SCOTIA
SURVEY AND SAFETY LTD

Utility detection overview.

Speaker – Jim Mcleod

Saturday, 16 August 2025

Striking underground services

Consequences of damaging buried services include:

- Personal injury or death
- Increased costs
- Environmental damage
- Damage to property or structures
- Inconvenience and disruption to business and the public
- Project delays
- Damage to reputation
- Possible prosecution.

Legislation and guidance

Avoiding Danger from underground services (HSG47)

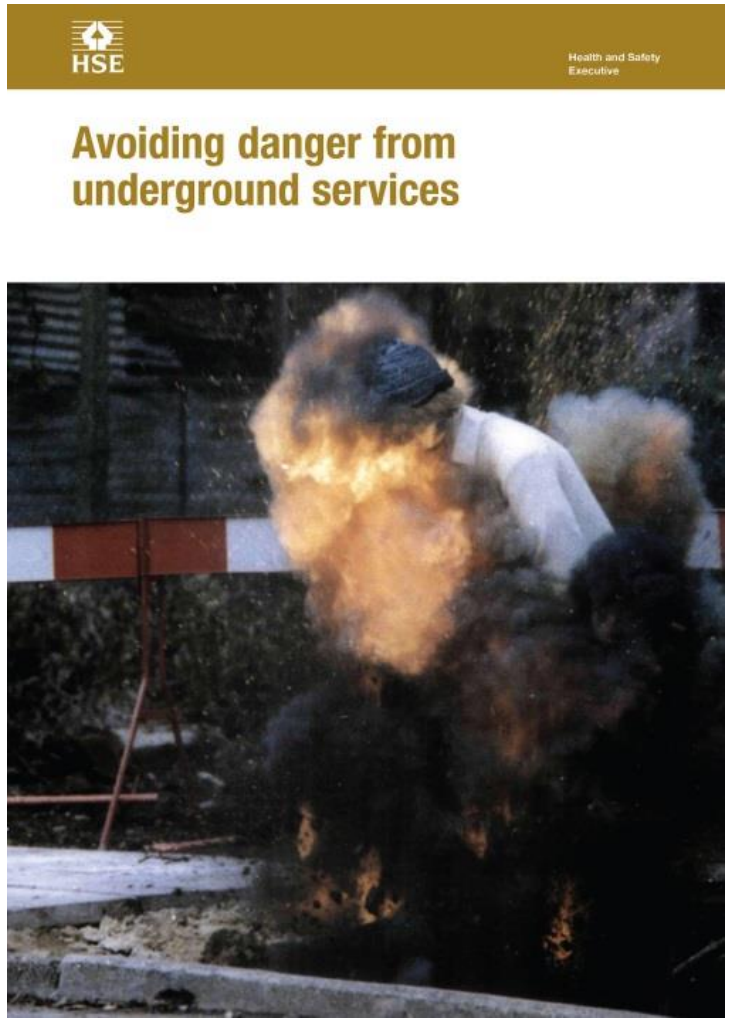
Safe system of work:

- **Identify & manage the dangers**
- **Plan the work.**
- **Locate and identify buried services**
- **Safe excavation**

Services to located and marked by competent persons who have had thorough training in the use and limitations of the equipment

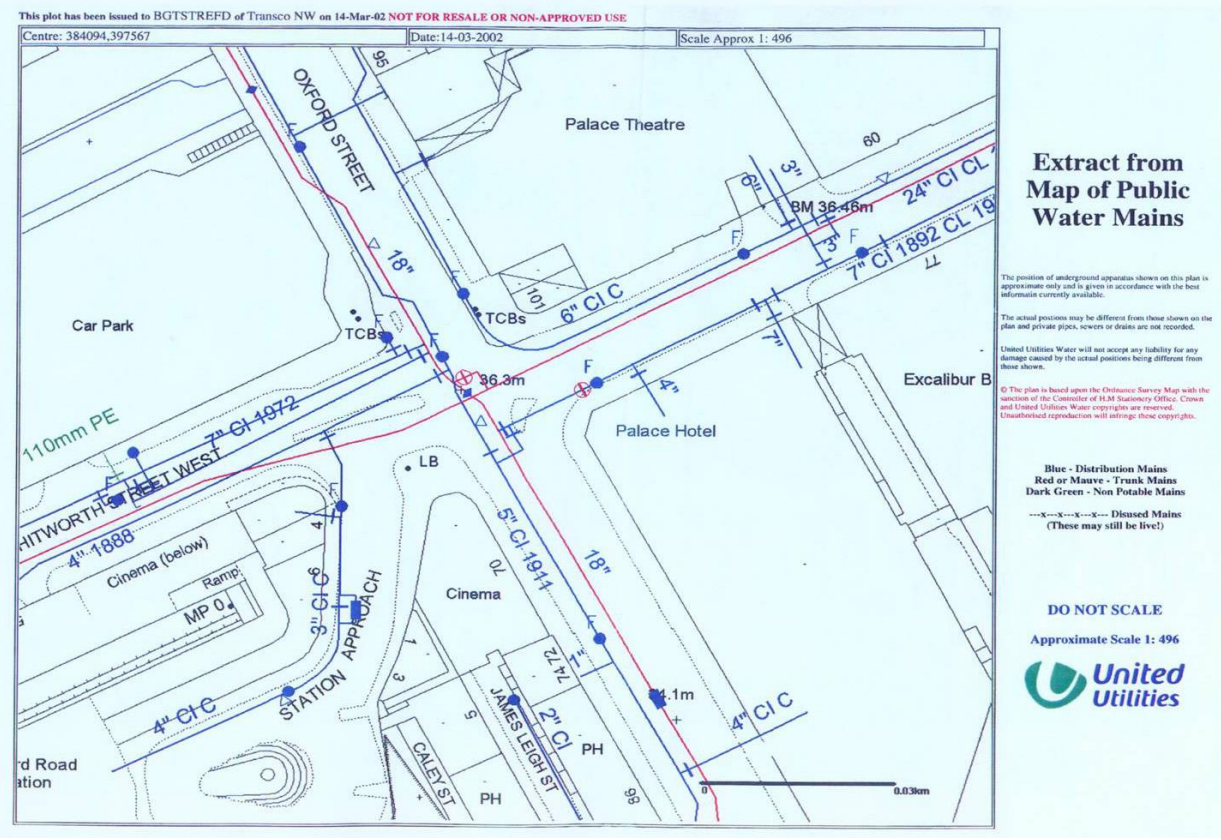
“Use of signal generators will significantly increase the accuracy of the service location”

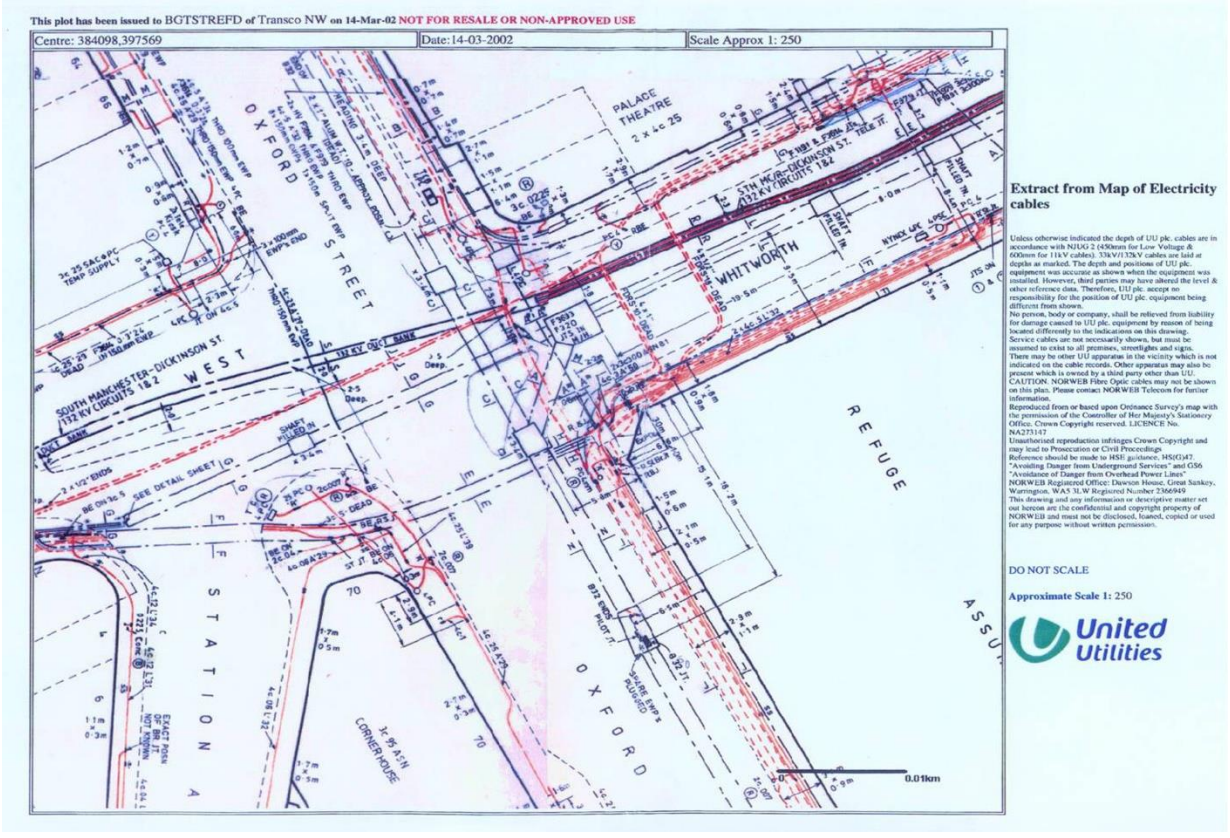
Continue to scan at determined intervals during excavation



Use of service plans

Service plans play an important part in any utility scan. They not only give us an idea of what's in our work area, they also help us plan best detection methods and practices and are a useful aid for site visual inspection.





Electromagnetic location

What do CAT's detect ?

A CAT cannot detect cables, pipes, electricity or voltage.

It detects the electromagnetic field (signal) often radiated by metallic services.

Many buried services emit little or no signal, making them difficult or impossible to locate with the CAT alone.

This is why use of the Genny is so vital in any utility scan.

The Genny is used to apply a signal detectable by the CAT to a metallic service, maximizing the number of services which can be located.

Remember, no signal, no locate !


ScottishPower
CAUTION
Telephone 0141 776 2877
275 kV
Cables
Underground

Passive Locating

- **Passive locating** is when using a C.A.T on its own in Power, Radio or Avoidance

Power Mode

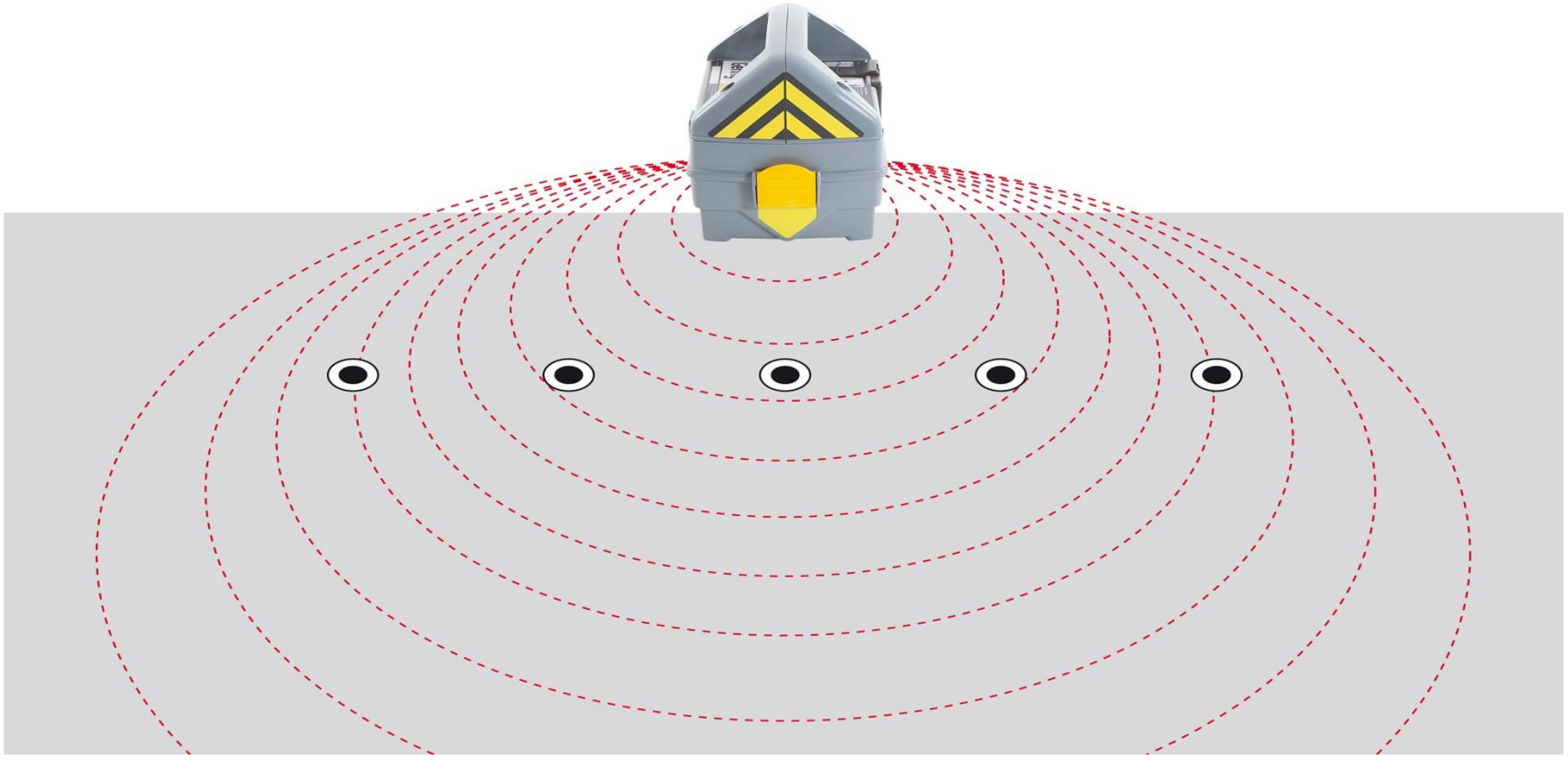
Radio Mode

Avoidance Mode

Active Locating. Direct connection

Active locating. Induction mode

- Induction mode induces signal onto conductive buried services
- 10 metres between CAT & Genny
- Genny placed in line with suspected path of services, chevron to chevron with the CAT



Limitations of this equipment

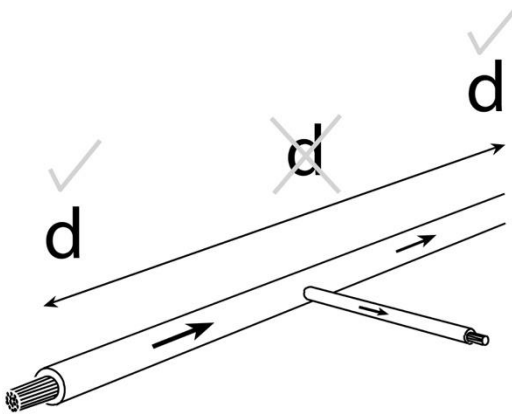
Not all services are detectable using a CAT & Genny !

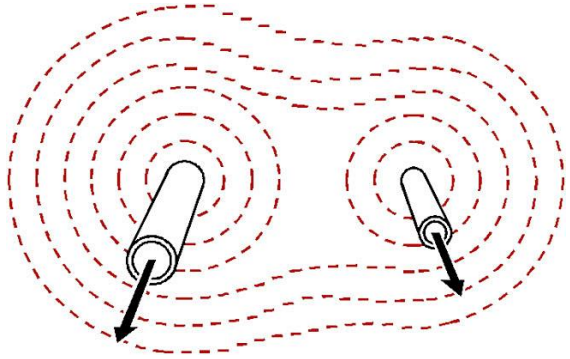
- Plastic pipes, ducting
- Fireclay pipes
- Concrete pipes
- Asbestos pipes
- Fibre optic cables
- Pot ended cables (unearthed)
- Deep services

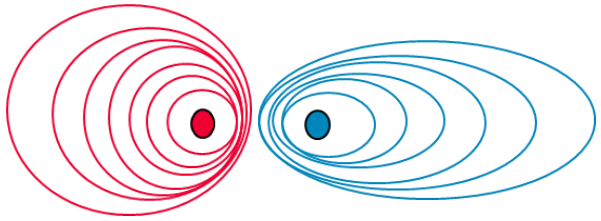
Even when using a CAT & Genny, always dig with caution and follow company procedures.

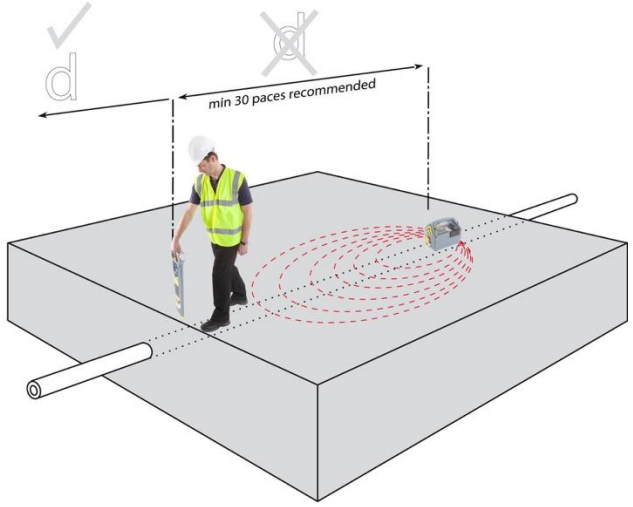
A CAT cannot determine if a cable is energised. All services should be considered live !

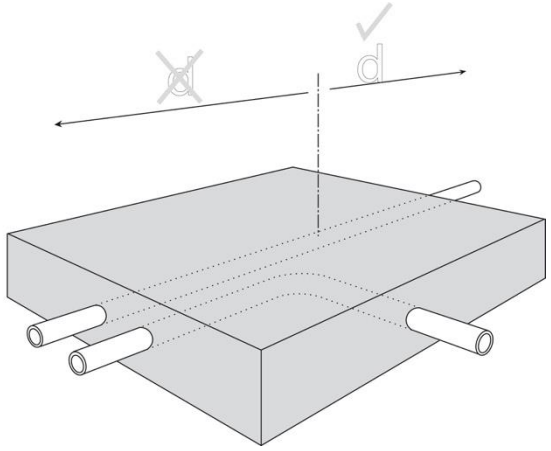
Signal Distortion

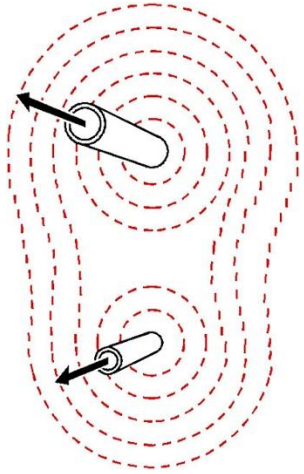








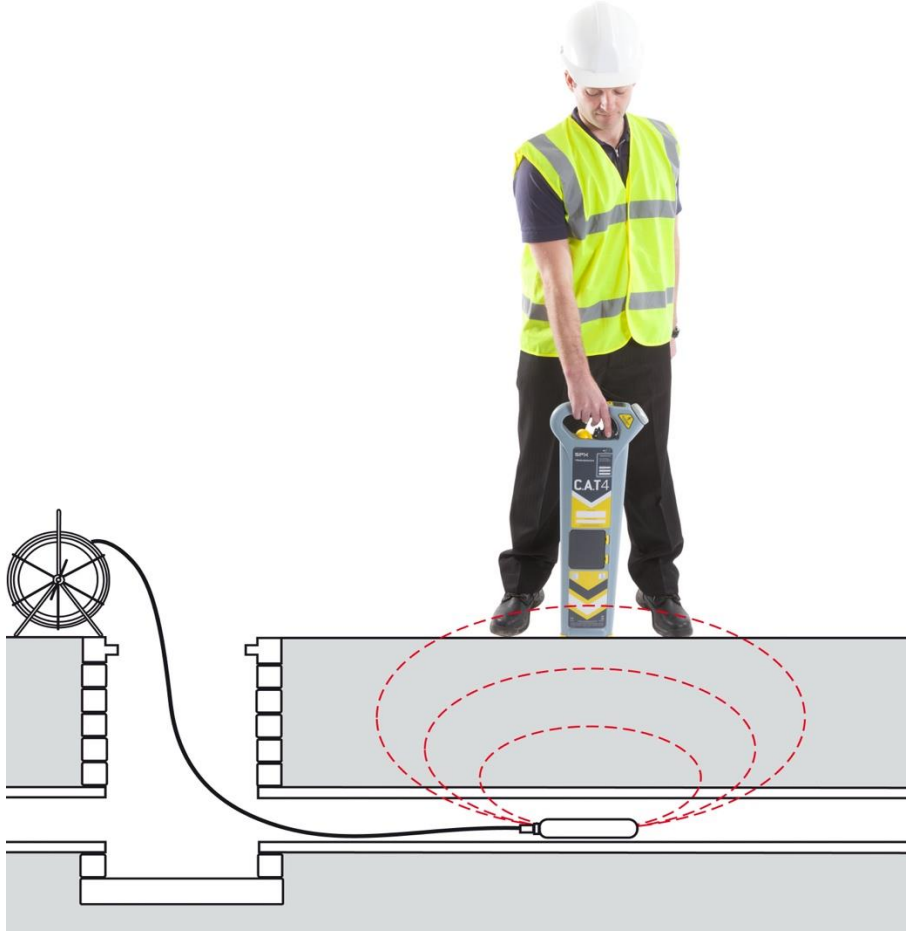




Distorted signals can cause inaccuracies when marking out, and with depth estimations

Locating non metallic services

- Non-metallic pipes may be traced, and blockages located using a Sonde.
- There are various types of Sondes for different applications



Locating non-metallic services

- Locating non-metallic pipes with a Flexitrace

Data Logging and GPS

CAT's are available with data logging and GPS capability, which is increasingly becoming mandatory requirement on many sites.

Jim McLeod

Training

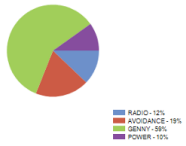
Company: Scotia Survey and Safety, Unit 6.21, Clyde workshops, Covault Business park, Glasgow, G32 8YL, UNITED KINGDOM

C.A.T SN: 10/C4EN03-38898
C.A.T Operator: Jim Mcleod
Account: Default

Report date: 05/08/2025
Created by: Jim Mcleod
Contract: Default

Genny Signal Detection	
Radio	00:03:35
Avoidance	00:09:41
Genny	00:17:46
Power	00:02:36
Total Duration	00:30:04

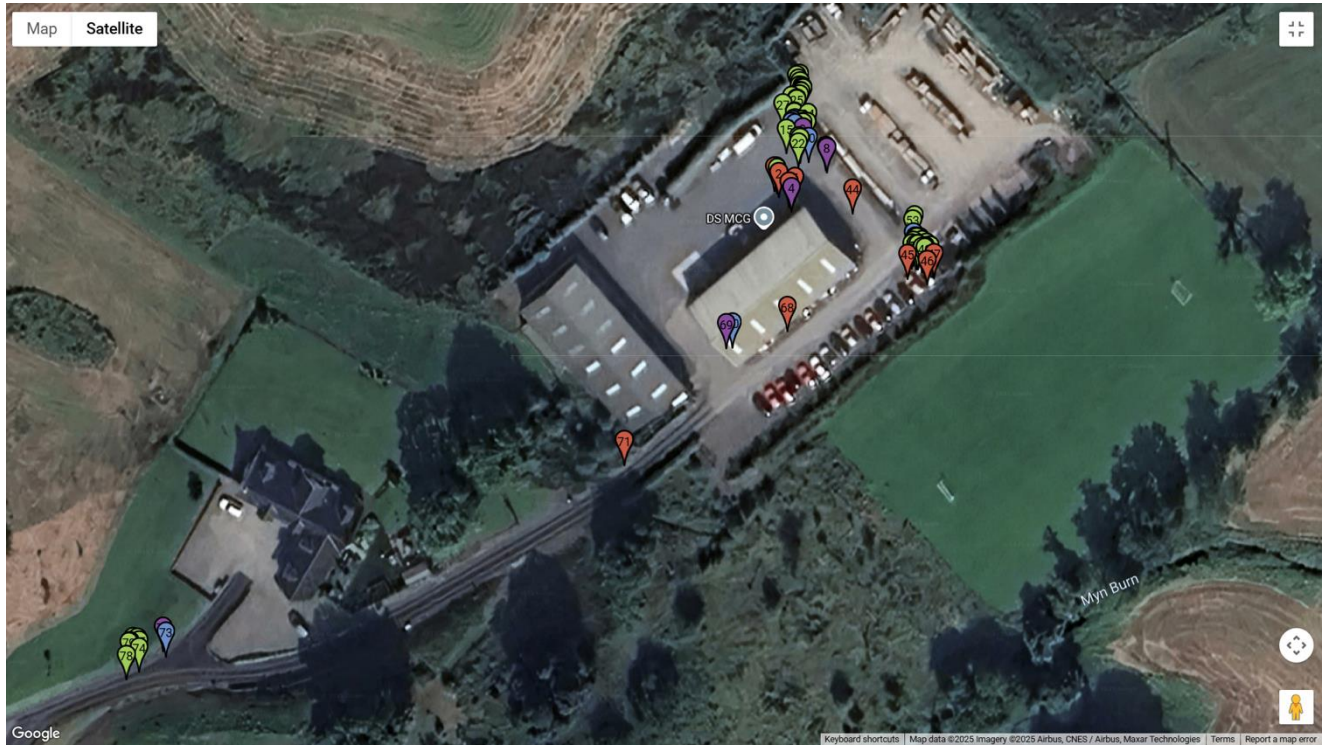
Number of Scans	80
Average Scan	00:00:22
Longest Scan	00:01:45
Swing Warning	24
Number of Scans with GPS	76
GPS Available %	84



Date	Scan	Survey	Start Time	Duration	Swing Warning	Radio	Avoidance	Genny	Power	Genny HF	Genny LF	Max Gain	Min Gain	GPS %
06/01/2025	1	1	11:02:57	00:00:08	0	00:00:00	00:00:08	00:00:00	00:00:00	00:00:00	00:00:00	100	100	75
06/01/2025	2	1	11:04:12	00:00:29	0	00:00:00	00:00:29	00:00:00	00:00:00	00:00:00	00:00:00	100	100	100
06/01/2025	3	1	11:06:25	00:00:28	0	00:00:02	00:00:17	00:00:01	00:00:08	00:00:00	00:00:00	100	67.1	92
06/01/2025	4	1	11:06:59	00:00:03	0	00:00:00	00:00:00	00:00:00	00:00:03	00:00:00	00:00:00	100	100	66
06/01/2025	5	1	11:07:27	00:00:02	0	00:00:00	00:00:02	00:00:00	00:00:00	00:00:00	00:00:00	100	100	50
06/01/2025	6	1	11:08:20	00:00:20	9	00:00:00	00:00:00	00:00:20	00:00:00	00:00:00	00:00:18	100	100	90
06/01/2025	7	1	11:08:43	00:00:10	0	00:00:00	00:00:00	00:00:10	00:00:00	00:00:00	00:00:07	100	70.6	90
06/01/2025	8	1	11:11:02	00:01:00	0	00:00:00	00:00:00	00:00:00	00:01:00	00:00:00	00:00:00	100	100	96
06/01/2025	9	1	11:11:05	00:00:42	0	00:00:02	00:00:00	00:00:00	00:00:40	00:00:00	00:00:00	100	100	97
06/01/2025	10	1	11:12:02	00:01:35	0	00:01:35	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	100	64.3	100
06/01/2025	11	1	11:12:06	00:00:30	0	00:00:30	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	100	100	96
06/01/2025	12	1	11:12:38	00:00:08	0	00:00:08	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	100	100	87
06/01/2025	13	1	11:12:52	00:00:15	0	00:00:15	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	100	100	86
06/01/2025	14	1	11:13:19	00:00:10	0	00:00:10	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	100	100	80
06/01/2025	15	1	11:14:42	00:00:04	0	00:00:00	00:00:00	00:00:04	00:00:00	00:00:00	00:00:03	100	100	75
06/01/2025	16	1	11:14:43	00:00:05	0	00:00:00	00:00:00	00:00:05	00:00:00	00:00:00	00:00:04	100	100	60
06/01/2025	17	1	11:14:53	00:00:09	0	00:00:00	00:00:00	00:00:09	00:00:00	00:00:00	00:00:08	100	100	88
06/01/2025	18	1	11:15:01	00:01:45	0	00:00:00	00:00:00	00:01:45	00:00:00	00:00:00	00:01:35	100	1.2	99
06/01/2025	19	1	11:15:06	00:01:19	0	00:00:00	00:00:00	00:01:19	00:00:00	00:00:00	00:00:56	100	0	98
06/01/2025	20	1	11:16:29	00:00:08	0	00:00:00	00:00:00	00:00:08	00:00:00	00:00:00	00:00:05	6.8	0	75

Page 1

Scotia Survey and Safety



Locator usage can be monitored to help drive best practice, reduce utility strikes and improve safety.

Precision locator systems

Advantages

- Locate and trace single lines in congested areas.
- Current measurement/direction aids line identification
- Power harmonics
- More powerful, multi frequency transmitter
- Aids rapid detection and following of services

Disadvantages

- More intensive training required
- Cost
- Time ?

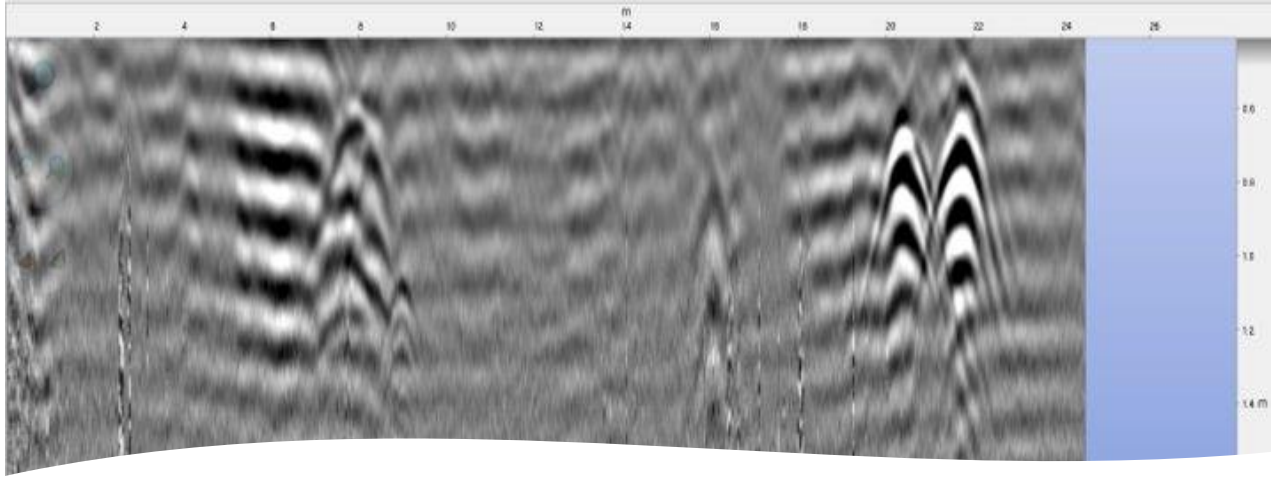
Use of Ground Penetrating Radar ?

Advantages

- Can detect metal and non-metallic objects, as well as voids and underground irregularities.
- Possible to measure the dimensions, depth and thickness of targets.
- Data is provided quickly and can cover a large site area.

Disadvantages

- More costly than EM location.
- Requires more intensive training.
- Terrain needs to be relatively flat.
- Results vary depending on ground conditions.



Importance of training

Thorough training is vital on the use of Cable avoidance tools and proven to reduce service strikes. Allowing operators to:

- Maximize the number of located services
- Understand equipment limitations
- Identify best location practices
- Increase efficiency
- Comply with current legislation, guidance and company policy.

Summary

Using Cable Avoidance Tools is part of a safe digging process.

- Safe system of work
- Training
- Use of the Genny
- Service drawings
- Visual inspection
- Continued scanning during the excavation

End of presentation, thank you.