Presenter:

Charlie Eccleson – Sales & Support Engineer

smartmicro UK
SMART MICROWAVE SENSORS

TRAFFIC SENSORS

OVERCOMING THE CHALLENGES OF BRIDGE MOUNTED DETECTION

A48 BRITON FERRY BRIDGE IN SOUTH WALES

centregreat traffic signals

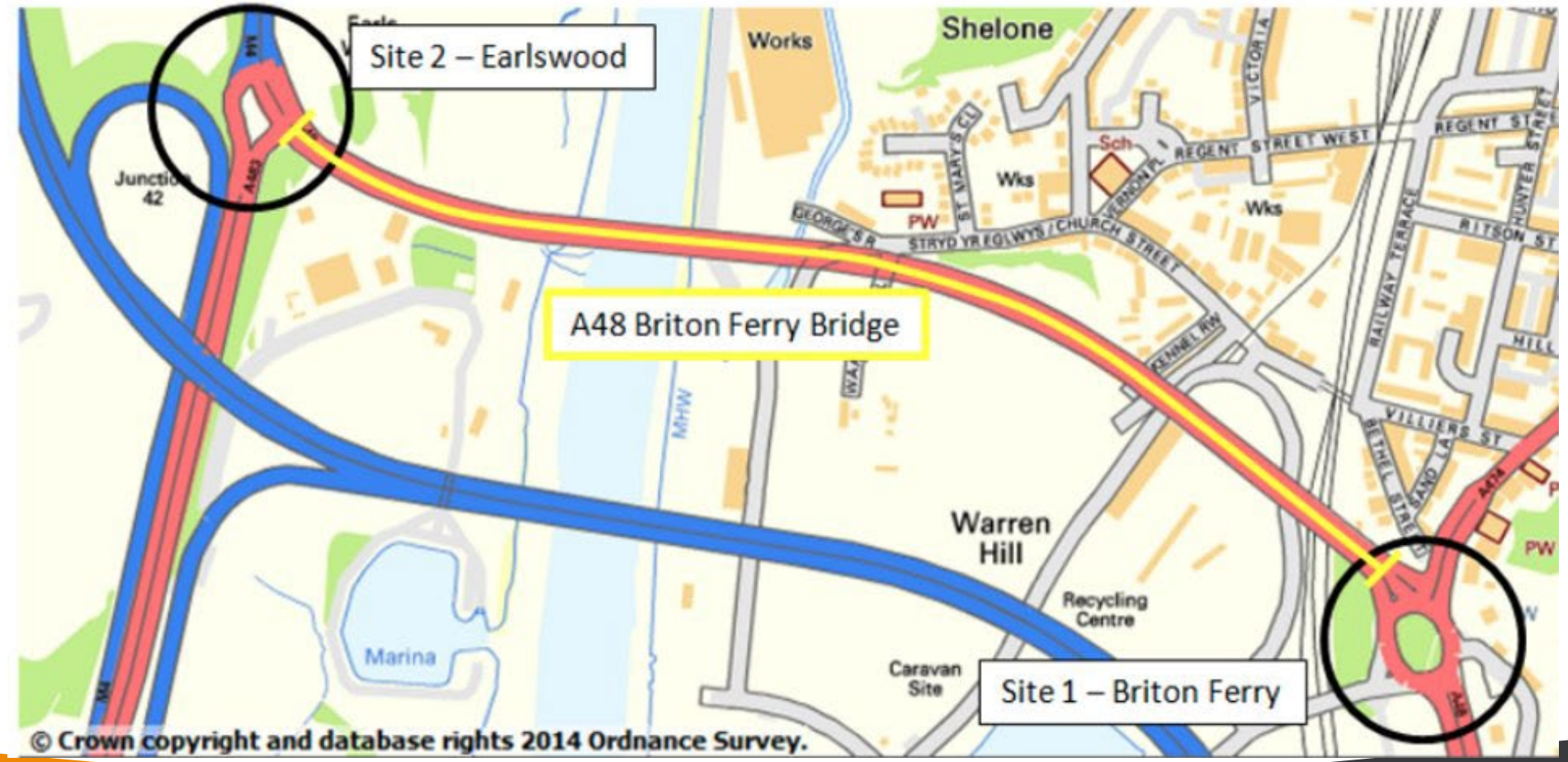
Asiant Cefnffyrdd De Cymru
South Wales Trunk Road Agent

OVERVIEW

SITE HISTORY

- The bridge consists of a 17-span steel viaduct some 585m long, carried on steel and concrete piers.
- The river is crossed by the central span of 91m
- It runs parallel to the newer M4 Bridge, which was completed in 1993
- Major diversion route if M4 is closed
- Bridge is a steel and concrete structure built in 1953 to replace a ferry
- Highly elevated position with significant changes in elevation along its route
- Carries 4 lane dual carriageway plus cycleway
- Speed limit 50mph – reduced from national speed limit in 2014
- Upgrade from VA to MOVA was planned to be added in 2014 – design by Atkins

SITE LAYOUT



EARLY DETECTION CHALLENGES - 2014

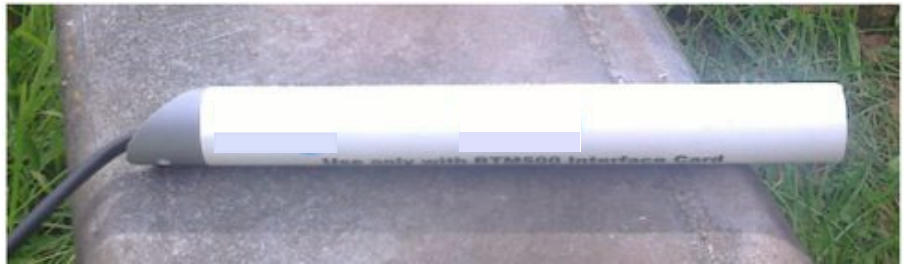
Due to the age of the bridge structure, precise construction details were not available.
It was understood that the road construction above bridge water proofing was approximately 30-40mm deep.

1. Very shallow road construction
2. Significant, potentially structural, ‘step up’ from carriageway level to adjacent footway/reserve
3. No available ducting in the bridge
4. No access to lamp columns
5. Change in elevation - bridge climbs ‘away’ from signals
6. Elevation – Significant drops to the side of the bridge
7. Weather, an exposed location which was prone to wind and fog
8. Solution for detection at 100m+ required

Detector Technology	Reason for rejection
Conventional loops	Insufficient depth for slot cutting. No ducting.
Side fire radar	Unable to position new poles on bridge deck. Whilst could be lamp column mounted, unable to install cables into lamps
Video detection	100m detection would require camera at extreme height plus bridge prone to fog
Thermal detection	Camera required at extreme height – not viable
Conventional radar	Could not cover the 100m distance required in 2014
Wireless magnetometers	Insufficient carriageway depth for core drill
Slot-cut wired magnetometers	No carriageway depth, no way to get tails off carriageway
Increase road depth	Significant bridge redesign. Barrier redesign and weight on bridge.
Do nothing!	MOVA required to improve operation. Current operation sub-optimal

WHAT WAS DONE IN 2014? ……

- ✓ Wired magnetometer detection was selected
- ✓ It was suggested that they could accurately detect vehicles if installed underground, adjacent to a traffic lane, rather than directly under the lane.
- ✓ 15 years of maintenance-free design life was claimed



Installation was completed August 2014

SUCCESS OR NOT?

Initial results were good for lane 1

- Most traffic was detected successfully

Results for Lane 2 were not so successful

- The majority of drivers appeared to keep well to the left of the lane and kept outside of the range of the detection.
- Only a few vehicles were detected correctly

*(NB: above comments taken from Atkins independent report on the scheme from 2014)

Although the installation was initially deemed successful, the detectors grew increasingly unreliable, culminating in total failure and requiring the South Wales Trunk Road Agency to seek replacement technology in 2023.

ON TO 2023…..

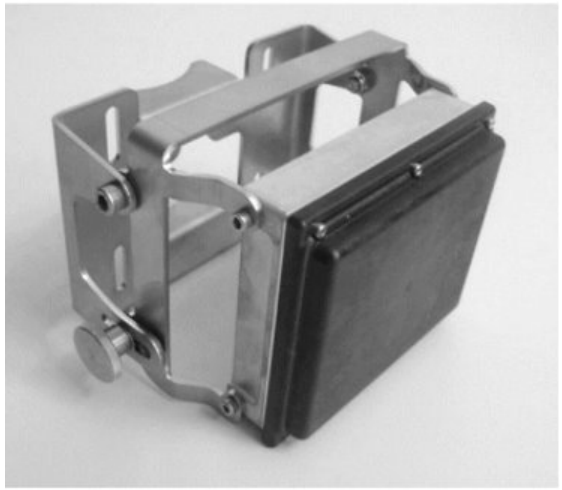
- ✓ It became clear that the detection technology previously installed had failed – causing particular issues at the Earlswood location.
- ✓ The South Wales Trunk Roads Agency (SWTRA) sought an alternative detection solution
- ✓ The reputation and previous success of the smartmicro radar range was known to the clients' consultants, and a recommendation was given to utilise these radars.
- ✓ The UMRR-11 Type 45 radars were chosen:
  - ✓ Long range (219m/718 feet) with multiple lanes covered (4)
  - ✓ Replace up to 30 loops with 'virtual loops' on the carriageway
  - ✓ Works in all weather conditions – bridge particularly affected by fog/mist
  - ✓ Maintenance free

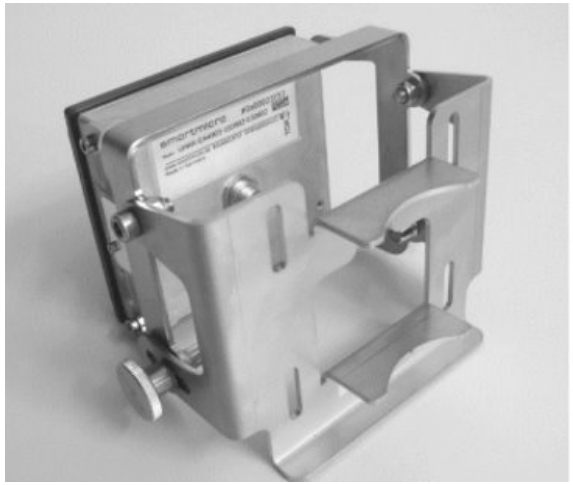
UMRR-11 SERIES

SRO
8 programmable relays

SRO
Attached to UMRR-11 Type 45

Stainless steel bracket

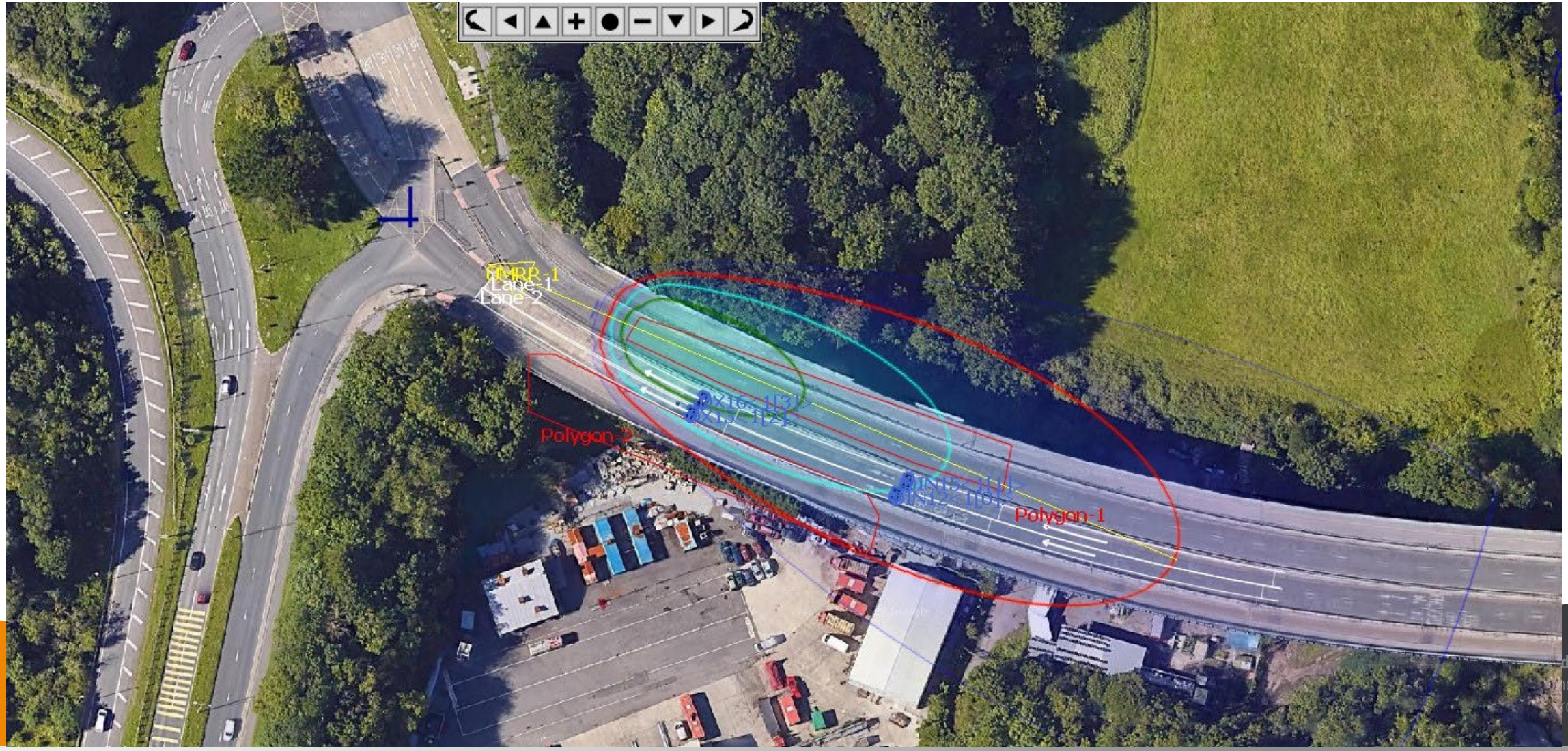




INSTALLATION - EARLSWOOD

- ✓ Failure of the detection at this site had become a major issue
- ✓ IN loops completely failed
- ✓ X loops were ‘partially’ operational, controlling the green time on that approach, but MOVA was ‘blind’ to vehicles further out than the X loops, causing an erroneous ‘end of green’ decision.
- ✓ Replacement of detection was deemed necessary
- ✓ UMRR-11 Type 45 radar was chosen
- ✓ Site was plotted within the traffic management software and detection loops programmed (IN’s and X’s)
- ✓ Site verification was undertaken to the satisfaction of Matt Williams of JSTSM

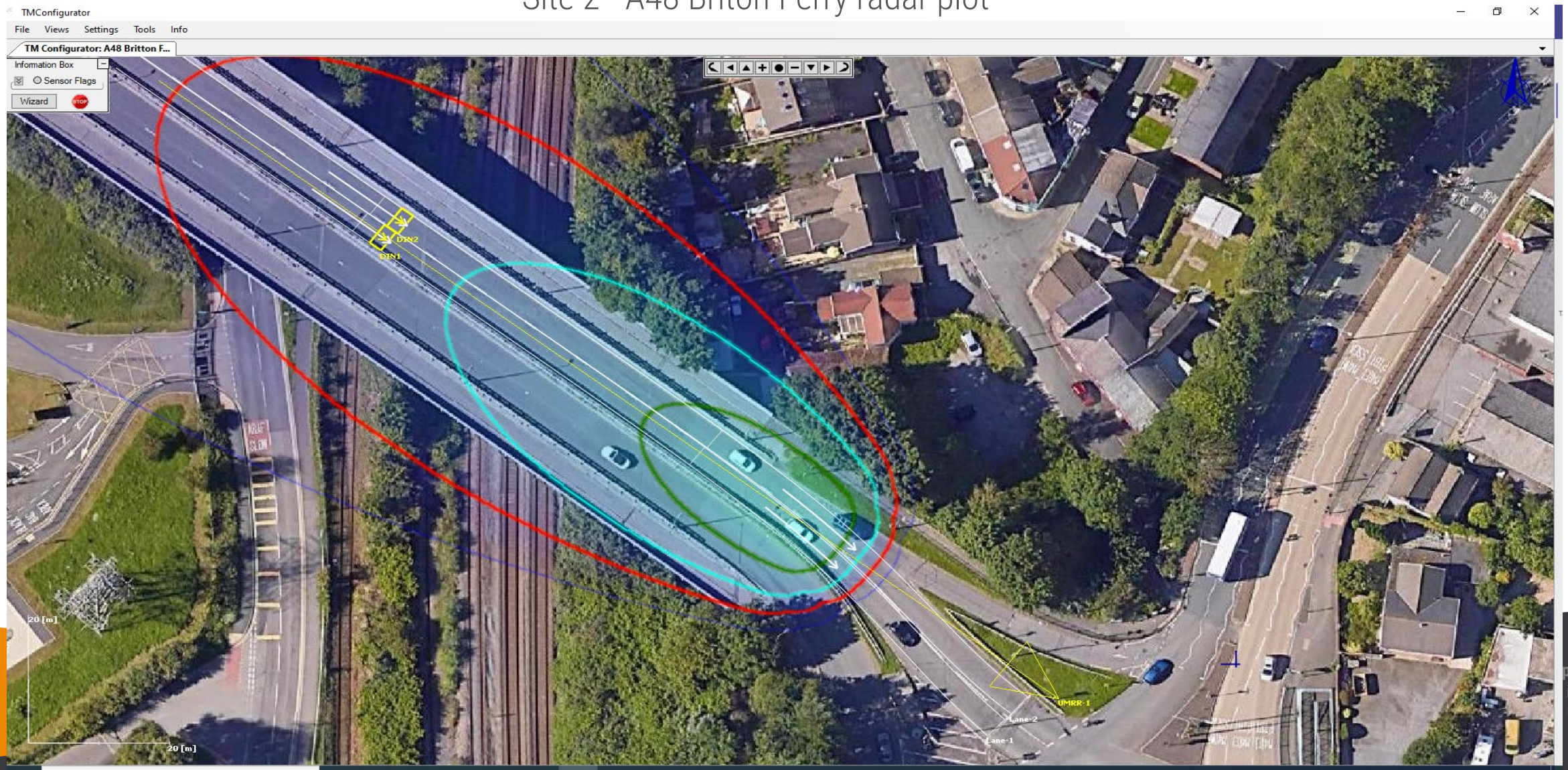
Site 1 Earlswood (J42 M4) – Briton Ferry Bridge radar plot



INSTALLATION – A48

- ✓ IN loops on this site had failed.
- ✓ Use of the radars on this second site was endorsed by success of Earlswood installation, where the conditions were much the same – fog, road speed, bridge deck depth, etc.
- ✓ The site didn't initially go as planned
- ✓ Access problems with MEWP to the original pole was deemed to be unsafe
- ✓ An alternative pole was selected and found to be suitable for the coverage necessary
  - ✓ The upside of this particular problem demonstrated the flexibility in the use of these radars
- ✓ Verification was undertaken to the satisfaction of Tom Siddall of 4Ways Consulting

Site 2 - A48 Briton Ferry radar plot



INSTALLATION (MOUNTING) – A48

UMRR-11 Type 44 radar (Mounted on 3m extension pole)

J-Box for traffic signal cable access

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