

# TRANSFORMING GEOTECHNICAL DATA

Lessons from around the world

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Managing Director - Keynetix

# WHAT IS THE MAIN DELIVERABLE FROM SITE INVESTIGATION?

# Data!



Is this your data store?

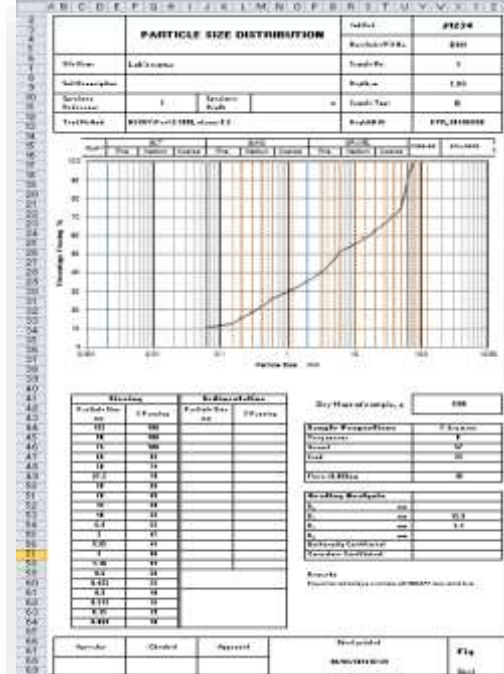


There is no data here .....

# What is geotechnical data?

# NO DATA HERE ....

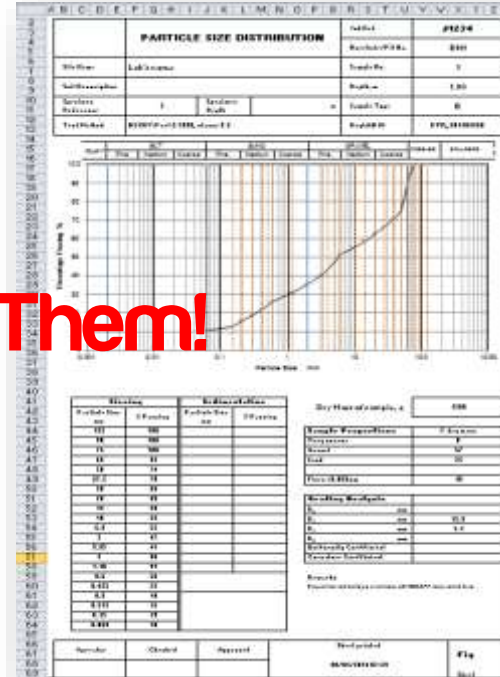
Borehole Log				Borehole No.
Project Name	Clarey, Galeside	Project No.	CLG2016	BH02
Location	Weymouth	Client	1100	Scale
Drawn	09/08/16	Date	20/08/16 - 20/08/16	Scale
Depth (m)	Soil Type	Moisture (%)	LAB No.	Notes
0.00	CL	20.0	1100/01	SPREAD
0.50	CL	20.0	1100/02	SPREAD
1.00	CL	20.0	1100/03	SPREAD
1.50	CL	20.0	1100/04	SPREAD
2.00	CL	20.0	1100/05	SPREAD
2.50	CL	20.0	1100/06	SPREAD
3.00	CL	20.0	1100/07	SPREAD
3.50	CL	20.0	1100/08	SPREAD
4.00	CL	20.0	1100/09	SPREAD
4.50	CL	20.0	1100/10	SPREAD
5.00	CL	20.0	1100/11	SPREAD
5.50	CL	20.0	1100/12	SPREAD
6.00	CL	20.0	1100/13	SPREAD
6.50	CL	20.0	1100/14	SPREAD
7.00	CL	20.0	1100/15	SPREAD
7.50	CL	20.0	1100/16	SPREAD
8.00	CL	20.0	1100/17	SPREAD
8.50	CL	20.0	1100/18	SPREAD
9.00	CL	20.0	1100/19	SPREAD
9.50	CL	20.0	1100/20	SPREAD
10.00	CL	20.0	1100/21	SPREAD
10.50	CL	20.0	1100/22	SPREAD
11.00	CL	20.0	1100/23	SPREAD
11.50	CL	20.0	1100/24	SPREAD
12.00	CL	20.0	1100/25	SPREAD
12.50	CL	20.0	1100/26	SPREAD
13.00	CL	20.0	1100/27	SPREAD
13.50	CL	20.0	1100/28	SPREAD
14.00	CL	20.0	1100/29	SPREAD
14.50	CL	20.0	1100/30	SPREAD
15.00	CL	20.0	1100/31	SPREAD
15.50	CL	20.0	1100/32	SPREAD
16.00	CL	20.0	1100/33	SPREAD
16.50	CL	20.0	1100/34	SPREAD
17.00	CL	20.0	1100/35	SPREAD
17.50	CL	20.0	1100/36	SPREAD
18.00	CL	20.0	1100/37	SPREAD
18.50	CL	20.0	1100/38	SPREAD
19.00	CL	20.0	1100/39	SPREAD
19.50	CL	20.0	1100/40	SPREAD
20.00	CL	20.0	1100/41	SPREAD
20.50	CL	20.0	1100/42	SPREAD
21.00	CL	20.0	1100/43	SPREAD
21.50	CL	20.0	1100/44	SPREAD
22.00	CL	20.0	1100/45	SPREAD
22.50	CL	20.0	1100/46	SPREAD
23.00	CL	20.0	1100/47	SPREAD
23.50	CL	20.0	1100/48	SPREAD
24.00	CL	20.0	1100/49	SPREAD
24.50	CL	20.0	1100/50	SPREAD
25.00	CL	20.0	1100/51	SPREAD
25.50	CL	20.0	1100/52	SPREAD
26.00	CL	20.0	1100/53	SPREAD
26.50	CL	20.0	1100/54	SPREAD
27.00	CL	20.0	1100/55	SPREAD
27.50	CL	20.0	1100/56	SPREAD
28.00	CL	20.0	1100/57	SPREAD
28.50	CL	20.0	1100/58	SPREAD
29.00	CL	20.0	1100/59	SPREAD
29.50	CL	20.0	1100/60	SPREAD
30.00	CL	20.0	1100/61	SPREAD
30.50	CL	20.0	1100/62	SPREAD
31.00	CL	20.0	1100/63	SPREAD
31.50	CL	20.0	1100/64	SPREAD
32.00	CL	20.0	1100/65	SPREAD
32.50	CL	20.0	1100/66	SPREAD
33.00	CL	20.0	1100/67	SPREAD
33.50	CL	20.0	1100/68	SPREAD
34.00	CL	20.0	1100/69	SPREAD
34.50	CL	20.0	1100/70	SPREAD
35.00	CL	20.0	1100/71	SPREAD
35.50	CL	20.0	1100/72	SPREAD
36.00	CL	20.0	1100/73	SPREAD
36.50	CL	20.0	1100/74	SPREAD
37.00	CL	20.0	1100/75	SPREAD
37.50	CL	20.0	1100/76	SPREAD
38.00	CL	20.0	1100/77	SPREAD
38.50	CL	20.0	1100/78	SPREAD
39.00	CL	20.0	1100/79	SPREAD
39.50	CL	20.0	1100/80	SPREAD
40.00	CL	20.0	1100/81	SPREAD
40.50	CL	20.0	1100/82	SPREAD
41.00	CL	20.0	1100/83	SPREAD
41.50	CL	20.0	1100/84	SPREAD
42.00	CL	20.0	1100/85	SPREAD
42.50	CL	20.0	1100/86	SPREAD
43.00	CL	20.0	1100/87	SPREAD
43.50	CL	20.0	1100/88	SPREAD
44.00	CL	20.0	1100/89	SPREAD
44.50	CL	20.0	1100/90	SPREAD
45.00	CL	20.0	1100/91	SPREAD
45.50	CL	20.0	1100/92	SPREAD
46.00	CL	20.0	1100/93	SPREAD
46.50	CL	20.0	1100/94	SPREAD
47.00	CL	20.0	1100/95	SPREAD
47.50	CL	20.0	1100/96	SPREAD
48.00	CL	20.0	1100/97	SPREAD
48.50	CL	20.0	1100/98	SPREAD
49.00	CL	20.0	1100/99	SPREAD
49.50	CL	20.0	1100/100	SPREAD





# WHAT CAN YOU DO WITH THESE?

Borehole Log									
Project Name	Client	Project No	Contract	Date	Drawn By	Scale	Sheet No	Total Sheets	Revision
CLAYTON	CLAYTON	CLAYTON	CLAYTON	2000.01.01	CLAYTON	1:50	01	02	
Client	Project	Date	Drawn By	Scale	Sheet No	Total Sheets	Revision		
CLAYTON	CLAYTON	2000.01.01	CLAYTON	1:50	01	02			
Depth (m)	Soil Description	Moisture (%)	Lab No	Notes	Remarks				
0.00	GRAVEL								
0.50	GRAVEL								
1.00	GRAVEL								
1.50	GRAVEL								
2.00	GRAVEL								
2.50	GRAVEL								
3.00	GRAVEL								
3.50	GRAVEL								
4.00	GRAVEL								
4.50	GRAVEL								
5.00	GRAVEL								
5.50	GRAVEL								
6.00	GRAVEL								
6.50	GRAVEL								
7.00	GRAVEL								
7.50	GRAVEL								
8.00	GRAVEL								
8.50	GRAVEL								
9.00	GRAVEL								
9.50	GRAVEL								
10.00	GRAVEL								

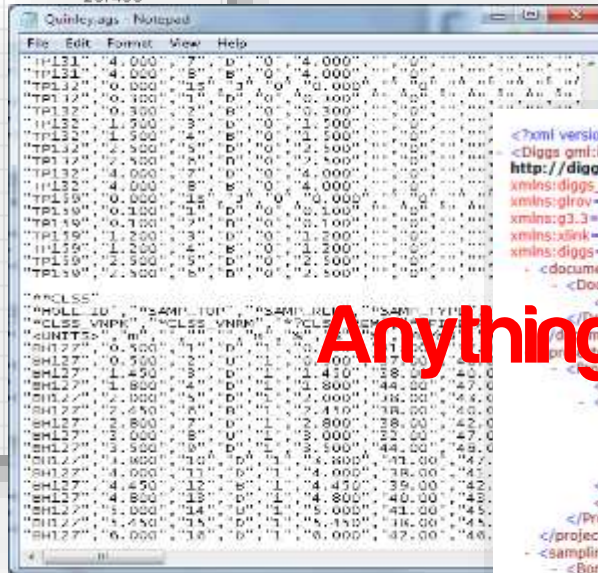


Read or Print Them!



# WHAT CAN YOU DO WITH THESE?

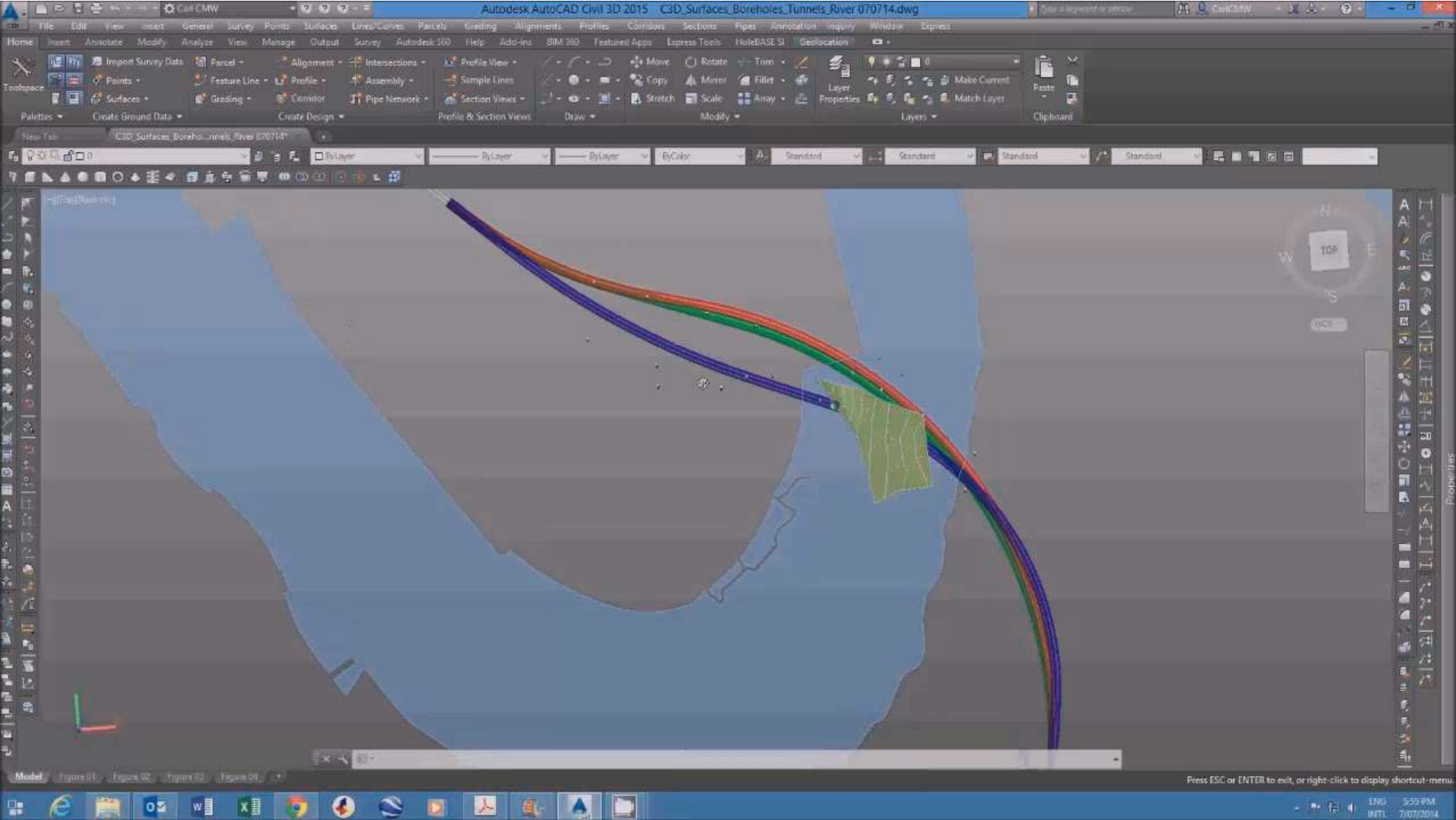
	A	B	C
1	Date	Location ID	Water Depth
2	02/05/2012	BH 1	24.185
3	03/05/2012	BH 1	23.82
4	04/05/2012	BH 1	23.455
5	08/05/2012	BH 1	
6	09/05/2012	BH 1	
7	10/05/2012	BH 1	
8	11/05/2012	BH 1	
9	14/05/2012	BH 1	
10	15/05/2012	BH 1	
11	16/05/2012	BH 1	
12	17/05/2012	BH 1	
13	18/05/2012	BH 1	
14	21/05/2012	BH 1	
15	22/05/2012	BH 1	
16	23/05/2012	BH 1	
17	24/05/2012	BH 1	
18	25/05/2012	BH 1	
19	28/05/2012	BH 1	
20	29/05/2012	BH 1	
21	30/05/2012	BH 1	
22	31/05/2012	BH 1	
23	01/06/2012	BH 1	



Anything

```
<?xml version="1.0" encoding="UTF-8"?>
<Diggs gml:id="bcd" xsi:schemaLocation="http://diggsml.org/schemas/2.0.b
http://diggsml.org/schemas/2.0.b/Complete.xsd" xmlns:witami="http://www.witamsi.org/schemas/131"
xmlns:diggs_geo="http://diggsml.org/schemas/2.0.b/geotechnical"
xmlns:glrov="http://www.opengis.net/gml/3.3/irrov" xmlns:glr="http://www.opengis.net/gml/3.3/ir"
xmlns:g3.3="http://www.opengis.net/gml/3.3/ce" xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:diggs="http://diggsml.org/schemas/2.0.b" xmlns="http://diggsml.org/schemas/2.0.b">
  <documentInformation>
    <documentInformation gml:id="docinfo">
      <creationDate>2015-12-30</creationDate>
    </documentInformation>
  </documentInformation>
  <Project gml:id="TestProject">
    <gml:name>Dewey Dam</gml:name>
    <roles>
      <Role>
        <rolePerformed>Client</rolePerformed>
        <businessAssociate>USACE</businessAssociate>
      </Role>
    </roles>
    <location>Some location, Norcross</location>
  </Project>
</projects>
<samplingFeatures>
  <Borehole gml:id="BH-38">
    <gml:name>BH-38</gml:name>
    <roles>
      <Role>
        <rolePerformed>Drilling Contractor</rolePerformed>
        <businessAssociate>ABC Drilling</businessAssociate>
      </Role>
    </roles>
  </Borehole>
</samplingFeatures>
```

# River Tunnel Alignment Australia



# Flood Defence Scheme

## UK



# MTR Station Hong Kong



ARUP



2015 Excellence in Infrastructure Winner

# Augmented Reality

## UK





# Two Golden Rules of Data Entry

# TWO GOLDEN RULES FOR DATA ENTRY

Only do it once

# TWO GOLDEN RULES FOR DATA ENTRY

Get someone else  
to do it

Record data as close to  
source as possible and  
transfer it in a standardized  
electronic format

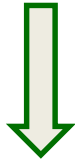


# It's all about Standardization / Standardisation

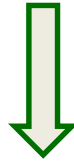
# HTML



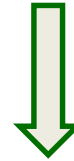
HTML



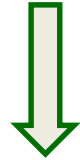
HTML



HTML

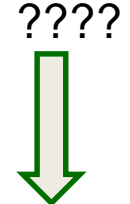
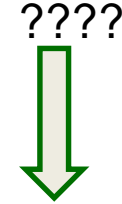
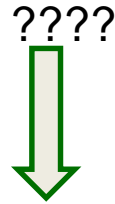
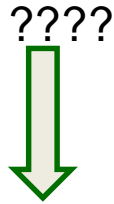


HTML





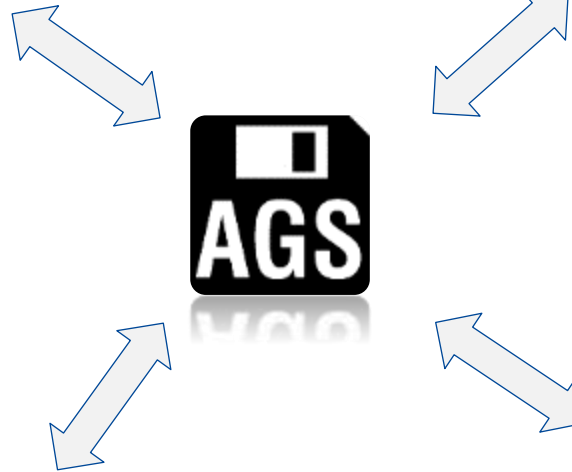
# WHAT IS OUR HTML?

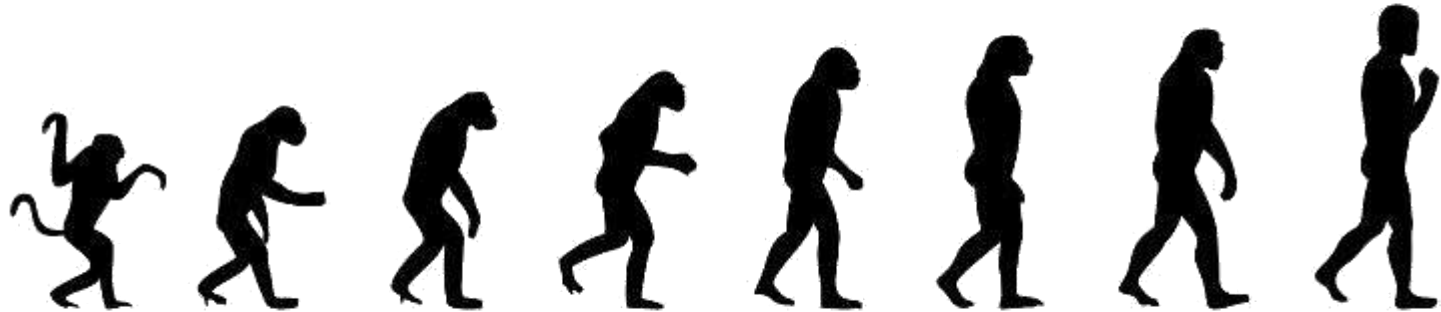


# WHAT IS OUR HTML?



# WHAT IS OUR HTML?





.123

.xls

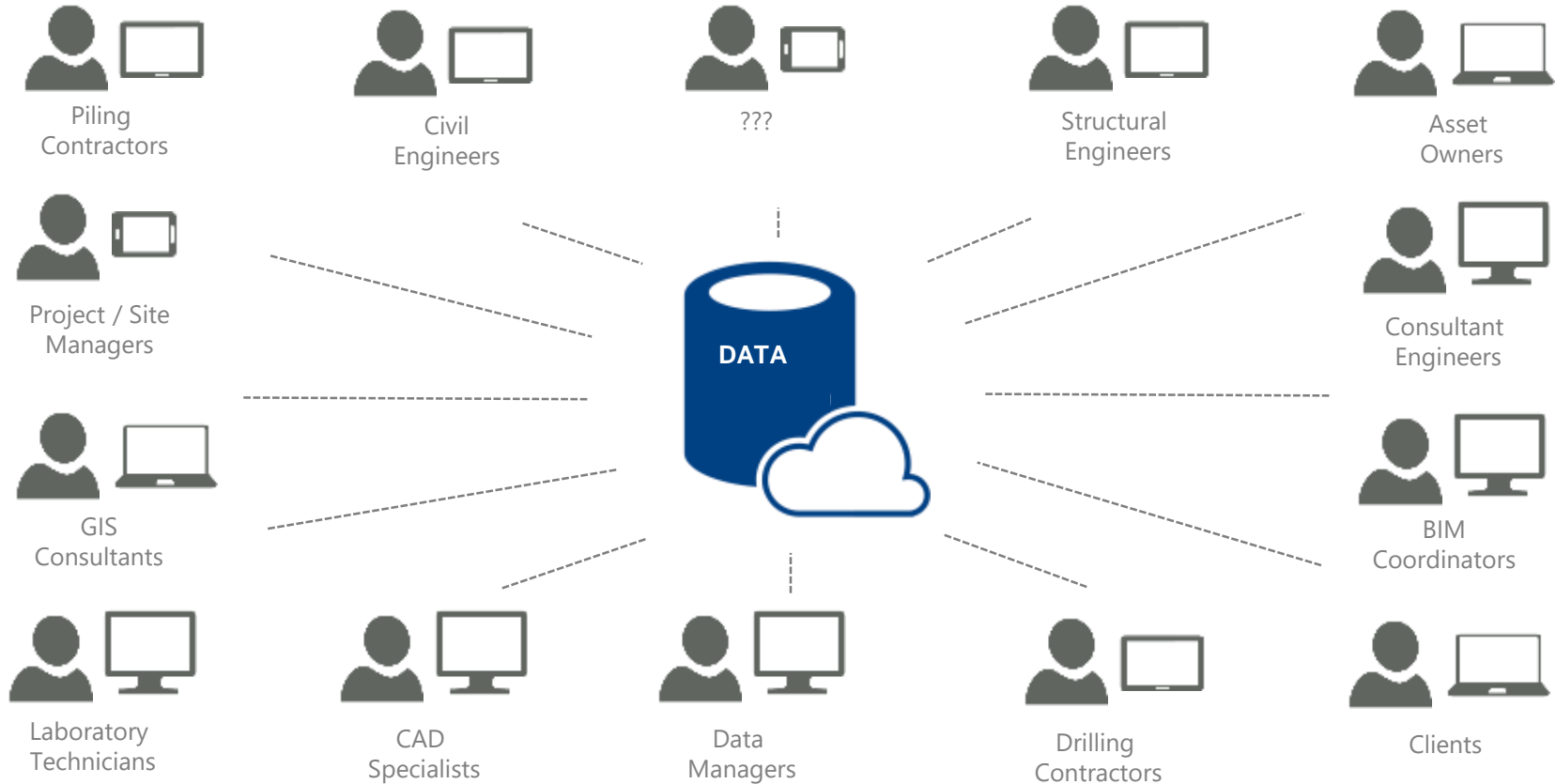
.AGS

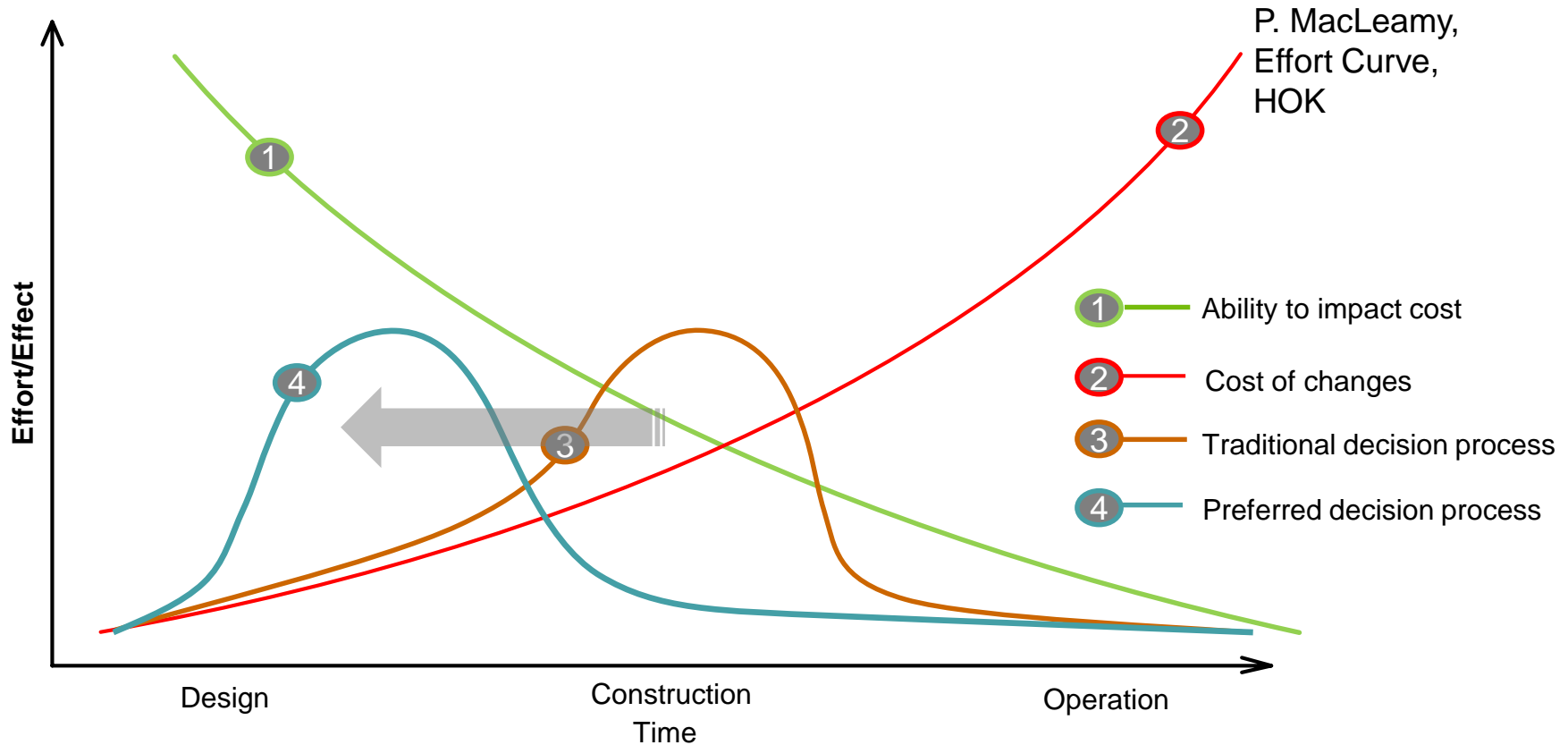
.DIGGS ???

Piling??

Construction Records??

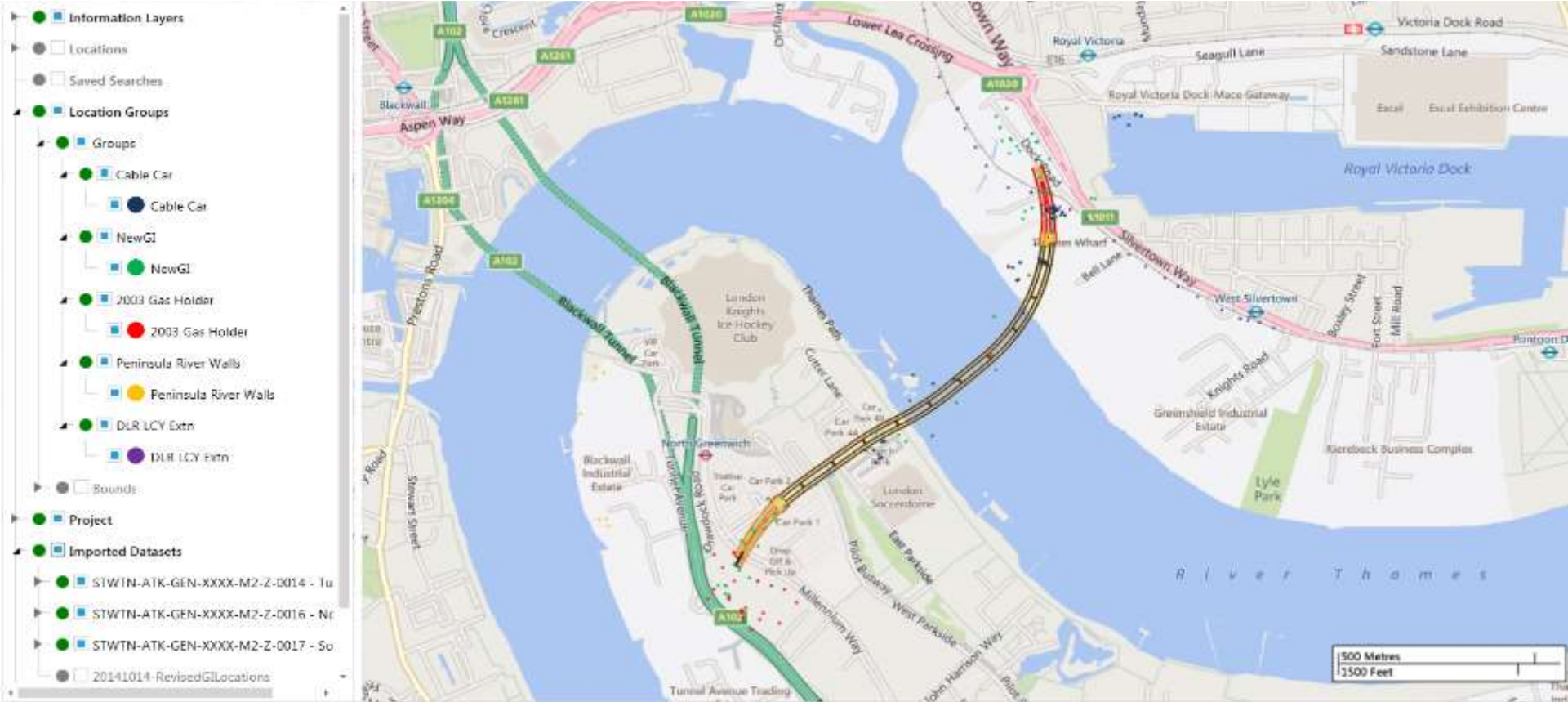
# IMPROVE COLLABORATION THROUGHOUT THE WIDER SUPPLY CHAIN





# River Tunnel London

# AGS DATA IN A BIM ENVIRONMENT



**Silvertown Tunnel:**  
By kind permission of Transport for London

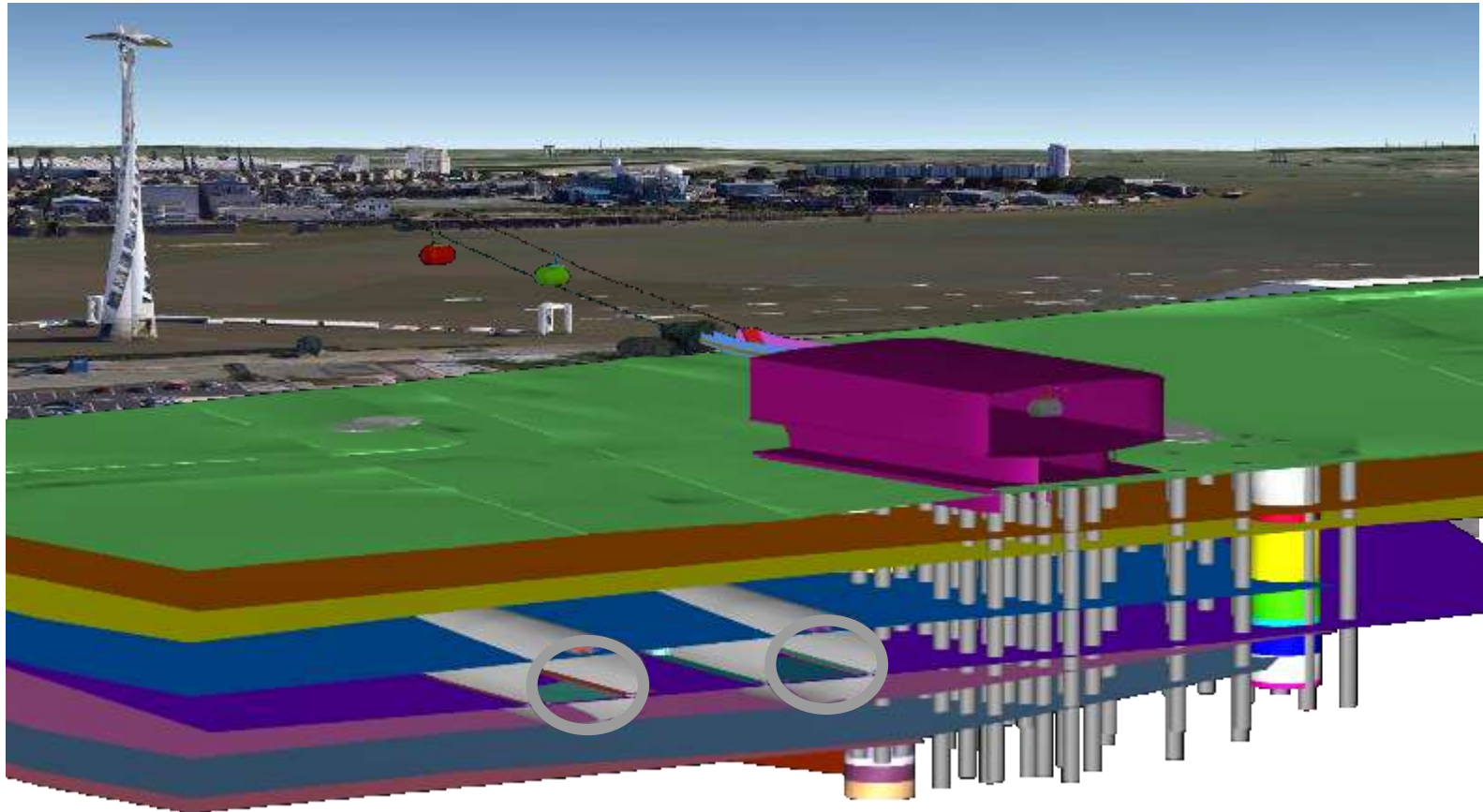




# SILVERTOWN TUNNEL PREVIOUS INVESTIGATIONS

- DLR
- Millennium dome
- Cable Car (same alignment as tunnel)
- Only needed 3 over water holes. (each one costs £20,000)
- Estimated saving around £100,000





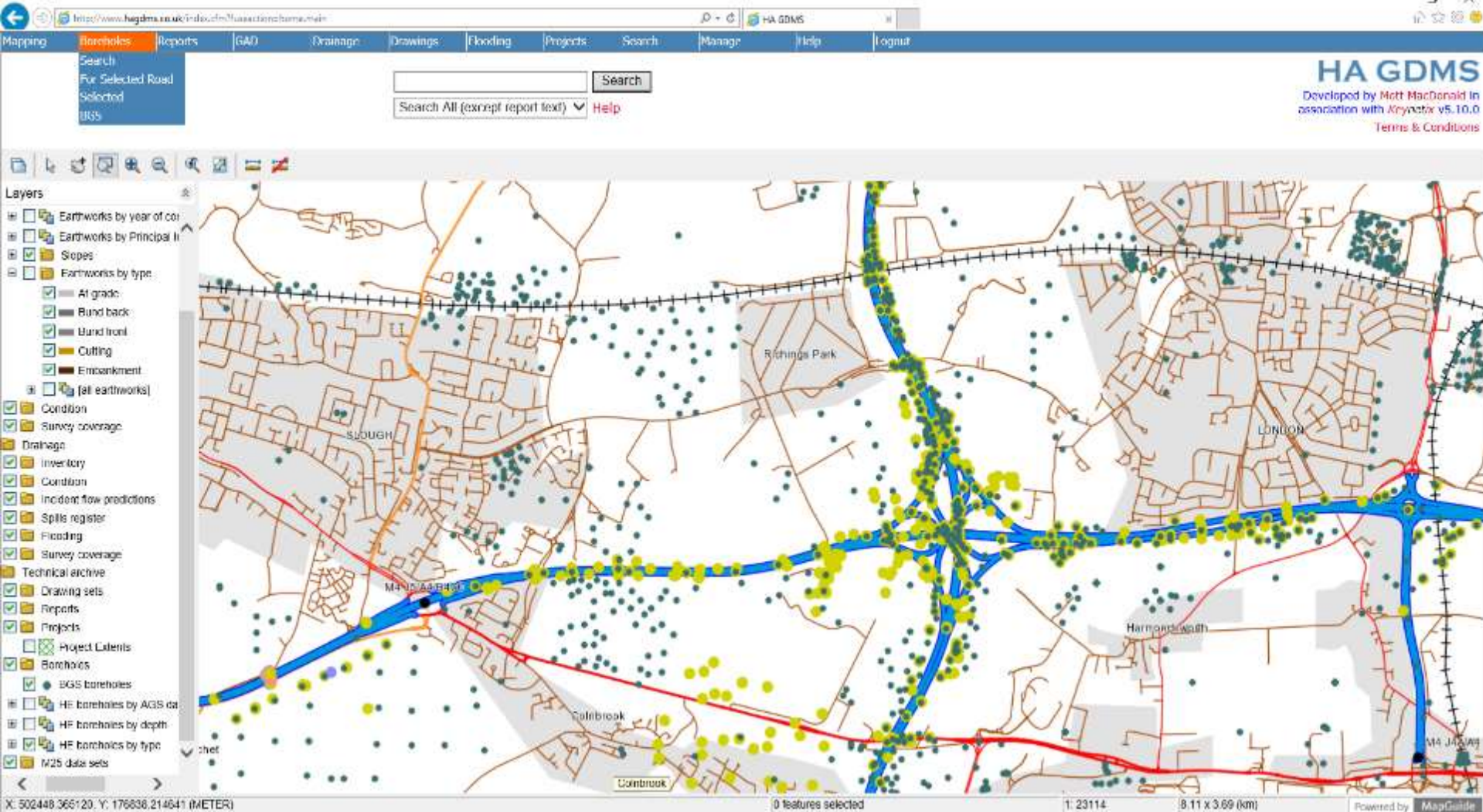
**Silvertown Tunnel:**  
By kind permission of Transport for London

ATKINS

# Data Storage

No PDFs Allowed

# Highways Agency Geotechnical Data Management Systems (HAGDMS) England



The screenshot displays the HAGDMS web application interface. At the top, there is a navigation menu with tabs for Mapping, Boreholes, Reports, GAO, Drainage, Drawings, Flooding, Projects, Search, Manage, Help, and Logout. A search bar is located in the top right, with a dropdown menu for 'Search For Selected Road Selected 1835'. The main map area shows a geographical view of the M4/M25 area, with various data layers overlaid. The layers panel on the left includes categories such as Earthworks by year of completion, Earthworks by Principal Investigator, Slopes, Earthworks by type (with sub-items like At grade, Bund bank, Bund front, Cutting, Embankment), Condition, Survey coverage, Drainage, Inventory, Condition, Incident flow predictions, Spills register, Flooding, Survey coverage, Technical archive, Drawing sets, Reports, Projects, Project Details, Boreholes (with sub-items like BGS boreholes, HF boreholes by AGS data, HF boreholes by depth, HF boreholes by type), and M25 data sets. The map shows a network of roads, including the M4 and M25, and various data points represented by colored dots (yellow, green, blue). The map is titled 'Richings Park' and 'LONDON'. The bottom status bar shows coordinates (X: 502448.366120, Y: 176636.214641 (METER)), scale (1: 23114), dimensions (8.11 x 3.69 (km)), and a 'Powered by MapGuide' logo.

# Canterbury Data Centre New Zealand



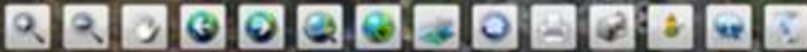
## Legend

- Cone Penetration Test
- Scala Penetration Test
- Hand Augered Scala
- Hand Augered Borehole
- Machine Borehole
- ECan Borehole
- Swedish Weight Test
- Active MASW Image
- Active MASW Line
- Geotechnical Section
- Atterburg
- Fines Content
- Water Content
- Particle Size Distribution (PSD)
- Piezometer

# gINfo Hong Kong

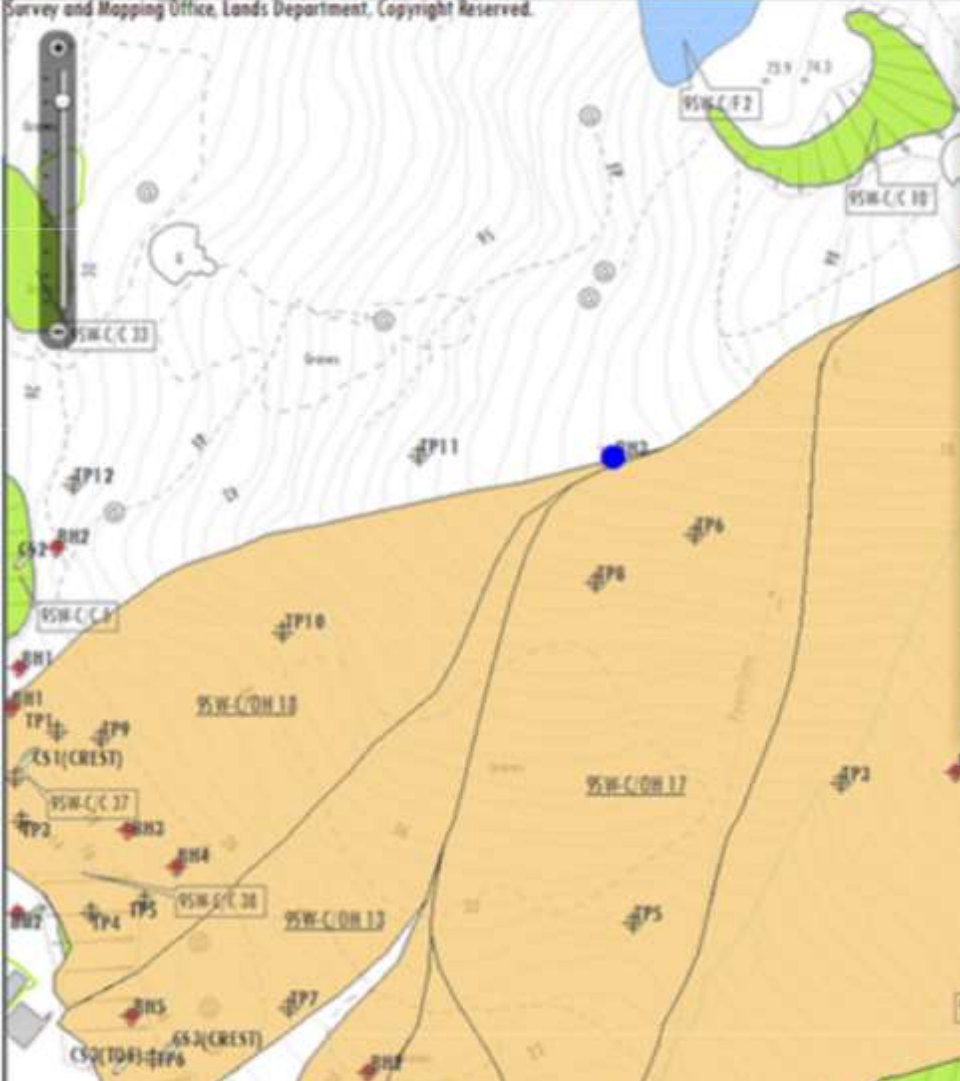


GEOTECHNICAL INFORMATION INFRASTRUCTURE  
POWERED BY ARCGIS


Project Scheme: GIRecord    Transparency:    Select Area:    Select District:    

Map Scale: 1:1000    Easting Min: 803324    Northing Min: 813026    Easting Max: 803656    Northing Max: 813241    Position: 803558E 813096N    Map Sheet: 9SW-18C, 9SW-23A    Welcome,

Survey and Mapping Office, Lands Department, Copyright Reserved.



**56790, BH3**

GIU Report No. 56790    

Work Order No. GE/2012/21/TO/01

Title IP & Mitigation Programme 2011, Ground


Author Tysen Foundation Limited

Report Type Ground Investigation Report

Association Reports (Double-Click to open)


Report No.	Title

Name	Value
Drillhole Type	DH
Drillhole Depth	



**Menu**

- Map Content
- Search
- Textual Search  
GI Report  
e.g. 25730
- Graphical Search  
GI Location
- Buffer (m)
- Auto Search within screen (scale <= 200)

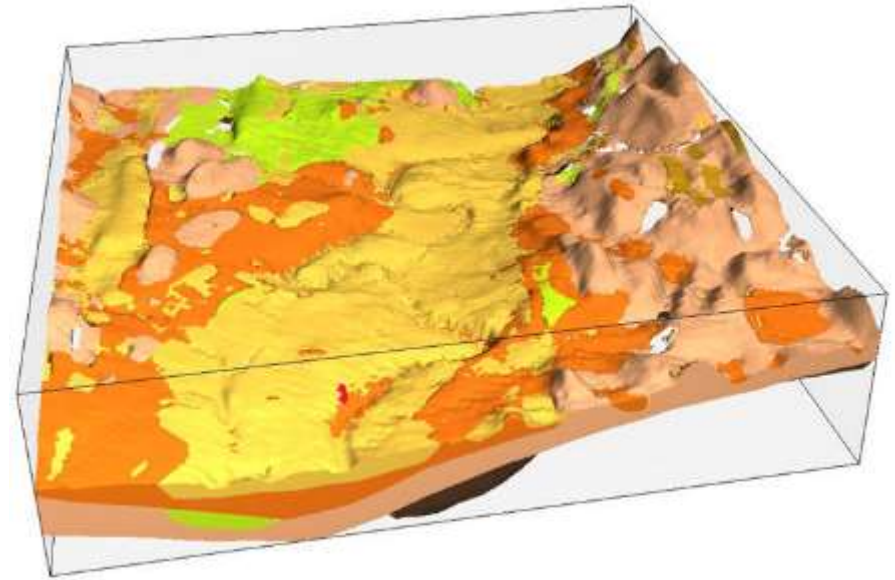


# ASK Network BGS

## UK



# ASK NETWORK



## CONCLUSION

- Geotechnical Engineers should do more to exploit the Data Age.
- Data sharing is transforming how we work

# THANK YOU

- Special thank you to the following organisations for providing case studies information for this presentation

