Open Mosaic Habitats on Previously Developed Land Inventory Data Capture Rule Base v1.2

prepared for

Defra, Natural England and CCW

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Version history

Version number	Author	Date
1.0	Mike J Lush, exeGesIS SDM Ltd	4th May 2012
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1.2	Mike J Lush, exeGesIS SDM Ltd	5th March 2013

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1   Introduction

1.1   Priority habitat data capture

The following text is taken largely from information relating to previous priority habitat data capture contracts.

Defra and its partners in the Biodiversity 2020 process have a well-defined requirement for inventories of Priority Habitats. Work with Defra has established the following:

- That habitat inventories can inform and target agri-environment schemes and maximise the contribution of these policies to Biodiversity 2020;
- That inventories enable local and regional planning authorities to identify networks of semi-natural habitat and hence make a full contribution to the BAP process through the planning system;
- That inventories provide a sampling framework for assessing and reporting on outcomes from a range of policy instruments – including agri-environment schemes.

Riding *et al* (2010) undertook phase 1 of this project to determine how Open Mosaic Habitats on Previously Developed Land (OMH) could be identified both remotely and in the field and mapped in a habitat inventory. This involved the survey and data capture of a limited number of sites. Their method involved utilising a range of third party datasets and aerial photographs. The ability of the method to accurately identify OMH without field survey was acknowledged and the usefulness of each third party dataset identified was critically reviewed.

This rule base aims to build on phase 1 with a view to consolidating and developing the data capture methodology further and creating an initial OMH inventory in GIS.

2   General working method

2.1   Manual assessment and data capture

2.1.1   Assessment of site data

A decision making key for assessing site data is available in Appendix A.

2.1.2   Existing polygons

Any datasets that are already available in GIS format may be used to populate or update the inventory. Attributes from these existing datasets may be used, though only where they conform to the inventory standard. Their boundaries may also require some level of improvement, though the cost-benefit of doing so should be discussed with the project manager before this is done. Overlap queries can be used to assess the amount of overlap with and hence the proportion of update to the existing inventory polygons required. Areas <0.25 ha should be excluded.

The primary datasets that indicated OMH were:

- The National Land Use Database of Previously Developed Land (NLUD-PDL), supplied by the Homes and Communities Agency
- The Britpits dataset, supplied by the British Geological Society
- Historic Landfill data, supplied by the Environment Agency

Box 2.1 – Consideration of Land Cover Map 2007

Land Cover Map 2007 (LCM2007) was considered as a potential data source for indicating the presence of OMH. It was found not to specifically identify OMH, so the land cover types it identified that contained OMH were checked to see how frequently OMH occurred within these polygons. Only a very small number of OMH sites were identified in this way and LCM2007 was considered to be no more useful than simply searching in urban areas.

LCM2007 was also considered as a way of eliminating areas that could not be OMH. The main land cover types identified within LCM2007 that could achieve this were the coastal and water types. These were not found to coincide significantly with any of the datasets that indicated the presence of OMH, so could not be used to eliminate areas.

2.1.3   Newly digitised polygons

Where new polygons are digitised (particularly from paper data sources) they **must** be drawn to the standards described in Appendix B. These include:

- Snapping to OS MasterMap where possible;
- No application of maximum polygon size limits;
- A minimum mappable unit of 0.25 ha. Where smaller fragments occur these may be mapped if they are part of a larger contiguous area, separated only by a linear feature such as a metalled road;
- Polygons will not extend across any road or river with an OS polygon, though may cross smaller linear features;
- Polygons will be closed, with no dangling nodes, and will not have overlap with other polygons within the same inventory.

2.1.4   Attribution of the OMH inventory

The standard priority habitat inventory format has been made consistent across all priority habitat inventories in England. Nevertheless, there may be good reasons for adding to the standard attributes to account for information specific to OMH sites. Such additions must be agreed with the parties responsible for the inventory and documented in this rule base.

One of the key fields of the standard priority habitat inventory format is the Priority Determination field (Pridet), which allows the user to define the level of certainty of a polygon meeting the relevant habitat definition. A priority determination comment field is also provided (Pridetcom). Users should make full use of this field to describe how the determination decision has been made.

2.1.5   What to do when datasets do not agree

When two datasets disagree an assessment should be made of the most reliable, taking into account:

- Date of the data – recent information is more likely to depict the current habitats on the site
- The evidence provided for OMH
- Resolution of the data – detailed maps are an indication that more time was spent conducting the survey and thus it is likely to be more accurate
- Detail and therefore likely quality of the data – detailed surveys are more likely to be carried out by experienced assessors than by amateurs

Inevitably, this sort of decision making requires a subjective decision and is greatly influenced by personal experience of OMH habitats. If in any doubt the opinion of experts in this habitat should be sought.

2.1.6 Species data

Records of certain species may prove to be useful as indicators of the presence of OMH, to be supported by aerial photograph interpretation and other data. Such species may include invertebrates, lichens and bryophytes recorded in higher concentrations in OMH than in the general countryside. The proven method is to undertake a cluster analysis of the data.

Where the records are recorded as grid references these should be mapped as a polygon in GIS. Thus an 8 figure grid reference should be mapped as the 10 m square to which it relates, a 10 figure reference will be mapped as a metre square and a 6 figure grid reference will be mapped as a 100 m square. This ensures that the grid references are mapped as accurately as possible.

A cluster analysis should then be undertaken to determine where three or more records occur within a set distance of one another. These clusters are then used to target aerial photograph interpretation to determine the presence of OMH. See Box 2.2.

Box 2.2 – Clustering species records: test case.

A very brief test of clustering records of a small number of species records from the NBN Gateway in the North West and West Midlands was undertaken. Records of the following species were mapped and clustered where they were 1 km resolution or better and within 1 km of one another:

- *Adonis annua*
- *Bombus humilis*
- *Bombus muscorum*
- *Bombus ruderarius*
- *Bombus ruderatus*
- *Bombus sylvarum*
- *Carabus monilis*
- *Cerceris quadricincta*
- *Cerceris quinquefasciata*
- *Cicindela sylvatica*
- *Colettes halophilus*
- *Eucera longicornis*
- *Odynerus melanocephalus*
- *Ophonus puncticollus*
- *Ophonus stictus*
- *Thyridanthrax fenestratus*

The clusters were then checked against aerial imagery to determine whether they coincided with OMH.

In total sixty-six clusters were checked, though only one cluster (of *Bombus ruderarius*, *B. ruderatus* and *Odynerus melanocephalus*) coincided with clear OMH. The OMH site was also represented in the NLUD-PDL, so the clusters did not identify a new site.

This implies a very poor coincidence of these species with OMH, but this was based upon a very small list of species and a limited number of records. It is possible that a larger test, including a greater number of species, would produce better results.

This test also made clear that a cut-off date for the records should be used, as OMH sites tend to be a modern feature in the landscape and older records are likely to relate to previous habitat. A cut-off of 1970 is recommended, which should ensure sufficient records to allow clusters to be identified but eliminate records that pre-date the occurrence of OMH.

2.1.7   Treatment of sites on the border of the project area

Sites on the border of the project area should be kept intact where there is a contiguous area of OMH. This may mean capturing data for areas outside of the project area. Any subsequent overlaps with adjacent datasets will be dealt with at a later date.

Where there is an existing site boundary in the habitat inventory database that crosses the border these should be treated as though they occur entirely within the project area. This includes capturing data for areas of OMH entirely outside the project area but within the existing site boundary.

2.1.8   Infra-red aerial photography

Infra-red aerial photography was suggested by Riding *et al.* (2010) as a potentially useful indicator of the presence of OMH. A subjective test of false colour infra-red aerial photography

against true colour aerial photography showed extremely limited value. Though it may help in rare cases, in other cases it can be misleading and checking it is always time consuming. Given the additional time required and potential high costs the use of infra-red aerial photography is not recommended.

2.2　Automated data processing

It is possible that some electronic datasets can be processed automatically. By necessity this process will be tailored for each dataset, but will ensure that the ArcGIS shapefiles or MapInfo tables created meet the standards and format of the database. Any overlaps between polygons created for these data and other OMH polygons will be dealt with subsequently.

2.3　Final processing

The completed dataset must be cleaned and checked. Identically attributed polygons can be merged where adjacent to simplify and complete the dataset.

3　Future update of the rule base

This rule base is a working document and is therefore subject to update to account for unanticipated changes or additions. Thus the project manager should be informed of any required alterations to the document. These should be discussed as they are encountered, as this will allow a group decision to be made. The details of these discussions should then be sent to the project manager (in an email), containing the following information:

- Which dataset the issue was encountered in
- The details of the issue
- Who the issue was discussed with
- What changes are required to the rule base

The rule base will then be altered and re-issued at appropriate intervals.

4　OMH habitat definition

The following definition follows broadly the layout of other priority habitat definitions.

4.1　Introduction

4.1.1　General description of OMH

The following has been taken from the 'Priority Habitat Descriptions' (BRIG, 2010).

OMH sites are generally primary successions, and as such unusual in the British landscape, especially the lowlands. The vegetation can have similarities to early/pioneer communities (particularly grasslands) on more 'natural' substrates but, due to the edaphic conditions, the habitat can often persist (remaining relatively stable) for decades without active management (intervention). Stands of vegetation commonly comprise small patches and may vary over relatively small areas, reflecting small-scale variation in substrate and topography.

Plant assemblages are unusual, selected by propagule supply as well as site conditions (Ash *et al.*, 1991; Shaw, 1994). The habitat supports a range of notable vascular plant, moss and lichen species. These often include species declining in the wider countryside such as *Ophrys*

apifera, *Gymnadenia conopsea* (alkaline wastes), *Epipactis youngiana* (acid waste), *Osmunda regalis* (acid sandstone quarries), *Peltigera rufescens* (lime waste, PFA), *Cladonia pocillum* (calcareous wastes), *Diploschistes muscorum* (PFA) and a UK BAP priority liverwort, *Petalophyllum ralfsii* (PFA). Exotic plant species, which are well adapted to the prevailing environmental conditions, are a characteristic component of associated plant assemblages.

Invertebrate faunas can be species-rich and include many uncommon species (Eyre *et al.*, 2002; Eyre *et al.*, 2004). Between 12% and 15% of all nationally-rare and nationally-scarce insects are recorded from brownfield sites, which will include many post-industrial examples (Gibson, 1998; Jones, 2002). Exotic plants provide for an extended flowering season and, with the floristic and structural diversity of the habitat mosaic, contribute to the value of the habitat for invertebrates (Bodsworth *et al.*, 2005).

Some areas are important for birds that are primarily associated with previously developed or brownfield land such as little ringed plover (in 1984 97% of LRP nests in England were in 'man-made' habitats), as well as more widespread, but UK BAP priority species, including skylark and grey partridge. The habitat provides secure breeding and feeding areas commonly absent from land under agricultural management.

The heterogeneity within the habitat mosaic reflects chemical and physical modification by former development or previous industrial processes, including the exposure of underlying substrates and the tipping of wastes and spoils. Features such as ditches, other exposures, spoil mounds and even the relicts of built structures provide topographical heterogeneity at the macro- and micro-scale. Sealed surfaces and compaction add further variation and contribute to the modified hydrology of such habitats resulting in areas of impeded and accelerated drainage. Stochastic factors also have a significant influence in shaping the habitat.

Edaphic conditions for this habitat are severely limiting on plant growth. Examples are substrates with extreme pH, whether alkaline (e.g. chemical wastes) or acid (e.g. colliery spoils); deficiency of nitrogen (PFA), or available phosphate (highly calcareous Leblanc waste, blast furnace slag and calcareous quarry spoil); or water-deficient (dry gravel and sand pits). Other typical situations where such conditions arise include disused quarries, former railway sidings, extraction pits and landfill sites.

The habitat is concentrated in urban, urban fringe and large-scale former industrial landscapes, especially in the lowlands, though more isolated examples can be found on previously developed land in more remote rural areas.

4.1.2 Criteria

Each of these criteria must be met.

1. The area of open mosaic habitat is at least 0.25 ha in size.
2. Known history of disturbance at the site or evidence that soil has been removed or severely modified by previous use(s) of the site. Extraneous materials/substrates such as industrial spoil may have been added.
3. The site contains some vegetation. This will comprise early successional communities consisting mainly of stress-tolerant species (e.g. indicative of low nutrient status or drought). Early successional communities are composed of (a) annuals, or (b) mosses/liverworts, or (c) lichens, or (d) ruderals, or (e) inundation species, or (f) open grassland, or (g) flower-rich grassland, or (h) heathland.
4. The site contains un-vegetated, loose bare substrate and pools may be present.

5.   The site shows spatial variation, forming a mosaic of one or more of the early successional communities (a)–(h) above (criterion 3) plus bare substrate, within 0.25 ha.

4.1.3 Explanatory notes

The criteria are for guidance but cannot cover all potential scenarios and an element of expert judgement is therefore needed. It is assumed that the user will be able to recognise plant communities and the key component species.

1.   The minimum size refers to the potential open mosaic habitat (OMH), which might be a part of a larger site containing other habitats such as woodland or developed land.

2.   Disturbance refers to that resulting from major historical industrial use or development.
      a. Extraneous materials refer to extensive additions of spoil rather than incidental dumping of litter, broken glass, etc.
      b. There might be evidence of heavy metal contamination but extensive stands of calaminarian grassland are specifically excluded as that is a distinct Priority Habitat.

3.   Brief descriptions of the early successional communities:
      a. Annual communities are those comprised mainly of stress tolerant ruderals, which are short in stature and suited to low nutrient availability. Typical examples would be *Arenaria serpyllifolia*, *Centaurium erythraea*, *Linum catharticum* or *Trifolium arvense*.
      b. Moss/liverwort communities can contain both acrocarpous (i.e. usually un-branched, tufted) and pleurocarpous (usually branched, carpeted) mosses and are usually relatively open and less luxuriant than in more mature habitats, often with bare ground present in a fine-grained mosaic. They can occur in discrete patches or interspersed in other communities such as open grassland or heathland. Common species are usually present such as the mosses *Brachythecium rutabulum*, *Dicranum scoparium* or *Hypnum cupressiforme* and the liverworts *Lophocolea heterophylla* or *Ptilidium ciliare*.
      c. Lichen communities are likely to occur in extensive patches or interspersed with other communities such as open grassland or heathland. Species with a range of growth forms might be present, for example foliose (leaf-like), crustose (crust) or fruticose (shrubby and branched).
      d. Ruderal communities are those composed mainly of taller annuals, biennials or short-lived perennials and typical of slightly more nutrient-rich or less disturbed conditions than the annual communities. Typical examples would be *Daucus carota*, *Linaria vulgaris*, *Medicago lupulina* or *Reseda luteola*.
      e. Inundation communities are comprised of species suited to periodic, often seasonal flooding. Vegetation is usually interspersed with bare areas of mud which can have a caked surface during dry periods and can result in annuals establishing. Typical species would be *Alopecurus geniculatus*, *Juncus bufonius*, *Persicaria maculosa* or *Ranunculus flammula*.
      f. Open grassland is comprised mainly of perennial, stress-tolerant species of short stature with patches of bare ground at very fine-grained scale and often with a significant number of annual species or lichens in the sward. Typical species would be *Festuca ovina*, *Hypochaeris radicata*, *Pilosella officinarum* or *Rumex acetosella*.

g. Flower-rich grassland is a more typical, mature community with fewer gaps and characterised by more robust mesotrophic forbs such as *Centaurea nigra*, *Lotus corniculatus*, *Ranunculus acris* or *Trifolium pratense*.

h. Heathland communities are composed mainly of dwarf shrubs, often interspersed or in mosaics with graminoids, bryophytes or lichens. On OMH they tend to have a more open structure with less plant litter and other organic matter build up on the substrate than in more typical heathlands. Typical species include *Calluna vulgaris*, *Deschampsia flexuosa*, *Festuca ovina* or *Nardus stricta*.

Annex 1 shows species of vascular plant known to be associated with, but not confined to, the habitat in certain areas and/or substrates.

Other plant species associated with the particular edaphic conditions might also be present, for example ericaceous species on acidic sites. Species composition will also vary with geographic location and site age.

One of the principal reasons for the habitat being a priority is its importance for invertebrates. Many have very precise requirements for habitat 'niches' within their landscape. As well as areas of bare ground and food plants, these may be for sheltered places at various times of the year, or for rough vegetation or cover at others. At any particular site, features such as scrub may be essential to maintain the invertebrate value of the main habitat. Therefore, scattered scrub (up to 10–15% cover) may be present and adds to the conservation value of the site. Other communities or habitats might also be present (e.g. reed swamp, open water), but early successional communities should comprise the majority of the area.

4. 'Loose bare' substrate is intended to separate substrate potentially colonisable by plants from large expanses of sealed surface (concrete, tarmac, etc.) where vegetation could only establish if it is broken up or heavily weathered.

a. Bare substrate can occur at a range of spatial scales, from un-vegetated patches easily seen from a distance, to small, open spaces between individual plants within a community. On some substrates, for example coal spoil, the patches of bare ground may be 10 cm across or less. A site with a wide variety of patch sizes could also qualify.

b. Bare substrate also implies absence of organic matter accumulation.

5. A mosaic is defined as an area where a range of contiguous plant community types occur in transition with one another, usually with ecotone habitat gradients and repeated occurrences of each community, and often at a small scale.

a. The mosaic could comprise either:

i. a mixture of one of the habitats (a)–(c) or (e)–(h) plus bare ground together forming a mosaic;

ii. a mixture of two or more of the habitats (a)–(h) in a mosaic, with adjacent bare ground;

iii. a mixture of two or more of the habitats (a)–(h) plus bare ground together forming a mosaic.

b. Continuous blocks of a closed plant community greater than 0.25 ha would be classified as a habitat other than OMH, although those containing very fine-grained mosaics might qualify.

4.1.4 Key issues with mapping and discriminating from other habitats

- Please refer to the description of OMH above.
- The minimum mappable unit (MMU) for this habitat is 0.25 ha.

- Areas of closed habitat within OMH should only be included as part of the OMH resource if they are not greater than 0.25 ha in area.
- Overlaps between OMH and many other priority habitats, especially grassland and heathland, are allowable.
- OMH does not include calaminarian grassland, which is a separate priority habitat that is specifically excluded. It is often anthropogenic and characterised by high levels of heavy metals or other unusual minerals.

4.1.5   Applicability of aerial photos and other remote sensing technologies

Aerial photograph interpretation is an incredibly useful tool available to the habitat ecologist, but has its limitations. In particular, the use of aerial photography to identify OMH sites may be limited, due to their internal and external variability. In many cases, OMH sites may look like rough grassland or other habitats/land uses. As such, data supporting the identification of OMH is of key importance, with aerial photographs used to help determine the boundary. In such cases, aerial photography should be added as a data source.

In addition, where the aerial photograph clearly shows OMH to be clearly not present (e.g. it has been developed) and is more recent than the third party data the aerial photograph should be given the highest priority.

In order to assist with aerial photograph interpretation a collection of examples is provided in Appendix D. These should be added to as new examples arise. Appendix E shows additional examples from the review of the draft inventory in 2012, comparing sites with similar characteristics which were and were not confirmed as potential OMH.

Interpretation of satellite imagery is unlikely to be valuable as the small scale mosaic and high variability will ensure that recognisable patterns will not be apparent.

The work undertaken in 2012 to develop OMH inventories for England and Wales established the importance of Ordnance Survey (OS) MasterMap data and tools such as Google Street View and Bing Streetside for determining whether OMH is present or not:

- Where aerial photography shows potential OMH but MasterMap has features that are not represented on the aerial photography this often means the site has changed, as up to date OS MasterMap is likely to be more recent than the aerial photography. Such sites can be checked using Google Street View or Bing Streetside and are often found to have been developed. Where more recent OS MasterMap clearly shows roads and houses that are not visible on the aerial photography it is usually not necessary to undertake further checks and the site can be eliminated.
- Where the aerial photography shows buildings or other features that are not represented in MasterMap this often means the features have been removed and the site has been levelled. Such sites need to be checked using Google Street View or Bing Streetside to determine whether OMH is likely to have developed since the change.
- The results of the inventory review in 2012 highlighted the importance of using the most recent aerial photography available, preferably less than 1 year old, to exclude sites that were being developed.
- Local knowledge or a site visit was required to exclude sites recently lost to development. Aerial photography via online tools may not be the most recent image available. Google Street View indicates the capture date as part of the image but Google and Bing aerial imagery does not show the date of the imagery, which could also vary with scale. Wherever possible metadata for the imagery should be acquired to ensure the most recent is used.

4.2 Altitudinal limits

No specific upper or lower altitudinal limits.

4.3 Habitat classification

The categories in these classifications are not totally synonymous and the comparisons below attempt to be the best approximation.

Classification and version date	Code	Description	Relationship to OMH*	Comments
BAP priority habitat (2007)		Open Mosaic Habitats on Previously Developed Land	=	Overlaps with grassland and heathland priority habitats are most likely to occur with OMH.\n\nOverlaps with other priority habitats are less likely, but may occur.\n\nFollowing consultation in 2012, overlaps with calaminarian grassland have been allowed, though sites that show strong calaminarian characteristics should not be include in OMH.
		Grassland priority habitats	#	
		Heathland priority habitats	#	
		Wetland priority habitats	#	
		Woodland priority habitats	#	
		Calaminarian grassland	#	
BAP priority habitat (1995)		Grassland priority habitats	#	See above.
		Heathland priority habitats	#	
		Wetland priority habitats	#	
		Woodland priority habitats	#	
BAP broad habitat (1998)		Built up areas and gardens	#	Also overlaps with the majority of inland broad habitat types

Classification and version date	Code	Description	Relationship to OMH*	Comments
Phase 1 (1990)	B11	Unimproved acid grassland	#	Overlaps may occur with other Phase 1 communities where they form part of the mosaic.
	B12	Semi-improved acid grassland	#	
	B21	Unimproved neutral grassland	#	
	B22	Semi-improved neutral grassland	#	
	B31	Unimproved calcareous grassland	#	
	B32	Semi-improved calcareous grassland	#	
	B5	Marsh/marshy grassland	#	
	C31	Tall ruderal	#	
	C32	Other non-ruderal tall herb	#	
	D11	Acid dry dwarf shrub heath	#	
	D12	Calcareous dry dwarf shrub heath	#	
	D2	Wet dwarf shrub heath	#	
	D3	Lichen/bryophyte heath	#	
	D5	Dry heath/acid grassland mosaic	#	
	D6	Wet heath/acid grassland mosaic	#	
	E21	Acid/neutral flush	#	
	E22	Basic flush	#	
	E3	Fen	#	
	F21	Marginal vegetation	#	
	F22	Inundation vegetation	#	
	I21	Quarry	#	
	I22	Spoil	#	
	I23	Mine	#	
	I24	Refuse-tip	#	
	J13	Ephemeral/short perennial	#	
	J4	Bare ground	#	

Classification and version date	Code	Description	Relationship to OMH*	Comments
NVC (1991)	MG1	*Arrhenatherum elatius* grassland	#	The coverage of the NVC to OMH is poor (Rodwell *et al.*, 2000), so many OMH constituents are not included. There are overlaps with other open communities, though these are perhaps the most likely to occur. Overlaps will occur with some woodland NVC communities.
	MG2	*Arrhenatherum elatius-Filipendula ulmaria* tall-herb grassland	#	
	MG9	*Holcus lanatus-Deschampsia cespitosa* grassland	#	
	MG10	*Holcus lanatus-Juncus effusus* rush-pasture	#	
	MG11	*Festuca rubra-Agrostis stolonifera-Potentilla anserina* grassland	#	
	MG13	*Agrostis stolonifera-Alopecurus geniculatus* grassland	#	
	CG10	*Festuca ovina-Agrostis capillaris-Thymus praecox* grassland	#	
	U1	*Festuca ovina-Agrostis capillaris-Rumex acetosella* grassland	#	
	U2	*Deschampsia flexuosa* grassland	#	
	W6	*Alnus glutinosa-Urtica dioica* woodland	#	
	W23	*Ulex europaeus-Rubus fruticosus* scrub	#	
	OV17	*Reseda lutea-Polygonum aviculare* community	#	
	OV18	*Polygonum aviculare-Chamomilla suaveolens* community	#	
	OV19	*Poa annua-Matricaria perforata* community	#	
	OV20	*Poa annua-Sagina procumbens* community	#	
	OV21	*Poa annua-Plantago major* community	#	
	OV22	*Poa annua-Taraxacum officinale* community	#	
	OV23	*Lolium perenne-Dactylis glomerata* community	#	
	OV24	*Urtica dioica-Galium aparine* community	#	
	OV25	*Urtica dioica-Cirsium arvense* community	#	
	OV27	*Epilobium angustifolium* community	#	
	OV41	*Parietaria diffusa* community	#	

Classification and version date	Code	Description	Relationship to OMH*	Comments
EUNIS	E1.1	Inland sand and rock with open vegetation	#	EUNIS perhaps defines the range of communities possible on OMH better than any other existing habitat classification, due to the focus on context, management and structure as well as vegetation.
	E1.2	Perennial calcareous grassland and basic steppes	#	
	E1.7	Closed non-Mediterranean dry acid and neutral grassland	#	
	E1.9	Open non-Mediterranean dry acid and neutral grassland, including inland dune grassland	#	
	E2.7	Unmanaged mesic grassland	#	
	E2.8	Trampled mesophilous grasslands with annuals	#	
	E5.12	Weed communities of recently abandoned urban and suburban constructions	<	
	E5.13	Weed communities of recently abandoned rural constructions	#	
	E5.14	Weed communities of recently abandoned extractive industrial sites	<	
	F3.11	Medio-European rich-soil thickets	#	
	F3.13	Atlantic poor soil thickets	#	
	F3.15	*Ulex europaeus* thickets	#	
	F4.225	Britannic *Calluna-Genista* heaths	#	
	H3.1C	Disused siliceous quarries	#	
	H3.2F	Disused chalk and limestone quarries	#	
	H5.3	Sparsely- or un-vegetated habitats on mineral substrates not resulting from recent ice activity	#	
	J1.51	Urban and suburban derelict spaces	#	
	J2.61	Derelict spaces of disused rural constructions	#	
	J6.1	Waste resulting from building construction or demolition	#	
	J6.5	Industrial waste	#	
Palaearctic	61	Screes, gravel and boulder fields	#	Overlaps may occur with other communities
	86.14	Town ruins and construction sites	#	
	86.24	Village ruins and construction sites	#	
	86.434	Disused industrial constructions	#	
	86.4	Old industrial sites and open spaces	#	
	86.41	Abandoned quarries	#	
	86.42	Slag heaps and other detritus heaps	#	
	87.2	Ruderal communities	#	

Classification and version date	Code	Description	Relationship to OMH*	Comments
CORINE (1991)	86.4	Old industrial sites	#	Overlaps may occur with other communities
	86.41	Quarries	#	
	86.42	Slag heaps and other detritus heaps	#	
	86.43	Railroad switch yards and other open spaces	#	
	87.2	Ruderal communities	#	
Annex 1 type (1999 Interpretation manual)				No specific Annex 1 habitat types relevant to OMH, though there may be overlaps with some habitat, particularly grassland and heathland habitats.
Shimwell (1983)	3a	Open communities of low-growing annuals of gardens, ornamental park borders, roadsides and refuse lips.	#	Also includes artificial substrate equivalents of 7a: Grasslands on a variety of natural habitats and Soils, dominated by one or several low-growing (<70cm) fine-leaved, grass species.
	3b	Therophyte-dominated communities of derelict brick-rubble, cinder and fuel-ash tips. etc.	<	
	6a	Communities dominated by tall, coarse grasses and umbellifers.	#	
	6b	Communities dominated by tall, gregarious, native herbs.	#	
	6c	Communities dominated by introduced plant species, many of garden origin.	#	
	7c	Communities dominated by either introduced or native low-growing «70cm), gregarious, stoloniferous or rhizomatous herbs.	#	
	8a	Dwarf scrub dominated by ericaceous (heathlike) species less than 70cm tall.	#	
	8b	Gorse and broom thickets of acidic soils.	#	
	8c	Bramble patches in a variety of habitats.	#	
	8d	Mixed woodland-edge scrub and hedgerows dominated by hawthorn, elder, hazel and a variety of other native shrub species, on dry or moist soils.	#	
	8e	Birch, willow, alder and poplar scrub of damp soils, either naturally developed or planted.	#	
	8f	Scrub of introduced, evergreen and deciduous shrubs, either in managed ornamental situations or naturalized in waste places	#	

Classification and version date	Code	Description	Relationship to OMH*	Comments
Land Cover Map 2007	6	Neutral grassland	#	Overlaps may occur with other communities
	7	Calcareous grassland	#	
	8	Acid grassland	#	
	10	Heather	#	
	11	Heather grassland	#	
	14	Inland rock	#	
	22	Urban	#	
	23	Suburban	#	

* relationship of classification type to Open Mosaic Habitat on Previously Developed Land:
= equal, < narrower than OMH, > wider than OMH, # overlap, ≠ no overlap

4.4 Species composition

There are no specific guidelines for species composition for OMH, as the habitat is defined mostly by its physical structure. See the General description above.

4.5 Geographical restrictions

OMH is found throughout the UK, but is restricted to previously developed land and other sites that have been influenced by intensive anthropogenic disturbance. It is therefore centred in and near urban areas and industrial sites.

4.6 Geology and soils

Due to their artificial nature, OMH sites can be found on a wide range of geology and soil types.

There is usually an artificial component to the substrate, due to the dumping of waste or decomposition of concrete surfaces, etc. As a result, OMH sites often display a wide range of natural and artificial substrate types and particle sizes. Artificial substrates often present include (BRIG, 2010; Gwent Ecology, 2010; Riding *et al.*, 2010):

- chemical wastes
- colliery spoils
- Pulverised Fuel Ash (PFA)
- Leblanc waste
- blast furnace slag
- quarry spoil
- gravel sand
- concrete/tarmac
- rubble
- dumped topsoil
- clay
- brick

The chemistry of the substrate can be highly variable, including extremely lime rich (e.g. Leblanc and chemical wastes) to acid (e.g. colliery spoils) pH, nitrogen deficiency (e.g. PFA) and phosphate deficiency (e.g. Leblanc waste, blast furnace slag, calcareous quarry spoil).

4.7 Hydrology

OMH occurs on both wet (e.g. quarry bases) and dry substrates (e.g. dry gravel and sand). The impact of groundwater levels may be affected by introduced substrates.

4.8 Relationship with other habitats

	Open Mosaic Habitats on Previously Developed Land
Rivers	No overlap.
Oligotrophic and Dystrophic Lakes	No overlap.
Ponds	Allowable overlap. Ponds can occur within OMH sites where they are likely to be mapped below 0.25 ha. Ponds over 0.25 ha can also be included within OMH site boundaries where they form an integral part of the mosaic.
Mesotrophic Lakes	No overlap.
Eutrophic Standing Waters	No overlap.
Aquifer-Fed Naturally Fluctuating Water Bodies	No overlap. Whilst fluctuating water bodies are likely to be present within OMH sites they are unlikely to be aquifer-fed.
Arable Field Margins	No overlap.
Hedgerows	Allowable overlap. Hedgerows will be mapped as linear features and should not artificially sub-divide contiguous areas of OMH.
Traditional Orchards	No overlap.
Wood-Pasture and Parkland	No overlap.
Upland Oakwood	Allowable overlap. Whilst small areas with >20% canopy cover are allowed within OMH such areas are unlikely to match the definition for upland oakwood.
Lowland Beech and Yew Woodland	Allowable overlap. Whilst small areas with >20% canopy cover are allowed within OMH such areas are unlikely to match the definition for lowland beech and yew woodland.
Upland Mixed Ashwoods	Allowable overlap. Whilst small areas with >20% canopy cover are allowed within OMH such areas are unlikely to match the definition for upland mixed ashwoods.
Wet Woodland	Allowable overlap. Continuous areas >0.25 ha that lack all the characteristics of OMH should be excluded.
Lowland Mixed Deciduous Woodland	Allowable overlap. Continuous areas >0.25 ha that lack all the characteristics of OMH should be excluded.
Upland Birchwoods	Allowable overlap. Whilst small areas with >20% canopy cover are allowed within OMH such areas are unlikely to match the definition for upland birchwood.
Native Pine Woodlands	No overlap.
Lowland Dry Acid Grassland	Allowable overlap.
Lowland Calcareous Grassland	Allowable overlap.
Upland Calcareous Grassland	Allowable overlap.
Lowland Meadows	Allowable overlap.
Upland Hay Meadows	No overlap
Coastal and Floodplain Grazing Marsh	Allowable overlap.
Lowland Heathland	Allowable overlap.
Upland Heathland	Allowable overlap.
Upland Flushes, Fens and Swamps	Allowable overlap.
Purple Moor Grass and Rush Pastures	Allowable overlap.
Lowland Fens	Allowable overlap.
Reedbeds	No overlap. Small areas of reedbed <0.25 ha may be included.

Lowland Raised Bog	No overlap.
Blanket Bog	No overlap. Small areas of blanket bog <0.25 ha may be included.
Mountain Heaths and Willow Scrub	No overlap.
Inland Rock Outcrop and Scree Habitats	No overlap.
Calaminarian Grasslands	Limited overlap allowable, though sites that exhibit strong calaminarian characteristics should not also be regarded as OMH
Limestone Pavements	No overlap.
Maritime Cliff and Slopes	No overlap. Similar communities may occur within OMH.
Coastal Vegetated Shingle	No overlap. Similar communities may occur within OMH.
Machair	No overlap.
Coastal Sand Dunes	No overlap. Dune communities on artificial substrates can be included in OMH.

4.9 Management

OMH sites are often not in a regular management regime. Instead, management tends to be sporadic if it occurs at all. Management such as mowing, which would keep the site open, can actually be harmful if it reduces the phytogenous resources available, such as nectar sources, overwintering locations for invertebrates, nest sites, etc.

Rather OMH sites are defined by irregular disturbance events. These events include the introduction of material from outside the site or mechanical disturbance of the substrate. The frequency and scale of these events depend very much upon the site and are often only considered to have negative impacts where they occur at a large scale relative to the site. Some sites may have had no disturbance since they were originally created, as the substrate prevents the habitat succession to complete coverage of closed habitats.

4.10 Size of mappable units

- Minimum mappable unit (MMU): 0.25 ha

5 Data capture rules

OMH will be identified using a range of data sources, including inventories of previously developed land, aerial photographs, Google Street View, Bing Streetside, species information and local knowledge. Nevertheless, much of the mapping will be based upon modern aerial photographs, as this will allow the extent of OMH to be accurately mapped. Rules are needed to standardise how the determination of OMH boundaries is made. These rules are as follows:

1. An OMH site must be at least 0.25 ha in size.
2. Areas of closed habitat over 0.25 ha must be excluded. Areas of trees and scrub in a mosaic with shorter vegetation can be included and assigned a low confidence.
3. Areas of open water over 0.25 ha must be excluded. Fringes of water bodies including inundation, bog, fen and swamp communities are often important components of OMH sites and should be included.
4. Mapped OMH sites must have bare ground or short turfed areas. They must not be entirely comprised of rank grassland, though some taller vegetation in the mosaic is allowable.
5. Areas known to be heavily contaminated with heavy metals should not be included in the inventory, but should be referred to the calaminarian grassland inventory.

6. Polygons should not cross rivers or public roads, defined as having an area in OS MasterMap. Railway sidings are an important part of the OMH resource, so OMH may cross used and disused railways where OMH is believed to occur on both sides.
7. Areas that appear to be OMH on aerial photographs should not be captured unless they are supported by other evidence that suggests that they have been previously developed. A process for determining the confidence attached to these assessments is outlined in Appendix A, with the levels of confidence for each area recorded in the inventory.
8. It should be emphasised that the rules base is a working document and subject to update on account of experience with mapping from existing data sources and/or in the field. The rules base only allows for accurate mapping and quantification of OMH; habitat quality assessment requires specialist field survey to be undertaken. It is important to ensure that the latest draft of the rules base is obtained (suggest contact) before any future work on the inventory is undertaken.

6 Bibliography

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Appendix A   *Flowchart for site by site assessment*
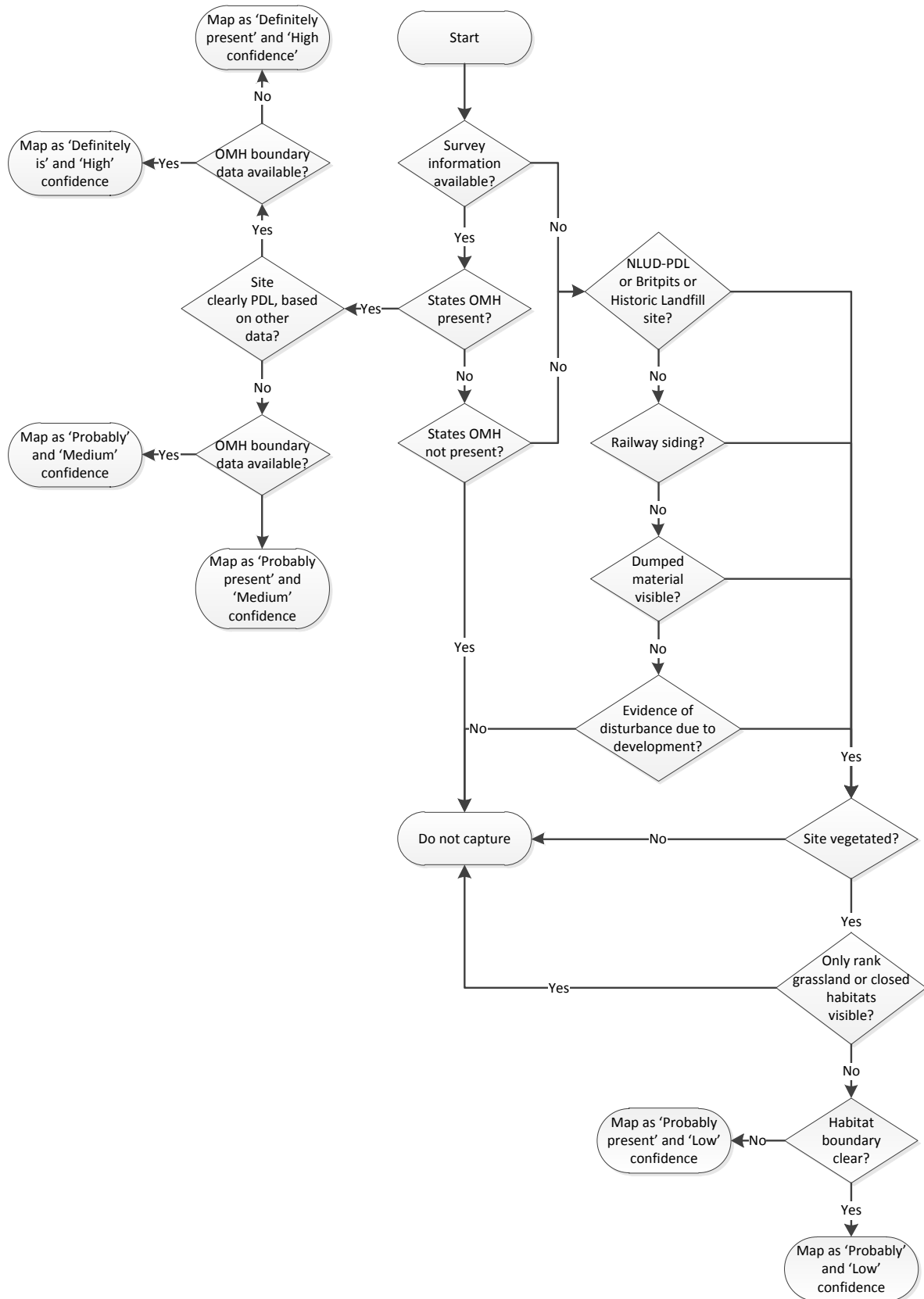
Appendix B   Provisional OMH inventory table structure

All polygons should include the standard Natural England attribute fields, as follows:

Name	Data Type	Values/format	Description
Incid	Char(17)	nnnn:nnnnnnn	This is a unique id for each habitat inventory polygon. It is of the form SSSU:NNNNNN, e.g. (site id, user, polygon number). A unique site number for each organisation should be obtained from Natural England.
Habdefver	Char(10)	0.0	Habitat definition version used for determination of habitat. No version number is currently available for OMH.
Prihabtxt	Char(254)	Open Mosaic Habitat on Previously Developed Land	Priority habitat name.
Nbnprihab	Char(20)	NBNSYS0100000013	NBN Habitat Dictionary biotope key for OMH.
Pridet	Char(100)	ONLY the following values are permitted: Definitely is Definitely present within polygon but not mappable Probably the Priority Habitat but some uncertainty of interpretation Probably the Priority Habitat but some uncertainty of interpretation and not mappable	Categorises the accuracy with which the priority habitat has been determined e.g. 'Definitely is'.
Interpqual	Char(10)	ONLY the following values are permitted: High Medium Low	A combination of the assessment of the quality of the original habitat identification in the data source and the relationship between the original habitat type and the priority habitat type.
Pridetcom	Char(254)		A free text field and is compulsory to explain priority determination other than Definitely is
Phabfeanot	Char(254)		A list of other key habitat features that are of relevance to the habitat
Source1txt	Char(100)		Title of source data set
S1captdate	Date	dd/mm/yyyy	The date of the source information used
S1habclass	Char(70)	National Vegetation Classification	The classification used with this source information or 'N/A' where none is used.
S1habtype	Char(70)		Habitat type for the source dataset from which the priority habitat

Name	Data Type	Values/format	Description
			determination was made, or #'N/A' where none is used.
S1boundary	Char(10)	Primary Secondary Continuity None	Indicates if this source was used as the Primary or Secondary source for the boundary, or supports the boundary suggested by the Primary and Secondary sources.
S1habid	Char(10)	Primary Secondary Continuity None	Indicates if source provides a Primary or Secondary source of the habitat, or supports the habitat suggested by the Primary and Secondary sources.
Source2txt	Char(100)		""
S2captdate	Date	dd/mm/yyyy	""
S2habclass	Char(70)		""
S2habtype	Char(70)		""
S2boundary	Char(10)	Primary Secondary Continuity None	""
S2habid	Char(10)	Primary Secondary Continuity None	""
Source3txt	Char(100)		""
S3captdate	Date	dd/mm/yyyy	""
S3habclass	Char(70)		""
S3habtype	Char(70)	Primary Secondary Continuity None	""
S3boundary	Char(10)	Primary Secondary Continuity None	""
S3habid	Char(10)		""
Bsmapscale	Char(10)		Map scale for the primary boundary data source, e.g. '1:10000' or 'None'
Digquality	Char(20)		Digitising quality, consisting of the following code letters in order of importance, separated by semicolons: A - Snapped to OS Land-Line B - Snapped to OS MasterMap feature C - Interpreted from APs D - Freehand E - Other
Fileref	Char(100)		Any file reference(s) that may be available for the feature.
Siteref	Char(100)		Any site reference(s) that may be available for the feature.

Name	Data Type	Values/format	Description
Createdate	Date	dd/mm/yyyy	Date inventory polygon captured
Createdby	Char(50)		Name of individual capturing data
Moddate	Date	dd/mm/yyyy	Date polygon was last modified
Modby	Char(50)		Name of individual last modifying polygon
Modsmade	Char(10)		Modification made e.g. Boundary
Modsreason	Char(150)		Reason for modification e.g. Change in habitat distribution
Modscommen	Char(254)		Update comment
Generalcom	Char(254)		Any additional comments about the polygon, habitat etc. NOT included elsewhere, and which are necessary to give a proper understanding of the site.

Note: Fields shaded blue are compulsory, with the exception of Pridetcom which is only compulsory where for determinations other than 'Definitely is'. Fields shaded white are desirable.

Appendix C   Boundary and digitising standards

The following are Natural England's digitising standards, which are to be followed during capture of wood-pasture and parkland data:

All data within habitat inventories should be mapped as polygons. There is no maximum polygon size. Digitise large polygons as large polygons. The size of the polygon (or length of a linear feature) is determined by the extent of the contiguous habitat patch to which a single BAP priority habitat code and associated attribution can be applied. There should be no artificial limiting of polygon size to match an existing GIS dataset, such as site boundaries. Polygons will not normally be mapped as multi-part polygons unless this is allowable in the habitat definition, e.g. for habitats occurring in small stands, such as calaminarian grasslands.

Generic minimum mappable units (MMU) are defined in the habitat definition for each habitat; generally 0.25 ha can be used as a guide. Many priority habitats are to be found in small fragmented parcels and to omit these from inventories on the basis of an arbitrary minimum would devalue the overall project and its aims. Therefore, the MMU in the habitat definition is based on knowledge of habitat fragmentation and the perceived significance of smaller parcels in defining the overall resource. In some cases minimum parcel sizes should be determined by the contributory data sources in use. This information should be stored in the metadata on the contributing datasets. No polygons of priority habitats are to be mapped that fall below the defined MMU for that habitat, unless they are part of a larger contiguous area of BAP habitat divided by a linear feature such as a metalled road and would not meet the MMU if counted as a single polygon.

Some land parcels may be included in more than one inventory. For example lowland meadows that are part of coastal grazing marshes should be mapped as both (i.e. a copy of the polygon should be included in each inventory dataset and attributed accordingly for each inventory). Each habitat definition defines allowable overlaps with other priority habitats.

In the cases of habitat "mosaics" where possible the mosaic should be separated into polygons meeting individual habitat definitions, subject to the MMU for that habitat. Where it is impossible to separate closely associated habitats, then the land parcel may be included in both inventories but mapped as "definitely present within polygon but not mappable" under the priority determination attribute.

Polygons may not extend across roads (as defined with metaling on the OS MasterMap data) or used railways. Polygons may not extend across any rivers that are mapped as polygons. Hedgerows (including the BAP Priority Habitat, ancient and/or species rich hedgerows) should not normally subdivide an otherwise continuous area of priority habitat. If subdividing an otherwise contiguous area of priority habitat with a road causes a polygon to fall below the designated MMU for that habitat then it may be included within the inventory even if below the ascribed MMU.

As soon as a feature has been captured to GIS its mandatory attributes should normally be added before further features are captured.

Digitising polygons

Where a boundary follows an OS MasterMap feature the OS MasterMap feature should be copied so that the habitat feature uses its geometry.

Where a boundary follows part of an OS MasterMap feature the digital boundary should be snapped along the OS MasterMap feature so that the digitised boundary and OS MasterMap feature both share the same geometry where appropriate.

Where a boundary does not follow an OS MasterMap feature, such as where the boundary follows a feature on an aerial photograph or scanned and geo-rectified map (maybe field or historical), the digitised boundary should be captured with sufficient nodes that the digitised feature takes on the shape of the feature on the source material at a scale of 1:2500.

Where a boundary is shared between two (or more) polygons the boundaries should all share the same geometry. Thus there should be no slivers or gaps between polygons with shared boundaries.

Features should not be "stream" digitised. Stream digitising is the process of manual digitising, of lines or regions, where nodes are automatically placed at pre-set intervals based upon distance or time.

Polygons should not contain inappropriate "spikes". In the figure below the digitised field has an inappropriate spike.
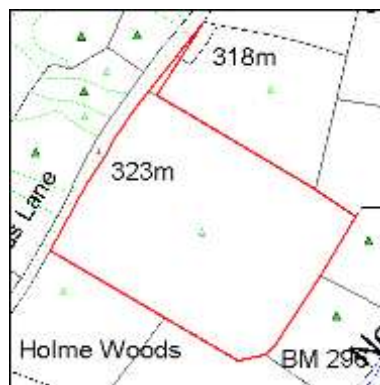
Polygons must not contain "bowties" (self-intersecting). Polygons must not intersect or cross themselves. In the figure below the digitised field has a bowtie caused by a polygon crossing itself.

Holes in polygons should be appropriately "punched". Where there is a hole in a polygon this should be digitised as a hole as shown below.

Appendix D   Examples for aerial photograph interpretation

<u>Previously developed</u>

Figure D.1 − definitely OMH, as included in Buglife's All of a Buzz project.

Figure D.2 − definitely OMH, as included within Buglife's All of a Buzz project.

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Figure D.3 – definitely OMH, as identified by Buglife's All of a Buzz project. This is an example of a site that gives very little indication of a clear mosaic.

Figure D.4 – a possible OMH site, as indicated by the fact that it is previously developed, has some vegetation and has a 'lumpy' appearance. The lumpiness is most likely due to historic disturbance.

Figure D.5 – a possible OMH site that has been clearly modified, as shown through the large bare areas. The combination of integrated bare areas and vegetation mean that it should be included in the inventory.

Figure D.6 – possible OMH, as it is previously developed, contains vegetation and has visible bare ground.
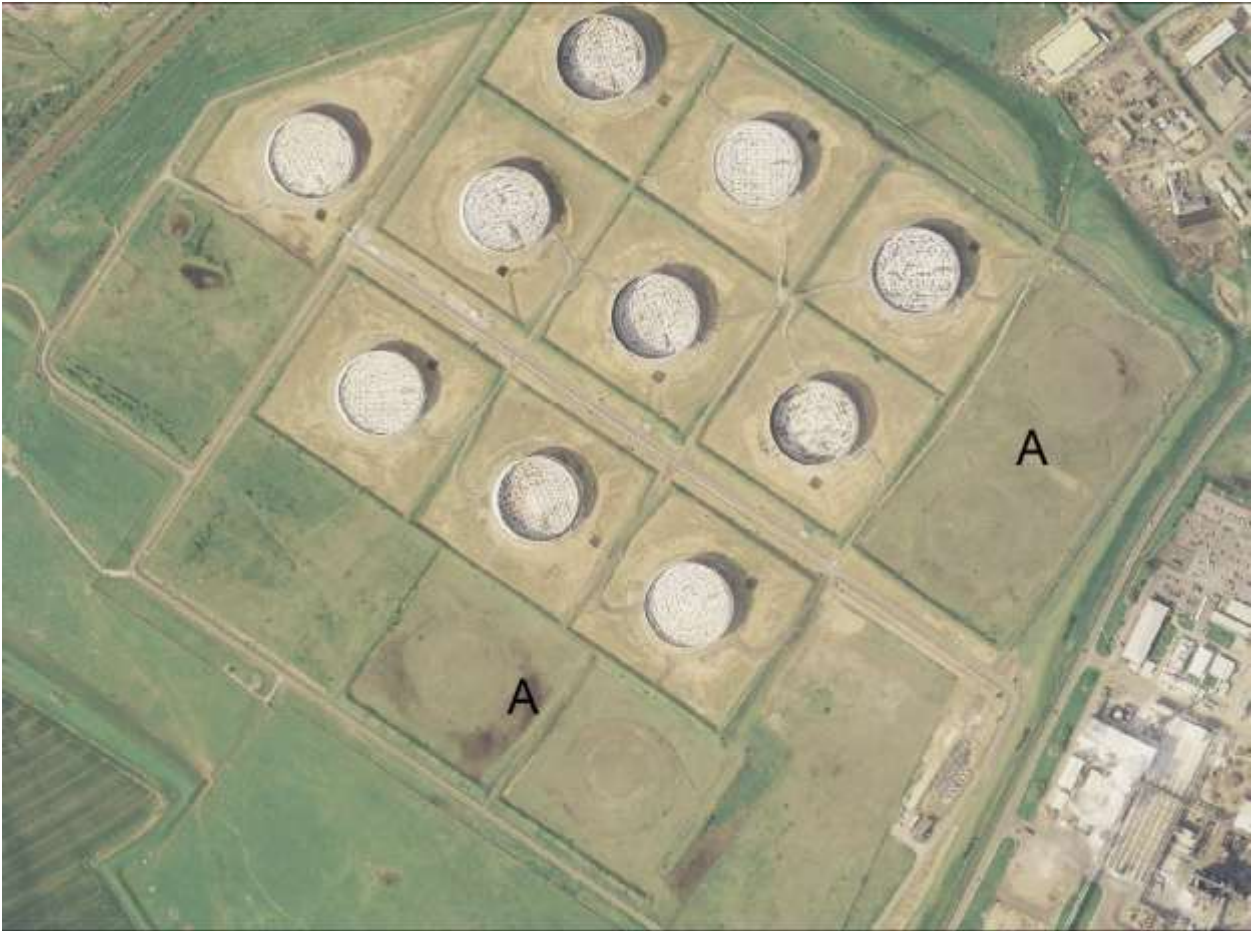
OMH on previously developed parts of still active sites

Figure D.7 – Chemical works, showing areas that have visible footprints of units that have been removed (A), as well as other areas that have most likely been modified during the development. This site was not identified as previously developed, as it is still active, but it is nevertheless clear that it contains previously developed areas.

Ex-colliery

Figure D.8 – this image is of an ex-colliery site, with the heaped spoil visible as grey patches. The spoil is clearly vegetated and should be treated as potential OMH. The woodland to the south, whilst previously developed, is now predominantly closed and therefore does not meet the definition, but open patches within the woodland might and should be included in the inventory.

Leblanc waste

Figure D.9 – Nob End SSSI, a known Leblanc waste site that has been recolonized by calcicolous vegetation.

Disused quarry

Figure D.10 – a long-disused and now largely scrubbed over quarry. Despite the scrub, this site is known to be OMH as it was included in Buglife's All of a Buzz project. It seems as though the limited amount of open habitat in the centre of the site and the cliffs around the edges are sufficient to maintain the biodiversity interest of the site.

Figure D.11 – an example of a small disused quarry. It clearly has some vegetation and bare ground and should be included in the inventory.

Railway siding

Figure D.12 – railway sidings on an active section of railway, identified as definitely OMH in Buglife's All of a Buzz project.

Figure D.13 – an example of possible OMH on railway sidings. The area contains vegetation and bare ground and has been previously developed, but does not feature in the NLUD-PDL, Britpits or the Historic Landfill dataset. In such situations it may be appropriate to map across railway lines or include polygons smaller than 0.25 ha where the total area of the cluster of polygons is greater than 0.25 ha.

Broken and re-vegetated concrete and tarmac

Figure D.14 – although much of this area is clearly concrete, this has broken up and become partially vegetated. This site is therefore considered potential OMH.

Dumping

Figure D.15 – this potential OMH site has very clear evidence of dumping of small patches of artificial substrates, as well as exposure of the underlying rock.

Not known to have been previously developed

Figure D.16 – this site is not on the NLUD-PDL, Britpits or the Historic Landfill dataset. It is not a railway siding. Nevertheless, it appears to be associates with the development in central east of the image and is therefore considered possible OMH. The confidence in such assessments is extremely low, so it is not considered appropriate to specifically search for similar sites.

Not OMH - un-vegetated

Figure D.17 – it is clear from this photograph that the area is completely un-vegetated, as there is no hint of green. The area is most likely solid tarmac or concrete.

Not OMH – greened and re-landscaped

Figure D.18 – this previously developed site has been re-landscaped, through laying turfs or reseeding, resulting in improved amenity grassland. The patchy appearance in this instance is due to parching of the grass.

Figure D.19 – the same site as in Figure D.18 as shown on Google Maps (above) and Street View (below), showing clearly improved grassland.

Figure D.20 – another example of a previously developed site that is now improved amenity grassland.

Not OMH - overgrown

Figure D.21 – An example of a former housing site. When left unmanaged after demolition of the houses such sites tend to become overgrown, as shown. This is likely due to the suitability of the ex-garden soil for plant growth.

Caution!!!

Figure D.22 – this site appears to be rather rank and overgrown. Nevertheless, it definitely is OMH as it was identified as such in the Buglife All of a Buzz project. It appears as though the small patches of shorter, less rank vegetation visible are sufficient to retain the biodiversity interest.

Figure D.23 – this site appears to be very scrubby and could be interpreted as too overgrown for OMH. Nevertheless, this site was identified as definitely OMH by Buglife's All of a Buzz project, so the open areas between the scrub are clearly sufficient to maintain the biodiversity interest.

Not OMH - churchyard

Figure D.24 – the mosaic appearance of this site is due to its use as a graveyard. It is therefore not OMH.

Not OMH – other habitats

Figure D.25 - an example of a site in the NLUD-PDL that is part built, part arable and part improved grassland. Such areas should be removed, but the remaining part of the site can be included in the inventory.

Lagoons

Figure D.26 – though this site is clearly predominantly a lagoon, it was identified as an OMH site in Buglife's All of a Buzz project. The areas around the lagoon should be incorporated into the inventory, but the lagoon should be excluded.

Appendix E   Review of OMH Draft Inventory for England

Once the initial inventory creation was completed, the draft inventory was sent to all local authorities within the North East and West Midlands regions, either as a GIS layer or PDF maps with an accompanying Excel spreadsheet. A copy of the draft inventory was also sent to other interested parties in these regions who had volunteered to review data via the questionnaire.

Sites excluded from the analysis

It was necessary early on to learn to identify potential OMH sites from aerial photography so that the rule base could be refined. Several days were spent capturing OMH sites and honing remote sensing techniques, resulting in some polygons that were known to be incorrect. These sites were not revisited prior to the review, as it was felt better to use the time identifying and mapping new sites. Though they were included in the draft inventory that was sent out to those undertaking the review these sites (1.1% of the sites returned by area) were subsequently excluded from the inventory and analysis, as it was clear that they would have been removed previously if they had been reassessed.

E.1   Results of the inventory review

Comparison of reviewed data to draft inventory

Nearly 17% of the sites sent were reviewed using local knowledge covering nearly 16% of the sites by area (Table E.1). The remaining sites were not reviewed as the majority of authorities did not return any data, so no local information was available for these areas.

	No. polygons	Area (ha)
Draft sites sent	1,292	5,872.64
Draft sites reviewed	218	926.19
Percentage reviewed	16.9%	15.8%

Table E.1 - Sites sent and reviewed by number of polygons and area in hectares. Sites were classed as reviewed where OMH status or comments were completed

For each of the reviewed sites, the revised data were compared with the inventory. The boundary was modified where sites were flagged as partially OMH. The sites were removed where they were flagged as not OMH. For each site removed, the polygon was checked against the aerial photography and internet sources to determine the reason why the site was incorrectly identified as OMH. The results of this review are shown in Figure E.1.
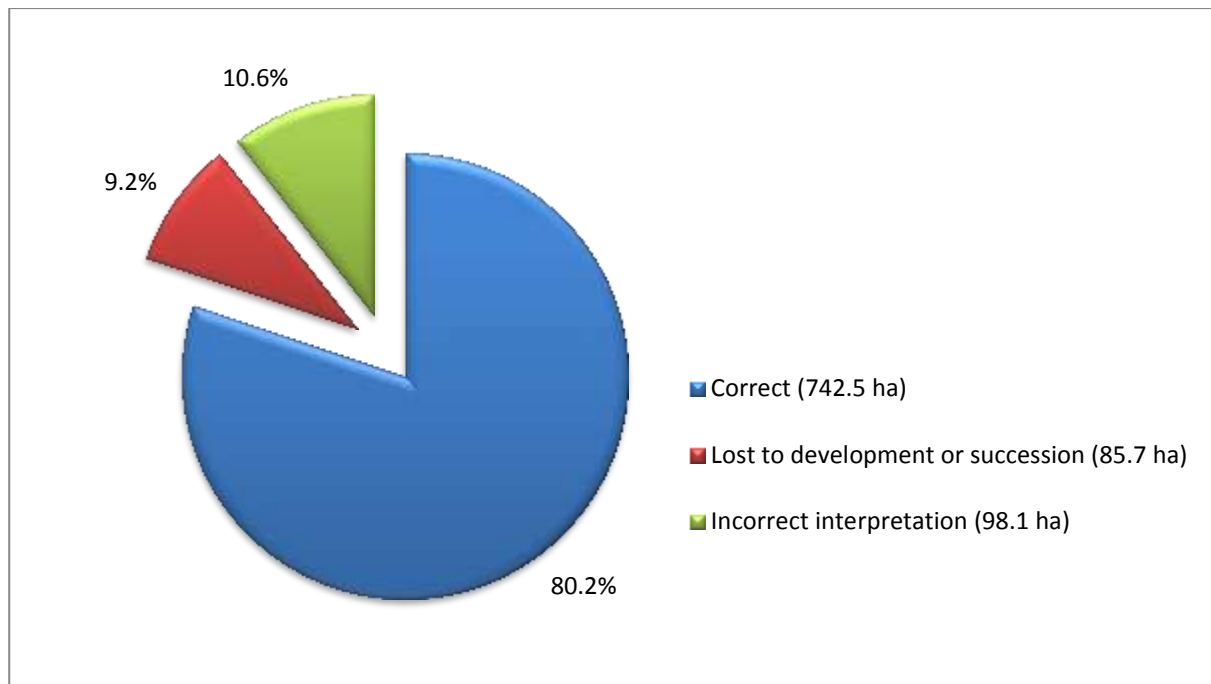
Figure E.1 - Status of reviewed sites by percentage of total area reviewed (926.19 ha). 'Correct' indicates sites which remained in the revised inventory, but this does not indicate the site was checked by the respondent. For excluded sites, see 'Sites excluded from the analysis'

The aerial photography supplied by Natural England was cross-checked against internet sources for the 9.2% of OMH habitat in the inventory that had been lost to development or succession. The internet sources included Google aerials and StreetView, Bing Aerial and Birds-eye View. In the majority of cases new buildings were visible on one of the four sources checked. In one instance in Stoke on Trent a site had been developed and a website showing photographs of the building was found, but neither the supplied aerial photography nor any of the internet sources showed the developed site.

The majority of the 10.6% of OMH habitat in the inventory which was incorrectly interpreted as OMH could be classified into two categories:

- Sites which appeared scruffy with possible areas of bare ground on the supplied aerial photographs, which were identified as grassland or rank grassland during the review.
- Sites which appeared mostly bare on the supplied aerial photographs with some areas of sparse vegetation, which were identified as bare substrate during the review.

The following figures are examples of these two categories of site which were removed from the inventory and where possible similar examples which were confirmed as OMH are also shown for comparison purposes.

Grassland

Based upon the supplied aerial photographs, it was hard to distinguish the difference between the adjacent grazed grassland and the OMH on the ex-landfill site (Figure E.2) without additional information. Online sources were checked and found to show clear signs that the site in Figure E.3 has been mown.

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Figure E.2 - Ex-landfill site confirmed as Open Mosaic Habitat

Figure E.3 - Site removed as identified as amenity grassland with bare ground caused by grazing

For sites that are mostly grassland, the principal criteria for inclusion or exclusion depends upon the presence of bare ground. Some sites contain light or dark brown patches that could

be interpreted as bare ground as shown in Figure E.4, but comparison with online sources shows these areas are grass tussocks or low bushes. Images from different seasons may help to correctly exclude these sites as fully vegetated.

Figure E.4 - Site on coal spoil removed as identified as rank grassland. Possible areas of bare ground are actually tussocky grass.

Figure E.5 - New site proposed as Open Mosaic Habitat

Bare Ground

Areas which are entirely bare should not be included in the inventory, though they may become Open Mosaic Habitat in future if they are left to develop vegetation naturally. Sites that only have vegetation along the boundary (Figure E.6) should not be included in the inventory.

The two confirmed sites (Figure E.7 and Figure E.8) have different levels of vegetation cover. As a general rule, there should be either small clusters of individual plants scattered across the whole site or the site should be generally green on the aerial photograph indicating a large amount of low vegetation e.g. grass or mosses.

Figure E.6 - Site removed as it was identified as active quarry and vegetation was only present on site boundary.

Figure E.7 - Site confirmed as Open Mosaic Habitat. Internet photography shows bare ground with short vegetation.

Figure E.8 – Site confirmed as Open Mosaic Habitat. Mostly bare but small areas of vegetation were developing across the site.

Figure E.9 - Site removed as identified as hard-standing with no vegetation.

An exception to these rules may occur in coastal areas. Figure E.10 shows a previously developed site which was captured as it contained some plants in bare ground, but local knowledge identified the site as being sand with marram grass. Marram grass is typical of sand dune habitat, so it was unlikely that the site was OMH and it was removed. Since this can only be determined by local knowledge or field survey, the general rule should be that these sites should be captured if they meet other rules for OMH, but they should be regarded as low confidence and the potential for sand dune noted.

Figure E.10 – Site with bare ground removed as identified as containing marram grass i.e. sand dune habitat

Additional OMH identified by the review

As part of the review of existing sites, some sites were extended and some new sites were proposed. In total 28.62 hectares of additional OMH was added to the inventory. Extensions were mostly due to expansion of habitat or demolition of buildings. The new sites were mostly not identified by existing data sources such as the National Land Use Database. The total area of reviewed OMH in the revised inventory was 771.1 hectares. The majority of this area was comprised of existing sites (Figure E.11).
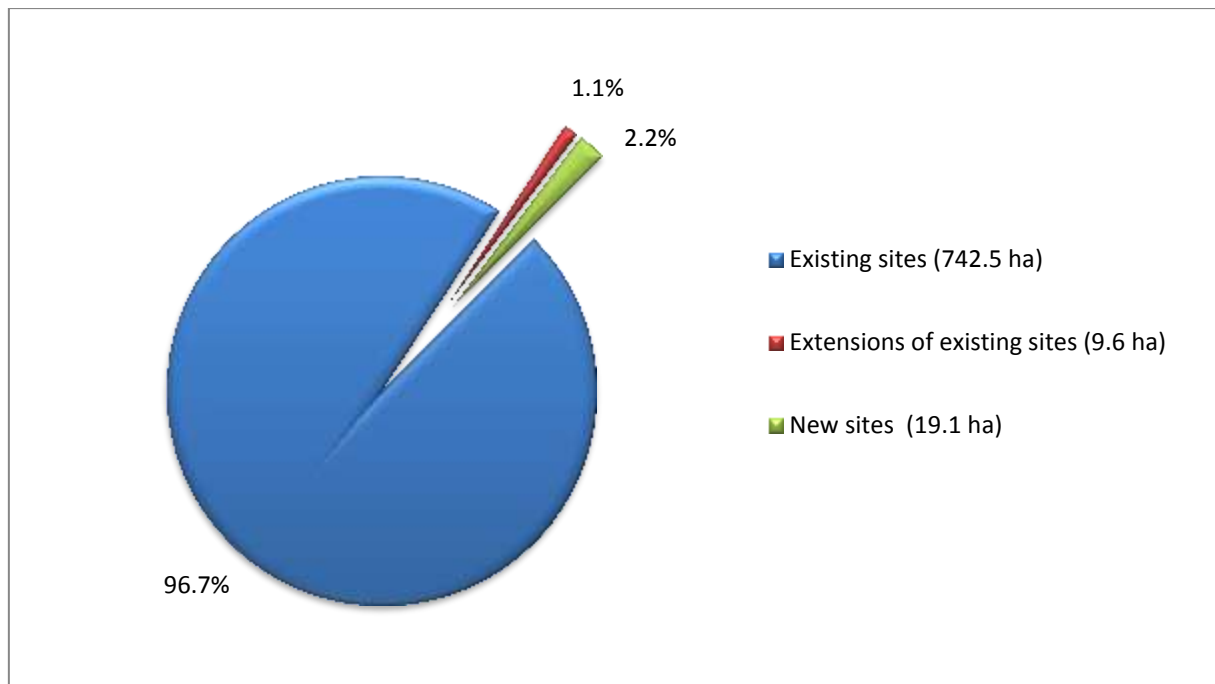
Figure E.11 - Area of revised inventory by data source.

E.2   Conclusions

The inventory review highlighted the requirement to assess and map potential OMH using recent aerial photography, preferably less than 1 year old. Alternatively, using aerial photography from a range of dates e.g. 1, 3 and 5 years old or cross-checking against internet sources usually allowed more accurate identification of OMH sites, particularly if the photographs were taken at varying times of year, as changes over time or appearance at different times of year could be assessed. In addition to more accurate identification, the existence of a site as OMH over multiple years could be used to assign a higher InterpQual. The cost-benefit of this approach must be assessed as it will increase the time required to assess each site.