27 years ago

Foundation re-use is rising on every agenda. But our ability to characterise what is actually in the ground has barely moved.

The question: does our ground characterisation practice match the sustainability ambition we are placing on top of it?

9/10	60%	~0%
capital projects overrun — ground conditions a primary cause	pile length saved when the ground is truly understood first (GroundIQ proven case)	change in how industry assesses subsurface variability at feasibility stage — in 20 years

Yesterday, we heard what re-use looks like in practice:

Session 1 — Port of Rotterdam
A landmark case on foundation re-use at scale. The ambition is clear. The intent is right.

Session 2 — Foundation Testing
The tools are advancing. The methods exist. The capability is building.

Session 3 — Design for Sustainability (this session)
How do we design for re-use? And critically — is our ground intelligence good enough to support it?

The carbon is in the materials. The risk is in the ground. To solve one, you must master the other.

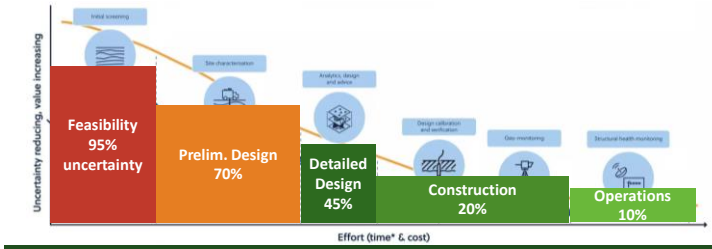
We are designing for sustainability on a foundation of assumption.

"Why does everything in the world seem to move so quickly, yet I have to wait six months for my site investigation?"
— Asset Owner (verbatim)

1. Geotechnical services are still initiated late — used for validation, not decision-making
2. Professional liability concerns reinforce conservative assumptions — even when better data exists.
3. German codes prohibit aggregate re-use in concrete — not ideology, but an epistemic data gap at scale
4. The industry is re-using foundations based on historical records — not data-driven ground truth

The value of ground data is highest when it is rarest — at the very start of a project.

Fugro's Geo-Risk Management Framework (GRMF) makes this structural reality visible.



Frequently poorly informed foundation re-use decisions are made, with €-million commitments at 95% uncertainty. That is not a sustainability strategy — it is a risk transfer.

Making the ground transparent changes everything about how we re-use foundations.

GroundIQ® is Fugro's advanced ground intelligence solution — delivering better ground insights to inform smarter design and build decisions

Early screening
- 3D ground model in days
- Non-invasive, minimal permitting
- Decision support before a single borehole

Geotechnical validation
- Advanced synthesis of geophysical scanning
- Optimised borehole validation
- Right data, right place, right time

Engineering design
- Ground models translated into foundation parameters
- pile type, depth, load capacity, re-use viability
- with quantified residual risk

When you understand the ground, you change the foundation decision entirely.

Challenge: Foundation pile design based on conservative assumptions. Poor subsurface characterisation driving over-engineering and carbon overload.

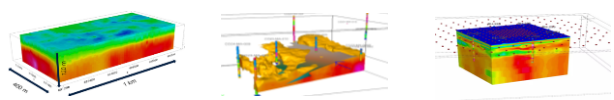
GroundIQ® Approach: Ambient Noise Technology + 3D ground model + optimised geotechnical validation. Borehole count reduced by 75%.

Re-use Relevance: The same ground model that reduced pile length can confirm re-use viability with quantified confidence.

60%
saving in pile length

75%
fewer boreholes

>50%
time saving vs conventional



The A9. A motorway every engineer in this room knows. 208 piles. 1,211 tonnes of CO_2 avoided.

A9 BaHo — Badhoevedorp to Holendrecht · 11 km · 11 civil structures · Rijkswaterstaat / FCC Construcción / Fugro

The Challenge

Widen 11 civil structures built in the 1960s–70s from 37.5m to 60m. Reuse as many foundations as possible under increased traffic loads and current Dutch codes.

208
existing piles reused — all of them

The Approach

2,600+ CPTs. 250 boreholes. Full 3D ground model. Magneto CPTs to verify existing pile locations and tip levels. Bearing capacity assessed under NEN 9997-1 and NEN 8707.

1,211t
CO_2 equivalent avoided on one structure

The Outcome

All 208 existing piles on structure KW004 confirmed reusable. 1,211 tonnes CO_2 avoided. 84.5% of the saving in production phase alone — exactly where material carbon lives.

134k
MKI environmental cost reduction

"Reusing foundations is a feasible and profitable design approach that results in significant CO_2 savings, in addition to saving time and money."

20 minutes from where you are sitting. A project that proves the case.

The Frame Building, Zuidoost, Amsterdam — 213 homes, 17-storey and 12-storey blocks, Doniger Urban Developments

The Challenge

213 homes on a constrained Amsterdam site. Could 1970s prefab piles be trusted to carry a new 17-storey tower?

38
existing piles reused

The Approach

Targeted ground data. Bearing capacity modelled under current Dutch codes. Old and new pile systems combined with precision.

28
new piles avoided

The Outcome

38 piles reused. 28 avoided. Less concrete, less steel, less carbon — on a project 20 minutes from this room.

>25%
cost savings on new piles

"There is everything to gain from engaging the right expertise early in the process."

Re-use decisions made without subsurface confidence transfer risk — they don't eliminate it.

Challenge: Subsurface voids and cavities are invisible to conventional assessment. Standard desk studies and borehole grids miss them entirely.

GroundIQ® Approach: Rapid geophysical scanning identified cavity risk pre-construction validated by geotechnical investigations. Enabled confident go/no-go on foundation re-use before mobilisation.

Re-use Relevance: "What is actually down there?" is the fundamental question of every re-use decision. GroundIQ answers it in days, not months.

fast
days to deliver initial ground model

data gap
uncertainty quantified before mobilisation

design ready
confident go/no-go before first pile driven

A data-driven foundation re-use assessment requires three questions answered in sequence.

01 | What is actually in the ground?

Tool: GroundIQ® Early Screening | Output: 3D ground model — soil layers, anomalies, voids, interfaces. Delivered in days.

02 | Does the existing foundation still perform?

Tool: Geotechnical Validation | Output: Load capacity, degradation profile, engineering parameters — from targeted investigation, not guesswork.

03 | What does re-use unlock vs. what does it risk?

Tool: Actionable Engineering Insight | Output: Carbon delta · cost delta · code compliance pathway · quantified residual risk. Decision-ready output.

The codes are not the obstacle. The data gap is.

DE German Codes

Prohibit aggregate re-use in concrete — not ideological. Epistemic: we cannot yet certify re-use materials and contamination traceability at scale with current data standards.

Global Regulatory Direction

Performance-based codes are emerging — but they require verifiable evidence. Ground models provide that evidence.

Industry Standards Gap

No consistent standard yet exists for certification of foundation re-use at scale. This is the industry's next challenge.

The Strategic Opportunity

The industry that builds data standards for ground characterisation will lead the re-use economy. That work starts with better ground models.

The codes will follow the data. Are we generating the right data, earlier and fast enough?

Session 4 will show you where the carbon actually lives. It lives in the materials.

New Foundations

Steel · concrete · cement — embodied carbon at maximum. Every new pile is a carbon commitment that does not need to happen if the existing foundation is viable.

Ground Intelligence

GroundIQ® delivers the evidence that unlocks the re-use decision — and avoids the carbon spend entirely. The ground model IS the decarbonisation tool.

Re-used Foundations

Zero new material carbon. Ground characterisation investment = fractional cost of one pile — but unlocks whole-foundation re-use.

We have the technology to see the ground clearly.

The question is whether we have the ambition to use it early enough to matter.

Foundation re-use without a 3D ground model is not sustainability — it is optimism with a green label.

The carbon savings in materials are real. But they are locked behind ground uncertainty we choose not to manage.

The next decade of infrastructure will be built on ground we have never fully characterised. That ends when we decide it ends.

"The ground is not the problem. Our relationship with ground data is."

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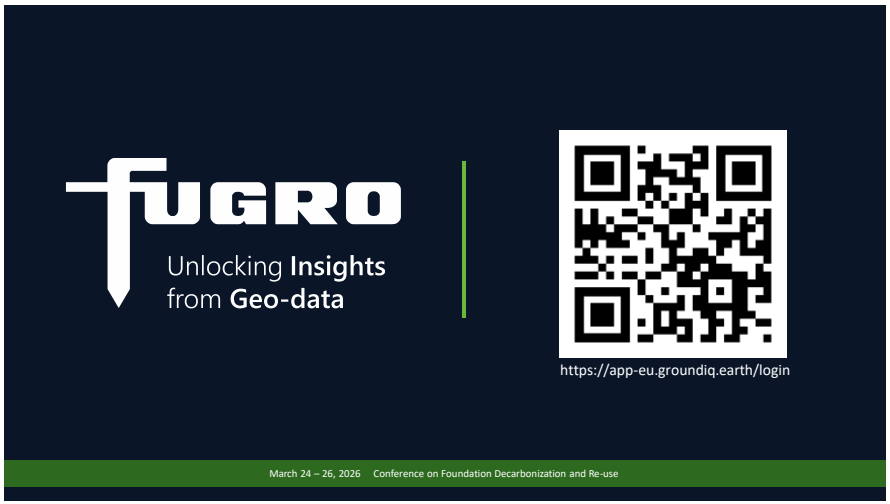
FUGRO
Unlocking Insights
from Geo-data
https://app-eu.groundiq.earth/login
March 24 – 26, 2026 Conference on Foundation Decarbonization and Re-use