: **1136.78 5136.16**

Logged by: **CLH**

Depth (m)	Type	Description	STRATA RECORD	
			Level (m AOD)	Depth (m)
0.00	0.00	Surface	0.00	0.00
0.10	0.10	Dark, dense, brown and yellow loam, medium to coarse angular clay to sandy SILT, with fine brown sand. (1A)	0.10	0.10
0.20	0.20	Medium dense, damp, dark brown, fine grained silty SAND (1A)	0.20	0.20
0.30	0.30	Loose, moist, brown, fine to medium grained SAND (1A)	0.30	0.30
0.40	0.40	Silt, dense, dark brown, fine grained silty SAND, with some organic matter. (1A)	0.40	0.40
0.50	0.50	Silt, moist, brown and grey brown sandy CLAY, with grey, fine to medium grained sand and occasional grey fine sand subrounded gravel. (1A)	0.50	0.50
0.60	0.60	Dark, moist, brown, fine grained silty SAND (1A)	0.60	0.60
0.70	0.70	Silt, wet, grey, brown, sandy CLAY, with brown, fine grained sand. (1A)	0.70	0.70
0.80	0.80	End of borehole at 0.8m	0.80	0.80

Sample No.	Depth (m)	Packaging Used	Sample Remarks
001	0.10	0.00	
002	0.20	0.00	
003	0.30	0.00	
004	0.40	0.00	
005	0.50	0.00	
006	0.60	0.00	
007	0.70	0.00	
008	0.80	0.00	

Scale: 1:50  
DATE OF SAMPLE: 01/02/2006  
DRAWN BY: CLH



online viewers



Maps



Memoirs



Boreholes

# Geology and hydrogeology



Geological data



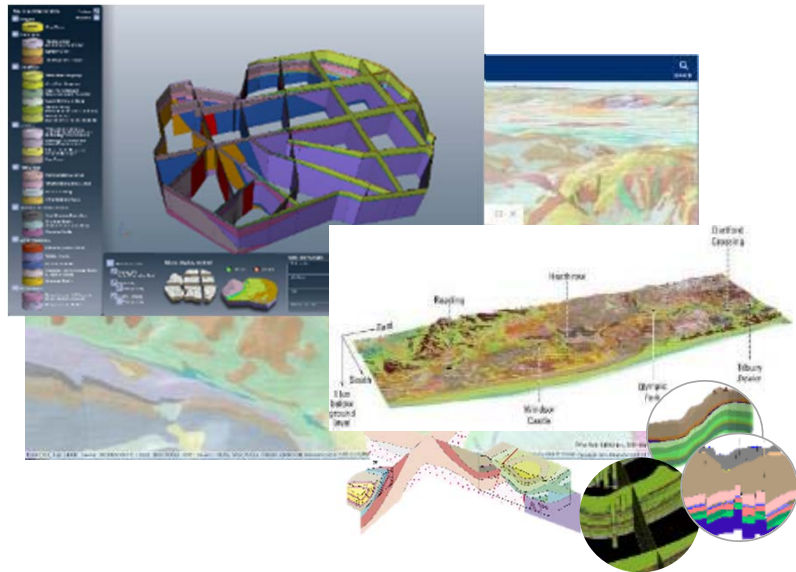
Maps



Online viewers



- Maps
- Memoirs
- Boreholes



# Geology and hydrogeology



Geological data



Maps



Online viewers



- Maps
- Memoirs
- Boreholes



3D geology

- Superficial deposits
- Superficial thickness
- Aquifer designation
- Depth to groundwater
- Groundwater vulnerability



# Geology and hydrogeology



Geological data



Maps



Online viewers



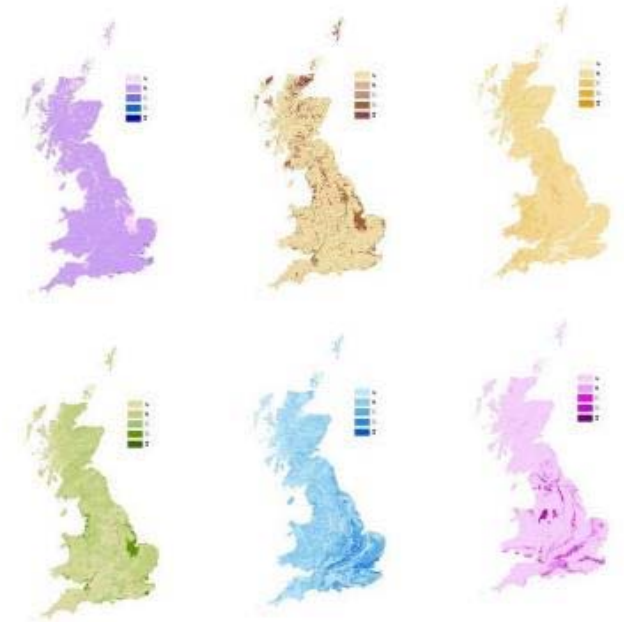
- Maps
- Memoirs
- Boreholes



3D geology

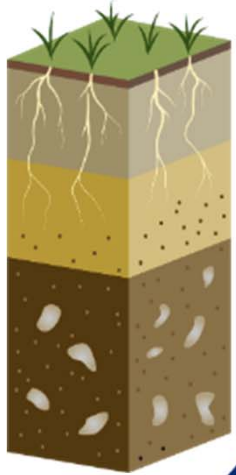


Derived data





# Geochemistry



Routes



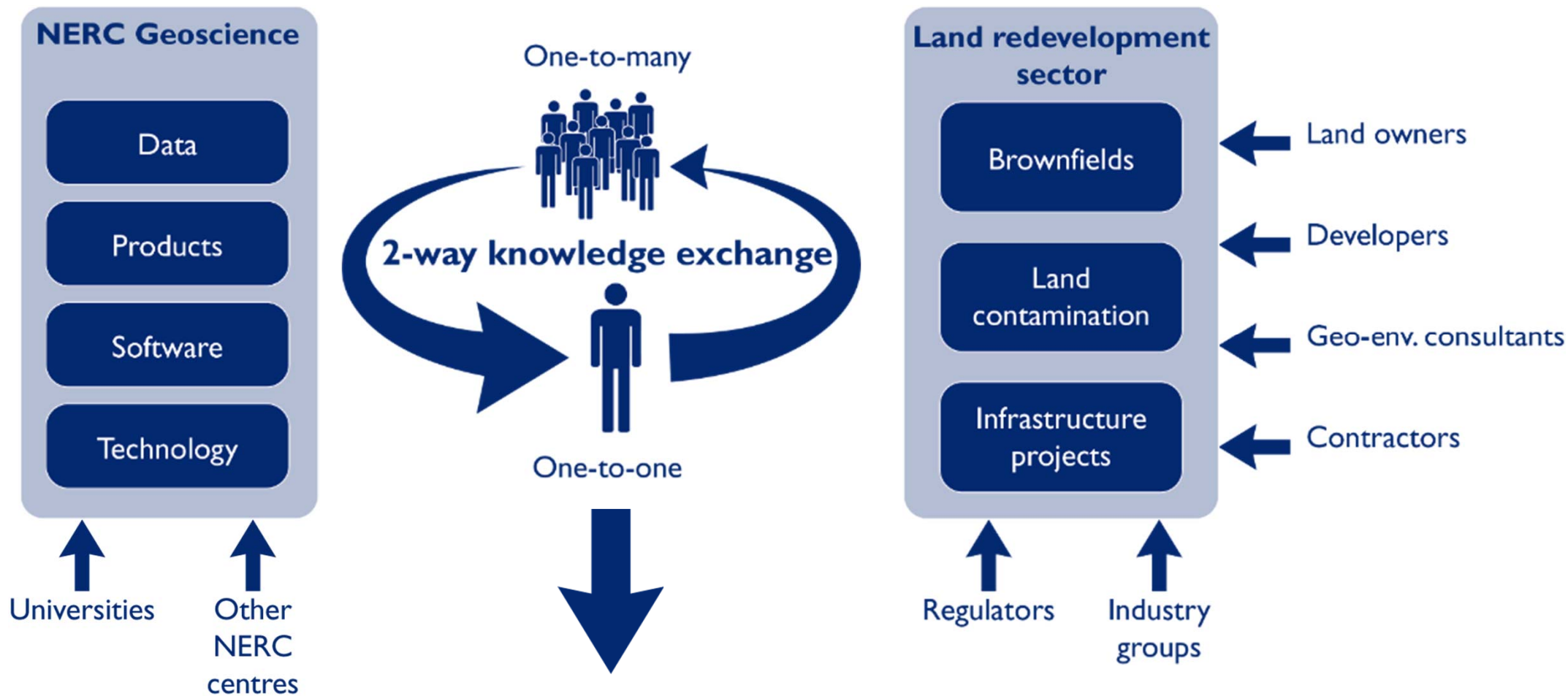
What factors affect the release of these chemicals?

What concentrations of potentially harmful elements are present in soil?

What is the bioaccessibility of these chemicals?

What is the normal background concentration of selected soil chemicals?

# NERC Knowledge Exchange Fellowship



# Knowledge exchange

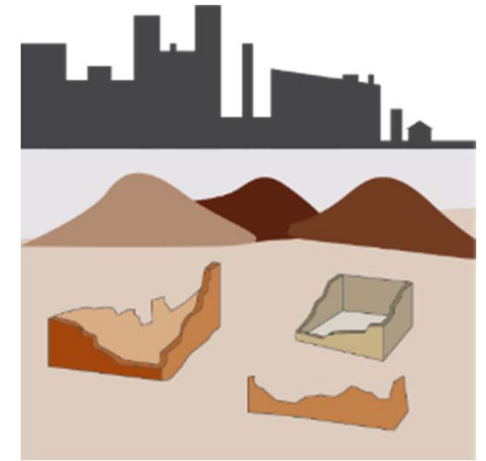
Problems / key facts



Lots of science we feel is under utilised



Would like to see more benefits come from our science



UK brownfields rising back up the agenda



Examples of science designed without end-user input



End-user led innovation is the right new way to do things

## Knowledge exchange

### Outcomes



- New opportunities to adapt and improve
- Behavioural change in BGS
- Improved utilisation of our science
- Measurable changes in decision making

# Knowledge exchange

## Actions / project plan



Workshops



Prioritise opportunities



Collaborative projects



Measure current impact



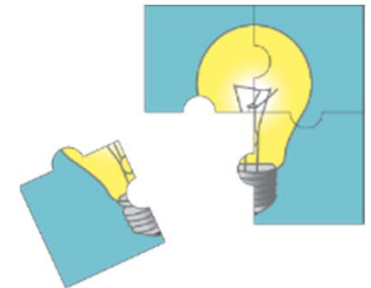
Do work



Measure impact



Report as case studies  
(internal and external)



Co-develop  
Co-design  
Co-deliver



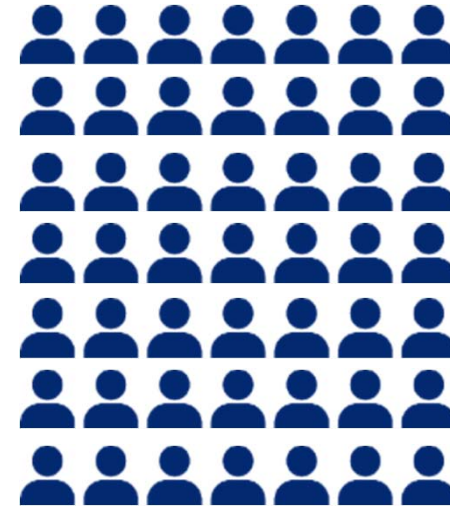
## Workshops



Response rate to invitations very good



Inspired by new mandate to make improvements to existing offering and develop new things



70 participants involved

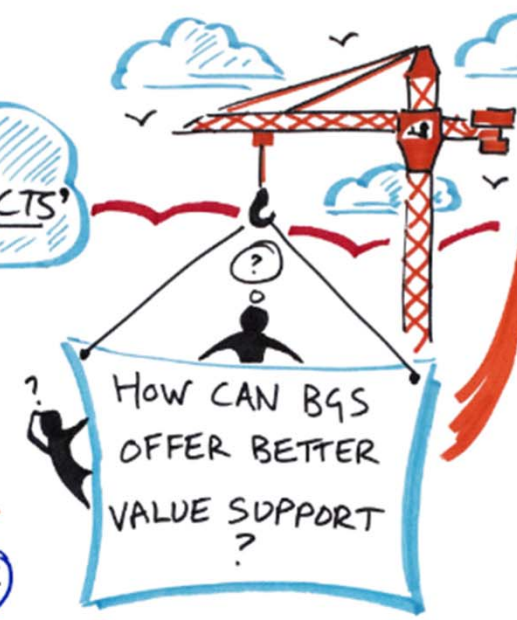


Genuine enthusiasm from those involved, both BGS staff and industry

# IMPROVING THE USE OF GEOSCIENCE IN BROWNFIELD REDEVELOPMENT PROJECTS



BGS GEOLOGY & DERIVED PRODUCTS



- WEBSITE FUNCTIONALITY
  - MAP PLATFORM
  - OPEN ACCESS
  - DATA HARVESTING
  - REGIONAL GROUPS
- 5 KEY POINTS

'GEOCHEMISTRY IN BROWNFIELD RISK ASSESSMENT'

FEEDBACK  
KEEP GOING BGS!



- ESTIMATING REMEDIATION COSTS USING ENVIRONMENTAL DATA
- BGS GEOLOGY RESOURCES
- GROUNDHOG SOFTWARE FOR CROSS-SECTIONS, BOREHOLES & LINWORK
- BGS DATA & DECISION SUPPORT TOOLS
- BGS GEOCHEMISTRY



# Outputs

## BGS Geoscience and Brownfield Workshops

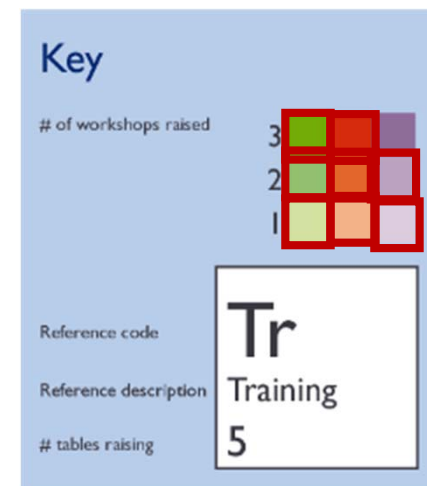
Industry recommendations arising from table discussions at workshops:

- London
- Birmingham
- Leeds

Cross cutting themes

**Commercial awareness | Marketing | Data ingestion | Payments**

Awareness			Accessibility			Innovation			
<b>Tr</b> Training 5	<b>We</b> Webinars 4	<b>Co</b> Conferences 3	<b>W</b> Website 10	<b>Wa</b> WebApps 1	<b>Pu</b> Purchasing 2	<b>Gw</b> Groundwater data 2	<b>Ra</b> Radon 1	<b>Gr</b> Ground risk tool 1	<b>Ag</b> Artificial ground 10
<b>Tu</b> Tutorials 1	<b>Cm</b> Communications 5	<b>Cs</b> Case studies 2	<b>D</b> Data portal 8	<b>3P</b> 3rd party data 2	<b>Bm</b> Business models 3	<b>U</b> UXO tool 1	<b>Di</b> 1:10k digital maps 1	<b>N</b> NBCs for Scotland 1	<b>La</b> Landfill 1
						<b>Un</b> Uncertainty 1	<b>Fi</b> Field research 1	<b>3D</b> Groundhog & BIM 2	<b>Le</b> Lexicon 1



# Feedback

I am very encouraged to find that BGS are so keen to make their data/services work for their audience. It was refreshing to find a genuine quest to understand what each stakeholder needs/aspires to. So often these kind of event turn out to be marketing in stealth!

Good industry event for understanding what BGS does and the resources available

Excellent two way exchange of information

I was expecting a sales pitch and found it refreshing that the session was a genuine feedback / interactive session

There is a great and rich resource here, both of data and software

It's been great that BGS have been able to facilitate the discussions we've been involved in today and hope that it will change and influence the way the industry undertakes its objectives

Interesting and enjoyable day. I learnt some useful tips about accessing BGS data

## Next steps



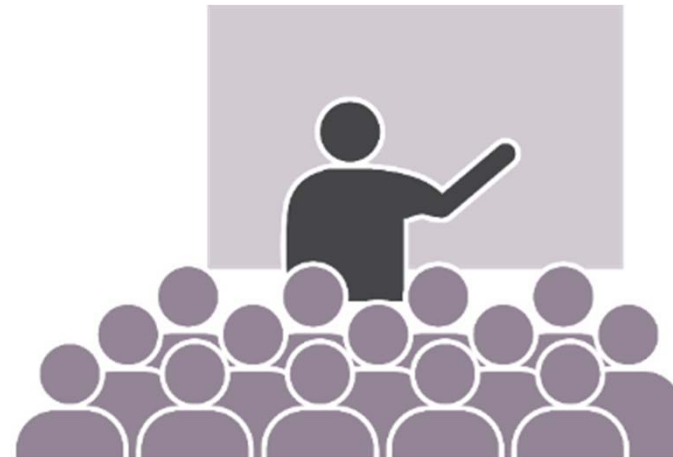
Awareness – training



Access – data portal



Products – remediation cost calculator

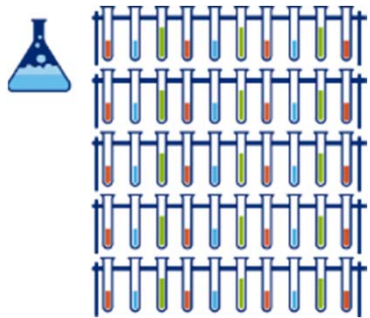


Dissemination



# Innovation

## Solid phase aquifer properties



Geochemical analysis of over 500 samples



Conducted for use in groundwater risk assessment



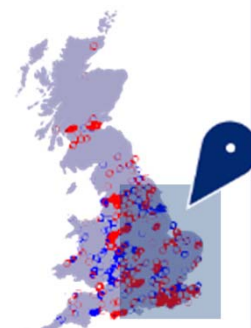
Over 60 formations across the major lithostratigraphical groups



elemental analysis and a range of other parameters



Joint EA and BGS project



○ Below median  
○ Above median

## Opportunities



Open report to be published soon...



Solid samples still available for further analysis



Additional samples been collected since

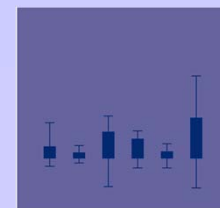


Make the database publicly available

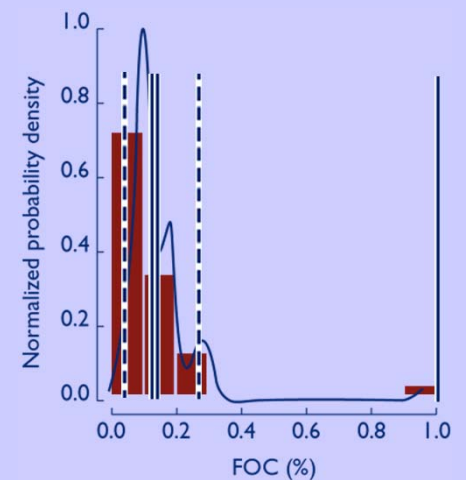


Add data from industry

## Foc for Cretaceous (Chalk)



n = 61

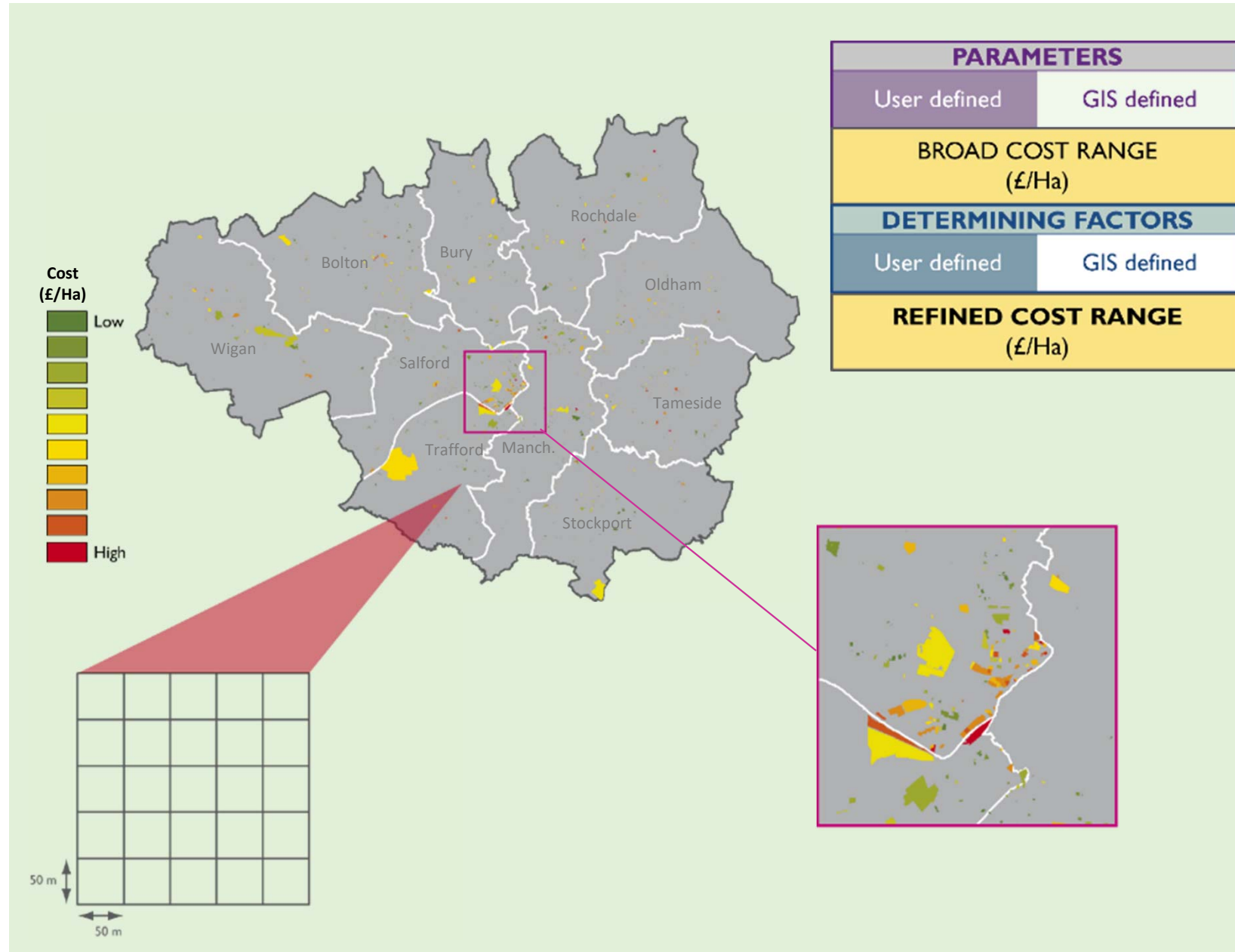


## Innovation

### Remediation Cost Calculator



- GIS prototype for estimating remediation cost for brownfields in Greater Manchester
- Based on historical and proposed landuse
- Requires multiple environmental datasets
- Map output used to prioritise ground risk for redevelopment projects



# Innovation

## GroundHog Desktop

Groundhog Desktop GIS - DEFAULT workspace  
 Session Interoperability Tools Geology Help

HOME SETTINGS DRAW CALCULATE

Start Workspace Codes

- Workspace
  - Geological Objects
    - Locations
    - Database Download SOB1 18-04-2018 08:42:20
    - Cross-Sections
      - 1
    - Croplines
    - Fault Traces
    - Unconformities
    - Fold Axes
    - Dip and Azimuth Measurements
    - Structure Contours
    - Modelled Objects
    - Geological Sequence
    - Features
    - Models
  - Reference Objects

1 x WMGR-FILLU Create Cross-Section

1 Objects 1 Settings

- Boundary
- Slider
- Show Simplified Workspace Boundary
- Show Elevations
- Show Simplified Croplines
- Set Background Colour
- Show map snaps
- Snap croplines to faults
- Show Grid Lines
- Show Metadata Layer

1 x Vertical Exaggeration 5.0 WMGR-FILLU Undo Redo

Cross-Section: 1 Vertical scale: x 5.0  
 Profile source: OS Open Data DTM 50m

m [chainage]

LC-CLSI  
 RTD-XSV  
 WMGR-FILLU

m [AOD]

W: 341.32 Z: 22.34 DEPTH: -8.44 X: 529360.10 Y: 180381.00

1 Objects 1 Settings

- Show legend
- Borehole options
- Clean section
- Trim
- Update profiles
- Create fixed elevation profile
- Simplify profiles
- Check geological sequence
- Animate

Associations created

View Error Messages

## Conclusions

- BGS has a great geoscience offering
- A lot is being used
- There are improvements to made:



Awareness



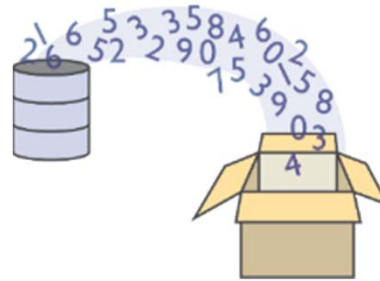
Access



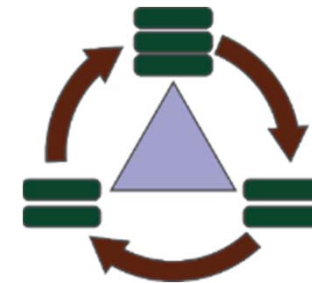
Innovation



Commercial awareness



Ingestion of data



Business models

*We have a plan, lets work together to deliver it*



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Thank-you

Do you have any questions?



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