

Presented at the FIG Working Week 2025
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FIGIS



Material Tracking with Custom Geospatial Solutions

Traceability and data-driven decision making in site remediation

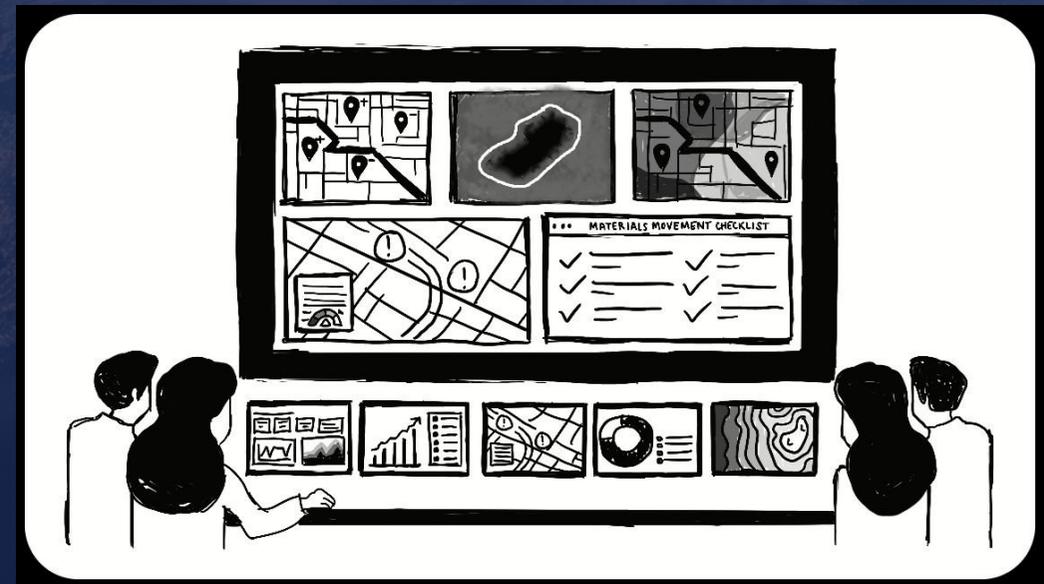
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Tracking Material Movements – A Growing Challenge



- How do you track thousands of cubic metres of material over a dynamic project landscape spanning many years?
- Unique requirements, varying material types / quantities from > 1,000 originating sites.
- Purpose-built geospatial solutions enable smarter tracking, real-time oversight, and better decision-making.



Why Material Tracking With GIS is Critical



01

Environmental
Outcomes

02

Compliance & ESG

03

Data Complexity

Traditional Methods Aren't Enough



- Pain points:
 - Errors
 - Inconsistencies
 - Lack of scalability
- Need an integrated system.
- Must be trust in the data.

The screenshot displays a web application interface for inventory management. It features three tabs: 'Inventories', 'Movements', and 'Dashboard'. The 'Inventories' tab is active, showing a table with columns for Feature Code, Original Volume, Classification, Inventory Type, Status, and Date Created. A blue 'Filters' bar is positioned above the table. To the right of the table are navigation icons for adding (+) and uploading (↑) data. Below the table is a map view showing a satellite image of a field with a yellow polygon highlighting a specific area. The map includes zoom controls (+/-) and a settings gear icon. The text 'Powered by Esri' is visible in the bottom right corner of the map area.

Feature Code	Original Volume	Classification	Inventory Type	Status	Date Created ↑
Test Site 1	1000 m ³	Uncontaminated...	Stockpile	In Progress	18/11/2024
Test Site 2	1000 m ³	Uncontaminated	Stockpile	Not Started	18/11/2024
Test Site 3	1000 m ³	BRF / RRC Unac...	Well Pad	Not Started	18/11/2024
Test Site 4	-	Unknown	Off Island	Not Started	18/11/2024
Test Site 5	500 m ³	Uncontaminated	Well Pad	Not Started	19/11/2024
Test Site 6	500 m ³	Uncontaminated...	Well Pad	Not Started	19/11/2024
Test Site 7	-	Unknown	Treatment Facility	Not Started	19/11/2024
Test Site 8	-	Uncontaminated	Well Pad	Not Started	20/11/2024
Test Site 9	1000 m ³	Uncontaminated	Well Pad	Not Started	26/11/2024
Test Site 10	84 m ³	BRF / RRC Unac...	Pit	Exhausted	27/11/2024

Building a Smarter, Scalable System



The screenshot displays a web application interface with a navigation bar at the top containing three tabs: "Inventories", "Movements", and "Dashboard". The "Inventories" tab is currently selected.

Below the navigation bar, there is a white content area. At the top right of this area are two small icons: a plus sign (+) and an upload icon (an upward-pointing arrow). Below these icons is a blue button labeled "Filters".

Underneath the "Filters" button is a table header with the following columns: "Feature Code", "Original VolurClassification", "Inventory Typ", "Status", and "Date Created".

Below the table header, the text "No Data" is centered. At the bottom left of the table area, there is a label "Items per page:" followed by a dropdown menu showing the number "20" and a downward arrow. To the right of the dropdown, the text "0 of 0" is displayed.

On the right side of the interface is a map showing an aerial view of a landscape with a dirt road and some vegetation. The map has a vertical zoom control on the left side with plus (+) and minus (-) buttons. In the top right corner of the map area, there are three icons: a map layer icon, a location pin icon, and a settings gear icon.

At the bottom of the map, there is a small text label "Chevron" on the left and "Powered by Esri" on the right.

Designed for Field and Office Teams

Inventories **Movements** Dashboard

1 Select Source — 2 Select Destination — 3 Details — Confirmation

Please select one or more Source on the map, or manually enter below

Select Source

Waste Movement? **Clear all**

Source Test Site 3 ✕

Feature Code Test Site 3	Original Volume 250 m ³
Adjusted Volume 250.00 m ³	Assessment Date -
Bulking Factor 1	Linked Site Parent Site 2
Feature Type Stockpile	Assessment Status Not assessed
Material Type Top Soil	Landform Category Upland
Survey Level -	Soil Characterisation Classification Uncontaminated - Contains Inert Waste

CAPTURE INFORMATION

Personnel Name *
Name of the survey submitter
admin

Date and Time *
Monday, 24 June 2024
4:09 PM

Feature Type
High level description of the feature
 Pad
 Dump
 Road

Demarcate Area of Interest *
Area: 4,240 m², Perimeter: 262 m

2 of 5

Powered by Esri

Guided, Structured and Compliance Focused

Inventories **Movements** Dashboard

Select Source **Select Destination** Details **4 Confirmation**

Sequence Ordering

1	Source Feature ID	>	Volume To Be Moved	>	Destination Feature ID
	Test Site 2		150 m ³		Test Site 1

2	Source Feature ID	>	Volume To Be Moved	>	Destination Feature ID
	Test Site 3		250 m ³		Test Site 1

Summary

Sources Feature Codes	Destination Feature Code
Test Site 2, Test Site 3	Test Site 1
Total Source Volume	Total Volume To Be Moved
400 m ³	400 m ³

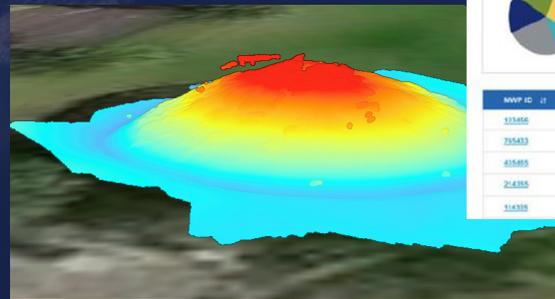
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Beyond Remediation: What's Next?



MVP Release, 1st Update, 2nd Update...

- Improved dashboard visuals of key metrics.
- Potential applications in mining, infrastructure, environmental management.
- Further integration with a sites operating systems – routable road network, IVMS, geofencing proximity alerts etc.
- Ingestion of sampling and laboratory data and concentration heat mapping.
- Handheld device lidar image capture to support volumetric calculations (voids, stockpiles etc.).



The dashboard is divided into three main sections: Inventory, Movements, and Approvals. The 'Movements' section is currently active.

Plan a movement

Metrics: Total planned movements: 100, Active sites: 100, Completed movements: 100

Site status (by month): A stacked bar chart showing the number of sites in different statuses (Completed, Pending, In progress, Planned, Closed) from January to December.

Movement statuses: A pie chart showing the distribution of movements across different statuses.

Status based accumulative volume (m³): A line chart showing the volume of material in different statuses from 2024 to 2027.

COI A Heatmap: A color-coded map showing the concentration of COI A across the site.

MVP ID	Date created	Created by	Original volume (m³)	Current status
113456	30/10/2023	Firstname Lastname	xxxx m³	Completed
215432	22/10/2023	Firstname Lastname	xxxx m³	Pending
415885	18/08/2023	Firstname Lastname	xxxx m³	In progress
214205	09/08/2023	Firstname Lastname	xxxx m³	Planned
318310	16/07/2023	Firstname Lastname	xxxx m³	Completed

Feature ID: 123456 selected

Sample ID: xxxxx
Sampled date: 01/01/2023
COI A (mg/kg): 1.56 mg/kg
COI B (mg/kg): 0.37 mg/kg
COI C (mg/kg): 2.78 mg/kg

The most relevant SDGs related to the presentation and theme of this session

1st relevant SDG

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



2nd relevant SDG

11 SUSTAINABLE CITIES AND COMMUNITIES



3rd relevant SDG

15 LIFE ON LAND



SUSTAINABLE DEVELOPMENT GOALS

International Federation of Surveyors supports the Sustainable Development Goals

Final Thoughts

- Design, build, integration and test of an advanced technology stack.
- Multi-disciplinary collaboration.
- Scalable and customisable design.
- If material tracking is a challenge in your organisation, how could a system like this improve efficiency and compliance for you?



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Thank you

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