OS MASTERMAP IMAGERY LAYER

Ordnance Survey

Technical Specification

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Contents

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Preface

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Using this specification

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

Chapter 1   Introduction

OS MasterMap Imagery Layer adds a visual and contextual capability to the other OS MasterMap Layers and OS data. Ordnance Survey has set the specification and quality levels for the OS MasterMap Imagery Layer with the aim of providing a reliable and consistent source of orthorectified aerial photography for general business use in Great Britain.

The technical specification contains details on the visual appearance of the ortho images within the imagery layer. It includes positional and geometric fidelity requirements and detail on mosaicing and edgematching between areas of imagery collected at different times.

In addition, this specification provides information on Georeferencing, Header files and product Metadata.

Chapter 2   Image Appearance

Image Enhancement

There are a number of factors that can degrade the overall appearance and quality of the image. Each image is assessed for the following defects before being accepted.

- o A **digital artefact** is the term given to small blemishes or visual anomalies that appear on the imagery as a consequence of the production process that do not represent real world conditions. The existence of an artefact may not render the image unacceptable if they do not have a significant impact on the actual image – for example, they do not obscure objects/features – but their impact must be minimal. Any images with digital artefacts that distort or obscure objects/features are rejected.

- o **High pixel counts at the extremes of the histogram** curve may be detrimental to the image appearance. This is particularly so with the presence of high pixel count spikes within 10 greyscale levels of either 0 or 255 (**high pixel counts** are regarded as spikes of counts over 16 000 pixels in this case for digital imagery). Where these high pixel counts are present they will be judged under image appearance rules. In some cases high pixel counts may be acceptable. Examples of specific features where this can occur are white-roofed buildings, building shadow, caravan parks, inland water and dense urban areas.

- o **Cloud and snow cover** must be less than 3% per 5 km by 5 km block, and less than 5% per 1 km image. Any detail within the 1 km image that is obscured must not be of high significance (examples of high significance detail being all urban areas and housing or roads in rural areas). In mountainous areas these criteria may be relaxed to 10% obscured per 5 km by 5 km block and less than 15% per 1 km image and is provided only small amounts of ground detail are affected.

- o **Flood Water** must be less than 3% per 5km by 5km, and less than 5% per square kilometre image. Any detail obscured must not be of high significance, for example urban areas, housing and major communication routes.

- o **Colour and light balance** should be largely consistent across the image with an absence of banding caused by vignetting or hot spots caused by excessive light. The colour within the image must be a realistic representation of the ground.

- o **Contrast** must be consistent across the image.

- o **Sharpness and image smearing** – the image should be sharp when viewed at actual pixel resolution (1:1 scale) and should not show unnecessary pixilation or softness due to flying conditions or image processing. Image smearing, blurring or ghosting are not acceptable, except in exceptional circumstances where it does not have a detrimental effect on the overall image appearance.

- o **Obscuring shadow** is shadow in which no information is available. Obscuring shadow must be less than 1% per sq. km for naturally occurring features such as cliff faces, and no more than 0.05% per sq. km within built-up areas (for example, farms, hamlets or larger communities). This is also reflected in a high pixel count at the low end of the histogram (levels 0 to 10). Furthermore:

  - ▪ In mountainous areas obscuring shadow must be less than 3% per sq. km for naturally occurring features such as cliff faces, and no more than 0.05% per sq. km within built-up areas (for example, farms, hamlets or larger communities); and

  - ▪ Within any non-obscuring shadow area it must be possible to interpret and identify topographic features such as street furniture, road markings, access routes and extent of buildings

- o **Missing pixels** – missing pixels appear black in the image and will not be accepted.

- o **Image flaring** – an example of where this may occur is from expanses of glass, such as greenhouses or car windscreens, where substantial reflection can cause flaring. This must be kept to a minimum and not have a detrimental effect on the image appearance or obscure any permanent feature.

- **Colour bleeding** occurs where colour moves outside of its real-world object in the image into the surrounding pixels. This must be kept to a minimum and not be detrimental to the image appearance when viewed at true scale (that is 1:1).

- **Colour misregistration** happens where one colour band has systematically shifted in relation to the others. This must be kept to a minimum and not have a detrimental effect on the image appearance.

- **Rainbow effects** are caused by image processing and can be visible at the border of bright areas. This must be kept to a minimum and not be detrimental to the image appearance when viewed at true scale (that is 1:1).

- **Image burnout** happens where white surfaces appear 'bleached' and information has become obscured. This is also reflected in a high pixel count at the high end of the histogram (levels 245 to 255). This must be kept to a minimum and not obscure detail in the image.

- **Pixels that are stretched,** especially in near vertical slopes and cliffs during the orthorectification process must be minimised to avoid detrimental image appearance. Any modifications undertaken to reduce pixel stretch must ensure that the resultant ortho image is a realistic representation of real world features.

Great care is taken to ensure that the images in the Layer meet our detailed Image Appearance criteria. However, on occasion and under certain circumstances, these rules are relaxed. For example, if opportunities to capture new imagery have been limited by poor weather and existing imagery in the Imagery Layer is deemed out-of-date, then imagery will be accepted provided detail is visible on the ground. In these circumstances, image currency takes precedence over image appearance.

Geometric Fidelity

Geometric fidelity is the trueness of features in the Imagery Layer to the shapes and alignments of the real-world objects they represent. Normally, geometric fidelity takes priority over relative and absolute accuracy.

Geometric fidelity is judged on the following factors:

- Detail that is square on the ground is represented as square in the Imagery Layer, and shapes must be visually accurate.

- Alignments that are straight in the real world are represented as straight lines within the Imagery Layer.

- Lines of sight that pass through ground points should, when viewed at actual pixel resolution (1:1 scale), pass through the plan positions of the corresponding points in the Imagery Layer.

- Adjacent features are in sympathy with each other as regards alignment and orientation.

Every effort is made to ensure features retain geometric fidelity. These rules are occasionally relaxed in instances where rectification of geometric issues compromises the authenticity of the image.

Absolute Accuracy

Absolute accuracy is a measure that indicates how closely the coordinates of a point in the Imagery Layer agree with the true coordinates of the same point on the ground in Ordnance Survey National Grid and is measured by comparing the position recorded in the Imagery Layer and the true position of the feature on the ground. It is expressed in terms of root mean square error (RMSE).

Two data capture standards apply to the Imagery Layer:

- Urban and rural areas encompassing all 1:1250 scale and most 1:2500 scale topographic basic-scale areas, as well as a few small 1:10 000 scale topographic basic-scale areas.

- Designated sparsely populated areas encompassing the majority of 1:10 000 scale mountain and moorland and some 1:2500 scale topographic basic-scale areas.

All imagery is captured to an absolute accuracy of 1.1m RMSE.

Mosaicing and edgematching

OS Imagery Layer is a patchwork of images captured often months and years apart. Image mosaicing and block edgematching are undertaken to minimise these differences where possible.

Mosaicing and edgematching are two processes that check the overall appearance not just of a single image but of images when viewed alongside each other in the National Grid alignment.

Mosaicing is the process of creating a single image of a defined geographic area from a number of smaller images of the same geographic area.

Block edgematching is the process of joining adjacent blocks of imagery captured at different times so as to minimise visible joins and colour differences.

Sea only tiles are an exception, as it is not practical to create an entirely seamless mosaic. Sea-only tiles swill have minimal feathering applied between images.

The above information provides a summary of the very detailed acceptable quality levels that all imagery suppliers adhere to. The orthorectification process is undertaken to ensure that the imagery remains a realistic representation of the features on the ground and that the ability to extract information from the imagery is uncompromised.

Chapter 3　　Ancillary Files

Georeferencing Files

Georeferencing world files for all available image formats are available at the OS website.

The information contained in the georeferencing files is given in table 1.

Table 1: Georeferencing files

Image format	Georeferencing file	Description	Example
TIFF	*.TFW	TIFF world file states the X,Y coordinate of the centre of the north-west pixel.	0.250000 0.000000 0 -0.25000 297000 125000 570999.875000
JPEG	*.JGW	JPEG world file states the X,Y coordinate of the centre of the north-west pixel.	0.250000 0 0 -0.250000 467000.125000 98999.875000
ECW	*.EWW	ECW world file states the X,Y coordinate of the centre of the north-west pixel.	0.250000 0 0 -0.250000 176000.125000 827999.875000

GeoTIFF File

OS Imagery is available as a GeoTiff. In a GeoTiff the georeferencing is embed in the imagery file itself.

GeoTiff Header Files

GeoTIFF is delivered with GeoTIFF header information. The information provided is given in table 2

Table 2: TIFF header files

TIFF header
Tag 256 (image width)
Tag 257 (image length)
Tag 258 (bits per sample)
Tag 259 (compression)
Tag 262 (photometric interpretation)
Tag 269 (document name)
Tag 273 (strip offsets)

Tag 274 (orientation)
Tag 277 (samples per pixel)
Tag 278 (rows per strip)
Tag 279 (strip byte counts)
Tag 284 (planar configuration)
Tag 305 (software)
Tag 306 (date time)
Tag 33550 (model pixel scale tag)
Tag 33922 (model tie point tag)
Tag 34735 (GeoKey directory tag)

Metadata Files

All tiles are provided with metadata information. The detail of these is given in table 3.

Table 3: Metadata

Metadata property (as xml tags)	Value examples	Cardinality	Notes
copyright	Ordnance Survey, © Crown copyright	1	
kmReference	SU3608	1	
version	5	1	
dateFlown	2014-07-21	1.2	Single date shown as: CCYY-MM-DD Date range shown as dateFlown Earliest Date dateFlown Latest Date
kmRectangle	436000,108000 437000,109000	1	Coords in metres
resolution	0.25	1	Metres
fileSize	46.877	1	Megabytes to three decimal places
control	'GPS and OSTN02'	1	Choice of 'GPS and OSTN02™', 'NG from traditional control' or 'Land-Line®'.
createdBy	'Ordnance Survey'	1	Name of supplier
correctionType	'Orthorectified'	1	Fixed value

Where imagery has been merged from more than one source with different flying dates it is possible that small areas of imagery within a 1 kilometre square will not match the metadata values, particularly in rural areas where variations are not significant.

The files are encoded in XML according to an XML schema definition that is available at:
http://www.ordnancesurvey.co.uk/oswebsite/xml/schema/index.html

Annexe A   Product and service performance report form

Ordnance Survey welcomes feedback from its customers about OS MasterMap Imagery Layer.

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 MasterMap Highways Network Product Manager, Ordnance Survey, Adanac Drive, SOUTHAMPTON, SO16 0AS.

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