Nene Valley Habitat Opportunity Map

Methods - March 2012

Overview
This piece of work is designed to guide changes of land use in the Nene Valley when the opportunity arises through development, agri-environment schemes or other projects.

Intended Use:

The Habitat Opportunity Map is intended to give site managers, developers and land advisors an idea of the habitats that would be a priority for creation and restoration on a site in order to improve the ecological network in the Nene Valley.

The Opportunity Map is intended to represent an 'ideal world' situation, and it is recognised that it is unlikely to be feasible to match the habitat distribution exactly in terms of extent and location.

Mapping approach:

So far we have concluded that an automated approach will not give the level of detail that is desired for the relatively confined area of the Nene Valley. Therefore, a manual approach has been used. A range of map layers were visually analysed to fill in a number of criteria using MapInfo.

The mapping was undertaken for the major flood plain of the River Nene from Upper Heyford to Peterborough, and for the River Ise (see figure 1). Reach Statements have been produced for each of the following areas (see figure 2): Brampton Arm, Upper Ise, Lower Ise, Harper's Brook, Willow Brook, Wootton Brook, Upper Nene, Middle Nene, Lower Nene. These statements summarise the current land uses, distribution of BAP habitat, ecological status of the watercourses, and key features such as Scheduled Ancient Monuments. They then go on to suggest the key opportunities for habitat creation and restoration and measures for improving the ecological status of the watercourse.

Prioritisation of habitat opportunities:

In many cases a single parcel of land will contribute equally well to the ecological network of the Nene Valley as one of several different habitat types. In these cases a range of suitable habitats have been identified and the site conditions and type of management possible will inform the final choice. In other scenarios a parcel of land will form a crucial connection or buffer to an existing habitat or site and therefore should be restored to a single priority habitat if possible.

Effort has been made to avoid suggesting that arable or productive farmland be reverted to semi-natural habitat. In some cases, however, reverting arable land is the only means of connecting patches of habitat. In regularly flooded areas arable land is likely to be less productive and may also contribute towards high levels of phosphate and siltation in the river. In these cases, ideally the whole field would be reverted to another habitat type, but an acceptable result may be achieved by creating wide margins and buffer zones.
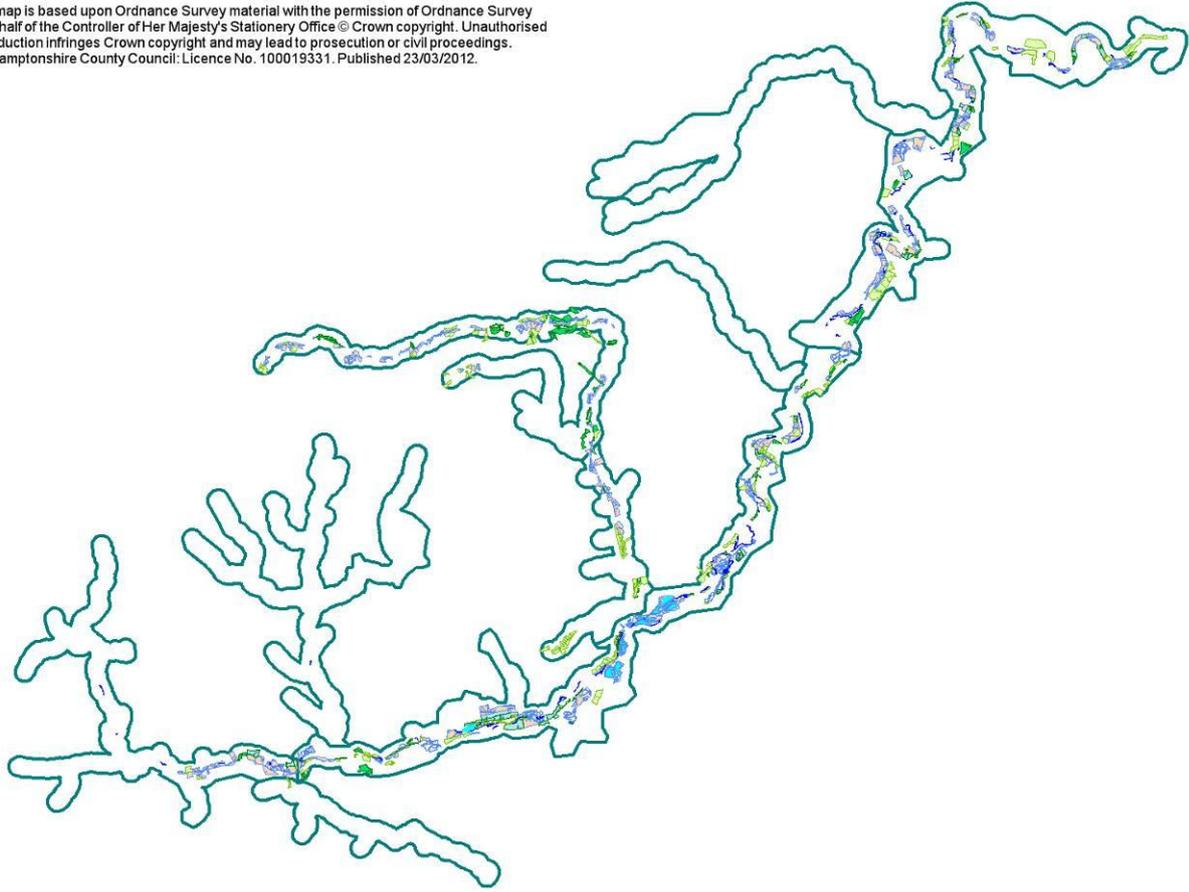
Figure 1: Overview of the Nene Valley Habitat Opportunity Map

Willow Brook

Lower Nene

Upper Ise

Harper's Brook

Lower Ise

Brampton Branch

Middle Nene

Upper Nene

Wootton Brook

Figure 2: Reaches of the River Nene

Procedure:

All of the layers listed in Appendix 1 were opened in a MapInfo workspace and the flowchart in Appendix 2 was followed. The columns in the MapInfo table (Appendix 3) were designed to assist in the decision making process as well as to hold a range of information about each polygon. Habitat types listed in Appendix 4 were used in the opportunity map. Some of the stages on the flow chart and information required for the table are described in more detail below.

Flowchart 5b:
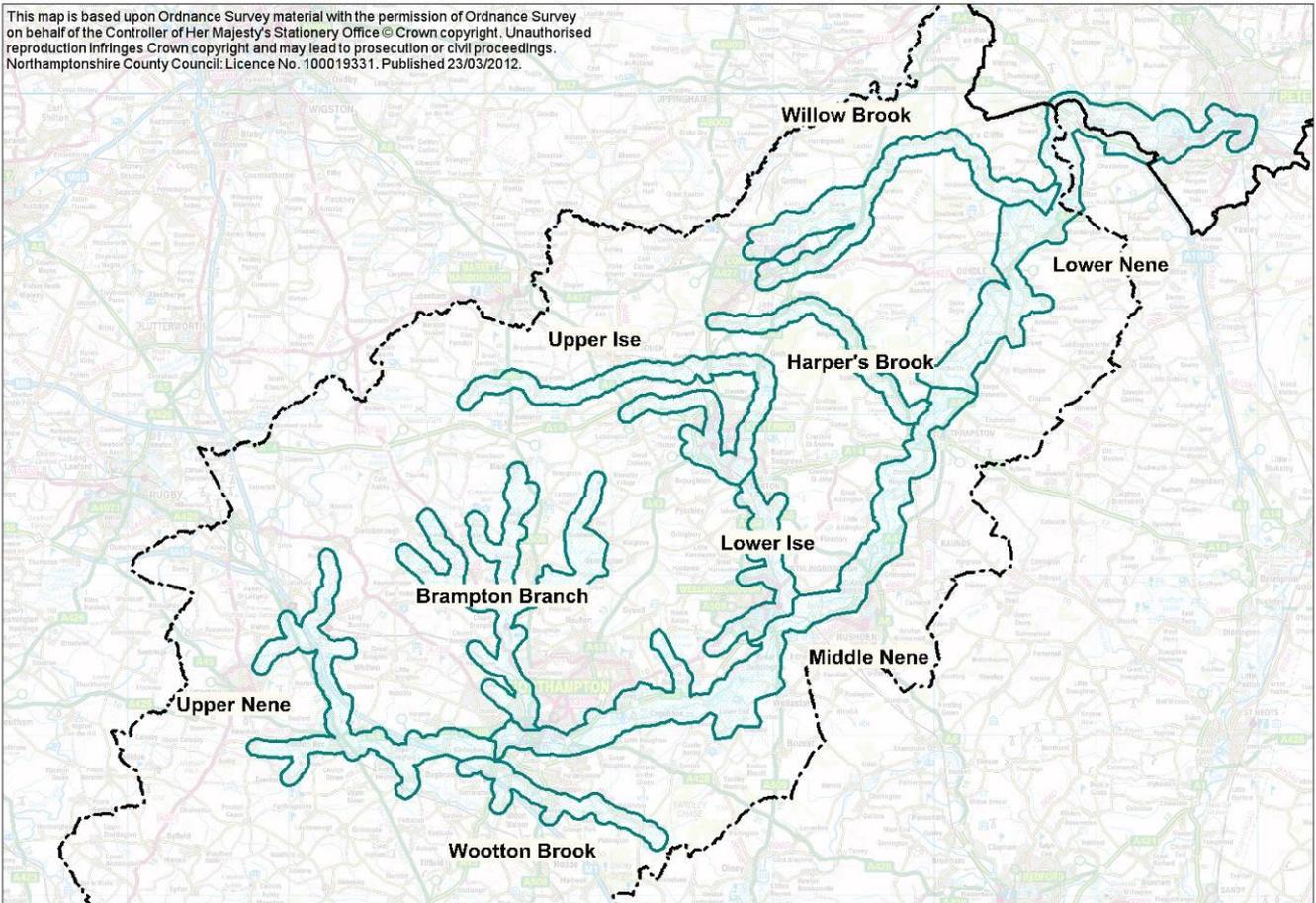Wetness needs to be investigated to see whether a wet habitat can be created. Look at frequency of flooding, distance from downstream lock, and physical position relative to water bodies such as ditches, scrapes, backwaters and backchannels. Deciding whether a site is wet or dry is partly subjective, but if it is in the 1:2 floodplain it is likely to be wet. Signs of wetness may also be visible from aerial photography (poor crop success, marshy vegetation, willow growth) or from the 1981 grassland survey maps.

Flowchart Q1 & 2:
Current and past habitat may determine the choice of habitat type. E.g. if the site was recorded as Marsh in 1981 and still looks like an area of wet grassland or marsh it is more desirable to restore to a fen/marsh habitat than to lowland meadow or wet woodland. In this case floodplain grazing marsh, lowland meadow or wet woodland would probably be the secondary option. If the site was recorded as improved grassland in 1981 and appears to be an area of dry grassland out of the floodplain now, it is unlikely that the site could be restored to floodplain grazing marsh or fen, but lowland meadow could be created.

Flowchart Q3:
Refer to Natural England's 'Enlargement Buffer' layers to identify key areas of connectivity for each habitat. Ecological experience and local knowledge are required to judge the level of connectivity that could be achieved.

Flowchart 3 and Q5:
The site status may affect its management e.g. the SSSI condition monitoring for the Upper Nene Valley Gravel Pits specifies no change in extent in certain habitat types. E.g. an area of open grassland should not be allowed to become scrub or woodland. However, areas of grassland do still have potential for enhancement in terms of species-richness or wetness to create lowland meadow or floodplain grazing marsh from semi-improved or improved grasslands. Grassland within the SPA that is not currently species-rich should be managed for the wintering bird interest; therefore this is more likely to be as floodplain grazing marsh.

Habitat Networks using buffers:

Habitat networks based on buffers around existing habitat patches were supplied by Natural England through their Biodiversity Opportunity Mapping Project 2009/10. A buffer zone of a set width was created around every polygon in each habitat layer. The buffers were then combined with overlapping buffers from habitats of the same type. These 'networks' were then given a strength value based on the number of overlapping buffers that were combined. These networks give an indication of where clusters of same-habitat patches occur and also where gaps exist.

The habitat layers have been updated since these networks were produced, so they are not completely accurate any more. E.g. we had overestimated the extent of lowland meadow around gravel pits in the Nene Valley, but this has been used to produce the network.

The networks for Fen, Lowland Meadow, Wet Woodland and Floodplain Grazing Marsh have been updated using 500m buffers around the revised habitat maps. In the original mapping project 500m was the average buffer distance used, but in some cases e.g. Fen, the buffer was 250m.

Missing data?

Geology and soil types are useful on a small scale to determine suitability of a site for restoration/creation of some habitat types. The data that we have available to us gives a broad overview, but not the fine detail that may be required for some habitats. Consequently, soil sampling ought to be part of the planning process for habitat

restoration and creation schemes. The geology data for Cambridgeshire and Peterborough was even less detailed than that for Northamptonshire.

Water level management in the River Nene is not easy to incorporate into the process. However, we have some idea of where water is impounded by structures, locally raising the water table.

Other approaches:

It has not been possible to find an example of a field-by-field biodiversity opportunity map. Most existing examples are much broader scale, identifying areas that are of priority for conservation action, with an indication of primary and secondary habitat types, but not allocating these to field parcels.

Example: The Broads potential habitat creation map has been produced based on the Norfolk Biodiversity Information Service (NBIS) mapping methodology used for the Norwich Green Infrastructure project, and similarly for the East of England Heathland Opportunity Mapping Project. This methodology identifies areas which may have the greatest potential for habitat creation, by linking core habitat areas within and between valleys through semi-natural habitat. Potential areas have been scored according to their location and connectivity to semi-natural habitats, designated sites, watercourses and the underlying peat resource. Criteria scores have been added to indicate those areas which hold the greatest potential for habitat creation opportunities. *See map on next page:*

Potential Habitat Creation Areas

Potential Habitat Creation Areas
Priority

- Low
- Medium
- High
- Rivers and Broads
- Existing Semi-natural Habitat
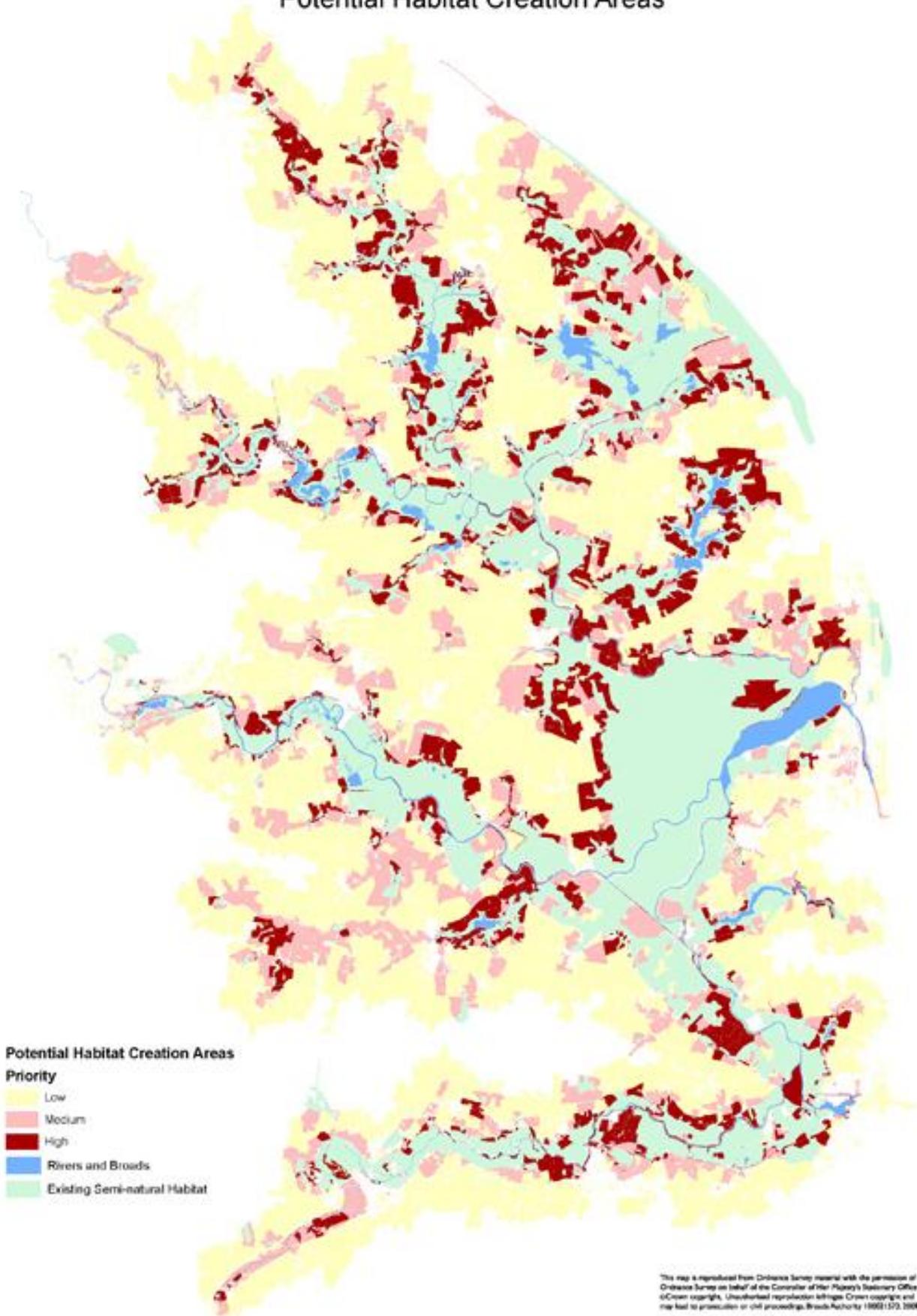
The Broads potential habitat creation map

Appendix 1 – Map Layers Used

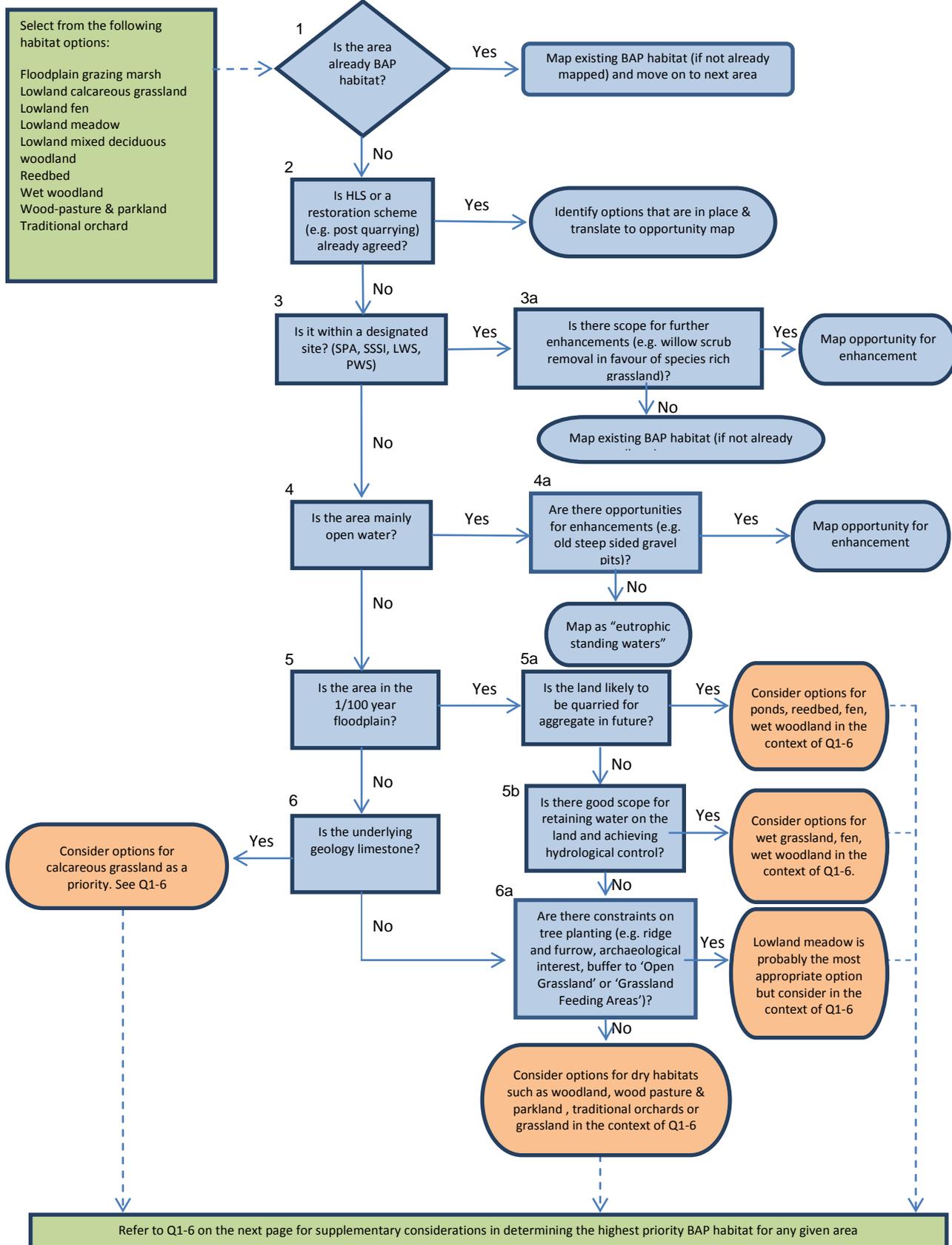| Layer	Description	Source
SPA	Special Protection Area	Natural England
SSSI	Sites of Special Scientific Interest	Natural England
LWS	Local Wildlife Sites	Wildlife Trust
PWS	Potential Wildlife Sites	Wildlife Trust
Nature Reserves	Wildlife Trust Nature Reserves	Wildlife Trust
Existing BAP habitats based on 2010 habitat mapping project	Individual layer for each habitat, initially produced in 2010, but updated regularly	Wildlife Trust
1981 grassland survey of the Nene Valley	Categorises grassland into 4 groups – 1, Natural Grassland, 2, Semi-natural grassland, 3, Poor semi-improved grassland, 4, Improved grassland. Indicates use e.g. hay, recreation. Also identifies marsh, arable and woodland.	Nature Conservancy Council (Wildlife Trust)
Flood Risk Outlines (1:2, 1:5, 1:10, up to 1:100 with defences)	Outline showing extent of floodplain for each flood frequency. 1:2 indicates that flooding is likely once every 2 years.	EA
Flood Zones 2 & 3 (without defences)	Flood Zone 2 – the 1:100 year flood outline prior to installation of flood defences. Flood Zone 3 – the 1:1000 year flood outline prior to installation of flood defences.	EA
Location of locks		EA
SSSI condition monitoring habitat layers	Reedbed, open grassland, grassland feeding areas, mixed natural succession, wet woodland for Upper Nene Valley Gravel Pits	Natural England
1:10,000 Ordnance Survey base map		NCC
Ordnance Survey Master Map water and water edge layers		NCC
Enlargement Buffers (NE layers)	Weighted buffer zones around existing BAP habitat – to identify networks.	Natural England
Google Earth		Google
Entry Level plus Higher Level Stewardship Scheme boundaries		Natural England
North Northamptonshire Land allocations for housing and employment		NNJPU
Northamptonshire Minerals site allocations		NCC
Quarry sites (historical)		NCC
Scheduled Ancient Monuments		NCC (Northamptonshire) PCC (Peterborough)
Ridge and Furrow	Identifies fields and 'townships' with confirmed ridge and furrow. This layer is not comprehensive.	NCC
Bird breeding data from SPA survey (waders)	Layers showing 'confirmed', 'probable' and 'possible' breeding wader locations in the SPA survey area.	RSPB
Backwaters	Identified backwaters and backchannels along the river Nene.	Wildlife Trust
Peterborough Local Development Framework Site Allocations		PCC
Peterborough Mineral Sites Allocations		PCC

Appendix 2 - Flowchart

Select from the following habitat options:

Floodplain grazing marsh
Lowland calcareous grassland
Lowland fen
Lowland meadow
Lowland mixed deciduous woodland
Reedbed
Wet woodland
Wood-pasture & parkland
Traditional orchard

1 Is the area already BAP habitat?

Yes → Map existing BAP habitat (if not already mapped) and move on to next area

No ↓

2 Is HLS or a restoration scheme (e.g. post quarrying) already agreed?

Yes → Identify options that are in place & translate to opportunity map

No ↓

3 Is it within a designated site? (SPA, SSSI, LWS, PWS)

Yes → **3a** Is there scope for further enhancements (e.g. willow scrub removal in favour of species rich grassland)?

3a Yes → Map opportunity for enhancement

3a No ↓ Map existing BAP habitat (if not already ...)

3 No ↓

4 Is the area mainly open water?

Yes → **4a** Are there opportunities for enhancements (e.g. old steep sided gravel pits)?

4a Yes → Map opportunity for enhancement

4a No ↓ Map as "eutrophic standing waters"

4 No ↓

5 Is the area in the 1/100 year floodplain?

Yes → **5a** Is the land likely to be quarried for aggregate in future?

5a Yes → Consider options for ponds, reedbed, fen, wet woodland in the context of Q1-6

5a No ↓

5b Is there good scope for retaining water on the land and achieving hydrological control?

5b Yes → Consider options for wet grassland, fen, wet woodland in the context of Q1-6.

5b No ↓

5 No ↓

6 Is the underlying geology limestone?

Yes → Consider options for calcareous grassland as a priority. See Q1-6

No →

6a Are there constraints on tree planting (e.g. ridge and furrow, archaeological interest, buffer to 'Open Grassland' or 'Grassland Feeding Areas')?

6a Yes → Lowland meadow is probably the most appropriate option but consider in the context of Q1-6

6a No ↓ Consider options for dry habitats such as woodland, wood pasture & parkland , traditional orchards or grassland in the context of Q1-6

Refer to Q1-6 on the next page for supplementary considerations in determining the highest priority BAP habitat for any given area

NB: your starting point in considering these supplementary questions/issues, should be one of the five orange "habitat options" boxes on the previous page (reproduced below). You should already therefore have determined a "short list" of options, e.g. a range of wetland habitats. These supplementary questions are solely to help narrow down the options and perhaps focus on a single high priority option in some cases.

Consider options for calcareous grassland as a priority.

Consider options for ponds, reedbed, fen, wet woodland

Consider options for wet grassland, fen, wet woodland

Lowland meadow is probably the most appropriate option

Consider options for dry habitats such as woodland, wood pasture & parkland , traditional orchards or grassland

Q1 Was the area shown as MG (marsh) on the 1981 survey?

Yes → Wet habitat such as lowland fen, reedbed or marsh should be priority. Secondary priority is likely to be lowland meadow, floodplain grazing marsh or wet woodland.

No ↓

Q2 Was the area shown as SNG1 or 2 (semi-natural grassland) on the 1981 survey?

Yes → Prioritise as lowland meadow unless answers to Q1-6 suggest otherwise

No ↓

Q3 Does the area provide an obvious link between two patches of existing habitat of same type or provide an opportunity to buffer or extend an existing BAP habitat?

Yes → Prioritise as adjacent habitat type unless answers to Q1-6 suggest otherwise

No ↓

Wet grassland – open landscape without hedgerows, preferably collections of fields >20ha.
Reedbed – 20ha+ ideally for bittern (RSPB).
Wet woodland - 40ha+ for lesser-spotted woodpecker (RSPB).
Woodland – 10ha (Expanding our Horizons, Woodland Trust, 2000)
Lowland Meadow – 2ha+ (UKBAP)

Q4 Does identifying the area as a specific BAP opportunity enable a critical threshold to be exceeded, alone or in combination with other patches of the same/similar habitat adjacent or close by? (thresholds and minimum separation distances to be determined)

Yes → Prioritise indicated habitat type unless answers to Q1-6 suggest otherwise

No ↓

Q5 Does the area provide a buffer to 'Open Grassland' or 'Grassland Feeding Area' in the Upper Nene Valley Gravel Pits SSSI, or have archaeological interest or ridge and furrow?

Yes → Consider open grassland types – lowland meadow or floodplain grazing marsh in accordance with Q1-6. Do not prioritise woodland.

No ↓

Q6 Is the area likely to be heavily used for dog-walking, informal recreation etc (e.g. public right of way present, close to urban fringe)

Yes → Consider sensitivity of remaining habitat options to human disturbance and consider scope for mitigation before selecting best habitat opportunity

No ↓

Prioritise indicated habitat type(s), or consider a range of farm management changes or maintenance of existing land use.

Appendix 3 - Column headings in table

Heading	Description
Broad Category	Seven broad groupings: Wet Woodland, Dry Woodland, Wet Grassland, Dry Grassland, Wetland, Open Water, Backwater
Priority Habitat Opportunity	Given the option this would be the habitat of choice
Priority Habitat Opportunity 2	If there are two options of equal preference, then put one in here.
Secondary Habitat Opportunity	If the priority option is not possible, this is the second choice
Other Habitat Opportunities	If there are more options for habitat creation and restoration these can be listed here.
Minimum Requirement	If it is not practical to restore any of the listed habitats over the whole site, then this option should be considered to improve ecological connectivity. E.g. Buffer watercourse, Increase field margins.
Current Habitat	According to existing habitat maps or aerial photography.
Site Status	Any nature conservation designation that applies to this area, SPA/LWS etc
Restoration Proposed	If there is already a restoration scheme in place e.g. through development or extraction, then include habitat type proposed here.
HLS Option	If HLS is in place, include option name here
Enhance Open Water	If the site is mainly open water and there are options to enhance, include here. E.g. re-profile margins, create islands.
Proposed Extraction	Yes/No – either planning application in progress or shown on allocations map
Proposed Development	Yes/No – either planning application in progress or shown on allocations map
Flood Probability With Def	Actual flood probability with defences e.g. 1:2 or indication that the terrain of the site varies to give a mix of probabilities.
Flood Probability Without Def	Is 1:100 flood probability WITHOUT defences increased or unchanged? If this is greater than with defences this indicates a chance to re-connect floodplain/re-wet. This is not possible to assess for more frequent flooding, so is not very helpful.
Geology	Name of dominant geology through the site e.g. Boulder Clay, or summary if several types.
Ridge Furrow	Yes/No
SAM	Yes/No
SSSI Buffer	If the site forms a buffer to the Upper Nene Valley Gravel Pits SSSI insert the name of the condition monitoring habitat type of the adjacent SSSI e.g. Open Grassland or Grassland Feeding Area.
Proximity Downstream Lock	Distance in kilometres along the river to the next downstream lock, mainly applicable for riverside sites. More water may be available for habitat creation directly upstream of a lock. If this value is 0.00 this means that the lock was deemed to be too far away to have any influence, while 0.01 means that the site is adjacent to the lock.
Water Availability	Notes of where water may be available from to create wet habitats e.g. backwater, lakes, ditches.
Wet or Dry	Wet/Dry/Mix - Does the area have the opportunity to be a wet habitat? Wet habitats are more condition-specific than dry so should be given higher priority.
Quarried	Was the site subject to quarrying, for gravel or other minerals?
Habitat 1981	If recorded during this survey.
Right of Way	FP (for footpath) or BW (for bridleway) or BYW (for byway), or Yes for other public access.
Agri Land Class	Agricultural Land Classification – enter number 1-7
River Restoration Options	Are there options for restoring part of the river alongside the habitat restoration/creation opportunity? E.g. backwater or back channel restoration.
Successional	*Not properly used* Quarried sites mature over time unless management is employed to delay

Stage Current	succession. This is an indication of which stage site conditions are at between bare ground (early) and woodland (late).
Successional Stage Desired	*Not properly used* For a range of interests, but primarily SSSI condition monitoring, what stage of succession is desired?
Constraints	*Not properly used* Any factors that may prevent the priority habitat opportunity being achieved.

Appendix 4 - Habitats

Below are the habitat descriptions that were used during the initial mapping of BAP habitats in Northamptonshire. These have been revised slightly and then used during the Nene Valley Opportunity Mapping.

Grasslands

Lowland Meadow:
- Neutral grassland indicator species dominant over other types
- Occurring on clay or alluvium or disused railway lines
- MG4 or MG5 identified as the dominant community during surveys
- Many managed for hay, although some are managed as pasture or unmanaged
- May be dry or subject to periodic flooding

Lowland Calcareous Grassland:
- Calcareous grassland indicator species dominant over other types
- Site designated as LWS because of calcareous grassland
- Occurring on limestone geology and on old extraction sites, especially ironstone gullets
- On disused extraction sites the grassland must be well developed and fit the typical calcareous grassland description, if not it was classed as Open Mosaic Habitats on Previously developed land
- CG communities identified during surveys
- Often managed for grazing or unmanaged/grazed by rabbits
- Always dry sites, often with significant variation in topography

Lowland Dry Acid Grassland:
- Acid grassland indicator species dominant over other types, although often equal numbers of neutral and acid species, and a fairly low number of indicators
- On Northampton Sand and Ironstone
- Sandy soils
- May be also planted with conifers or non-native plantation woodland
- Often on undulating hills
- Managed as pasture, mainly for sheep, and may be heavily grazed

Floodplain Grazing Marsh:
- Contains MG9-13 communities
- Usually on clay
- Wet during winter but dry in summer
- Grass dominated by rushes and sedges in places
- Usually managed by grazing
- Lie within the floodplain
- Network of ditches in/around fields or surrounding a gravel pit.
- Managed for wintering/breeding wader and waterfowl interest.
- Usually within an open landscape of few hedges and large fields.

Undetermined Grassland:
- Grassland that does not meet any of the LWS grassland criteria
- Shows no clear tendency towards a BAP grassland type
- Species poor
- Heavily grazed or unmanaged, often improved or semi-improved

Heathland

Heathland is a rare habitat in Northamptonshire and does not really occur in the typical form.

Key Features:

- Heather, gorse, bracken present
- Sandy soil with underlying Northampton Sand and Ironstone
- Often in a mosaic with acid grassland and plantation woodland
- Occurs within the rides and recently cleared areas at Harlestone Firs

Open Mosaic Habitats on Previously Developed Land
This habitat occurs on disused quarries and mineral extraction sites, and in some cases on railway lines.

Key Features:
- Mixture of grassland types, bare ground, tall ruderal vegetation and scrub
- Grassland types do not meet other BAP descriptions fully
- Often disturbed and showing delayed succession
- Usually unmanaged except for rabbit grazing

Wetland Habitats
Lowland Fen:
- Almost permanently wet ground
- Often directly linked to a water body or water course
- Dominated by typical marsh and swamp plant species
- May be described as marsh or swamp in site description
- Marginal vegetation along rivers and around water bodies is not included unless it forms a considerably large patch

Reedbed:
- Area of wetland dominated by common reed
- Considered to be large enough to support reedbed species such as reed warblers

Open Water (The definition of the BAP habitat Eutrophic Standing Water includes only water bodies over 2ha. We have mapped all water bodies together under the open water heading):
- All areas of standing and running water
- Includes ponds, reservoirs, gravel pits, lakes, canals, rivers
- Includes areas of marginal vegetation that are associated with these areas of water
- Ponds were included here unless they were small and formed a part of a different habitat such as a woodland

Woodland
Lowland Mixed Deciduous Woodland:
- Over 90% native species (non-natives are all conifers, sycamore, sweet chestnut etc.)
- All fragments of remaining ancient woodland
- Plantation woodlands are included where they are of native species and contain a natural ground flora
- Rides and glades included as part of the woodland

Wet Woodland:
- Dominated by willow species and alder
- Wet ground
- Marsh indicator species in ground flora
- Often closely linked to water body or river

Wood Pasture and Parkland:
- Scattered mature trees over grassland
- Often associated with historic estates
- Does not include modern parkland with clumps of non-native trees, fish ponds etc. set within grassland. These sites were split into their component parts, e.g. undetermined grassland and undetermined woodland.

Undetermined Woodland:

- Woodland that is more than 10% non-native
- Plantations on ancient woodland sites
- May also be mapped as heathland or grassland where the underlying value which is evident in the rides and clearings is of more ecological significance than the woodland itself
- Includes areas of natural regeneration of non-natives such as sycamore
- Includes spinneys, shelter belts and other areas of trees that aren't considered as typical woodland

Scrub:
- Dense scrub without standard forming trees
- Dominant vegetation is scrub rather than grassland or woodland
- Underlying grassland has limited value or potential