Building a National Geospatial Information System: the UK perspective

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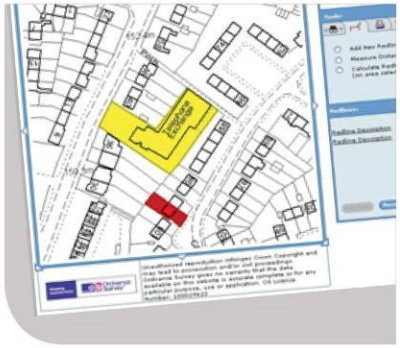
UN-GGIM High-level Forum, Qatar
February 2013

Geography: underpinning the nation

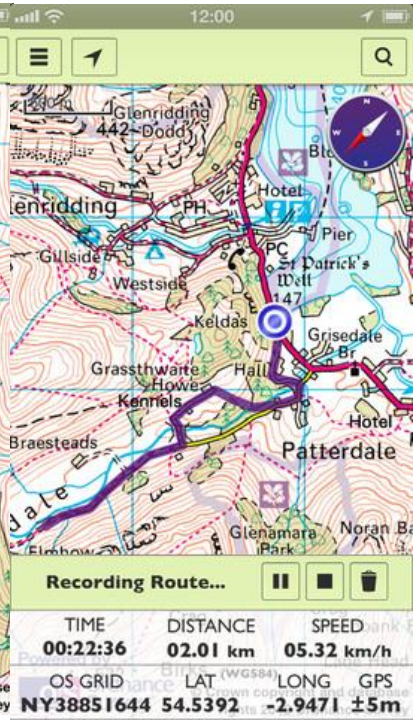
Office for National Statistics

Home Office



transport direct.info

Geography has gone mobile



The Location Strategy

Published 25 November 2008

www.communities.gov.uk/
Publications/communities/
Locationstrategy

Place Matters: the Location Strategy for the United Kingdom

- If we can understand more about:
  - The nature of place
  - Where events happen
  - And the impacts of the people and assets at a location

  We can plan better, manage risk better and use of resources better.
- This will increase the success rate for new initiatives, assist in the reduction of the potential for future problems and give tangible financial benefits.

Place Matters: the Location Strategy for the United Kingdom

28. To ensure that the UK exploits the full value of its information the Location Strategy requires a programme of strategic actions which ensure that:

1. we know what data we have, and avoid duplicating it;
2. we use common reference data so we know we are talking about the same places;
3. we can share location-related information easily through a common infrastructure of standards, technology and business relationships;
4. we have the appropriate skills, both among geographic professionals and among other professional groups who use location information or support its use;
5. we have strong leadership and governance to drive through change including the implementation of this Strategy and the implementation of INSPIRE.

Knowing what data we have and avoiding duplication

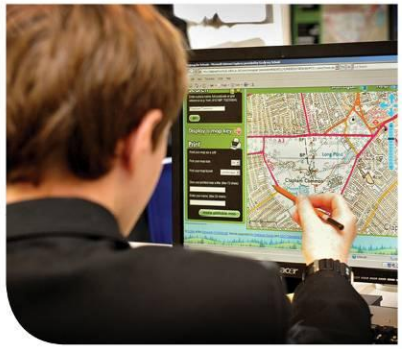
29. The Location Strategy seeks to ensure that the information about the UK's land, sea and air is collected once and then used many times in the public and private sector

30. Each public sector organisation should record and maintain up-to-date details of its location-related datasets

31. Each public sector organisation should make publicly available the details of its location-related datasets: even if the dataset itself is not publicly accessible or is not free of charge

Ordnance Survey Great Britain

- Ordnance Survey is 221 years old
- Civilian organisation since 1983; 1113 staff
- Independent Government Department and Executive Agency reporting directly to a Government Minister
- Trading Fund since April 1999
- Annual Report for 2011/12: Revenue of £141.8m (QAR 810m), profit before exceptional items of £31.9m (QAR182m), dividend £17.2m (QAR 98m)
- Headquarters in Southampton with 26 field offices around Great Britain



Ordnance Survey today

- Creates and maintains the ‘master map’ of Great Britain from which others derive benefit
- Manages complete national large scale digital data down to building level detail
- Maintains a database of 460 million features with over 10 000 changes made daily
- In 2011/12, 99.9% of real world features were represented in the database within six months of completion on the ground
- From the database, Ordnance Survey produces a range of digital data and paper maps for business, leisure, educational and administrative use

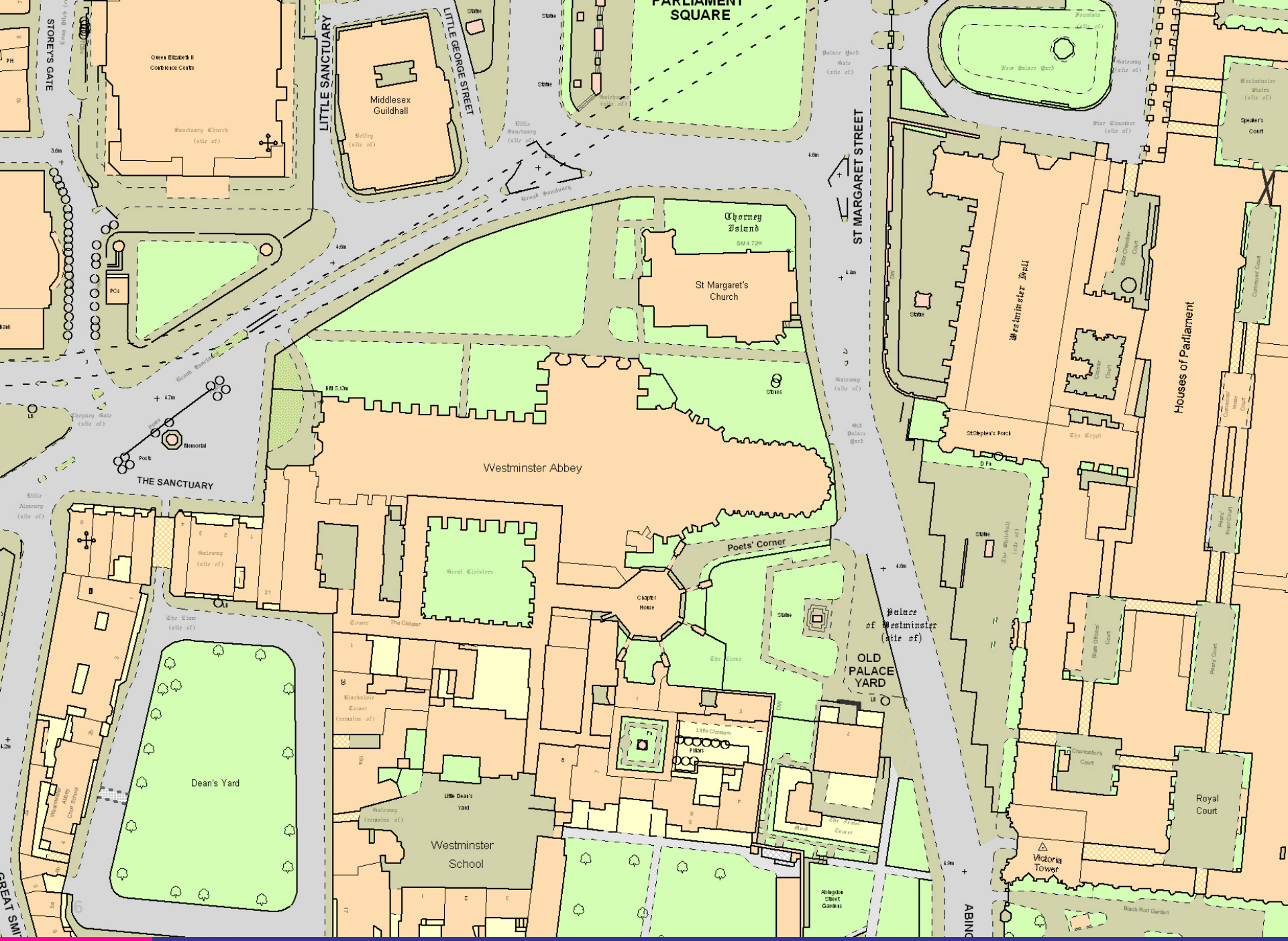
  Provides the underpinning geographic framework for Great Britain

Ordnance Survey's Vision

Ordnance Survey and its **Partners** will be the content providers of choice for location based information in the new information economy

As a result of the vision

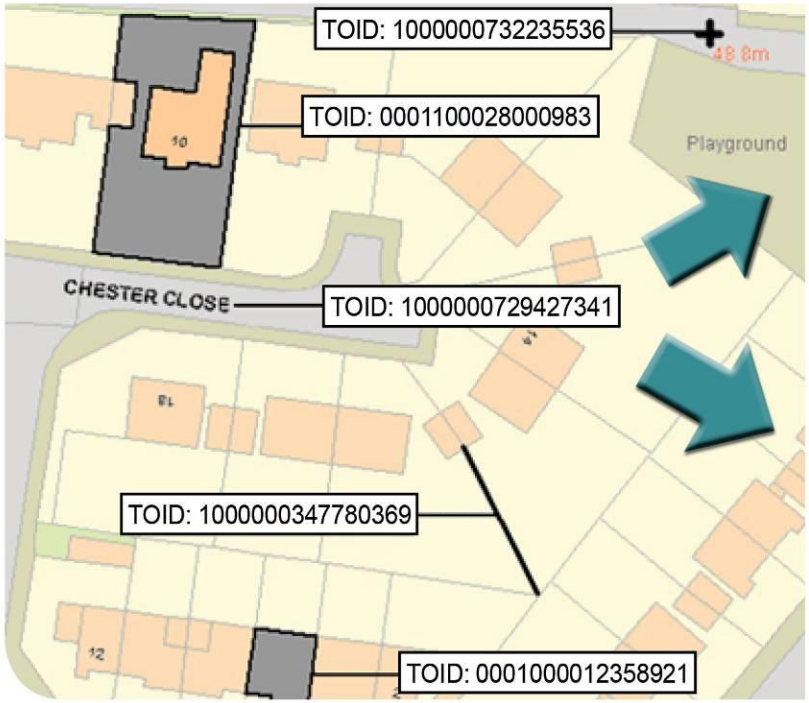
- 500 Partners
- Over £30m (QAR 171m) income for Ordnance Survey
- £350-400m (QAR 2000 – 2,285m)new revenues to British economy


PARLIAMENT SQUARE
STOREY'S GATE
Queen Elizabeth II Conference Centre
Sanctuary Church (site of)
LITTLE SANCTUARY
Middlesex Guildhall
LITTLE GEORGE STREET
Broad Sanctuary
Chorney Island
St Margaret's Church
ST MARGARET STREET
Westminster Hall
Houses of Parliament
Memorial
Ports
THE SANCTUARY
Westminster Abbey
Poets' Corner
Great Cloisters
Chapter House
The Cloister
Palace of Westminster (site of)
OLD PALACE YARD
Dean's Yard
Little Dean's Yard
Westminster School
Little Cloisters
Pyx
Abingdon Street Gardens
Victoria Tower
Royal Court
Chancellors Court
Peers Court
Peers Inner Court
Common Court
Common Inner Court
Star Chamber Court
Speaker's Court
New Palace Yard
Star Chamber (site of)
Westminster Stairs (site of)
St Stephen's Porch
The Crypt
The Undercroft
Black Rod Garden
Great Smith Street
Abingdon Street


HILL STREET
WAVERTON STREET
SOUTH AUDLEY STREET
AUDLEY SQUARE
DEANERY STREET
DEANERY MEWS
TILNEY STREET
STANHOPE GATE
PARK LANE
CURZON STREET
CURZON SQUARE
HEAD MEWS
MARKET MEWS
DERBY ST
STANHOPE ROW
HERTFORD STREET
CHESTERFIELD GARDENS
CHESTERFIELD STREET
Dorchester Hotel
Garage
Lion House
Chesterfield House
Leconfield House
Crewe House
Curzon House
Curzon Cinema
Embassy
Saddle Yard
The Lodge
Club
Bank
Hotel
Cycle Hire Station
LB
TCB
Fn
24.6m
24.5m
22.5m
22.3m
22.8m
20.2m
16.9m
18.1m
21.9m

A geographic database to connect information

- Every object represented in OS MasterMap has a unique identifier called a TOID. These TOIDs can be used to connect other information.



Highways database

road_name: **Chester Close**

road_type: **cul-de-sac**

lighting: **none**

TOID: osgb1000000729427341

Crime report database

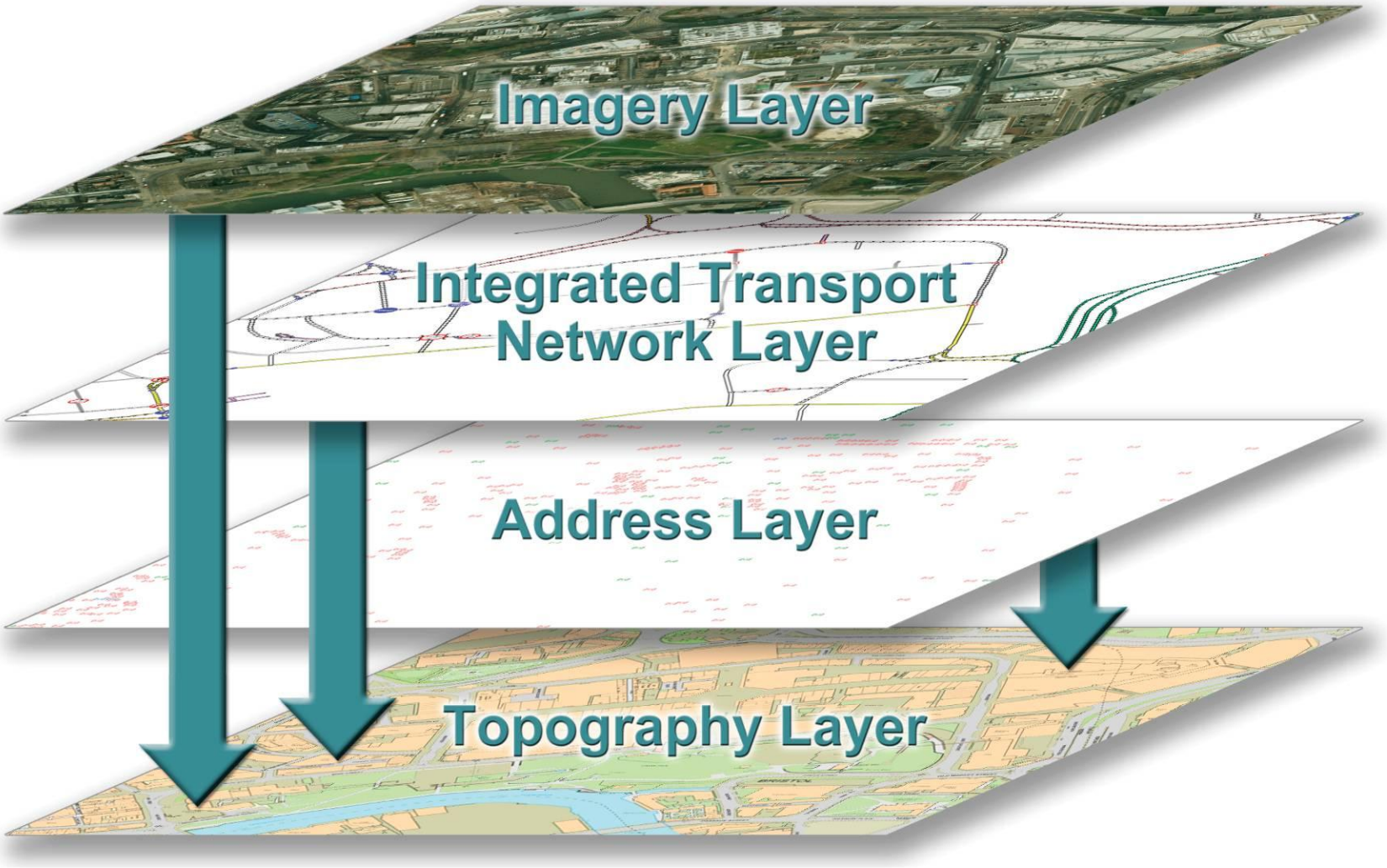
crime_type: **vehicle break-in**

date: **09/05/2003**

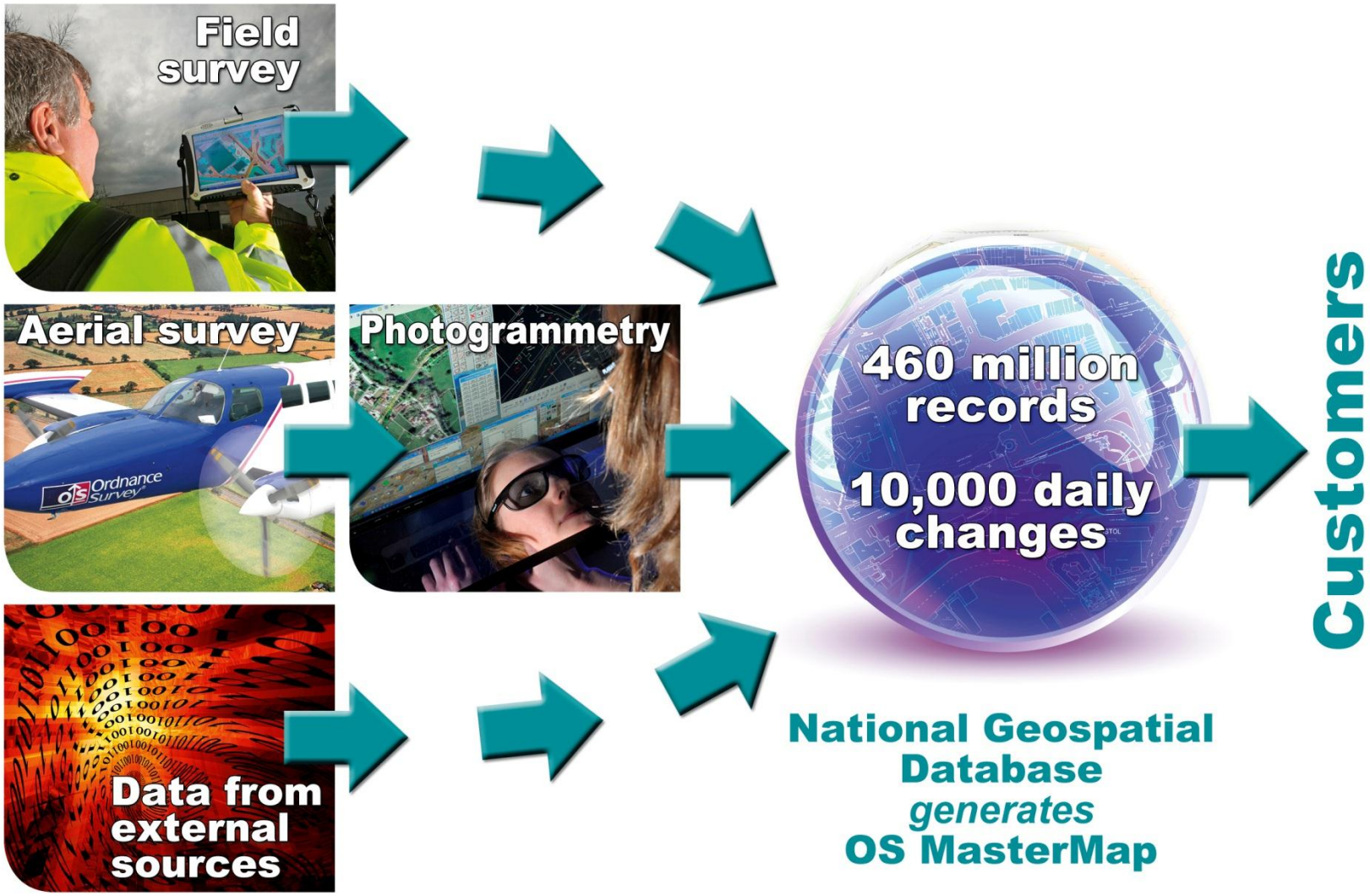
TOID: osgb1000000729427341

Highways and Police can share information

OS MasterMap current layers



Updating the Ordnance Survey database



The size of the task

Topographic Layer
(approximate volumes)

1:1250 Scale = 17 000 km2

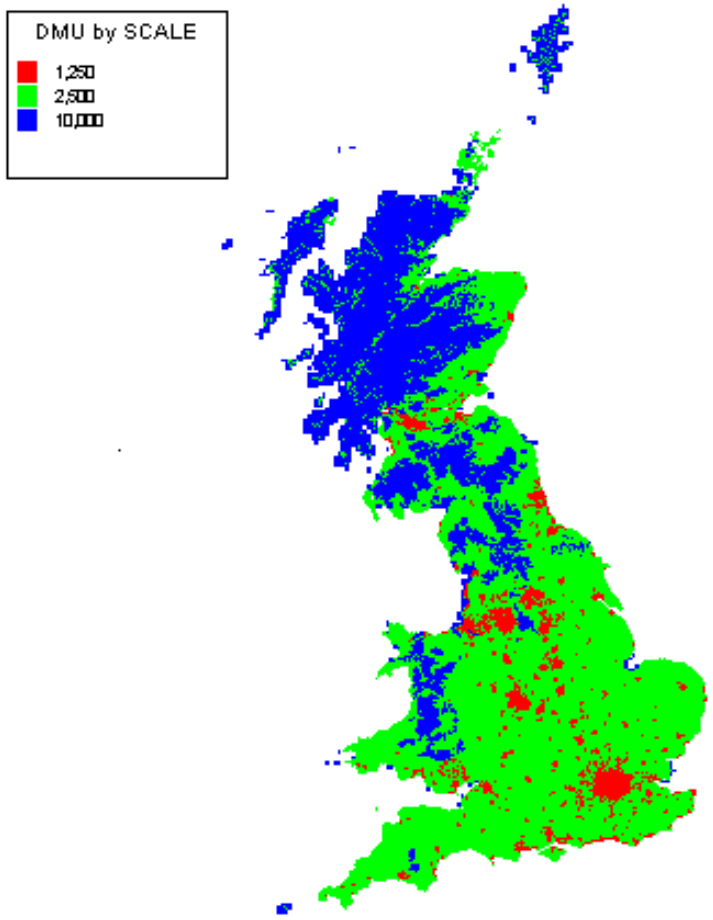
1:2500 Scale = 158 000 km2

1:10 000 Scale = 66 000 km2

Over one million units of change per year.

Address Layer
27.5 million geocoded postal addresses,
with 500 000 changes per year.

Transport Network Layer
547,772 kms of roads,
885 881 route instructions –
over 20 000 changes per month.

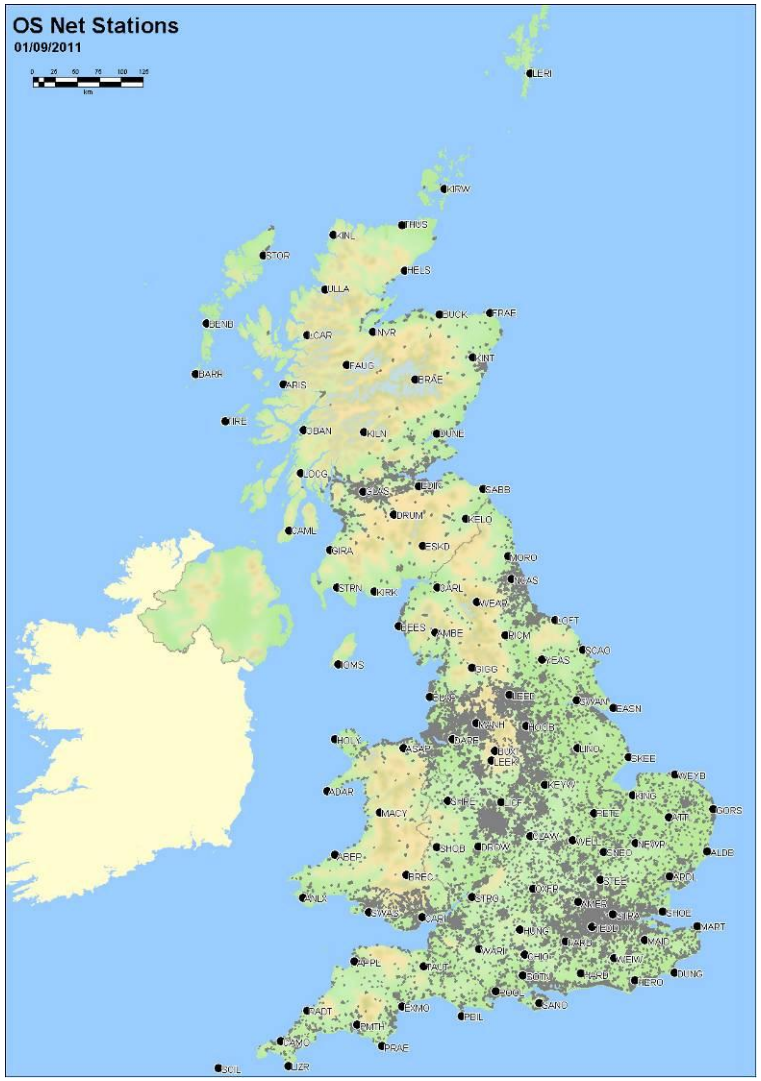



Basic dGPS: 0.8-3m
RTK:1-2cm
High Quality dGPS: 20-80cm
Standalone GPS: 10m

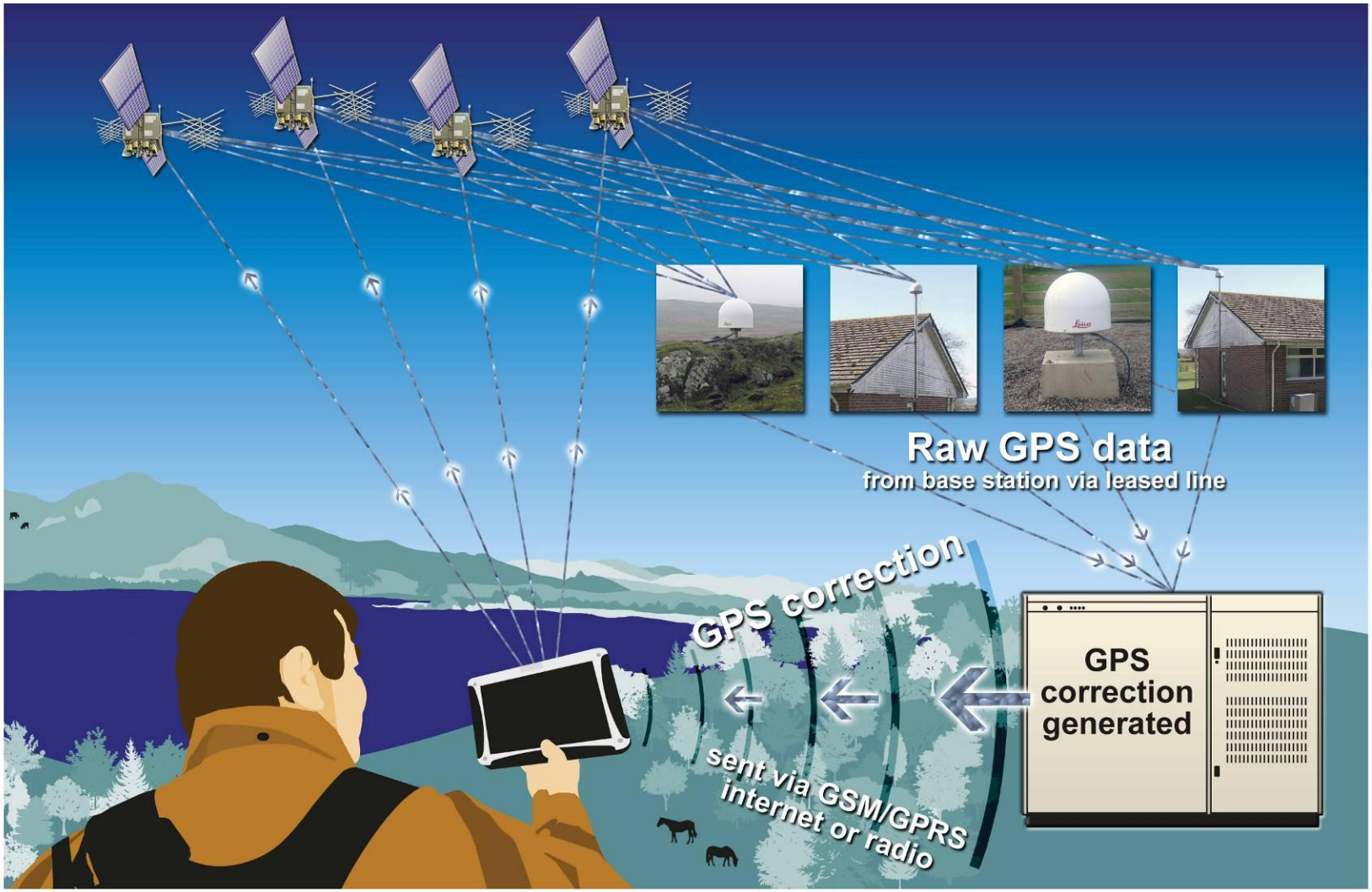
The OS Net Network

- Complete national coverage
- 1-3cm, 3D, GPS+GLONASS positioning
- Galileo ready
- Free GPS products from; www.ordnancesurvey.co.uk/oswebsite/gps

Typical Installation



How OS Net works



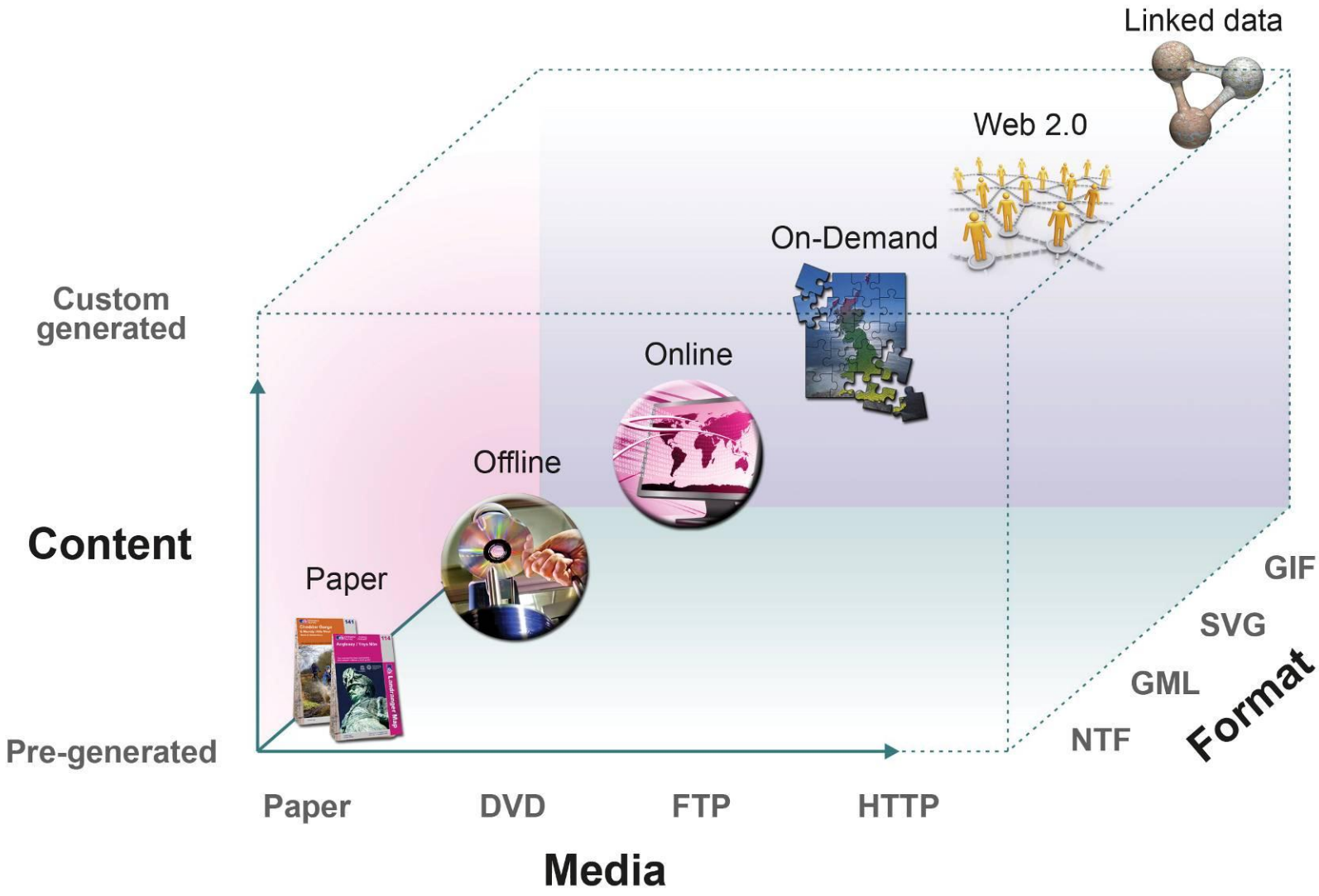
HIGHWAYS AGENCY

- 100,000 accidents on this network every year, 5000 require police investigation
- The Highways Agency work closely with the 38 Police Forces in England to give them the tools to carry out accurate investigations
- The Highways Agency started to investigate new survey methods in 2005
- Ordnance Survey worked with Warwickshire and Surrey Police forces to pilot using OS Net GPS
- OS Net provides up to 1cm level positioning
- This is now the primary method adopted by all police forces
- Highways Agency studies have shown that, on average, roads are opened 40 minutes quicker

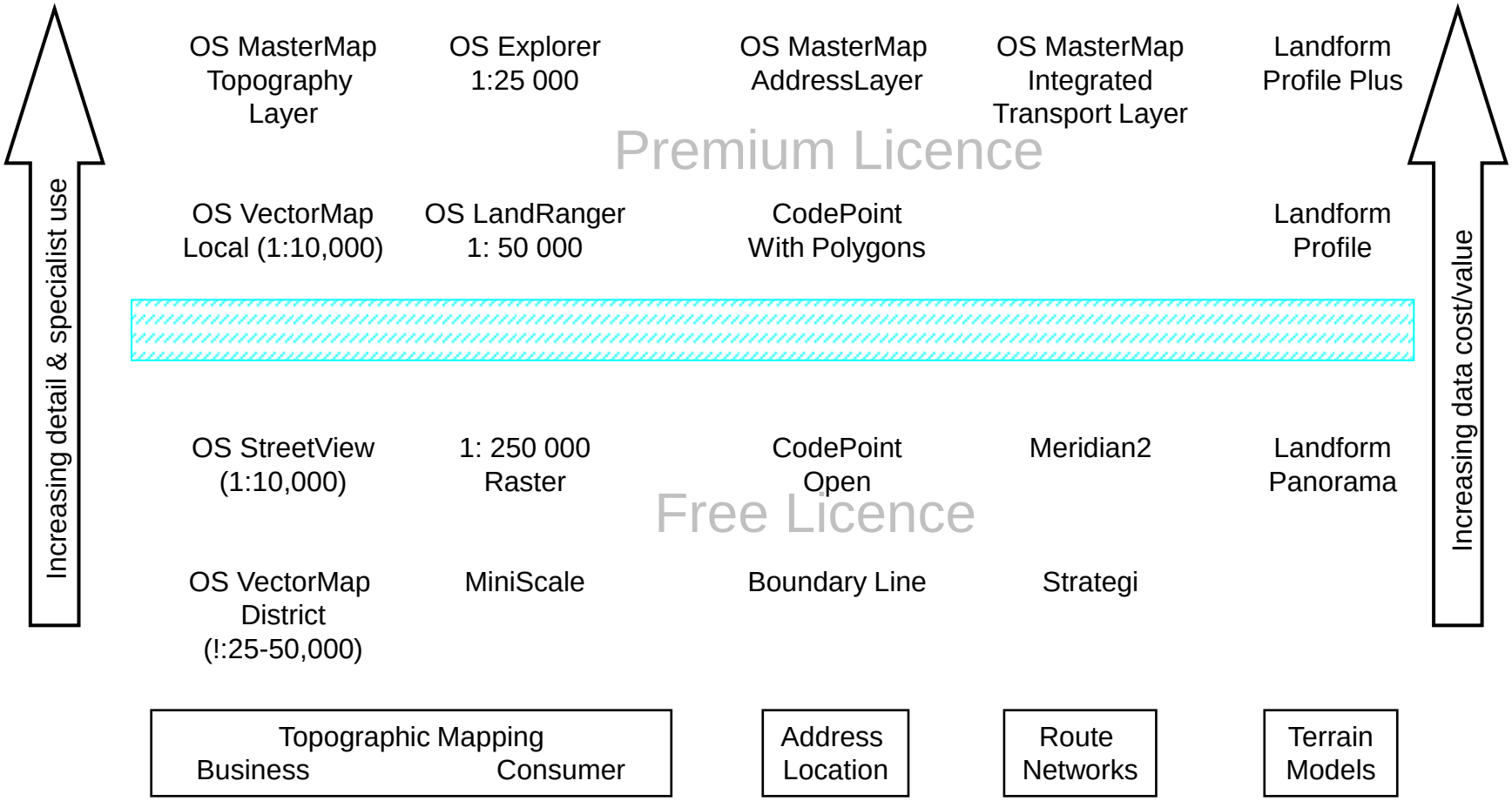
National Address Gazetteer Database

- Creation and maintenance of a single national address gazetteer database
  - Maintains existing local government addressing and street processes
  - Builds on investment in Ordnance Survey and local government address products
- Local Government Group and Ordnance Survey joint venture
- 50:50 Limited Liability Partnership (LLP) – creation of GeoPlace™
- The AddressBase range of products – AddressBase, AddressBase Plus and AddressBase Premium – now available through Ordnance Survey

Customer Focused **Supply Models**



A complete framework: Freemium Business Model



Public Sector Mapping Agreement (PSMA)

Ordnance Survey

Discover Ordnance Survey

Mobile site

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You are here: public-sector » mapping-agreement

- Public Sector – home
- Public Sector Mapping Agreement
- » PSMA – home
- » PSMA Members login
- » Apply to join the PSMA
- » Member benefits
- » Who can join

Public Sector Mapping Agreement (PSMA) for England and Wales

Welcome to the PSMA! If you are already a PSMA member login to the members' area now to find out more detailed news about your agreement.

Members - Log in

What does the PSMA provide?

- A new 10 year agreement for the Public Sector in England and Wales.
- The PSMA provides access to core geographic datasets from Ordnance Survey
- The PSMA datasets are free at the point of use for all eligible public sector bodies.
- Providing common geographic framework for the Public Sector will enable sharing of information

PSMA Member licence **key facts** »

18 months after launch…

Now has over 2700 members, comprising:

- 127 in Central Government, including 47 new (non-PGA) members
- 504 in Local Government, including 12 new (non-MSA) members
- 281 in the Health sector
- 1741 Town, Parish and Community Councils
- 19 Support Rescue Services
- 45 Other Authorities and Boards

… and customer/member feedback has been excellent…

Daventry District Council

Optimising waste collection using OS MasterMap Integrated Transport Network Layer

- Daventry generated new waste collection routes in all seven districts using OS MasterMap Integrated Transport Layer with Route Restriction Information

- Daventry has been able to rationalise the number of domestic waste collection routes from nine to eight, reducing diesel costs by 12%, increasing spare capacity by 14% and eliminating overtime costs.

'OS MasterMap ITN Layer and Road Routing Information has made it possible for us to meet our challenges of increasing efficiency, planning for growth and reducing landfill. In Daventry alone we are on target to achieve savings of around £100 000 per year, with much greater savings expected for the whole county.'

Jo Gilford
Corporate Manager for Public Space
Daventry District Council

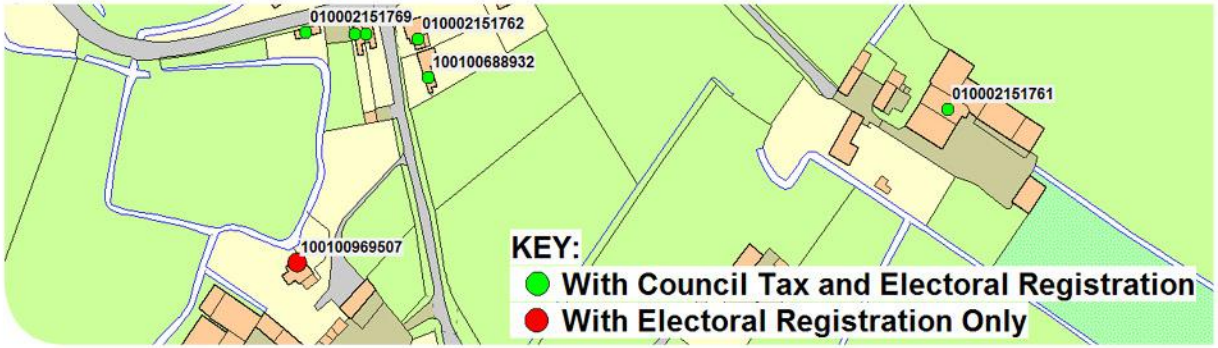
Photograph courtesy of Daventry District Council

Llywodraeth Cymru
Welsh Government

Welsh Government

Welsh authorities to generate **£500 000 (QAR 2.85m)** of additional revenue through effective address management

A collaborative pilot project, facilitated by Welsh Government and led by Newport City Council and Cardiff City Council, is improving the management of addresses by linking electoral registration, revenue and benefits and other systems. It has delivered significant additional revenue by making the process more efficient, reducing errors, detecting potential avoidance and fraud. It has now been extended across Wales.



'Projected benefits are likely to be over £500 000 across Wales – potentially in excess of £7 million extended throughout England and Wales'

Shaun Powell,
Newport City Council

Cardiff Council

Cardiff Council delivers more than **£1 300 000 (QAR 7.43m)** savings from enhanced SEN (special educational needs) route and vehicle management, and efficient contract re-negotiation

Cardiff Council's Schools Transport Team supports improved SEN school routing, optimisation and efficiency using geographic information from Ordnance Survey and the Capita One Route Optimisation system, delivering huge saving from improved contract re-negotiations.

'SEN Vehicle Management is having a major impact on how we manage transport needs. It is very easy to use and its intuitive menu system means that you don't have to know the whole system in detail to be able to use it. It is very user-friendly.'

Stephen Gerrard,
Schools' Transport Team Leader,
Cardiff Council

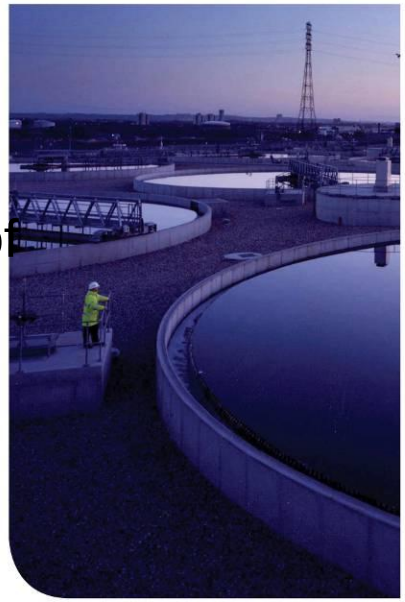
Utility efficiencies by linking customer records to Assets to billing

- What the asset department believes it supplies (blue)…
- Who the billing department believes they are billing (green)…
- Leaving those in red…

Northumbrian Water Limited – investing in GI

The return on investment is real and demonstrable and includes:

- Additional income alone of well over £1m (QAR 5.7m) through improved management of empty properties.
- A sustainable cut of at least £60,000 (QAR 342k) in operating costs through the call centre solve-at-source principle.
- Significant savings in time and cost in the provision of timely and accurate asset information to field technicians.



'From the customers' point of view and from the business point of view, GIS has been of great benefit and our investment has been well worth it'.

Ian Donald, Customer Services Director concludes:

Ordnance Survey's commitment

To provide the Geospatial Information framework to support the operational needs of those agencies responsible for the safety and security of the London 2012 Olympic Games.

Lee Valley White Water Centre

Geospatial Information Provision needs determined

- Discussions with politicians, the Met Police and the MOD started in 2008
- November 2010, Ordnance Survey meeting, hosted by the Defence Geographic Centre
- Ordnance Survey tasked with arranging further discussions with representatives from key security services.
- User group sessions arranged to gather requirements working to a deadline of 15th December 2010.
- The resulting information was fed into Ordnance Survey business planning process.
- Requirements were described in 3 tiers based on relative priorities.

Requirements: Venues

- **Tier 1** – The main Olympic Park plus a buffer corresponding to the Olympic Coordination Zone.

- **Tier 2** – All other permanent and temporary Olympic venues, London Outside Races and Official Live Sites.

- **Tier 3** – Official hotels and athlete/press accommodation, key training venues (based on threat assessment) selected Games operational nodes outside main Olympic Park.

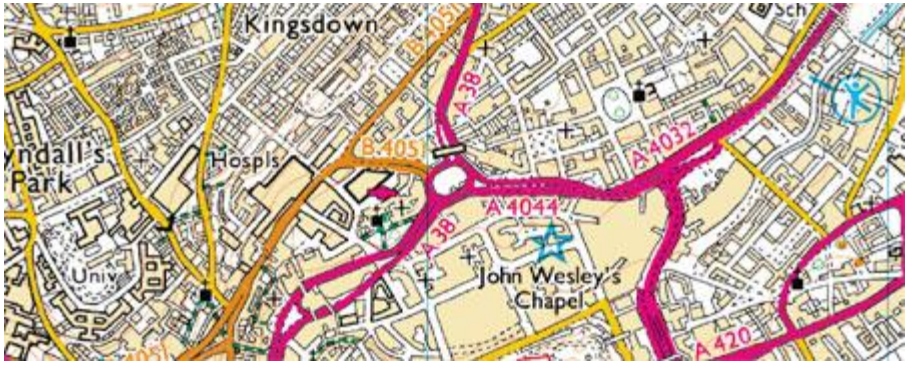
Requirements: Standard products

1. Frequent revision of our large scale topographic data to include all **minor changes** to the built and natural environment.

2. Frequent revision of our **road network** data.

3. Frequent revision of our **address information.**

4. Increased publication times for smaller scale products so as to ensure greater **content synchronicity** with our large scale data.

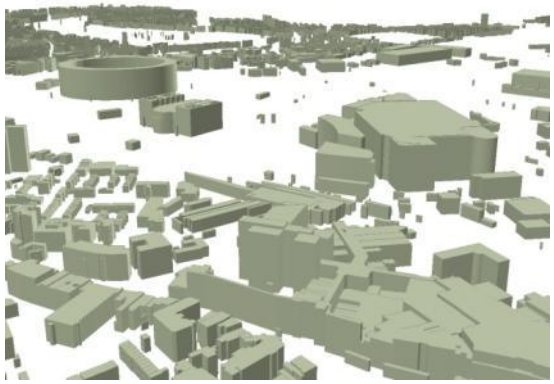


Requirements: Special Information Provision (SIPs)

1. **Street furniture** data captured within agreed areas close to key venues and sensitive sites.

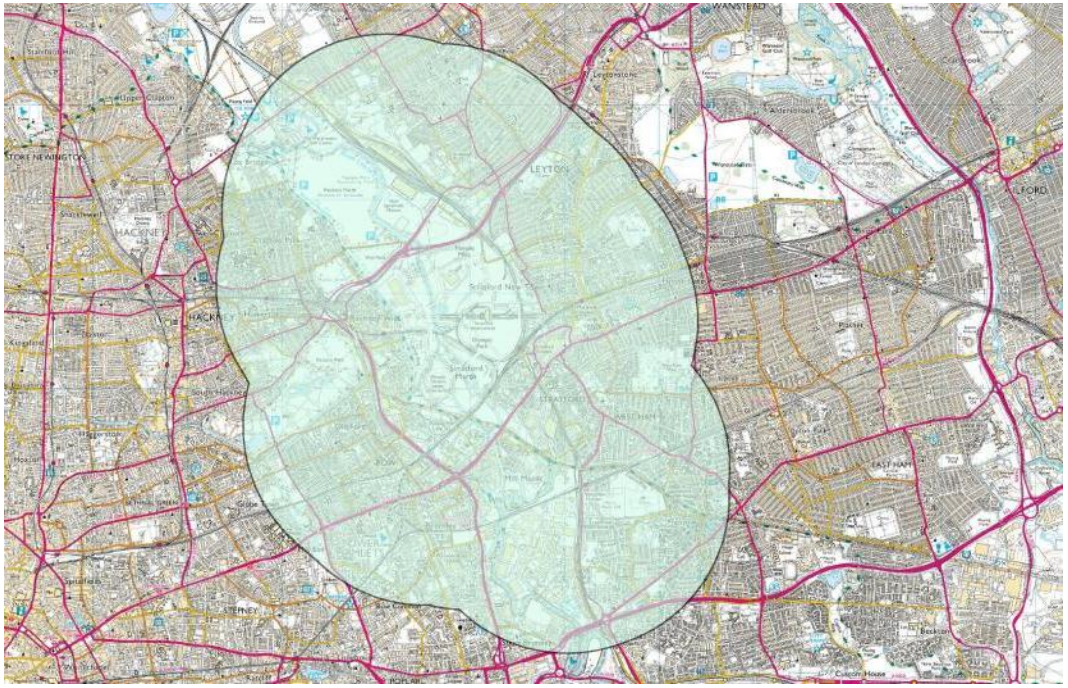
2. **High resolution** ortho-rectified colour aerial imagery (12.5cm, 10cm and 5 cm resolution) for agreed targets.

3. **Simple Building Height** information for all buildings in OS MasterMap Topo within agreed areas.



Requirements: Defining extents

- These extents were refined and modified through discussion and agreement, primarily with Metropolitan Police and MOD



Original buffered polygons refined and venue extents agreed for 87 kms.

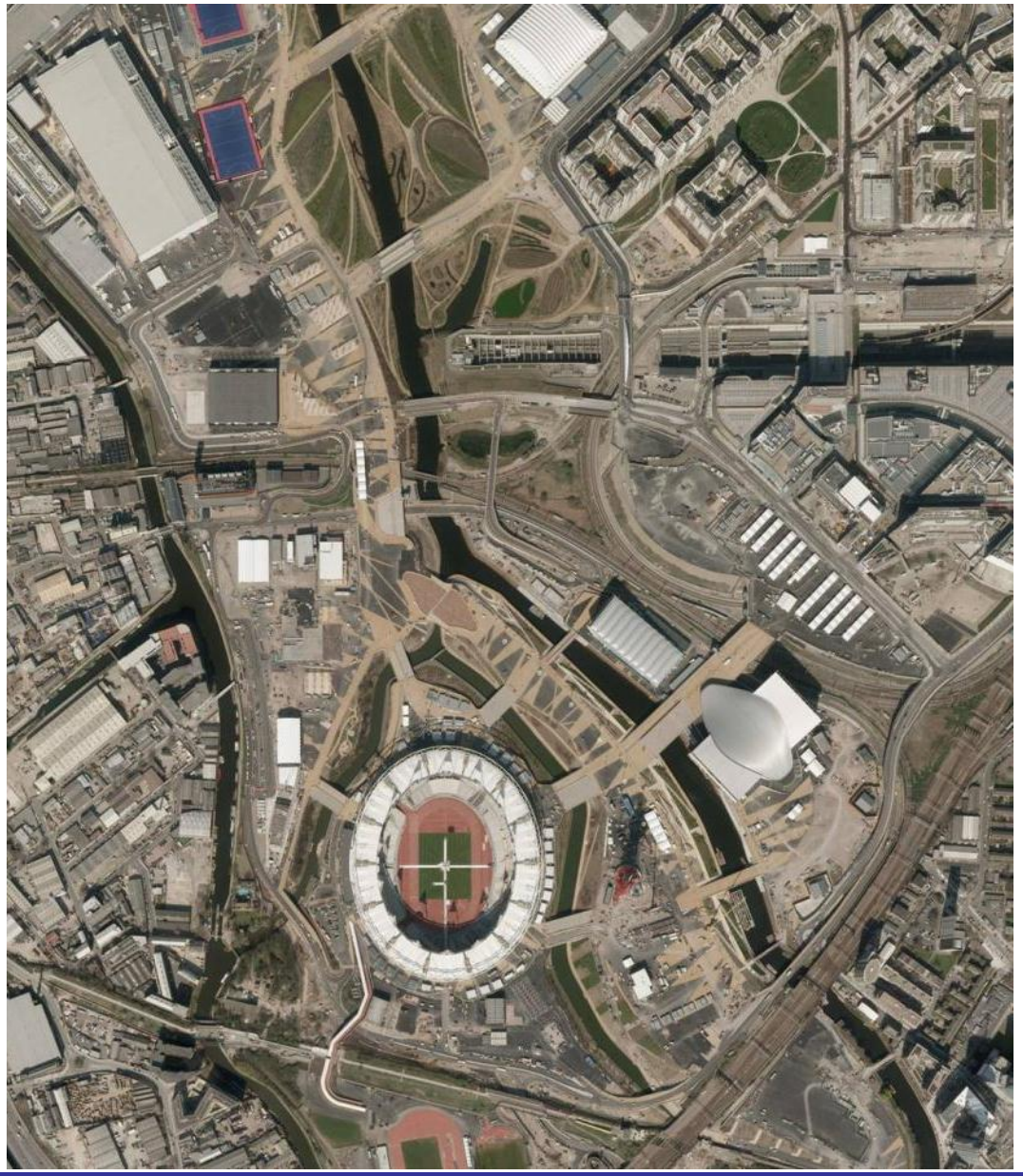
Olympic Park	24 kms
Other key venues	51 kms
Weymouth	5 kms
Football stadia	7 kms

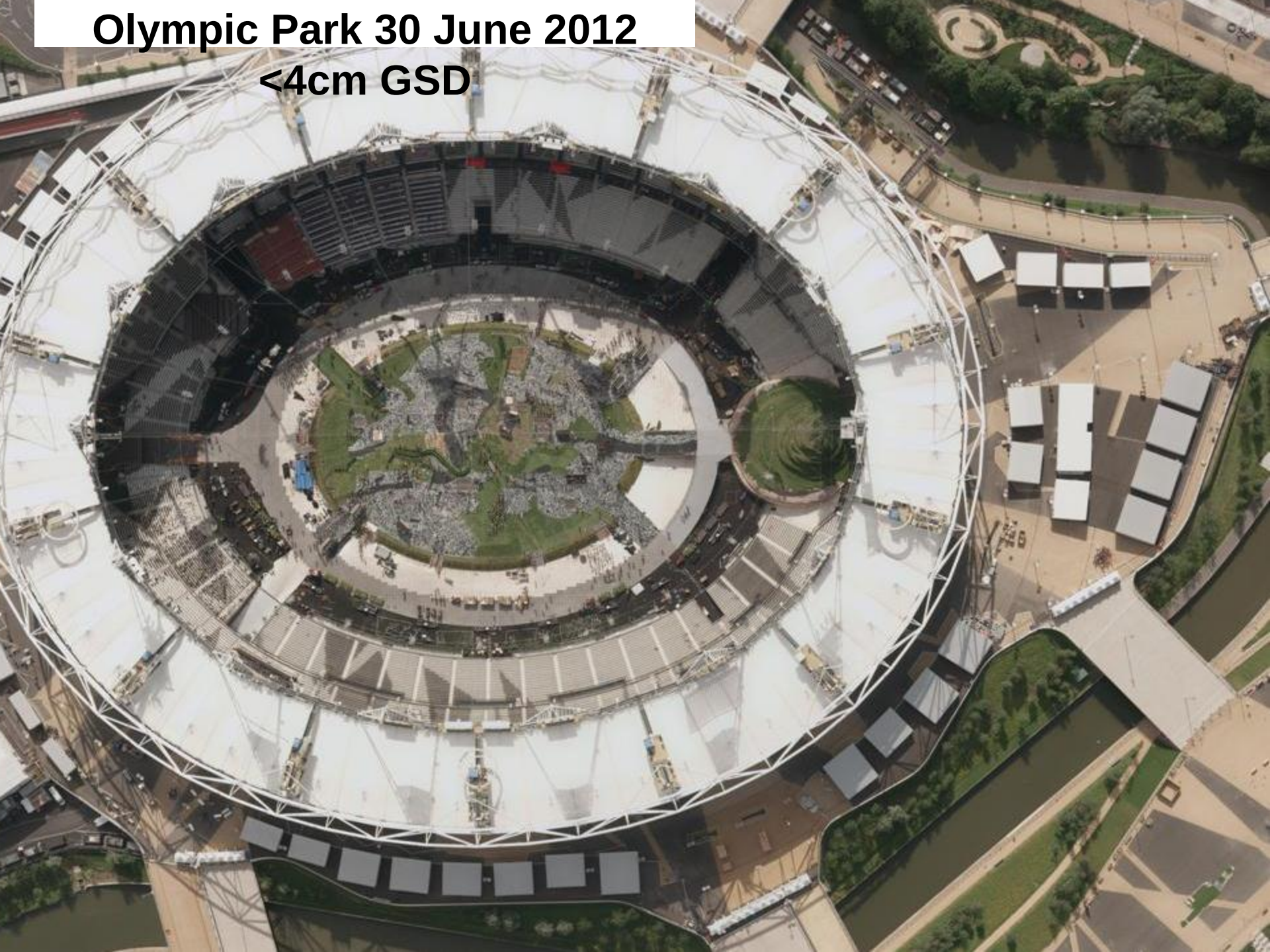
The datasets

High Resolution Imagery

August 2001

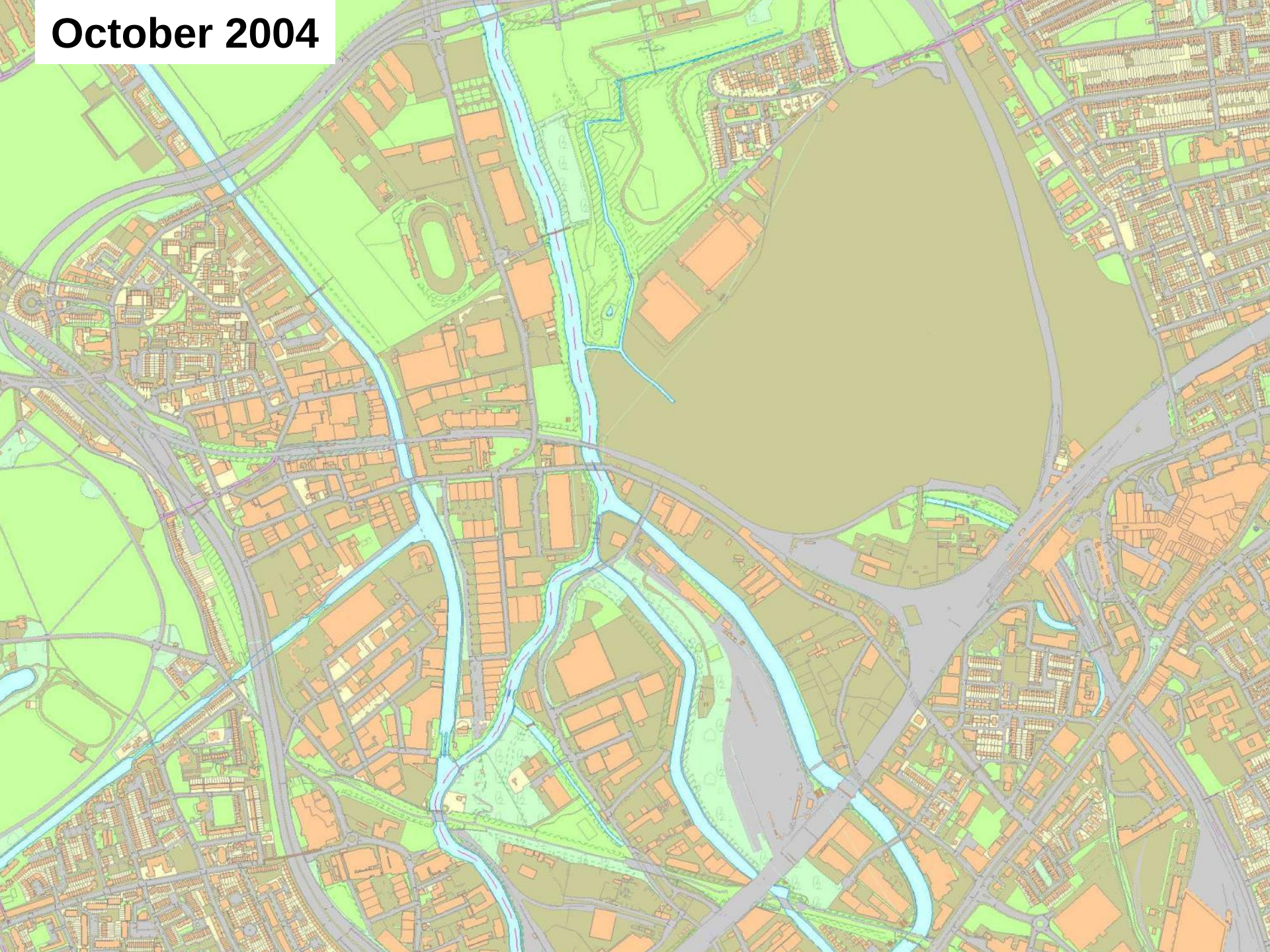
March 2012

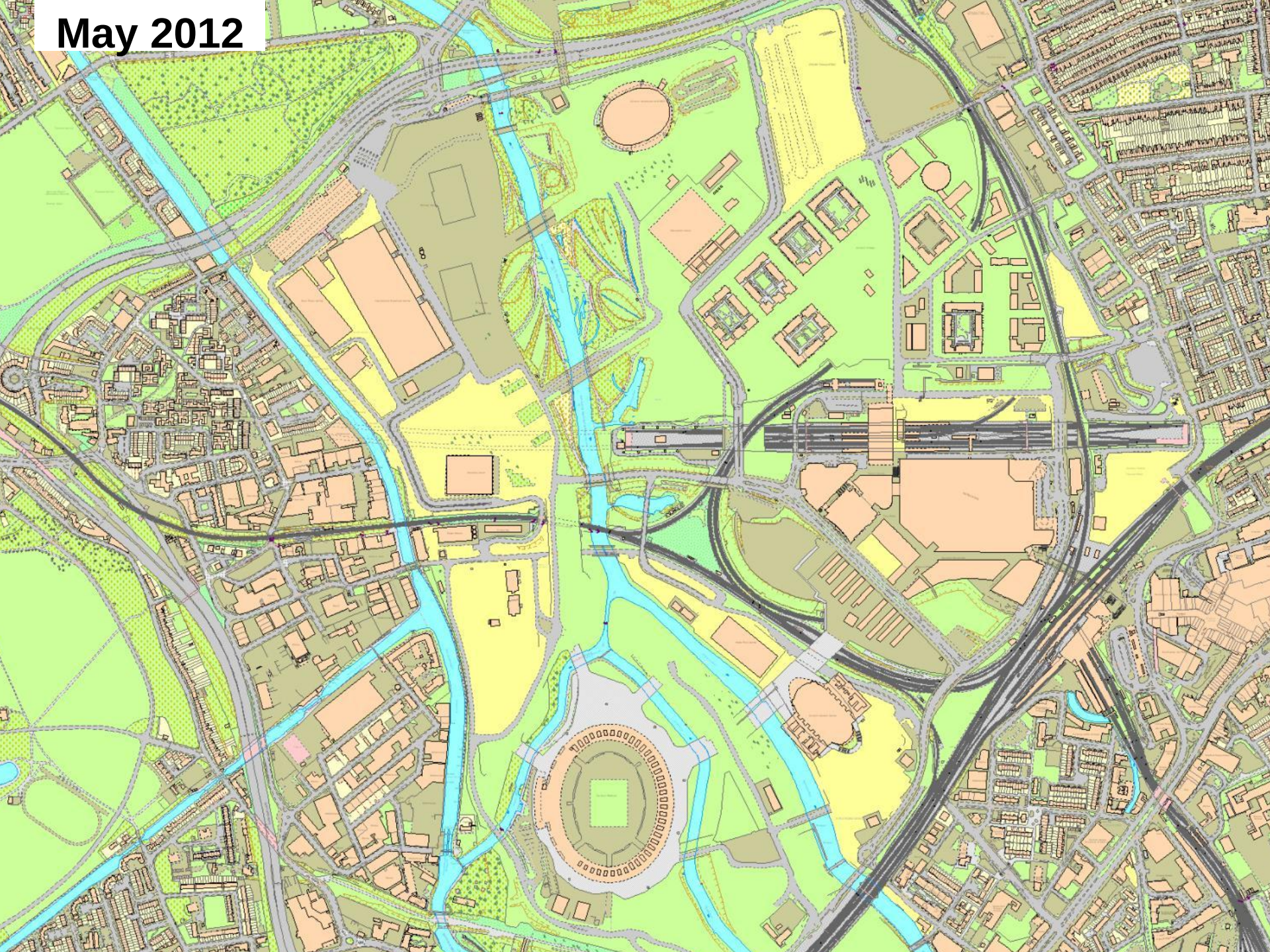


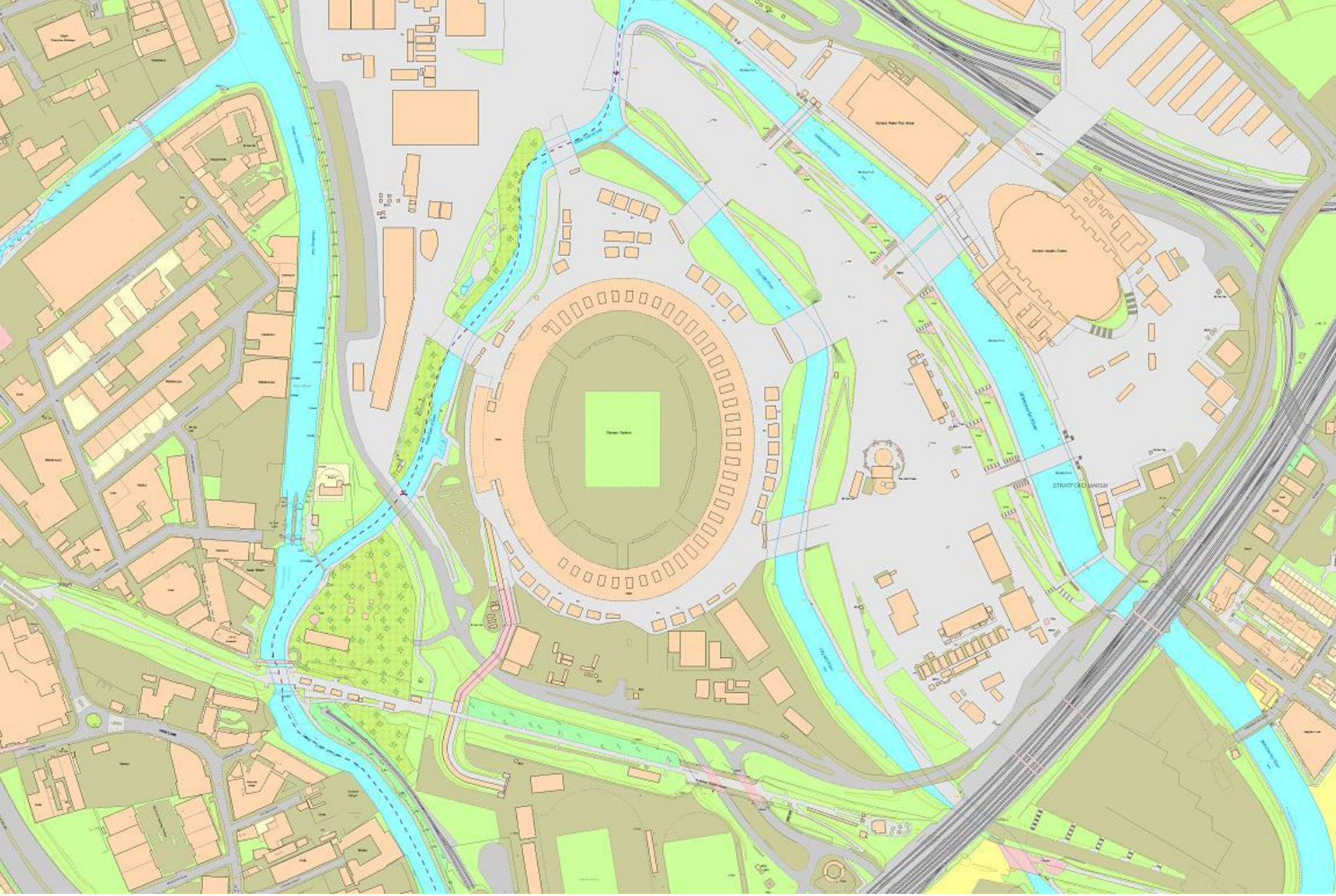

Olympic Park 30 June 2012
<4cm GSD

The datasets

OS MasterMap Topography Layer


October 2004


May 2012

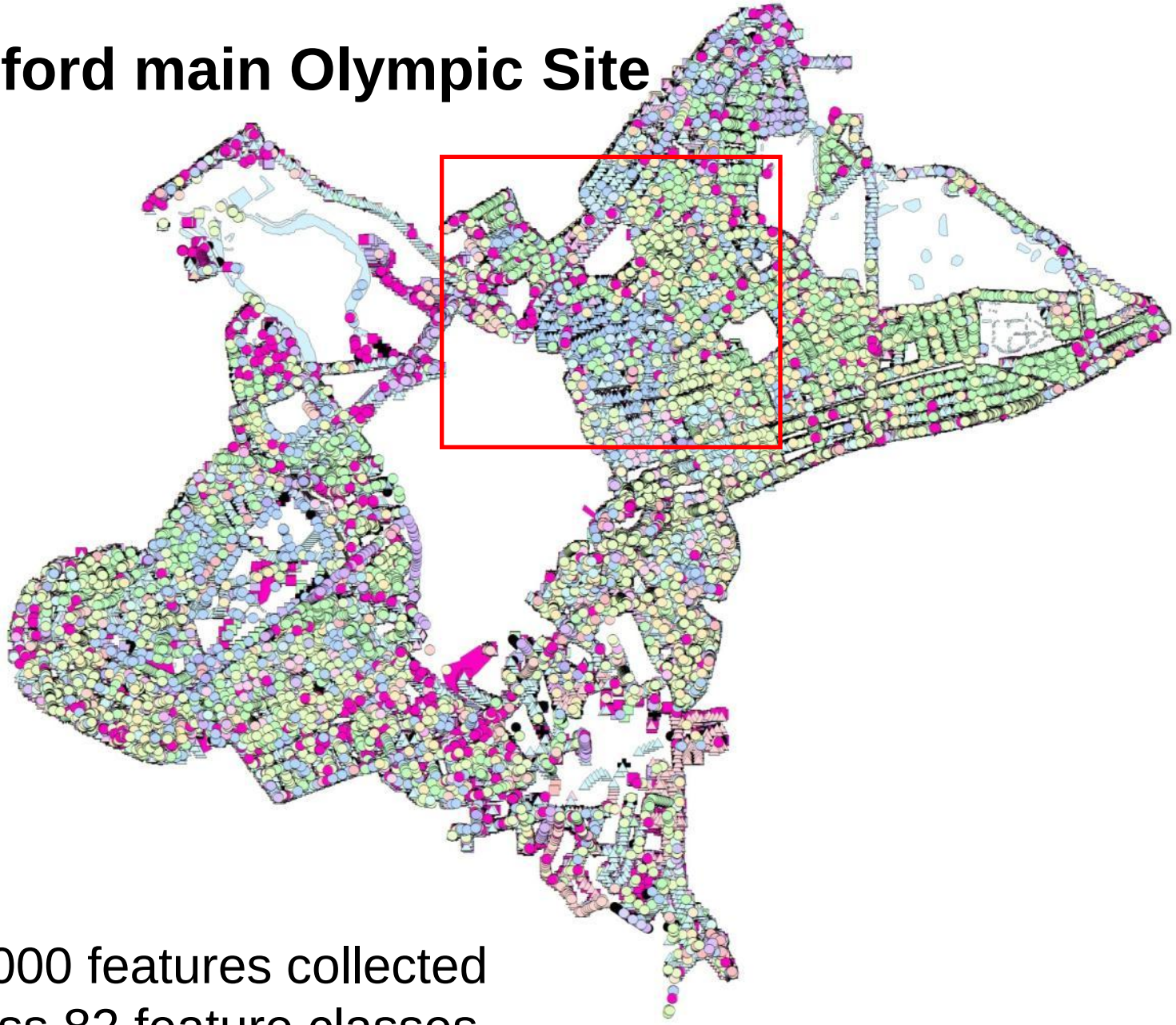


As at 29th June 2012

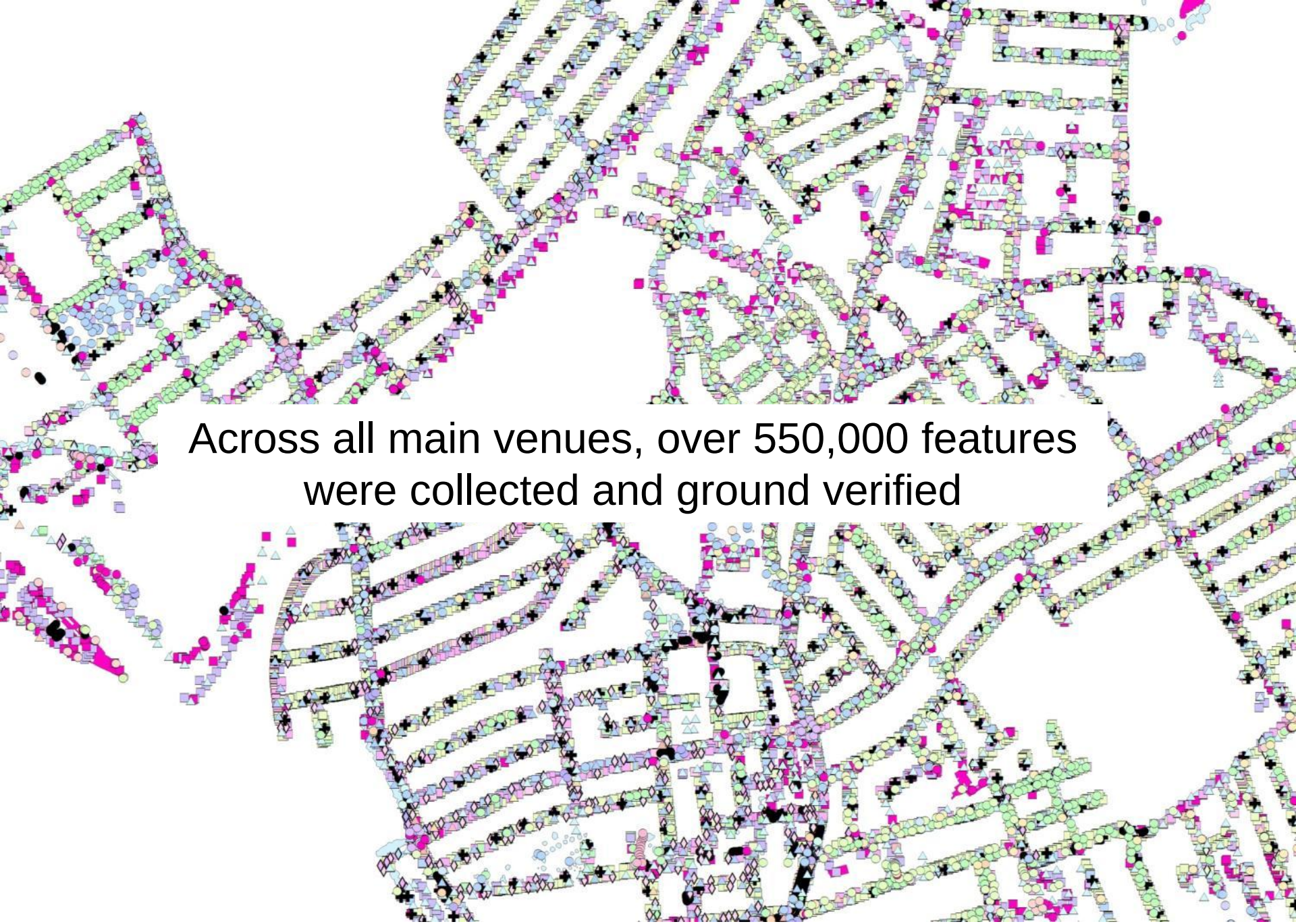
The datasets

Street Furniture

Stratford main Olympic Site



157,000 features collected
across 82 feature classes



Across all main venues, over 550,000 features were collected and ground verified

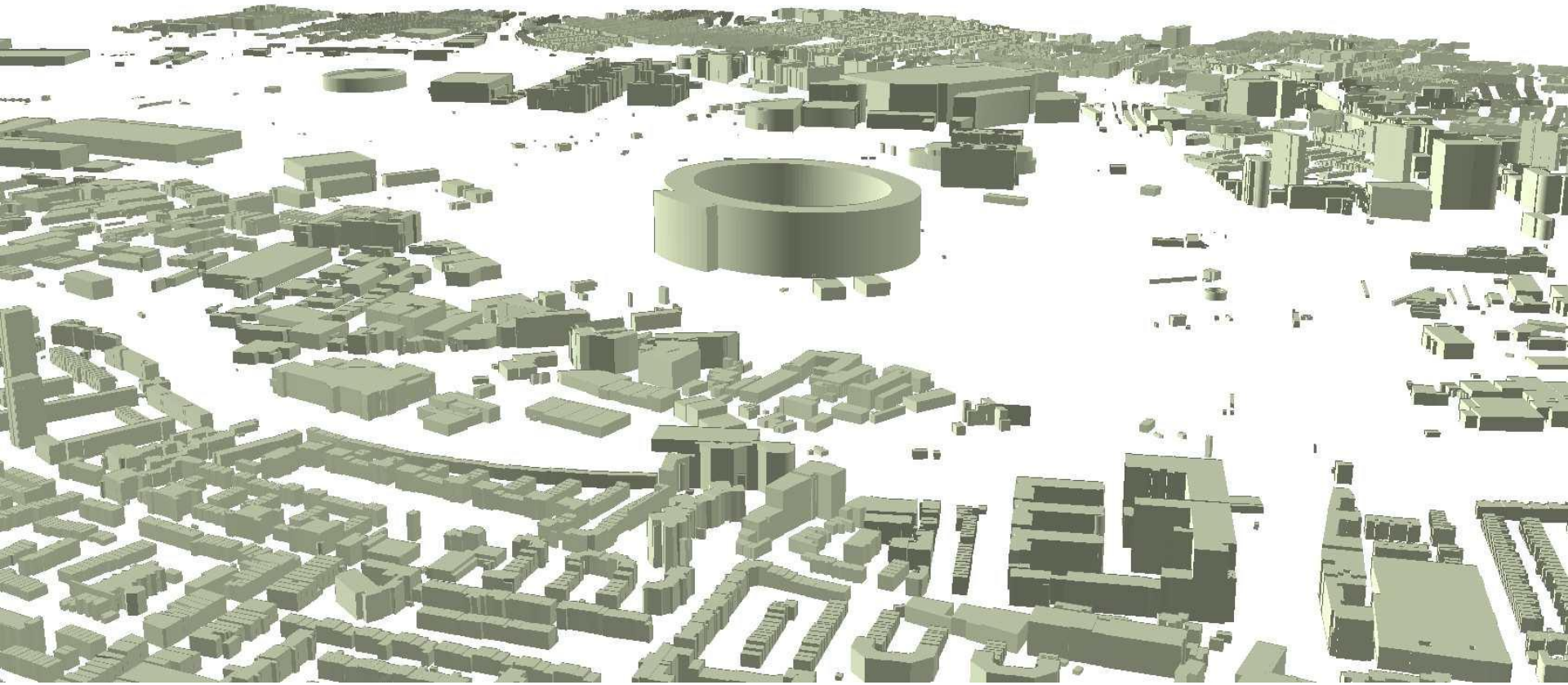

Mews
El Sub Sta
OLD FORD ROAD
12.4m
PH
Dethick
Court
FORD STREET

Street furniture coverage around Lords Cricket Ground

The datasets

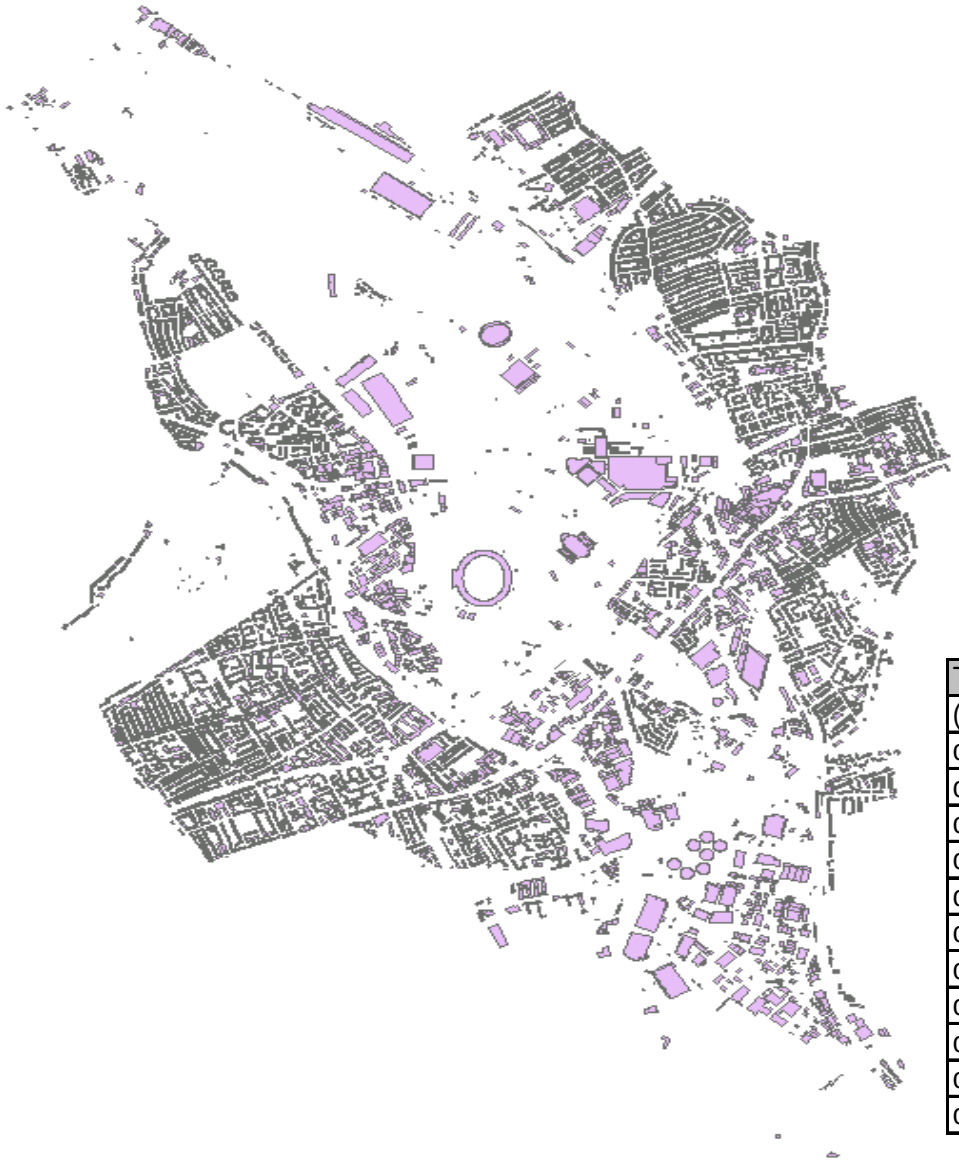
Simple Building Heights

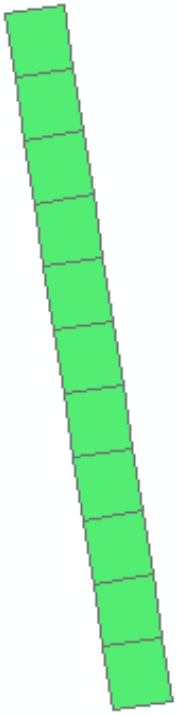
Enabling the third dimension



- Simple Building Heights were automatically generated using in-house developed software processing a combination of OS MasterMap Topo and High Resolution Imagery

Simple Building Heights



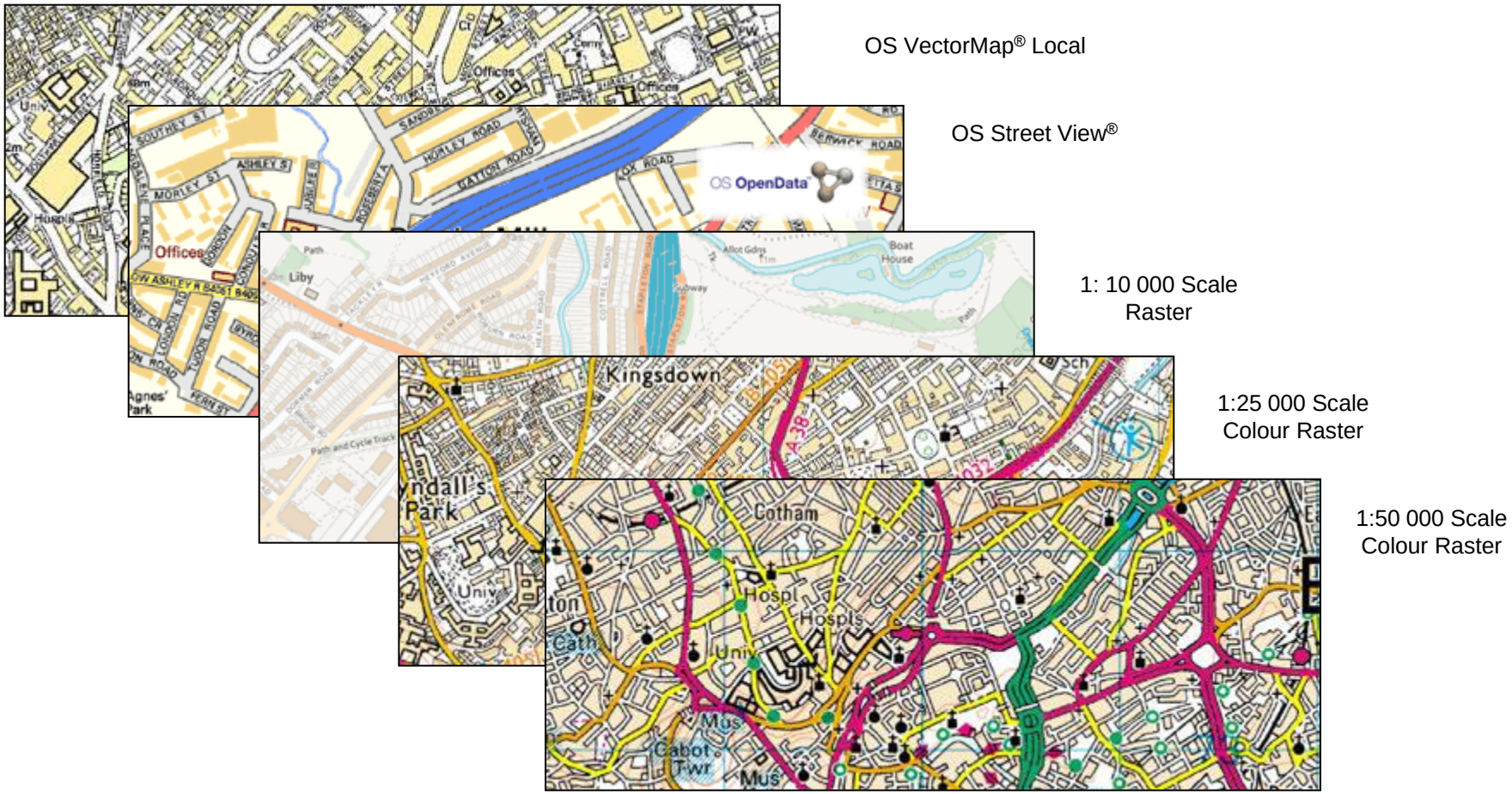


TOID	Ex. Ground Min	Ex. Roof Min	Ex. Roof Max
(north to south)			
osgb1000006617715	9.7	13.61	15.62
osgb1000006617716	9.7	13.15	14.98
osgb1000006617717	9.69	12.91	14.92
osgb1000006617718	9.69	12.81	14.92
osgb1000006617719	9.69	12.56	14.91
osgb1000006617720	9.74	12.74	14.91
osgb1000006617721	9.78	12.93	14.91
osgb1000006617722	9.92	13.2	15.14
osgb1000006617723	10.09	13.04	15.14
osgb1000006617724	10.26	13.35	15.06
osgb1000006617666	9.33	13.62	16.82

The datasets

Derived Data

Derived data: synchronisation of five key products

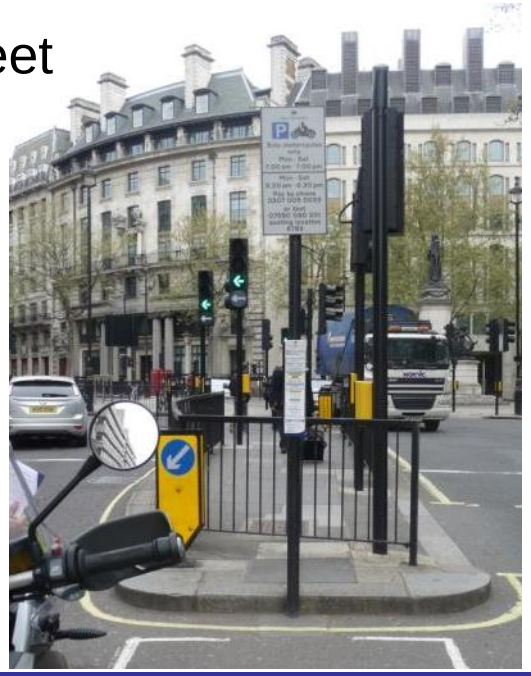


Data capture

The production effort

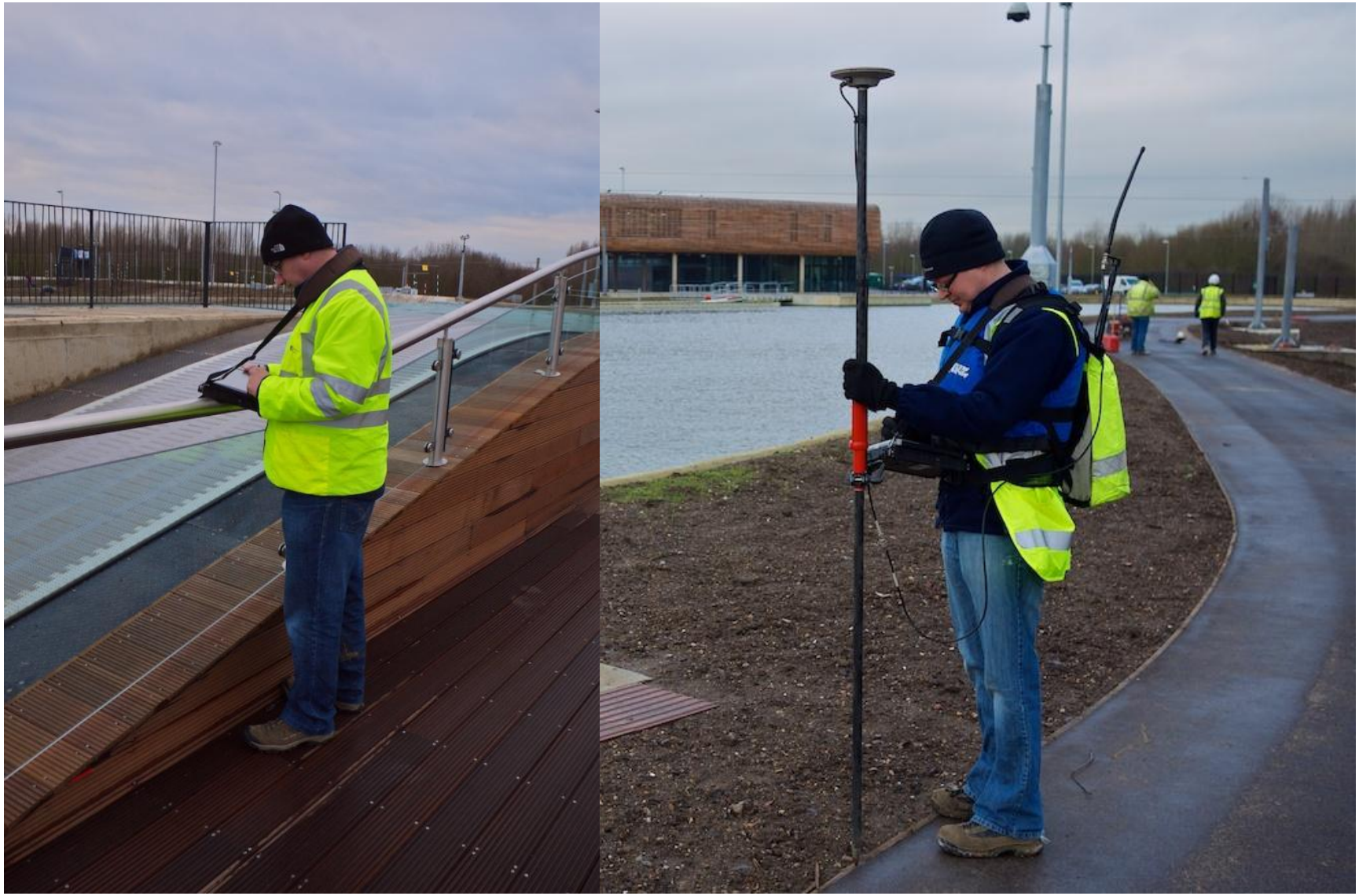
Remote-sensed capture and ground completion

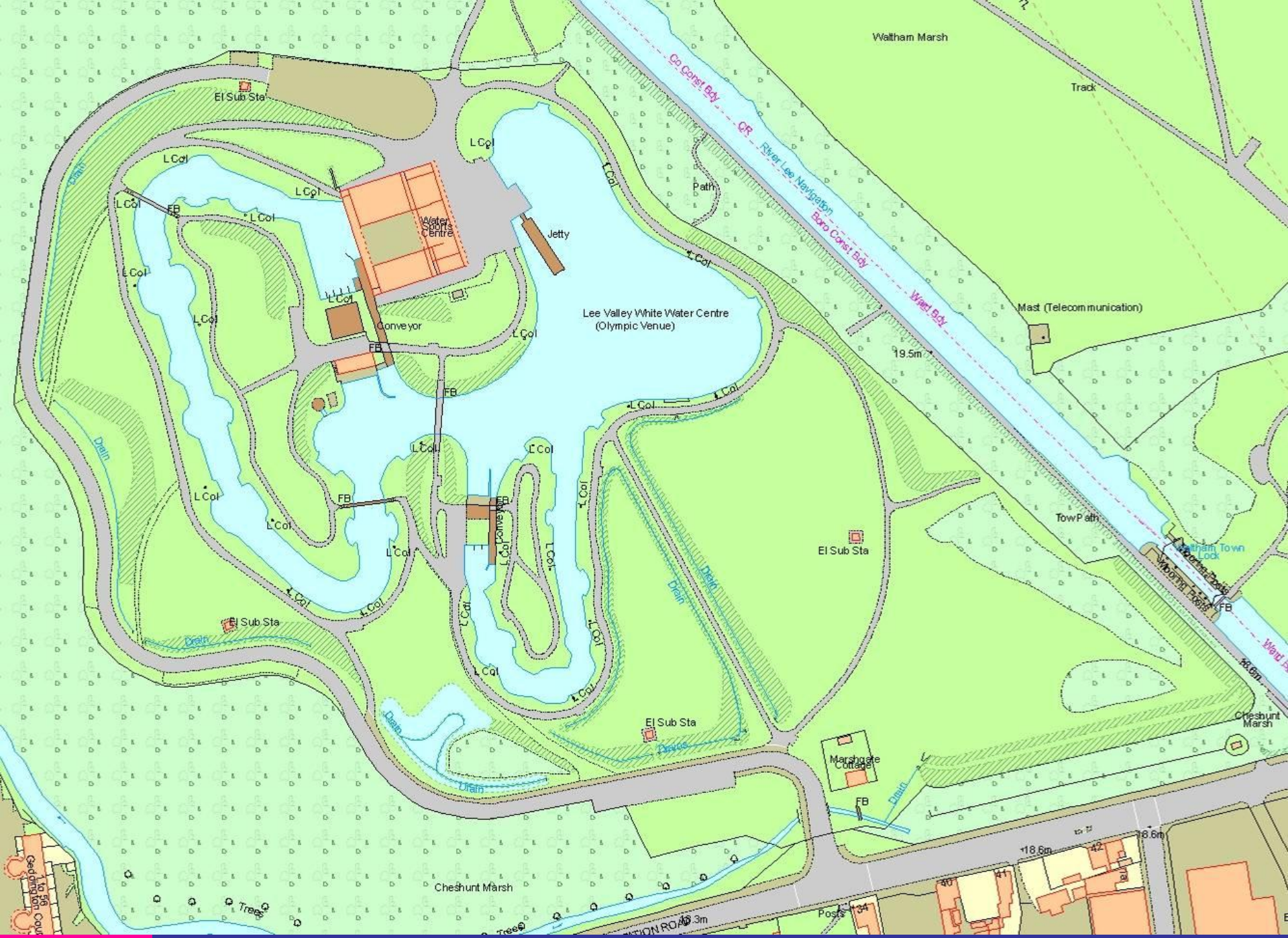
- 1398 kms flown & processed
- Remote Sensing and Field team working in parallel
- 87 kms of urban revision to the Geospatial Content Improvement Process (GCIP) specification
- Up to 8 Remote Sensed operators working on Street Furniture at any one time
- Up to 8 Surveyors on the ground at any one time
- 200 point feature sample check per venue for Street Furniture
- Over 30 visits to Stratford site

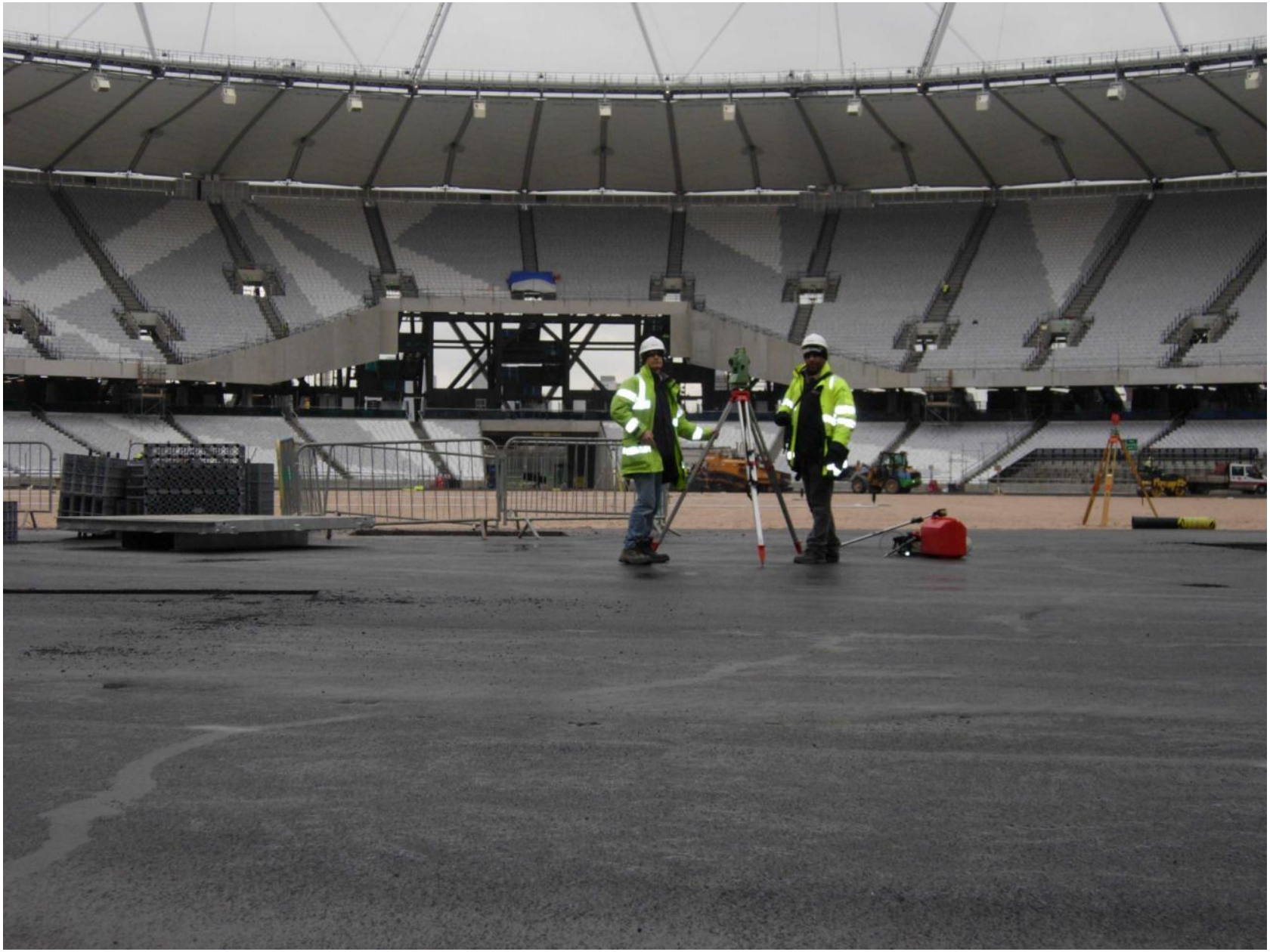


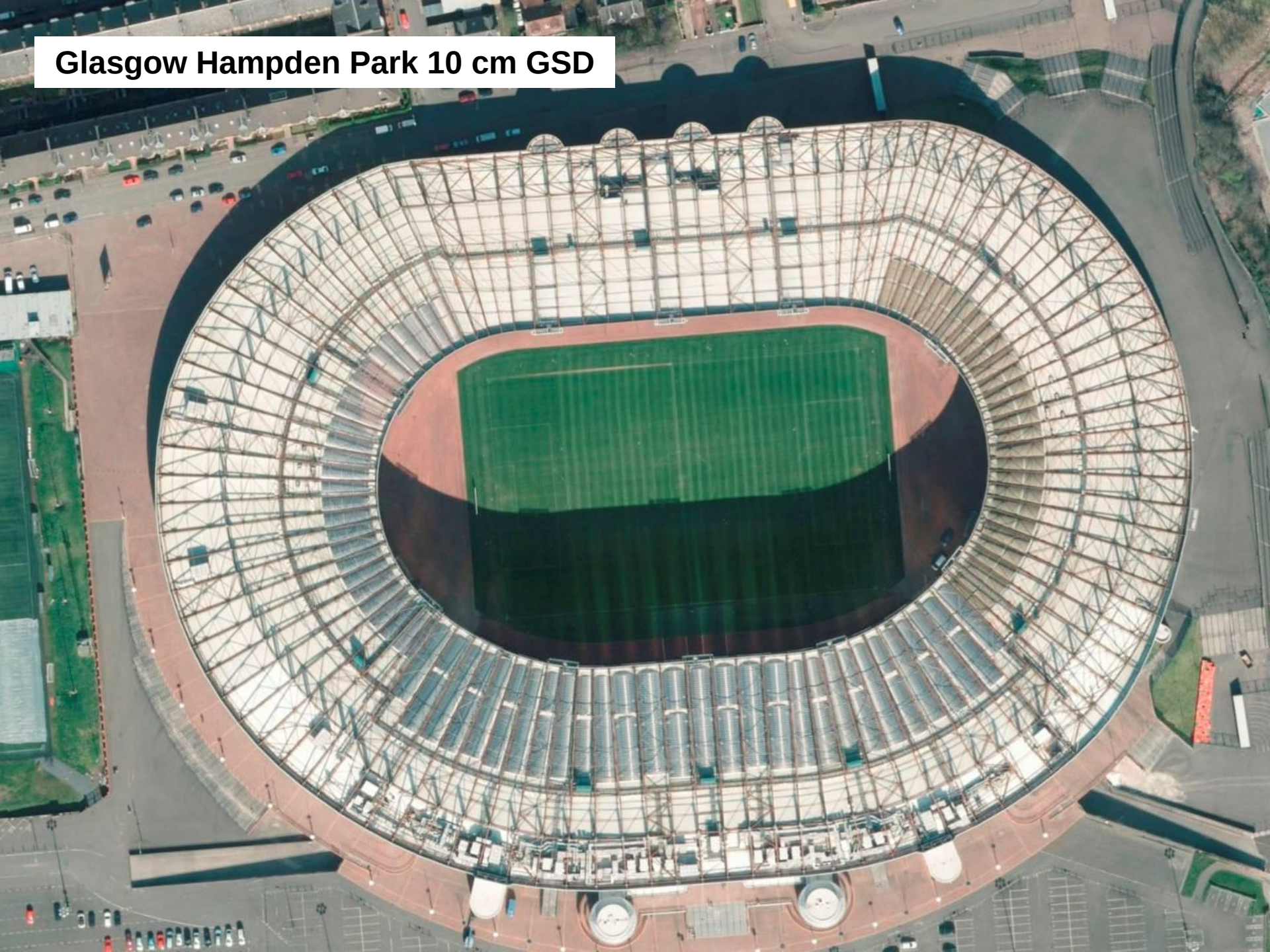
Lee Valley White Water Centre

A combination of remote-sensed capture and field completion




Waltham Marsh
Track
El Sub Sta
Co Const Bdy
CR
River Lee Navigation
Bord Const Bdy
Ward Bdy
Path
Water Sports Centre
Jetty
Lee Valley White Water Centre (Olympic Venue)
Conveyor
Mast (Telecommunication)
19.5m
Tow Path
Waltham Town Lock
Drain
FB
L Col
Cheshunt Marsh
Marshgate Cottage
18.6m
Trees
Posts




Glasgow Hampden Park 10 cm GSD

Team GB

Working collaboratively across Government

Key Stakeholders

Olympic GI Production Coordination Group

Aims

- To ensure that all UK Government organisations with an appropriate remit have access to the definitive and current geospatial data necessary to ensure a safe and secure running of the London 2012 Olympic Games
- To encourage collaboration across all such organisations over the creation of data and products, to ensure that the most cost-effective and efficient approach is taken by UK Government

Scope

- Specification and collection of data relating to Olympic venues & surrounds
- Definition and creation of products, including collaboration over consistent representation
- Delivery and dissemination of data and products to end users through a variety of media

Benefits of PCG

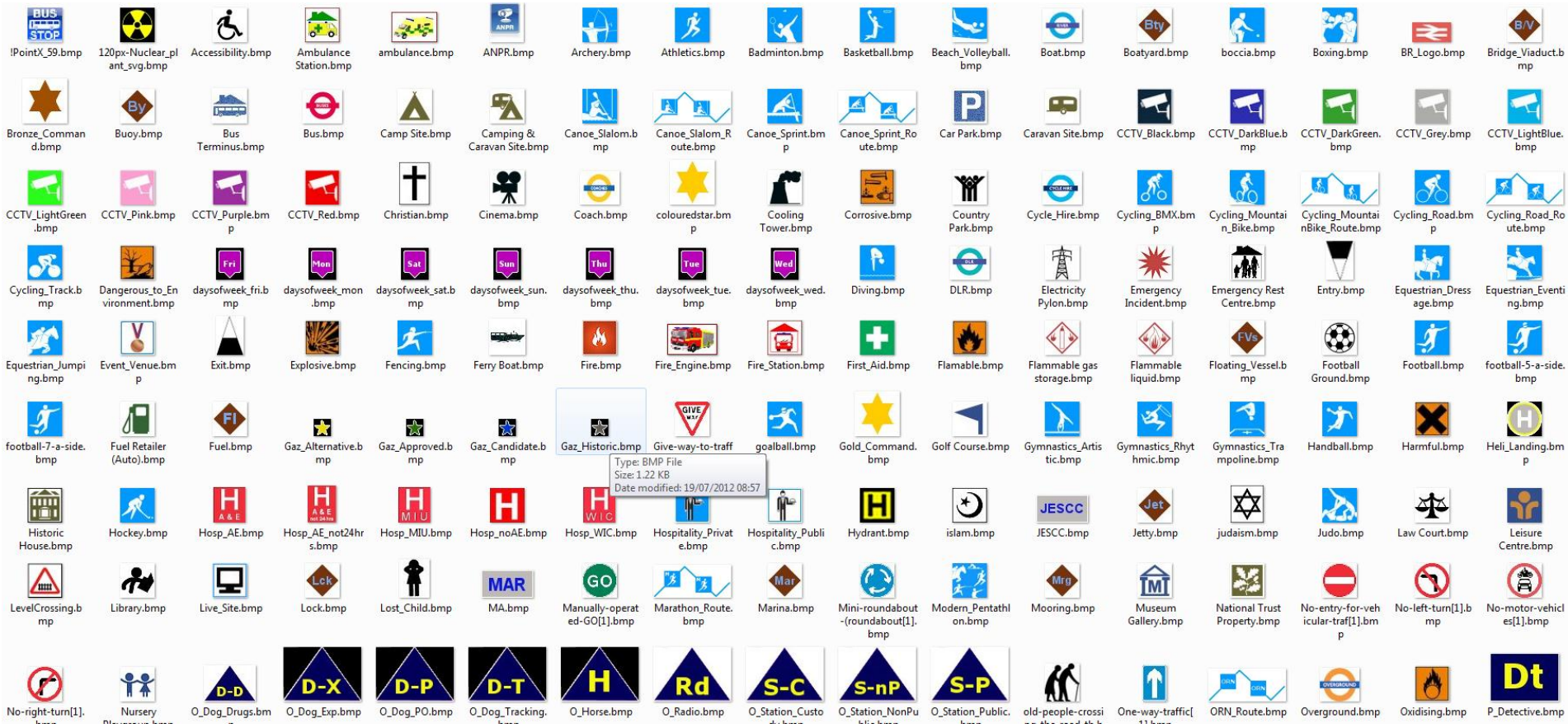
Data, product and burden sharing

- Data capture, data processing
- Common Data Catalogue

Issues tackled up by PCG include:

- Common local grid system for venues
- Shared symbology
- Portals and access to data
- Linking datasets – Olympic Torch Relay, Olympic Route Network

Symbology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ambulance.bmp
ANPR.bmp
Archery.bmp
Athletics.bmp
Badminton.bmp
Basketball.bmp
Beach_Volleyball.bmp
Boat.bmp
Boatyard.bmp
boccia.bmp
Boxing.bmp
BR_Logo.bmp
Bridge_Viaduct.bmp
Bronze_Command.bmp
Buoy.bmp
Bus Terminus.bmp
Bus.bmp
Camp Site.bmp
Camping & Caravan Site.bmp
Canoe_Slalom.bmp
Canoe_Slalom_Route.bmp
Canoe_Sprint.bmp
Canoe_Sprint_Route.bmp
Car Park.bmp
Caravan Site.bmp
CCTV_Black.bmp
CCTV_DarkBlue.bmp
CCTV_DarkGreen.bmp
CCTV_Grey.bmp
CCTV_LightBlue.bmp
CCTV_LightGreen.bmp
CCTV_Pink.bmp
CCTV_Purple.bmp
CCTV_Red.bmp
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Cinema.bmp
Coach.bmp
colouredstar.bmp
Cooling Tower.bmp
Corrosive.bmp
Country Park.bmp
Cycle_Hire.bmp
Cycling_BMX.bmp
Cycling_Mountain_Bike.bmp
Cycling_MountainBike_Route.bmp
Cycling_Road.bmp
Cycling_Road_Route.bmp
Cycling_Track.bmp
Dangerous_to_Environment.bmp
daysofweek_fri.bmp
daysofweek_mon.bmp
daysofweek_sat.bmp
daysofweek_sun.bmp
daysofweek_thu.bmp
daysofweek_tue.bmp
daysofweek_wed.bmp
Diving.bmp
DLR.bmp
Electricity Pylon.bmp
Emergency Incident.bmp
Emergency Rest Centre.bmp
Entry.bmp
Equestrian_Dressage.bmp
Equestrian_Eventing.bmp
Equestrian_Jumping.bmp
Event_Venue.bmp
Exit.bmp
Explosive.bmp
Fencing.bmp
Ferry Boat.bmp
Fire.bmp
Fire_Engine.bmp
Fire_Station.bmp
First_Aid.bmp
Flamable.bmp
Flammable gas storage.bmp
Flammable liquid.bmp
Floating_Vessel.bmp
Football Ground.bmp
Football.bmp
football-5-a-side.bmp
football-7-a-side.bmp
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Fuel.bmp
Gaz_Alternative.bmp
Gaz_Approved.bmp
Gaz_Candidate.bmp
Gaz_Historic.bmp
Give-way-to-traff
goalball.bmp
Gold_Command.bmp
Golf Course.bmp
Gymnastics_Artistic.bmp
Gymnastics_Rhythmic.bmp
Gymnastics_Trampoline.bmp
Handball.bmp
Harmful.bmp
Heli_Landing.bmp
Historic House.bmp
Hockey.bmp
Hosp_AE.bmp
Hosp_AE_not24hrs.bmp
Hosp_MIU.bmp
Hosp_noAE.bmp
Hosp_WIC.bmp
Hospitality_Private.bmp
Hospitality_Public.bmp
Hydrant.bmp
islam.bmp
JESCC.bmp
Jetty.bmp
judaism.bmp
Judo.bmp
Law Court.bmp
Leisure Centre.bmp
LevelCrossing.bmp
Library.bmp
Live_Site.bmp
Lock.bmp
Lost_Child.bmp
MA.bmp
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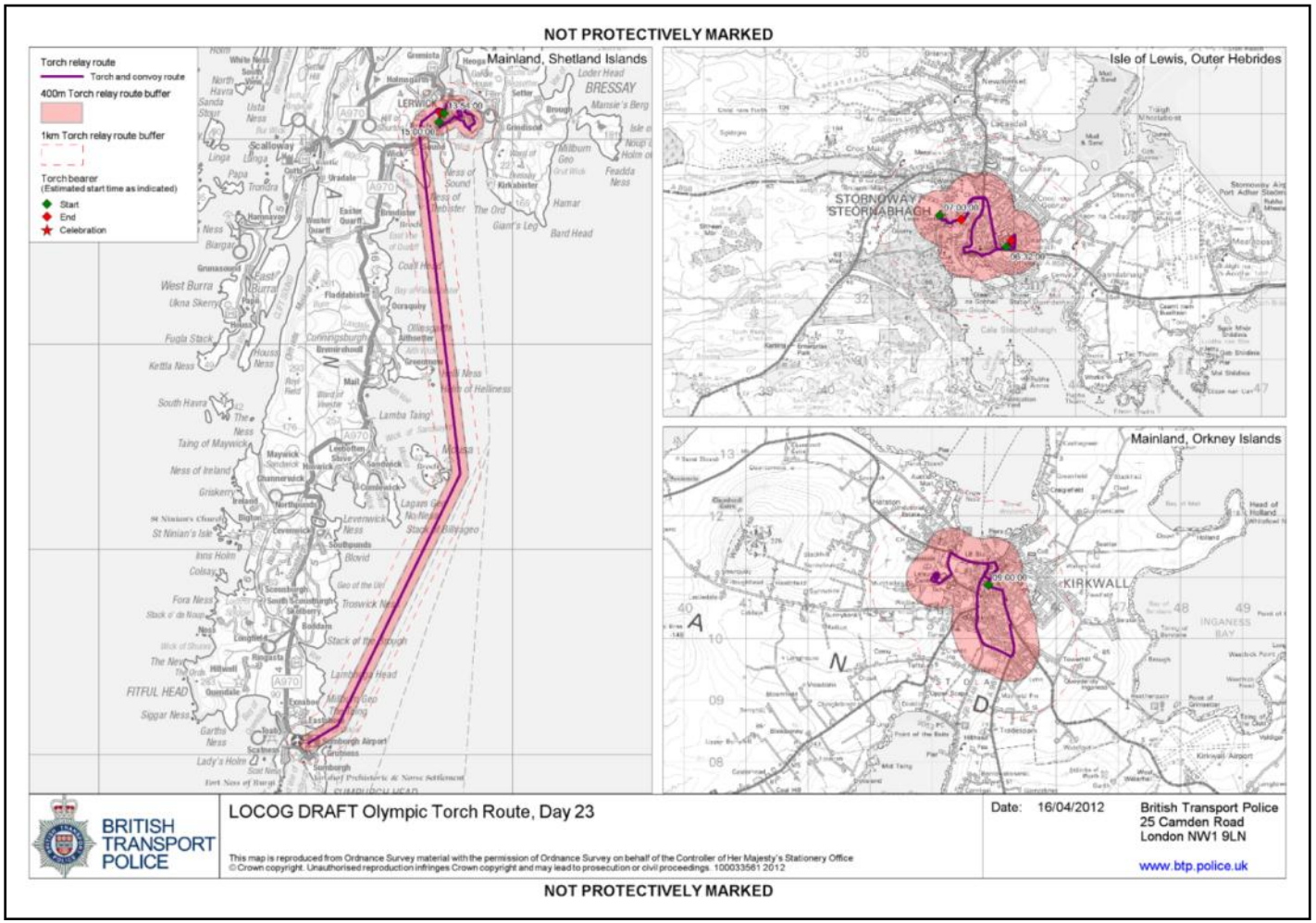
Marathon_Route.bmp
Marina.bmp
Mini-roundabout-(roundabout[1].bmp
Modern_Pentathlon.bmp
Mooring.bmp
Museum Gallery.bmp
National Trust Property.bmp
No-entry-for-vehicular-traf[1].bmp
No-left-turn[1].bmp
No-motor-vehicles[1].bmp
No-right-turn[1].
Nursery
O_Dog_Drugs.bm
O_Dog_Exp.bmp
O_Dog_PO.bmp
O_Dog_Tracking.
O_Horse.bmp
O_Radio.bmp
O_Station_Custo
O_Station_NonPu
O_Station_Public.
old-people-crossi
One-way-traffic[
ORN_Route.bmp
Overground.bmp
Oxidising.bmp
P_Detective.bmp
Type: BMP File
Size: 1.22 KB
Date modified: 19/07/2012 08:57

Turning Geospatial Information into Geospatial Intelligence

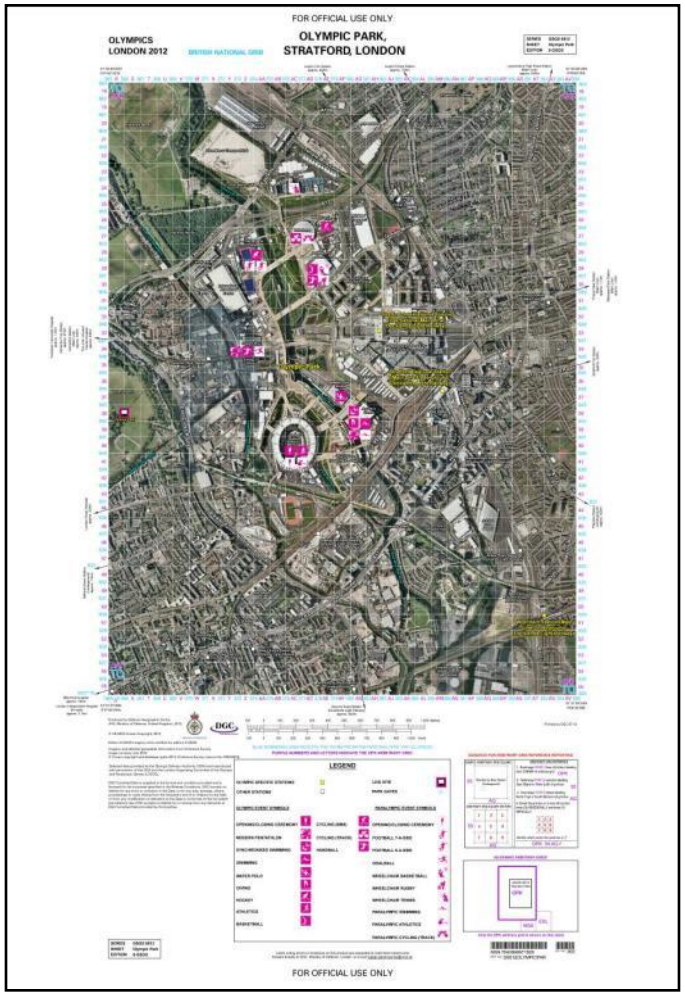
Collaboration with Olympic Production Coordination Group partners

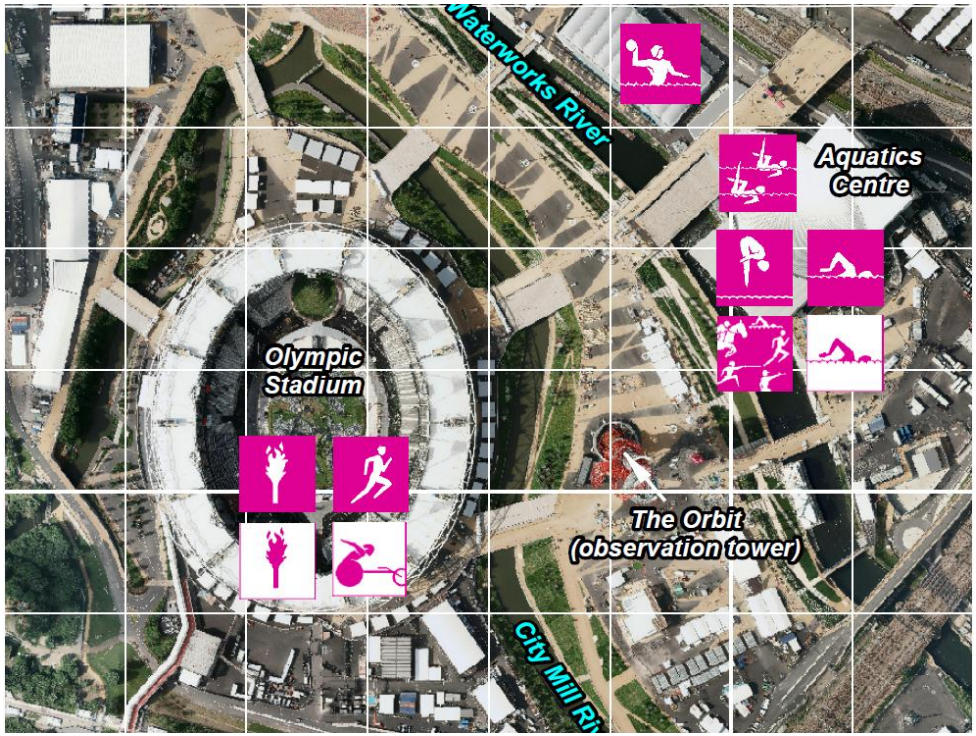
British Transport Police – Olympic torch relay route maps



Produced a graphic for all 70 days including Northern Ireland, Republic of Ireland, Channel Islands and the Isle of Man

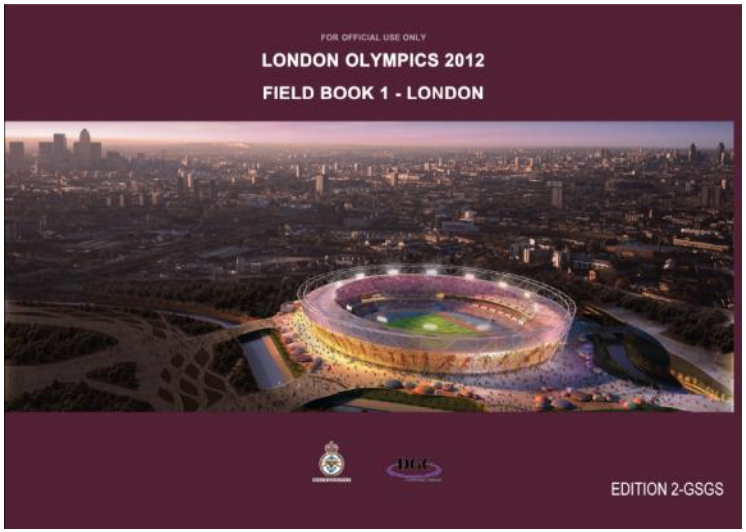
Defence Geographic Centre – venue image plans (GSGS6512)

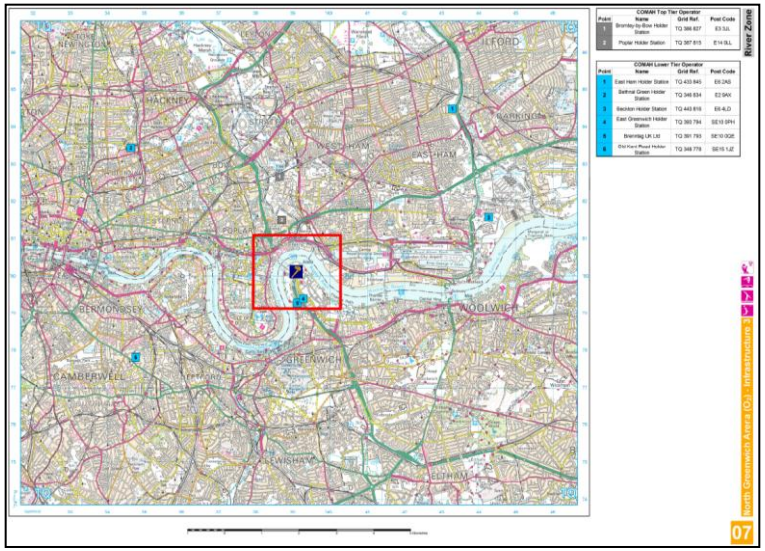


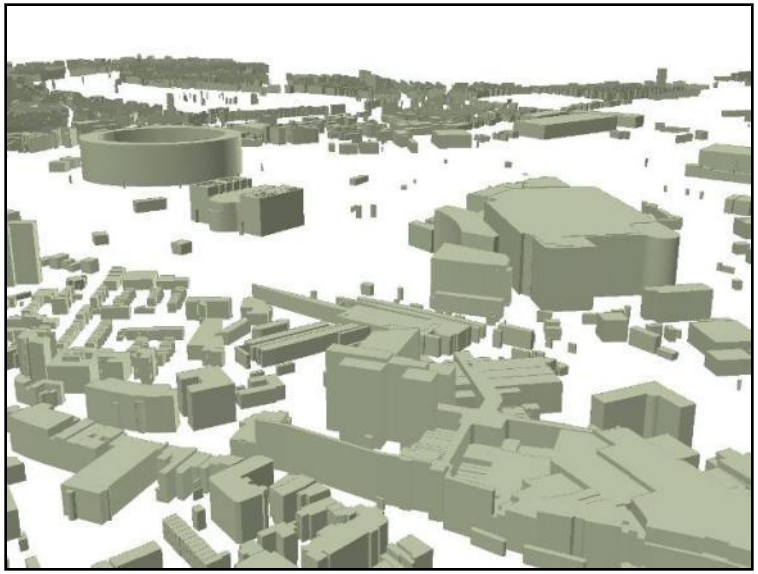


Olympic Park example based on Ordnance Survey high-resolution imagery captured: 30 June 2012

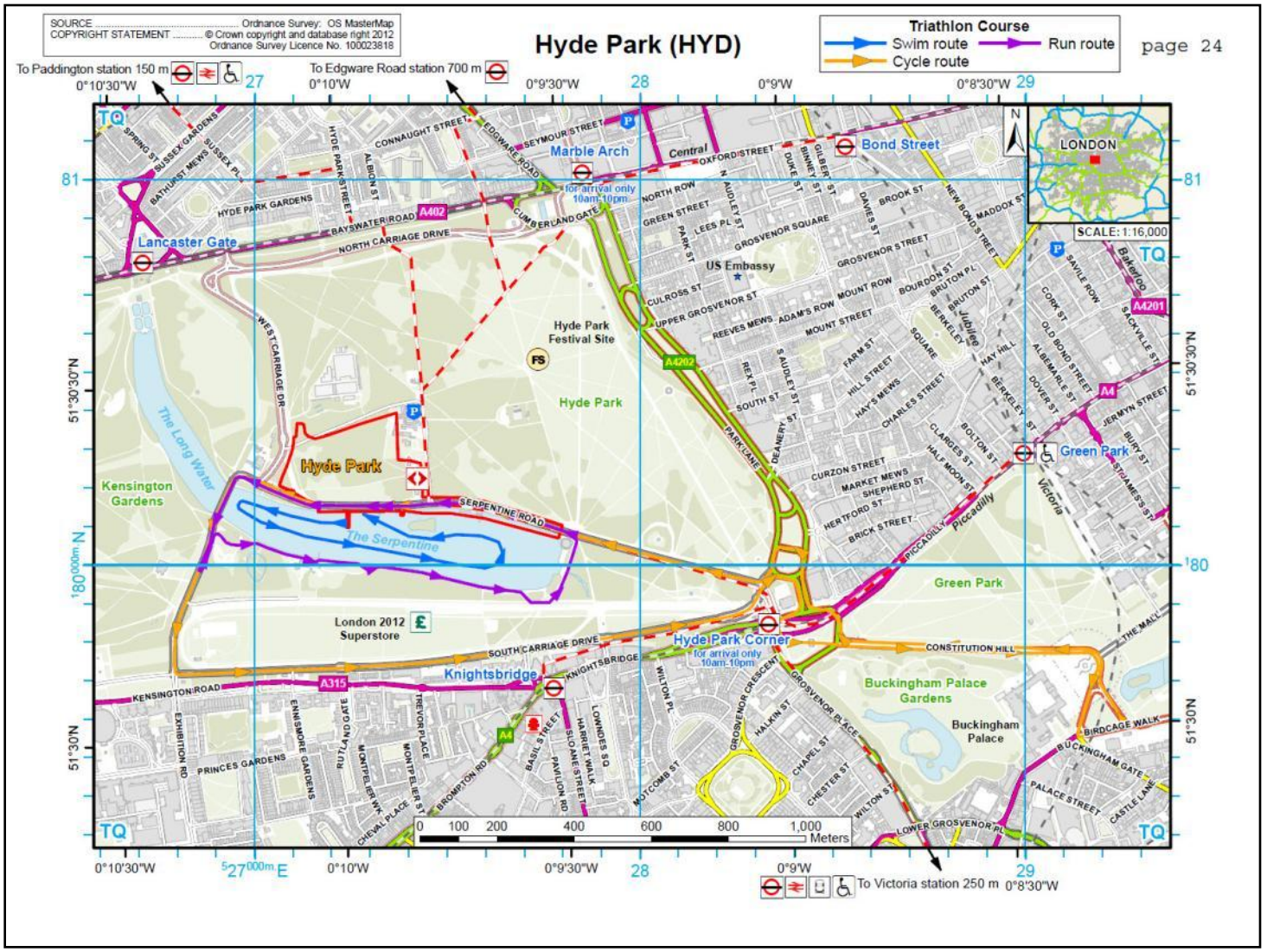
Defence Geographic Centre – Olympic field books (GSGS6542)





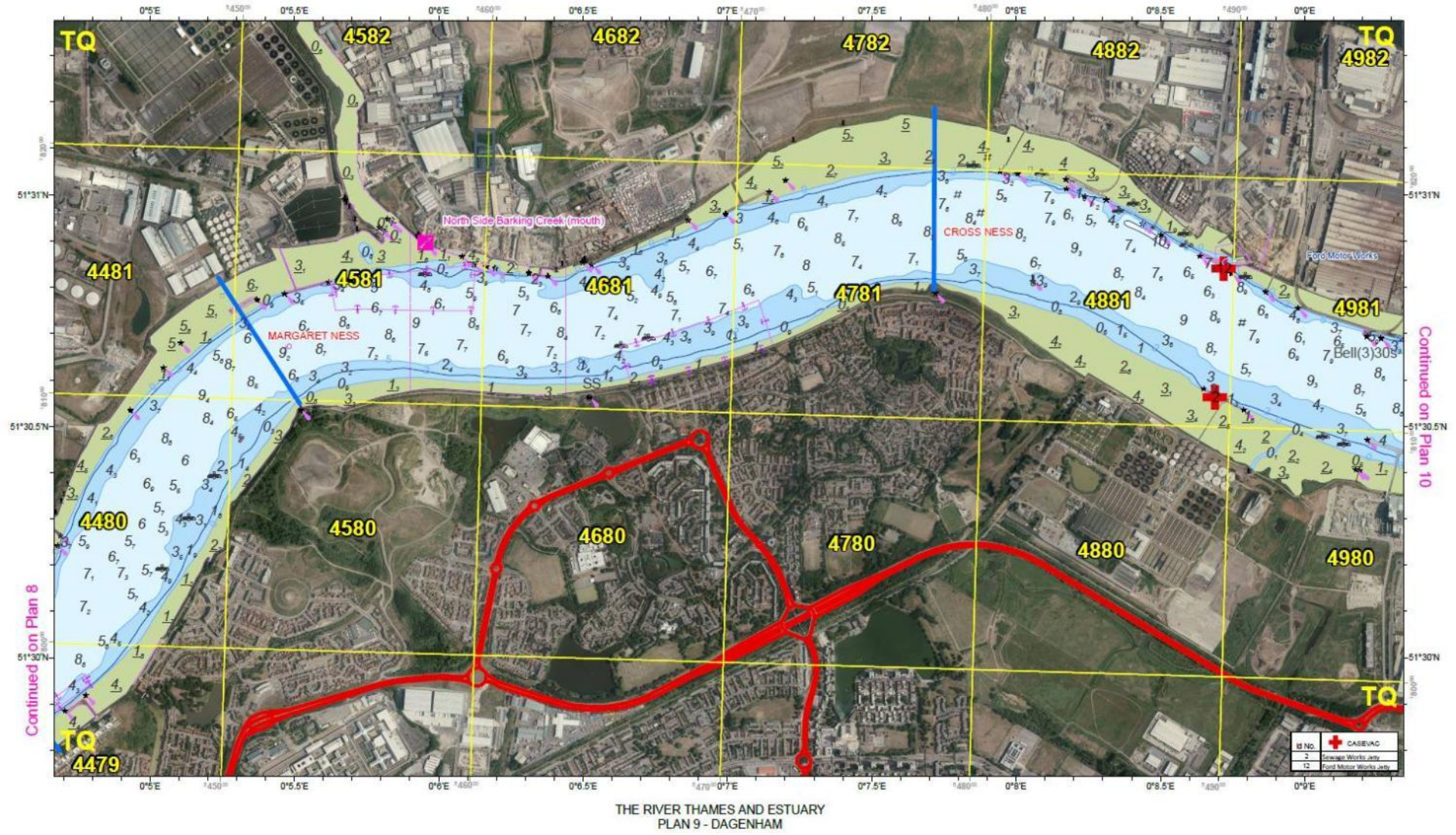


National Geospatial Intelligence Agency: field book



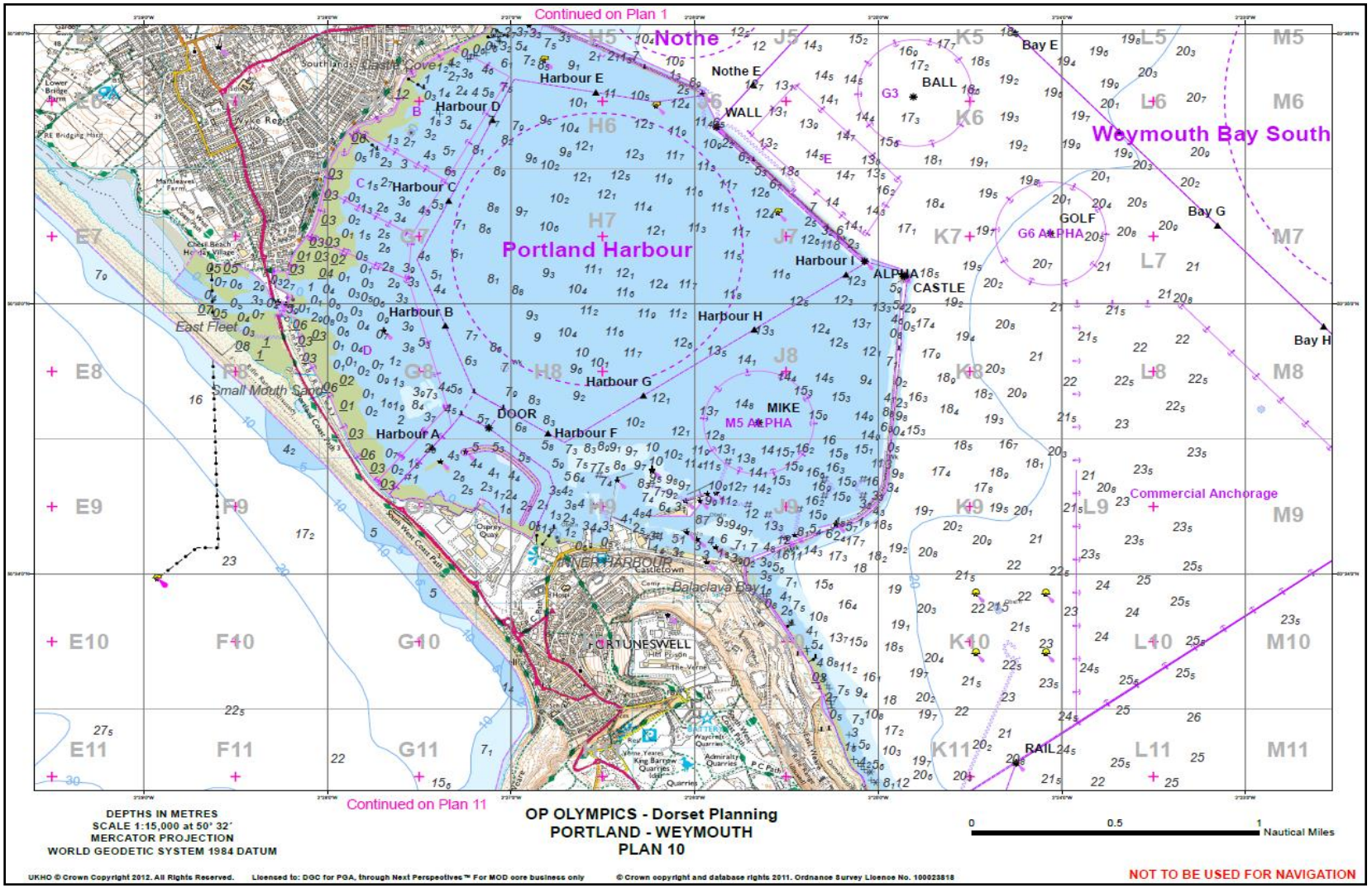
National Geospatial Intelligence Agency: 360˚ Imagery

Defence Maritime Geospatial Intelligence Centre (UKHO): Thames Chart book

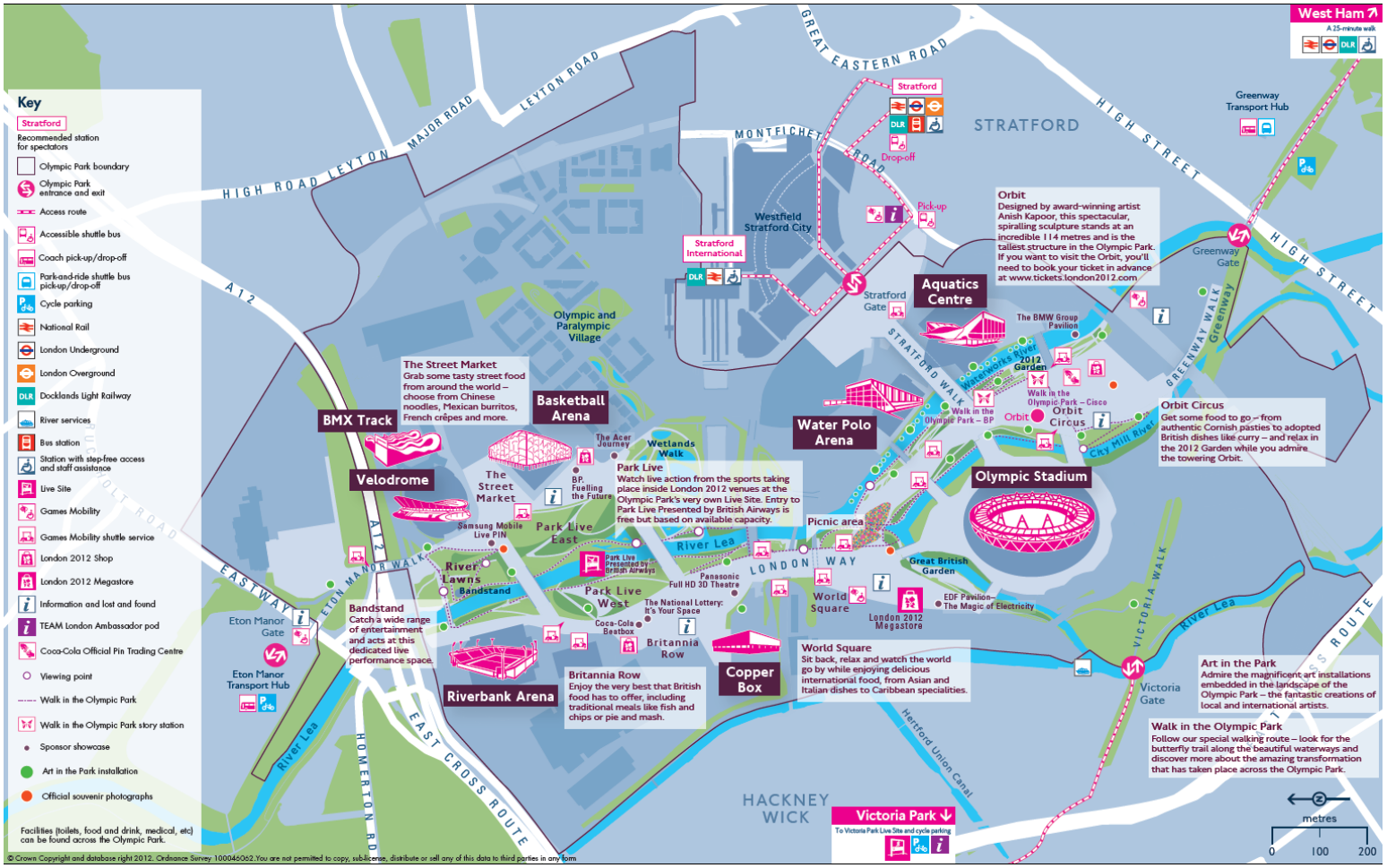


THE RIVER THAMES AND ESTUARY
PLAN 9 - DAGENHAM

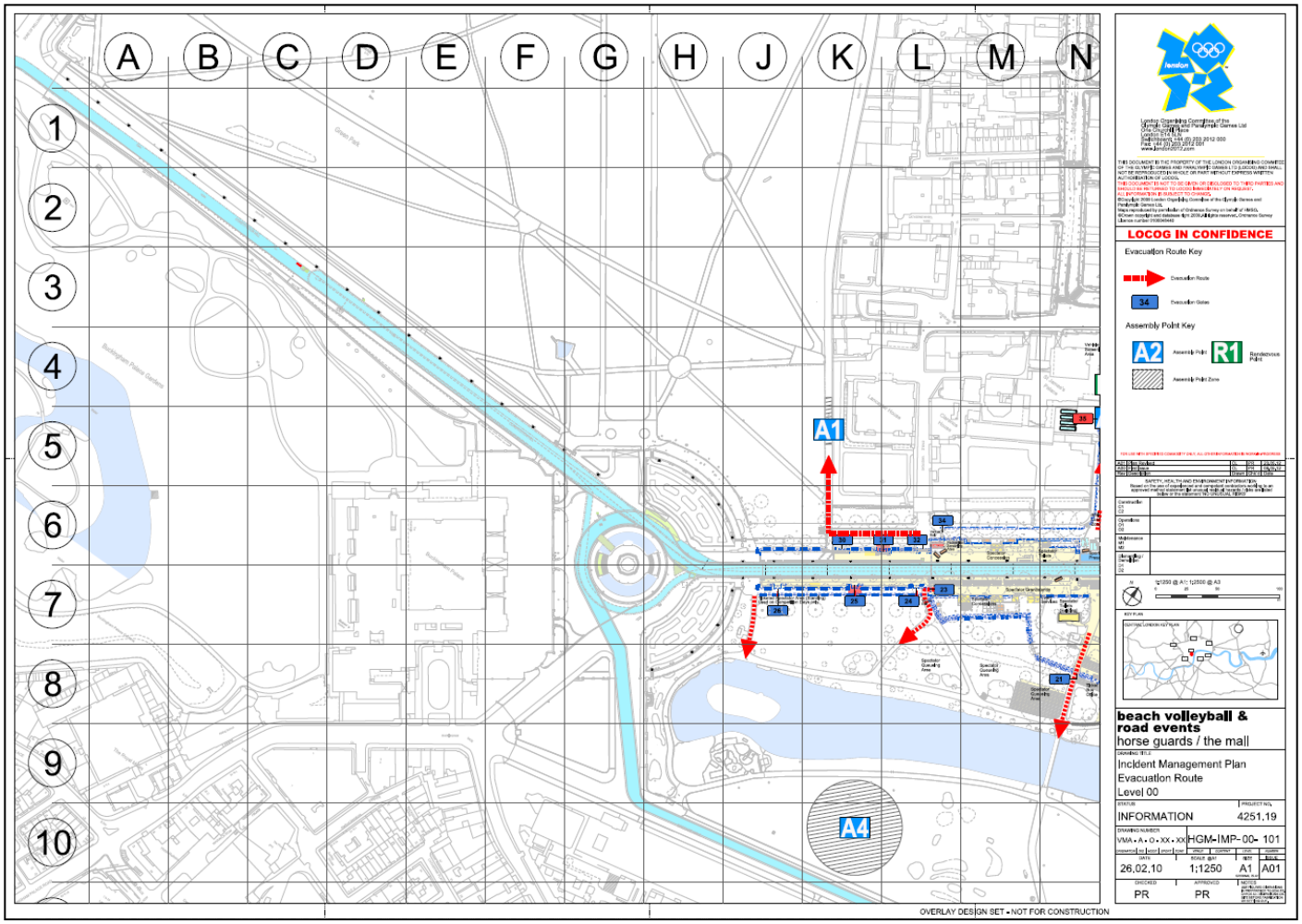
Defence Maritime Geospatial Intelligence Centre (UKHO): Portland: Weymouth chart book



Transport for London: spectator transport and information



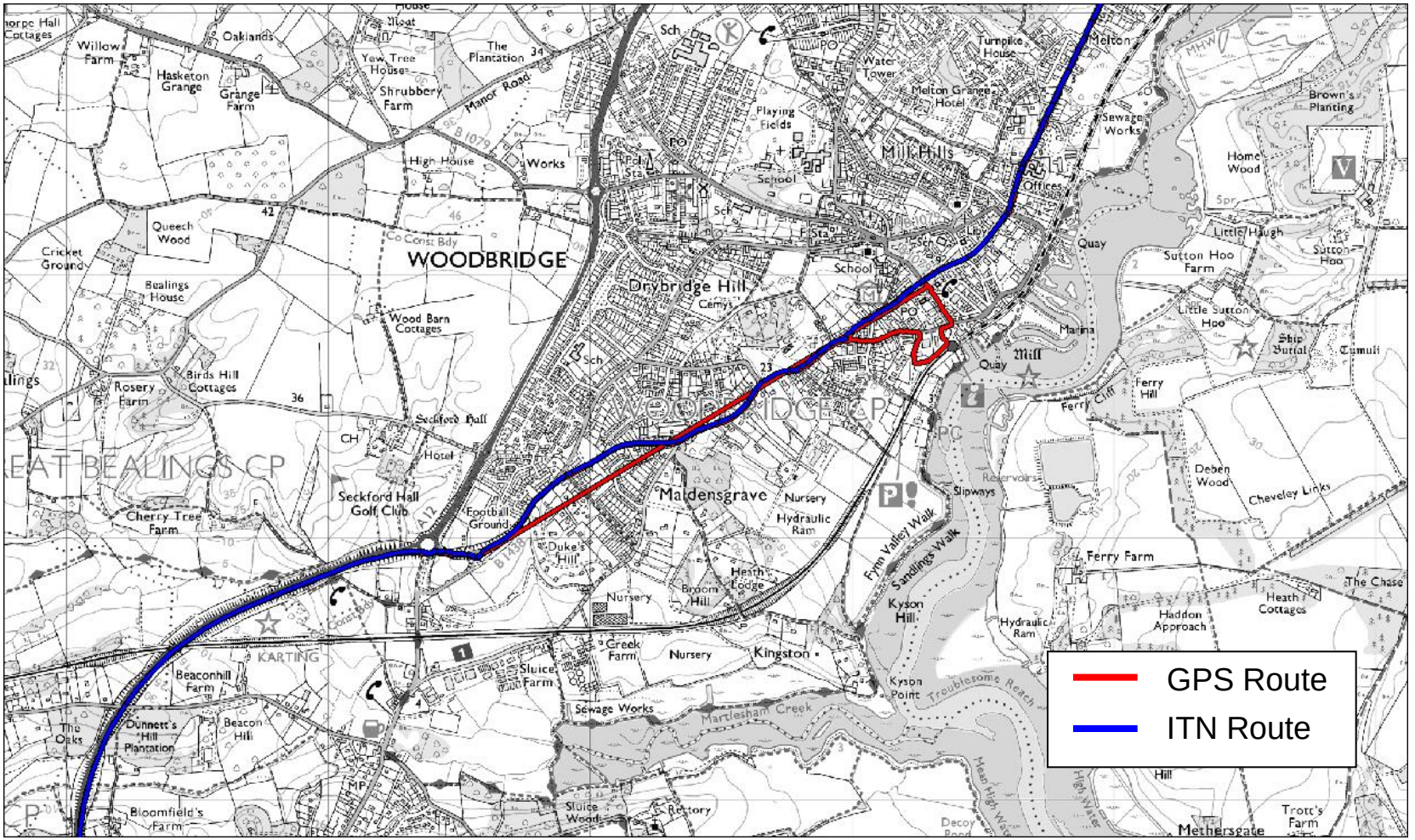
LOCOG: incident management plans



Operational support

Games time support

Olympic Torch Relay Route –
GPS data cleaning and matching to OS MasterMap ITN Layer



Olympic torch relay route – GPS data matched to ITN

- GPS Attribution:
- ID: Day 48
- Route: Norwich to Ipswich

ITN Attribution:

For each ITN link which constitute the route…

ID: TOID

Descriptive Term: B Road

Road Name: IPSWICH ROAD

DfT Number: B1438

Nature of Road: Single Carriageway

Length: 442.95m

Start Node: 4000000029211768

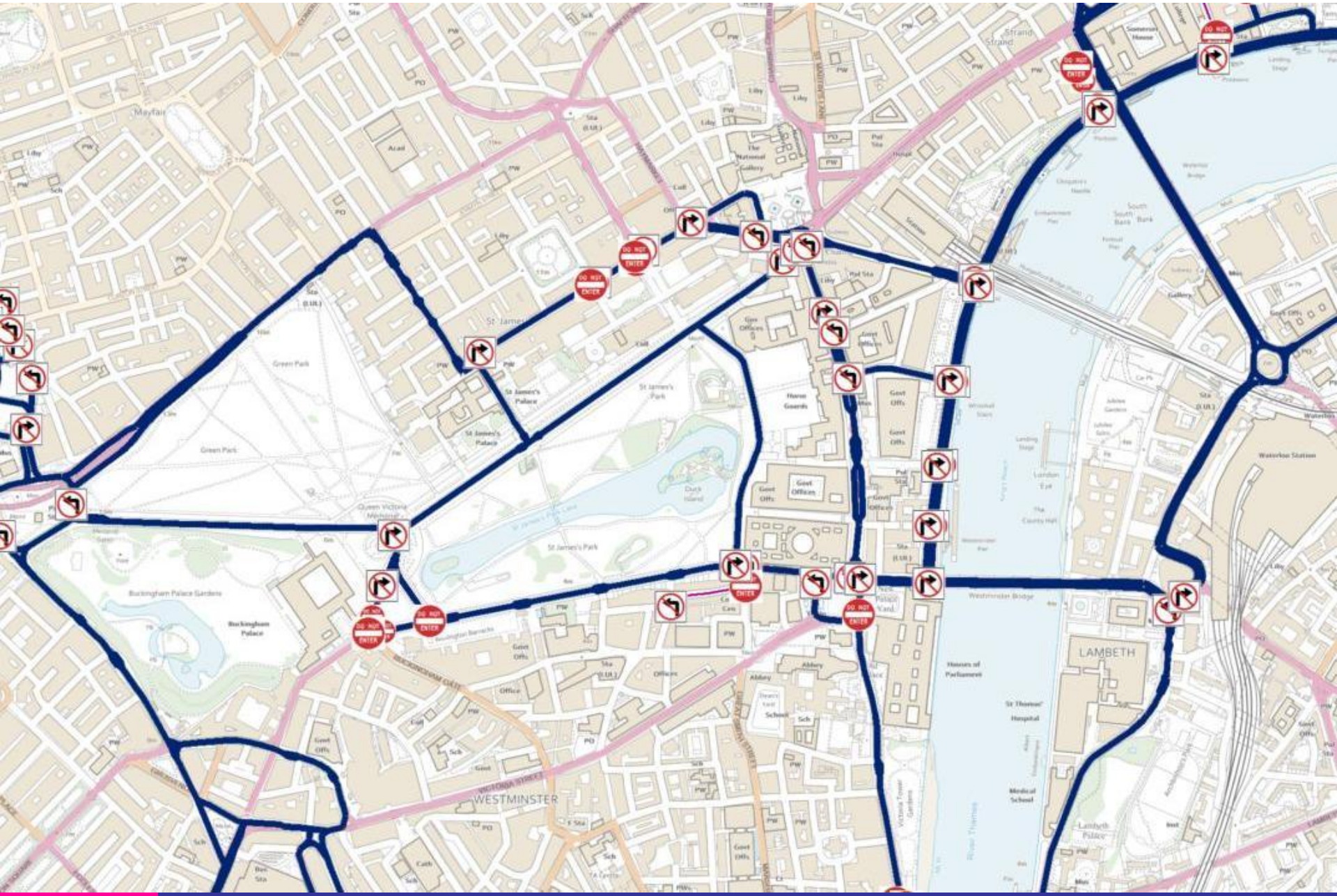
End Node: 4000000029211751

Last Change Date: 25/03/2009

Reason for Change: Modified

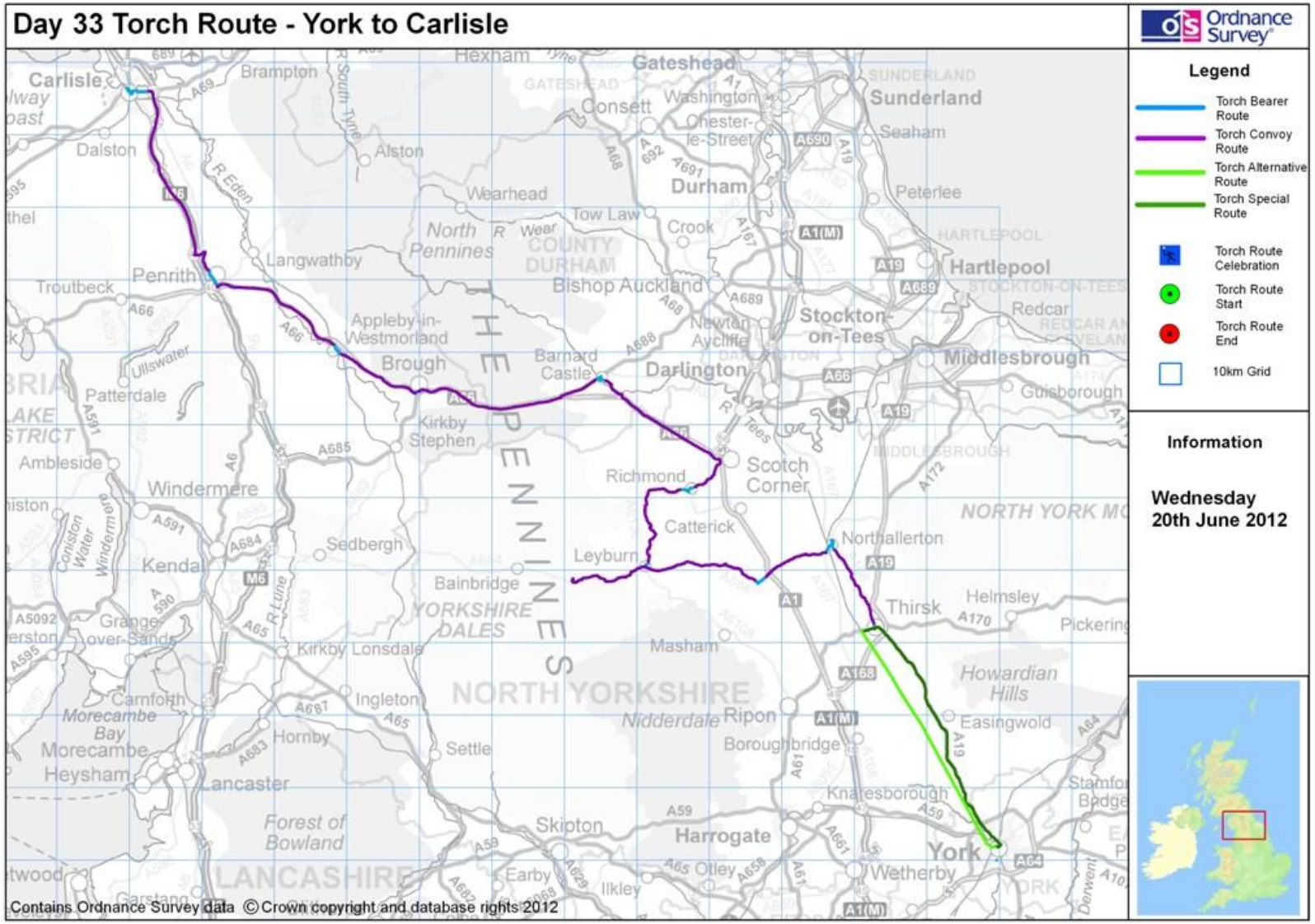
Olympic Route Network (ORN) analysis

Olympic Route Network (ORN) analysis



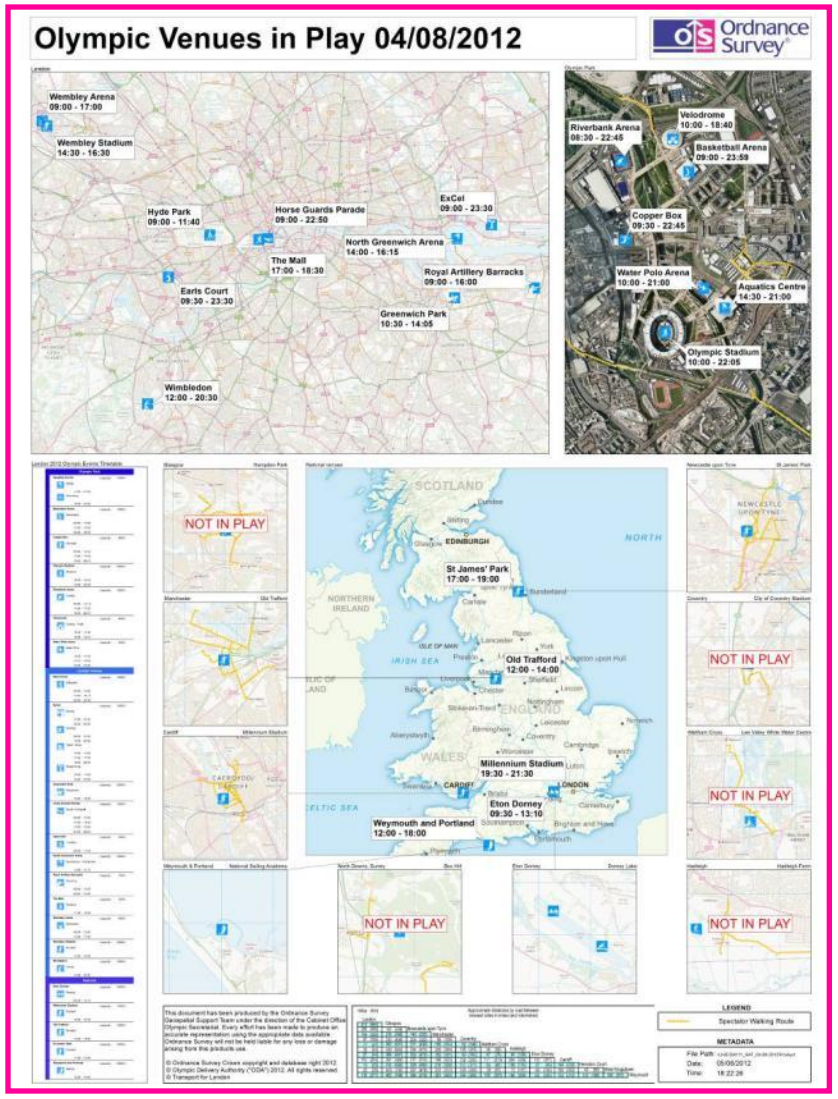
Olympic torch relay route – product generation

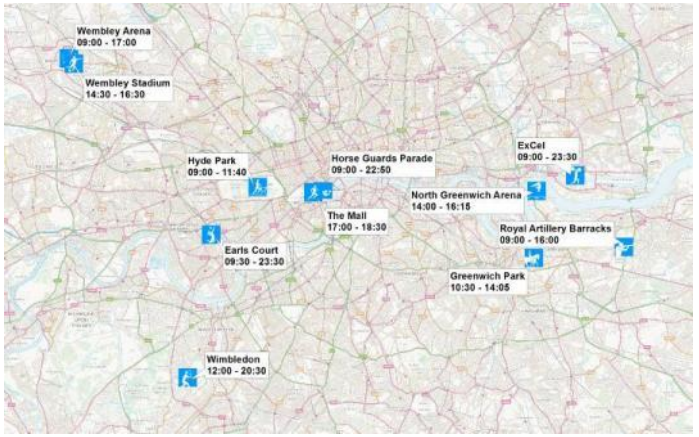
Torch relay products – daily detailed map



Olympic and Paralympic Games – daily map pack

Daily product: A0 venues in play overview

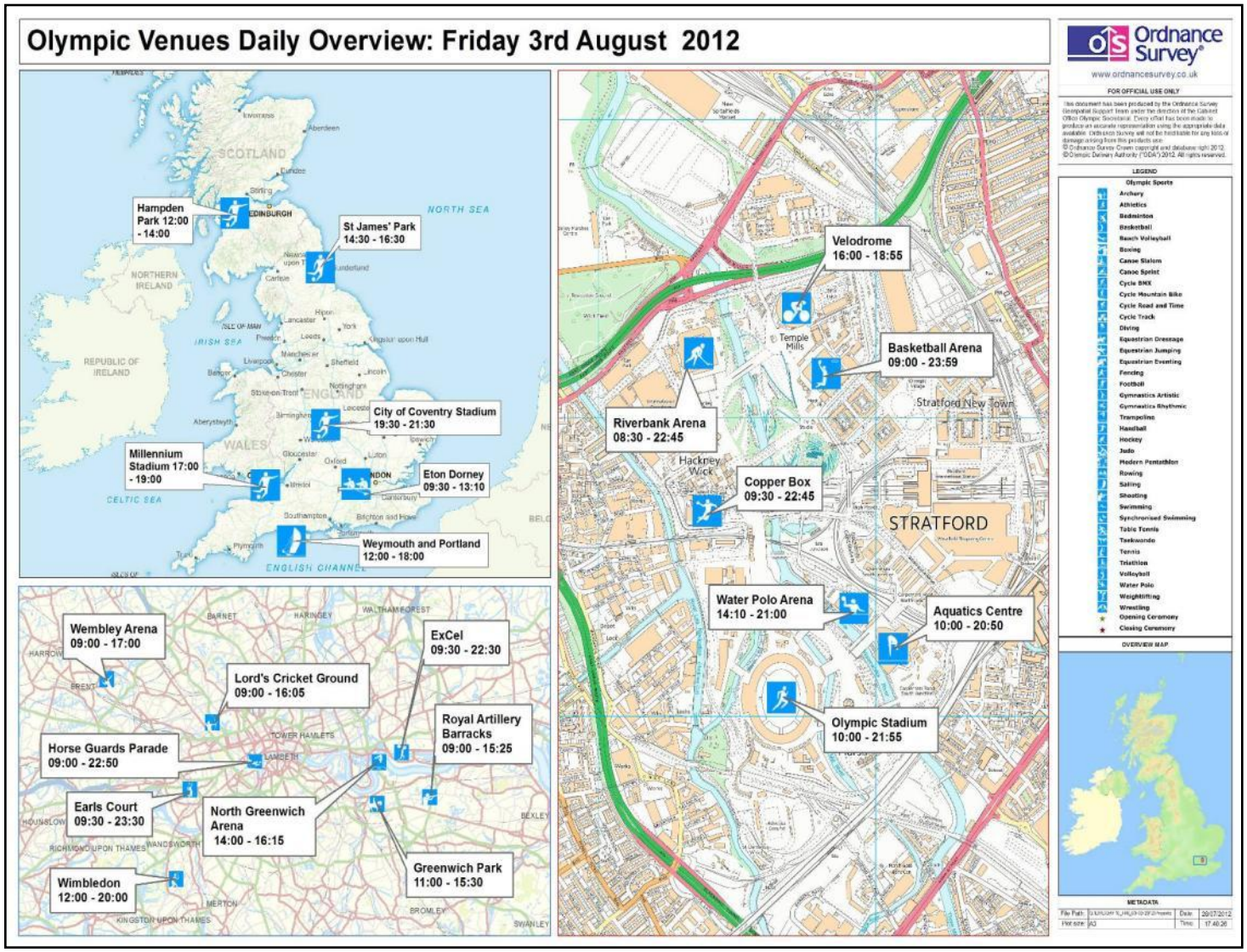




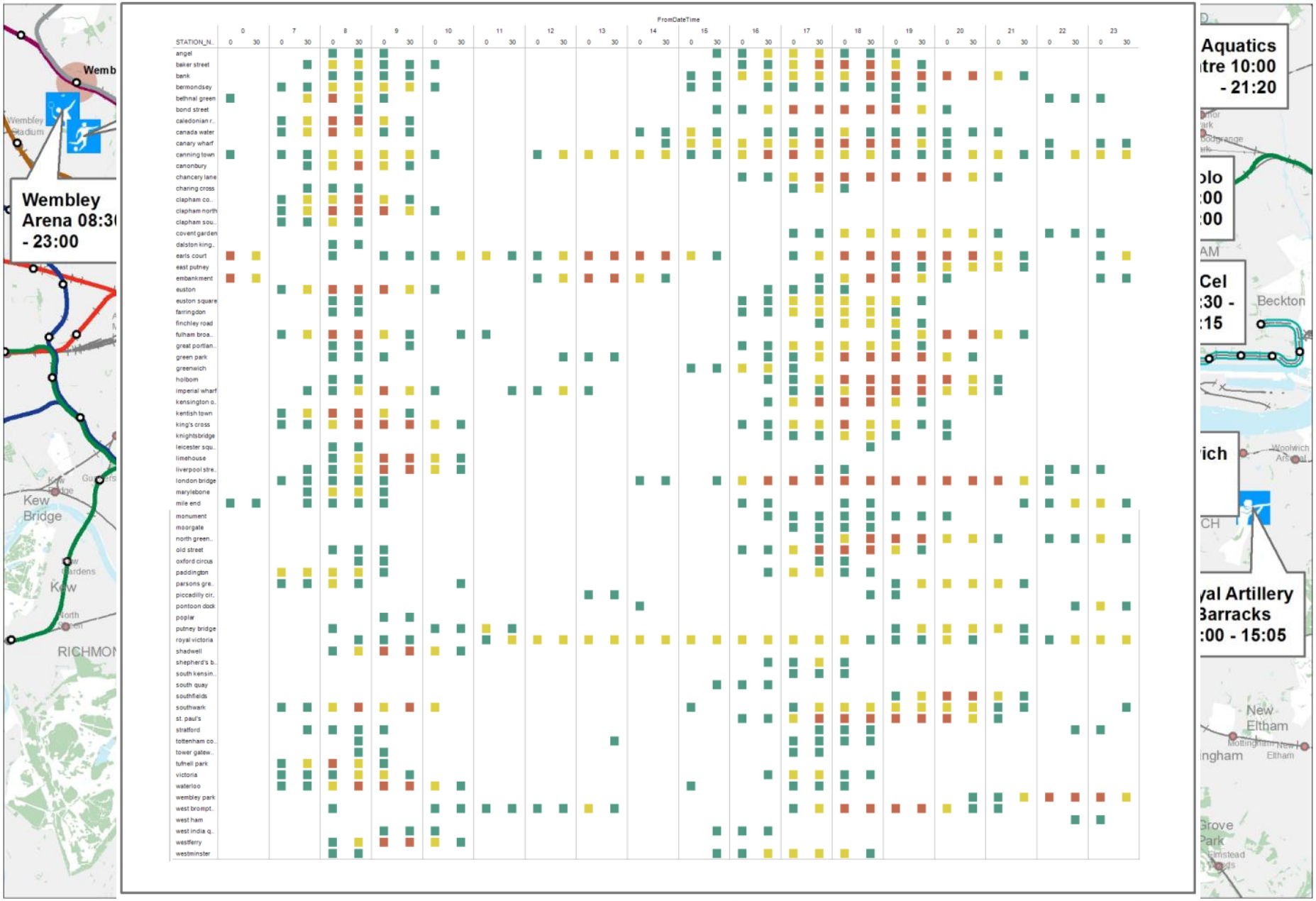
London venues insert

National venues insert

Daily product: A3 venues in play overview



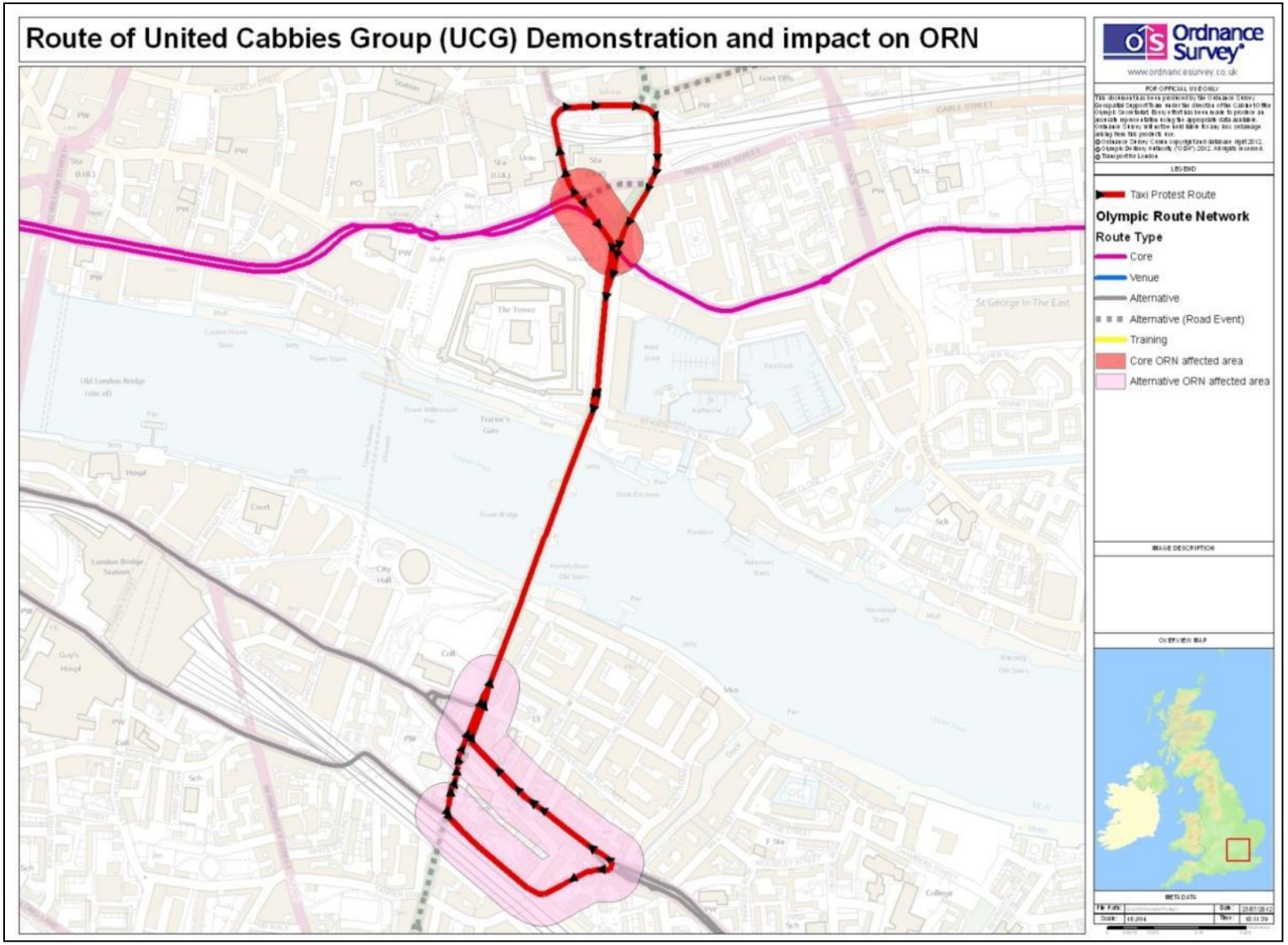
Daily product – rail transport waiting times



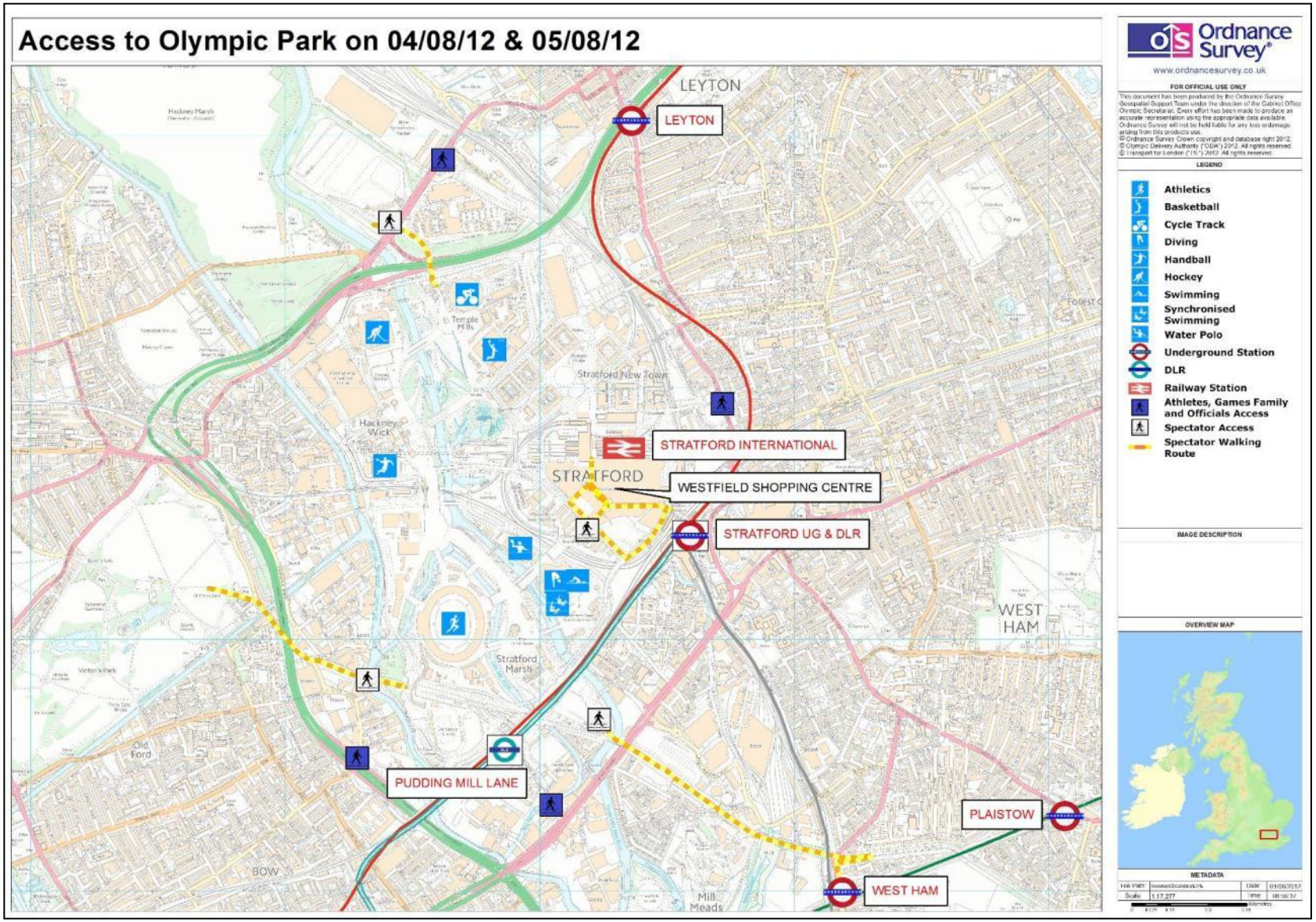
Ordnance Survey®

Bespoke product and analysis

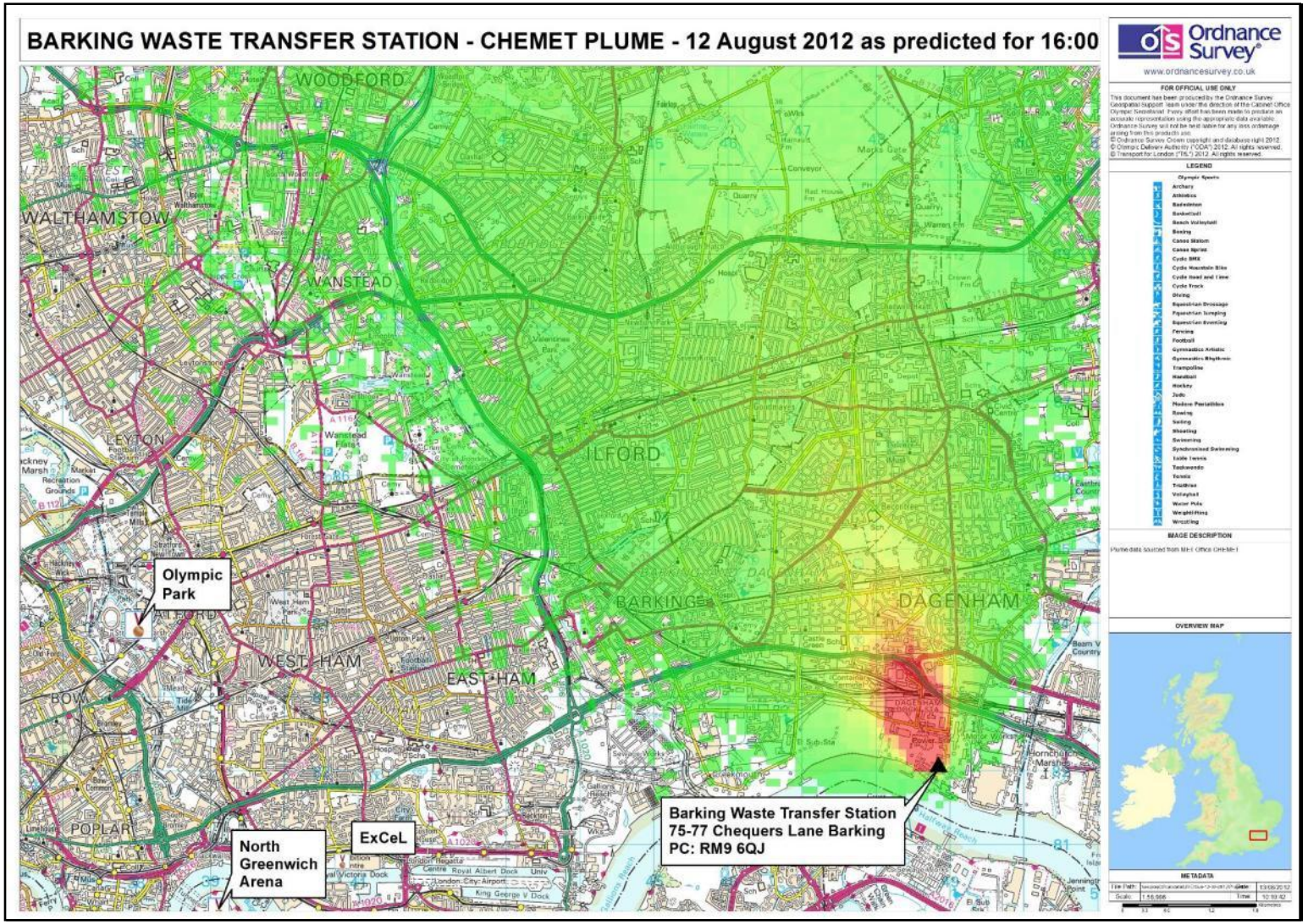
Protest routes and potential impact on Olympic Route Network



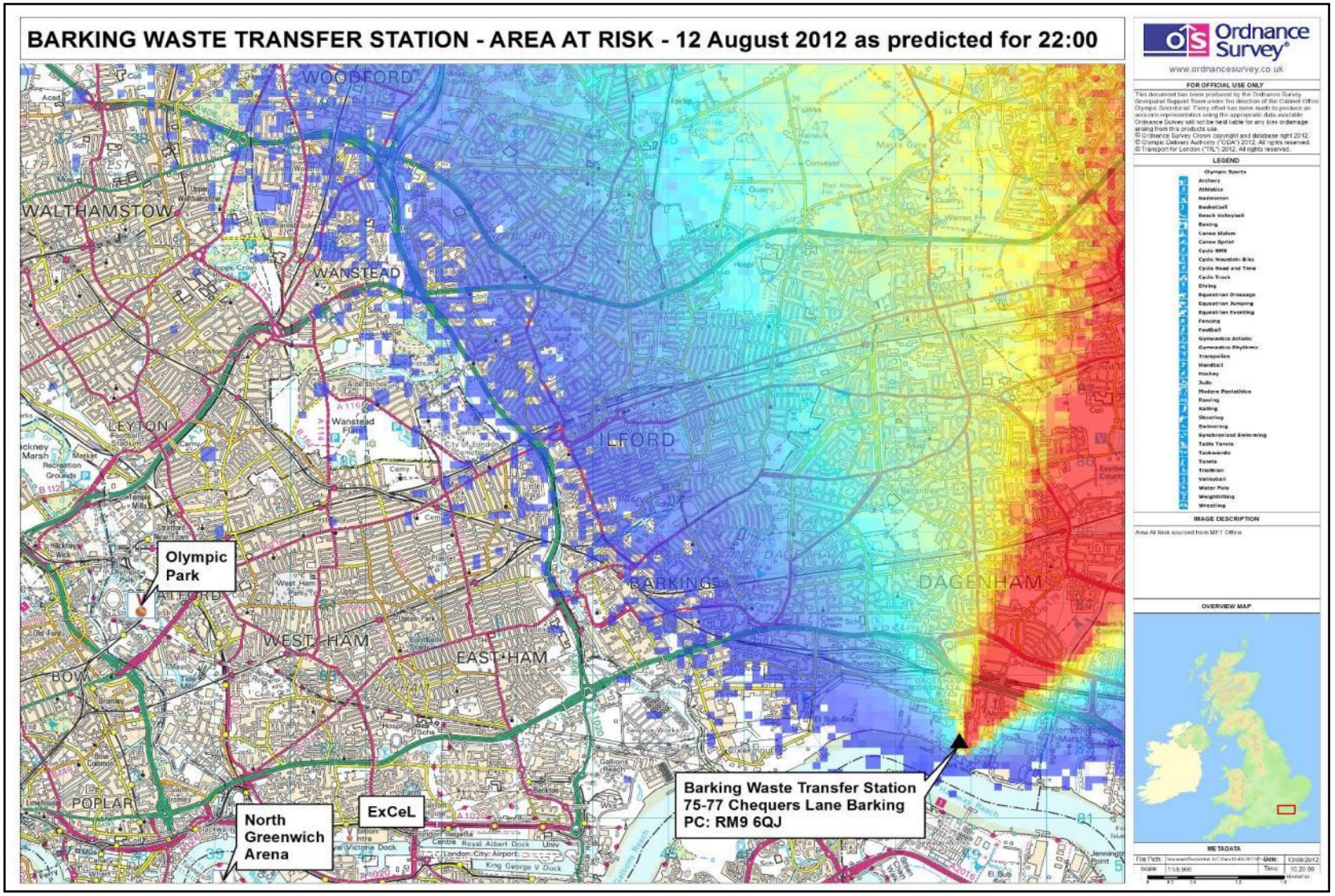
Crowd management at Westfield Shopping Centre



Plume impact of major fire in East London – time series



Area at risk due to major fire in East London – time series



Building a National Geospatial Information System: the UK perspective