Ground investigation for land redevelopment & Big infrastructure projects

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What is the main reason (driver) to execute a Ground and groundwater investigation in your country?

72 responses

Trends, developments in NL for big infrastructure projects: Groundinvestigation - Why

Initiators

Economical/political/societal developments:

- Energy transition: grid extension, H2 (hydrogen), heat etc
- European Water Framework Directive: measures in land and sediment to improve water quality
- Site (re)development, buildings, infrastructure

Why Ground investigation in those projects?

- Safely working in and handling of ground/groundwater
- Complying with environmental rules and legislation (handling with, re-use and disposal of ground and groundwater)
- Determination of cost and planning of projects

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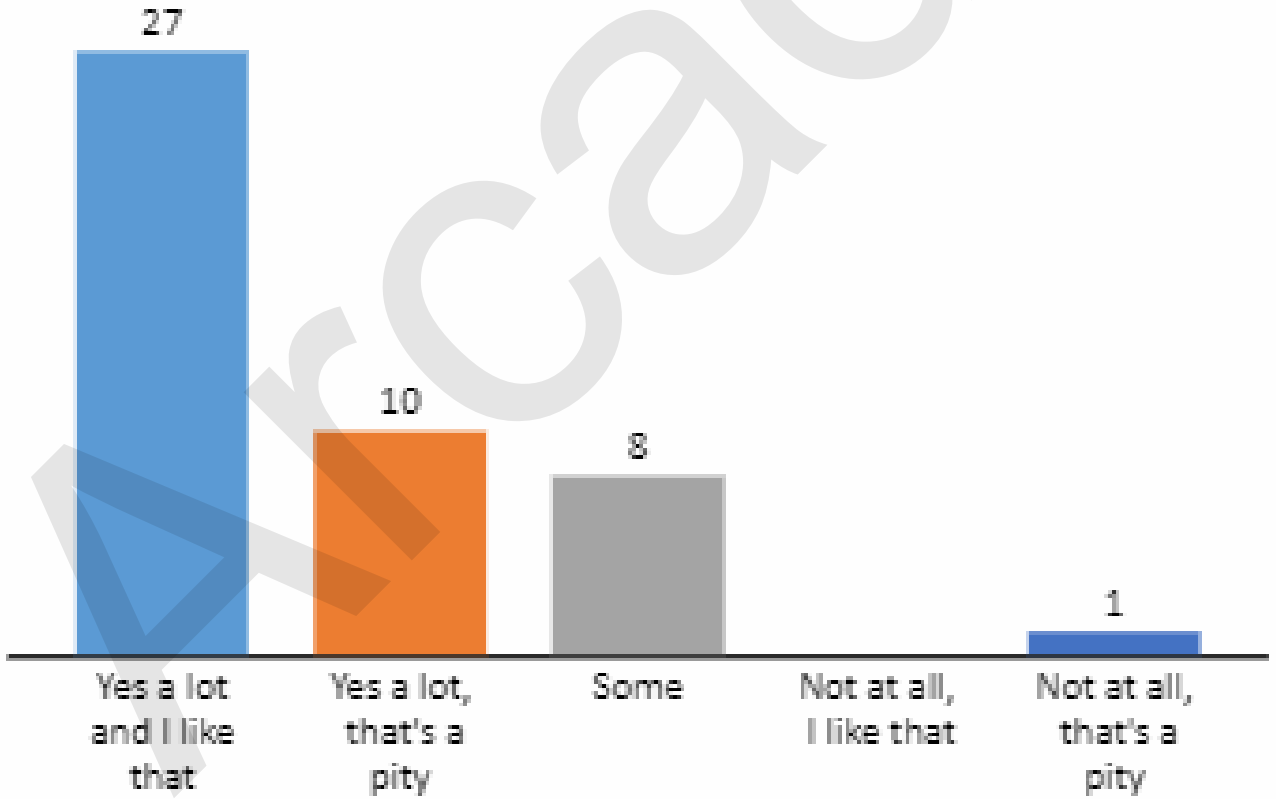
Do you have any guidelines for executing Ground investigations?



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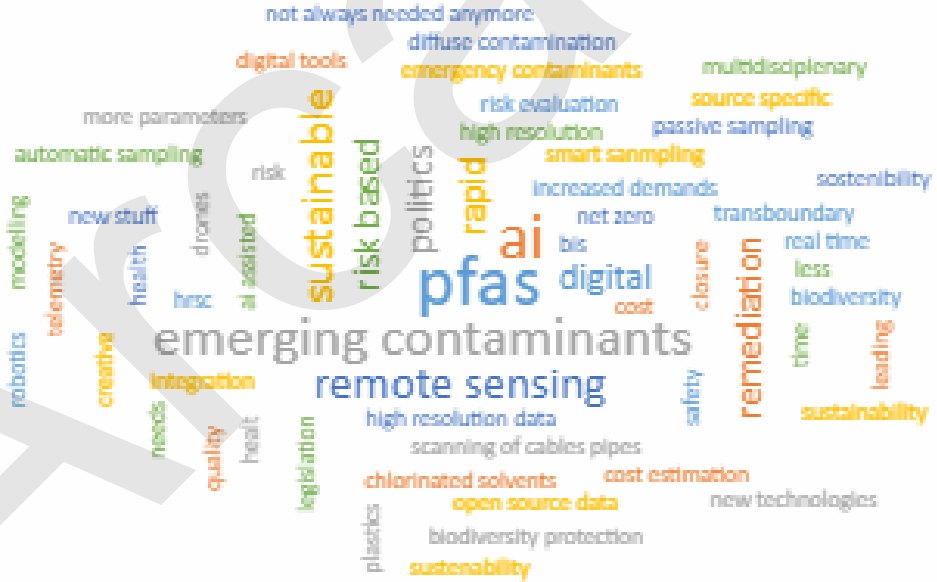
What are the first words that come to mind regarding future developments in Ground and Groundwater investigation

85 responses



Trends, developments in NL for big infrastructure projects

Trends in our projects

- Standardisation and digitalisation versus consultancy for specific complex situations
- Re-use of data
- Projects getting bigger and more complex (including (local) legislation)
- Ground investigation (environmental quality) in combination with other disciplines (UXO (unexploded ordnances), archaeology, ecology, physical ground characteristics, healthy soil etc…)

Developments, trends in the Netherlands

- Data re-use
- Integration of disciplines (conditioning services)
- Standardisation and digitisation

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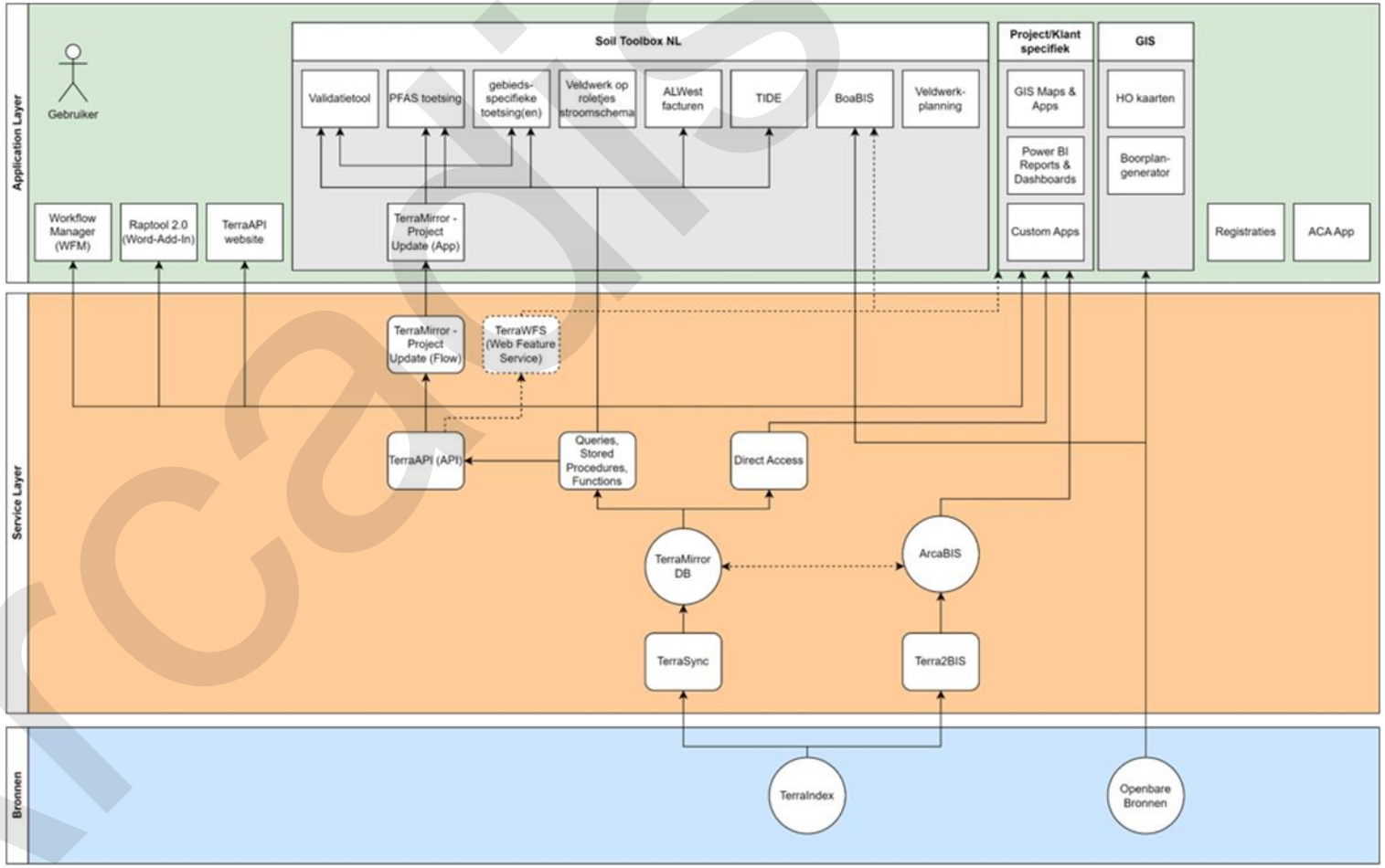
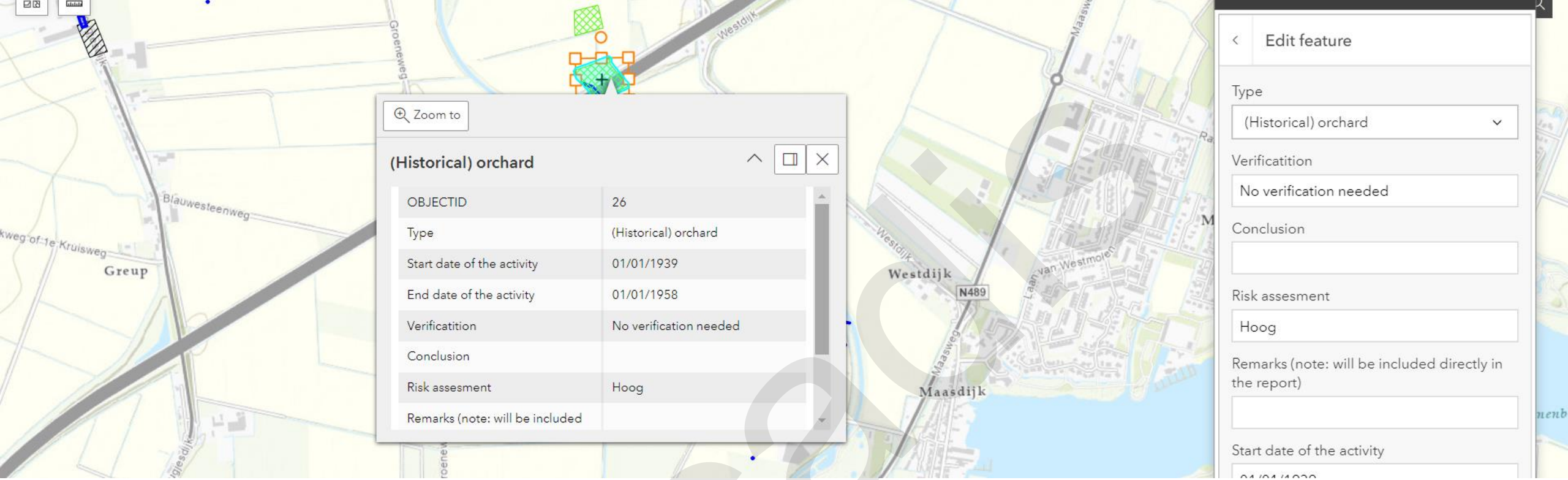


Arcadis project /client data

Public Data Sources



Data re-use

Integration of disciplines (conditioning services)

Standardisation and digitisation:

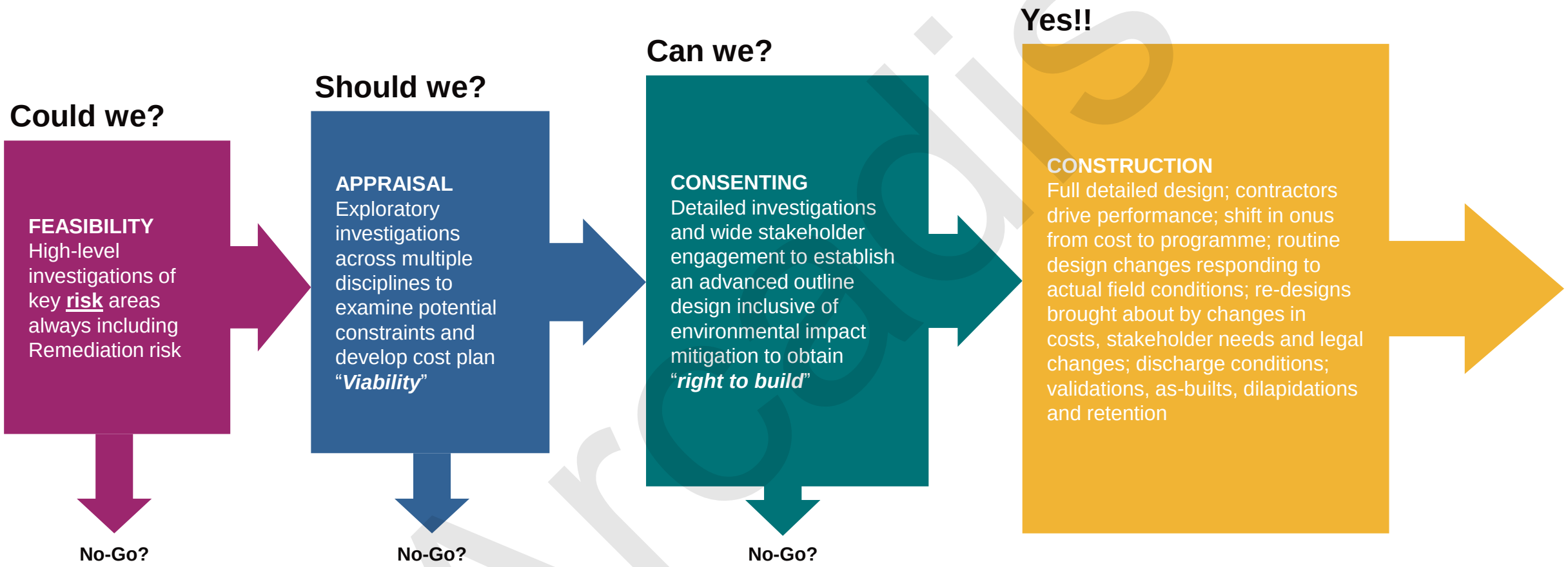
GIS Viewers

Advantages of GIS-viewers

1. Integration of various data sources (public, project).
2. Single source of truth: consistency and accuracy in data with standardized workflows.
3. Collaboration and sharing of information with projectteam, client, stakeholders.
4. Easy navigation through spatial content for a comprehensive overview.
5. Presentation of information with interactive maps.
6. Costeffective execution of deskstudy, with high quality.

Tales from the UK

Geo-environmental Considerations in Major Infrastructure & Development Projects



Phased Decision Making to Minimise Financial and Reputational Risk/Loss – Increasing Cost & Complexity

DEVELOPMENT CONSENTING (EIA & Permissions)

DESIGN & ENGINEERING (Structures & Civils)

GEO-ENVIRONMENTAL BRIDGE

Example Property Development Framework

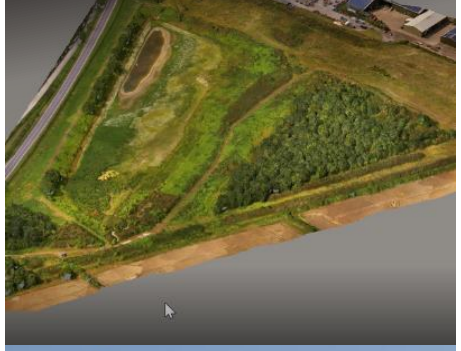
RIBA

RIBA Plan of Work 2022	0 Strategic Definition	1 Preparation & Brief	2 Concept Design	3 Spatial Coordination	4 Technical Design	5 Manufacturing & Construction	6 Handover	7 Use
Stage Outcome	Site Selection via feasibility/viability appraisal	Project Brief with updated cost plan, feasibility study and provisional layouts	Architectural Concept approved by the client and aligned to the Project Brief	*Architectural and engineering information Spatially Coordinated* *Tendering Construction works*	*All needed design information to manufacture and construct the project complete.*	*Manufacturing, construction and Commissioning completed*	*Building handed over, Aftercare initiated, and Building Contract concluded*	*Building used, operated and maintained efficiently*
Project Management	Prepare client requirements Review Project risks and support budget development	Coordination of survey teams Risk register & BIM Execution Plan Project Execution Plan & Programme Health & Safety Stewardship Plan	Coordination of survey teams Update PEP, Risk Register & Programme CDM Principal Designer PQQ for Engineering Contractors	*Pre-construction H&S Pack* *Develop tender appraisal methodology* *Tender Contractor's Works Package(s)*	*Contractors Appointed* *Contractor commences technical design and appoints his supply*	*Contract administrator or Employers agent duties commence*	*Organises suitable training and handover for occupation by the contractor to the client*	
Master planning	Block Layouts with prelim highway circulation system	Detailed constraints & opportunities plan	Design review with client & stakeholders	*Stg 3 DWGs*	*Stg 4 Tender DWGs*			
Planning Input Required	Strategic Planning Appraisal	Source pre-app advice EIA Screening	Obtain pre-application Planning Advice Stakeholder Engagement Strategy	*Submit planning application*	*Discharge pre-commencement planning conditions*			
Environmental	Desk Study Appraisal	Site Specific De-risking surveys Outline Mitigation Strategies	EIA Scoping EIA – Environmental Statement Detailed investigations if required	*Confirm Mitigation Strategies* *Confirm Permitting Requirements*				
Geo-Environment	Desk Study Appraisal	Intrusive ground investigation	Detailed investigations if required Remediation/Design Statement Materials Management Plan Stg 2 Concept DWGs	*Confirm Remediation/ Design Statement* *Stg 3 DWGs*	*Stg 4 Tender DWGs & Documents*			
Civil Engineering	Desk Study Appraisal	Enquiries to statutory bodies and regulators	Stg 2 Concept DWGs Agree route to Building Regulations compliance	*Stg 3 DWGs*	*Stg 4 Tender DWGs*			
Cost & Commercial		Preliminary cost plan						
Engineering Contractor		Long list	PQQ completion	*Early contractor involvement to inform designs*	*Full design review*	*Mobilise*	*Contractual handover to the client.*	

UK Infrastructure & Development Projects

…….large aggregated sites or very long linear traces

Canada Super Mill
Multi-D D&E with Enviro



- Appraisal
- Feasibility
- Consenting

Lower Thames Cross
Multi-D D&E with Enviro

- Feasibility
- Consenting
- (Construction)

Otterpool Park
Full Multi-D PM & Design

- Feasibility
- Consenting

Redcar Steelworks
Investigation & Remediation

- Appraisal
- Construction

Redcar Steelworks
Investigation & Remediation

- Construction

Considerations in Large Scale Multi-D

01 Most land is not Brownfield

- Likely that only isolated sections/zones need “remediation”
- Ground investigation information needed in many disciplines
- Consider Grounds and groundwater as wastes and resources

02 Multi-disciplinary & Intra-disciplinary

- Geological information for foundations, earthworks & concrete specifications
- Groundwater data influences drainage designs, slope stability & aquifer resource impact mitigation (inc WFD)
- Contaminant conc’s define remediation and waste management needs

03 Multiple Stakeholders (internal & external)

- Clients may come together as consortia
- Arcadis maybe part of a JV
- Major developments influence regulation and interest groups
- NB sustainability credentials high-up

04 Data management is paramount

- Huge amounts of data are generated so robust protocols needed
- Data needed throughout long-term project; accessibility is key
- Document Control is highly important
- Geospatial management is invaluable

05 Unpredictable Project Decisions

- Funding may dry up
- Fundamental blocks may occur
- Local/National politics may change
- Clear comms and collaborative approach needed for continuity

06 Long-term Propositions & Appointments

- Our appointments need to factor in inflation uplifts
- Contracts need to recognise that supplier costs may increase
- Clear exit clauses for both parties are advantageous
- Phasing and naming

Case Study: Fiddler's Ferry Power Station

Brownfield Regeneration on Surplus Energy Site

Project Vision

"where SSE sites do not have a future in power generation, they can play an important role in supporting local economies and communities; we want you to think like a developer"

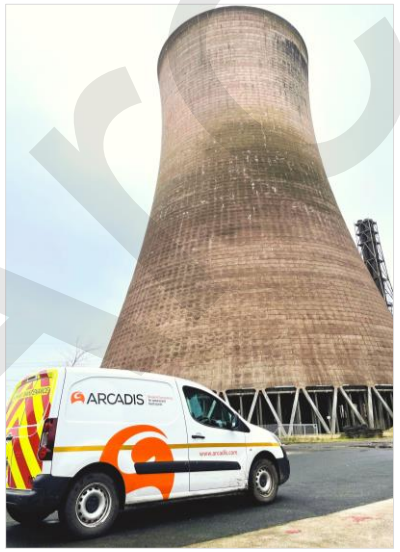
Date	2019 - 2022
Client	sse
Location	Widnes, Cheshire, UK
Area	330 ha
Value	€0.6m (net rev)

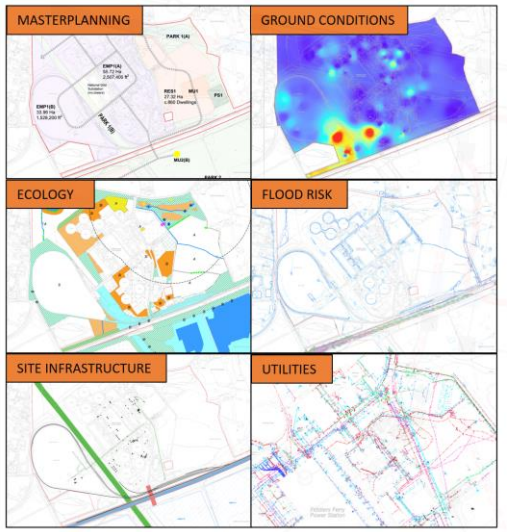
Comprehensive Site Evaluation

- Site-wide topographical survey into 3D digital terrain model
- Utilities and services mapping
- Intrusive ground investigations
- Ecological surveys
- Heritage surveys
- Built asset surveys
- UXO appraisals
- Integrated data storage and interrogation platform combining BIM360 (*now ACC*) & ESRi ArcGIS

BROWNFIELD AWARDS 2022 Highly Commended

Fiddler's Ferry tailored bim 360 common data environment sse





Thank you
any questions?