WHOLE RIVER RESTORATION PLAN FOR THE RIVER KENNET AND RIVER LAMBOURN SSSI (2011)

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Executive summary

The rivers Kennet and Lambourn are both designated as Sites of Special Scientific Interest (SSSI). The river Lambourn is also designated as a Special Area of Conservation (SAC).

Many river Sites of Special Scientific Interest (SSSIs) have had physical modifications to the channel that affect their optimal functioning as habitats for characteristic wildlife communities. These modifications, e.g. inappropriate dredging; inappropriate weirs, dams or other channel structures and inland flood defence works are recognised as reasons for ‘unfavourable condition’. Natural England’s SSSI Remedies programme includes ‘river restoration projects’ as a mechanism for achieving ‘favourable condition’. The river restoration project remedy involves developing a whole-river restoration plan, and starting to implement restoration works on the ground. The Environment Agency and Natural England are jointly responsible for getting the remedy underway, but it is acknowledged that implementation of the restoration plan will be over a long time, using a variety of delivery mechanisms, and will involve landowners and other river interests.

Whole-river restoration plans are required for river SSSIs (including the River Kennet and Lambourn SSSIs) for which physical modification is identified as a Reason for ‘Unfavourable Condition’. A strategic ‘whole river’ approach to river restoration is required, based upon identifying key habitat features, linking fluvial geomorphology and ecology, and phased implementation of restoration works that encourage assisted natural recovery. Restoration will contribute to meeting obligations under the Water Framework Directive, in respect of achieving Protected Area objectives and Good Ecological Status or Good Ecological Potential.

This strategy identifies all the actions necessary to address the impacts of physical modifications that are the principle reason for the 'unfavourable' classification of both SSSIs. It also identifies a range of costs for each 'restoration' and applies an 'aspirational' date to the actions.

Contents

1 Introduction

The Rivers Kennet and Lambourn are both designated as Sites of Special Scientific Interest (SSSI). Both rivers are classed as JNCC type III (base rich, low energy lowland rivers), and noted for their high quality and diverse habitats, supporting a range of aquatic vegetation, aquatic invertebrates, bird and fish species. The River Lambourn is also designated as a European Special Area of Conservation (SAC) (see section 4.3 and appendix 1).

Many river Sites of Special Scientific Interest (SSSIs) have had physical modifications to the channel that affect their optimal functioning as habitats for characteristic wildlife communities. These modifications, described in the NE Remedies database as 'inappropriate dredging';,'inappropriate weirs, dams or other channel structures' and 'inland flood defence works' are recognised as reasons for 'unfavourable condition'. Natural England's SSSI Remedies programme includes 'river restoration projects' as a mechanism for achieving 'favourable condition'.

Whole-river restoration plans are required for river SSSIs (including the River Kennet and Lambourn SSSIs) for which physical modification is identified as a Reason for 'Unfavourable Condition'. A strategic 'whole river' approach to river restoration is required, based upon identifying key habitat features, linking fluvial geomorphology and ecology, and phased implementation of restoration works that encourage assisted natural recovery. Restoration will contribute to meeting obligations under the Water Framework Directive, in respect of achieving Protected Area objectives and Good Ecological Status or Good Ecological Potential.

A Natural England document (developed in consultation with the Environment Agency) titled ''Guidelines for the restoration of physical and geomorphological favourable condition on river SSSIs in England' (Wheeldon 2010), was produced to provide guidance on how 'strategic whole river restoration plans' should be compiled. The following is taken from this guidance document:

"Physical restoration of river channels is necessary to bring many SSSI rivers into Favourable Condition. Restoration will also be needed across the wider river network under the Water Framework Directive, to an extent dependent on the hydromorphological interpretation of Good Ecological Status, judgements of Heavily Modified Waterbody status, and the definition of Good Ecological Potential. Note that the term restoration is used here in its broadest sense, and does not imply restoration to a pristine natural state – Natural England recognises that there are immovable constraints to restoration associated with people and the built environment and that restoration planning needs to recognise and accommodate these".

"The decision-making process outlined in this[NE] document recognises that river restoration action:

- is potentially highly costly and needs to maximise the use of assisted natural recovery;
- is rectifying damage caused by a range of historical activities, many of which were state-endorsed and/or state-funded at the time,
- is not the responsibility of any one organisation;

- has a range of potential benefits beyond ecological/conservation objectives that need to be maximised, including Catchment Flood Management Planning, fishery improvement and landscape and recreational value;

- has a range of potential disbenefits that need to be minimised, including increased flood risk, fishery modifications that are undesirable to local anglers, abstraction difficulties, and impacts on the historic built environment;

- is likely to take considerable time to achieve in its entirety;

- needs to draw on the full range of available funding and resourcing mechanisms appropriate to the measures needed".

2 Existing EA documents

Over the past 15-20yrs the EA has pursued an objective to improve the condition of both the river Kennet and river Lambourn, as well as many other of the associated watercourses in the Kennet catchment. Reductions in abstractions and improvements in sewage discharges have been achieved, and progress was steadily made, with limited funding, on improvements to physical habitat. With the designation of the rivers as SSSI (1995) and designation of the River Lambourn as a candidate SAC (2001), the profile of the rivers was raised and drivers for funding subsequently increased. This culminated in the PSA 3 objective which had the aim that by December 2010, 95% (by area) of all SSSI should be in 'favourable' or 'unfavourable recovering' condition. The implementation of the Water Framework Directive will continue to provide a significant driver for restoration and enhancement on these important rivers.

In order to meet the requirements for a whole river restoration plan as set out in the 'Guidelines for the restoration of physical and geomorphological favourable condition on river SSSIs in England (Wheeldon et al. 2010) we reviewed the existing documents that had been produced to help with the objective of improving all rivers in the Kennet catchment and specifically those aimed at the SSSI rivers. The main relevant documents are discussed below.

2.1 Water level Management Plans

In 2006, the EA reviewed many of its highest priority Water Level Management Plans (WLMPs) as part of the drive to meet the PSA 3 targets to achieve favourable condition on SSSIs,. This review included the WLMPs for the River Lambourn SSSI and the River Kennet SSSI, which were classed as being in unfavourable condition at that time. One of the principle reasons for failure of favourable condition targets on both SSSIs is loss of physical habitat and geomorphological function due to the presence of historic structures and/or over engineering of the channel.

The WLMPs identified all the structures on both SSSIs; assessed the scale of the negative impacts on the river; identified ways in which the structure could be operated differently, removed or bypassed, and suggested work that would be necessary to the channel to restore more natural features. The work was prioritised to identify all the actions necessary to achieve favourable condition (priority) and those necessary to secure the optimal management of the SSSIs (lower priority). This document was informed by EA officers with many years of experience of working on these watercourses, and was agreed with local NE officers.

Since 2006 we have restored several kilometres of SSSI river, on both the Kennet and the Lambourn, using the WLMP priority actions as a funding driver.

The structure ID codes and actions identified in these WLMPs can be seen in tabulated form in Appendix 2 and 4, and their locations identified in the maps in Appendix 3 and 5. The full reviewed WLMPs are available upon request.

2.2 Fluvial Audit

A comprehensive fluvial geomorphological assessment was undertaken for the River Kennet and its tributaries in 1999 (Geodata Institute report to the EA, 1999). This provides a catchment wide, strategic level assessment of the geomorphological status of the river system. Reaches were identified in the field and classified according to their geomorphological condition (i.e. degree of modification and naturalness). The field surveys, representative photographs and desk based assessment were used to identify the susceptibility of the fluvial system to disturbance, and provides a summary of the physical habitat diversity and the environmental potential within the fluvial system. Further details of the fluvial audit can be found in the 'River Kennet Habitat Restoration Strategy' (2008).

2.3 River Corridor Surveys

River Corridor Surveys (RCS) were completed for all the main river sections of the Kennet catchment (including the River Lambourn) in the mid 1990's. This survey details ecological features of the river channel and the associated floodplain habitats. Each survey assesses ecological importance, based on the diversity of macrophytes, habitats, physical structure and local importance, and assigns them one of four categories from 'poor' through to 'good', 'important' and 'critical'.

The Upper and Lower Kennet surveys assign a category to each reach based on both the channel and floodplain value combined; however, this can result in a reach being assigned as 'critical' (highest value) on the basis of floodplain habitat although the channel may in fact have a poor ecological status. The Middle Kennet survey however separately identifies categories for the channel and floodplain, making it easier to identify where the surveyor felt river channel habitat was of high value.

2.4 River Habitat Surveys

River Habitat Survey (RHS) is a field survey that involves recording the physical habitat and associated features found along a 500m stretch of river, in both the channel and along the river corridor, and is undertaken during the summer months. Across the Kennet catchment 69 sites have been surveyed, 22 of which are on the main River Kennet (only 7 of which are below Hungerford) and 30 on the River Lambourn.

The RHS data is used to provide a broad assessment of habitat quality and naturalness through the use of scoring indices. The Habitat Quality Assessment (HQA) scores are determined by the presence and extent of habitat features of known wildlife interest in the channel and river corridor, and by comparisons with 'reference' rivers of high quality. The Habitat Modification Score (HMS) assesses the degree of modification. The indices of both the HQA and HMS can be seen below:

Habitat Quality Assessment (HQA) classification
1 = Excellent
2 = Good
3 = Moderate
4 = Poor
5 = Extremely poor

Habitat Modification Score (HMS)
1 = Pristine/semi natural
2 = Predominately unmodified
3 = Obviously modified
4 = Significantly modified
5 = Severely modified

2.5 River Kennet Habitat Restoration strategy

In 2008, we produced a Habitat restoration strategy for the Kennet catchment. This was done to pull together all of the various documents listed above into one easily accessible publication. Amongst other things, this document has a series of maps, showing reaches of both SSSI rivers, illustrating those reaches most in need of physical habitat improvements.

This whole river restoration plan draws heavily on the 2008 strategy, but adds additional information about how the restored Rivers Kennet and Lambourn might look and respond to the proposed physical interventions, and estimates broad costings associated with restoring the rivers.

3 The six stages of 'whole-river restoration' planning

The local decision-making process for developing whole-river restoration plans, and its application to the Kennet and Lambourn is described step-by-step below. It is important to clarify the level of technical detail involved in the planning process at different stages. In particular, the development of the whole-river vision in Stage 2 is relatively high-level, giving a reach-by-reach characterisation of the restoration measures deemed to be appropriate. Detailed planning of measures with individual landowners comes during the reach based delivery phase(Stage 5), and is an ongoing process. This overall approach seeks to avoid lengthy delays in generating an outline plan, so that a clear idea of objectives and ways of working can be laid out as quickly as possible, subject to detailed local negotiation.

3.1 Stage 1 - Geomorphological appraisal and associated ecological interpretation.

This stage is aimed at developing a clear picture of the anthropogenic physical modifications that have occurred on the river and their ecological significance (Wheeldon et al 2010).

As discussed in section 2.2 above, there is a comprehensive fluvial audit covering both the river Kennet and the river Lambourn. This was put together using a combination of walkover survey and desk study. It identified reaches according to their sensitivity i.e. a naturalised reach is high sensitivity, a degraded reach is low sensitivity. In most cases this matches with reaches identified in the WLMP as degraded due to the presence of structures, thus reinforcing the opinion that presence of structures and associated degradation is the principle cause of unfavourable condition.

Similarly, the reaches identified in both the fluvial audit and the WLMP combine well with the reaches identified by expert opinion, and by ecological surveys (invertebrate, macrophyte and fishery surveys), as those reaches with a degraded ecology. Equally, walkover condition surveys carried out by English Nature in 2002 on the River Lambourn identified the same degraded reaches. This makes a clear connection between geomorphological degradation and ecological impacts.

The vast majority of the Kennet SSSI and all of the Lambourn SSSI are within the North Wessex Downs AONB. Due to the scale of the proposed river restoration works, changes to the river will have a minor visual effect, and in most circumstances we are working within the existing channel. Landscape impacts are therefore not likely to be significant.

3.2 Stage 2 – Generating a whole-river vision

3.2.1 Introduction

Expert judgement will need to be applied to determine the practical action most appropriate to resolving the adverse ecological consequences of physical modification on the characteristic flora and fauna of the river type. The action defined should be challenging but realistic in terms of the constraints imposed by land management, particularly immovable constraints imposed by flood risk to people and the built environment (Wheeldon et al 2010).

3.2.2 Identifying and agreeing actions

Our current documents, including this Restoration Plan, clearly identify across both rivers the management and physical restoration actions necessary to bring individual units and whole SSSIs, back into favourable condition.

3.2.3 Assessment of Flood Risk

Assessment of flood risk is obviously critical in carrying out any significant in-river works. Flood risk on the river Lambourn is generally low in the areas where physical habitat restoration is necessary. Those areas where flood risk is more of a risk, most notably at Woodspeen Mill and throughout Newbury, have already been restored. Thorough flood risk assessments for these areas were done.

On the top-middle reaches of the River Kennet SSSI – Marlborough to Newbury – the flood risk outside of the significant urban areas of Newbury and Hungerford is low. Much of the floodplain is dominated by historic water meadows now grazed extensively by sheep, cattle and horses. This is not high value arable land. At this stage none of the actions identified are deemed as being ‘non starters’ because of flood risk. Although risk is low, all restoration projects are assessed at detailed design stage as to their likely impacts on flooding.

3.2.4 Management actions and ecological benefit

This Plan uses the information provided by all of the previous relevant documents and pulls together a set of agreed restoration, enhancement and management actions necessary to achieve ‘favourable’ or ‘unfavourable recovering’ condition on both the riverine SSSIs. These actions are identified at a reach level but taken together provide a whole river approach to restoration.

Largely as a result of historic industrial, landscape and agricultural practices, both SSSIs are multi-channel watercourses with associated water level management structures. At a whole river scale, not all of these channels can be expected to exhibit all of the characteristic ‘natural’ chalk river features necessary to achieve the target condition status. Our aims for the SSSIs, agreed with NE, is to achieve at least a single strand of SSSI channel in favourable or unfavourable recovering condition, with no obstruction to fish movement.

The main ‘pressures’ identified for unfavourable condition on both rivers, with relation to physical habitat are: inappropriate dredging; inappropriate weirs, dams or other channel structures and inland flood defence works. All of these pressures are usually associated with over wide and over deep channels, with sluggish flows and deep layers of silt. The natural

gravel substrate has either been physically removed by dredging or covered in a significant depth of silt In addition, the presence of the structures often mean movement of fish from one reach to another is not possible.

Ecologically it is evident what the consequences of these pressures are. Chalk streams are typically characterised by fast flowing, clear water with stable temperatures and low nutrient levels. The substrate is dominated by clean gravels which provide an excellent spawning medium for the typical fish species – brown trout, grayling and brook lamprey. The invertebrate communities, many of which also rely on the clean gravel substrate, are diverse. The clear, nutrient poor water supports a diverse macrophyte population. The classic 'keystone' plant of chalk rivers – Ranunculus – requires a good velocity, relatively low nutrient levels and a gravel bed to root into. Sections of slacker flow and silt deposits would normally be associated with natural features such as woody debris and localised dense areas of vegetation growth.

The pressures discussed above will all impact the ecological communities in one form or another. The reduced velocities caused by inappropriate management of structures, or by over-widening or deepening of the channel, means that the velocities required by such species as Ranunculus are not present. To compound this, as the water velocity drops the sediment load of the river will settle on the bed. This not only smothers the important gravels, making them unusable as a spawning medium or invertebrate habitat, but provides a substandard rooting medium for characteristic flow-dependent macrophytes. River sediment carries a nutrient load, and as this is deposited in the substrate it becomes available to macrophytes associated with slacker flows as well as to algae species such as diatoms, especially where flows are sluggish, resulting in a subsequent loss in characteristic chalkstream macrophyte diversity.

The actions identified in this strategy are therefore largely aimed at:

- Increasing velocity – done by either removing or bypassing structures to give a more natural hydrological gradient, or by narrowing the river and raising the bed to create more natural dimensions and bed gradient.
- Reinstatement of natural gravel substrate
- Providing means by which fish can move freely through reaches

Velocity increase is critical for growth of the Ranunculus community and the species dependent on it, for keeping gravel substrate free from silt to enable effective spawning of the fish community and create micro habitats for invertebrates. Free fish movement is required to maintain the genetic integrity of the wild stocks in the catchment and to allow movement to the most suitable habitat for different life stages.

3.3 Categorisation of management requirements according to delivery mechanisms

A range of costs has been applied to the actions identified in the strategy. The suggested costs are based upon costs of works already delivered on the ground. These figures are obviously very approximate.

Currently, the main route for Environment Agency funding for significant restoration work lies within the Flood Risk Management capital programme and Local Levy budgets, or through the Defra monies made available to achieve WFD targets, with additional funds secured via partnership working and landowner contributions. As an example, NE have made available HLS money to implement recent projects on the Kennet SSSI at Avington and Chilton Estates.

Smaller enhancement works are more likely to be within the funding capacity of local river trusts or conservation groups. Environment Agency Local Levy or other funding streams could be used to part fund some of these smaller enhancements. Rod licence money may also be available for small-medium projects.

Approximate dates have not been provided for the 'enhancement' actions as it is believed that the timeframe for this category of works should be led by the landowners, with advice and potential partnership funding from statutory organisations. The actions would probably be expected to be implemented over a number of years.

The larger, more significant 'engineering' projects, labelled as 'restoration' in this strategy, have been assigned 'aspirational' target dates for delivery, and it is more likely that these projects will be led by the Environment Agency and/or Natural England.

3.4 Stage 4 – Consultation

The aim of a consultation at this stage is to develop and agree consensus around the restoration vision. In the case of the Kennet and Lambourn, principles for the restoration vision have already been broadly agreed; the River Kennet Habitat Restoration Strategy (EA 2008) was distributed for consultation to selected landowners, statutory bodies and interest groups such as Action for the River Kennet (ARK). The Kennet catchment strategy also had the same fundamental objectives as this whole river SSSI restoration plan, and the majority of the actions identified match up to those in this document.

The restoration of the Kennet and Lambourn is well underway on the ground, with several large scale restoration projects successfully completed on both SSSIs in the last 5-10 years. The cumulative length of river where direct physical works have been carried out since 2006 alone is approximately 7.5 km. This includes the removal of several significant structures and creating bypasses around others. The additional ecological benefits of these works will reach much further. These projects were done in consultation and partnership with landowners, NE and other interested parties. The works were also advertised in line with the Environment Agency's statutory requirements.

The previous Habitat Restoration Strategy actions have been expanded upon in this document, with actions identified in more detail. In keeping with our current approach to implementing restoration projects. Restoration actions will be consulted on in detail with individual landowners as implementation progresses.

3.5 Stage 5 - Establishment and implementation of finalised whole-river plan and reach based delivery plans

3.51 Reach based delivery plans

The catchment of the Kennet and Lambourn SSSI rivers is characterised by large estates with very restricted public access. Use of the estates is mostly limited to fishing and shooting activities as well as extensive sheep and cattle grazing. In order to develop and implement reach based restoration projects identified in the plan, agreement must be gained from the relevant landowner or Estate, which can often take several years.

The approach to developing detailed designs on individual reaches is to identify several priority reaches, and work with all the parties involved to show the potential impacts and benefits such restoration projects bring. This process becomes easier as more projects are completed, and the benefits of the restoration proposals can be demonstrated. The changes will nearly always be within the existing channel, so landscape impacts are minimal.

This approach has proved to be very successful on the Rivers Kennet and Lambourn, with a large amount of restoration projects having been agreed and implemented by consulting landowners in this way. Reach based plans to implement the major restoration actions will continue to be developed in this way.

3.5.2 Implementation mechanisms

This document, which brings together all the information and actions identified in previous publications, identifies all the actions required to allow the river SSSIs to be classified as in favourable or unfavourable recovering condition with regards to physical habitat quality.

Because of the nature of some of individual pressures, some of the actions identified will require significant intervention, such as removal of large structures, channel re-alignment and bed raising. However, other reaches need less intervention, such as sensitive management of existing structures and marginal habitat, provision of in-stream structures aimed at improving in-stream habitat, such as groynes, deflectors and large woody debris. For both scales of work, natural recovery of the channel features should be allowed to proceed.

The scale of the significant actions means that they will most likely need to be managed and funded by a combination of the EA and NE. It is normal practice to seek at least a 20% contribution from landowners to these projects. The less complex and large-scale actions are ones we could implement, but they are also suitable for implementation by landowners and local volunteer/interest groups.

The planning and implementation of individual projects follow a logical progression – i.e. removal of structures and allowing the river to rehabilitate itself as far as possible before agreeing other physical interventions. In the case of the Kennet and Lambourn there is no requisite logical order in which individual projects should be implemented. Work can be targeted to individual estates, identifying those where there is most chance of gaining an agreement reasonably quickly, and where significant improvements will be gained. In the vast majority of cases, because of the size of the individual estates, the immediate benefits felt by altering structures will, by and large, only be seen on the same estate.

‘Aspirational’ dates for implementation for the larger, more significant ‘restoration’ activities have been estimated and are summarised in Tables 4 and 5 . These are the dates we would like to begin these projects. However, these dates are heavily dictated by availability of funding and resources, and are therefore, with the best of intentions, subject to change. The River

Lambourn, because of its SAC designation, is identified as a ‘protected area’ under the WFD, and as such is a priority water body. Achieving GES on this river is required by 2015, and will therefore be a priority for funding.

3.6 Stage 6 - Confirmation of unfavourable recovering status

All of the various actions identified within this document have been agreed with NE as necessary to achieve favourable or unfavourable recovering condition with respect to the River Lambourn SSSI and the River Kennet SSSI.

This ‘whole river restoration plan’ combined with the works already underway on the ground, satisfies the requirements for a judgement of unfavourable recovering condition as set out in the NE guidelines (Wheeldon et al 2010):

- Clear identification of location and causes of unfavourable condition
- Measures required are identified
- Key partners (EA/NE) have committed themselves to use resources to implement actions
- All actions are actively being pursued and will be dependent on funding
- Broad ‘aspirational’ timescales for implementation have been produced and there are no significant blockages to implementation

4 Strategic whole river SSSI restoration plan

4.1 Introduction

The reach assessments and actions identified within this strategy have been based on the documents and work discussed in sections 1-3 above. In addition to these documents, the experience and knowledge of several members of the Environment Agency and Natural England was utilised.

The Environment Agency and Natural England are responsible for developing an agreed whole-river river restoration strategy for the River Kennet and Lambourn SSSIs, contributing to improving the physical habitat of the rivers, and moving them towards favourable condition. This will also contribute to achieving Good Ecological Status or Good Ecological Potential as required under the Water Framework Directive.

River restoration is one of a number of actions required in order to move the sites towards favourable condition. There is a need to restore the physical function and form of the rivers, improving their ecological health by enhancing the characteristic habitats needed for the wildlife to recover and thrive. The restored rivers will contain a diverse range of in-channel habitat features, clean gravels and mosaics of species-rich riverside vegetation and wetlands connected to the river.

4.2 Catchment characteristics

The Kennet and Lambourn catchment covers an area of approximately 1164 km2. It is situated to the West of the River Thames basin and is defined by the Berkshire and Marlborough Downs to the north and west, and by the Hampshire Downs to the south. Much of the catchment is captured within the North Wessex Downs AONB.

The whole of the River Lambourn (23km), from its source in Lynch Wood, north of Lambourn, to its confluence with the River Kennet east of Newbury, is designated a SSSI and SAC. The River Kennet is a SSSI between the east of Marlborough and Woolhampton (42kms).

The largest river within the catchment is the River Kennet. This flows in an easterly direction from its source west of Marlborough to its confluence with the Thames at Reading. The larger tributaries of the river along its length are the Og, Aldbourne, Dun, Shalbourne, Lambourn, Winterbourne, Enborne and Foudry Brook. All but the Enborne and Foudry Brook are predominately fed by groundwater from the underlying chalk aquifer. Because of the source of water the river water quality is generally very good and naturally low in nutrients.

The River Lambourn catchment is almost entirely chalk which results in a predominantly gravelly river bed. A key feature is the ephemeral nature of the upper section which generally flows during late autumn, winter and spring.

West of Newbury the chalk aquifer outcrops at the surface, the variation in aquifer levels being the main influence on river flows. East of Newbury, Tertiary clays and sands overlay the chalk, and the Enborne for instance has characteristics more akin to a clay river.

The Kennet and Avon Canal runs parallel to the river Kennet and interlinks with it at a number of locations. The SSSI includes canalised sections of the canal that are used for navigation, and built-up sections through Marlborough and Newbury.

The land use of the catchment is predominately rural. On the well drained hill sides arable agriculture dominates, with large areas under cereal production. Within the floodplain, land use is largely dominated by pasture with extensive grazing by sheep and cattle. The Lambourn catchment is home to a significant number of racing stables, with associated horse grazing.

There are major urban populations at Reading and Newbury, with smaller populations at Marlborough and Hungerford.

4.3 Reasons for designation and current condition assessment

The Rivers Kennet and Lambourn are designated as Sites of Special Scientific Interest (SSSI) along the main channels. Both rivers are classed as JNCC type III (base rich, low energy lowland rivers), and noted for their high quality and diverse habitats, supporting a range of protected aquatic vegetation, aquatic invertebrates, bird and fish species.

The River Lambourn is also designated as a European Special Area of Conservation (SAC) for the following:

River habitat characterised by the water crowfoot and starwort vegetation community
Bullhead
Brook lamprey

The citations for both the River Kennet and River Lambourn SSSIs and the river Lambourn SAC data sheet can be found in Appendix 1. The extent of the individual SSSI units can be seen in Figure 1.

Despite the high quality of both river systems, the rivers have been heavily modified in the past, divided into many artificial channels within the floodplain, and with water levels artificially controlled and flows regulated by a series of weirs and sluices. These modifications are often of historic nature with the reasons for modification (e.g. milling, navigation and water meadows) now of historic relevance and their functions obsolete.

The River Kennet and Lambourn SSSIs are divided into 7 riverine units (4 on the Kennet, 3 on the Lambourn as shown in Figure 1), the condition of which are assessed by Natural England against specific conservation objectives for the sites. An assessment of “Unfavourable condition” implies that enhancement works or improved management is required to restore and maintain a SSSI to favourable condition. “Favourable condition” means that special habitats and features are in a healthy state and are being conserved.

The most recent condition assessment for the River Kennet and Lambourn SSSI is summarised in Tables 1 and 2 below. None of the 7 river units meet the standards required and the units are therefore judged to be in unfavourable condition.

Unit	Unit Name	Condition Assessment 2008	Adverse Reason
1	Marlborough To Eddington Bridge	Unfavourable No Change	Inappropriate Weirs Dams And Other Structures, Invasive Freshwater Species, Siltation, Water Abstraction, Water Pollution - Agriculture/Run Off, Other
2	Eddington Bridge To Dismantled Railway	Unfavourable No Change	Inappropriate Weirs Dams And Other Structures, Invasive Freshwater Species, Siltation, Water Pollution - Agriculture/Run Off, Other
3	Dismantled Railway To Thatcham Bridge	Unfavourable No Change	Inland Flood Defence Works, Invasive Freshwater Species, Siltation, Water Pollution - Agriculture/Run Off, Other
4	Thatcham Bridge To Woolhampton	Unfavourable No Change	Inland Flood Defence Works, Invasive Freshwater Species, Siltation, Water Pollution - Agriculture/Run Off

Table 1 River Kennet condition assessment (2008)

Unit No	Unit Name	Condition Assessment 2008	Adverse Reason
1	Lynch Wood To Maidencourt Farm	Unfavourable No Change	Siltation
2	Maidencourt Farm To Oxford Road	Unfavourable No Change	Inappropriate Weirs Dams And Other Structures, Inland Flood Defence Works, Invasive Freshwater Species, Siltation, Water Pollution - Agriculture/Run Off, Other
3	Oxford Road To River Kennet	Unfavourable No Change	Inappropriate Weirs Dams And Other Structures, Inland Flood Defence Works, Invasive Freshwater Species, Siltation, Water Pollution - Agriculture/Run Off, Other

Table 2 River Lambourn SSSI condition assessment (2010)

4.4 Key types of physical modification, ecological consequences and restoration

Few chalk rivers are ‘natural’ even in part, having been extensively modified for the last two millennia to serve a variety of needs. For the purposes of this report, where the term naturally functioning is used this refers to the dynamic processes that maintain the designated status.

The dynamic processes (in terms of both the geomorphology and hydrology) found on a naturally functioning river create a wide range of habitat features that support characteristic communities of plants and animals. These habitat features are vulnerable to changes in the physical channel structure and flow (as well as many other factors, such as water quality). This means that modification of the river channel can lead to the loss of some, or all, of these features and the subsequent decline in biological diversity or ecological value

The impacts of past modification on the characteristic ecology, and therefore appropriate restoration actions, vary according to river type. The Rivers Kennet and Lambourn are broadly river type III (JNCC 1999) and in conditions of low modifications would be described as follows:

- Type III – Chalk rivers and other base-rich rivers with stable flows
- Naturally formed multiple channels, meandering through wet woodland and fen, or across the - floodplain in downstream reaches
- Substrate typically gravel, but with infrequent gravel shoals, bars and riffles
- Marginal plants encroach into channel as flow drops, resulting in clear water and a gravely bottom
- Abundant and species-rich plant communities
- Riparian trees provide important structure and habitat.

Photos 1-5 below show some of the features that could be considered to indicate good ecological health in the River Kennet and Lambourn (photo 1), the impacts of structures (2 and 4) and the benefits of removal and changes to sluice operation (3 and 5).

Table 3 below lists some of the habitat features that should be characteristic of parts of the Rivers Kennet and Lambourn; their broad ecological value; typical modifications and consequences; and examples of remedial measures that could help restore these features. Note that presence of these characteristic habitat features vary according to the river type.

Photo 1 – ‘Natural’ River Lambourn at Weston

Photo 2- Impounded River Lambourn upstream of Woodspeen mill structure

Photo 3 – Woodspeen Mill following structure removal

Photo 4 – River Kennet at Avington before restoration and change in sluice management

Photo 5 – River Kennet at Avington following restoration and change in sluice operation

Habitat feature	Ecological value	Modifications and their impacts	Remedial measures to restore habitat
Riffles; gravel in fast flows	Spawning habitat, rooting substrate for Ranunculus beds and associated plant community	Re-sectioning, straightening, deepening, and impoundments causing direct loss of river gravels or smothering of gravels due to excessive silt deposition	Bed raising, narrowing, re-meandering, introduction of suitable gravel, alteration, removal or sensitive management of structures
Bankside trees and scrub, associated debris dams and large woody debris	Stabilises river bank by resisting and stabilising flows; helps trap and retain sediment; provides shelter and foraging for invertebrates, mammals and fish and birds; increases flow diversity and habitat instream	Removal of trees and scrub for land drainage, intensive bank vegetation management, grazing	Reduce stocking; fencing; tree planting; retention of fallen trees; introduction of large woody debris; reduced maintenance. Create mosaic of shade
Underwater and exposed tree roots	Provide erosion protection and cover for fish; potential otter holt sites	Intensive bank vegetation management - tree removal, mowing, grazing	Reduced stocking, tree planting and fencing. Introduction of large woody debris, reduced maintenance
Eroding or steep cliffs	Nesting sites for kingfisher and sand martins; burrow sites for water voles, provides source of coarse material (gravels) and fines to	Reduced geomorphological processes due to re-sectioning; bank revetment	Re-meandering and channel narrowing; structure alteration,/removal to re-instate natural dynamics.

	river system.		
Shallow silty margins with abundant emergent aquatic vegetation	Species rich marginal plant communities, invertebrates, juvenile fish and small mammals	Dredging, re-profiling and bank revetment and removal of marginal silts; permanent fencing leading to increased dominance of woody material	Re-profiling, weir removal/modification; reduced maintenance
Submerged macrophyte beds	Mosaic of characteristic macrophyte communities; invertebrate habitat, cover for fish, creates instream diversity in flows; nutrient and sediment dynamics	Removal and/or smothering of gravels through re-sectioning, widening, deepening and presence/operation of structures which have reduced suitable habitat for these communities	Channel narrowing, bed raising, structure modification/removal, to help increase velocities to encourage the river to self clean
Side channels and oxbows	Provide nursery habitat for fish (including brook lamprey) and refuge for otter and water vole. Peripheral swamp/fen habitat	Channel straightening and intensive agriculture has led to loss of these features	Re-connection of channel to floodplain through embankment removal, bed raising, and re-meandering
Wet floodplain habitats	Peripheral wetlands such as swamp, mire, reedbed and wet woodland. Provide habitat for wetland plants and invertebrates (including Desmoulins Whorl Snail); refuge/feeding area for otters	Channel straightening and intensive agriculture has lead to loss of these features	Re-connection of channel to floodplain through embankment removal, bed raising, and re-meandering

Table 3 – typical habitat features of chalk rivers, likely impacts of modifications, and typical remedial actions

4.5 Detailed reach actions

4.5.1 Introduction

The tables below and their reach codes (KT05 etc) as far as possible, match those in the River Kennet Habitat Restoration Strategy (EA 2008), which included all the rivers in the Kennet catchment rather than just the SSSI rivers to which this document relates. This document is stand alone and all the reaches are clearly labelled in both the tables and the associated maps. Each reach is also clearly labelled in the maps presented in figures 2-5 for the River Kennet and Figures 6-8 for the River Lambourn

4.5.2 Information presented

The details of each reach and the actions identified are presented in tabular form. The example below explains the use of various information within the tables.

Status	**Category of action required (see 4.5.3):** • **Restoration required** • **Enhancement required** • **Good Quality habitat** • **Restored reach** • **Kennet and Avon Canal**
Grid ref	NGR of reach
Geomorphological Criteria	Classification of the reach as determined by the fluvial audit in 1999. Options include: • **Culverted** • **Navigable** • **Channelised** • **Low sensitivity** • **Moderate sensitivity** • **High sensitivity**
Ecological quality	A very brief assessment from historic river corridor survey. Details of RHS score if relevant. Scoring system below: Habitat Quality Assessment (HQA) classification

	1 = Excellent 2 = Good 3 = Moderate 4 = Poor 5 = Extremely poor Habitat Modification Score (HMS) 1 = Pristine/semi natural 2 = Predominately unmodified 3 = Obviously modified 4 = Significantly modified 5 = Severely modified
WLMP priority and actions required	Code identifies the structure ID as presented in the latest WLMP and seen in Appendix 2 and 4. In the WLMP structures were identified as High priority, Priority, or Low priority depending on the scale of impact. Description is action identified for that reach. Some text is taken from the latest WLMP.
Other	Includes actions already completed on identified reach
Approximate costs	Costs have been estimated based on final costs for previously completed projects. A price range has been included for many.

4.5.3 Reach categories

Five categories have been applied to the river and these are colour coded within the reach maps. These categories are:

Restoration required (coloured red on the maps)
This category is applied to stretches where either significant changes to structures and/or physical habitat restoration and intervention is required, in order for favourable condition to be achieved. It is most likely this work will be led by a statutory organisation.

Enhancement required (coloured green on the maps)
This category is applied to stretches where the physical habitat is not deemed to be a significantly limiting factor to achieving favourable condition (or good ecological status). The reach may require a change to the maintenance regime and/or minor works to allow self-healing. (e.g. encouraging berm formation to narrow channel, removal of bank revetments to create sediment supply). With low level enhancement and/or more sensitive management of structures and vegetation, the condition of the river could be maximised. This level of enhancement is ideal for landowners or local interest groups to implement.

Restored reach (coloured yellow on the maps)

These are reaches that have had physical habitat restoration carried out on them. Some of the reaches are still recovering under natural processes. These are classed as in favourable condition or unfavourable recovering.

Good quality habitat (coloured blue on the maps)
These reaches are those identified as being in relatively good condition. This category covers reaches that are:

1. Excellent physical and ecological condition no further work is necessary, they should be protected and conserved.

2. Physically modified but recovering, so that they support characteristic ecology i.e the Lambourn winterbourne sections

3. Relatively good physical habitat, but sensitive riparian management required

4. Channels that have reached their ecological potential, the impacts of major infrastructure – such as the presence of the Kennet and Avon canal and associated structures – prevents any meaningful restoration or enhancement.

These reaches are not currently a priority for restoration works, but may need to be looked at in more detail in future to make a distinction between types 1-4 above.

Kennet and Avon Canal (coloured brown on the maps)
This identifies the reaches of the Kennet and Avon Canal. For much of its length the canal occupies its own separate channel (though water is transferred between the systems at various points). At Copse Lock (Kintbury), the canal and river SSSI share a channel for the first time. From Kintbury down to Thatcham, the river and canal join and separate on a number of occasions. Significant physical habitat restoration is not possible on these shared reaches due to the navigation requirements, however enhancement to the river banks to achieve good ecological potential is possible.

4.6 Actions identified for the River Kennet SSSI

4.6.1 River Kennet (refer to maps in figures 2-5)

KT05 – River Kennet at Elcot Mill, downstream of Marlborough

Status	Enhancement required
Grid ref	SU 20413 69168 – SU 20584 69258
Geomorphological Criteria	Low sensitivity (Modified)
Ecological quality	RCS - Patches of Ranunculus spp and Callitriche spp and dense vegetated berms and marginal belts. RHS – No site
SSSI	Yes (downstream section only)
WLMP priority and actions required	Low (ID1) – This is an old undershot sluice structure which is no longer operational. The river upstream is free-flowing as far as the old railway crossing (200 m) and the sluice does not present an obstacle to fish movement. There is scope for enhancement of the

	reach, if required, to open up an old channel which flows to the east of the mill and which could be used for brown trout recruitment. This remnant channel rejoins the main river 200 m downstream of the mill. For this to operate successfully, the old sluice structure may need to be restored to give the necessary control over the flow split. John Hounslow is the River keeper.
Approximate costs	6-15K

KT06 – River Kennet at Werg Mill, Mildenhall

Status	**Enhancement required**
Grid ref	SU 21051 69339 - SU 21428 69563
Geomorphological Criteria	Low sensitivity (modified)
Ecological quality	RCS –Considerable growth of Ranunculus spp and Callitriche spp and extensive vegetated berms. RHS HQA-5 and HMS-2 (site 400m downstream)
SSSI	Yes
WLMP priority and actions required	Low (ID3C) - The structures are still in operation and being managed by the river keeper, John Hounslow. The river upstream is not badly impacted by the sluice and fish appear able to move freely between reaches. By allowing more water to pass through Structure 3C there is scope to open up the old, original, channel downstream of it and improve brown trout recruitment. This channel has been used successfully for incubation box work. In order to open up the channel, Structure 3C, under the fishing hut, would need to be restored in order to control the flow split adequately.
Approximate costs	6-15K

KT07 – River Kennet at Durnsford Mill, Mildenhall

Status	**Restoration required**
Grid ref	SU 21384 69572 - SU 22022 69599
Geomorphological Criteria	Low sensitivity (modified)
Ecological quality	RCS – Some Ranunculus spp and Callitiche spp and substantial vegetated berms. RHS HQA-3 and HMS-4
SSSI	Yes
WLMP priority and actions required	Low (4A& C) - The structures are still operating and managed by the river keeper, John Hounslow. There is a small side sluice upstream of the main set, and a further set passing under the Mill. The river upstream was dredged following the 1976 drought and it is the dredging work rather that the presence of the sluices which has the dominant impact on the river. To restore the river to its pre-1976 condition would require bed replacement from Durnsford Mill upstream as far as the houses below Mildenhall bridge, approximately 600 m. This measure, taken in conjunction with more active management of Durnsford sluices, would have a beneficial effect on the river and fish populations, and would

	open up two small streams to trout recruitment (downstream of Structures 4A and 4C). Assessment of the degree of fish passage is required for any potential scheme.
Approximate costs	40 – 70K

KT08 – River Kennet at Stitchcombe Mill

Status	**Enhancement required**
Grid ref	SU22282 69348 - SU22750 69509
Geomorphological Criteria	Low sensitivity (modified)
Ecological quality	RCS – Some Ranunculus spp and Callitiche spp and substantial vegetated berms. RHS – no site
SSSI	Yes
WLMP priority and actions required	Low (5A-C) - The structures at Stitchcombe Mill are still in operation and managed by the river keeper, John Hounslow. They are managed well but do create a degree of upstream impoundment. The channel has not been dredged and rehabilitation work has been done in certain stretches. A possible option to improve the river would be the restoration of the side sluices to take flow under the road and re-join the main channel 100m downstream. This would require management changes to open up Structure 5C to allow flow down the side channel. Fish passage is possible but could be enhanced.
Approximate costs	6-15k

KT09 – River Kennet at Axford and Ramsbury Manor and Axford Farm Loop and Priory Ditch

Status	**Restoration required**
Grid ref	SU 24511 70291 - SU 26318 71019
Geomorphological Criteria	Low sensitivity (modified) downstream section north channel and most of south channel through Ramsbury Manor. Moderate sensitivity (recovering) upstream section.
Ecological quality	RCS - Some patches of in-channel and marginal vegetation RHS HQA-5 and HMS-4
SSSI	Yes
WLMP priority and actions required	High priority Structures 9 A and B Structures 11 B,C,D , 12 The principle influence on the river through this reach is the lake at Ramsbury Manor. Structures 9a and b – 'Rags Hatches' determine a split in the flow. The structures also create a impoundment in the upstream reach. This reach has also been significantly dredged in the past but has benefited from a recent project to raise the bed using locally won gravels. However, the impounding effect of the structures currently restricts the gradient and the full benefits of bed raising cannot be realised. The structures also provide an obstruction to fish movement.

	At the structures, the upper channel continues down through Axford Farm, and eventually feeds into the lake at Ramsbury Manor. A feed is required through this section as it supports a SSSI channel and also feeds the landowners pinioned wildfowl lakes The lower channel, below the structures, is in a good condition, with suitable flow velocities, gravel bed and characteristic vegetation. However, this good physical channel/habitat structure is lost when the influence of the structures (11 a,b,c) that control the feed into Ramsbury lake are approached. These structures are managed to prioritise flow into the lake. The channel that bypasses the lake receives little flow and has poor habitat. The channel is heavily modified and straight. The lake level is controlled by structure 12 at the lake outflow. The lake has silted up significantly and each year produces large diatom blooms that are deliberately washed downstream to the detriment of the river. A feasibility study is required to produce options for the reach and agree a design. The objectives are to reduce the impoundment at structure 9 a and b, whilst continuing to provide a flow along the upper channel to the satisfaction of the landowner. Fish passage through the structure that feeds the lower channel should be provided. The structures that feed the lake need to be addressed and the balance of flows passed to the bypass channel, with a sweetening flow to the lake. The bypass channel would need to be restored to improve physical habitat and carrying capacity. The reduced flow to the lake would reduce the siltation issue and therefore the source of nutrients. The algal blooms that are produced should be captured on a suitable structure and disposed of rather than passed down the river system. The lakes macrophyte flora should also be improved to try and improve the ecological balance in the lake.
Other	The dredged reach upstream of structure 9 (a and b) has recently benefited from bed raising for 400m (completed 2008)
Approximate costs	30k (feasibility/design), 230 – 360 (construction)

KT10 – River Kennet and Moons Mill Tail Channel, Ramsbury

Status	**Restoration required**
Grid ref	SU 26657 71106 - SU 27012 71394
Geomorphological Criteria	Low sensitivity (modified and channelised)
Ecological quality	RCS - Some Ranunculus spp and reasonable marginal margins. RHS – no site
SSSI	Yes
WLMP priority and actions required	Low (14A) – Moon Mill impounds the river upstream quite significantly with significant siltation issues. Fish passage is not possible. At the time

	of the WLMP visit in 2006, the mill structure was under renovation. The intention was to replace the existing structure with an undershot gate, this should help implement a management regime that helps alleviate some of the issues. The retention of a certain head in the channel is necessary to feed a side watercourse that feeds a SSSI channel and lake at Harbrook. The management of Moon Mill structures should be reviewed to help maximise the channel upstream of the mill. Small scale, instream structures or narrowing would help maximise the flow velocities and improve the physical habitat. Fish passage around moon mill may be possible via the SSSI side channel and structure at Harbrook. Feasibility necessary.
other	Work to the main mill structure has now been completed. In channel works still required as is feasibility to look at fish pass options.
Approximate costs	15K (feasibility), 27-55K (construction)

KT11 – River Kennet at Ramsbury and Ramsbury Old Mill Stream and Newtown Mill

Status	**Restoration required**
Grid ref	SU 27100 71261 - SU 28341 71505
Geomorphological Criteria	Low sensitivity (modified) downstream section Moderate sensitivity (recovering) upstream section
Ecological quality	RCS – Reasonable frequency of submerged in-channel vegetation RHS HQA-4 HMS-5
SSSI	Yes
WLMP priority and actions required	Priority (15A-C) – This is a major structure affecting a significant length of the river upstream, which is over wide, deep and silty. Fish passage is not possible. The structure is comprised of sluices passing underneath the mill (condition unknown but there is some limited operational capacity); a side set of undershot sluices, in poor but operational condition, feeds the bulk of the flow into the main mill pool. There are also a number of side sluices feeding into wetlands to the south. One of these has been used successfully for brown trout incubation box work in the past. The main sluices at the Mill also control flows down a minor channel that flows along the Newtown road through a number of residential gardens. This joins the Aldbourne near Knighton. The main sluices are controlled by the owner, James Dallas, who is keen on restoration and is a Trustee of the Thames Rivers Restoration Trust. There are lots of gardens that back onto this impounded upstream reach. Therefore any changes to the management of the Ramsbury Mill structures would need consultation with landowners on how this will affect the river at their property. Changes in operation of the structures would have a limited effect on the river. An alternative proposal would be to cut a new channel. There is a channel (not on the OS map) into which more flow could be passed to bypass the Mill. Any drop in levels at the mill would need to be mindful of the feed to the small stream that runs to the north of the mill and through the village. A feasibility study is required to look at the options available to

	significantly reduce the impact of this impoundment. It is thought that the main flow could be diverted down a side channel that leaves the river upstream of the mill and re-joins to the south of the weir pool. This would help reduce the impounding effects and allow fish passage. The impounded reach runs in front of several large properties and seeking agreement from all these owners may be problematic. Feasibility required
Approximate costs	50K (feasibility/design) 275 - 350K (construction)

KT13 – River Kennet at Littlecote Park

Status	**Restoration required**
Grid ref	SU 29449 70995 SU 32286 70242
Geomorphological Criteria	Moderate sensitivity (recovering)
Ecological quality	RCS - Limited amounts of submerged instream vegetation in upstream section RHS HQA-3 and HMS-4
SSSI	Yes
WLMP priority and actions required	Priority (19A-G) – Pump house These are the main structures that take water from the river for Chilton Foliat meadows SSSI. They cause a lengthy upstream impoundment (back to Structure 18) and a change in management is needed with associated river restoration. This structure is of relevance to both the River Kennet and Chilton Foliat SSSIs. The structures would historically have supplied flows to the water meadow system between here and Knighton. It presently provides flows into a series of trout ponds upstream of the fish house although these are no longer used for their original purpose and this flow returns to the river 200 m downstream. The sluices here are still operational and are operated by the river keeper, Peter Woolnough. It is highly unlikely that the structures would be removed because of historic interest. It is more likely that a change in the water level management regime to one that is more flexible may be acceptable to the owner. If the structures were opened fully the water level would reduce significantly and the channel would need to be re-sized. The river is over wide here and the drop in water level through removal/change of the structure would likely be up to 1 m. It is necessary to perform an experimental lowering of the structure to determine the impacts upon water levels, the length of affected reach upstream and to assess the degree of narrowing required. A feasibility/design report is required to assess how all the structures on this estate (17-20b) can be managed/removed/altered to gain maximum benefit for the river and fish passage whilst not having a significant impact on the Kennet and Lambourn Floodplain SAC component site.
Other	Discussions are ongoing with NE with regards implementing the feasibility report and the changes through a HLS scheme
Approximate costs	30k (feasibility), 250 - 350K (construction)

KT14 - River Kennet from Chilton Foliat to Eddington, Leverton Southern Loop, Water Garden and Pump House stream and Eddington Mill Stream.

Status	Restoration required
Grid ref	SU 32330 70264 - SU34214 69067
Geomorphological Criteria	Low sensitivity (modified and channelised) Moderate sensitivity (recovering)
Ecological quality	RCS - Poor & Good, Important (Eddington Mill Stream), Critical (lower sections or Leverton Pump House stream) channel value. RHS HQA-4 and HMS-3
SSSI	Yes
WLMP priority and actions	Priority (20B, 21, 22, 23, 25B, 25E –H/I &26A-E) The structures at Chilton Foliat Mill (20b and 21) impound the river significantly and are a blockage to fish movement. The channel upstream is over-wide, deep and the substrate dominated by silt. In places the banks show signs of previous dredging activity. The impoundment goes as far upstream as an island created during the 1980s, a distance of about 300 m. Discussions and investigation into the possible alteration/management of these structures should be incorporated into the feasibility report required for structures identified in KT13. Downstream of Chilton Foliat Mill and the main road through the town, the river becomes significantly wider through the 'broad water'. Tackling this feature is deemed problematic due to the significant dimensions and the landscape impact of changing it. This feature has therefore been identified as requiring enhancement rather than restoration. Throughout the rest of the Chilton Estate there are a series of structures and associated SSSI channels. Some of the channels are in good condition, others are not. In the 2006 WLMP review we agreed that a management plan was required to identify those structures that need to be operated differently or amended structurally to maximise the ecological quality of the river through the estate. In combination with this we needed to look at those channels that needed physical restoration. The aim was to achieve at least one continuous channel in favourable condition with fish passage. A restoration scheme was implemented on the estate in October 2010, this involved physical restoration on over 300m of channel as well as changes to significant structures. These elements have been identified as 'restored' in this plan. Between Chilton estate and the town of Hungerford, the river is impacted by a series of structures located around Eddington Mill and the associated on-line lake. Eddington Mill is a major impoundment and an obstruction to fish passage. The river upstream is significantly impounded and the habitat quality is largely poor. This impact is compounded by the presence of a large lake that is fed through a structure from the main channel. The lake then discharges via another structure into the main river. This lake is having considerable water quality impacts, most notably from large diatom blooms each summer. As a result the reach up to Eddington Mill is identified as requiring restoration.

Other	Designs have also been drawn up for bypassing Eddington Mill and removing the large on-line lake. The plans create a free flowing, meandering channel through the area that is currently occupied by the lake. This channel will be taken from the main channel via a rock ramp and will enter the channel downstream of Eddington Mill via a rock ramp. This project will create fish passage around the mill, remove the impacts associated with the on-line lake and help reduce the impounding impacts created by Eddington Mill.
Approximate costs	80-130K

KT15a River Kennet – Denford, Avington, and Barton Court KT15b Barton Holt

Status	**Restoration required**
Grid ref	A - SU 35106 68361 - SU 38671 67547 B - SU 38671 67547 - SU 39175 67741
Geomorphological Criteria	Low sensitivity (modified and small section of channelised) Moderate sensitivity (recovering) Small upstream section at Denford.
Ecological quality	RCS – Poor channel value RHS HQA-2 and HMS-5
SSSI	Yes
WLMP priority and action	Priority (30, 31A&B, 32D, 38AB&C) Low (28B, 33A, 33B-D, 36B) These reaches include the river SSSI through Hungerford Common (nr the Hungerford STW discharge) and then through Avington, Denford, Barton Court, and Barton Holt (Wilderness) Estates. The lower reaches on Hungerford common and the upper reaches on Avington Estate were impounded by structure 30. Fish passage through this structure was limited. The reach on Avington between structure 30 and 31B was also deeply impounded. Fish passage through structure 31B and 32A&B was also obstructed. The river in-between 31 and 32A&B is also deeply impounded. Structure 31A, which feeds a SSSI side channel that bypasses structures 31B and 32A&B, was impassable to fish. The habitat quality on the SSSI side channel was very poor due to the impounded nature of the main channel that was impounded by structure 32D (a large weed rack). A significant river restoration project covering over 2km of SSSI channel was implemented on Avington Estate with funding from EA and NE between October 2008 and April 2010. Structure 30 – a significant set of sluices – was opened fully, and will remain permanently open. This removed the upstream impounding effect and allowed free fish movement. The channel upstream was narrowed significantly and the bed raised using locally sourced gravels. Downstream, the structures at 31A and 31B were managed to allow a more free flowing river. This dropped the head in the channel. Downstream of structure 31, 3 artificial riffles raised the head in the

	channel sufficient to allow fish passage through the structure and into the main channel. This allowed fish to bypass structures 31B and 32A&B, therefore creating free fish passage through the estate. The main channel between structure 30 and 31A was narrowed using large brushwood mattresses, and the bed raised using locally sourced gravels. The SSSI side channel, downstream of Structure 31A to its confluence with the main channel downstream of structure 32A&B, was narrowed significantly and the bed was raised using locally sourced gravels. Denford estate contains a large number of smaller SSSI side channels. These channels are very important for salmonids recruitment and juvenile habitat. Some of the channels are in good condition, exhibiting classic chalk stream features. Most of the structures are passable by fish. However, some of the channels and structures would benefit from enhancement Barton Court Estate is directly downstream of Avington Estate. It is characterised by a large number of inter- linked channels. The river enters the Estate through 3 structures – 33A, 33C, and 33D. There is also an associated feed to the Kennet and Avon Canal via a significant set of hatches - Shermans Hatches. 33C&D are undershot structures allowing some level of fish movement. These structures, in association, have an impounding effect on the lower reaches (approx 500m) of the river on the Avington Estate. Having these structures operated so that the river flows more freely will reduce the impounding effect and will benefit the river. Associated physical restoration may be needed to maximise benefit though natural processes may eventually achieve a similar aim. A feasibility and design report needs to be produced to assess the benefits and potential issues associated with changes to these structures and also the degree of channel restoration required. The main channel through Barton Court was significantly impounded by structure 35A. Upstream from this structure the river was over deep with the loss of characteristic gravels. Much of it had also been significantly over-widened. Some of the associated side channels also had very poor physical habitat due to being over-wide and over deep as a result of historic dredging activities. A restoration project was implemented in 2005/6 on Barton Court. Several of the SSSI channels have had physical habitat improvements, aimed at increasing velocities and providing a natural gravel substrate. Fish passage through the Estate is largely unobstructed. Structure 35 was amended to reduce its impounding effect (380m), and the main channel upstream was restored by narrowing and bed raising using locally sourced gravels. The river downstream of the structure (approx 350m) was narrowed and the bed raised using locally sourced gravels.

	As the river passes under the Kintbury road from Barton Court, it flows onto the Barton Holt Estate. Structures 38AB&C cause an impoundment of about 200m and create a total blockage to fish passage. The river upstream of these structures is deep, sluggish and silty with very poor physical instream habitat. Downstream of these structures the river has been dredged quite significantly with the channel being substantially over deep and lacking the natural gravel substrate.
Other	The projects on Avington Estate and Barton Court Estate have been very successful leading to dramatic improvements in the instream habitat and encouraging excellent growth of characteristic vegetation. A design and feasibility report has been produced for structures 38AB&C and associated river restoration at Barton Holt. This project is being implemented in 2011 by Action for the River Kennet (ARK) under permission from the estate, with guidance from the EA.
Approximate costs	145 -170K

KT16 – River Kennet, The Wilderness, Downstream of Kintbury

Status	**Restoration required**
Grid ref	SU 39175 67741 - SU 41307 67295
Geomorphological Criteria	Moderate sensitivity (recovering)
Ecological quality	RCS – Poor channel value. RHS – no site
SSSI	Yes
WLMP priority	No
Other	Although many of the smaller side channels are in good condition, a long length of the main channel has been badly dredged and is over deep and over wide in places. The channel does not exhibit many characteristic chalk stream features. A draft restoration plan has been drawn up by the estate with the intention of funding the work through a HLS agreement if funds are available.
Approximate costs	130-175K

KT17 – River Kennet – Craven fishery, Benham Estate, under the A34 and upstream of Newbury.

Status	**Enhancement required**
Grid ref	SU 41307 67295 - SU 45977 67126
Geomorphological Criteria	Moderate sensitivity (recovering) - Benham Low sensitivity (modified) – A34 Low sensitivity (modified) – Upstream Newbury
Ecological quality	Benham RCS – Good channel value. RHS – no site

	A34 RCS – Good channel value (assessed before construction of A34) RHS – No site Upstream of Newbury RCS – poor channel value RHS HQA 2 and HMS - 4
SSSI	Yes
WLMP priority	Low (48A & 51B)
Other	A restoration scheme was implemented on this reach in 2009, funded by HLS and implemented and managed by the estate. Much of the SSSI is in a good condition, with the restored reach beginning to recover. However, some of the channels are in a poor physical condition because of the presence and effects of the interaction of the river with the canal. Without a major project to separate the canal and the river, these channels are probably achieving as good a standard as possible. There is currently a feasibility study to assess the cost and benefits of such a 'separation' project.
Approximate costs	35-70K

KT20 – River Kennet, Downstream of Northcroft sports ground, Newbury

Status	**Enhancement required**
Grid ref	SU 46779 67175 - SU 47077 67155
Geomorphological Criteria	Low sensitivity (modified)
Ecological quality	RCS – Poor channel value RHS HQA-2 and HMS-4 (200m upstream)
SSSI	Yes
WLMP priority	No
Other	As this channel approaches the canal:river interaction it becomes impounded. However in the upper reaches there is still a good gradient and some channel enhancements would benefit the SSSI.
Approximate costs	6-15K

KT21 – River Kennet, Newbury town centre (north and south of canal)

Status	**Enhancement required**
Grid ref	SU 47425 67184 - SU47990 67323
Geomorphological Criteria	Low sensitivity (modified)
Ecological quality	RCS – Poor channel value RHS – no site
SSSI	Yes
WLMP priority	No
Other	The SSSI channels that do not form part of the navigation would benefit from some enhancement
Approximate costs	20-35K

KT22 – River Kennet, Newbury - upstream of Ham Lock to Bulls Lock

Status	**Enhancement required**
Grid ref	SU 48735 672954 - SU 49877 66698
Geomorphological Criteria	Low sensitivity (modified)
Ecological quality	RCS - Poor channel value – channel re-profiling recommended RHS – no site available
SSSI	Yes
WLMP priority	No
Other	Much of this reach is in a reasonable condition. There has been some channel engineering but the river does exhibit a fair degree of naturalness. However, there is a lack of instream habitat diversity. Enhancement aimed at increasing this diversity, would benefit the SSSI. It is recommended that strategic use of large woody debris and creation of backwaters would benefit the SSSI.
Approximate costs	15-25K

KT23 – River Kennet, Doghead stakes through to Brimpton Mill including the Priors Moor ditch

Status	**Enhancement required**
Grid ref	SU 50512 66261 - SU 55523 65683
Geomorphological Criteria	Low sensitivity (modified) downstream of road bridge to Brimpton Mill Moderate sensitivity (recovering) small upstream section at Chamberhouse Farm
Ecological quality	RCS - Good (small upstream section at Chamberhouse Farm), Poor (River re-profiling recommended downstream of road bridge.) channel value.41 RHS HQA-3 and HMS-5
SSSI	Yes
WLMP priority	Low (57A-C)
Other	Dog head stakes appears to be impassable by coarse fish during low-medium flows. This structure is ‘temporary’ and is due to be replaced by BW in the future. Full fish passage will be required when the permanent structure is put in. The long reach from Doghead stakes, through to Brimpton Mill is in a satisfactory physical condition for much of its length. However, there is a lack of instream habitat diversity. Enhancement aimed at increasing this diversity would benefit the SSSI. It is recommended that strategic use of large woody debris and creation of backwaters would benefit the SSSI. Brimpton Mill is a significant structure, however, there is fish passage around it, which is due to be improved as compensation for implementation for a hydropower scheme at the site
Approximate costs	35-50K

4.6.2 River Lambourn SSSI (for map reference see figures 6-8)

LB01 – River Lambourn, downstream of Lambourn Village

Status	Enhancement required
Grid ref	SU 32985 78671 - SU 33310 78212
Geomorphological Criteria	Low sensitivity (modified)
Ecological quality	RCS – Important channel value RHS HQA-4 and HMS-5
SSSI	Yes
WLMP priority	No
Other	As with most of the ephemeral reach of the SSSI the channel has been artificially straightened. However, the channel width and depth is generally acceptable, with good natural gravel substrate. When it is flowing the abundant Ranunculus spp. creates a range of velocities and depths. Low level enhancement could include bank regrading to create a more natural profile and also introduction of woody debris to create some channel sinuosity. Summer weed cutting by the EA should continue to follow the weed cutting protocol, and efforts should be made by both EA and NE to encourage landowners to do any vegetation clearance in a sensitive manner.
Approximate costs	6-15K

LB02 – River Lambourn, upstream of Eastbury

Status	Enhancement required
Grid ref	SU 33607 77935 - SU 34333 77495
Geomorphological Criteria	Low sensitivity (modified)
Ecological quality	RCS – Important channel value RHS HQA-4 and HMS-5
SSSI	Yes
WLMP priority	No
Other	As with most of the ephemeral reach of the SSSI the channel has been artificially straightened. However, the channel width and depth is generally acceptable, with good natural gravel substrate. When it is flowing the abundant Ranunculus spp. creates a range of velocities and depths. Low level enhancement could include bank regrading to create a more natural profile and also introduction of woody debris to create some channel sinuosity. Summer weed cutting by the EA should continue to follow the weed cutting protocol, and efforts should be made by both EA and NE to encourage landowners to do any vegetation clearance in a sustainable manner.
Approximate costs	6-15K

LB03 – River Lambourn at Weston and Weston Mill side stream

Status	**Restoration required**
Grid ref	SU 39800 73986 - SU41015 73225
Geomorphological Criteria	Moderate sensitivity (recovering)
Ecological quality	RCS - Poor/ Good (Weston Mill side stream),Good (upstream section), Important (through and downstream of Weston) channel value. RHS HQA-4 and HMS-4
SSSI	Yes
WLMP priority	Priority (13 & 14) low priority 16-18 At Elton Lane there is a small wooden structure (structure 13) that impounds approximately 150m of the channel. The reach above the structure is also artificially wide and densely shaded. Habitat quality is poor. The structure could very simply be removed and the habitat upstream improved by narrowing and use of instream woody debris. The gravel substrate could also be improved by importing locally won gravels. This scheme could be implemented by the fishery with supervision and contribution from the EA. About 350m downstream from the structure (13) is Weston Mill. The mill structure creates a significant impoundment for approximately 200m. The channel is deep, wide and silty. Characteristic substrate and instream vegetation are absent. Fish passage is not possible. Just upstream of the mill structure there is a sluice that takes water around the mill via a side channel. The structure is not passable by fish. This side channel joins back into the main river about 750m downstream. This side channel is in excellent ecological condition. It has been suggested that it would be possible to take a new channel off the main river about 150m upstream of the mill and feed it into the existing side channel. Sending more water down here would allow fish passage around the mill and would create a length of new chalk river. The structures at the mill could be operated to maintain the existing head, although a better option may be to operate it open and then narrow the existing channel to suit the lower river levels. A feasibility investigation is required to look at the levels and flow splits and the impacts of creating the new channel. Several gardens back onto the existing mill channel and getting agreement from these properties would be necessary. Downstream of Weston Mill the river flows into Welford Park. Within Welford Park the river flows over a weir and a large cascade. The large cascade has a significant impounding effect on approximately 150m of river. The physical habitat in the channel is poor. Fish passage is unlikely up any of the structures. A feasibility/design report is required to look at the options of

	reducing the impoundment and making the structures passable to fish.
Approximate costs	50K (feasibility /design), 210-400K (construction)

LB04 – River Lambourn, upstream of Boxford

Status	Enhancement required
Grid ref	SU 42828 72264 - SU 42756 71520
Geomorphological Criteria	Low sensitivity (modified)
Ecological quality	RCS - Poor/ Important channel value RHS HQA-3 and HMS-5
SSSI	Yes
WLMP priority	Low (25) Mill and current operation doesn't seem to be having a significant impact on the channel upstream. Chalk river features are present. Fish passage possible, though could be improved.
Approximate costs	25-40K

LB05 – River Lambourn, Hunts Green Farm, through Newbury to confluence with River Kennet.

Status	**Restoration required**
Grid ref	SU 44623 69182 - SU 49001 67279
Geomorphological Criteria	Low sensitivity (modified) – very small sections Moderate sensitivity (recovering) – majority
Ecological quality	RCS – Poor, Good (small sections at Bagnor and Woodspeen) channel value RHS HQA-4 HMS-5 (multiple sites)
SSSI	Yes
WLMP priority	Priority (29, 31-33, 36, 39-41, 43-45) Low (42)
Other	**Hunts Green (restored)** Physical habitat restoration has been carried out on Hunts Green Estate (Lewisia Ltd) over 2km of river since 2006. Prior to this work much of the river on this estate was in a poor condition due to impoundment, and the impacts of dredging and over-widening. A major set of structures at Woodspeen Mill (31/32) were taken out, which removed a significant impoundment and blockage to fish movement. There is a large structure (29A,B,C) remaining on the Estate which is having a minor impounding effect, but which creates a blockage to fish movement. The landowner/estate manager is looking at options for this structure. **Bagnor Manor/Watermill Theatre (restoration required)** Downstream of Hunts Green and Woodspeen Mill is Bagnor

	Manor and the Watermill Theatre. The river along this reach is impounded significantly by the structure (36) at the Water Mill Theatre and a stone weir (34) at Bagnor Manor. Structure 36 is impassable by fish. There is a small watercourse that bypasses the mill structure, and this is fed via a small structure (33) about 400m upstream of the Theatre. This structure is not passable by fish. A feasibility study is necessary to pick out the most beneficial and cost effective option of improving in-channel habitat and providing fish passage. **Donnington Grove (restored)** Downstream of the Watermill Theatre the channel is in good condition, with at least one of the channels exhibiting classic chalk stream features. After the river flows under the A34, it enters Donnington Grove country club and golf course. The river used to be impounded for about 300m by a weir (structure 39). A series of associated side structures (40A,B,C) fed a considerable flow into an adjacent landscaped lake. A restoration project was carried out on the site, removing the impounding weir and blocking up all but one of the feeds to the lake. The river upstream of the structure was narrowed. **Shaw Gauging Station** Downstream of structure 39 the channel is in good condition, until it reaches structure 43 – The EA gauging weir at Shaw, in Newbury. This structure creates a significant impoundment and is a blockage to fish movement. A feasibility report is necessary to see how we can reduce the impacts of this structure and maintain an accurate gauging record at the site. **Lambourn in Newbury (restored)** Downstream of the gauging weir, to the confluence with the river Kennet, a river restoration project has been completed. Physical habitat improvements were carried out over 1700m of channel. This included channel narrowing, bed raising and provision of large woody debris. At the confluence with the Kennet 2 large structures were lowered to create a more natural gradient and velocity. Fish passage was created through these structures. There is one outstanding structure in Newbury (structure 44 – Shaw Mill) that does need addressing to assess its impounding nature and whether it is a blockage to fish movement.
Approximate costs	Bagnor Manor – 150-250K Shaw Gauging station – 30K (feasibility), 170-250K (construction) Shaw Mill – 25K - 40K

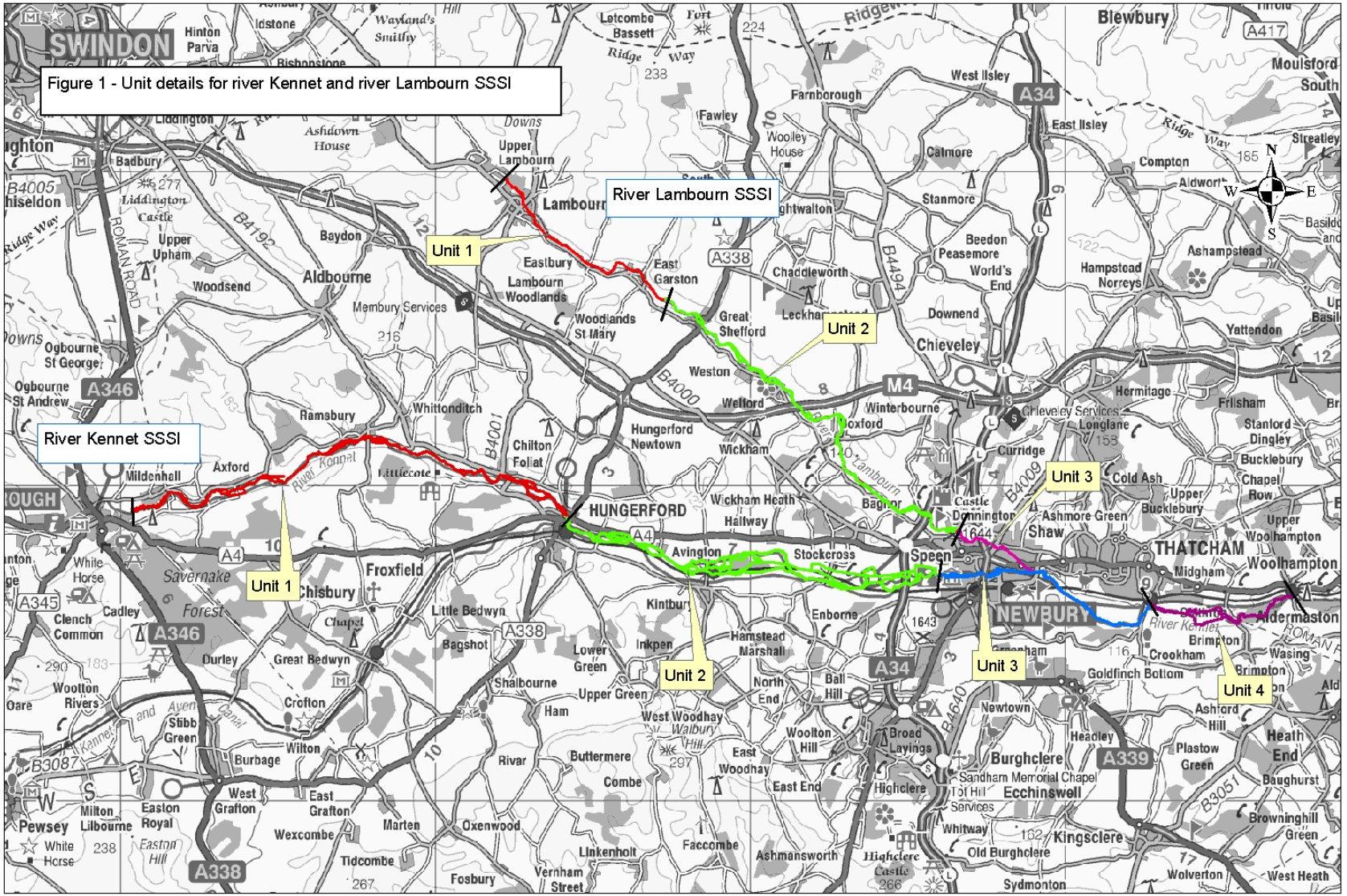
Table 4 - Summary of actions – River Kennet SSSI

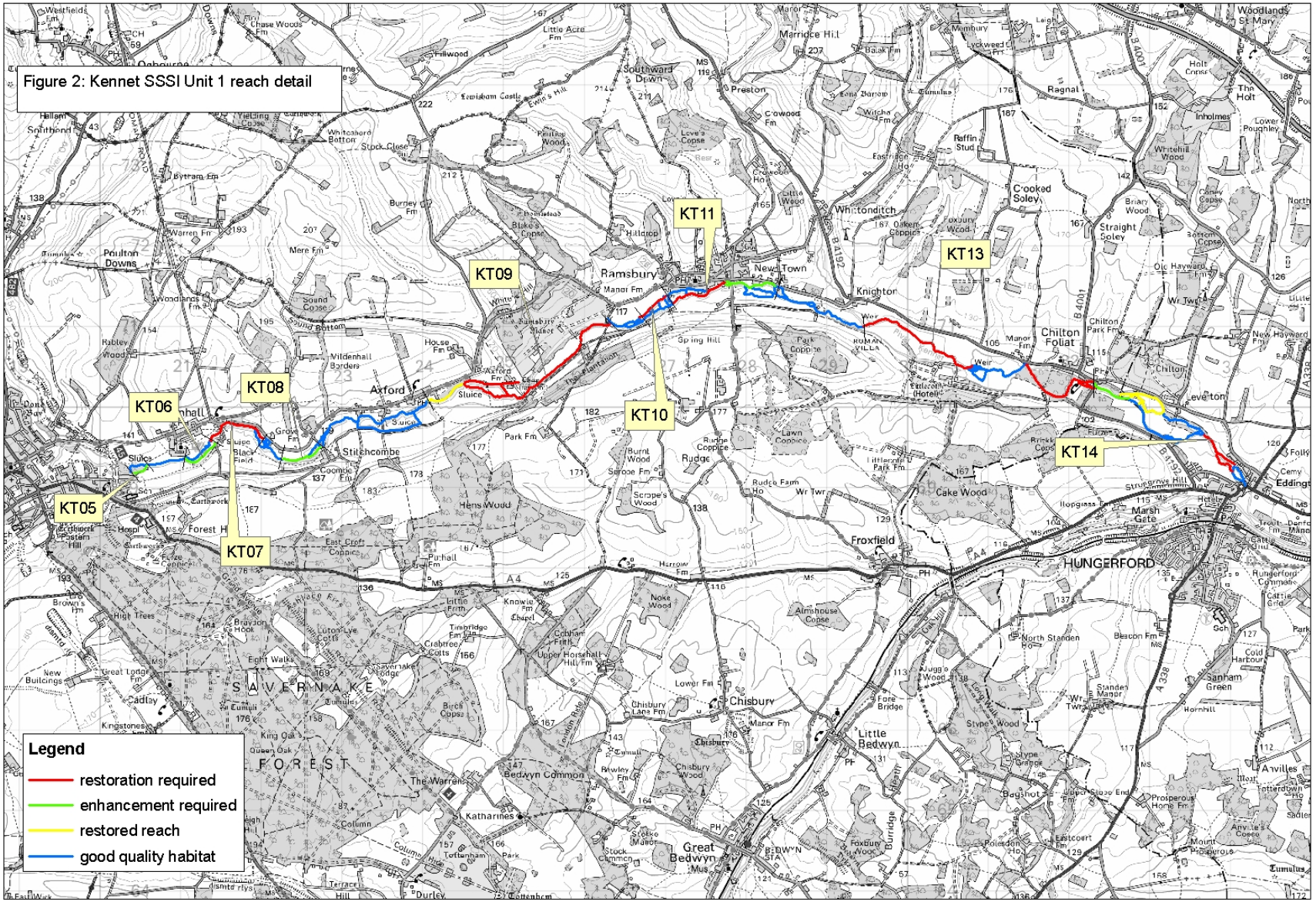
Reach	Category(m in each)				Actions										
	Restore	Enhance	Good quality	Restored	Modify structure*	Hatch operating protocol	Bed raise	Narrow channel	Large woody debris	Re-grade banks	Re-occupy old channel	Creation of backwaters	Length of reach needing action (m)	Approximate costs(£ K)	Aspirational date of 'restoration' elements
KT05		241	✓		✓	✓					✓		241	6-15	
KT06		490	✓		✓	✓					✓		490	6-15	
KT07	860		✓			✓	✓	✓	✓		✓		860	40-70	2012/13
KT08		534	✓		✓	✓					✓		534	6-15	
KT09	3000			530	✓	✓	✓		✓	✓			3000	260 -390	2016/18
KT10	450		✓		✓	✓		✓	✓				450	42-70	2016/17
KT11	775	714	✓		✓	✓	✓	✓	✓	✓			1489	275-400	2014/16
KT13	2800		✓		✓	✓	✓	✓	✓	✓			2800	280-380	2012/15
KT14	900	500	✓	1300	✓	✓	✓	✓	✓	✓			1400	80-130	2013/14
KT15		3600		4350			✓	✓	✓	✓			3600	145-170	
KT16	1500		✓				✓	✓	✓	✓			1500	130-175	2015/16
KT17		3673	✓	995			✓	✓	✓	✓			3673	35-70	
KT20		356					✓		✓				356	6-15	
KT21		1480					✓		✓				1480	20-35	
KT22		1550					✓		✓			✓	1550	15-25	
KT23		8000	✓				✓		✓			✓	8000	35-50	
Totals	10,285	21,138		7,175									31,423	1,381- 2,025	

* modify includes removal, lowering and bypassing

Table 5 - Summary of Actions – River Lambourn SSSI

Reach	Category (m in each)												
	Restore	Enhance	Good quality	Restored	Modify*	Hatch operating protocol	Bed raise	Narrow channel	Large woody debris	Re-grade banks	Length of reach requiring action (m)	Approximate costs (£k)	Aspirational date of 'restoration' elements
LB01		611	✓						✓	✓	611	6-15	
LB02		841	✓						✓	✓	841	6-15	
LB03	1600		✓		✓	✓	✓	✓	✓	✓	1600	270-450	2012-15
LB04		865	✓			✓		✓	✓		865	25-40	
LB05	792	380	✓	4630	✓	✓	✓	✓	✓	✓	1172	Bagnor – 150-250 Shaw Gauging – 200-280 Shaw Mill – 25-40	2011-15
											5,089	681 – 1,090	





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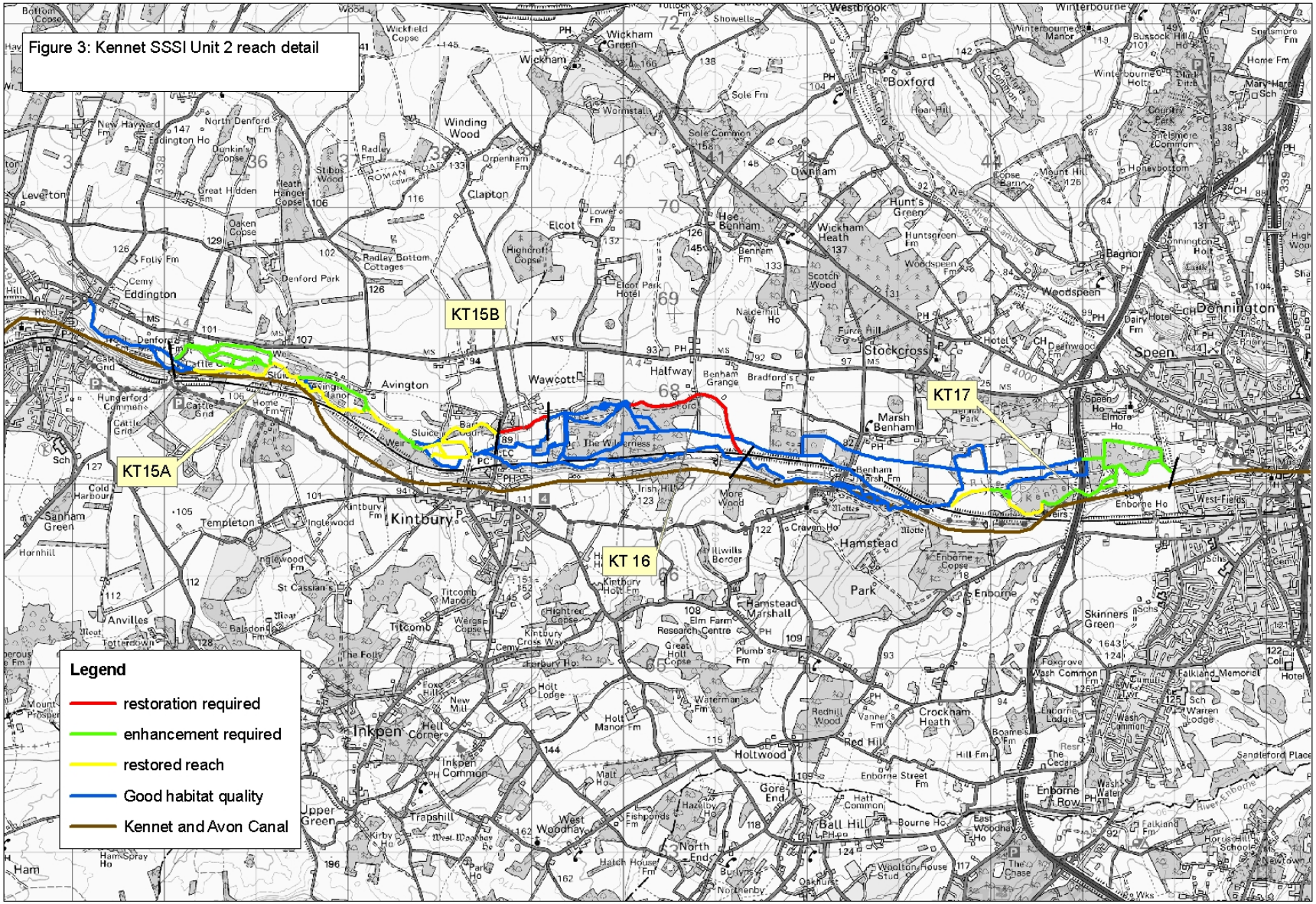

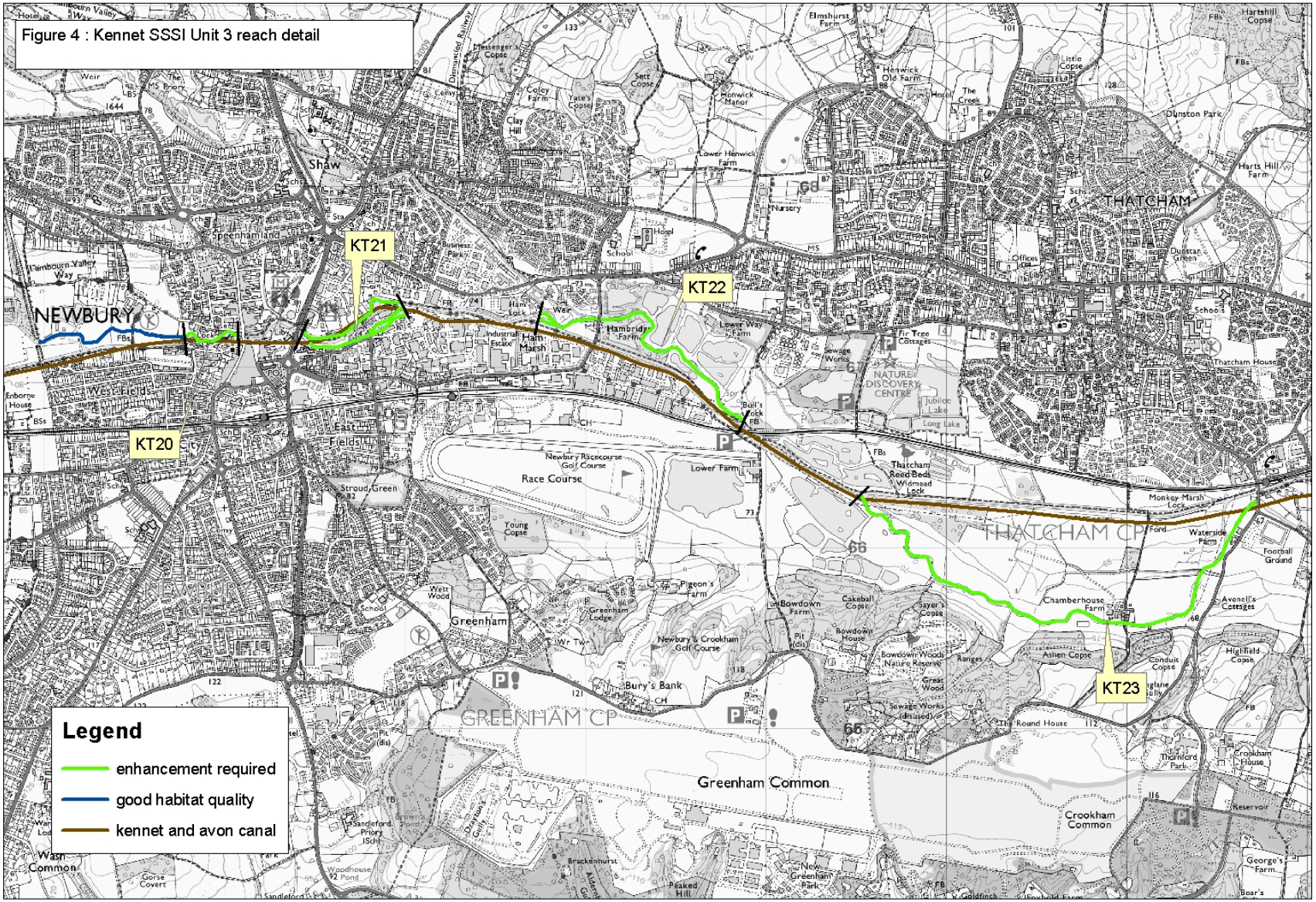

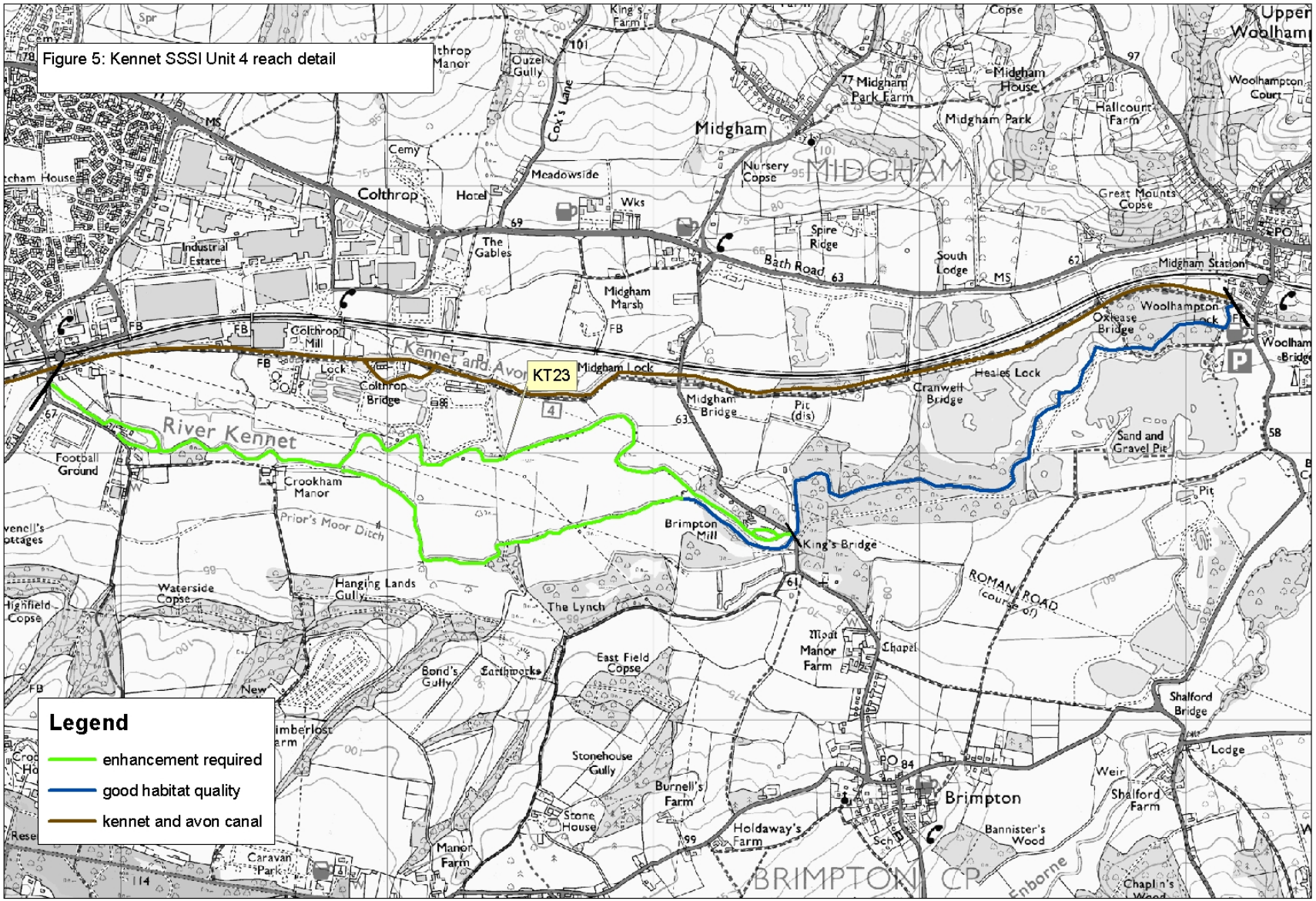

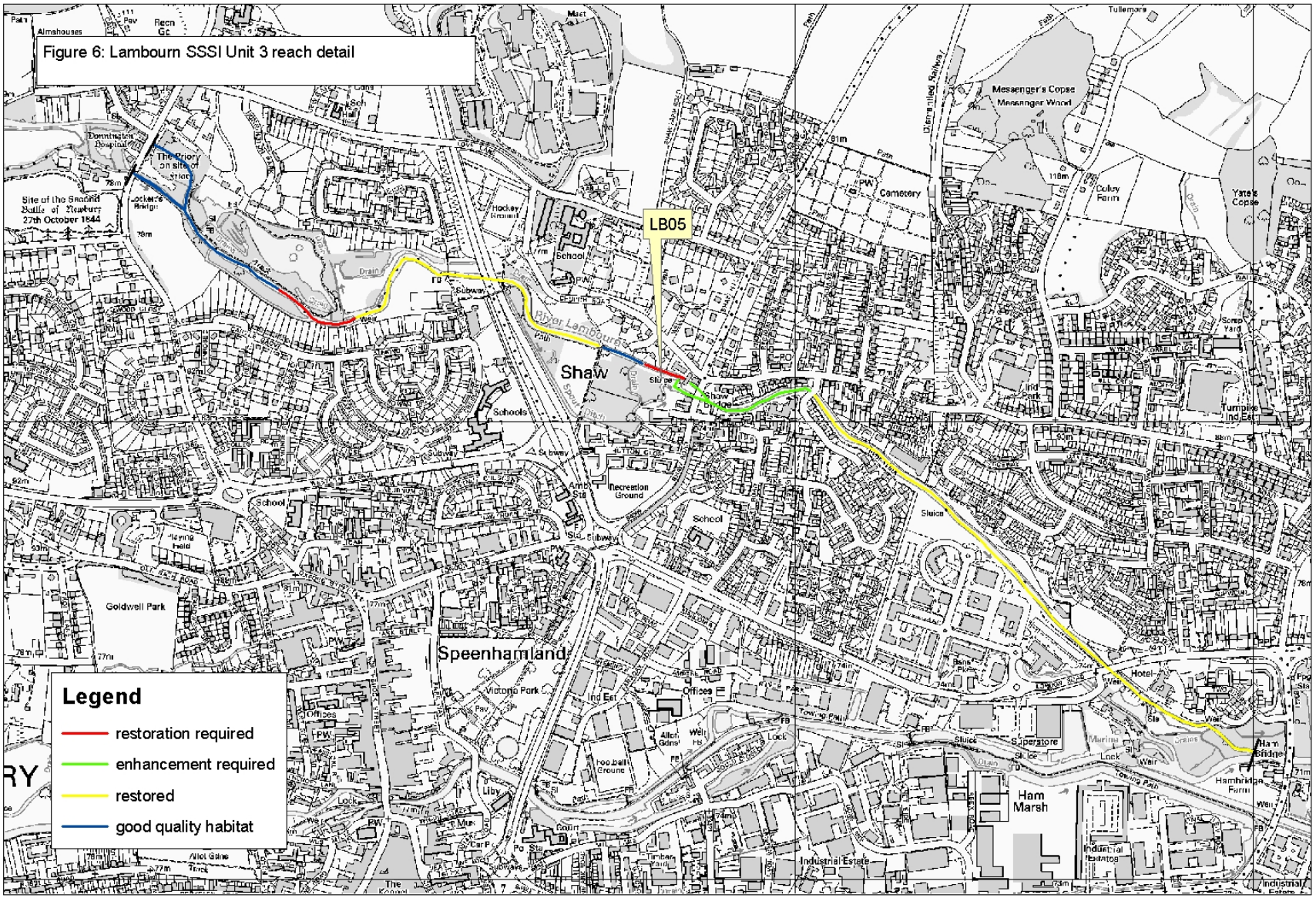

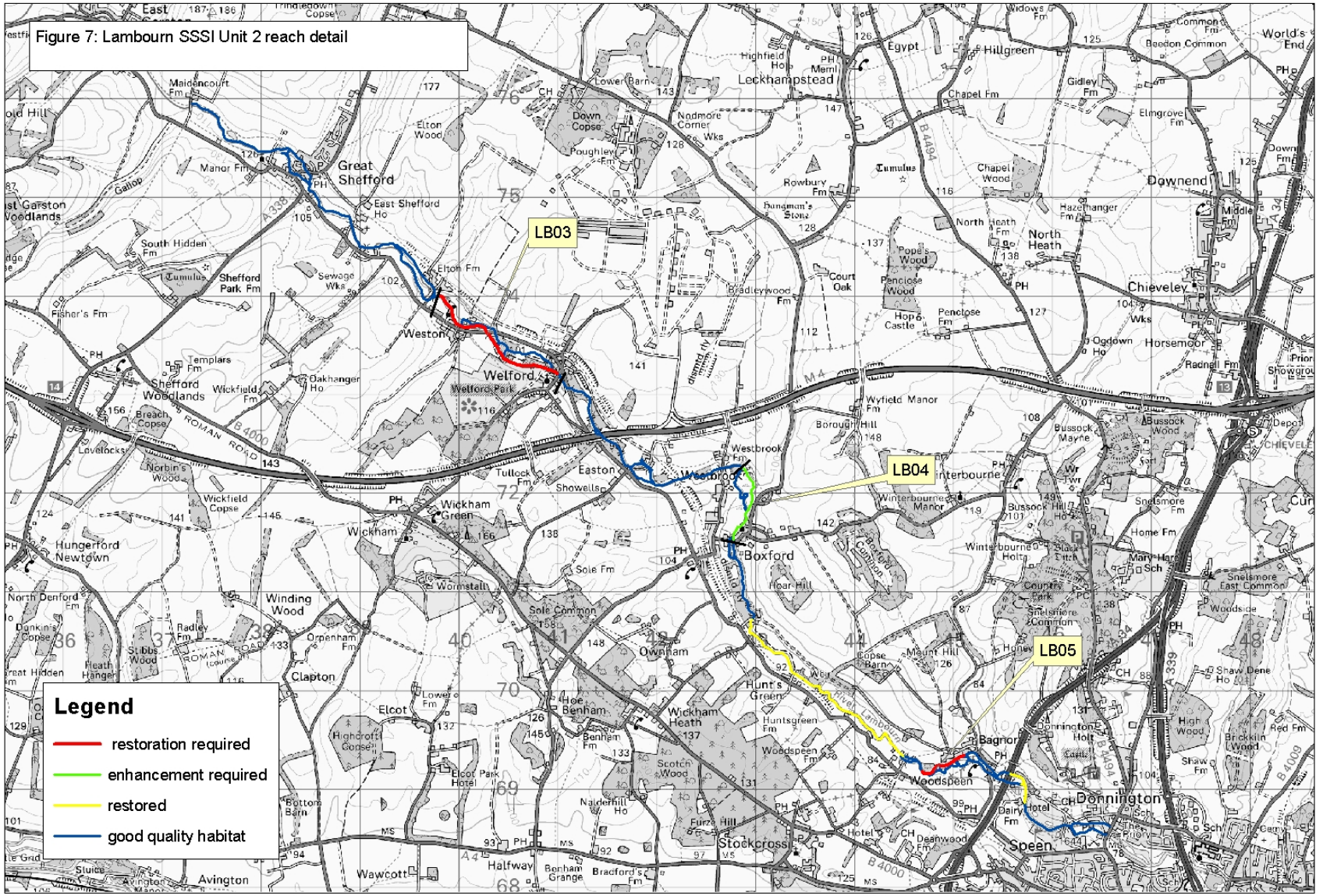

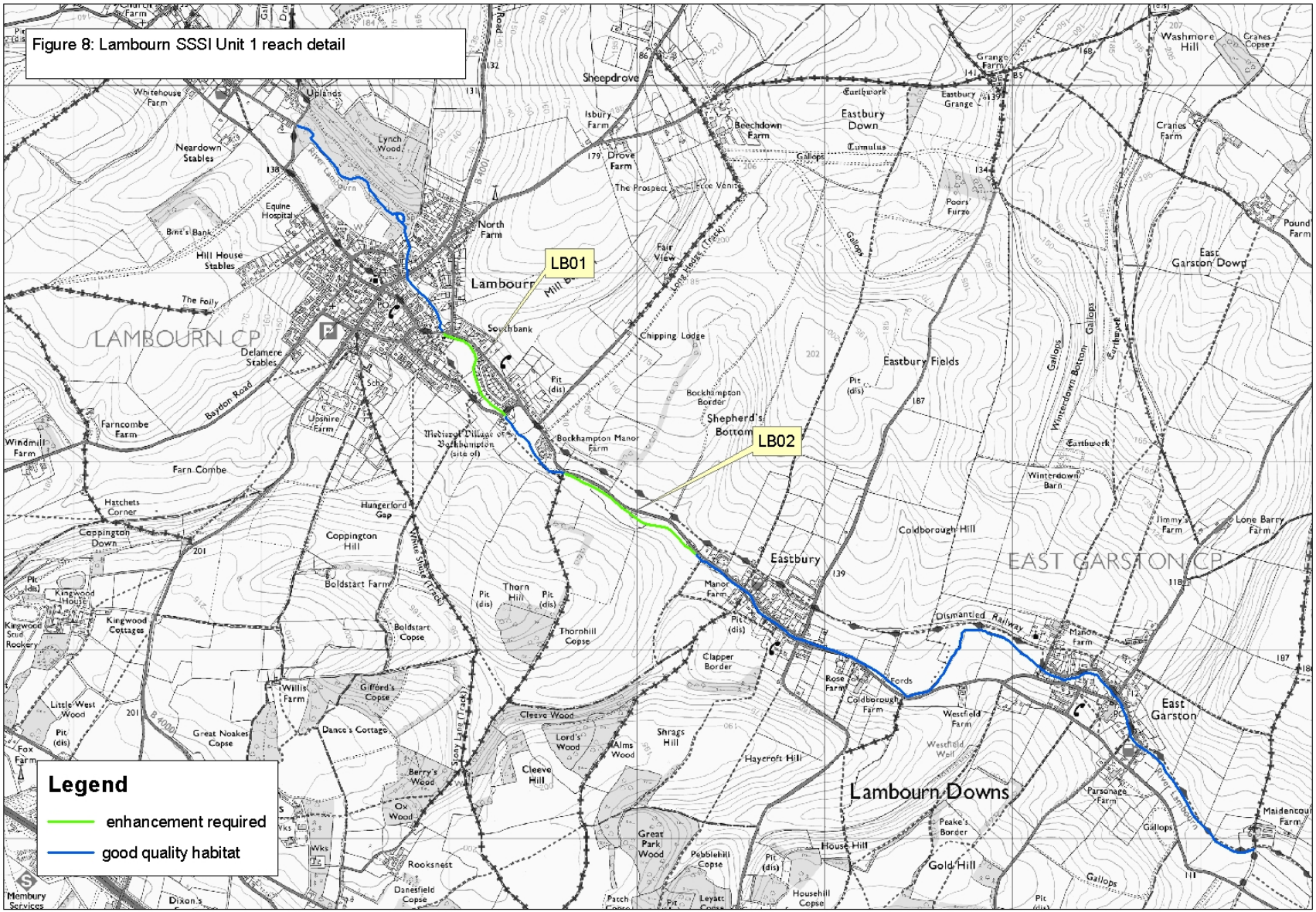

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APPENDIX 1 – SSSI CITATIONS

COUNTY: BERKSHIRE
SITE NAME: RIVER LAMBOURN

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981
Local Planning Authorities: Berkshire County Council, Newbury District Council
National Grid Reference: SU322798 to SU490672
Ordnance Survey Sheet 1:50,000: 174 1:10,000: SU37NW, SU37NE, SU37SE, SU47SW, SU46NE
Date Notified (Under 1981 Act): 1 November 1995
Date of Last Revision:
Area: 27.92 ha

Other information: The River Lambourn SSSI is a tributary of the River Kennet SSSI. There are also two existing SSSIs along the River Lambourn which are Boxford Water Meadows SSSI and Easton Meadow SSSI. The site boundary is the bank top or, where this is indistinct, the first break of slope.

Description and Reasons for Notification
The River Lambourn is a classic example of a lowland chalk river. It rises 152 metres above sea level in Lynch Wood,north of Lambourn and flows down to a confluence with the River Kennet east of Newbury.

The catchment that the RiverLambourn drains is almost entirely chalk which results in a predominantly gravelly river bed. A key feature of this river is the tendency for the upper section to only flow during late autumn, winter and early spring. This is known as a 'winterbourne' and is a natural characteristic of chalk rivers. Any flora or fauna occurring in these stretches must be adapted to wide variations in flow, thus winterbourne sections tend to be less species-rich than the lower reaches which hold water all year round.

Between the villages of Lambourn and Great Shefford the river flows mainly through agriculturally improved pasture and arable fields; however, the section south of Great Shefford to Bagnor meanders through disused water meadow systems and wet pastures and woodlands. In places the main channel divides; these secondary channels were associated with the water meadows and mills, but have still retained the character of the main river.

Additional habitats which are associated with the river include some small areas of fringing reed swamp which is dominated by common reed Phragmites australis and willow carr. The Lambourn has a naturally impoverished winterbourne flora in its upper reaches; species characteristic of these conditions include pond water crowfoot Ranunculus peltatus which is the dominant aquatic plant, as well as fool's watercress Apium nodiflorum and the moss Fontinalis antipyretica. The occurrence of the pollution-sensitive red algae Lemanea fluviatilis in the Upper Lambourn appears to be unique on the lowland southern rivers. This species is usually found in upland streams. Further down the river where there are perennial flows, the aquatic plants are typical of shallow, gravel bedded watercourses. Here river water crowfoot Ranunculus penicillatus Ssp. pseudofluitans, lesser water parsnip Berula erecta and watercress Nasturtium officinale are abundant, starwort Callitriche obtusangula is also characteristic in the channel. River water dropwort Oenanthe fluviatilis, common club rush Scirpus lacustris and unbranched bur-reed Sparganium emersum are found in the lowest reaches. Fissidens limbatus, a nationally scarce moss which grows on compacted or thin soils, has also been recorded from the banks of the River Lambourn.

At least five nationally scarce invertebrates have been recorded from the River Lambourn which include the predatory flatworm Crenobia alpina scarce in lowland Britain. Found in the winterbourne section of the river, it is considered to be a relict ice-age species being usually confined to cold water springs. Other species recorded from elsewhere on the river include the beetle Rhantus saturalis, the caddis flies Matelype fragilis and Ylodes conspersus usually restricted to calcareous river and streams.

Healthy self-sustaining populations of wild brown trout Salmo trutta and grayling Thymallus thymallus are also found in the river reflecting the excellent breeding habitats necessary for these fish. A good range of riverine bird species is also found along the Lambourn and include kingfisher, grey wagtail, water rail and green sandpiper.

COUNTY: BERKSHIRE/WILTSHIRE
SITE NAME: RIVER KENNET
Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981
Local Planning Authorities: Berkshire County Council, Wiltshire County Council, Newbury District Council, Kennet District COuncil
National Grid Reference: SU203692 to SU572667
Ordnance Survey Sheet 1:50,000: 174 1:10,000: SU26 NW, SU27 SW, SU27 SE, SU37 SW, SU36 NW, SU36 NE, SU47 NW, SU46 NE, SU56 NW, SU56 NE
Date Notified (Under 1981 Act): 1 November 1995
Date of Last Revision:
Area: 112.72 ha

Other information: The River Lambourn, which is a tributary of the River Kennet, is also an SSSI. There are two existing SSSIs along the River Kennet: Freemans Marsh and Chilton Foliat Meadows. The site boundary is the bank top or, where this is indistinct, the first break of slope.

Description and Reasons for Notification
The River Kennet has a catchment dominated by chalk with the majority of the river bed being lined by gravels. The Kennet below Newbury traverses Tertiary sands and gravels, London Clay and silt, thus showing a downstream transition from the chalk to a lowland clay river.
As well as having a long history of being managed as a chalk stream predominantly for trout, the Kennet has been further modified by the construction of the Kennet and Avon Canal. In some places the canal joins with the river to form a single channel. There are also many carriers and channels formerly associated with water meadow systems. The river flows through substantial undisturbed areas of marshy grassland, wet woodland and reed beds.

The flora of the River Kennet is species-rich and diverse, having the highest average number of species per site surveyed of any other lowland river in Britain. The Kennet shows a clear downstream succession in plant communities reflecting variations in geology and flow rate as well as the influence of the canal. The flora is considered to be intermediate in character between the classic chalk rivers of the south and the oolitic rivers to the north. Stream water-crowfoot Ranunculus pencillatus, starwort Callitriche obtusangula and watercress Nasturtium officinale dominate the upper half of the river where shallow water and gravel are typical. In the slower, deeper water found downstream a much wider range of species occurs. This includes four species of pondweed (Potamogeton spp.) and horned pondweed Zannichellia palustris. Other plants occurring here include spiked water-milfoil Myriophyllum spicatum, yellow water-lily Nuph lutea, common club-rush Scirpus lacustris and bur-reed species Sparganium. Below Newbury there is a larger volume of water and less chalk influence and river water-crowfoot Ranunculus fluitans occurs for the first time. River waterdropwort
Oenanthe fluviatilis, a nationally scarce species of larger chalk streams, has been recorded from the mid to lower Kennet.
Aquatic invertebrates are abundant and the Kennet is especially noted for its large hatches of mayflies (Ephemeroptera), including Ecdyonorus insignis and Ephemerella notata which have a very local distribution. These are associated with moderately flowing water in calcareous areas. Also worthy of mention are the beautiful and banded demoiselle damselflies, Calopteryx virgo and C. splendens respectively. The nationally scarce cranefly Molophilus niger (the larvae of which live in vegetated stream and riverside) has been recorded from the Kennet. The caddis fly Ylodes conspersus, also ranked as nationally scarce, has also been found along the river.

The Kennet supports good populations of kingfisher, grey wagtail, mute swan and little grebe, as well as sedge and reed warblers. Common sandpiper and redshank frequently use this river on passage.

The Kennet has a varied and mixed fishery including healthy, self-sustaining populations of wild brown trout, grayling, perch, chub, dace, roach, pike, gudgeon and bullhead.

EC Directive 92/43 on the Conservation of Natural Habitats and of Wild Fauna and Flora

Citation for Special Area of Conservation (SAC)

Name:	River Lambourn
Unitary Authority/County:	West Berkshire
SAC status:	Designated on 1 April 2005
Grid reference:	SU398739
SAC EU code:	UK0030257
Area (ha):	27.27
Component SSSI:	River Lambourn SSSI

Site description:
The River Lambourn is a classic example of a lowland chalk river. It rises in Lynch Wood, north of Lambourn and flows down to a confluence with the River Kennet east of Newbury. The catchment is almost entirely chalk which results in a predominantly gravelly river bed.

A key feature is the ephemeral nature of the upper section which generally flows from February through to the autumn. This is known as a 'winterbourne'. Any flora or fauna occurring in these stretches must be adapted to wide variations in flow, thus winterbourne sections tend to be less species-rich than the lower reaches which hold water all year round. Species characteristic of these conditions include pond water-crowfoot *Ranunculus peltatus* which is the dominant aquatic plant, as well as fool's-water-cress *Apium nodiflorum* and the moss *Fontinalis antipyretica*.

Further down the river where there are perennial flows, the aquatic plants are typical of shallow, gravel-bedded watercourses. Stream water-crowfoot *Ranunculus penicillatus* ssp. *pseudofluitans*, lesser water-parsnip *Berula erecta* and water-cress *Rorippa nasturtium-aquaticum* are abundant; blunt-fruited water-starwort *Callitriche obtusangula* is also characteristic in the channel. The good water quality, coarse sediments and extensive beds of submerged plants provide excellent habitat for bullhead *Cottus gobio* and brook lamprey *Lampetra planeri*.

Qualifying habitats: The site is designated under **article 4(4)** of the Directive (92/43/EEC) as it hosts the following habitats listed in Annex I:

- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. (Rivers with floating vegetation often dominated by water-crowfoot)

Qualifying species: The site is designated under **article 4(4)** of the Directive (92/43/EEC) as it hosts the following species listed in Annex II:

- Bullhead *Cottus gobio*
- Brook lamprey *Lampetra planeri*

This citation relates to a site entered in the Register of European Sites for Great Britain.
Register reference number: UK0030257
Date of registration: 14 June 2005
Signed: Trevor Salmon
On behalf of the Secretary of State for Environment, Food and Rural Affairs

APPENDIX 2 – RIVER KENNET SSSI – WLMP STRUCTURES AND ACTIONS

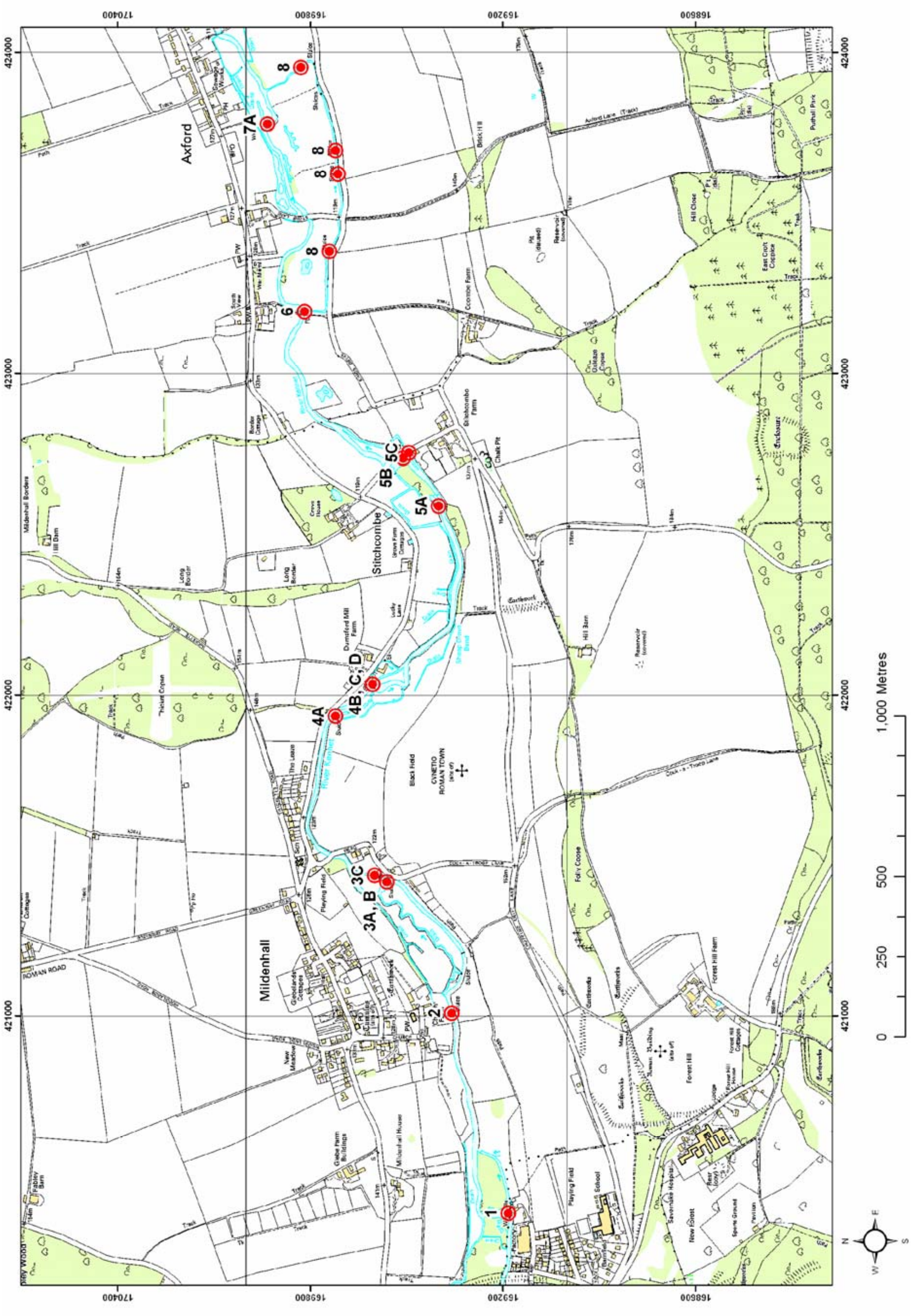
ID no	Location	Type of changes required	Detail	Responsibility	Priority
1	Elcot Mill, Marlborough	Structure restoration/ removal	Consider the benefits of restoring the structure to open up the back channel for the benefit of brown trout and associated chalk river features	EA/NE/landowner	Low priority
3C	Werg Mill, Mildenhall	Change in management	Change in management to allow more water through the structure, and renovation of the structure if necessary.	EA/NE/landowner	Low-priority
4A, 4C	Durnsford Mill, Mildenhall	Change in management and river restoration	Feasibility study to investigate the options to restore the river bed to pre-dredging condition, changes in management and channel enhancement to improve flow and fish habitat	EA/NE/landowner	Low-priority
5A-C	Stitchcombe Mill	Change in management	Change in management and reinstatement of side sluices to allow flow down the side channel, and associated river restoration.	EA/NE/landowner	Low-priority
6 and 8	Kings Drive, Axford	Structure removal	Structure 6 needs to be replaced or renovated and Structure 8 removed. Fencing should be installed to prevent cattle access to the channel to the south.	EA/NE/ landowner	Low-priority
7A	Red Lion Hatches, Axford	Structure removal	Remove the structure and restore river channel. Changes to Structure 7A should be made with consideration of changes to Structure 9 (below).	EA/NE/landowner	Low-priority
ID 9 (10B/C)	Rags Hatches Axford	Change in management or structure removal	A feasibility study is needed to examine options for improving the river through changes in structure management/removal, restoration (including narrowing and bed re-levelling) and increased fish passage. It is essential that enough water passes along the higher level channel and through Priory Farm to maintain a supply for the artificial lake within the grounds.	EA/NE/landowner	Priority
11B and /or C	Offtake to Ramsbury Lake	Change in management	Change in management to retain more water in the river and associated river restoration. The bypass channel would need works to it to improve the habitat. Changes to these structures should be made with consideration of changes at Structure 12.	EA/NE/landowner	Priority
12	Outfall from the Ramsbury Lake	Change in management	Manage in conjunction with changes agreed to operation of lake offtake. Use of a boom is suggested to prevent algal build-up on the lake discharging into the Kennet	EA/NE/landowner	Low-priority

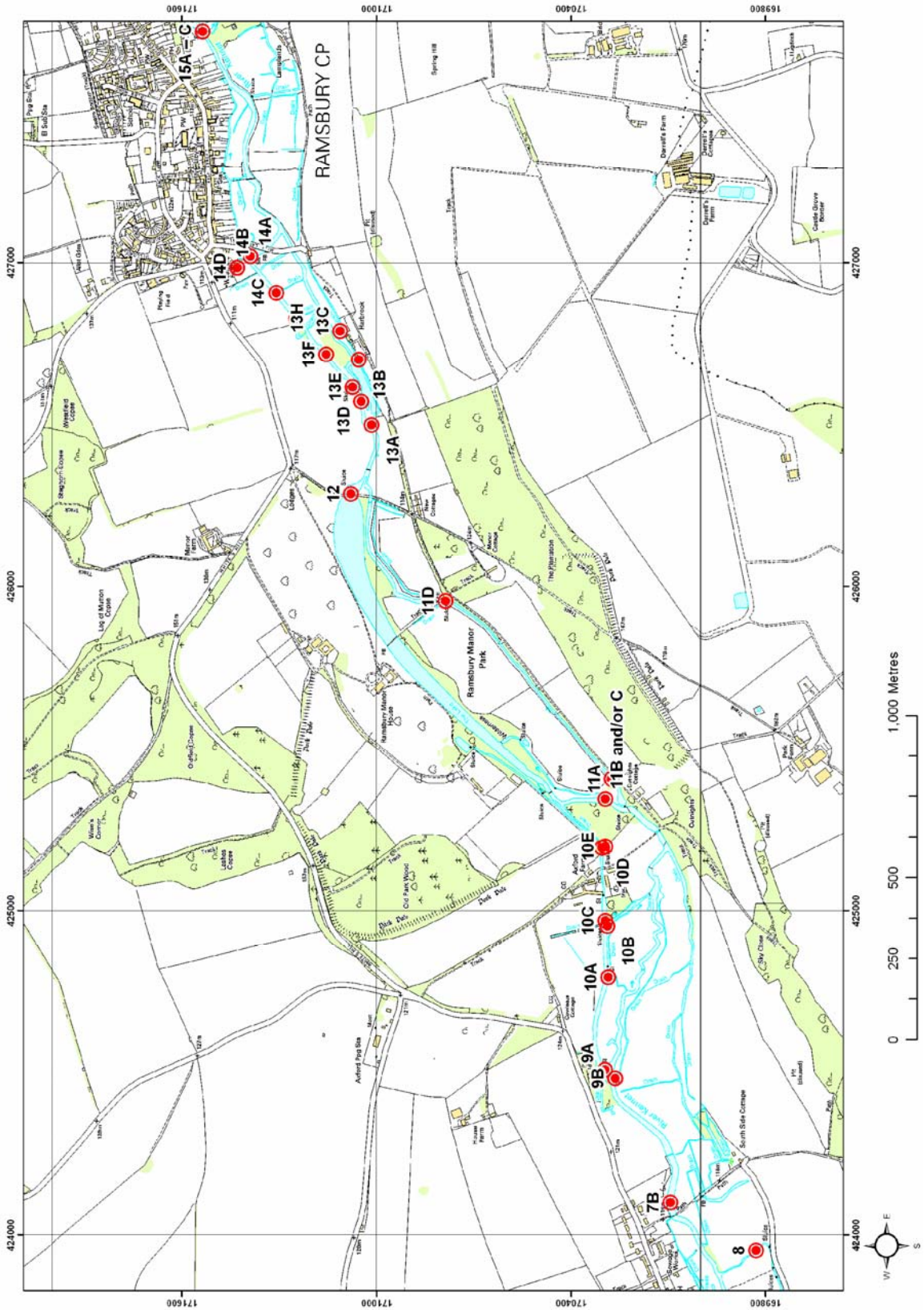
ID no	Location	Type of changes required	Detail	Responsibility	Priority
14A	Moons Mill, Ramsbury	Change in management	Agree an operating procedure for the new and existing structures to try and relieve the impounding effect. This would be done in association with upstream restoration works. Investigate methods of fish passage.	EA/NE/landowner	Low-priority
15A-C	Ramsbury Mill (u/s of Howe Mill)	River restoration	A feasibility study is required to investigate the options available to significantly reduce this impoundment, including using a by-pass channel to avoid the mill, and bed and bank re-profiling to enhance the chalk river features.	EA/NE/landowner	Priority
17	Sluice by West Lodge	Management agreement	Management agreement. Possible restoration of carrier streams	EA/NE/landowner	Low-priority
19 A-G	Littlecote Fish House	Change in management and river restoration	A feasibility study is required to fully explore possible options for restoring the river, the need for narrowing works, the optimal water level and to liaise with local landowners. Need to investigate how a change in operation of the main weir at the pump house would affect the upstream reach, how much channel work would be required, and the possibility of making fish passage available via one of the channels. Any changes should consider the potential effect upon the water levels of Chilton Foliat Meadows SSSI (see the WLMP for that site).	EA/NE/landowner	Priority
20B, 21	Between SU316703 and Chilton Foliat Mill	Change in management and river restoration	A feasibility study is required to fully explore possible options for changing the split in flow, opening the blocked channel downstream of the weed rack and river restoration. Any changes should consider the potential effect upon the water levels of Chilton Foliat Meadows SSSI (see the WLMP for that site).	EA/NE/landowner	Priority
22, 23 25B, 25E to H/I	Chilton Estate	Change in management and river restoration	A feasibility study is required to maximise the potential of the river through this estate. This is likely to include agreeing the best operating methodology to try and establish at least one chalk stream channel in favourable condition. This channel should have unrestricted fish access.	EA/NE/landowner	Priority
26A-E	Eddington Mill	Management agreement	A feasibility study is required to investigate the management and condition of the mill structure, determine management responsibilities and get a management agreement in place.	EA/NE/landowner	Priority

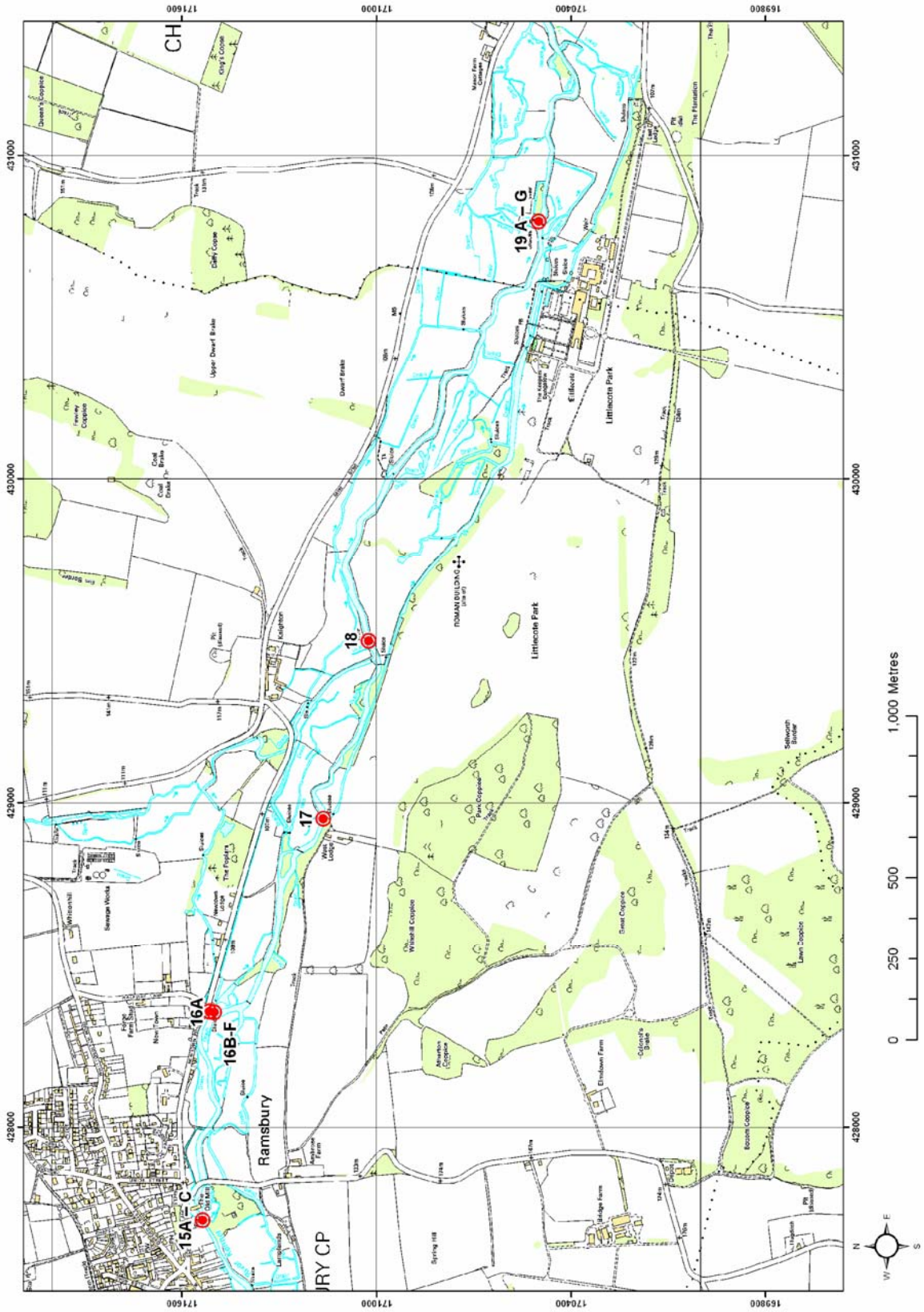
ID no	Location	Type of changes required	Detail	Responsibility	Priority
			Options to consider include sending more water down the channel which flows south of the lakes; this would help increase the gradient and remove the impounding effect of the main mill. It may also be an option to replace the side structure at the mill to allow more flow and fish passage. It is critical to maintain flow down the 'waste stream' as this is a major feed for Eddington Meadows which is a component part of the Kennet and Lambourn Floodplain SAC and SSSI		
27C	Eddington Bridge to Brackets Hatches	Management agreement	Management agreement to minimise any impact on the river and conflict over the flow split.	EA/NE/landowner	Low-priority
28B	Denford Mill	Management agreement	Operating agreement to minimise any impact on the river and conflict over the flow split.	EA/NE/landowner	Low-priority
30	Avington No 1	Change in management and river restoration	A feasibility study is required to examine the effects of proposed changes in management of the structure on the upstream reach, and the need for river restoration. In addition the impact to adjacent landowners should also be investigated.	EA/NE/landowner	Priority
31A and B	Avington Fishing Hut	Change in management and river restoration	Review of the existing feasibility study into the options to change the current flow split to encourage more water to flow down the back SSSI channel, river restoration and management agreement.	EA/NE/landowner	Priority
32A-B	Main structures at Avington	Change in management	If the SSSI side channel can be used (fed from structure 31A), as the main SSSI channel then the operation of these structures become important in maintaining a head in the canalised reach. Operating agreement would need to be produced in conjunction with the changes upstream.	EA/NE/landowner	Low-priority
32D	Weed rack upstream of Barton Court	Structure removal	Remove or alter structure and assess degree of upstream restoration that would be required.	EA/NE/landowner	Priority
33A	Upstream of Kintbury water	Structure removal	Remove the structure	EA/NE/landowner	Low-priority

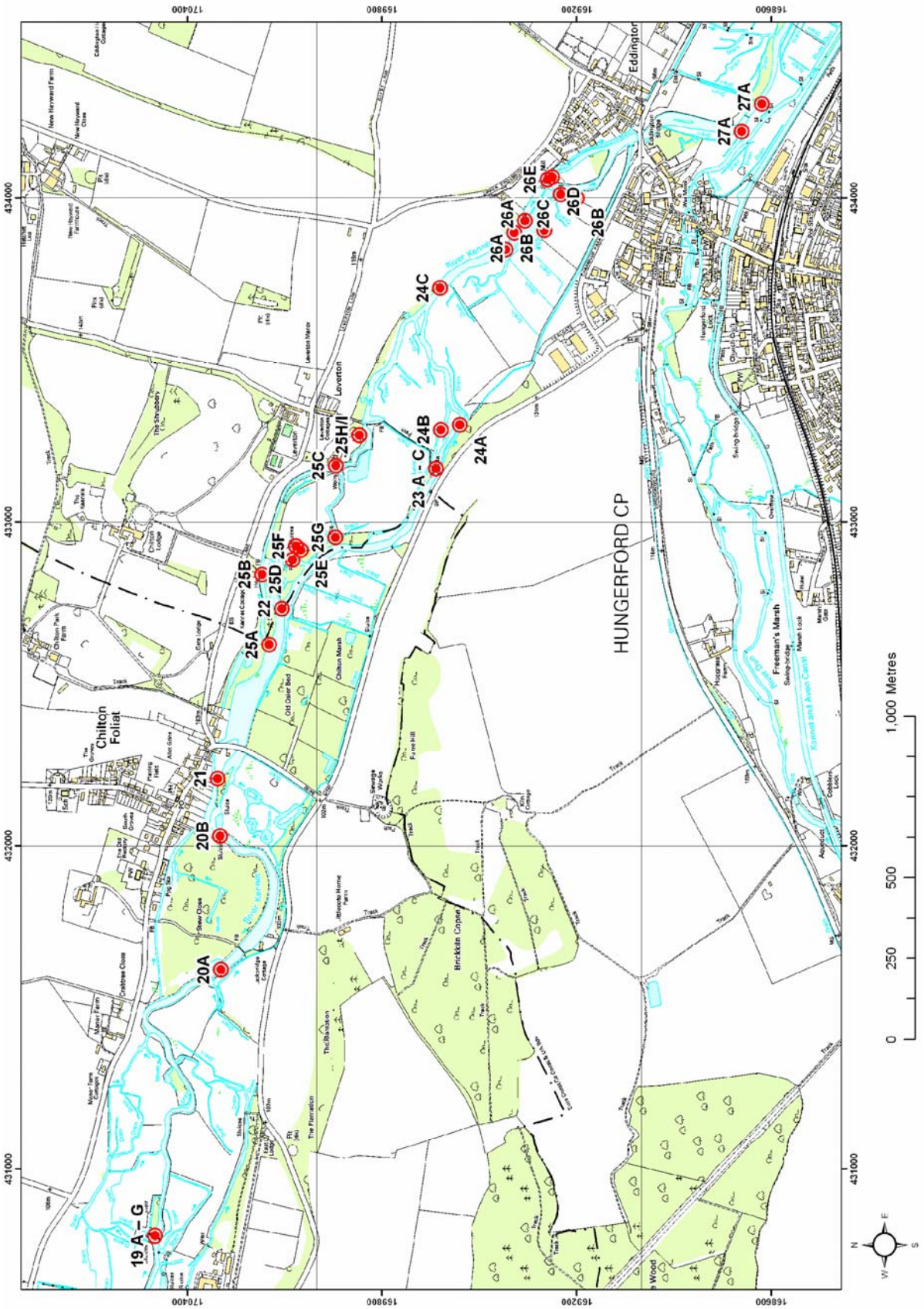
ID no	Location	Type of changes required	Detail	Responsibility	Priority
	meadow				
33B-D	Sherman's Hatches	Management agreement	Consider changes to the operation of the structures to reduce input of flow to the canal in the winter months.	EA/NE/landowner	Low-priority
36B	Kintbury Water Meadows	Management agreement	Management agreement	EA/NE/landowner	Low-priority
38A-B	Barton Holt	Structure removal	Remove weir and find alternative feed for the lake via an existing channel that runs parallel to the river. Advanced plans are currently being drawn up.	EA/NE/landowner	Priority
46A-E	Downstream of Hamstead	Change in management	Change in management and river restoration	EA/NE/landowner	Low-priority
48A	Barnetts Hatches	Management agreement	Continue existing management. Flows must be maintained down to the lake, and from the lake into stream which feeds the SAC. Further advice has now been given to the owners of Benham Estate on the operation of the relevant structures.	EA/NE/landowner	Low-priority
51B	Downstream of Barnett Hatches	Change in management	A feasibility study is required to assess the options to minimise the impact on the river while retaining the historic interest of the structures and the bathing pool, and the need for river restoration.	EA/NE/landowner	Low-priority
56	Dogs' Head Stakes, near Widmead Lock	Structure replacement and management agreement	British Waterways may wish to replace this structure in the future and the Environment Agency should provide appropriate advice as required	EA/NE/landowner	Low-priority
57A-C	Chamberhouse Mill	Change in management	Agree the most beneficial management of structure.	EA/NE/landowner	Low-priority

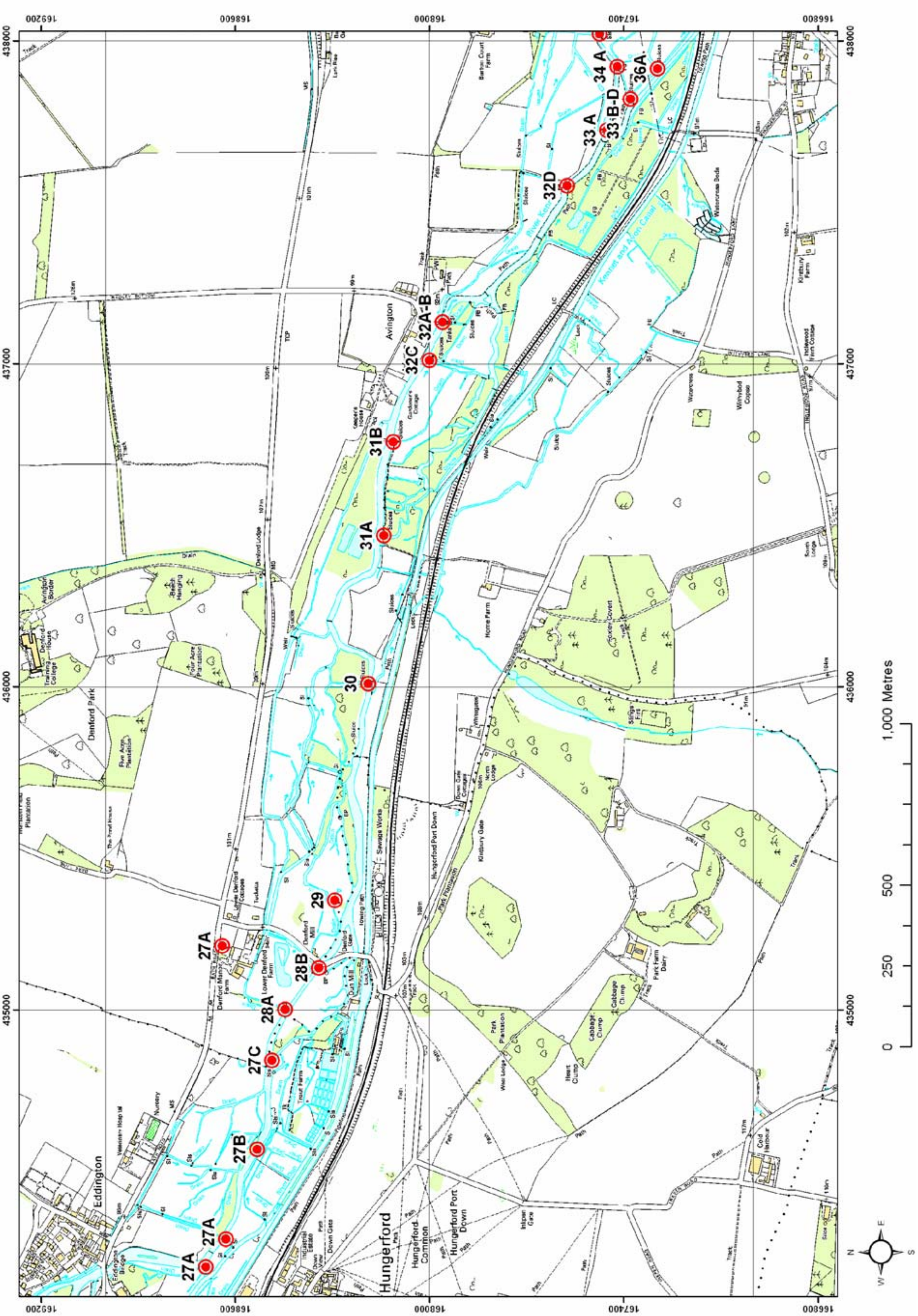
APPENDIX 3 WLMP MAPS – RIVER KENNET SSSI

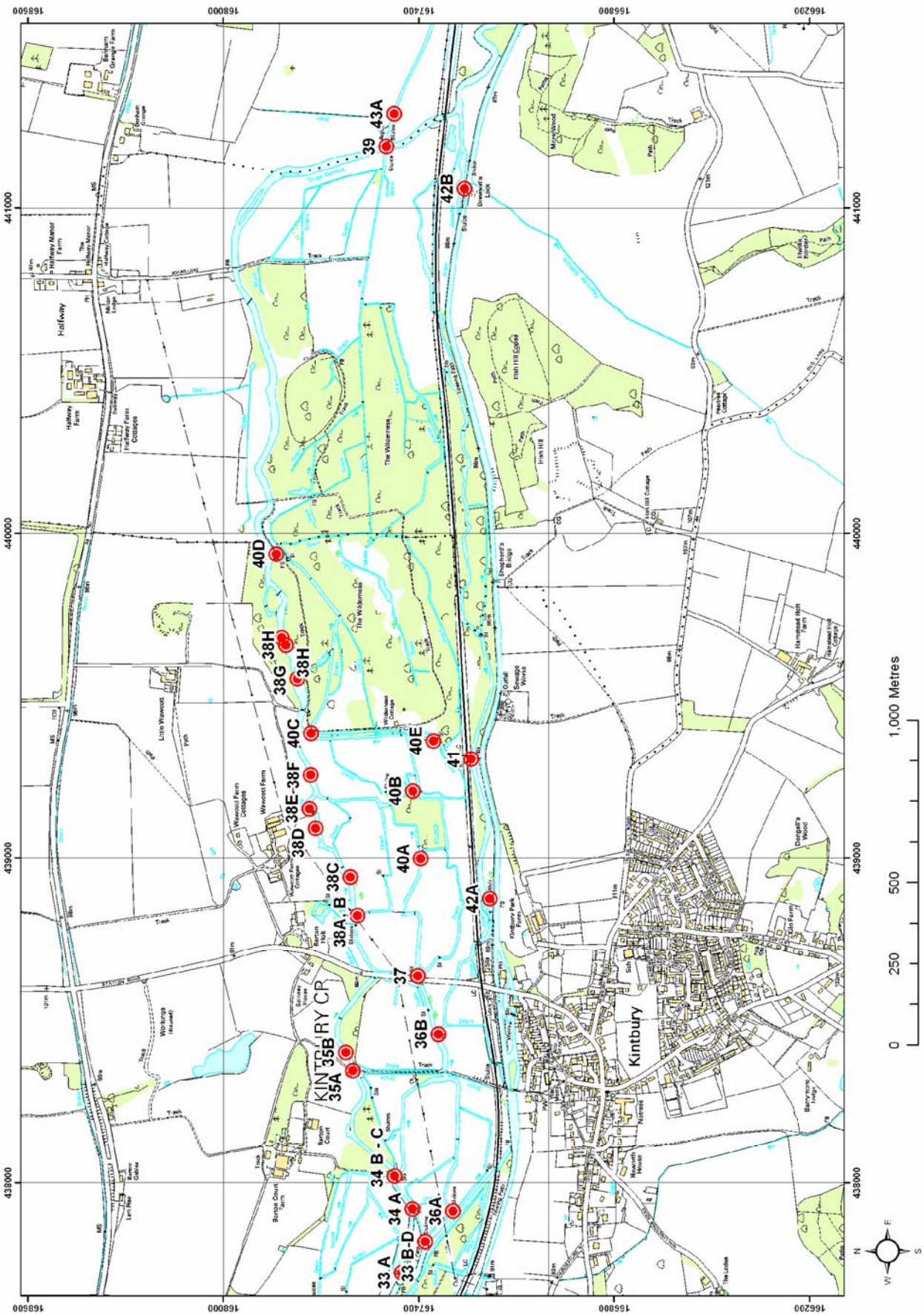

Axford
7A
8
8
8
8
8
6
5C
5B
5A
Stitchcombe
4A
4B, C, D
3C
3A, B
Mildenhall
2
1
424000
423000
422000
421000
170400
169800
169200
168800
1,000 Metres
500
250
0

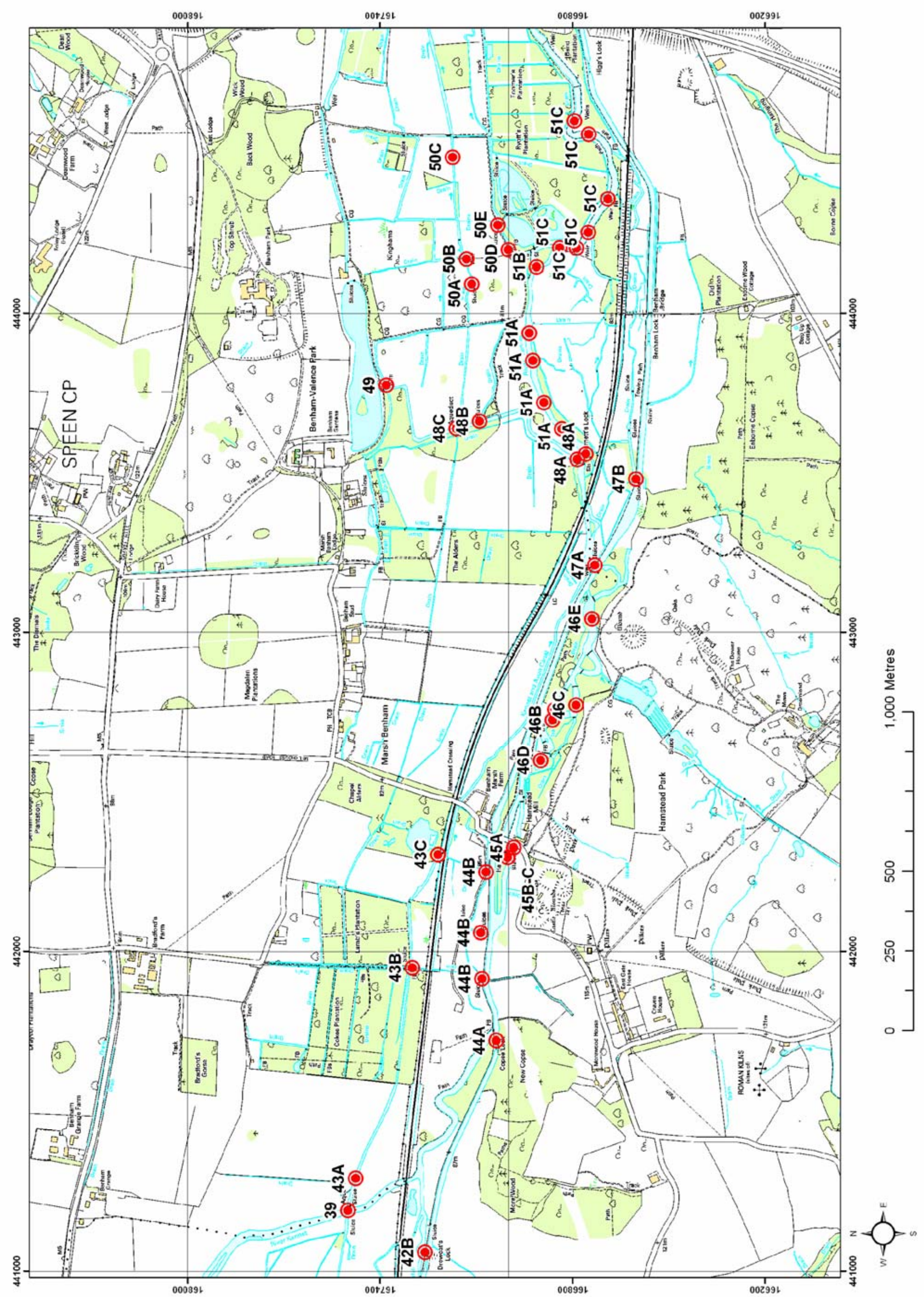

RAMSBURY CP
15A
C
14B
14A
14D
14C
13H
13C
13F
13E
13D
13B
13A
12
11D
11B and/or C
11A
10E
10D
10C
10B
10A
9A
9B
7B
8
Ramsbury Manor Park
1,000 Metres
0
250
500
427000
426000
425000
424000
171600
171000
170400
169800


Littlecote Park
Littlecote Park
Ramsbury
19 A – G
18
17
16A
16B-F
15A – C
1,000 Metres
0
250
500
N
E
S
W


19 A – G
20A
20B
21
22
23 A – C
24A
24B
24C
25A
25B
25C
25D
25E
25F
25G
25H/I
26A
26B
26C
26D
26E
27A
HUNGERFORD CP
Chilton Foliat
Eddington
Freeman's Marsh
Brickkiln Copse
River Kennet
River Lambourn
0
250
500
1,000 Metres
N
E
S
W


27A
27A
27A
27B
27C
28A
28B
29
30
31A
31B
32C
32A-B
32D
33 A
33 B-D
34 A
36A
Eddington
Hungerford
Hungerford Common
Hungerford Port Down
Avington
Denford Park
Sewage Works
435000
436000
437000
438000
169200
168800
168000
167400
166800
0
250
500
1,000 Metres


168600
168000
167400
166800
166200
441000
440000
439000
438000
43A
39
42B
40D
38H
38G
38H
40C
40E
41
38E
38F
38D
40B
40A
38C
38A
38B
42A
37
36B
35B
35A
34 B - C
34 A
36A
33 B-D
33 A
Halfway
Kintbury
0
250
500
1,000 Metres
N
E
S
W


SPEEN CP
Marsh Benham
Hamstead Park
39
42B
43A
43B
43C
44A
44B
44B
44B
45A
45B-C
46B
46C
46D
46E
47A
47B
48A
48A
48B
48C
49
50A
50B
50C
50D
50E
51A
51A
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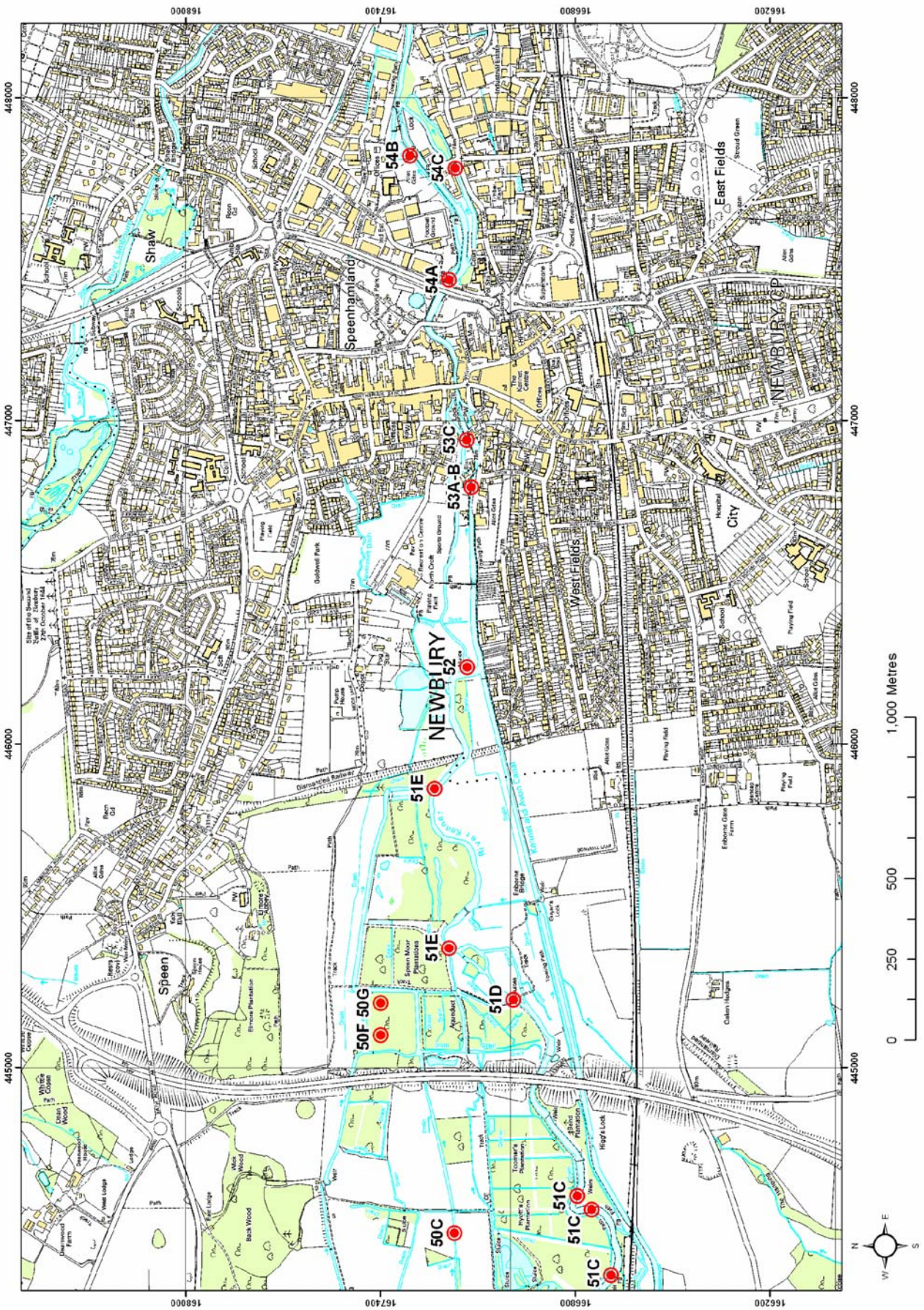
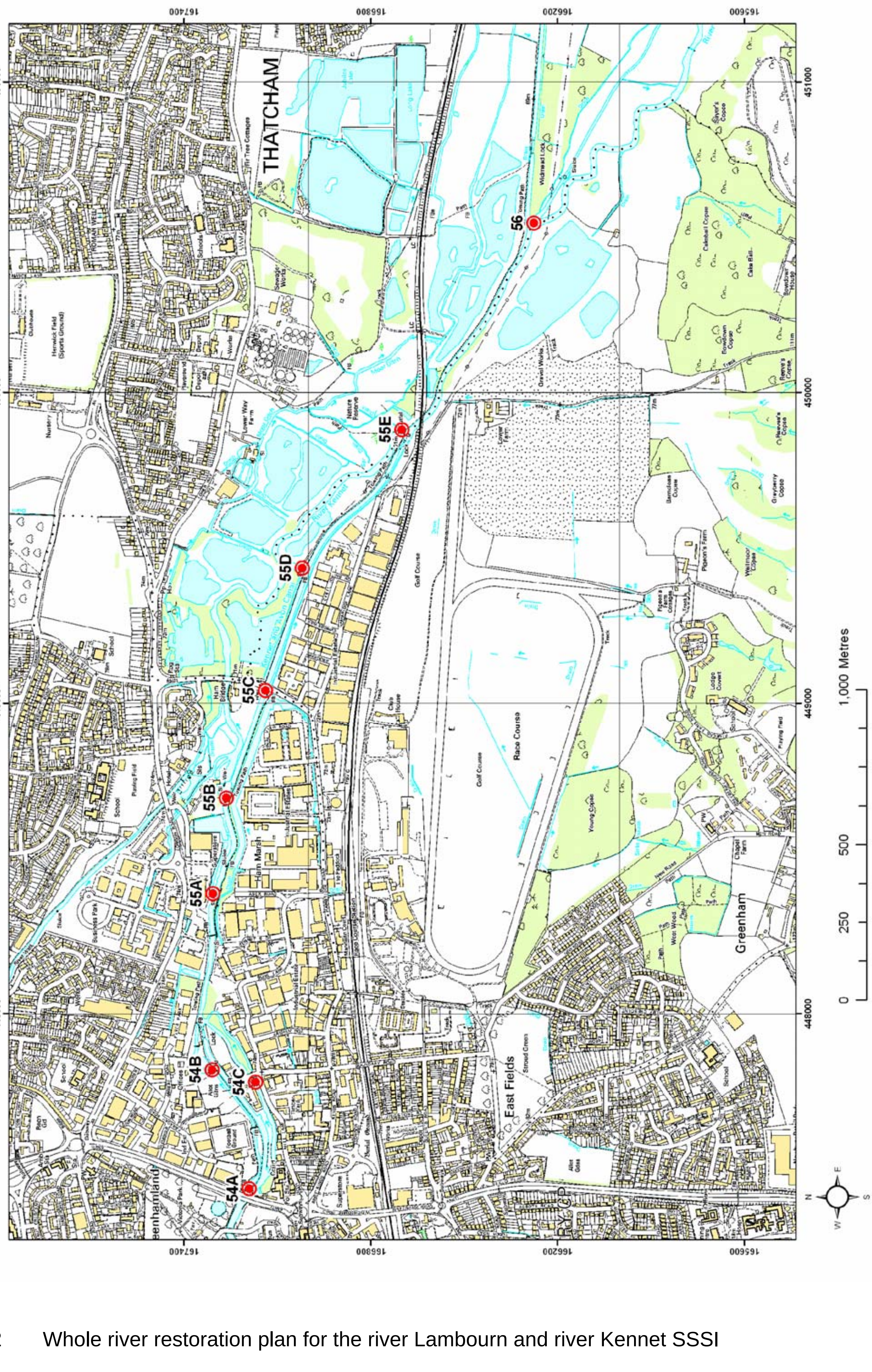
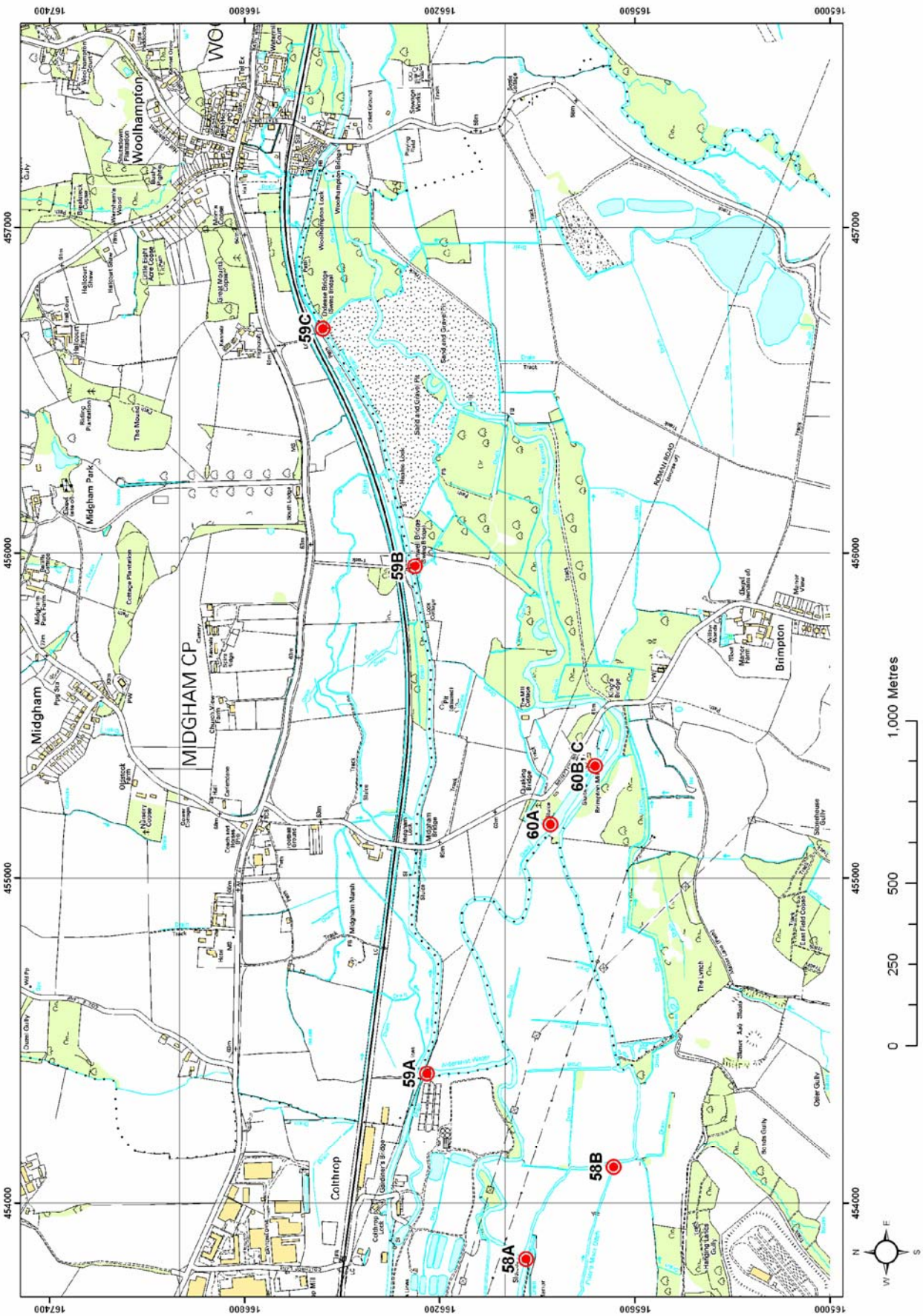
51B
51C
51C
51C
51C
51C
51C
1,000 Metres
500
250
0


168000
167400
166800
166200
448000
447000
446000
445000
54B
54C
54A
53C
53A-B
52
51E
51E
51D
50F
50G
50C
51C
51C
51C
NEWBURY
Speenhamland
Shaw
Speen
East Fields
West Fields
City
NEWBURY GP
0
250
500
1,000 Metres
N
E
S
W


THATCHAM
56
55E
55D
55C
55B
55A
54B
54C
54A
Greenham
East Fields
Race Course
Golf Course
Ham Marsh
0
250
500
1,000 Metres
451000
450000
449000
448000
167400
166800
166200
165600


167400
166800
166200
165600
165000
457000
456000
455000
454000
59C
59B
59A
60B
60A
58B
58A
MIDGHAM CP
Midgham
Midgham Park
Woolhampton
Brimpton
Colthrop
ROMAN ROAD
0
250
500
1,000 Metres
N
E
S
W

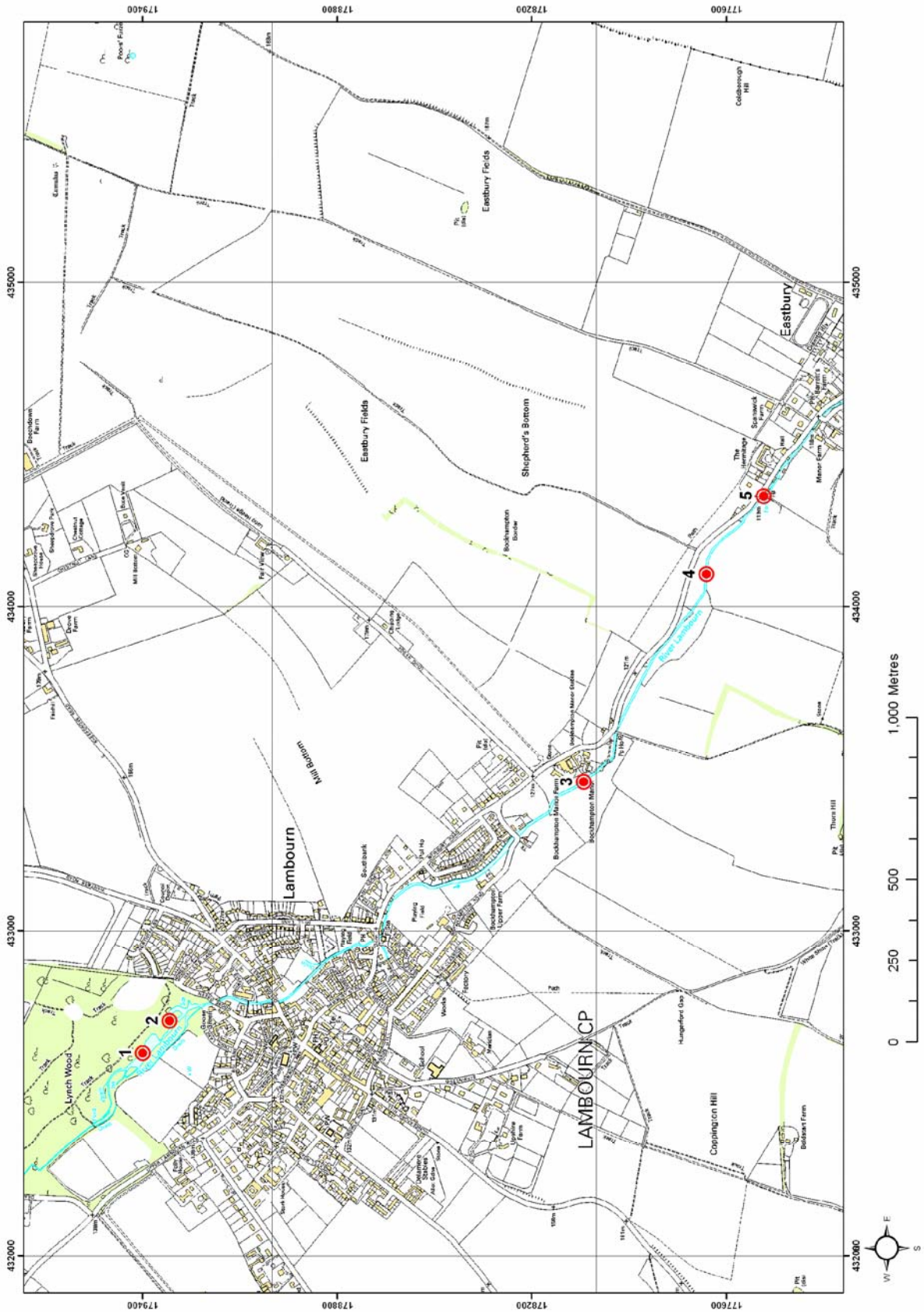
APPENDIX 4 – WLMP STRUCTURES AND ACTIONS – RIVER LAMBOURN SSSI

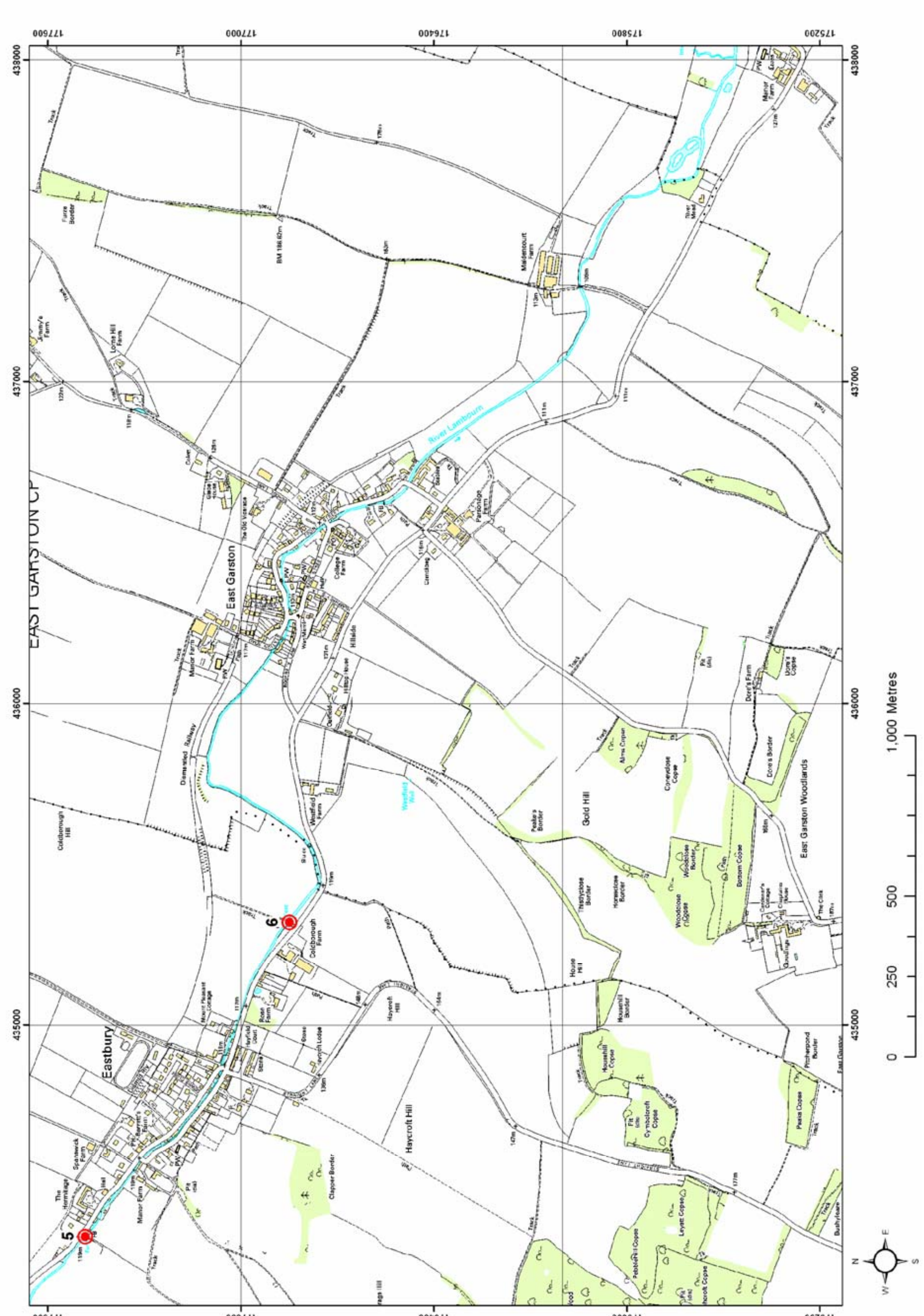
ID no	Location	Changes required	Detail	Responsibility	Priority
9	East Shefford Gauging Weir	Change/removal of structure	Assess potential for a replacement structure or removal of structure if it is no longer required. Liaise with landowner to get agreement. If the structure cannot be removed then it should be adapted to include a fish pass.	EA/NE/ landowner	Low priority
11	Mill House at East Shefford	Change in management	Assess potential to gain better control on the weir upstream of the Mill house to maintain flows in the mill stream. This channel could be used to maintain a channel open to fish passage. Works to the structure may be required. A management agreement is required to minimise the impoundment effect of the sluice.	EA/NE/ landowner	Low priority
13	Elton Lane	Removal of structure	Remove impoundment to allow free passage of water. Assessment of levels required and landowner agreement will be needed. Initial contact with fishery owner suggests they will have no objection to this. Upstream narrowing and possibly bed reprofiling will be necessary as will tree works to allow some sunlight into the reach.	EA/NE/ landowner	Priority
14	Mill at Weston	Identify options to reduce impounding effect and allow fish passage	Assess options for this structure and look at the feasibility of creating a free flowing channel down the back channel whilst maintain sufficient flow under the mill and in the downstream channel	EA/NE/ landowner	Priority
16-18	Welford Park	Change/Removal of structure	Consider alterations to the larger structure to alleviate some of the impounding effect and improving fish migration. This could be as simple as opening up a channel through the weir. Some upstream restoration will be required to allow for the drop in levels. Retention of the feed for the water feature will be essential.	EA/NE/ landowner	Low priority
20	Downstream of Welford	Removal of structure	None	EA/NE/ landowner	Low priority
25	Boxford Mill	Maintain current management	Maintain current management	EA/NE/ landowner	Low priority
29	Downstream of Hunts Green	Replacement of structure	Replace structure with undershot sluices to maintain silt movement in high flows and remove barrier to fish migration. River keeper/landowner looking at options and plan to replace existing with a new structure.	EA/NE/ landowner	Priority
31-32	Woodspeen Mill	Implement planned river	Implement restoration project planned for this site.	EA/NE/ landowner	Priority

ID no	Location	Changes required	Detail	Responsibility	Priority
		restoration			
33	Upstream of Bagnor Manor	Change in management and river restoration	Assess feasibility of sending more water down the back channel. Look at potential to replace the small side sluice with an open channel structure to allow fish passage. Assess any in-stream works that would be required to enable more flow to go down the channel. Agree the operation of the large side sluice at the mill to sustain flows under the mill to support the SSSI channel downstream and maintain levels necessary for the requirements of Bagnor Manor. Investigate the structure under the Watermill to ensure there is no blockage.	EA/NE/ landowner	Priority
36	Watermill Theatre	Removal of structure and change in management	Structure 36B under the Theatre needs to be further investigated to determine its condition, to remove any debris or sediment build-up. It is important that any changes made to improve flow through the structure under the mill be considered within the feasibility study proposed for passing water down the Bagnor back channel via Structure 33. The study should take account of this and aim to balance flows down the Bagnor back channel and the main channel.	EA/NE	Priority
39, 40, 41	Donnington Grove Lake	Removal of structure and change in management	Further the proposals in the Cain Consultancy restoration plans in partnership with Donnington Grove Country club.	EA/NE	Priority
42	Donnington Mill	Feasibility study to bypass mill	A feasibility study is needed to determine the options for bypassing the structures at Donnington Mill.	EA/NE	Low priority
43	Shaw Park gauging weir	Study into alternative flow gauging techniques	Begin study to investigate alternative methods for flow gauging that do not cause impoundments so that gauging structures that create fish barriers or unfavourable water levels can be removed. The study needs to be undertaken with the Environment Agency Hydrometry team. Begin feasibility study to investigate the potential changes that could be implemented at Shaw	EA/NE	Priority
44	Shaw Mill	River restoration	A feasibility study is needed to build upon the Cain Consultancy (2005) report, to collect elevation data and other necessary information with which to determine the feasibility of improving the river channel and Spout Ditch, and produce detailed designs. The restoration work must tie into and enhance the lottery bid by FWAG. (Note Natural England and EA are partners in the FWAG project).	EA/NE	Priority
45	Newbury Manor	Removal of structure and river	Investigate the feasibility of removing the sluice at the hotel, lowering the bed and increasing the capacity of the channel beneath the pedestrian footbridge	EA/NE	Priority

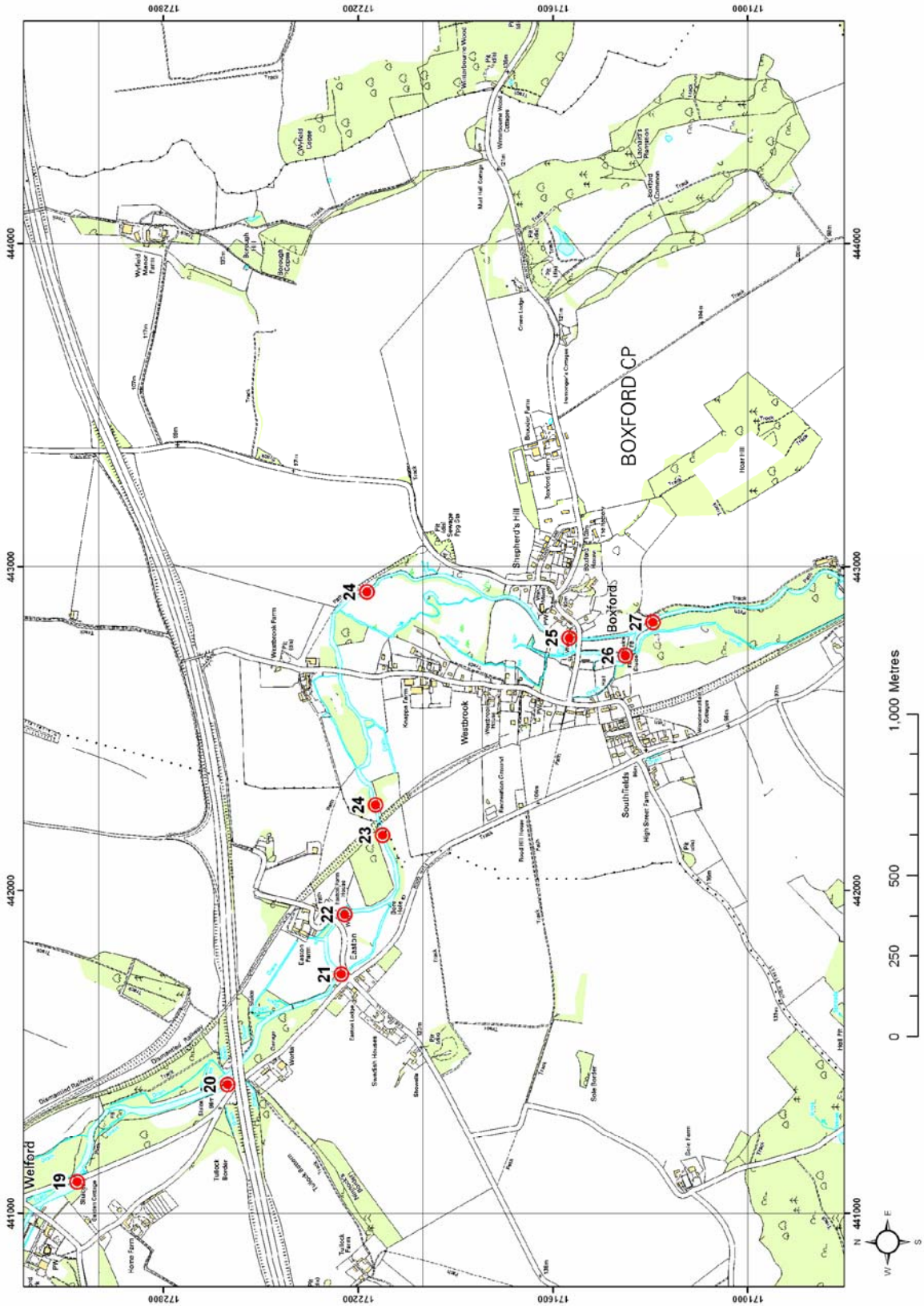
ID no	Location	Changes required	Detail	Responsibility	Priority
	Hotel	restoration	and to what extent can the channel upstream be narrowed without increasing the flood risk. Communication with the Hotel needs to continue to discuss the possibility of removing the structure or at least replacing it with one that is passable to fish.		

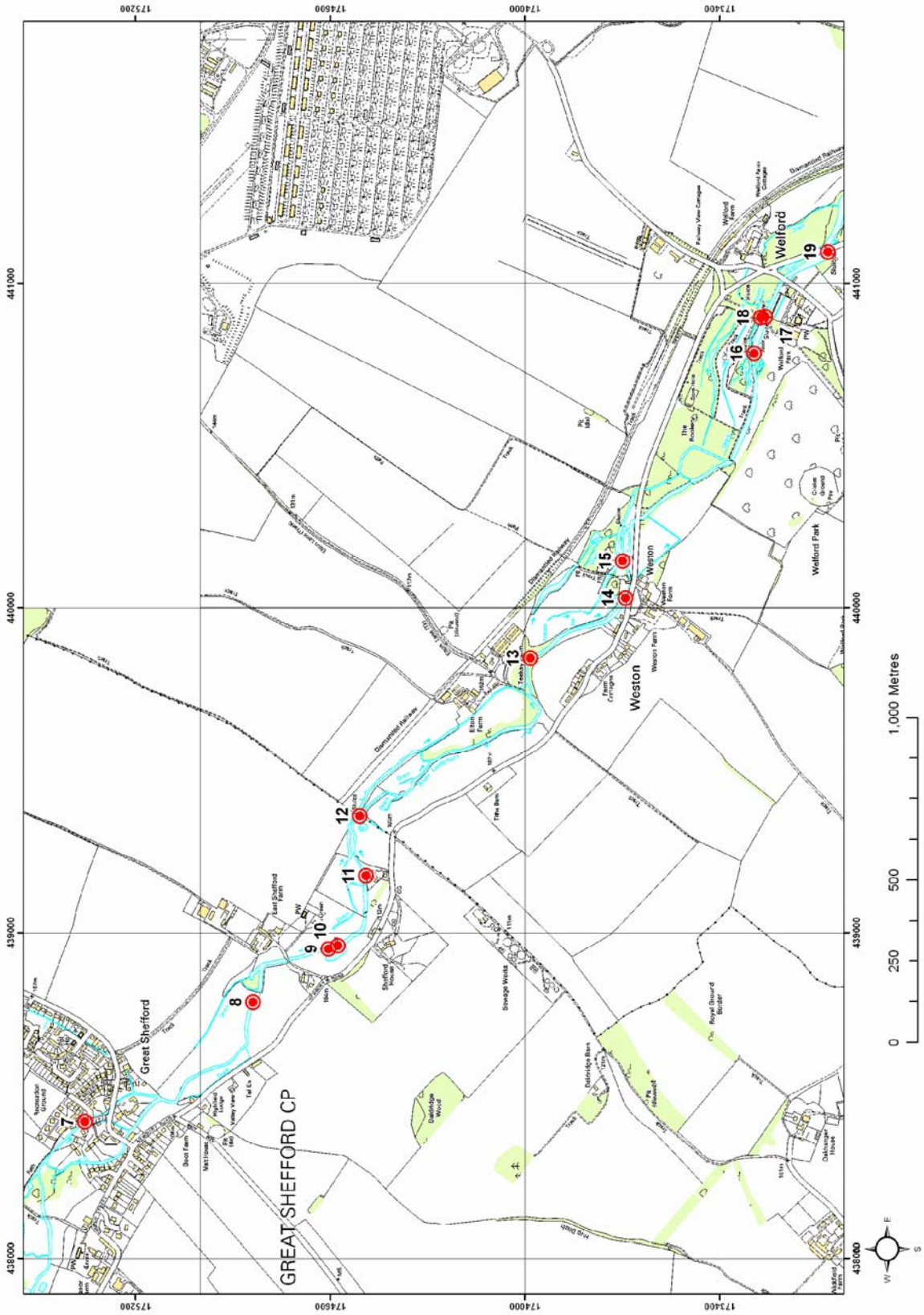
APPENDIX 5 – WLMP MAPS – RIVER LAMBOURN SSSI

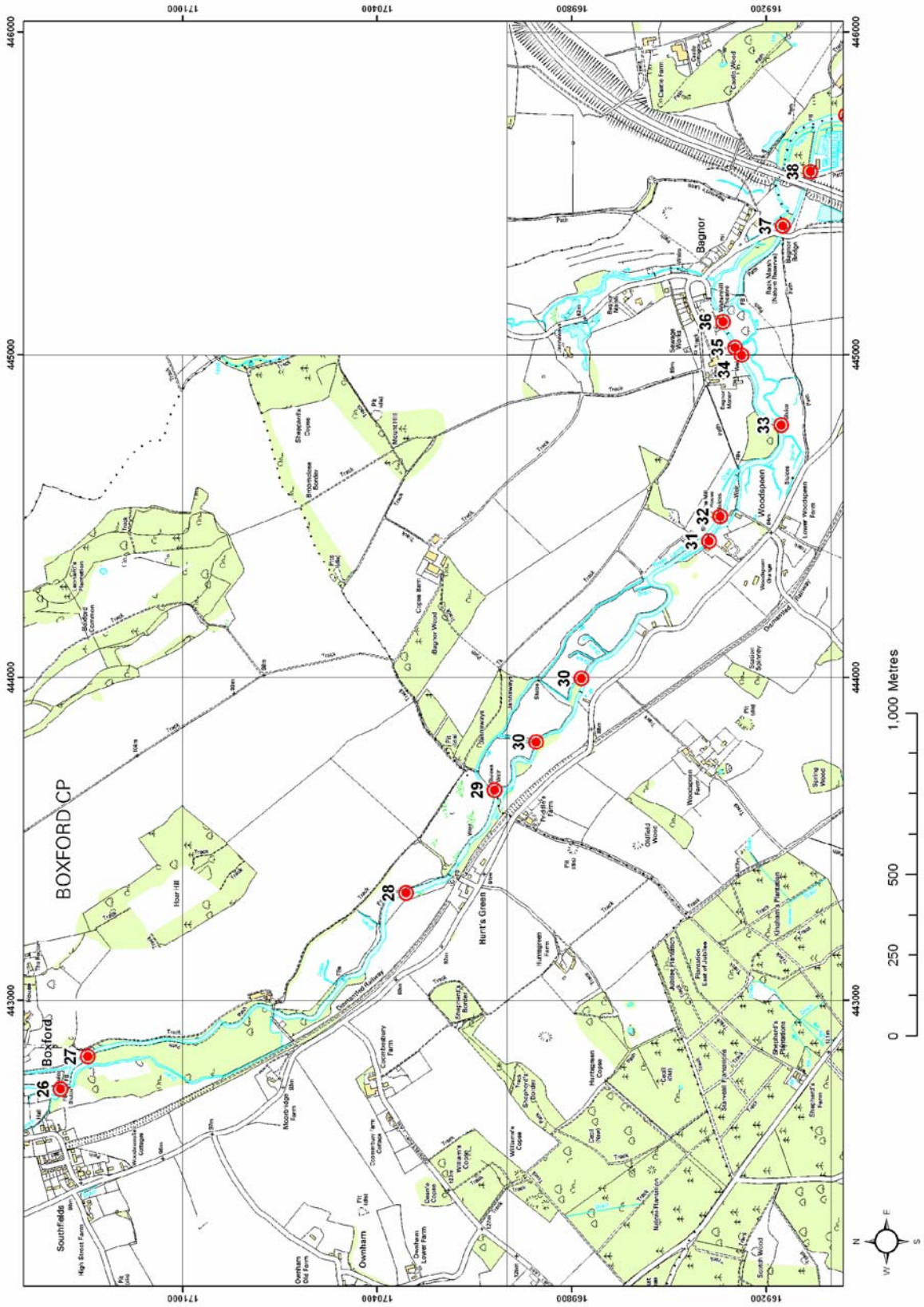

Eastbury Fields
Shepherd's Bottom
Eastbury
Lambourn
Mill Bottom
LAMBOURN CP
River Lambourn
Lynch Wood
Coppington Hill
1
2
3
4
5
0
250
500
1,000 Metres

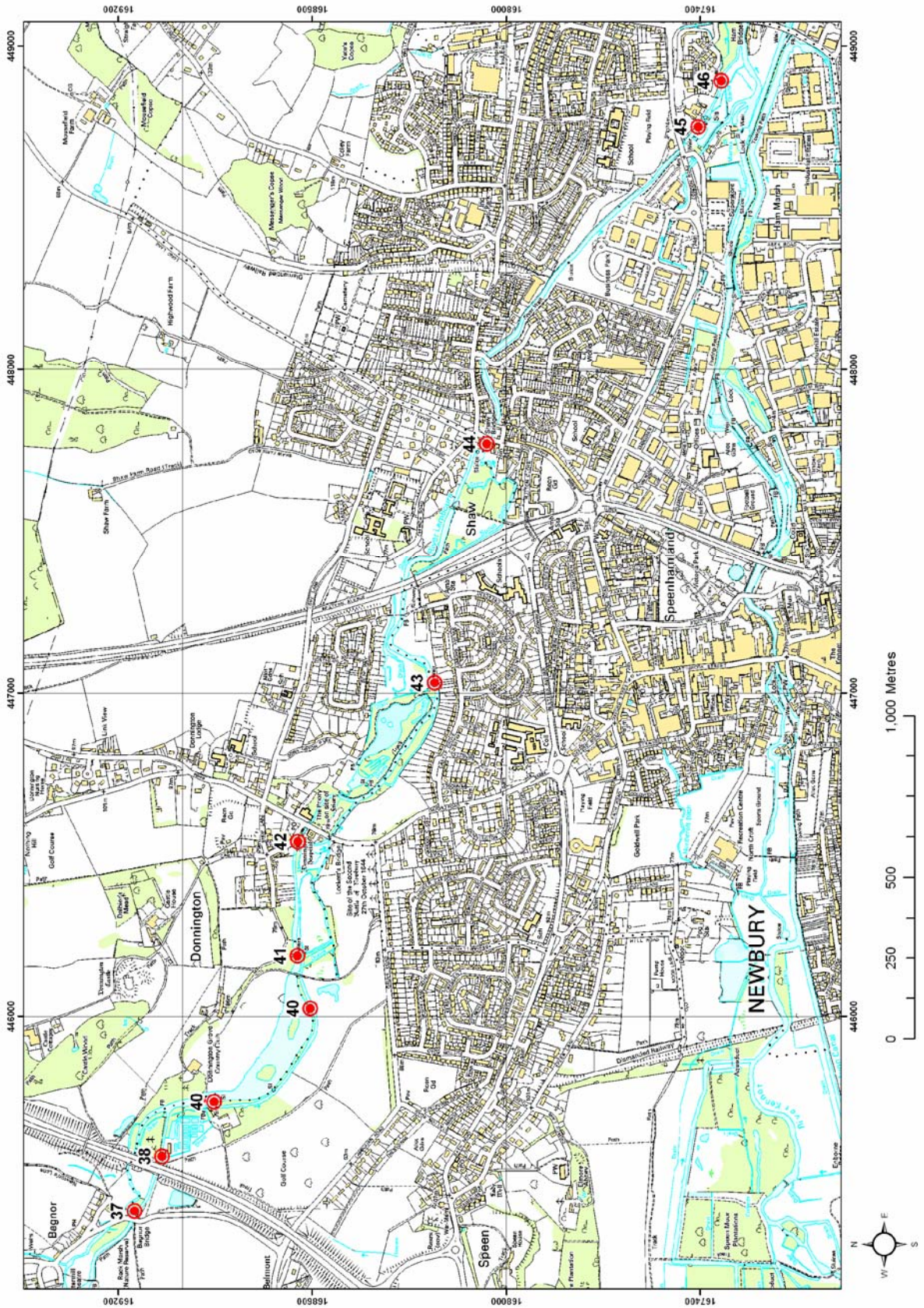


East Garston
EAST GARSTON CP
Eastbury
River Lambourn
Gold Hill
Haycroft Hill
East Garston Woodlands
5
6
0
250
500
1,000 Metres
435000
436000
437000
438000
177600
177000
176400
175800
175200


BOXFORD CP
Welford
Boxford
Westbrook
Shepherd's Hill
Easton
Southfields
19
20
21
22
23
24
24
25
26
27
0
250
500
1,000 Metres


GREAT SHEFFORD CP
Great Shefford
Weston
Welford
Welford Park
1
7
8
9
10
11
12
13
14
15
16
17
18
19
175200
174600
174000
173400
441000
440000
439000
438000
0
250
500
1,000 Metres


BOXFORD CP
Boxford
Hurst Green
Bagnor
Woodspeen
Ownham
Southfields
0
250
500
1,000 Metres


NEWBURY
Donnington
Shaw
Speenhamland
Speen
Begnor
0
250
500
1,000 Metres

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