Ordnance Survey®

OS OnDemand

User guide and technical specification

OS OnDemand

User guide

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Preface

This user guide (hereafter referred to as the guide) is designed to provide an overview of the OS OnDemand web map service (WMS) and web map tile 'like' service (WMTS-like), (hereafter referred to as the product). and it gives guidelines and advice on how a customer might derive the maximum benefit from the product. It assumes a general knowledge of geographic information. If you find an error or omission in this guide, or otherwise wish to make a comment or suggestion as to how we can improve the guide, please contact us at the address shown below under contact details or complete the product and service performance report form at annexe A and return it to us.

Contact details

Our Customer Service Centre will be pleased to deal with your enquiries:

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SOUTHAMPTON
SO16 0AS

General enquiries (calls charged at local rate): +44 (0)8456 05 05 05

Dedicated Welsh Language HelpLine: 08456 05 05 04

Textphone (deaf and hard of hearing users only please): +44 (0)23 8005 6146

customerservices@ordnancesurvey.co.uk

or visit the Ordnance Survey website at: www.ordnancesurvey.co.uk

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Using this guide

The documentation is supplied in portable document format (PDF) only. Free Adobe® Reader® software, which displays the guide, incorporates search and zoom facilities and allows you to navigate within. Hyperlinks are used to navigate between associated parts of the guide and to relevant Internet resources by clicking on the blue hyperlinks and the table of contents.

If you are unfamiliar with any words or terms used and require clarification please refer to the glossary at the end of the document.

Chapter 1 Introduction

OS OnDemand is a national web map service (WMS) and web map tile service (WMTS-like) for Great Britain that delivers raster data and rasterised vector data over the web directly into a customer's application as and when the customer requests the data from their computer. This service is provided to customers as an addition to supply on CD and DVD. The service is subscription-based and requires the organisation subscribing to the service to have, or be entitled through an agreement with Ordnance Survey, to take coverage of the licensed products available through the service.

Web map services

A web map service (WMS) is a service that runs over the Internet. It offers subscribers the facility to send a request for a map, from their computer, to an external organisation that stores or hosts the maps. The host receives the request, via the Internet (in the form of a standard web URL), extracts the map requested and sends it back to the customer's computer as an image. The customer views the map through systems or applications that have been enabled to run with a web map service. These are referred to as web map service clients.

The specification for WMS is available from the Open Geospatial Consortium (OGC® http://www.opengeospatial.org), which is an international standard.

The OS OnDemand WMS conforms to the OGC and Inspire specifications. How the client is set up will dictate which instructions can be sent to the host.

The OS OnDemand WMTS is a 'like' service, in that it is similar to the web map tile service (WMTS) defined by OGC. Currently, the service can only be accessed using an application programming interface (API), not a geographical information system (GIS), which is a requirement of the OGC standard.

Access to OS OnDemand

OS OnDemand customers must be licensed to use all the data they receive via the service. The data can be used for any application that is allowed under the customers' or partners' existing product licence (please contact Ordnance Survey for details of relevant licences).

Customers can connect to the OS OnDemand WMS service using a GIS or a web browser and receive data directly into their application. There are a number of different types of system that can run a web map service and these include a web page viewed in an Internet browser, a map-viewing application or a GIS (any application that can communicate via the web and can handle images can be made to work with a WMS).

To connect to the OS OnDemand WMTS-like service, customers can use an Internet browser to access an HTML page containing an API key. This will allow customers to place a map on a web page.

This is illustrated in Figure 1 and Figure 2 below.

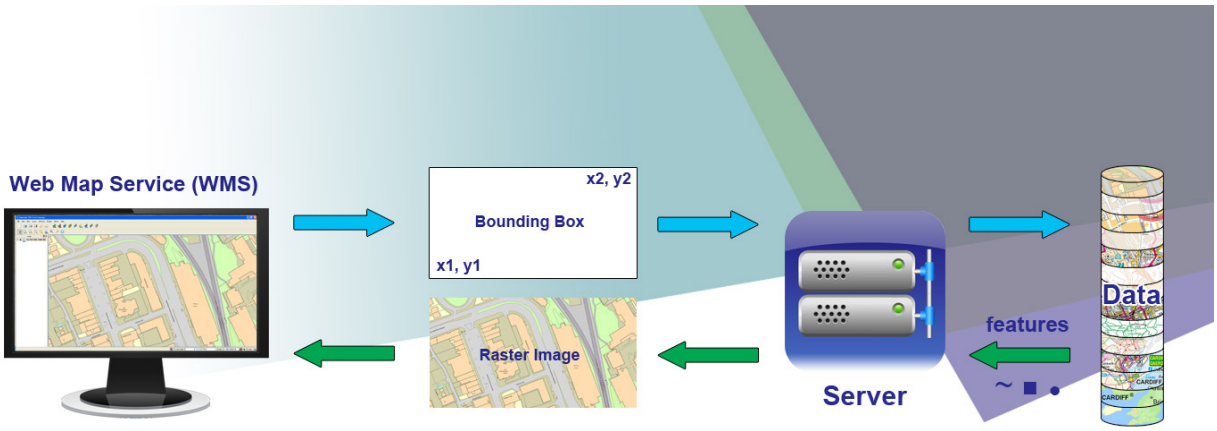
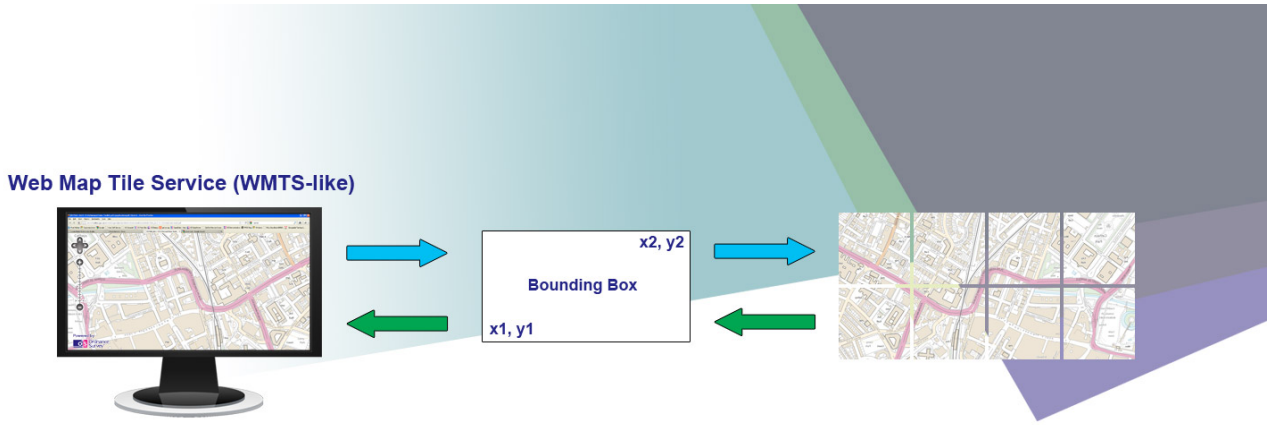


Figure 1: the supply of the OS OnDemand WMS service

Figure 2: the supply of the OS OnDemand WMTS-like



Applications

Building an application around OS OnDemand can provide many benefits, including:

- instant access to the most up-to-date raster views of Ordnance Survey data/location products can improve the quality of decision-making where location is involved;
- reduced reliance on IT infrastructure to support and serve geographic information;
- the ability to extend the functionality of existing mapping systems or incorporate the service into existing Internet/Intranet applications; and
- provide a more cost-effective solution than building and maintaining a stand-alone service.

Chapter 2 System requirements

OS OnDemand WMS

Many GIS are able to act as a client for OS OnDemand; a list of GIS vendors that are able to access OS OnDemand to OGC compliance standards can be found on the Ordnance Survey website: http://www.ordnancesurvey.co.uk/oswebsite/web-services/os-ondemand/compliant-software.html

If a customer already has a GIS, it is suggested that they contact their system supplier in the first instance to establish if a WMS client is available for their system. In all cases, customers should contact system suppliers first before subscribing to the OS OnDemand web map service. If an organisation has no existing systems, a list of software companies that provide systems that currently use Ordnance Survey products is available on the partner pages of the Ordnance Survey website and a list of compliant software can be obtained from: http://www.opengeospatial.org/resource/products/byspec

More technical information on the OS OnDemand service can be found in the technical specification.

The WMS service is very straightforward in terms of what it can do:

- a client sends a request for a map to the WMS; and
- the WMS then generates and returns an image of the results of the request, which is then displayed by the client.

The client, however, can be set up to provide more or less functionality. The functionality of the client is determined by the client provider (for example a software company) and what the organisation wants its users to be able to do with the maps. For example, a client could be configured to:

- request only certain maps (subject to scale constraints); and
- to display only certain maps at certain scales of view.

Different categories of user within an organisation could even have clients tailored specifically to their needs for geographic information. Prior to establishing a client, an organisation may like to consider the different way in which the geographic information available through OS OnDemand may be used and also what access, if any, to other sources of geographic information needs to be used within the client.

Once the client is enabled on a customer's computer, access to the service will be controlled by the terms of the contract with Ordnance Survey and the organisation's IT infrastructure, including any firewall and security protocols, which should be identified and tested to ensure an optimal service experience.

Chapter 4 explains, in detail, what data products are provided through this service.

OS OnDemand WMTS-like

The WMTS-like service is currently only available via the API. The API is a JavaScript® library that is accessed via an HTML page. In order to be able to view the HTML page, you require a web browser capable of supporting JavaScript. For further details, please refer to the OS OnDemand WMTS-like page:

http://www.ordnancesurvey.co.uk/oswebsite/support/web-services/configuring-os-ondemand-wmts.html

Chapter 3 Products

The service contains Great Britain coverage for separate raster products. Where the product is derived from a vector product (for example, OS MasterMap® Topography Layer), it is served as raster image based on a predesigned Style Layer Descriptor (SLD):

Product	WMS	WMTS-like
OS MasterMap Topography Layer (raster format image)	✔	
Beta OS MasterMap Topography Layer (raster format image)	✔	
OS MasterMap Integrated Transport Network™ Layer Road Network theme (raster format image)	✔	
OS MasterMap Integrated Transport Network Layer Road Routing Information theme (raster format image)	✔	
OS MasterMap Integrated Transport Network Layer Urban Paths theme (raster format image)	✔	
OS MasterMap Imagery Layer	✔	
OS VectorMap® Local	✔	✔
1:10 000 Scale Black and White Raster	✔	
1:10 000 Scale Raster	✔	
1:25 000 Scale Colour Raster	✔	✔
1:50 000 Scale Colour Raster	✔	✔
Land-Form PROFILE® contours	✔	
Land-Form PROFILE digital terrain model (DTM)	✔	
*GB Overview+	✔	✔
*GB Overview	✔	✔
OS OpenData™ products:		
OS VectorMap District	✔	✔
1:50 000 Scale Gazetteer	✔	*
1:250 000 Scale Colour Raster	✔	✔
Boundary-Line™	✔	*
Land-Form PANORAMA® Contours	✔	
Land-Form PANORAMA DTM	✔	
Meridian™ 2	✔	
MiniScale®	✔	✔
OS Locator™	✔	
Strategi®	✔	
OS Street View® (1:10 000 scale)	✔	✔
Code-Point® Open		*
ZoomMap stack		
CS00 – generated from Strategi		✔
CS01 – generated from Strategi and Land-Form PANORAMA		✔
CS02 – generated from Strategi and Land-Form PANORAMA		✔
CS03 – generated from Strategi and Land-Form PANORAMA		✔
CS04 – generated from Strategi and Land-Form PANORAMA		✔
CS05 – generated from Strategi and Land-Form PANORAMA		✔
CS06 – generated from OS VectorMap District, Strategi and Land-Form PANORAMA		✔

	CS07 – generated from OS VectorMap District, Strategi and Land-Form PANORAMA		✔
	CS08 – generated from OS VectorMap District, Strategi and Land-Form PANORAMA		✔
	CS09 – generated from OS VectorMap Local		✔
	CS10 – generated from OS VectorMap Local		✔

* lookups

For more information on individual products, please see the product web pages on the Ordnance Survey website: http://www.ordnancesurvey.co.uk/oswebsite/products/index.html.

Scale ratios

Both OS OnDemand web services have built-in, preset scale ranges for each product and show them at a suggested optimal scale.

More information, including extracts and suggested scale thresholds for each product, can be found within the technical specification.

In the case of the WMTS-like service, the product selection is predefined into 10 zoom levels that are hard-coded into the API itself.

Chapter 4 Support

The OS OnDemand service is available 24/7, with telephone support from 8.30 am to 5.30 pm, Monday to Friday, direct to the Ordnance Survey Customer Service Centre.

Availability and service parameters

Service levels	WMS	WMTS-like
Service availability	99.9%*	99.9%* Monitored by Information Systems site confidence
Planned maintenance	8.00 pm – 8.00 am weekdays and weekends Seven days' notice is provided for planned maintenance	8.00 am – 10.00 pm Thursdays and 8.00 am – 2.00 pm Sundays Five days' notice is provided for planned maintenance

Key service metrics

	WMS	WMTS-like
Hosted infrastructure management	99.9% 24/7 – 365 days** Amazon® cloud	99.9% 24/7 – 365 days** Amazon cloud
Software and data throughput.	24/7 – 365 days	24/7 – 365 days
Application and data backup and disaster recovery	24/7 – 365 days	24/7 – 365 days

**excluding planned maintenance

Transaction metrics are based on requests for 500 x 500 pixel data requests.

Access to help

Ordnance Survey provides telephone support for queries on service availability, subscription and technical information about the service itself from 8.30 am to 5.30 pm, Monday to Friday, through the Customer Service Centre. Contact details can be found in the preface to this guide.

For assistance on setting up and using a client to access the service, customers are urged to contact their system supplier and their IT security manager. The IT security manager is likely to be responsible for and understand firewall and IT security protocols, so is likely to able to offer advice on an optimal solution for accessing and onward managing of the OS OnDemand web service.

Annexe A Product and service performance report form

Ordnance Survey welcomes feedback from its customers about OS OnDemand.

If you would like to share your thoughts with us, please print a copy of this form and when completed post or fax it to the address below.

Your name: .....

Organisation: .....

Address: .....

.....

.....

Postcode: .....

Phone: .....

Fax: .....

Email: .....

Quotation or order reference: .....

Please record your comments or feedback in the space below. We will acknowledge receipt of your form within three (3) working days and provide you with a full reply or a status report within 21 working days.

If you are posting this form, please send it to:

OS OnDemand Product Manager, Ordnance Survey, Adanac Drive, SOUTHAMPTON, SO16 0AS.

If you wish to return it by fax, please dial +44 (0)23 8005 6159.

Any personal information that you supply with this report form will be used by Ordnance Survey only in the improvement of its products and services. It will not be made available to third parties.

OS OnDemand

Technical specification

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Introduction

Purpose of this specification and disclaimer

This is the technical specification (hereafter referred to as the specification) applicable to the OS OnDemand web map service (WMS) and web map tile 'like' service (WMTS-like), (hereafter referred to as the product), which is referred to in the Framework Direct Licence, Specific Use Framework Partner Licence or your other customer contract for the product.

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Chapter 1 Overview

This document describes how to access the OS OnDemand web map service (WMS) provided by Ordnance Survey. OS OnDemand also offers a web map tile service (WMTS-like). The technical specification for this service option is available in the OS OnDemand WMTS-like page:

http://www.ordnancesurvey.co.uk/oswebsite/support/web-services/configuring-os-ondemand-wmts.html

The OS OnDemand WMS service is designed to allow clients to make Hypertext Transfer Protocol (HTTP) map requests, with the content of the map being determined by a series of WMS parameters. The relevant map image is composed by the WMS and streamed back to the client. The service is Open Geospatial Consortium (OGC) WMS 1.1.1 and WMS 1.3.0 compliant and provides access to a range of Ordnance Survey data products. The OS OnDemand service includes data for the whole of Great Britain and requests for maps can be made at any scale. However, only the appropriate data products for the scale of the map requested will be rendered on the output image. The service uses digital rights management (DRM) to (blue) mask areas not licensed for viewing.

This document does not attempt to provide a detailed description of the WMS specification. Instead, it attempts to guide users in making appropriate requests to the service. For further information on the WMS 1.1.1 and WMS 1.3.0 specification, please refer to http://www.opengeospatial.org/docs/01-068r3.pdf.

As an OGC WMS 1.1.1 and WMS 1.3.0 compliant service, there are two main types of request that a WMS client can make to OS OnDemand:

- GetCapabilities – these requests will return a document to the client software that will describe the capability of the service; and
- GetMap – these requests will return a map image according to the parameters specified by the client.

For OS MasterMap Imagery Layer only, we also support the GetFeatureInfo request, which returns the metadata (date flown and so on) for this layer.

GetCapabilities

A GetCapabilities request will return an XML document that describes to the client making the request what features are supported by the OS OnDemand service. A capabilities document can be retrieved using the following URL:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetCapabilities

Annexe B contains the XML document that the above request returns. There are two main sections to the document: service and capability. The service section contains general metadata about the service, such as the title of the service and an abstract describing the service.

The capability section is divided into three main groups of information: request, exception and layer. The request section contains details of the WMS requests supported by the service, along with details of the response format and the location (URL) and type for the request. For example, the following section from the GetCapabilities document describes the GetMap request:

```
<GetMap>
      <Format>image/png</Format>
      <Format>image/gif</Format>
      <Format>image/jpeg</Format>
      <DCPType>
            <HTTP>
                  <Get>
                        <OnlineResource
                        xlink:href="http://osondemand.ordnancesurvey.co.uk:80/on
                        demand/wms?" xlink:type="simple"/>
                  </Get>
            </HTTP>
      </DCPType>
</GetMap>
```

In this fragment, there are three elements named ‘Format’; the content of these elements tell the requesting client what formats are available to request. In this case, there is the choice of either JPEG, GIF or PNG. The ‘DCPType’ element describes to the client how it can make a GetMap request. In this case, the client will know that it must perform a HTTP GET request to the xlink:href attribute of the ‘OnlineResource’ element.

The exception section describes the formats it will return service errors in. A service exception will typically occur when an incorrect request is made, for example, when insufficient parameters are included in the GetMap request:

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<ServiceExceptionReport  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="http://schemas.opengis.net/wms/1.3.0/exceptions_1
_3_0.xsd"  >
      <ServiceException code="ParameterEmpty">
      Parameter value for LAYERS is empty
      </ServiceException>
</ServiceExceptionReport>
```

This is an exception returned as a result of an incorrectly formed GetMap request. This exception tells us that the request was missing the 'LAYERS' parameter.

The final section of a GetCapabilities document is 'Layer'; this is the section that describes the core capabilities of the OS OnDemand service. The Layer section contains the following key elements:

- **CRS** – a list of the Coordinate Reference Systems supported by the service;
- **LatLonBoundingBox** – the bounding box for the service described in latitude and longitude;
- **BoundingBox** – the bounding box for the service described in British National Grid eastings and northings; and
- **Layer** – a list of layer elements, one for each layer available in the service.

The list of layer elements describes all of the layers (Ordnance Survey products) available in the service. The attributes of each layer element provide further information about the layer:

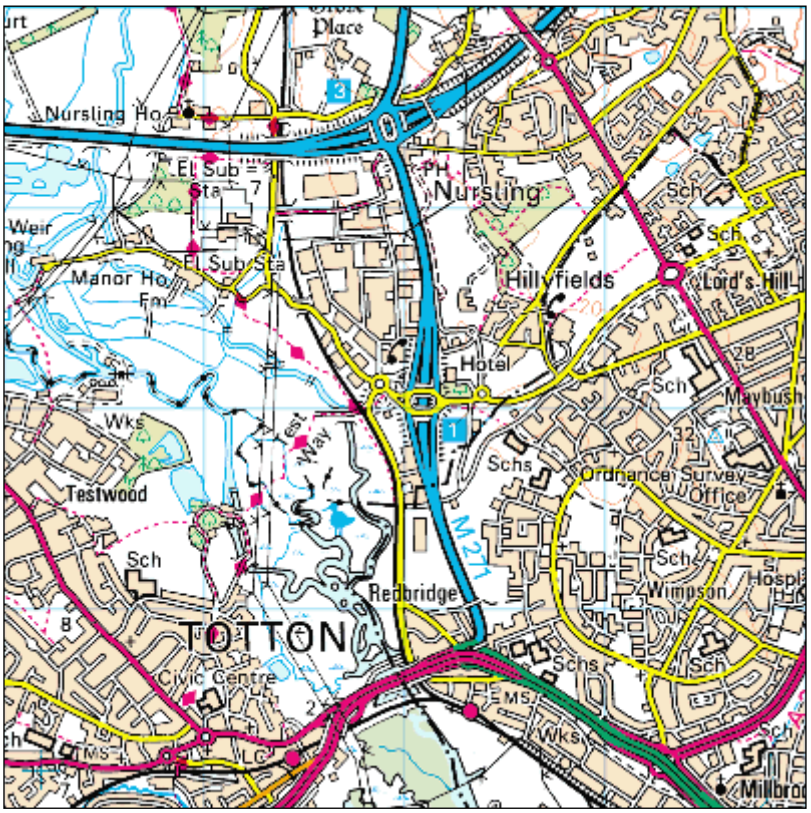
- **queryable** – a Boolean value indicating if a GetFeatureInfo request can be made for this layer.
- **Name** – a string value that provides the identifier for this layer in a GetMap request.
- **Title** – a string value that provides the name for this layer to be used in a GUI. For OS OnDemand, this is the name of the product delivered in this layer.
- **CRS** – the default coordinate reference system for this layer, expressed as an EPSG identifier (http://www.epsg.org/).
- **LatLonBoundingBox** – the extents for this layer expressed as the minx, miny, maxx and maxy coordinates.

A more complete discussion of the GetCapabilities document returned by a WMS can be found on the OGC website.

The GetMap WMS parameters

A GetMap request will return a map image. An example of a GetMap WMS request to the service is shown below:
http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=435000,113000,439000,117000&WIDTH=400&HEIGHT=400&&LAYERS=MMAREA,MMLINE,MMBDY,MMSYM,MMPT,MMTXT,50K,SV&FORMAT=image/GIF&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

The map output from this request is as follows:



The display of individual map layers is also controlled by scale thresholds that are automatically applied. In the sample request above, even though multiple layer indexes were specified in the Layers parameter, only 1:50 000 Scale Colour Raster data was displayed in the resultant map. This is because most data layers are only appropriate for a particular scale range. See chapter 2 for a more detailed description of this topic.

The WMS request can be broken down into the following constituent elements:

Base URL

`http://osondemand.ordnancesurvey.co.uk/ondemand/wms?`

The base URL identifies the WMS service to which requests are to be made. Map-specific parameters are appended to this URL to define the properties of the required map.

REQUEST

`REQUEST=GetMap`

For a map image request, the REQUEST parameter should always be set to GetMap. This parameter is mandatory.

VERSION

`VERSION=1.1.1 or VERSION=1.3.0`

This parameter specifies the version of the WMS request. The OS OnDemand service is 1.1.1 and 1.3.0 compliant. This parameter is not mandatory; if it is not included the service will default to version 1.3.0.

SERVICE

`SERVICE=WMS`

If present this parameter should always be set to WMS; however the parameter itself is not mandatory.

CRS

`CRS=EPSG:27700`

This parameter defines the coordinate reference system of the bounding coordinates in the BBOX parameter. We recommend that the value of this parameter should be EPSG:27700, which indicates the British National Grid. However the service also supports EPSG:4258, which indicates the ETRS89 projection and EPSG:4326 which indicates the WGS84 projection. However with both of these projections the BBOX coordinates must also be in the relevant projection. This parameter is mandatory.

BBOX

`BBOX=435000,113000,439000,117000`

This parameter represents the bounding coordinates for the required map. The order of the coordinates is: <minimum east>,<minimum north>,<maximum east>,<maximum north>. If an invalid bounding box is supplied, where for example the minimum easting is greater than the maximum easting, an XML service exception will be returned. If ETRS89 or WGS84 projections are used in the CRS parameter then the BBOX coordinates need to also be in these projections as decimal latitude and longitude. This parameter is mandatory.

WIDTH and HEIGHT

`WIDTH=400&HEIGHT=400`

These parameters define the width and height of the returned map image in pixels. This parameter is mandatory.

LAYERS

`LAYERS=MMAREA,MMLINE,MMBDY,MMSYM,MMPT,MMTXT,50K,SV`

The Layers parameter defines which map layers should be displayed on the map. If more than one layer is specified, each should be separated by a comma. This parameter is mandatory. For the OS OnDemand service, map layers should be referenced by product index name, as detailed below:

Product layer	**Index**
OS MasterMap Topography area (raster format image)	MMAREA
OS MasterMap Topography line (raster format image)	MMLINE
OS MasterMap Boundary-Line (raster format image)	MMBDY
OS MasterMap Cartographic Symbol (raster format image)	MMSYM
OS MasterMap Topographic Point Symbol (raster format image)	MMPT
OS MasterMap Cartographic Text (raster format image)	MMTXT
Beta OS MasterMap Topography area (raster format image) ‡	MMAREA2
Beta OS MasterMap Topography line (raster format image) ‡	MMLINE2
Beta OS MasterMap Boundary-Line (raster format image) ‡	MMBDY2
Beta OS MasterMap Cartographic Symbol (raster format image) ‡	MMSYM2
Beta OS MasterMap Topographic Point Symbol (raster format image) ‡	MMPT2
Beta OS MasterMap Cartographic Text (raster format image) ‡	MMTXT2
OS MasterMap Integrated Transport Network Layer (raster format image)	MMITNR
OS MasterMap Integrated Transport Network Layer Urban Paths theme (raster format image)	MMITNP
OS MasterMap Imagery Layer	IMA25

OS VectorMap Local	VML
1:10 000 Scale Black and White Raster	10KBW
1:10 000 Scale Raster	10KC
1:25 000 Scale Colour Raster	25K
1:50 000 Scale Colour Raster	50K
Land-Form PROFILE Contours	PROCONT
Land-Form PROFILE DTM	PRODTM
GB Overview+ *	OV1
GB Overview *	OV0
OS OpenData products:	
OS VectorMap District	VMD
1:50 000 Scale Gazetteer	GAZ
1:250 000 Scale Colour Raster	250K
Boundary-Line	BL
Land-Form PANORAMA Contours	PANCONT
Land-Form PANORAMA DTM	PANDTM
Meridian 2	M2
MiniScale	MS
OS Locator	LOC
Strategi	STRAT
OS Street View (1:10 000 scale)	SV

* GB Overview and GB Overview+ do not form part of the Ordnance Survey product portfolio but are used to provide context at very small scales.

‡ The Beta OS MasterMap Topography layers are an optional backdrop mapping style.

FORMAT

`FORMAT=image/GIF`

This parameter specifies the format of the output image. The possible values are image/GIF, image/PNG and image/JPEG. This parameter is mandatory.

BGCOLOR

`BGCOLOR=0xFFFFFF`

This parameter specifies the background colour in hexadecimal format. This background colour will only be seen when a transparent layer is displayed. This parameter is not mandatory.

TRANSPARENT

`TRANSPARENT=TRUE`

This parameter specifies whether the map background is to be made transparent or not. The valid values are `TRUE` or `FALSE`. This parameter is most useful when vector data is being requested, so the image can be overlaid on another background image by the client. It should be noted that the JPEG format does not support transparency and so the value of this parameter will be overridden by the service. This parameter is not mandatory.

EXCEPTIONS

`EXCEPTIONS=XML`

This parameter specifies the format of any exceptions. This parameter is not mandatory.

The GetFeatureInfo WMS parameters

A GetFeatureInfo request will return an XML, HTML or plain text document dependent on the format parameters. An example of a GetFeatureInfo WMS request to the service is shown below:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetFeatureInfo&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=435000,113000,439000,117000&WIDTH=400&HEIGHT=400&INFO_FORMAT=text/plain&LAYERS=IMA25&QUERY_LAYERS=IMA25&I=200&J=200&EXCEPTIONS=XML

The output from this request is as follows:

```
Results for FeatureType 'ima25_metadata':
--------------------------------------------
the_geom = [GEOMETRY (MultiPolygon) with 5 points]
kmref = SU3614
copyright = Ordnance Survey, (c) Crown Copyright
version = 7
dateflown = 2012-03-29
dateflown2 =
lensfocall = 100.5
flyinght = 3783.03
imagescale = 1:37650
resolution = 0.25
filesize = 45.807
control = GPS and OSTN02
createdby = Ordnance Survey
correction = Orthorectified
kmrectangl = 436000,114000 437000,115000
--------------------------------------------
```

The WMS GetFeatureInfo request can be broken down into the following constituent elements:

Base URL

`http://osondemand.ordnancesurvey.co.uk/ondemand/wms?`

The base URL identifies the WMS service to which requests are to be made. Map-specific parameters are appended to this URL to define the properties of the required map.

REQUEST

`REQUEST= GetFeatureInfo`

For a GetFeatureInfo request, the REQUEST parameter should always be set to GetFeatureInfo. This parameter is mandatory.

VERSION

`VERSION=1.1.1 or VERSION=1.3.0`

This parameter specifies the version of the WMS request. The OS OnDemand service is 1.1.1 and 1.3.0 compliant. This parameter is not mandatory; if it is not included the service will default to version 1.3.0.

SERVICE

`SERVICE=WMS`

If present this parameter should always be set to WMS; however the parameter itself is not mandatory.

CRS

`CRS=EPSG:27700`

This parameter defines the coordinate reference system of the bounding coordinates in the BBOX parameter. We recommend that the value of this parameter should be EPSG:27700, which indicates the British National Grid. However the service also supports EPSG:4258, which indicates the ETRS89 projection and EPSG:4326, which indicates the WGS84 projection. However, with both of these projections, the BBOX coordinates must also be in the relevant projection. This parameter is mandatory.

BBOX

`BBOX=435000,113000,439000,117000`

This parameter represents the bounding coordinates for the required request. The order of the coordinates is: <minimum east>, <minimum north>, <maximum east>, <maximum north>. If an invalid bounding box is supplied; where for example, the minimum easting is greater than the maximum easting, an XML service exception will be returned. If ETRS89 or WGS84 projections are used in the CRS parameter then the BBOX coordinates need to also be in these projections as decimal latitude and longitude. This parameter is mandatory.

WIDTH and HEIGHT

`WIDTH=400&HEIGHT=400`

These parameters define the width and height of the returned map image in pixels. This parameter is mandatory.

LAYERS

`LAYERS=IMA25`

The Layers parameter defines which layers should be requested. If more than one layer is specified, each should be separated by a comma. This parameter is mandatory. For the OS OnDemand service, map layers should be referenced by product index name but the only map layer that will return a GetFeatureInfo request is the OS MasterMap Imagery Layer, which is referenced with IMA25.

QUERY LAYERS

`QUERY_LAYERS=IMA25`

The Query Layers parameter defines which layers from which features should be requested. If more than one layer is specified, each should be separated by a comma. This parameter is mandatory. For the OS OnDemand service, map layers should be referenced by product index name but the only map layer that will return a GetFeatureInfo request is the OS MasterMap Imagery Layer, which is referenced with IMA25.

INFO FORMAT

`INFO_FORMAT=text/plain`

The INFO FORMAT parameter defines the format that features should be returned in. This parameter is mandatory. For the OS OnDemand service, features can be requested in plain text (text/plain), HTML (text/html) or GML 2 (application/vnd.ogc.gml).

PIXEL COLUMN (X or I) and PIXEL ROW (Y or J)

`I=200&J=200`

These parameters define the pixel position of the feature to be returned. In version 1.1.1 of the OGC WMS specification these were specified as parameters X and Y. In version 1.3.0 these are now parameters I and J. These parameters are mandatory.

EXCEPTIONS

`EXCEPTIONS=XML`

This parameter specifies the format of any exceptions. This parameter is not mandatory.

Chapter 2 Scale ratios for map products

The display of individual layers in OS OnDemand is controlled by scale threshold settings. This is to ensure that the appropriate map products are automatically displayed for the map scale requested. The map scale is a function of the BBOX (bounding box) and WIDTH (pixel width) and HEIGHT (pixel height) WMS parameters.

The scale of the map requested can be represented in terms of metres per pixel as follows:

- (maximum easting – minimum easting) / (pixel width)

For example, a WMS request might contain the following parameters:

`BBOX=410000,110000,450000,140000&WIDTH=400&HEIGHT=400`

The map scale in terms of metres per pixel is:

- (450000 – 410000) / 400 = 100 metres per pixel

Although a map can be requested at any scale, raster map products will demonstrate optimal quality at particular scales. The table at annexe C shows the suggested map scale for each product, as well as the scales at which the products are available. Maps can be requested at intermediate scales, but the resulting image might show slight pixilation.

Chapter 3 Data layer details

This chapter gives examples of the GetMap commands for each product in the OS OnDemand service, starting with the smallest scale data, MiniScale.

MiniScale

Suggested scale: 100 metres per pixel

Example request:

```
http://osondemand.ordnancesurvey.co.uk/ondemand/wms?version=1.3.0&request=GetMap&WIDTH=500&HEIGHT=500&crs=EPSG:27700&BBox=412295,90543,462295,140543&layers=MS&format=image/png&bgcolor=0xFFFFFF&transparent=TRUE&exceptions=XML
```

Output:

1:250 000 Scale Colour Raster

Suggested scale: 25 metres per pixel

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=431045,109293,443545,121793&WIDTH=500&HEIGHT=500&LAYERS=250K&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

Output:

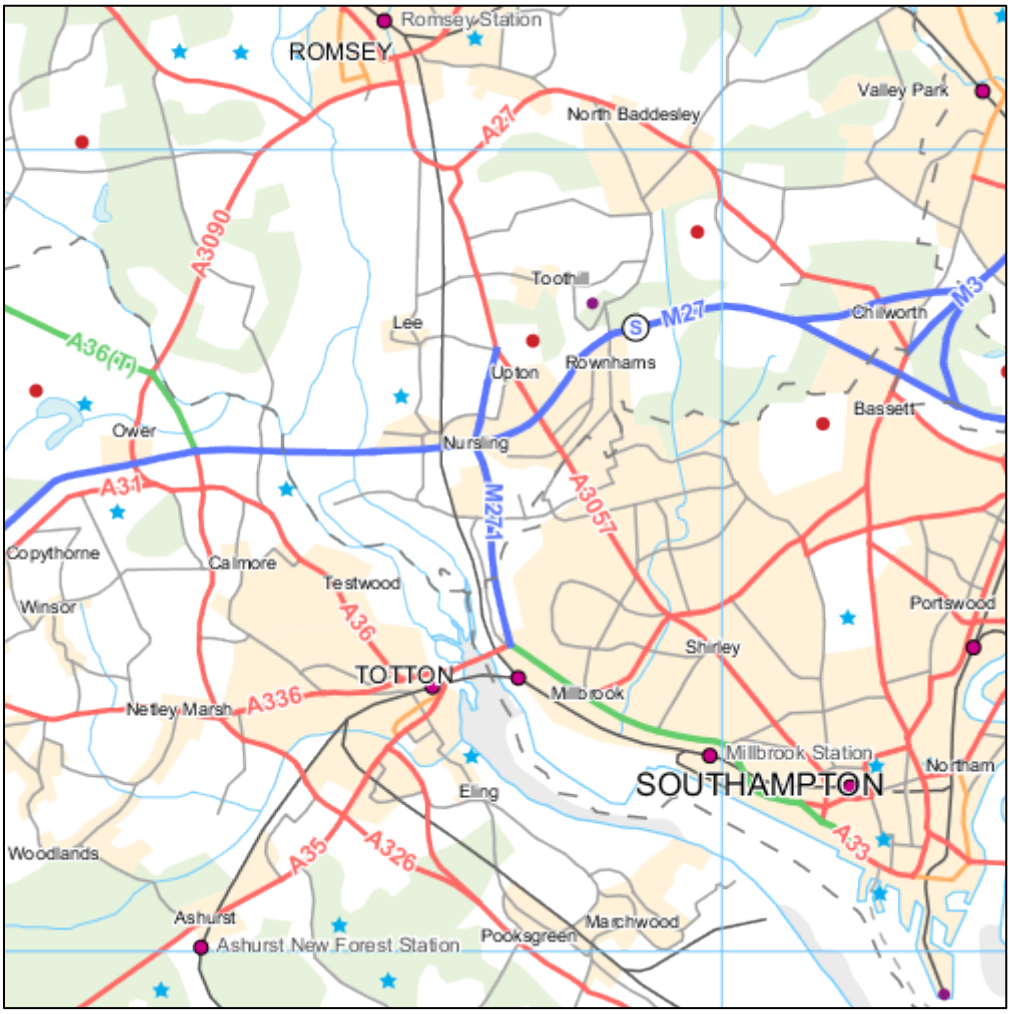
Strategi

Suggested scale: 25 metres per pixel

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=431045,109293,443545,121793&WIDTH=500&HEIGHT=500&LAYERS=STRAT&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

Output:



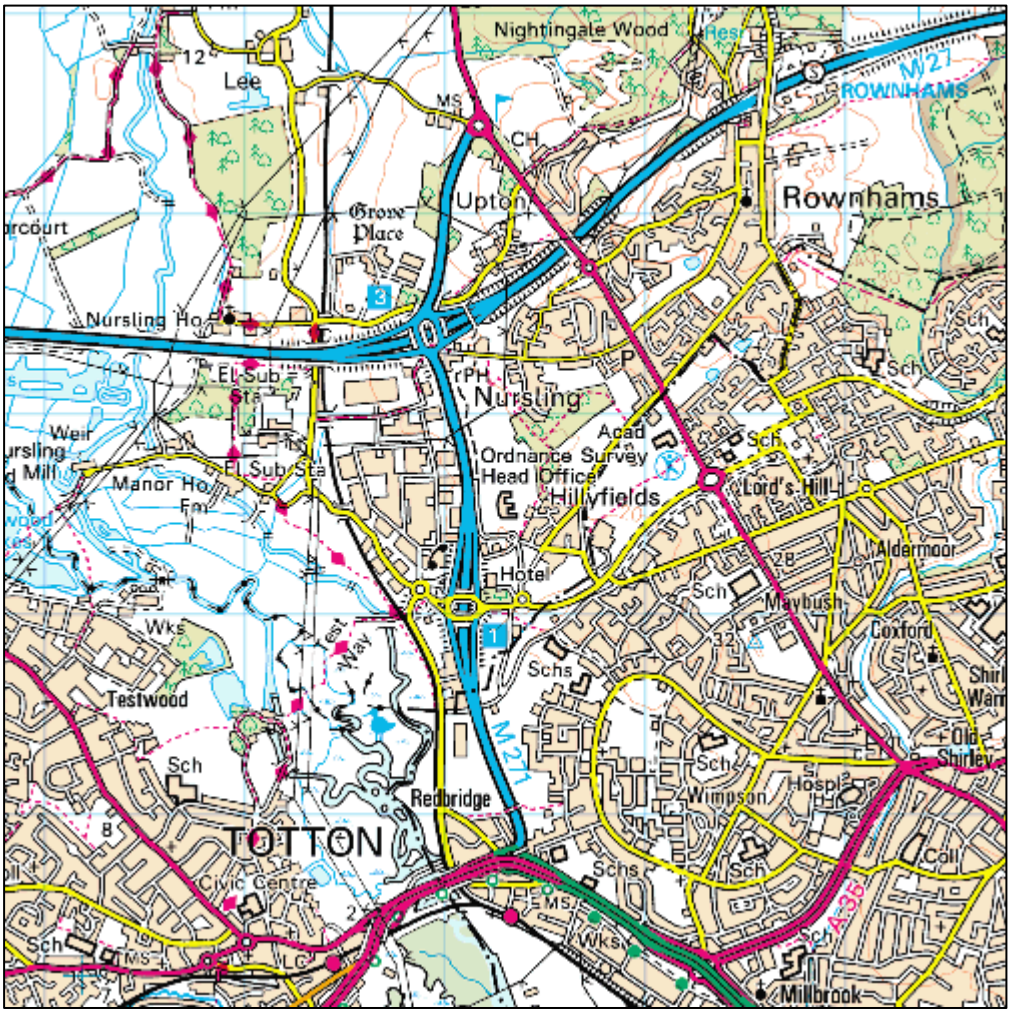
1: 50 000 Scale Colour Raster

Suggested scale: 10 metres per pixel

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=434795,113043,439795,118043&WIDTH=500&HEIGHT=500&LAYERS=50K&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

Output:



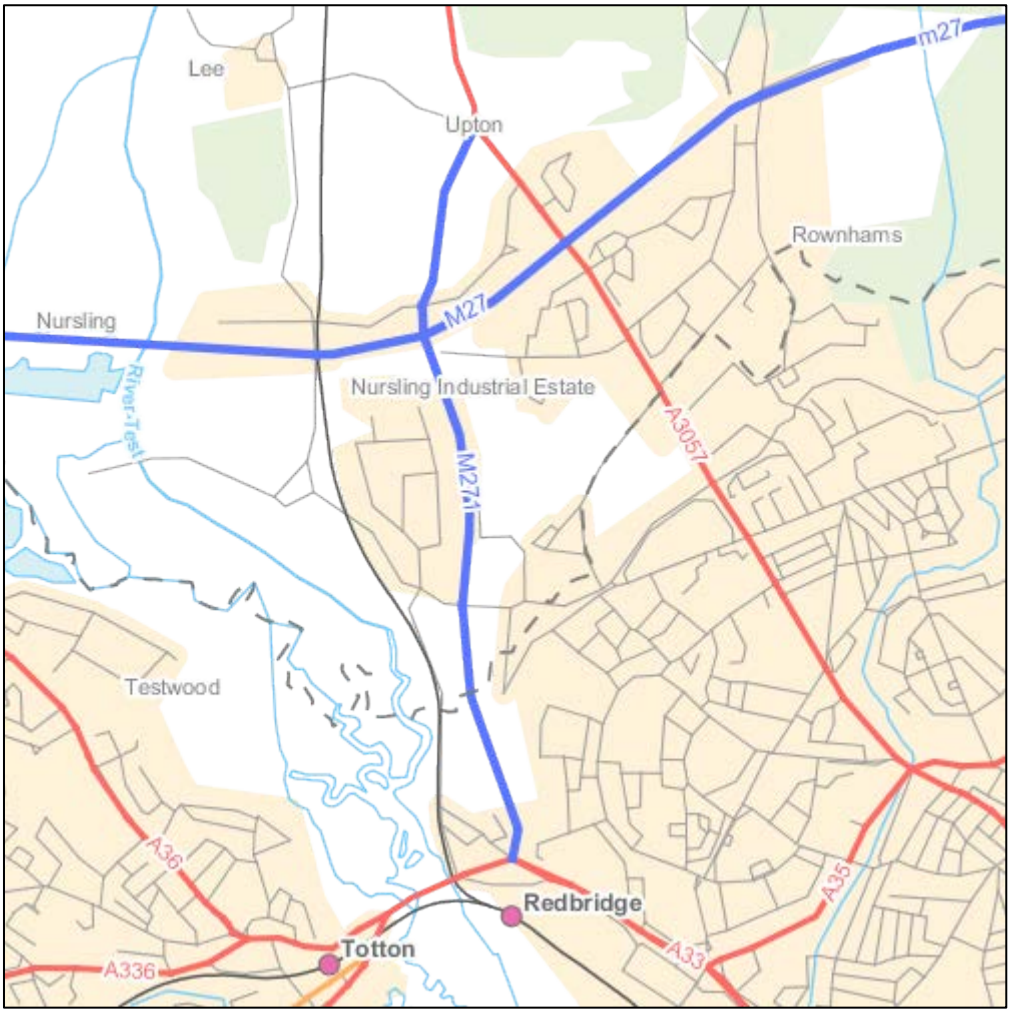
Meridian 2

Suggested scale: 10 metres per pixel

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=434795,113043,439795,118043&WIDTH=500&HEIGHT=500&LAYERS=M2&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

Output:



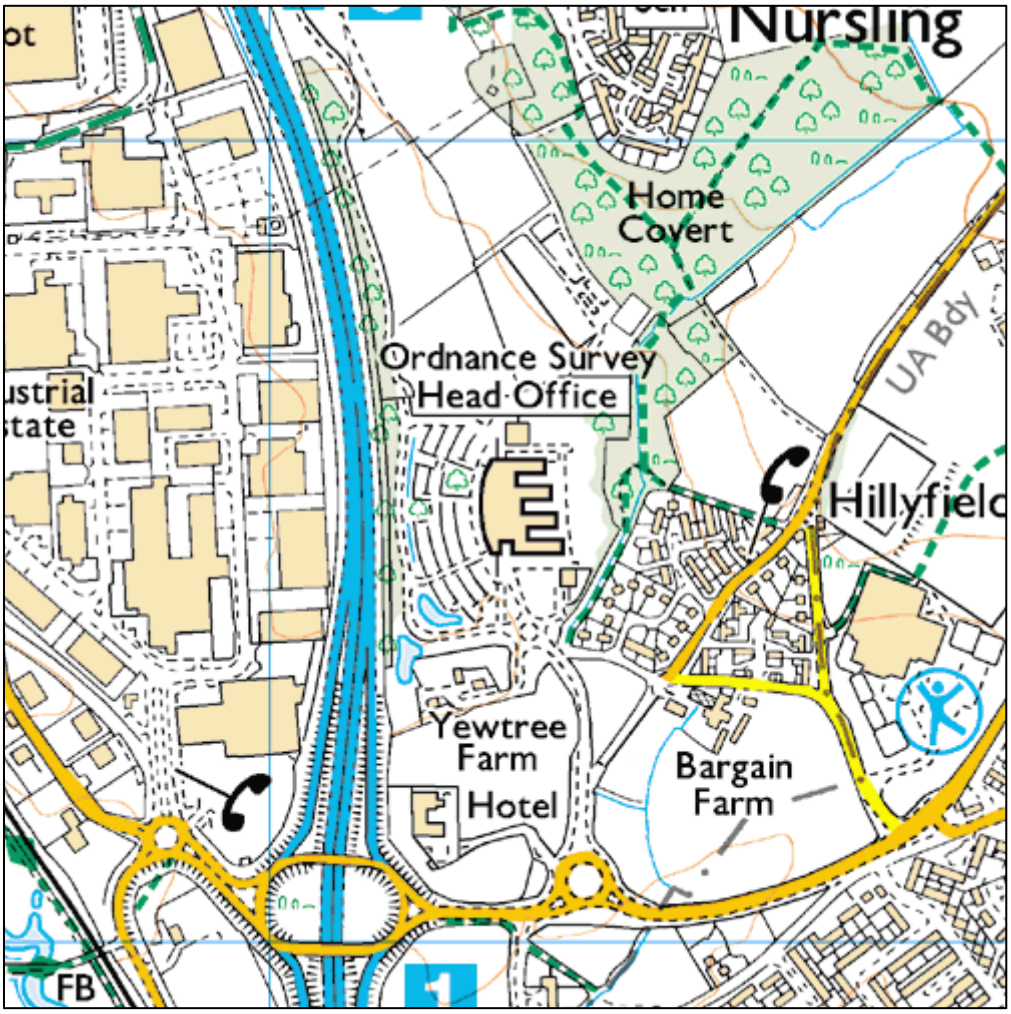
1:25 000 Scale Colour Raster

Suggested scale: 2.5 metres per pixel

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=436045,114293,438545,116793&WIDTH=500&HEIGHT=500&LAYERS=25K&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

Output:



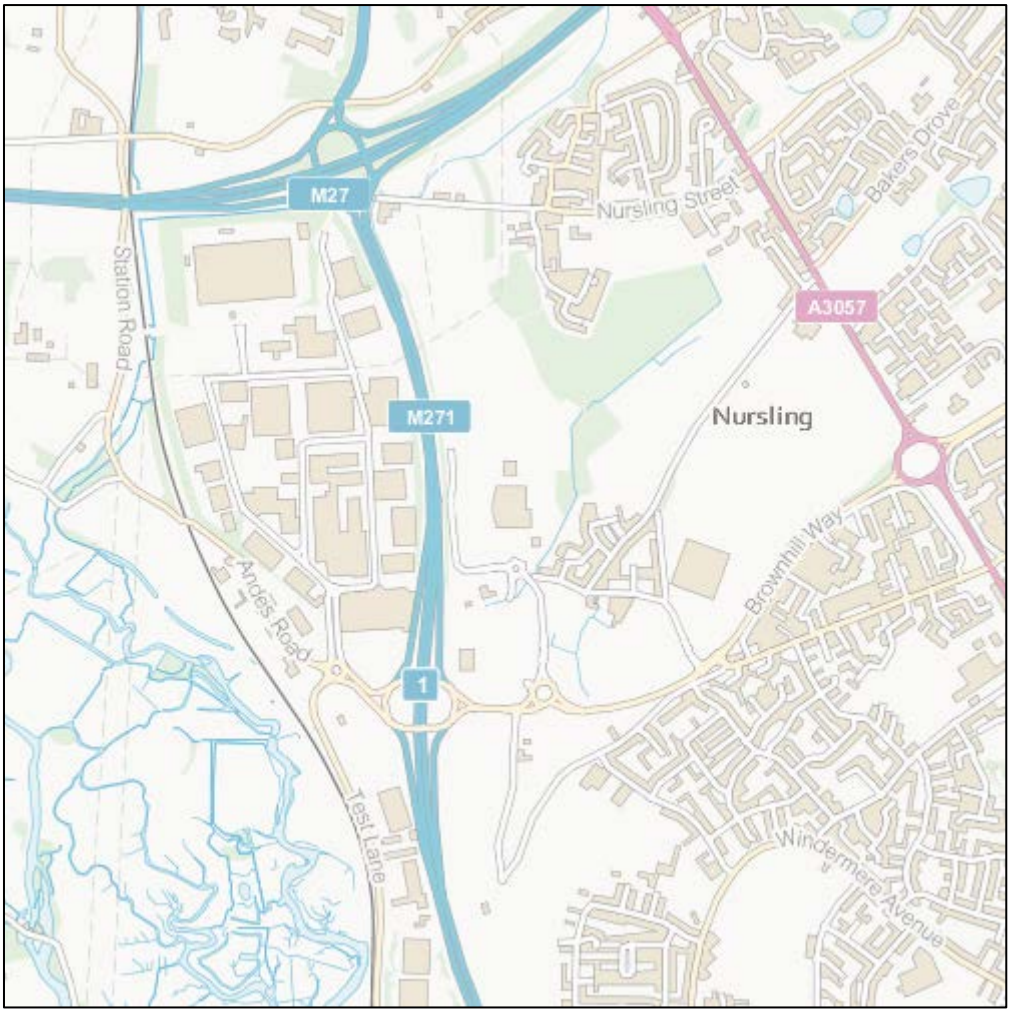
OS VectorMap District

Suggested scale: 2.55 metres per pixel

Example request:

```
http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=436045,114293,438545,116793&WIDTH=500&HEIGHT=500&LAYERS=VMD&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML
```

Output:



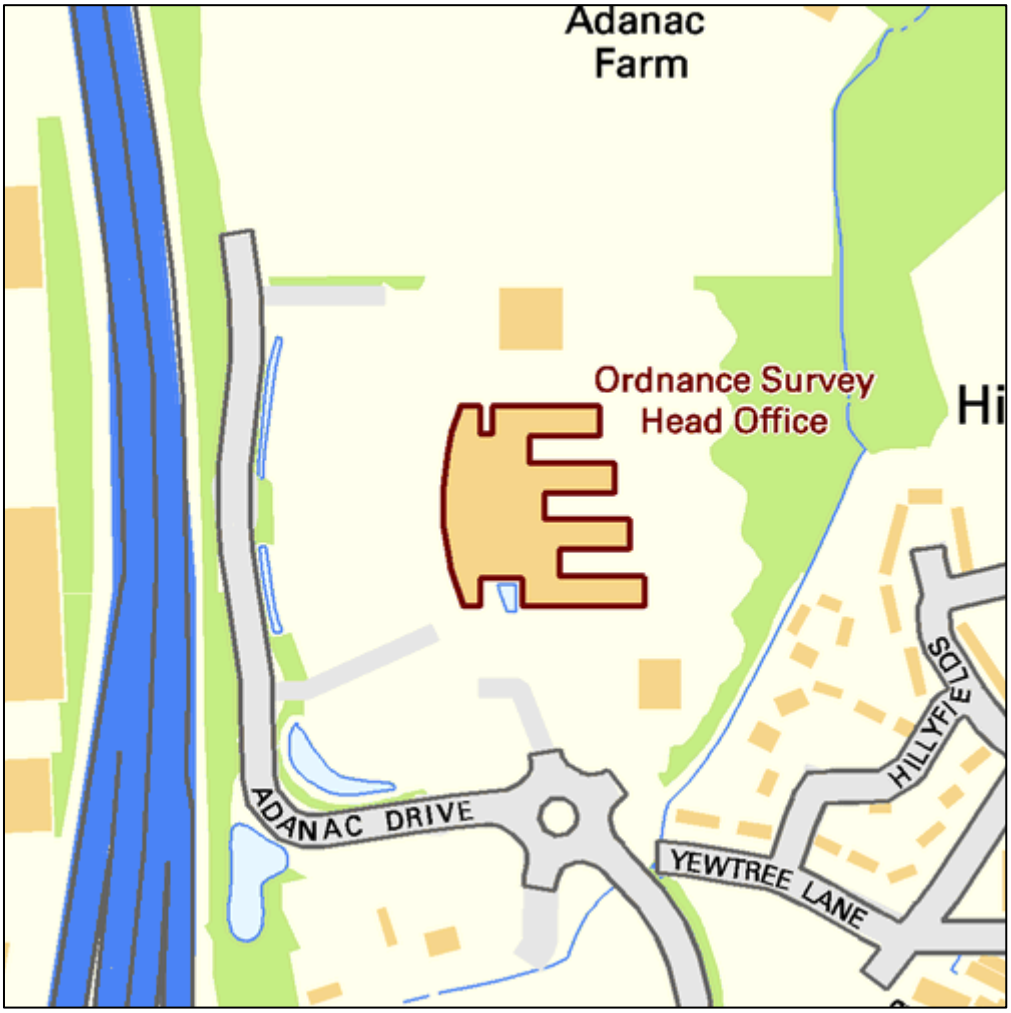
OS Street View

Suggested scale: 1 metre per pixel

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=437045,115293,437545,115793&WIDTH=500&HEIGHT=500&LAYERS=SV&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

Output:



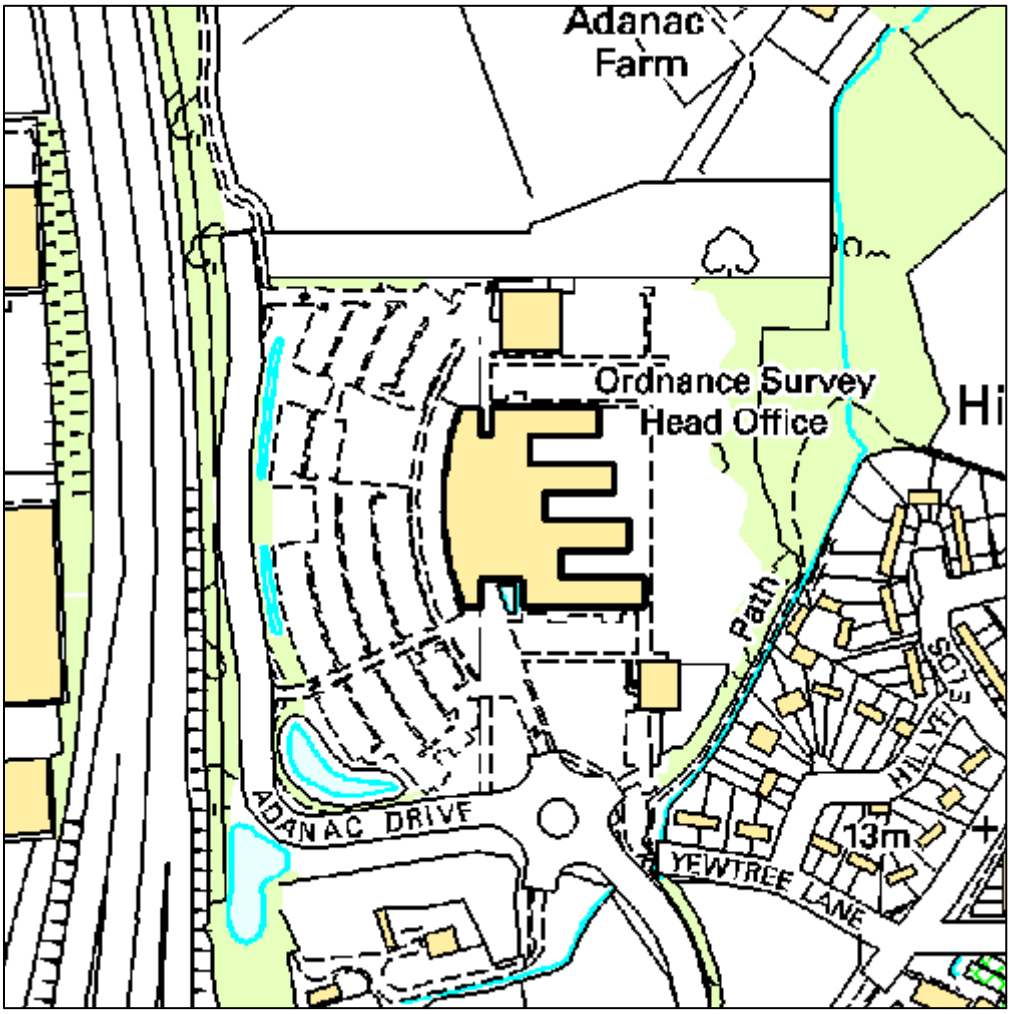
1:10 000 Scale Colour Raster

Suggested scale: 1 metre per pixel

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=437045,115293,437545,115793&WIDTH=500&HEIGHT=500&LAYERS=10KC&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

Output:



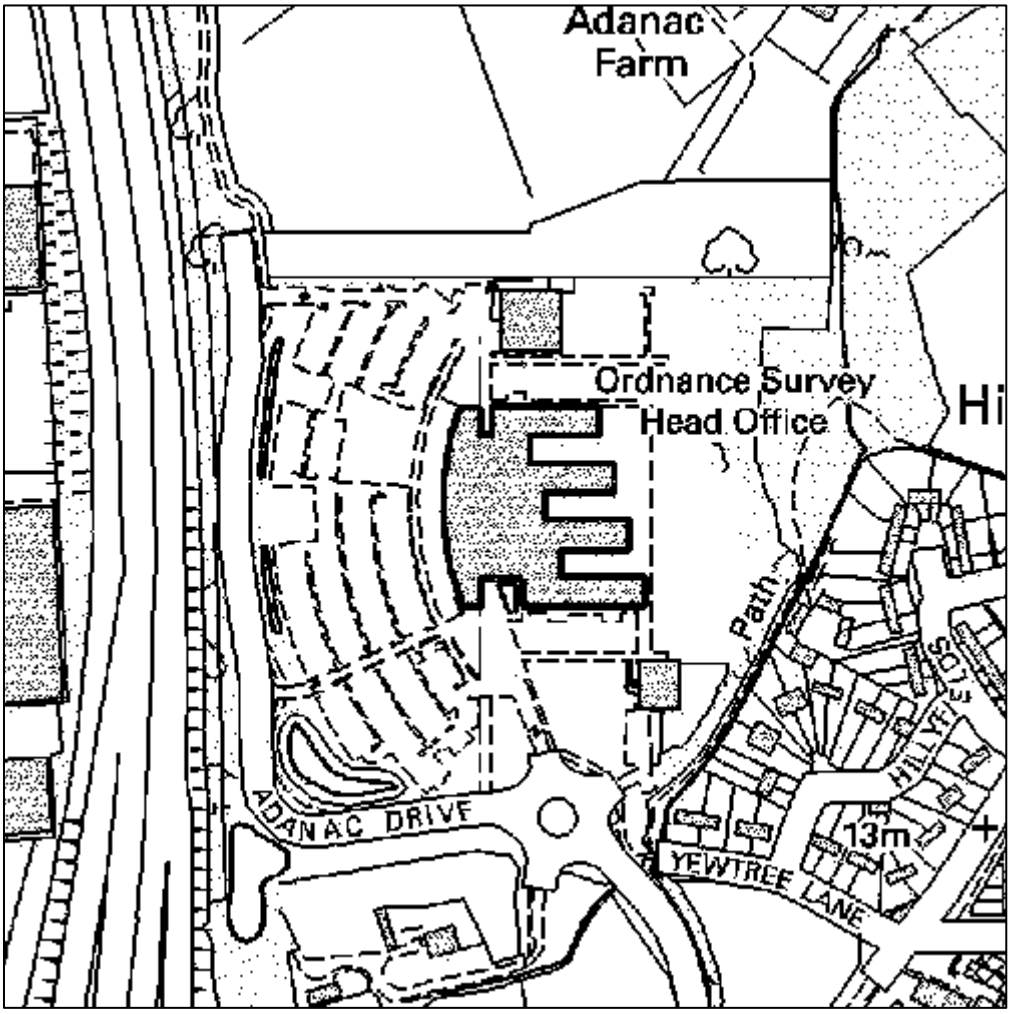
1:10 000 Scale Black and White Raster

Suggested scale: 1 metre per pixel

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=437045,115293,437545,115793&WIDTH=500&HEIGHT=500&LAYERS=10KBW&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

Output:



OS VectorMap Local

Suggested scale: 1 metre per pixel

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=437045,115293,437545,115793&WIDTH=500&HEIGHT=500&LAYERS=VML&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

Output:

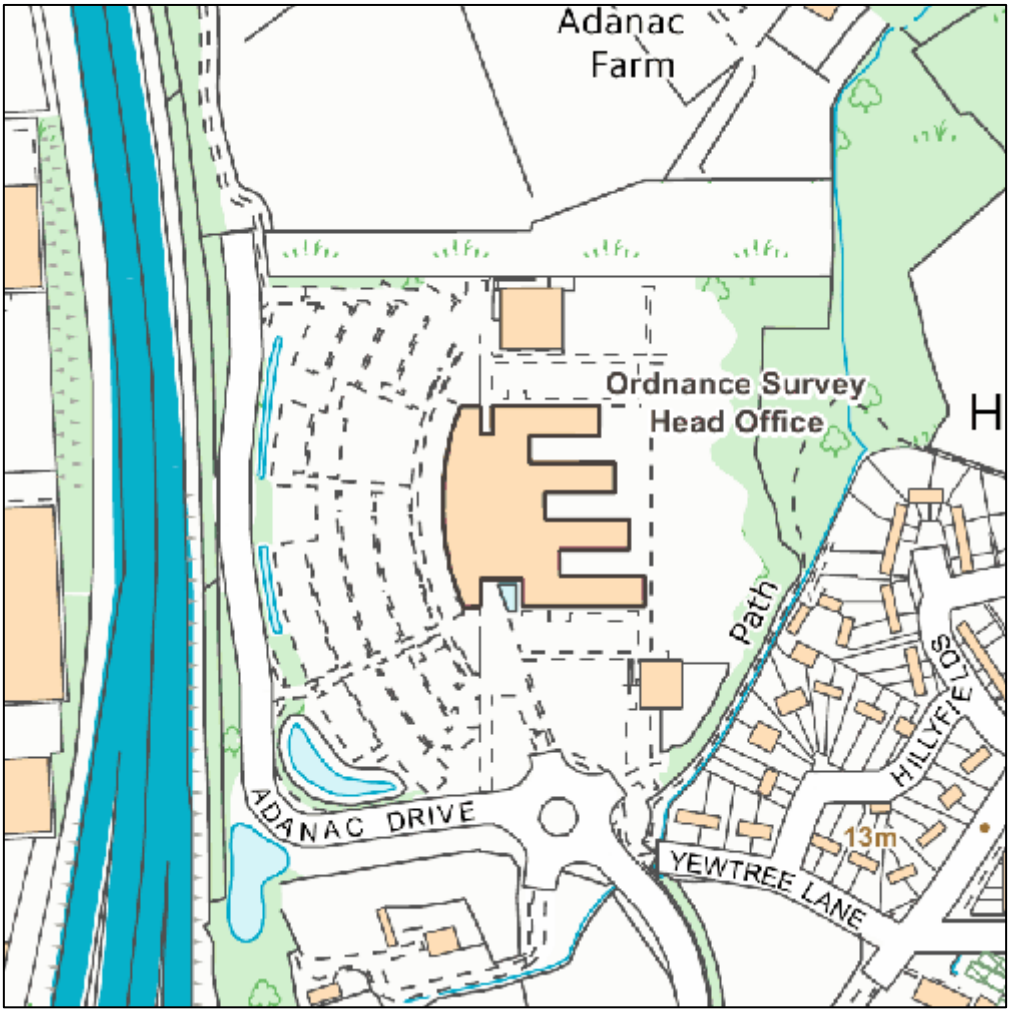
OS VectorMap Local Colour Raster

Suggested scale: 1 metre per pixel

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=437045,115293,437545,115793&WIDTH=500&HEIGHT=500&LAYERS=VMLCRAS&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

Output:



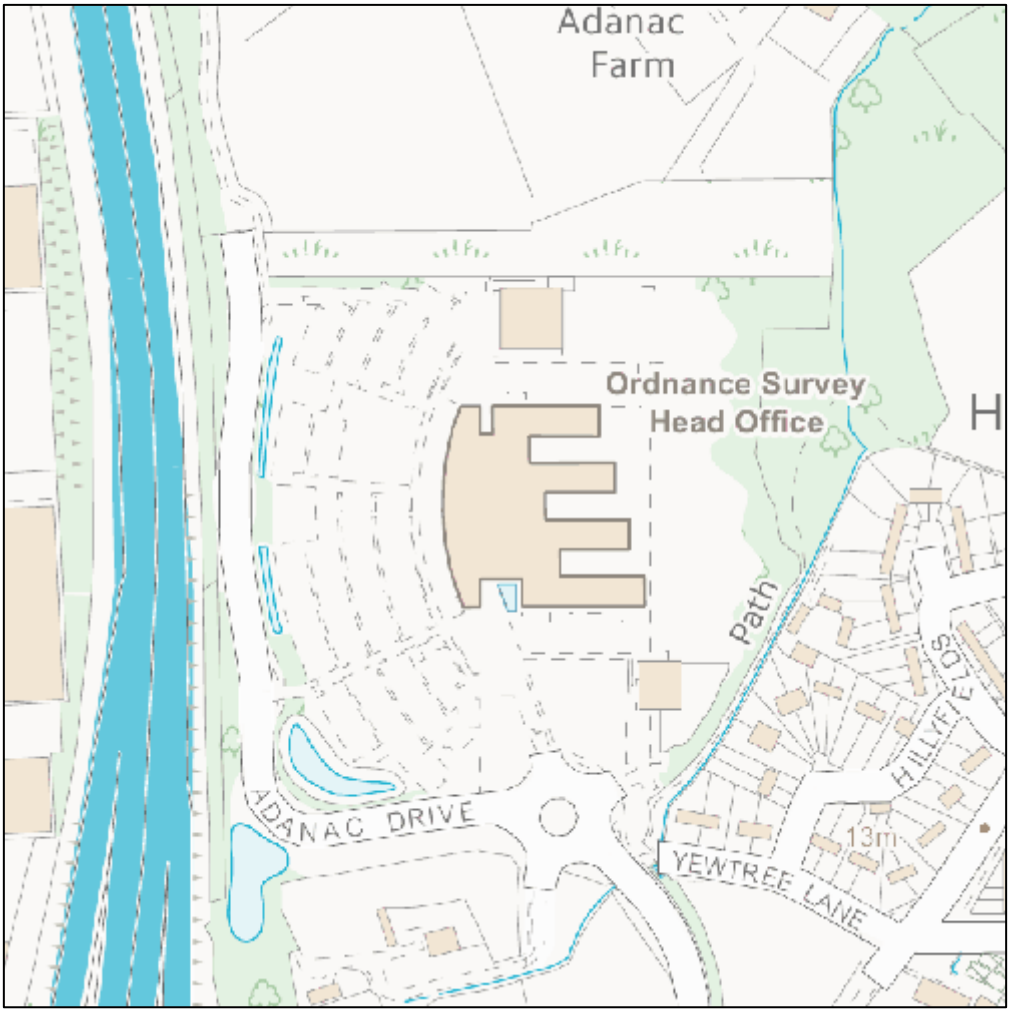
OS VectorMap Local Colour Backdrop Raster

Suggested scale: 1 metre per pixel

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=437045,115293,437545,115793&WIDTH=500&HEIGHT=500&LAYERS=VMLBCRAS&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

Output:



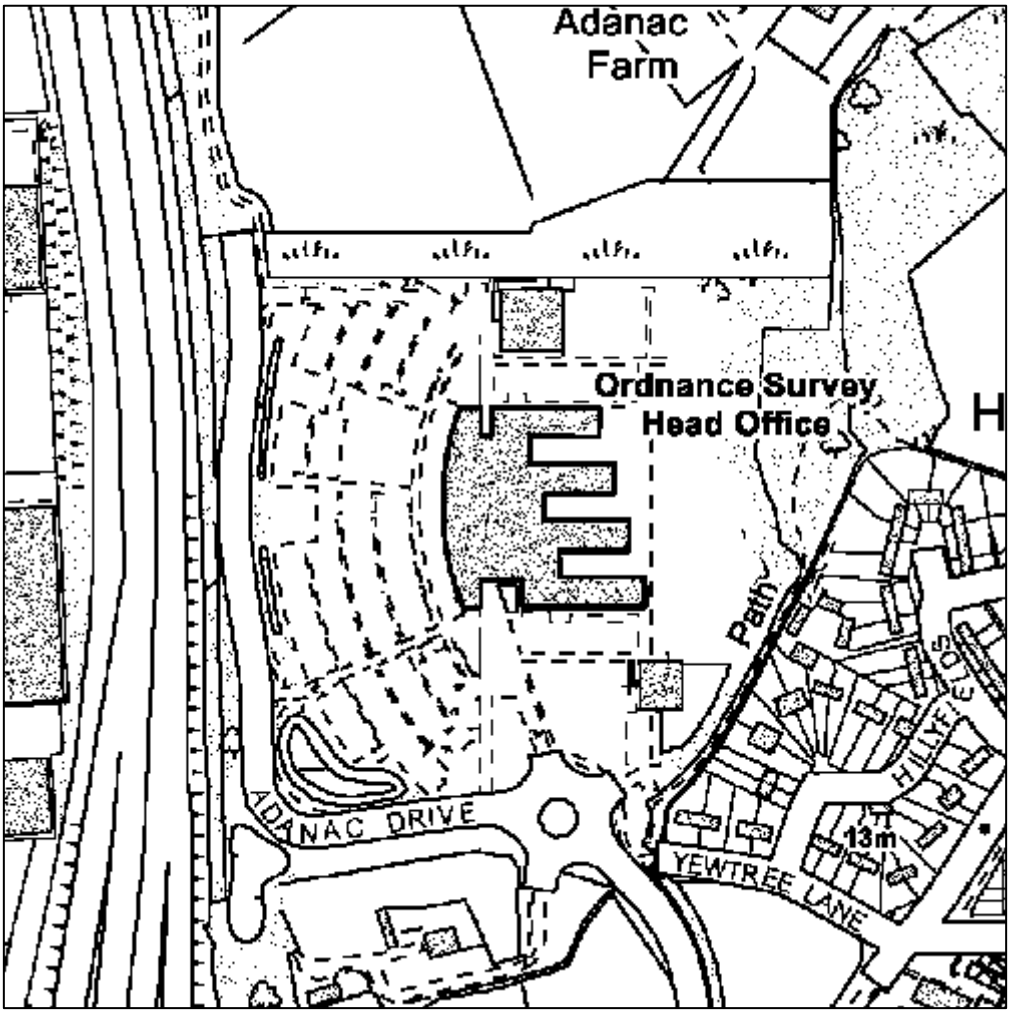
OS VectorMap Local Black and White Raster

Suggested scale: 1 metre per pixel

Example request:

```
http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=437045,115293,437545,115793&WIDTH=500&HEIGHT=500&LAYERS=VMLBWRAS&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML
```

Output:



OS MasterMap Topography Layer

OS OnDemand renders OS MasterMap Topography Layer into six separate image layers, as described in the discussion of the 'LAYERS' WMS parameter. The OS MasterMap features are stylised similar to the OS MasterMap User guide:

http://www.ordnancesurvey.co.uk/docs/user-guides/os-mastermap-topography-layer-user-guide.pdf

There is also an optional backdrop style available using the product index names above.

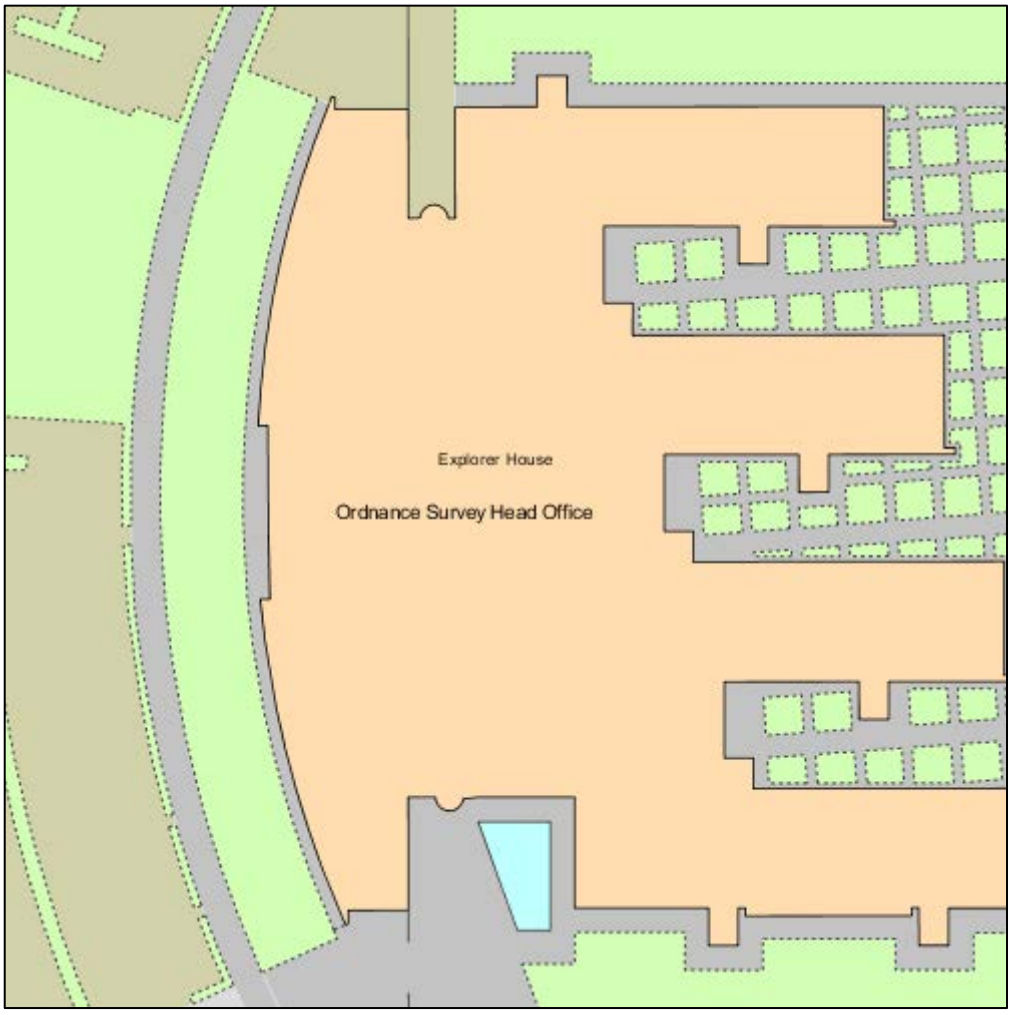
Maps can be requested at any scale between 0.01 and 0.979 metres per pixel. Maps at smaller scales will also be generated more quickly, as less data is being rendered by the WMS server. The map below has been generated at 0.25 metres per pixel, which provides a clear rendering of text and symbols.

Suggested scale: 0.25 metres per pixel

Example request:

```
http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=437232.5,115480.5,437357.5,115605.5&WIDTH=500&HEIGHT=500&LAYERS=MMAREA,MMTXT,MMPT,MMSYM,MMBDY,MMLINE&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML
```

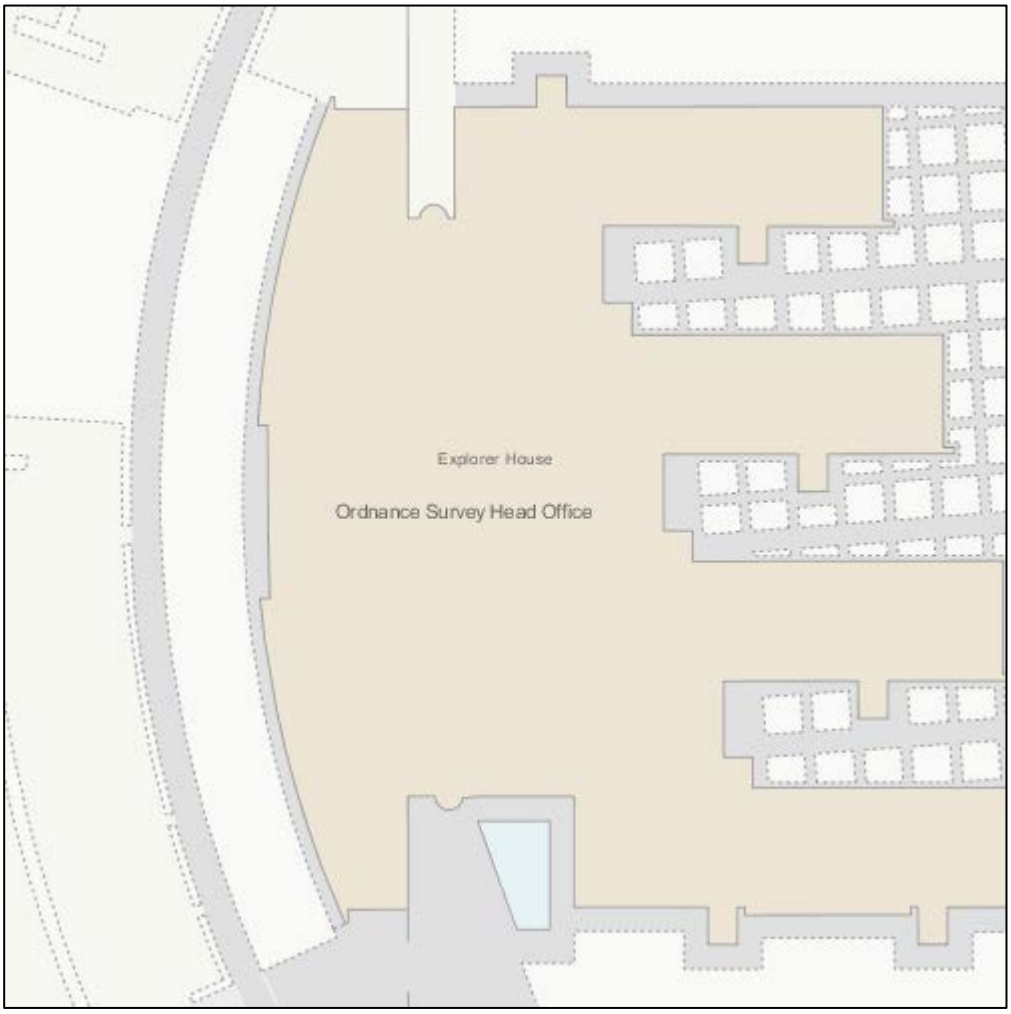
Output:



Example request for optional backdrop style:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=437232.5,115480.5,437357.5,115605.5&WIDTH=500&HEIGHT=500&LAYERS=MMAREA2,MMTXT2,MMPT2,MMSYM2,MMBDY2,MMLINE2&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

Output:



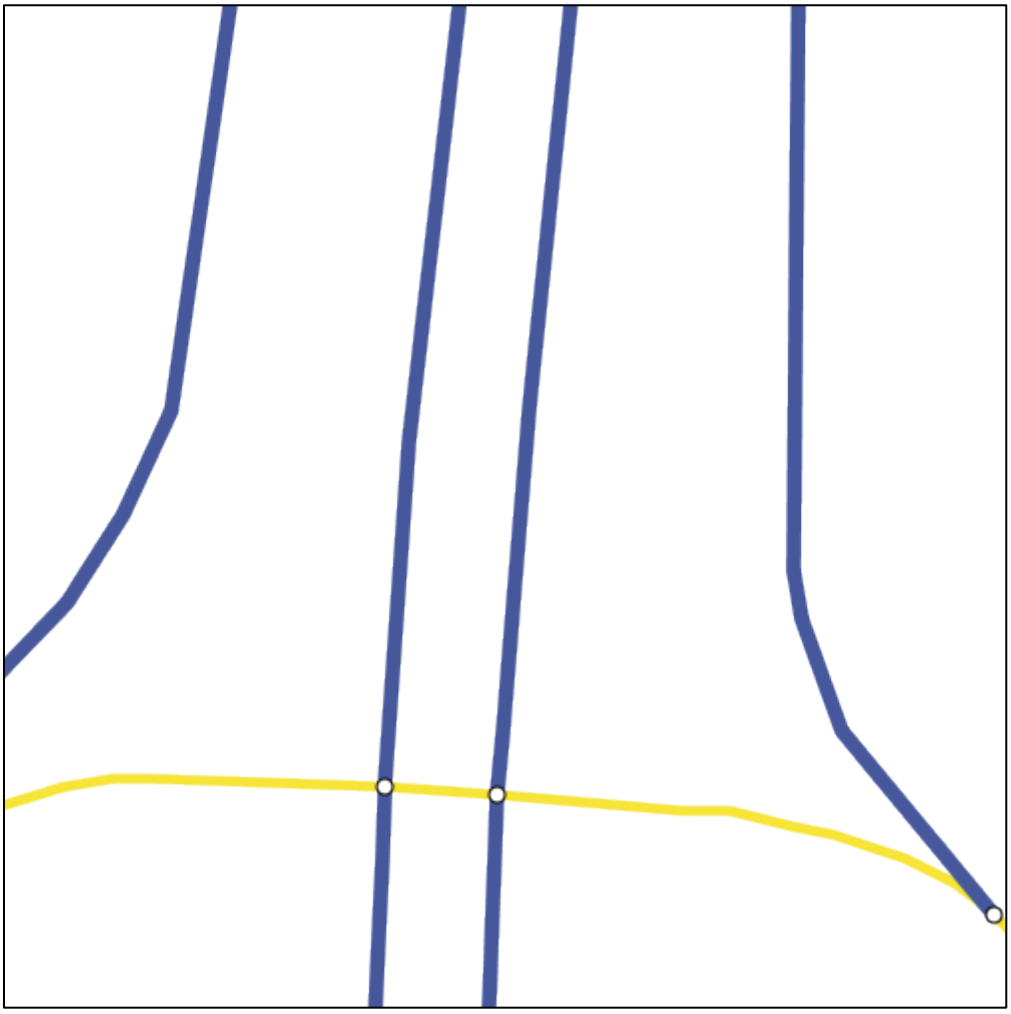
OS MasterMap Integrated Transport Network Layer

Suggested scale: 0.25 metres per pixel

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=437032.5,115080.5,437157.5,115205.5&WIDTH=500&HEIGHT=500&LAYERS=MMITNR&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

Output:



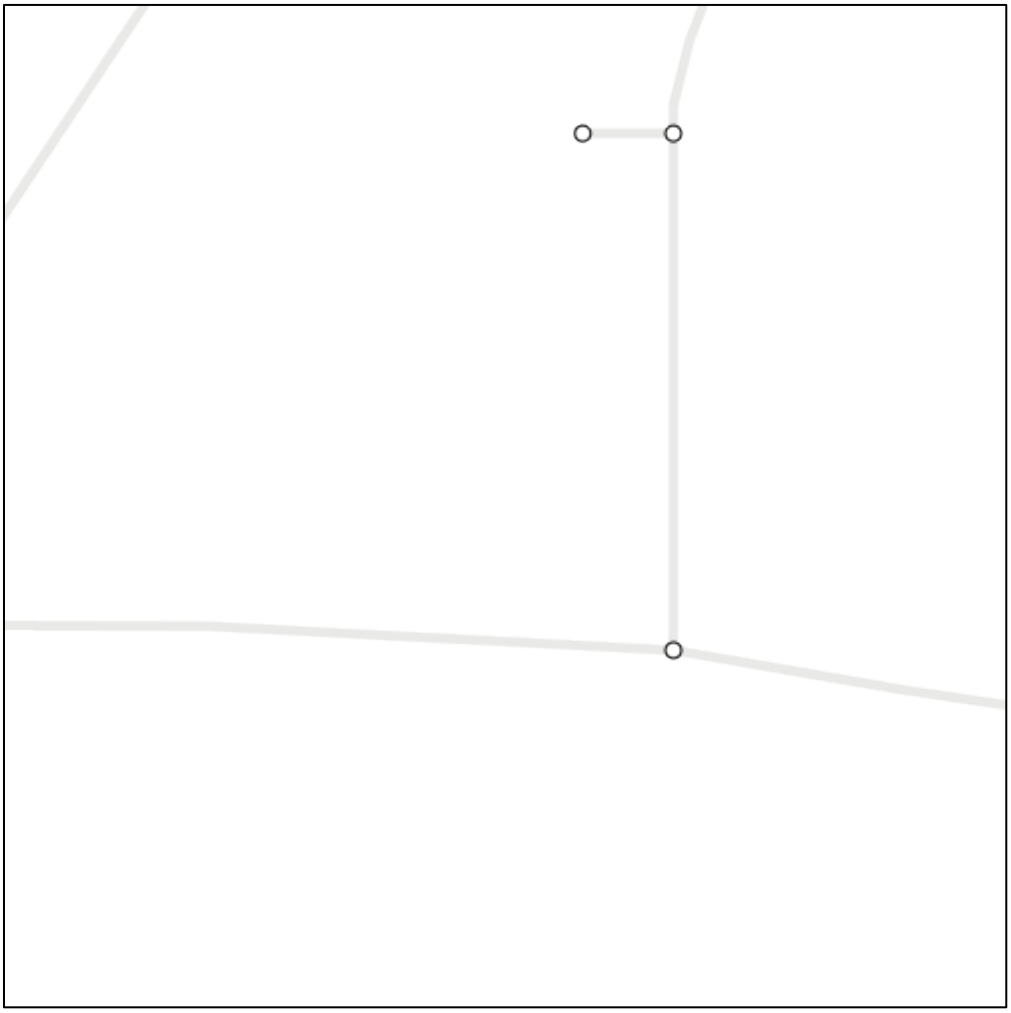
OS MasterMap Integrated Transport Network Layer Urban Paths

Suggested scale: 0.25 metres per pixel

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=437532.5,115280.5,437657.5,115405.5&WIDTH=500&HEIGHT=500&LAYERS=MMITNR&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

Output:



OS MasterMap Imagery Layer

Suggested scale: 0.25 metres per pixel

Example request:

```
http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=437232.5,115480.5,437357.5,115605.5&WIDTH=500&HEIGHT=500&LAYERS=IMA25&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML
```

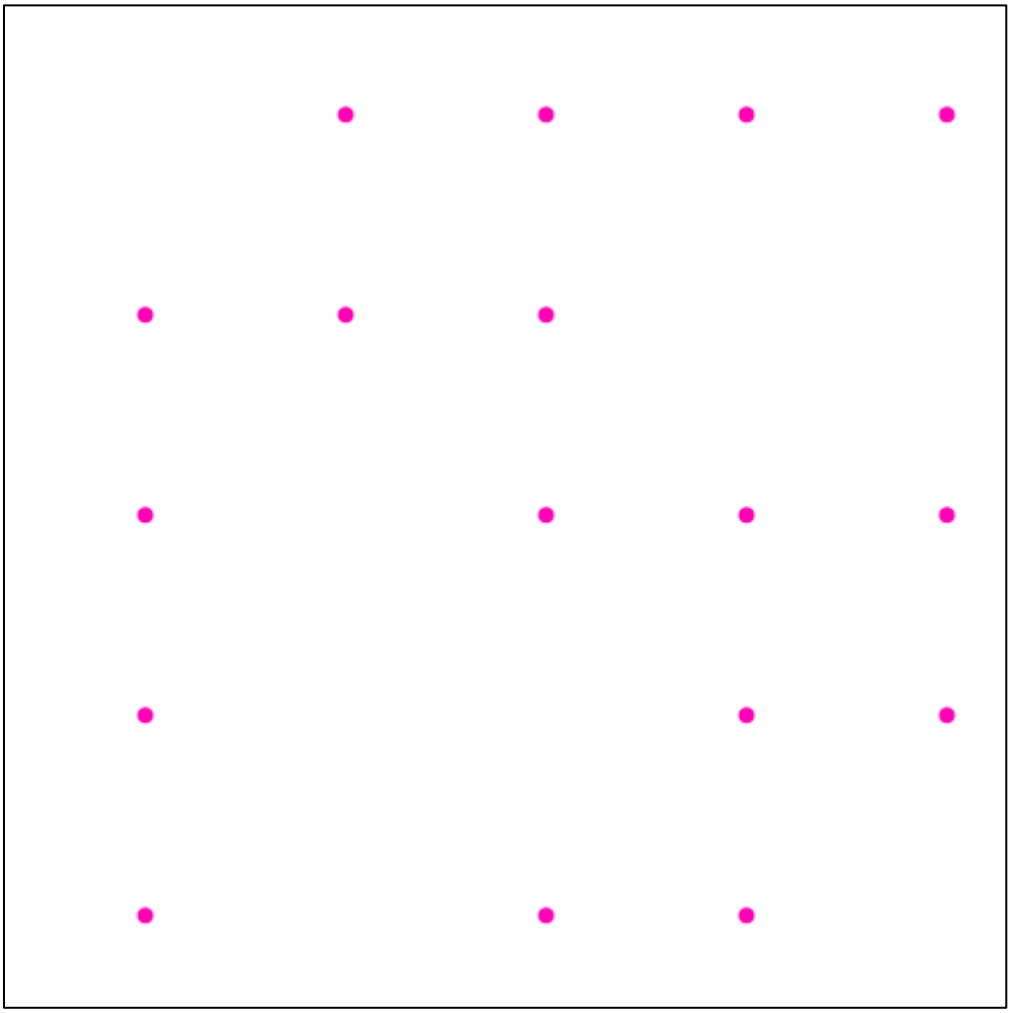
Output:

1:50 000 Scale Gazetteer

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=434795,113043,439795,118043&WIDTH=500&HEIGHT=500&LAYERS=50KGAZ&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

Output:

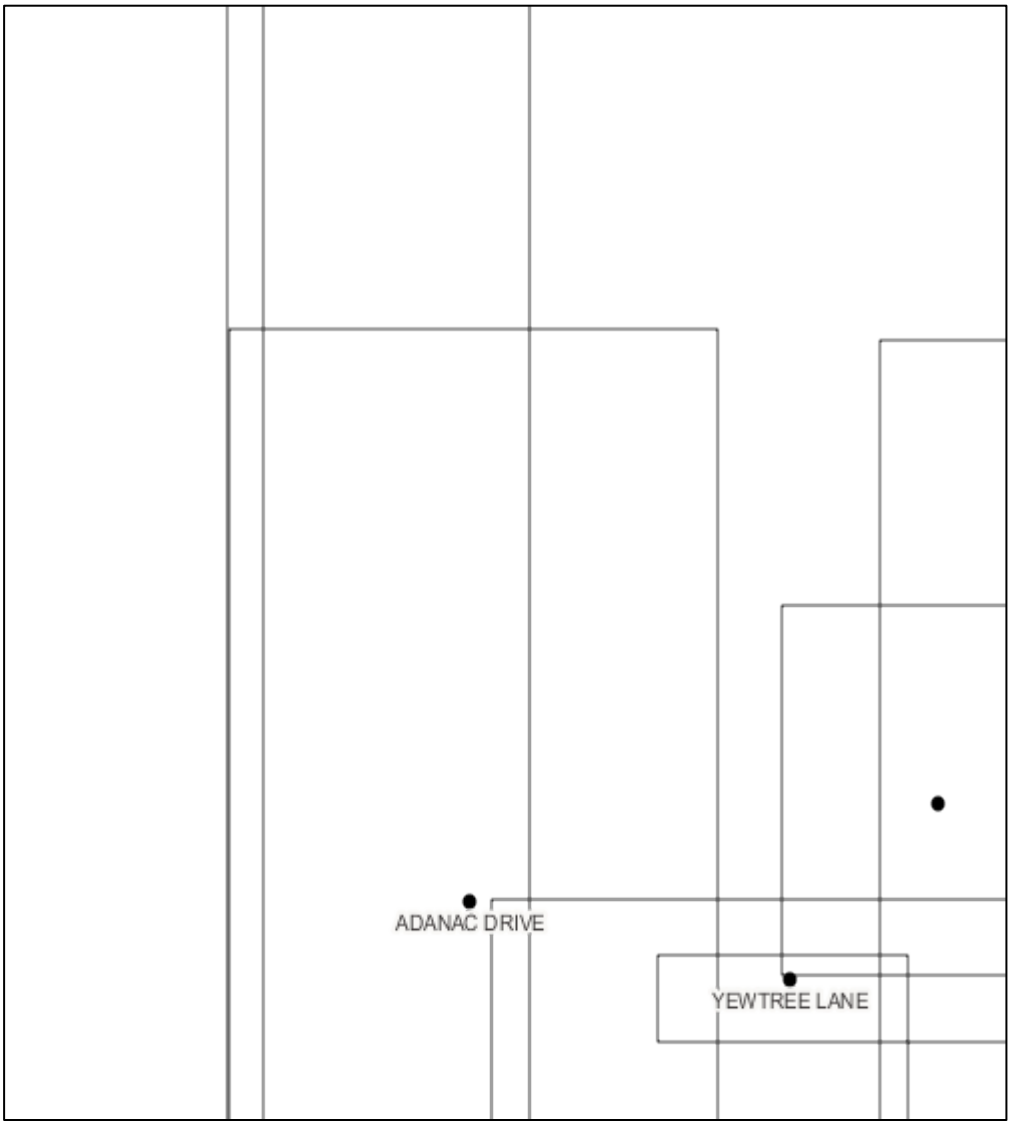


OS Locator

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=437045,115293,437545,115793&WIDTH=500&HEIGHT=500&LAYERS=LOC&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

Output:



Land-Form PANORAMA Contours

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=431896,113189,434396,115689&WIDTH=500&HEIGHT=500&LAYERS=PANCONT&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

Output:

Land-Form PANORAMA DTM

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?REQUEST=GetMap&VERSION=1.3.0&SERVICE=WMS&CRS=EPSG:27700&BBOX=431896,113189,434396,115689&WIDTH=500&HEIGHT=500&LAYERS=PANDTM&FORMAT=image/png&BGCOLOR=0xFFFFFF&TRANSPARENT=TRUE&EXCEPTIONS=XML

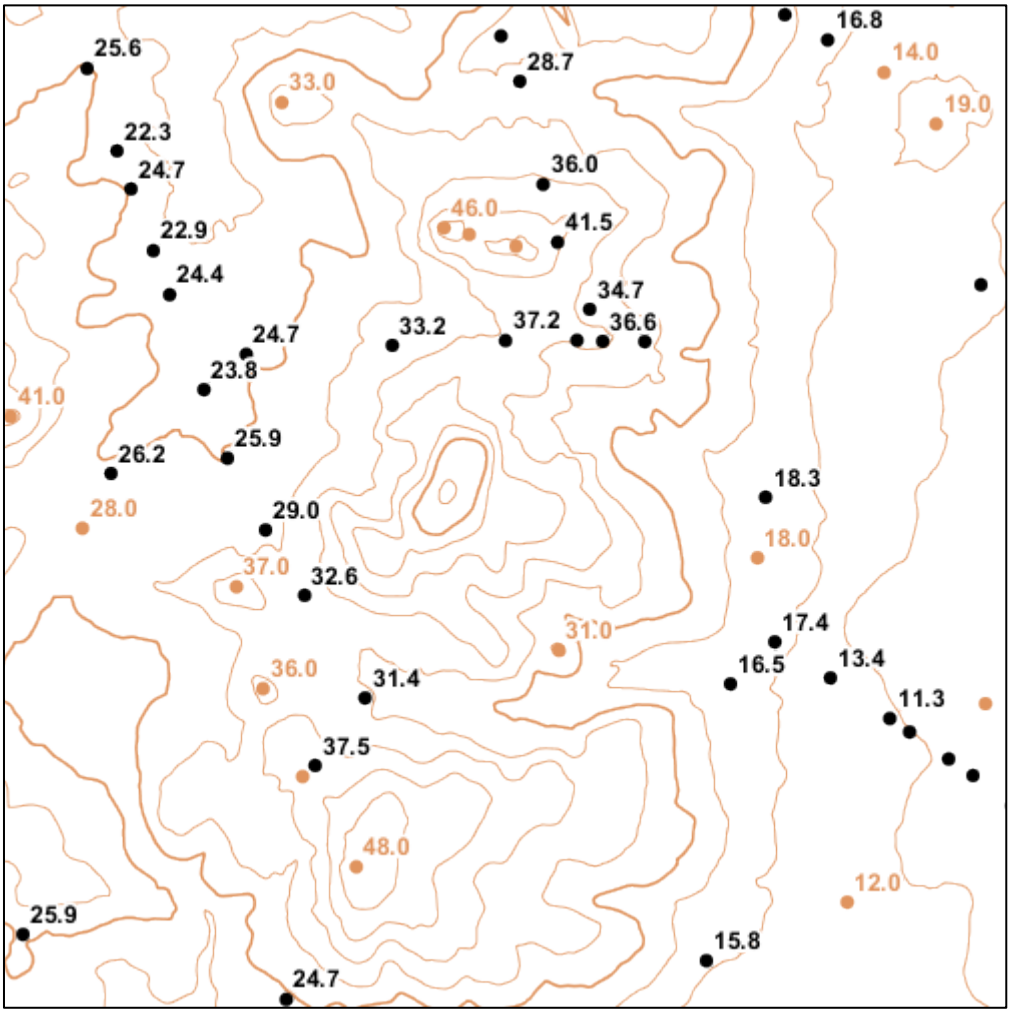
Output:

Land-Form PROFILE Contours

Example request:

http://osondemand.ordnancesurvey.co.uk/ondemand/wms?VERSION=1.3.0&REQUEST=GetMap&LAYERS=PROCONT&CRS=EPSG:27700&BBOX=431896,113189,434396,115689&WIDTH=500&HEIGHT=500&FORMAT=image/png&TRANSPARENT=TRUE&BGCOLOR=0xFFFFFF&EXCEPTIONS=XML

Output:



Land-Form PROFILE DTM

Example request:

```
http://osondemand.ordnancesurvey.co.uk/ondemand/wms?VERSION=1.3.0&REQUEST=GetMap
&LAYERS=PRODTM&CRS=EPSG:27700&BBOX=293128,220539,295628,223039&WIDTH=500&HEIGHT=
500&FORMAT=image/png&TRANSPARENT=TRUE&BGCOLOR=0xFFFFFF&EXCEPTIONS=XML
```

Output:

Annexe A Glossary

The purpose of this chapter is to provide a glossary of terms used in the definition of products, services, licensing and other terms and conditions for Ordnance Survey products.

Where terms refer to other terms within the glossary, they are connected by means of hyperlink to the relevant entries.

American Standard Code for Information Interchange (ASCII)
A standard binary coding system used to represent characters within a computer.

attribute
Any item of information packaged in a vector feature.

attribute set
A group of attributes that can legitimately and logically be used together. Each feature type uses a particular attribute set.

binary digit (BIT)
The smallest possible unit of data, resulting from a choice between 0 and 1.

boundary
A boundary forms the division between two similar real-world objects, for example, property boundary or administrative boundary, and is defined by one or more lines.

byte
A unit of computer storage of binary data, usually comprising 8 bits, equivalent to a character.

character
A distinctive mark; an inscribed letter; one of a set of writing symbols.

character code
The binary representation of a single element of a character set; for example, EBCDIC, ASCII.

compact disc
Read only memory (CD-ROM). A data storage medium. A 12-cm disc similar to the audio CD. It is an alloy disc pitted with tiny holes and then coated in plastic. A laser head reads the pattern of the holes and translates them into binary data.

complex feature
A feature that is a collection of other features. An example could be a feature representing a river, composed of many area and line features representing parts of the river. Complex features are not currently a part of OS MasterMap.

contract
The agreement that a customer has for access to Ordnance Survey products and services.

coordinate pair
A coordinate pair is an easting and a northing (see rectangular coordinates).

coordinate reference system
The term used in GML (and hence in OS MasterMap specifications) for the definition that allows each spatial position to be stated as a coordinate The only coordinate reference system currently used in OS MasterMap is the British National Grid.

coordinate transformation
A computational process of converting an image or map from one coordinate system to another.

copyright
The sole legal right to print or publish a work. Crown Copyright subsists in all Ordnance Survey publications for a 50-year period, from the end of the year in which they were first published, by virtue of the *Copyright, Designs and Patents Act 1988*.

customer
An organisation or individual that makes use of Ordnance Survey's data supply facilities. This includes both direct sales customers of Ordnance Survey as well as customers of Licensed Partners. It does not include anyone, or any organisation, that has access to Ordnance Survey material without charge.

data
A representation of facts, concepts or instructions in a formalised manner suitable for communication, interpretation or processing.

database
An organised, integrated collection of geographic data, which may or may not be spatial data. It is stored so that specific applications can access the data by different logical paths. A database is accessed and managed by a database management system (software for managing database information).

data format
A specification that defines the order in which data is stored or a description of the way data is held in a file or record.

data quality
Attributes of a dataset that define its suitability for a particular purpose, such as completeness, positional accuracy, currency and so on.

dataset
An identifiable set of data that share common characteristics and that are managed as a subset of the data within a database.

data structure
The defined logical arrangement of data as used by a system for data management; a representation of a data model in computer form.

definitive name
The actual name of a feature as shown on the map.

delivery mechanism
The method of supply of data to a customer (for example, offline and online).

descriptive group
Attribute with descriptive information about the feature.

descriptive name
A name describing a real-world object or feature (for example, 'School') as shown on the 1:10 000 Scale Raster map.

descriptive text
Descriptive text is defined within OS MasterMap Topography Layer as a generic name given to a feature where a distinctive name does not apply; for example, 'drain', 'boundary post' or 'car park'. Where the function or purpose of some features are not clear, it is possible that they will be described with both a distinctive and descriptive name, for example, 'Sandy Lane (Track)' or 'Old Thatched House (PH)'.

descriptive term
Attribute with descriptive information about the feature.

digital
Data that is expressed as numbers (digits) in computer-readable form.

Digital National Framework (DNF)
A nationally-consistent geographic referencing framework for Great Britain, comprising the National Grid and the National Geographic Database, that defines each geographic feature as it exists in the real world with a maintained unique reference allocated to each feature. The DNF is not a product; it is the framework on which our future products will be based.

digital update
The supply of digital data to a customer at a predetermined interval of time if, when the time interval has elapsed, the map has reached an agreed level of change.

distinctive name
A text feature that form(s) a name that distinguishes it from other text features of the same type, for example, Millbrook School.

distinctive text
Distinctive text is defined within OS MasterMap Topography Layer as a name given to a feature or place to distinguish it from other features or places of a similar nature, for example, 'River Avon', 'Hill Lane Surgery', 'Leeds' or 'New Forest'.

dots per inch (dpi)
The resolution, or fineness, of a raster image.

eastings
See rectangular coordinates.

ECW
The Enhanced Compressed Wavelet (ECW) raster image compression software has been designed to compress, display, serve on the Internet and distribute raster. The key characteristic of wavelet-based compressions is that it is able to preserve a very good quality of the image with high compression ratios.

This compression format uses mathematical wavelet transformations to store image data rather than storing a grid of values for image pixels such as TIFF or other common formats. This allows a great reduction in the amount of disk space it takes to store large images, whilst retaining nearly all the original image's quality, colour and detail.

ECW is a lossy format, meaning that some information is lost when the image is converted from its original format to the ECW format. However, wavelet compression is very good at retaining the character of images, so the amount of loss is very small.

encoding
The process of converting information to a computer-readable form, for example, digitising maps.

EPSG
A scientific organisation that compiled and disseminated the EPSG Geodetic Parameter Set, a widely-used database of Earth ellipsoids, geodetic datums, geographic and projected coordinate systems and units of measurement.

extended binary coded decimal Interchange code (EBCDIC)
An 8-bit-character encoding scheme. For example, 100111100. These can also be letters or specific characters, for example, + =.

feature
A geographic entity such as a building or stream, either taken from a map or surveyed directly from the real world. Can be a point/symbol, text or line.

feature code
A numerical feature code (a five-digit integer) assigned to each feature with OS MasterMap Topography Layer. This feature code is wholly determined by the feature type, the descriptive group(s) and the descriptive term(s).

feature type
A high-level grouping of features that are treated in a similar way, for example, TopographicPoint features.

format
The specified arrangement of data, for example, the layout of a printed document, the arrangement of the parts of a computer instruction or the arrangement of data in a record.

FTP
File Transfer Protocol. A protocol that allows a user on one computer to transfer files to and from another computer over a TCP/IP network such as the Internet.

generalised
Generalisation is the task of deriving maps or geographic information products at a smaller scale, starting with more detailed existing mapping or source data. It involves exaggerating those aspects that are important for a particular purpose and scale and removing irrelevant detail that would clutter the product and confuse the user.

GIF
A bitmap image format that was introduced in 1987. The format supports up to 8 bits per pixel thus allowing a single image to reference a palette of up to 256 distinct colours.

gigabyte (Gb)
1 073 741 824 bytes, a measure of data storage capacity (see megabyte).

GML
Geography Markup Language. An XML encoding for the transport and storage of geographic information, including both the geometry and attributes of geographic features.

GPS
Global Positioning System. A satellite-based navigation system allowing the determination of any point on the Earth's surface with a high degree of accuracy, given a suitable GPS receiver.

identifier
An identifier that is primarily intended to provide unique and unambiguous feature identification for the purposes of exchanging feature-based information between computer systems, or associating data within a computer system.

indefinite detail
Indefinite detail is defined as those physical features that are significantly important and have an outline that is either liable to change or not defined precisely by any surveyable feature; for example, vegetation limits or man-made slopes. The nature of vegetation is shown, except for trees and scrub (bushes, brambles and undergrowth) growing in permanent water. Indefinite detail is not surveyed precisely. The accuracy of survey is related to the degree of definition on the ground.

inferred links
Line features representing inferences about the real world rather than topographic statements of fact. These sensibly subdivide certain types of polygon feature where there is no appropriate topographic detail. They are normally used to:

- divide road sections;
- separate individual garden plots in residential areas where no dividing fence, hedge or wall exists;
- close junctions between roads and car parks or hard-standing areas; and
- close fields that have simple breaks in the hedge or wall rather than gates.

JPEG
An image named after the Joint Photographic Experts Group, it uses a lossy compression format. It is designed for compressing a full colour or greyscale images of natural, real-world scenes and works well on photographs. It is the de facto standard for photographs on the web.

kilobyte (Kb)
1 024 bytes, a measure of data storage capacity.

Licensed Partner
Any organisation that has entered into a formal licence agreement with Ordnance Survey to market map information or to incorporate map data with their application or service.

line
The straight line segment between two given points.

map scale
The ratio between the extent of a feature on the map and its extent on the ground, normally expressed as a representative fraction, for example, 1:1 250, 1:50 000 and so on.

megabyte (Mb)
1 048 576 bytes, a measure of data storage capacity (see gigabyte).

metadata
Graphical or textual information about the content, quality, condition, origins and characteristics of data.

National Grid
A unique referencing system that can be applied to all Ordnance Survey maps of Great Britain at all scales. It provides an unambiguous spatial reference for any place or entity in Great Britain.

northings
See rectangular coordinates.

object-based data
Data in which one whole feature or a collection of whole features represents one real-world object, for example, a building or land parcel.

origin
The zero point in a system of rectangular coordinates.

OS Net®
The infrastructure of active and passive GPS reference stations that allow surveyors to determine precise coordinates in GPS and British National Grid coordinate reference systems. OS Net provides the physical definition of the British National Grid, the primary coordinate reference system used in OS MasterMap. A central component of the Digital National Framework.

pixel
A single point represented by a square.

PNG
A bitmap image format and video codec that employs lossless data compression.

point
A pair of coordinates.

point feature
A feature representing a real-world object. The geometry of a point feature is a single point (a pair of coordinates) with optional size and orientation.

polygon
Polygons are representations of areas. A polygon is defined as a closed line or perimeter that completely encloses a contiguous space and is made up of one or more lines.

positional accuracy
The accuracy of the feature geometry relative to the coordinate reference system.

raster data
Attribute data expressed as an array of pixels, with spatial position implicit in the ordering of the pixels.

real-world object
The real-world feature represented by a feature, for example, a building, a fence, a wood.

rectangular coordinates
Also known as x-y coordinates and as eastings and northings. These are two-dimensional coordinates that measure the position of any point relative to an arbitrary origin on a plane surface (for example, a map projection, a digitising table or a computer screen).

stipple
Used to produce light or dark shading (for example, building/water fill); this is dependent on spacing of the dots – the denser the dots, the darker the effect.

string
A set of items that can be arranged into a sequence according to a rule.

supply format
The file format in which the data is supplied to the customer.

symbology
The use of symbols.

tag
Tags are unique numbers that are used for identifying specific information in TIFF files, for example, image width, image length, bits per sample, photo interpretation and resolution.

TIFF
TIFF is a tagged image file format-based file format for storing and interchanging raster images with the most recent version – 6.0 published in 1992.

Uniform Resource Locator (URL)
A uniform syntax constructed from a compact string of characters to identify resources on the Internet. More commonly referred to as a web page address.

XML
Extensible Markup Language. A flexible way to create common information formats and share both the format and the data on the Internet, Intranets and elsewhere. XML is extensible because, unlike HTML, the markup tags are unlimited and self-defining. XML is a simpler and easier-to-use subset of the Standard Generalised Markup Language (SGML), the standard for how to create a document structure.

vector data
Positional data in the form of coordinates of the ends of line segments, points, text positions and polygons and capable of attribution.

Annexe B OS OnDemand GetCapabilities XML document

This section contains the XML document that is returned when requested. There are two main sections to the document: service and capability. The service section contains general metadata about the service, such as the title of the service and an abstract describing the service. The capability section is divided into three main groups of information:

- Request
- Exception
- Layer

```
<?xml version="1.0" encoding="UTF-8"?>
<WMS_Capabilities
xmlns:inspire_vs="http://inspire.ec.europa.eu/schemas/inspire_vs/1.0"
xmlns:gml="http://schemas.opengis.net/gml"
xmlns:inspire_common="http://inspire.ec.europa.eu/schemas/common/1.0"
xmlns="http://www.opengis.net/wms" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" version="1.3.0"
xsi:schemaLocation="http://www.opengis.net/wms
http://schemas.opengis.net/wms/1.3.0/capabilities_1_3_0.xsd
http://inspire.ec.europa.eu/schemas/inspire_vs/1.0
http://inspire.ec.europa.eu/schemas/inspire_vs/1.0/inspire_vs.xsd">
  <Service>
    <Name>WMS</Name>
    <Title>OS On Demand WMS</Title>
    <Abstract>OS On Demand Web Map Service</Abstract>
    <KeywordList>
      <Keyword>WMS</Keyword>
      <Keyword>Ordnance Survey</Keyword>
      <Keyword>OS On Demand</Keyword>
      <Keyword>Web Map Service</Keyword>
    </KeywordList>
    <!-- TODO: The OnlineResource should be the service top-level web address,
not the service endpoint? -->
    <OnlineResource
xlink:href="http://osondemand.ordnancesurvey.co.uk:80/ondemand/wms?"
xlink:type="simple"/>
    <ContactInformation>
      <ContactPersonPrimary>
        <ContactPerson>Customer Service Centre</ContactPerson>
        <ContactOrganization>Ordnance Survey</ContactOrganization>
      </ContactPersonPrimary>
      <ContactPosition>Product Manager</ContactPosition>
      <ContactAddress>
        <AddressType/>
        <Address>Adanac Drive</Address>
        <City>Southampton</City>
        <StateOrProvince>Hampshire</StateOrProvince>
        <PostCode>SO16 0AS</PostCode>
        <Country>Great Britain</Country>
      </ContactAddress>
      <ContactVoiceTelephone>08456 05 05 05</ContactVoiceTelephone>
      <ContactFacsimileTelephone/>
<ContactElectronicMailAddress>support@ordnancesurvey.co.uk</ContactElectronicMai
lAddress>
    </ContactInformation>
    <Fees>NONE</Fees>
    <AccessConstraints>NONE</AccessConstraints>
  </Service>
  <Capability>
    <Request>
      <GetCapabilities>
        <Format>text/xml</Format>
        <DCPType>
          <HTTP>
            <Get>
              <OnlineResource
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xlink:type="simple"/>
```

```
            </Get>
            <Post>
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xlink:href="http://osondemand.ordnancesurvey.co.uk:80/ondemand/wms?"
xlink:type="simple"/>
            </Post>
          </HTTP>
        </DCPType>
      </GetCapabilities>
      <GetMap>
        <Format>image/png</Format>
        <Format>image/gif</Format>
        <Format>image/jpeg</Format>
        <DCPType>
          <HTTP>
            <Get>
              <OnlineResource
xlink:href="http://osondemand.ordnancesurvey.co.uk:80/ondemand/wms?"
xlink:type="simple"/>
            </Get>
          </HTTP>
        </DCPType>
      </GetMap>
      <GetFeatureInfo>
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        <Format>text/html</Format>
        <Format>application/vnd.ogc.gml</Format>
        <DCPType>
          <HTTP>
            <Get>
              <OnlineResource
xlink:href="http://osondemand.ordnancesurvey.co.uk:80/ondemand/wms?"
xlink:type="simple"/>
            </Get>
          </HTTP>
        </DCPType>
      </GetFeatureInfo>
    </Request>
    <Exception>
      <Format>XML</Format>
      <Format>INIMAGE</Format>
      <Format>BLANK</Format>
    </Exception>
    <inspire_vs:ExtendedCapabilities>
      <inspire_common:MetadataUrl xsi:type="inspire_common:resourceLocatorType">

<inspire_common:URL>http://www.ordnancesurvey.co.uk/oswebsite/xml/products/OSOnD
emandService.xml</inspire_common:URL>
        <inspire_common:MediaType>text/xml</inspire_common:MediaType>
      </inspire_common:MetadataUrl>
      <inspire_common:SupportedLanguages>
        <inspire_common:DefaultLanguage>
          <inspire_common:Language>eng</inspire_common:Language>
        </inspire_common:DefaultLanguage>
      </inspire_common:SupportedLanguages>
      <inspire_common:ResponseLanguage>
        <inspire_common:Language>eng</inspire_common:Language>
      </inspire_common:ResponseLanguage>
    </inspire_vs:ExtendedCapabilities>
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      <Abstract>OS On Demand Web Map Service</Abstract>
      <CRS>EPSG:27700</CRS>
      <CRS>EPSG:4258</CRS>
      <CRS>EPSG:4326</CRS>
      <!-- TODO: BBox coords taken from GeoServer. User Guide Coords extend
much further East and West -->
      <EX_GeographicBoundingBox>
        <westBoundLongitude>-18.614796709518433</westBoundLongitude>
        <eastBoundLongitude>10.881688394895756</eastBoundLongitude>
        <southBoundLatitude>48.33135481047483</southBoundLatitude>
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```
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        <Title>Raster Products</Title>
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          <Title>OS 1:10 000 Scale Black and White Raster</Title>
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            <eastBoundLongitude>3.632</eastBoundLongitude>
            <southBoundLatitude>49.767</southBoundLatitude>
            <northBoundLatitude>61.578</northBoundLatitude>
          </EX_GeographicBoundingBox>
          <BoundingBox CRS="EPSG:27700" minx="0.0" miny="0.0" maxx="700000.0"
maxy="1300000.0"/>
          <MetadataURL type="ISO19115:2003">
            <Format>text/xml</Format>
            <OnlineResource xlink:type="simple"
xlink:href="http://www.ordnancesurvey.co.uk/oswebsite/xml/products/10kBlackandWh
iteRaster.xml"/>
          </MetadataURL>
          <!-- TODO: The Infotech document specifies a style called
inspire_common:DEFAULT
This style does not exist in our service, and I believe it is required to
be a minimal style. Therefore I have specified our actual style -->
          <Style>
            <Name>OS10kRasterStyle</Name>
            <Title>Ordnance Survey OS OnDemand WMS</Title>
            <Abstract>v1.0 Sept 2011</Abstract>
          </Style>
        </Layer>
        <Layer queryable="false">
          <Name>10KC</Name>
          <Title>OS 1:10 000 Scale Colour Raster</Title>
          <EX_GeographicBoundingBox>
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            <southBoundLatitude>49.767</southBoundLatitude>
            <northBoundLatitude>61.578</northBoundLatitude>
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          <BoundingBox CRS="EPSG:27700" minx="0.0" miny="0.0" maxx="700000.0"
maxy="1300000.0"/>
          <MetadataURL type="ISO19115:2003">
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            <OnlineResource xlink:type="simple"
xlink:href="http://www.ordnancesurvey.co.uk/oswebsite/xml/products/10kcolRas.xml
"/>
          </MetadataURL>
          <Style>
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            <Abstract>v1.0 Sept 2011</Abstract>
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        </Layer>
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            <eastBoundLongitude>3.632</eastBoundLongitude>
            <southBoundLatitude>49.767</southBoundLatitude>
            <northBoundLatitude>61.578</northBoundLatitude>
          </EX_GeographicBoundingBox>
          <BoundingBox CRS="EPSG:27700" minx="0.0" miny="0.0" maxx="700000.0"
maxy="1300000.0"/>
          <MetadataURL type="ISO19115:2003">
            <Format>text/xml</Format>
            <OnlineResource xlink:type="simple"
xlink:href="http://www.ordnancesurvey.co.uk/oswebsite/xml/products/OSSVras.xml"/
>
          </MetadataURL>
          <Style>
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```
            <Name>OSStreetViewRasterStyle</Name>
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            <Abstract>v1.0 Sept 2011</Abstract>
          </Style>
        </Layer>
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          <Title>OS 1:25 000 Scale Colour Raster</Title>
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            <eastBoundLongitude>3.632</eastBoundLongitude>
            <southBoundLatitude>49.767</southBoundLatitude>
            <northBoundLatitude>61.578</northBoundLatitude>
          </EX_GeographicBoundingBox>
          <BoundingBox CRS="EPSG:27700" minx="0.0" miny="0.0" maxx="700000.0"
maxy="1300000.0"/>
          <MetadataURL type="ISO19115:2003">
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            <OnlineResource xlink:type="simple"
xlink:href="http://www.ordnancesurvey.co.uk/oswebsite/xml/products/25kColRas.xml
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          </MetadataURL>
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            <Abstract>v1.0 Sept 2011</Abstract>
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          <Title>OS 1:50 000 Scale Colour Raster</Title>
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            <eastBoundLongitude>3.632</eastBoundLongitude>
            <southBoundLatitude>49.767</southBoundLatitude>
            <northBoundLatitude>61.578</northBoundLatitude>
          </EX_GeographicBoundingBox>
          <BoundingBox CRS="EPSG:27700" minx="0.0" miny="0.0" maxx="700000.0"
maxy="1300000.0"/>
          <MetadataURL type="ISO19115:2003">
            <Format>text/xml</Format>
            <OnlineResource xlink:type="simple"
xlink:href="http://www.ordnancesurvey.co.uk/oswebsite/xml/products/50colRas.xml"
/>
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            <Title>Ordnance Survey OS OnDemand WMS</Title>
            <Abstract>v1.0 Sept 2011</Abstract>
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        </Layer>
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          <Title>OS 1:250 000 Scale Colour Raster</Title>
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            <eastBoundLongitude>3.632</eastBoundLongitude>
            <southBoundLatitude>49.767</southBoundLatitude>
            <northBoundLatitude>61.578</northBoundLatitude>
          </EX_GeographicBoundingBox>
          <BoundingBox CRS="EPSG:27700" minx="0.0" miny="0.0" maxx="700000.0"
maxy="1300000.0"/>
          <MetadataURL type="ISO19115:2003">
            <Format>text/xml</Format>
            <OnlineResource xlink:type="simple"
xlink:href="http://www.ordnancesurvey.co.uk/oswebsite/xml/products/250colRas.xml
"/>
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            <Title>Ordnance Survey OS OnDemand WMS</Title>
            <Abstract>v1.0 Sept 2011</Abstract>
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```
          </Style>
        </Layer>
        <Layer queryable="false">
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          <Title>OS MiniScale</Title>
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            <eastBoundLongitude>3.632</eastBoundLongitude>
            <southBoundLatitude>49.767</southBoundLatitude>
            <northBoundLatitude>61.578</northBoundLatitude>
          </EX_GeographicBoundingBox>
          <BoundingBox CRS="EPSG:27700" minx="0.0" miny="0.0" maxx="700000.0"
maxy="1300000.0"/>
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            <Name>OSMiniScaleStyle</Name>
            <Title>Ordnance Survey OS OnDemand WMS</Title>
            <Abstract>v1.0 Sept 2011</Abstract>
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        </Layer>
      </Layer>
      <Layer>
        <Title>Imagery Products</Title>
        <Layer queryable="1">
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          <Title>OSMM Imagery 25cm</Title>
          <EX_GeographicBoundingBox>
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            <eastBoundLongitude>3.632</eastBoundLongitude>
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xlink:href="http://www.ordnancesurvey.co.uk/oswebsite/xml/products/OSLocator.xml
"/>
          </MetadataURL>
          <!-- This style does not exist because the Layer is a Group of Layers
-->
          <Style>
            <Name>OSLocatorStyle</Name>
            <Title>Ordnance Survey OS OnDemand WMS</Title>
          </Style>
        </Layer>
        <Layer queryable="false">
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          <Title>OS 1:50 000 Scale Gazetteer</Title>
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            <eastBoundLongitude>3.632</eastBoundLongitude>
            <southBoundLatitude>49.767</southBoundLatitude>
            <northBoundLatitude>61.578</northBoundLatitude>
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maxy="1300000.0"/>
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xlink:href="http://www.ordnancesurvey.co.uk/oswebsite/xml/products/50kGaz.xml"/>
          </MetadataURL>
          <Style>
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            <Title>Ordnance Survey OS OnDemand WMS</Title>
            <Abstract>v1.0 September 2011</Abstract>
          </Style>
        </Layer>
      </Layer>
      <Layer>
        <Title>Overview</Title>
        <Layer queryable="false">
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          <Title>GB Overview +</Title>
          <EX_GeographicBoundingBox>
            <westBoundLongitude>-18.614796709518433</westBoundLongitude>
            <eastBoundLongitude>10.881688394895756</eastBoundLongitude>
            <southBoundLatitude>48.33135481047483</southBoundLatitude>
            <northBoundLatitude>60.97924625780423</northBoundLatitude>
          </EX_GeographicBoundingBox>
          <BoundingBox CRS="EPSG:27700" minx="-521611.7877215" miny="-
99060.2018315805" maxx="1107515.6274664556" maxy="1234593.14792"/>
          <Style>
            <Name>Overview1RasterStyle</Name>
            <Title>Ordnance Survey OS OnDemand WMS</Title>
            <Abstract>v1.0 September 2011</Abstract>
          </Style>
        </Layer>
        <Layer queryable="false">
          <Name>OV0</Name>
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          <Title>GB Overview</Title>
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            <southBoundLatitude>48.33135481047483</southBoundLatitude>
            <northBoundLatitude>60.97924625780423</northBoundLatitude>
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          <BoundingBox CRS="EPSG:27700" minx="-521611.7877215" miny="-
99060.2018315805" maxx="1107515.6274664556" maxy="1234593.14792"/>
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            <Title>Ordnance Survey OS OnDemand WMS</Title>
            <Abstract>v1.0 September 2011</Abstract>
          </Style>
        </Layer>
      </Layer>
    </Layer>
  </Capability>
</WMS_Capabilities>
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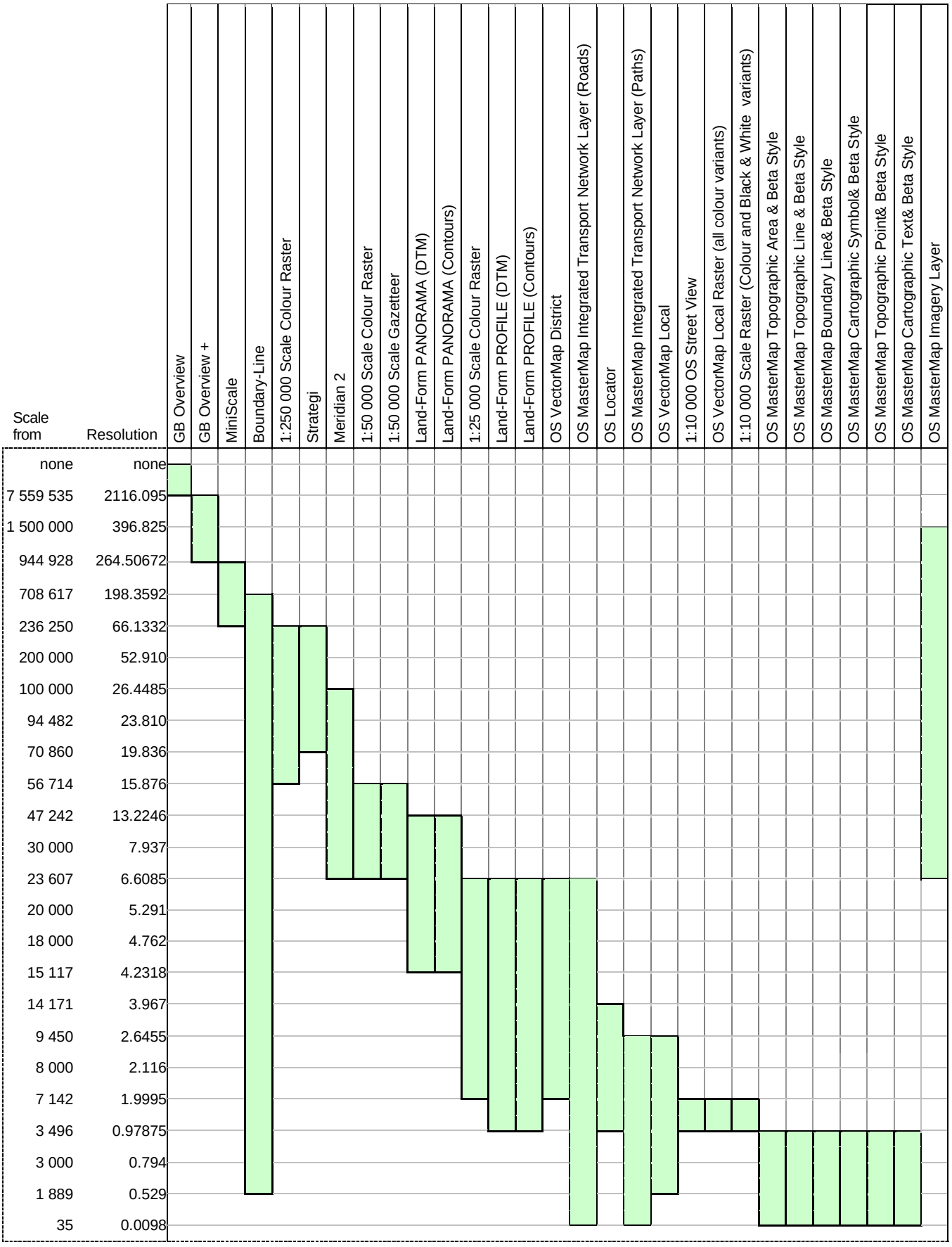
Annexe C Product scale ranges



The scales ranges are calculated from the resolution (metres per pixel) values, with an assumption of a 0.28mm pixel size (90.7 dpi), rounded down.