

EDUCATIONAL GEOTHERMAL DASHBOARD



Created & Designed By Data Rich Ltd



Sponsored by Imrandd Ltd

INTRODUCTION

Why Create an Educational Dashboard?

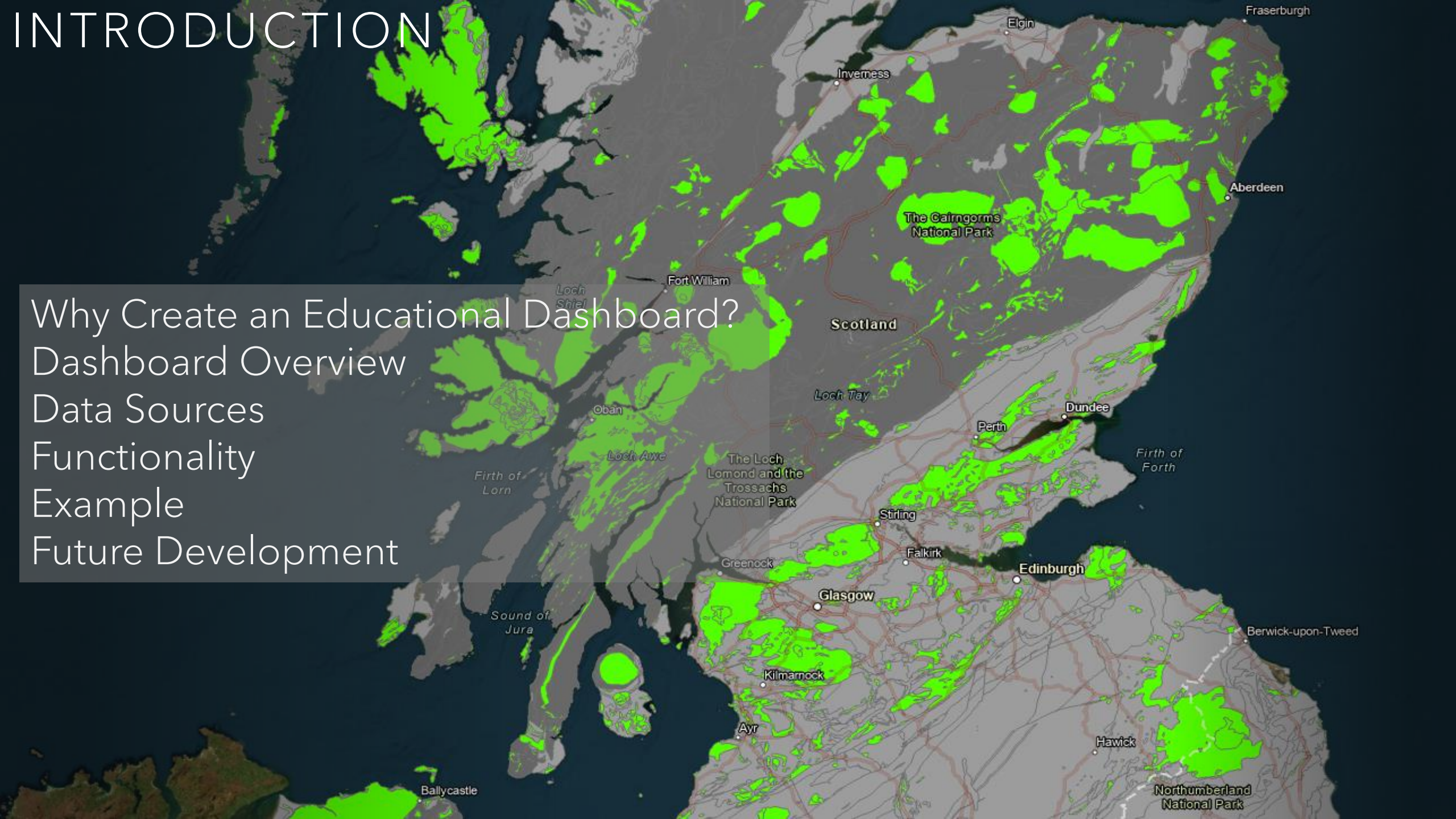
Dashboard Overview

Data Sources

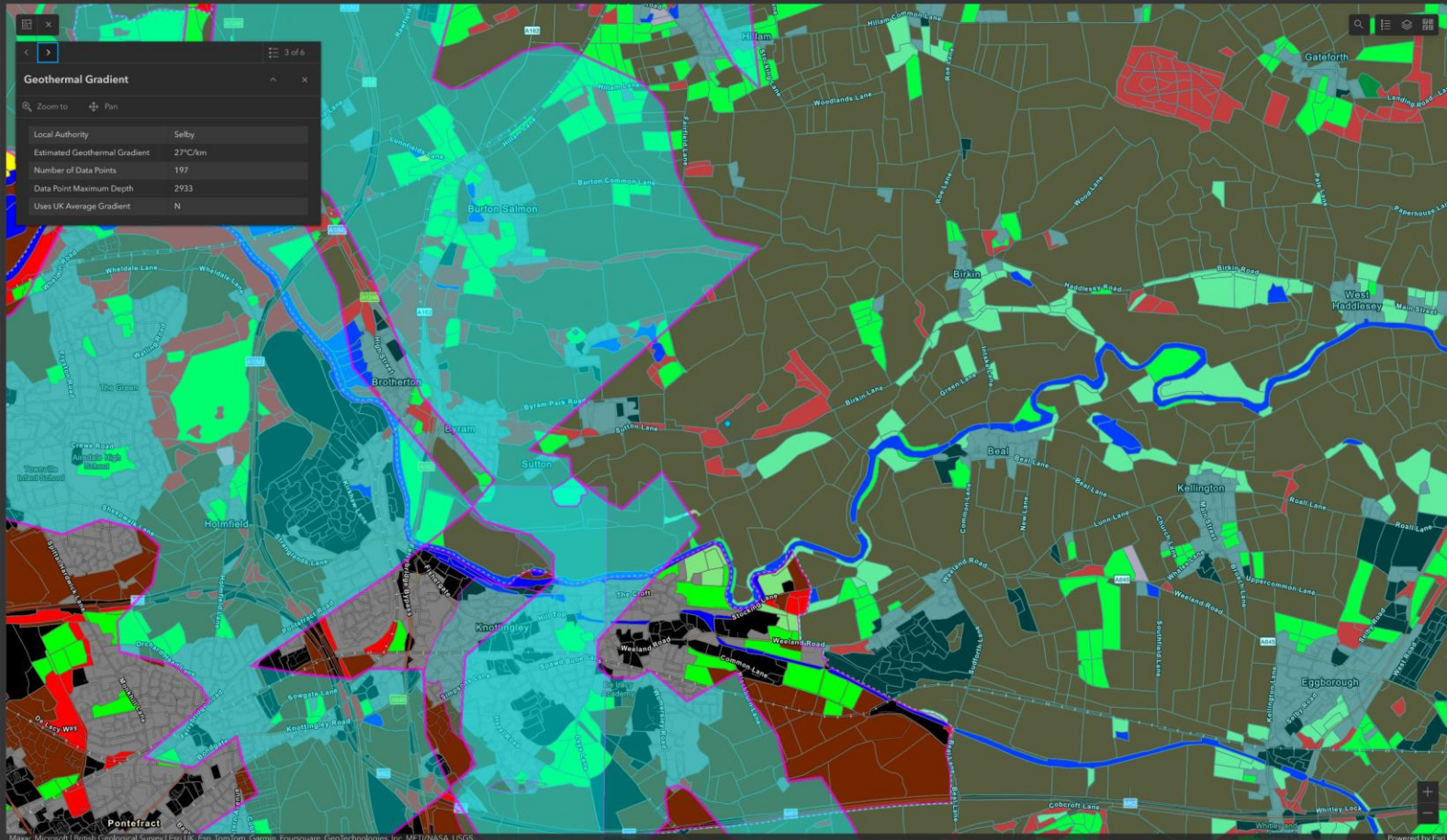
Functionality

Example

Future Development



DASHBOARD OVERVIEW



Land Cover
Improved Grassland

Land Cover Insight Information

Bedrock Geology
Sedimentary
Rock Hardness: Medium

Geology

Hydrogeology
Highly productive aquifer

Hydrogeology

Permeability
Flow Type: Fracture
Min/Max Permeability: High/Very High

Permeability Insight Information

The right sidebar contains four circular icons representing different geological and hydrogeological features: a field of grass for Land Cover, a cross-section of rock layers for Bedrock Geology, a blue water flow diagram for Hydrogeology, and a cracked rock surface for Permeability.

Geothermal Gradient

Selby 27°C/km
-1°C Less Than UK Average

Geothermal Gradient Insight Information

This block features a large heading 'Geothermal Gradient' and a prominent text display showing 'Selby 27°C/km' and '-1°C Less Than UK Average'. Below the text are three small navigation tabs: 'Geothermal Gradient', 'Insight', and 'Information'.

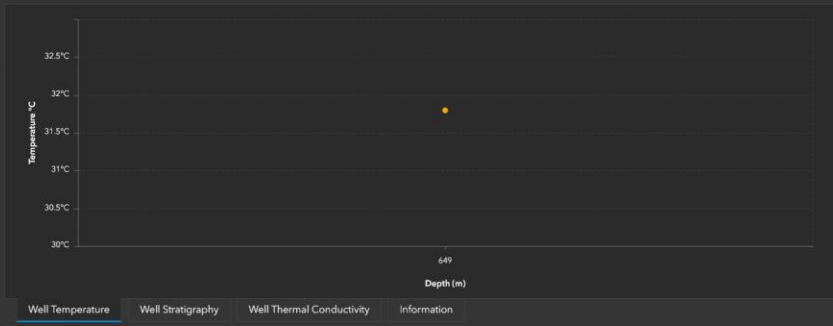
Sites

Recommended Well Type
Hydrothermal System

Fryston
KELINGLEY

Well Type Information

This block is titled 'Sites' and displays a 'Recommended Well Type' of 'Hydrothermal System'. It shows a map with a red dot indicating a site near 'Fryston' and 'KELINGLEY'. Below the map are two navigation tabs: 'Well Type' and 'Information'.



About/User Guide

Designed and Created by

Data Rich Ltd

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IMRANDD shift
INTELLIGENCE WITH INTEGRITY GEOTHERMAL

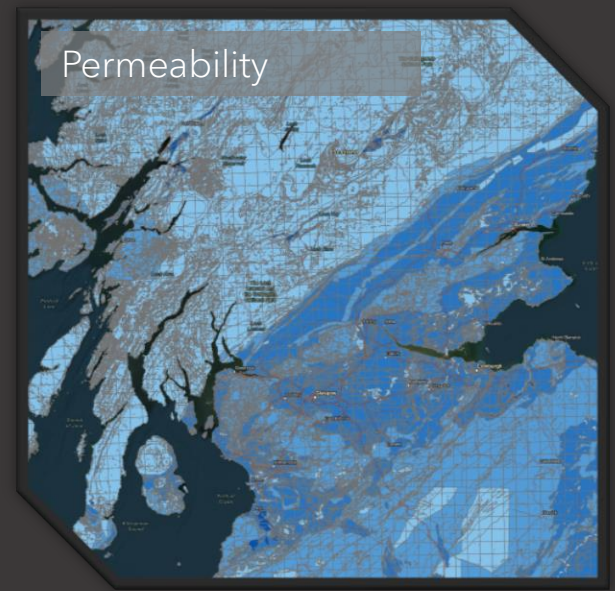
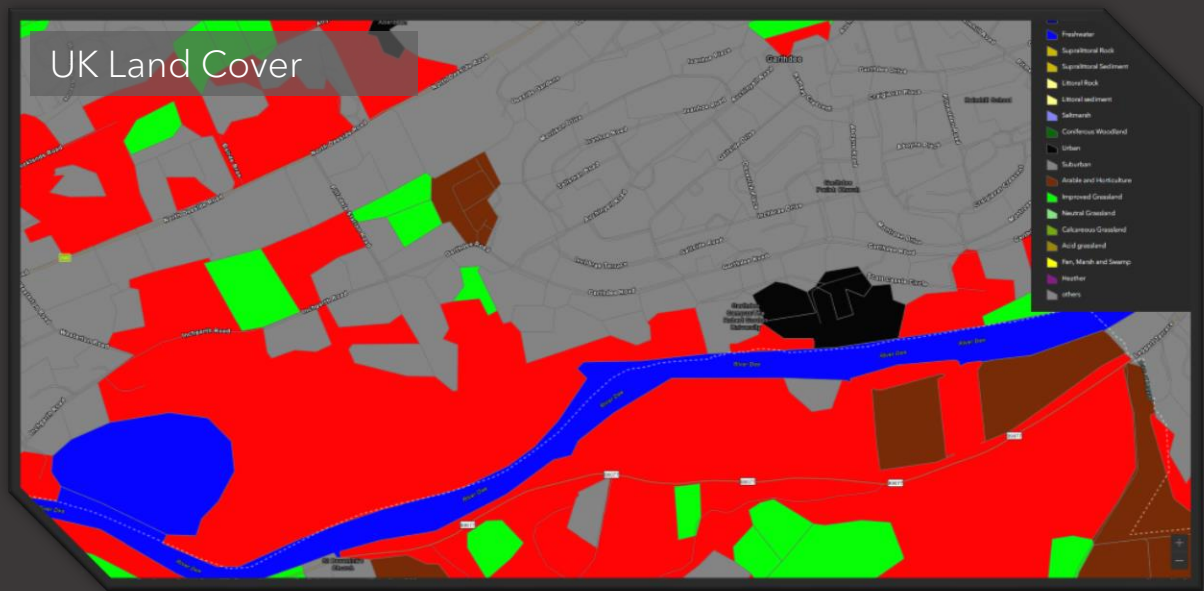
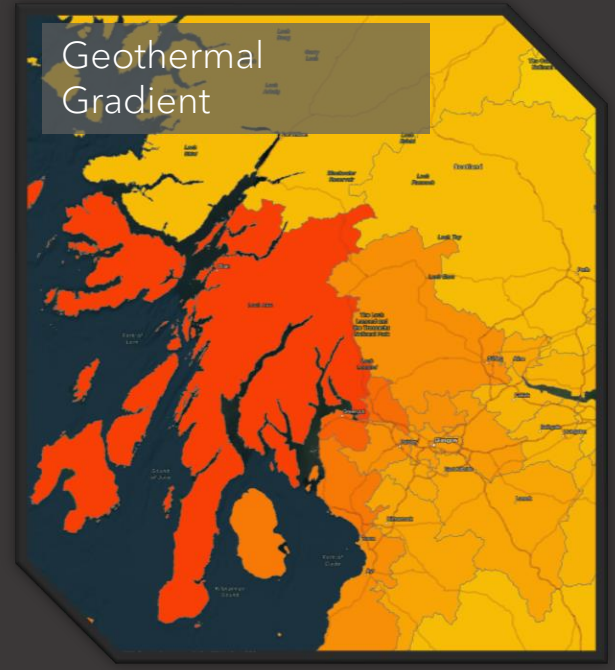
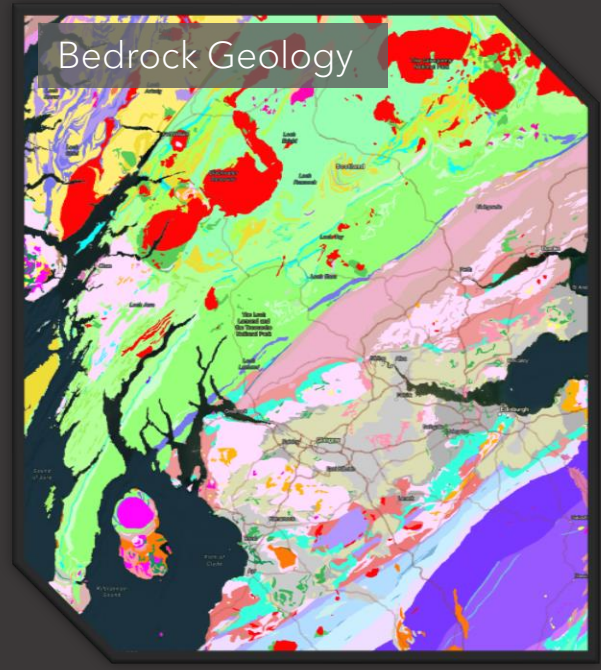
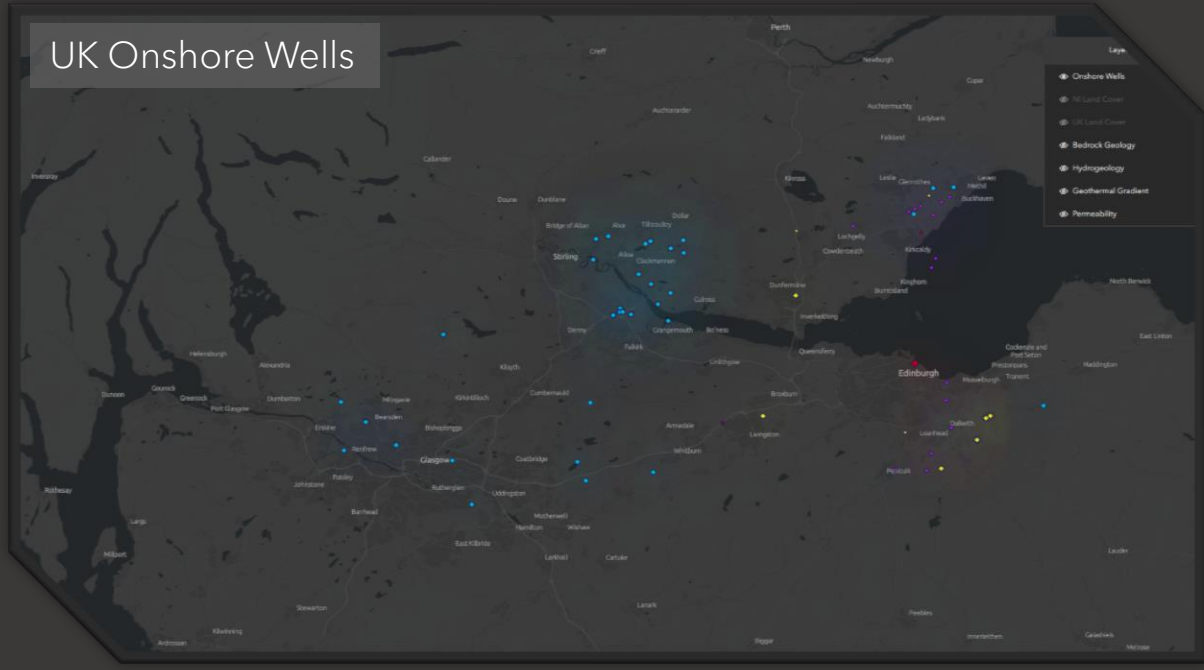
Contains British Geological Survey materials © UKRI 2023
Contains OS data © Crown copyright and database right 2023

Useful Links References

This block contains text about the dashboard's design and sponsorship. It includes the 'Data Rich Ltd' logo, the 'IMRANDD shift' logo with the tagline 'INTELLIGENCE WITH INTEGRITY GEOTHERMAL', and copyright information. At the bottom, there are two navigation tabs: 'Useful Links' and 'References'.

DATA SOURCES

British Geological Survey, Ordnance Survey, UK Onshore Geophysical Library, Newcastle/Durham University



DASHBOARD LAYER SELECTION



DASHBOARD FEATURE SELECTION

Educational Geothermal Exloration Dashboard
0603831 - Richard Thomson - CM4700 - Honours Project

Current Depth: 1000

Select a geothermal gradient and a depth

Temperature Gradient

Temperature

Select a geothermal gradient area

Aberdeenshire
Last update: 10 seconds ago

Temperature Direct Heat Applications Information

Geothermal Gradient Sites

Well Type
Select a Depth, Geothermal Gradient and Hydrogeology feature

Select a site

No sites within map view

Select a land cover feature (you must be zoomed in to see land cover)

Land Cover Insight Information

Select a bedrock geology feature

Geology

Select a hydrogeology feature

Hydrogeology

Select a permeability feature

Permeability Insight Information

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FUNCTIONALITY

Indicators

Green / Red Highlights that there are important insights for the selected area

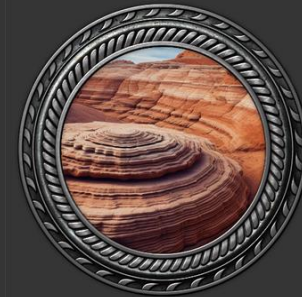


Land Cover
Improved Grassland

[Land Cover](#) [Insight](#) [Information](#)

Insights

Describes what the insight from the data is

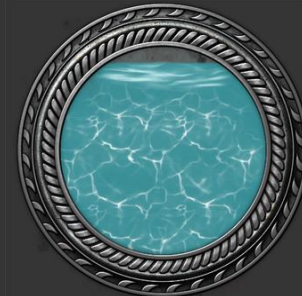


Moderate drill rates due to medium hard rock
It might be feasible to drill here

[Insight](#)

Descriptions

Contains further useful data on the topic



Hydrogeology

Rock Unit	ZECHSTEIN GROUP
Aquifer Description	Highly productive aquifer
Flow Mechanism	Flow is virtually all through fractures and other discontinuities
Summary	Significant regional dolomitised limestone aquifer up to 300 m thick near Durham. Locally yielding up to 50 L/s of very hard water.

[Description](#)

Information

Explains the relevance of the data and insights regarding geothermal exploration and development



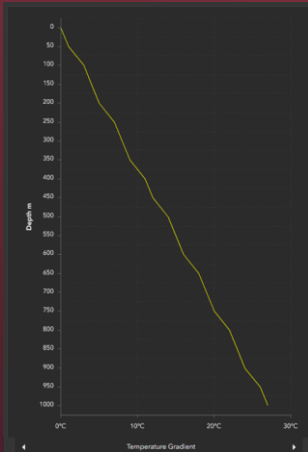
Permeability

This indicator shows the permeability and flow mechanism of liquids in the selected area. The indicator will display green if permeability is high or very high, meaning good flow rates and efficient heat transfer, or red if permeability is low or very low. No colour will be shown if permeability is moderate.

Permeability directly influences the movement and flow of fluids within the subsurface, impacting the extraction of geothermal energy. High permeability formations allow fluids to flow more easily, enabling efficient heat transfer and extraction of geothermal fluids. While low-permeability formations restrict fluid flow, which can hinder the productivity and effectiveness of geothermal wells.

[Permeability](#) [Insight](#) [Information](#)

FUNCTIONALITY

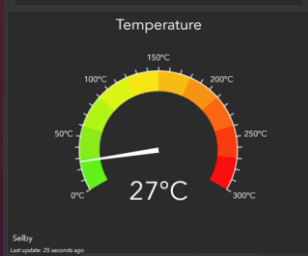


Temperature Gradient Graph

Shows the predicted rate that temperature increases with depth

Estimated Temperature

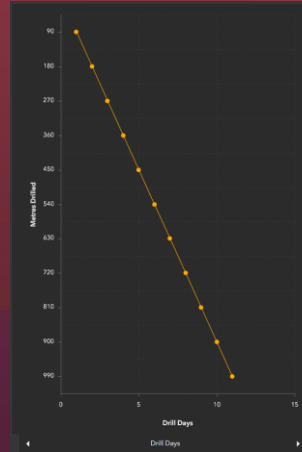
Shows the predicted temperature at the selected depth



Geothermal Gradient

Shows the estimated temperature gradient for the select area

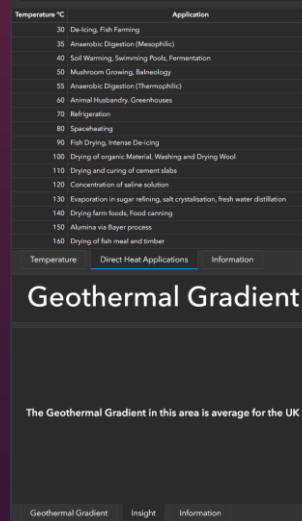
Selby 27°C/km
-1°C Less Than UK Average



Drill Days Graph

Based on bedrock geology and rock hardness

Users can select a drill rate and estimate drill days to reach the selected depth



Direct Heat Applications

Examples of different industrial processes and their average operating water temperature

Options

Depth Range
0m - 1,000m

Rock Hardness
Hard

Geothermal Gradient Range
11 - 49

Average Geothermal Gradients
No category selected

Aquifer Filter
No category selected

Permeability Filter
No category selected

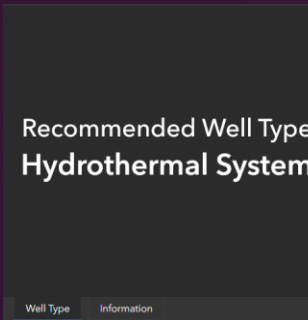
Well Temperature Filter
No category selected

Well stratigraphy Filter
No category selected

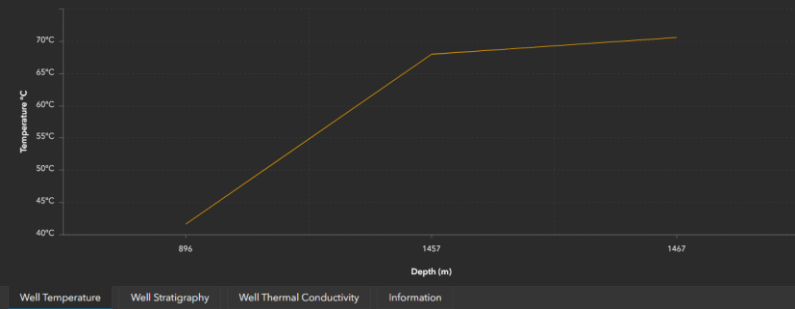
Well Thermal Conductivity filter
No category selected

Options

Multiple filters to aid users in finding relevant areas or data



Sites



Recommended Well Type

UK Onshore Well Sites

- Temperature
- Stratigraphy
- Thermal conductivity

EXAMPLE



Apsley Farms

Temperature °C	Application
30	De-Icing, Fish Farming
35	Anaerobic Digestion (Mesophilic)

Geothermal Gradient

Basingstoke and Deane 28°C/km

UK Average

Geothermal Gradient Insight Information

Geothermal Gradient

Zoom to Pan

Local Authority	Basingstoke and Deane
Estimated Geothermal Gradient	28°C/km
Number of Data Points	121
Data Point Maximum Depth	2959
Uses UK Average Gradient	N

- Land Cover**
 Arable and Horticulture
 Not a protected area
- Bedrock Geology**
 Sedimentary
 Rock Hardness: Soft
 High drill rates due to soft rock
 This might be an economical area to drill
- Hydrogeology**
 Highly productive aquifer
 This is an ideal location for a Hydrothermal Well
- Permeability**
 Flow Type: Fracture
 Min/Max Permeability: Very High/Very High
 Insight: Fluids will flow quickly through these rocks
 heat transfer through the bedrock will be efficient

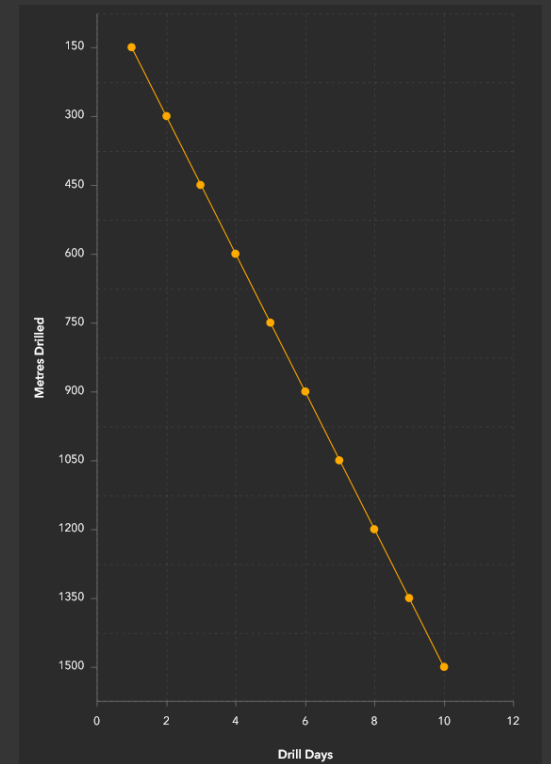


Temperature

Basingstoke and Deane
Last update: 21 minutes ago

Temperature Direct Heat Applications Information

- Rock Hardness: Soft
150m Per Day
- Rock Hardness: Soft
160m Per Day
- Rock Hardness: Soft
170m Per Day
- Rock Hardness: Soft
180m Per Day
- Rock Hardness: Soft
190m Per Day
- Rock Hardness: Soft
200m Per Day



FUTURE DEVELOPMENT



Data

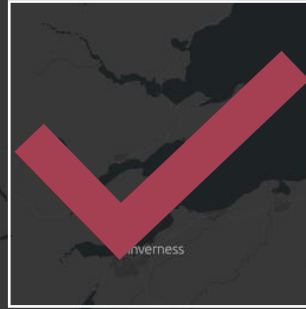
Increase Data

- Readily available data
- Further Data Extraction
- Data Mining

Work with experts to maximise insights and information

Geothermal Gradient Models

Next Steps Resources



Functionality

Cost Estimation/Analysis

Heat Requirement

Temperature Differential Analysis

Time to Economic Recovery

LET'S CHAT



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