We are the Environment Agency. We protect and improve the environment. We help people and wildlife adapt to climate change and reduce its impacts, including flooding, drought, sea level rise and coastal erosion.

We improve the quality of our water, land and air by tackling pollution. We work with businesses to help them comply with environmental regulations. A healthy and diverse environment enhances people's lives and contributes to economic growth.

We can't do this alone. We work as part of the Defra group (Department for Environment, Food & Rural Affairs), with the rest of government, local councils, businesses, civil society groups and local communities to create a better place for people and wildlife.

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www.gov.uk/environment-agency

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Email: enquiries@environment-agency.gov.uk

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<th>Date</th>
<th>Status</th>
<th>Author</th>
</tr>
</thead>
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<tr>
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<td>26/09/2012</td>
<td>Original Report - Draft</td>
<td>Hyder Consulting (UK) Limited</td>
</tr>
<tr>
<td>2</td>
<td>31/05/2019</td>
<td>Summary - Final</td>
<td>Environment Agency</td>
</tr>
</tbody>
</table>

This summary has been based on a report prepared for Environment Agency by Hyder Consulting (UK) Limited in accordance with the terms and conditions of appointment for Reach by Reach Restoration Plan dated 26.10.11. Report number: 004-GL-UA004077-03, Date: 26th September 2012.
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NATURAL ENGLAND AND ENVIRONMENT AGENCY AGREEMENT

Moors River System SSSI Restoration Plan

<table>
<thead>
<tr>
<th>Site name</th>
<th>Moors River System SSSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>NE Water Adviser</td>
<td>Douglas Kite</td>
</tr>
<tr>
<td>EA Project Manager</td>
<td>Sarah Healy</td>
</tr>
</tbody>
</table>

We agree with the findings and recommendations of the above report, as an outline plan prior to feasibility and further design.

We believe that development and implementation of the actions would achieve the restoration and rehabilitation appropriate for securing recovering/favourable condition of the affected elements in river SSSI units 1 - 5 & 7 – 8*.
* There is no unit 6

<table>
<thead>
<tr>
<th>Name</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrew Smith</td>
<td></td>
<td>21.5.2019</td>
</tr>
<tr>
<td>Natural England Area Manager (interim - Dorset, Hants and Isle of Wight)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nick Gupta</td>
<td></td>
<td>30.5.2019</td>
</tr>
<tr>
<td>Environment Agency Area Manager South West – Wessex</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

Natural England welcomes and supports this Restoration Plan for the Moors River SSSI.
Executive summary

In 2012 the Environment Agency contracted Hyder Consulting to undertake a study of the Middle and Lower Stour (the main river only) and Moors River system in Dorset. One of the main drivers for this report was the Water Framework Directive (WFD) ambition to seek improvement to rivers and watercourses with the eventual aim for rivers to achieve ‘good ecological status’. Restoring both rivers to a more natural state will allow the expression of the characteristic habitat form and function of both rivers for the benefit of the flora and fauna.

A large part of the river system is designated as a riverine Site of Special Scientific Interest (SSSI). Historical modification and activities have impacted the ecological value of the river and in 2009 Natural England’s Condition Assessment identified these impacts to be contributing to ‘unfavourable, no change’ condition on all seven river SSSI units in the Moors River System SSSI. The UK Government set a Public Service Agreement (PSA) target to improve 95% of SSSIs to ‘favourable’ or ‘recovering’ condition by 2010, and in England’s biodiversity strategy identified an outcome to have at least 50% of SSSIs in ‘favourable’ condition by 2020 as a contribution toward meeting international and European biodiversity commitments. These targets forced a more strategic approach to the problem and was a key driver to produce a restoration plan for the river SSSI and its tributaries.

The study involved walking the banks of both rivers, recording key geomorphological features on each river, the extent of physical modification that each river has been subject to, and providing recommendations for enhancement measures to restore each river to a more natural state.

Following the completion of the survey a broad ecological vision was developed for each river. The ecological vision provides a set of aspirations highlighting what good ecological status could look like for both rivers, following the removal of physical constraints and completion of restoration works. The broad ecological visions are presented in a separate document (Hyder Consulting 2012) which are available in draft from the Environment Agency upon request.

Following on from the ecological vision a detailed reach by reach restoration plan was proposed for each river, highlighting the key issues that are preventing the rivers from achieving good ecological status and making targeted recommendations for restoration. This report is a revised summary of the original draft restoration plan.

The Moors River System is an essentially natural system exhibiting an exceptionally diverse range of aquatic and wetland vegetation. On a local scale the river has, in the past, been modified to provide water for mills, trout lakes and for watercress cultivation. In the southern reaches of the river, below Verwood, discrete lengths have been dredged and realigned for agriculture, flood alleviation and urban drainage. In addition, until recently, weed cutting in the channel took place to increase drainage capacity. Proposed restoration measures for the Moors River System have focused more on management of adjacent habitats rather than extensive physical restoration of the river itself.

Although the Moors River is in need of restoration it should be remembered that it currently supports a diverse range of wildlife and the restoration measures proposed aim to build on the wealth of biodiversity that already exists. It should be noted that the ecological vision and the reach by reach restoration plans represent a ‘snapshot’ in time and that the baseline will alter over time.
Part 1: Background

Introduction

This report presents a detailed reach by reach restoration plan for the Moors River System in Dorset (Figure 1). It summarises the key issues that are preventing this river from achieving good ecological status and makes targeted recommendations for restoration.

For the purposes of the restoration plan the river was divided into a series of reaches varying in length from 1-4km and divided on the basis of the presence of physical structures such as weirs or bridges. The Moors River System was divided into 27 reaches (RM1 to RM27) to include the River Crane, Uddens Water, Mannington Brook and the Moors River. Of these reaches RM3 (part)-RM14 and RM25-RM27 are within the Moors River System SSSI. This restoration plan does not cover the Leadon Stour which also forms part of the SSSI.

![Map of the Moors River System](image)

Figure 1 Area covered by the River Restoration Plans for the Moors River System and the Middle and Lower Stour Restoration Plan.

Within each survey reach physical data was collected as a series of point data on a handheld GPS. The physical data collected include details on the following:

- Sources of sediment input to the river
- How sediment was being transported within the river
- How sediment was being deposited within the river
- Any physical modifications to the river channel
Any barriers to the movement of fish species within the river

The physical data was uploaded into Arc GIS to create a detailed geomorphological database the legend to which is shown in Figure 2. The outputs of the geomorphological database are included on the plans showing the restoration solutions proposed for each reach.

The walkover survey was high level and conducted during the winter period, when flows were relatively high, it is possible that there may have, in some areas, been more in-channel features present than were recorded. This will need to be taken into account when projects are being taken forward to ensure that restoration measures are targeted in the correct locations.

![Figure 2: Legend to show geomorphological symbols used on the reach maps](image)

**The need for ecological restoration**

The Moors River System is an essentially natural system exhibiting an exceptionally diverse range of aquatic and wetland vegetation. On a local scale the river has, in the past, been modified to provide water for mills, trout lakes and for watercress cultivation. In the southern reaches of the river, below Verwood, discrete lengths have been dredged and realigned for agriculture, flood alleviation and urban drainage. In addition, until recently, weed cutting in the channel took place to increase drainage capacity.
Solomon (1998) investigated and highlighted potential obstructions to fish migration, principally migratory trout and salmon, on the River Crane and the Mannington Brook and identified a number of barriers to fish movement.

A large part of the Moors River System is designated as a riverine Site of Special Scientific Interest (SSSI). The condition of all SSSIs in England, including the Moors River, is assessed by Natural England against site-specific Conservation Objectives. A SSSI unit is assessed to be in ‘favourable condition’ if the SSSI is being adequately conserved and is meeting its Conservation Objectives. In 2009 Natural England’s Condition Assessment identified all seven river SSSI units in the Moors River to be in an ‘unfavourable, no change’ condition, in part due to historical modifications that continue to degrade the river habitat in some parts.

The Government set a Public Service Agreement (PSA) target to bring into favourable or recovering condition 95% of the area of SSSIs in England by 2010, and later, through England’s biodiversity strategy, to have at least 50% of SSSIs in ‘favourable’ condition by 2020 as a contribution toward meeting international and European biodiversity commitments. The PSA target was very ambitious and instigated Natural England and the Environment Agency to work together to develop strategic long-term whole-river restoration plans. These plans set out actions to move the river towards a more natural, self-sustaining state that supports a greater diversity and abundance of characteristic wildlife. Further details on the special interest of the Moors River System SSSI are given in the site citation included in Appendix 1.

Although the Moors River has been recognised for its ecological value, it has been heavily modified over time for a variety of different reasons, agriculture and land management. The historical changes which have affected the river have impacted to some extent upon its ecological value.

Reach specific measures

The ecological condition and the natural functioning of the Moors River System could be improved through the implementation of various measures. This section outlines these, focussing on the aim of each, and how it could potentially be implemented.

Table 1 outlines these potential measures; this has been based partly on restoration options for lowland rivers suggested by Natural England (Mainstone, 2007), and informed by the walkover survey. These potential solutions have been grouped into the following broad categories: Adaptive Management; Physical Rehabilitation; Management of Control Structures; and Natural Processes.

<table>
<thead>
<tr>
<th>Adaptive Management</th>
<th>Description</th>
<th>Why and benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catchment Sensitive Farming Programme. Countryside Stewardship Scheme.</td>
<td>Entering adjacent land into the scheme to improve water quality and reduce the amount of diffuse pollution entering the river.</td>
<td>Promote an improvement in water quality and reduce the amount of diffuse pollution entering the river.</td>
</tr>
</tbody>
</table>

Table 1 Suggested Restoration Measures for the Moors River System. (The colour coding follows that on the Reach by Reach Restoration Plans in Part 2)
<table>
<thead>
<tr>
<th><strong>Reduced/modified channel maintenance operations,</strong></th>
<th>To promote natural recovery of form and function, particularly in respect of the seasonal encroachment of marginal vegetation, the establishment of woody debris in the channel and reducing over-capacity of channel.</th>
<th>Channel maintenance operations include management of marginal and riparian vegetation (e.g. cutting trees and branches), management of in-channel vegetation, management of large woody debris and log jams and the management of sediment. A reduction or cessation of such maintenance operations will increase the diversity of in-channel habitats and will allow the river to begin to recover from historical management and function more naturally. Maintenance work along the Moors River has changed in recent years, with the focus moving away from land drainage, ensuring flood water leaves agricultural land as quickly as possible, to a focus on routine maintenance ensuring that the Flood Alleviation Schemes (FAS) on the river function properly.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Riparian tree-planting</strong></td>
<td>In particular along stretches with no trees, to provide a beneficial mosaic of channel and riparian conditions, stabilise banks and enhance the introduction of woody debris into the channel.</td>
<td>Trees help to stabilise banks, increase channel diversity and enhance the long term supply of large woody debris to the channel. Shading from trees helps regulate river temperatures as well as providing cover for fish and invertebrates. In most cases, planting should be targeted, aiming to create a diverse mixture of shady and sunlit patches rather than continuous belts of trees. In some situations on the Moors River it would be advantageous to plant larger areas (up to 1ha) to create new riparian wet woodland, particularly if good floodplain connectivity could be also be achieved by bank re-profiling adjacent to the new planting.</td>
</tr>
<tr>
<td><strong>Riparian tree management</strong></td>
<td>In particular along stretches of mature dense riparian trees and shrubs that are preventing suitable amounts of light to penetrate and reducing in-channel vegetation growth.</td>
<td>Riparian trees are of considerable benefit, adding to the diversity of the river channel. Tree management involving felling, coppicing or pollarding of existing trees can aim to create a mixture of shady and sunlit patches. This type of management can be carried out on whole stands or individual trees. Where appropriate, the material produced from tree management operations should be added to the channel or pinned to the bank as a source of large woody debris, rather than removed.</td>
</tr>
<tr>
<td><strong>Livestock management</strong></td>
<td>To stabilise banks and reduce siltation and channel widening. Preferably through reducing stock densities or, if not possible, through fencing set-back from the channel to allow some channel movement with occasional grazing/cutting of vegetation as appropriate.</td>
<td>Stock grazing riparian vegetation can have positive biodiversity benefits by adding to the structural diversity of the riparian zone. In some cases intensive grazing has helped to re-profiling steep banks and creating marginal zone habitats adjacent to the river. However, intensive grazing can cause a number of problems and cause erosion of banks, suppression of riparian vegetation and reduction of fine sediment input to the river. Grazing should be controlled or managed in riparian zone.</td>
</tr>
<tr>
<td><strong>Floodplain wetland habitat creation,</strong></td>
<td>Increase and restore natural wetland habitat in the floodplain (for example, ponds, scrapes, marshy grassland and wet woodland).</td>
<td>This relates to the interaction between the river, its riparian habitat and wider floodplain habitats. Hydrological connectivity between the river and its floodplain, either through movement of the channel or floodplain inundation during flood flows, supports mosaics of different habitats which in turn provide conditions for characteristic water dependant plant and animal species.</td>
</tr>
<tr>
<td>Physical Rehabilitation</td>
<td></td>
<td></td>
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<tr>
<td>-------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Increase the diversity and relief of the river channel and bed,</strong></td>
<td>To improve the diversity of uniform stretches of river and create flow diversity to encourage the river to function in a more natural manner.</td>
<td>In some sections the river channel has been dredged or realigned creating a straight uniform channel, often trapezoidal in section, with a uniform flow regime. It would be appropriate to undertake measures to create diversity in the flow conditions, which in turn would encourage morphological and ecological diversity.</td>
</tr>
<tr>
<td><strong>Narrowing of over-wide channels,</strong></td>
<td>To improve habitat provision at low flows and improve hydrological connectivity with banks and floodplain, allowing the recreation of fen, carr and wet grassland communities. Large woody debris backfilled naturally with silt deposits is a good option.</td>
<td>Channel narrowing can be used to reduce the negative effects of historical dredging works and the over widening and deepening of the river channel. It involves the reduction of the cross sectional area of the channel whilst creating new habitats for aquatic and marginal species. Narrowing increases flow velocity, encouraging the removal of silt deposits from spawning areas by the scouring of gravels. In addition, narrowing can help create sinuosity in the channel, increasing the extent of habitat niches for aquatic plants and invertebrates. Soft, or so called bio/green engineering techniques, are particularly applicable to channel narrowing.</td>
</tr>
<tr>
<td><strong>Bank reprofiling</strong></td>
<td>To improve the hydrological transition zone, for the benefit of characteristic riparian plants such as brooklime, water speedwells, water-cress, water-mint and marsh woundwort.</td>
<td>In some places the river channel has been dredged in the past creating a trapezoidal channel. River banks can be reprofiled involving the use of heavy plant (excavators) to reduce their gradient and create a shallow marginal zone on the edge of the channel or create a two stage channel with a narrow ledge along the toe of the bank on which wetland vegetation can establish. Restoration should aim to reduce the angle of banks to 30° or less with shallow areas on the margins of the river to allow the establishment of vegetation and allow the river better connectivity with the floodplain.</td>
</tr>
<tr>
<td><strong>Re-meandering or meander reconnection</strong></td>
<td>To restore habitat length/area and improve flow, substrate and depth diversity, thereby providing improved habitat conditions to a wider range of fauna and flora.</td>
<td>A meandering river has a greater area and diversity of habitat conditions than a straight uniform channel. Much of the Moors River system would naturally exhibit a meandering plan form, but in places the channel has been straightened or re-sectioned. The river does have the potential for some lateral movement of the channel. Channel narrowing and the introduction of large woody debris will promote the natural processes which add sinuosity to the channel and initiate a natural process of meandering. In addition, in some places there are depressions marking the former existence of meanders and oxbows and along some sections of the floodplain there are derelict back channels. Where appropriate these features could be enhanced to provide small areas of backwater that would act as refuges for fish fry, particularly during periods of high flows and additional habitat for dragonflies. Opportunities to create wetland habitat such as ponds and scrapes in the floodplain should also be explored.</td>
</tr>
<tr>
<td><strong>Reinstatement of coarse bed material</strong></td>
<td>For the benefit of riffle-dwelling fish and invertebrates and improved hydrological connectivity with banks and floodplain, preferably using material reclaimed from the flood banks or</td>
<td>Historic operations along some parts of the Moors River system involved the removal of bed material to deepen the river and improve its conveyance. The removal of sediments, particularly gravel and other coarse substrates, can have a significant impact on the natural functioning of the river system. The reinstatement of coarse bed material can be achieved through importation of gravel or reclamation of material from dredged flood banks. Coarse</td>
</tr>
<tr>
<td><strong>Introduction of large woody debris and logjams.</strong></td>
<td>As part of bank re-profiling/channel narrowing or as hydrologically permeable log jams, to restore diversity of substrate and water depth/velocity. Note that the creation of logjams will be appropriate in headwaters where overbank flows are not an issue with large woody debris appropriate in more widespread situations.</td>
<td>The introduction of large woody debris, or allowing the natural introduction of wood from riparian trees, should be implemented where appropriate. Fallen trees and branches are a natural feature of river systems and affect the geomorphological processes, aiding the trapping of sediment, diversifying flows and helping to create sinuosity in the channel. In addition, large woody debris provides valuable cover for fish and invertebrate species. In places along the Moors River system berms and side bars of fine sediment exist which, in part, owe their creation due to the trapping of silt by the roots and branches of riparian trees. These berms and side bars support a range of wetland plant and invertebrate species as well as helping narrow the channel and diversify flow regimes. In all cases, introduced large woody debris will need to be securely pinned or keyed into the bank or bed of the river.</td>
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<tr>
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<tr>
<td><strong>Removal/set-back of flood banks</strong></td>
<td>To restore hydrological continuity with the floodplain, allowing the recreation of wet grassland communities, including breeding waders.</td>
<td>The walkover survey did not identify extensive lengths of flood embankments, these being limited to discrete lengths in locations prone to flooding. Removal or set back of flood banks will increase the frequency of flooding but will allow the land to drain more naturally. This restoration measure would deliver benefits by allowing the river better connection with its floodplain. Floodplain connectivity is important as it allows the development of riparian vegetation and wetland floodplain habitats and can offer flood storage benefits, such benefits are restricted if the river is constrained within its banks. If it is not possible to remove flood embankments it might be possible to set them back further from the edge of the river, creating a larger effective floodplain on either side of the river channel.</td>
</tr>
<tr>
<td><strong>Removal of physical bank protection especially “hard” engineered protection</strong></td>
<td>To restore hydrological continuity with the floodplain, allowing the recreation of wet grassland communities, including breeding waders.</td>
<td>In a few locations there is hard bank protection, normally comprising steel sheet piling or wood or stone revetment. Whilst effective at controlling erosion, this reduced river habitat diversity and potentially also flow diversity, both through physical change and disruption to river morphological processes. Protection does not allow for example the establishment of vegetation or the use of the banks by species such as water vole. Careful consideration has to be given before hard bank protection is removed to ensure no critical infrastructure, such as roads, are affected.</td>
</tr>
</tbody>
</table>
Management of Control Structures

| Removal/lowering of in-channel control structures | To re-establish river morphology and flow patterns and riparian bank habitats through natural river processes and allow free movement of fauna. | Control structures, such as weirs and hatches, should be subject to a detailed review and, if no longer required for flood risk management or other purposes, then serious consideration should be given to their removal. The long term aim should be to remove control structures to create a more natural pattern of flow and sediment movement whilst allowing the free passage of fish within the channel. The removal of such structures can provide significant benefits to the channel by restoring characteristic depths and velocities, removing siltation of spawning substrates and allowing free passage of fauna. Whilst the fitting of fish passes will ease the passage of fish this will not allow the natural functioning of the river to be restored. When considering the removal of a control structure it is vital to undertake a detailed assessment of the current function of the structure, the users that the structure is serving and the predicted geomorphological and physical impacts on the river of removing the structure. The decision making process as to whether or not a structure can be removed can be complex even for relatively minor structures. |

Natural Processes

| Natural Processes | To allow natural processes to occur over time with the minimum of intervention. For example, cessation of routine channel maintenance and allowing vegetation within the channel and on the banks to develop naturally. | Natural processes refer to the process of allowing a particular reach to develop naturally with little or no active management intervention. Natural processes are likely to be restricted to those reaches that exhibit a near natural state (or as close to this as is possible) and those reaches for which it is considered that active management intervention is not required, for example where there is an existing supply of large woody debris which will enter the channel or dynamic channel movement. |

These restoration measures identified may have potential flood risk implications. An increase in flood risk is not likely to preclude the use of any of the restoration suggestions, but it may restrict the restoration measures being implemented in sensitive locations. Particularly sensitive locations are likely to be within, or in close proximity to, existing Flood Alleviation Schemes (FAS) and where there is critical infrastructure in close proximity to the river. More detailed flood risk modelling and the implications that this has on the restoration measures that are implemented will need to be developed on a reach by reach basis. Further information on flooding is available from the Environment Agency website.

**Climate change**

It is beyond the remit of this report to comment in detail on the potential effects of climate change. However, it is worth noting that the restoration suggestions being made have the potential to increase the resilience of the Moors River System to the effects of climate change, as well as providing a number of additional benefits.
Reach by reach restoration plans

Following the completion of the desk- and field-based elements of this study, the geomorphological database and photographs collected were reviewed and restoration plans produced for each reach. The restoration plans highlight the issues which have been identified and that require addressing in order for that reach to achieve good ecological status and the potential restoration measures required in order to achieve this. The start and finish points of each reach are marked by red lines crossing the river.

The reach by reach restoration plans are set out in two parts:

- A form presenting key ecological and geomorphological features of each reach, identifying the key issues and suggesting appropriate restoration solutions
- A plan of the reach highlighting where restoration solutions should be implemented.

The restoration measures outlined for each river reach have been divided into two phases:

- Phase 1 – these are restoration measures that could be relatively easily achieved in the short- to medium-term, notwithstanding funding and other potential constraints.
- Phase 2 – Longer term options. This would include those restoration measures not so easily achieved in the short to medium term and would include current immovable constraints (such as gauging weir removal).

Where possible, each restoration measure has been quantified to enable broad costings to be estimated. These broad costings are only an indication of the scale of costs and should be treated as such. A report, published by the Environment Agency (Environment Agency, 2008) provides an estimate of the actual cost of implementing river restoration solutions as detailed indicative costs (£) per km length of river channel. This information has been used to provide cost estimates, as detailed in Appendix 2, for each restoration measure.

Monitoring

With any restoration project it is important to be able to demonstrate that the restoration solutions implemented have been beneficial to biodiversity and the natural functioning of the river. To indicate the level of success, monitoring needs to be an integral part of the project process, from inception right through to project completion and beyond. Sound project objectives, that can be measured, need to be defined from the start; the data collected and analysed can then collectively increase the knowledge base. This can then help identify what techniques, or suite of techniques, are most successful for the Moors River System and give confidence to project funders that the restoration solutions are appropriate and actually work.

The River Restoration Centre (2011) has published guidance on the establishment of programmes to monitor the success of river restoration programmes and this guidance should form the basis of any subsequent monitoring programme.
References

Mainstone C. (2007). Rationale for the physical restoration of the SSSI river series in England


The Wild Trout Trust the Chalk stream Habitat Manual (http://www.wildtrout.org/sites/default/files/library/1%20introduction.pdf)


River Restoration Centre (2011) Practical River Restoration Appraisal Guidance for Monitoring Options

The Natural Choice securing the value of nature. The natural environment white paper. Defra (2011)


Part 2: Reach by reach restoration plans
These reaches were not surveyed during the original walkover survey conducted by the consultants in December 2011/January 2012. Further survey will be undertaken to identify and develop appropriate restoration options to enable the SSSI to reach favourable condition. These restoration options are indicative only.

<table>
<thead>
<tr>
<th>River Moors- Survey Reach 1 (RM1)</th>
<th>The River Crane</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key Ecological and Geomorphology Features</strong></td>
<td>Access permission was not secured for this reach; therefore the commentary is based on an interpretation of aerial photographs and the Ordnance Survey map. From aerial photographs, this reach of the Moors River System appears to be a winterbourne and the plan form of the channel appears natural. The winterbourne corridor supports extensive riparian trees and scrub which may cast shade reducing the extent of riparian vegetation. The adjacent land use appears to be intensive arable or improved grassland.</td>
</tr>
</tbody>
</table>
| **Issues for Restoration & Management** | • There is no water quality monitoring on this part of the river. The issues on suspended solids and nitrogen levels identified in downstream units may be relevant  
• The surrounding land use is dominated by arable farmland and improved grassland and diffuse pollution and agricultural runoff is likely to be an issue. |
| **Restoration Suggestions** | **Quantitative estimate** |
| **Phase 1** | **Adaptive Management**  
  • Land use management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen.  
  • Livestock management– A reduction in stocking density or a rotational grazing system are options that could be considered in order to reduce grazing pressure and establish a more diverse and more extensive riparian flora. |
| Note insufficient information to identify further restoration measures that may be required |
Generic measures along whole reach

- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
- Try and ensure an extensive grazing regime on land adjacent to river.
These reaches were not surveyed during the original walkover survey conducted by the consultants in December 2011/January 2012. Further survey will be undertaken to identify and develop appropriate restoration options to enable the SSSI to reach favourable condition. These restoration options are indicative only.

<table>
<thead>
<tr>
<th>River Moors- Survey Reach 2 (RM2) The River Crane</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key Ecological and Geomorphology Features</strong></td>
</tr>
<tr>
<td>Access permission was not secured for this reach; therefore the commentary is based on an interpretation of aerial photographs and the Ordnance Survey map. From aerial photographs, this reach of the Moors River System appears to be a winterbourne and the plan form of the channel appears natural. The winterbourne corridor supports extensive riparian trees and scrub which may cast shade reducing the extent of riparian vegetation. The adjacent land use appears to be intensive arable or improved grassland.</td>
</tr>
<tr>
<td>The surrounding land use is dominated by arable farmland and improved.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Issues for Restoration &amp; Management</strong></th>
</tr>
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<td>• The surrounding land use is dominated by arable farmland and improved grassland and diffuse pollution and agricultural runoff is likely to be an issue.</td>
</tr>
</tbody>
</table>

| **Restoration Suggestions** |
| Phase 1 |

<table>
<thead>
<tr>
<th><strong>Adaptive Management</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Land use management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen</td>
</tr>
<tr>
<td>• Livestock management – A reduction in stocking density or a rotational grazing system are options that could be considered in order to reduce grazing pressure and establish a more diverse and more extensive riparian flora.</td>
</tr>
</tbody>
</table>

Note insufficient information to identify further restoration measures that may be required.
Generic measures along whole reach

- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff.
- Livestock management aim to ensure low intensity grazing adjacent to the river.
These reaches were not surveyed during the original walkover survey conducted by the consultants in December 2011/January 2012. Further survey will be undertaken to identify and develop appropriate restoration options to enable the SSSI to reach favourable condition. These restoration options are indicative only.

**River Moors-Survey Reach 3 (RM3) The River Crane**

**Key Ecological and Geomorphology Features**
Access permission was not secured for this reach; therefore the commentary is based on an interpretation of aerial photographs and the Ordnance Survey map. In addition, Natural England’s Condition Assessment of the Moors River System Site of Special Scientific Interest (SSSI) has been reviewed.

From aerial photographs, this reach of the Moors River System appears to be a winterbourne and the plan form of the channel appears relatively natural but becomes quite straight and uniform as it enters the village of Cranborne. The winterbourne corridor supports scattered riparian trees and scrub which may cast shade reducing the extent of riparian vegetation. The adjacent land use appears to be intensive arable or improved grassland. The surrounding land use is dominated by arable farmland and residential gardens in the village.

**Issues for Restoration & Management**
Natural England has indicated that this section of the Moors River System is in unfavourable condition as chalk stream winterbourne habitat (Magic, 2012). The reasons cited for this unfavourable condition being: Inappropriate scrub control, inappropriate weed control and inland flood defence works.

- There is no water quality monitoring on this part of the river. The issues on suspended solids and nitrogen levels identified in downstream units may be relevant and the winterbourne is vulnerable to localised poor water quality from piped drainage in Cranborne that discharges directly into the channel.
- Much of the watercourse is significantly channelized and there are sections of hard artificial bank protection in connection with development and residential use in the riparian zone and adjacent to the river corridor.
- Diffuse pollution and agricultural runoff likely to be an issue.
- The channel habitat structure is severely altered and simplified by extensive and intensive channel cutting and vegetation removal and bank side gardening, dumping and amenity practises.

**Restoration Suggestions**

**Quantitative estimate**

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Adaptive Management</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Education programme - For the residents of Cranborne to reduce the dumping of garden refuse in the river channel</td>
</tr>
<tr>
<td></td>
<td>Channel management – Reduce channel maintenance of vegetation to vary flows and therefore potentially allow more sinuosity and bank vegetation structure</td>
</tr>
<tr>
<td></td>
<td>Land use management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen</td>
</tr>
<tr>
<td></td>
<td>Note insufficient information to identify further restoration measures that may be required</td>
</tr>
</tbody>
</table>

| Up to 500m of bank vegetation enhancements and management measures |

<table>
<thead>
<tr>
<th>Physical rehabilitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove bank protection - Investigate potential to remove hard artificial bank protection, or if appropriate, replace with soft/bio engineering options such as willow spilling.</td>
</tr>
<tr>
<td>Increase diversity and relief of riverbed</td>
</tr>
</tbody>
</table>

| Up to 500m of channel bed restoration, and bank enhancements |
| Removal of 200m hard bank protection |
Note insufficient information to identify further restoration measures that may be required
Investigate potential to remove hard artificial bank protection within Cranborne, and if appropriate, replace with soft/bio engineering options.

**Generic measures along whole reach**

- Education programme for the residents of Cranborne to reduce the dumping of garden refuse in the river channel
- Channel management – Reduce in-channel maintenance of vegetation to vary flows and therefore potentially allow more sinuosity
- Ensuring adjacent catchment is included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff.
These reaches were not surveyed during the original walkover survey conducted by the consultants in December 2011/January 2012. Further survey will be undertaken to identify and develop appropriate restoration options to enable the SSSI to reach favourable condition. These restoration options are indicative only.

<table>
<thead>
<tr>
<th>River Moors- Survey Reach 4 (RM4) The River Crane</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key Ecological and Geomorphology Features</strong></td>
</tr>
<tr>
<td>Access permission was not secured for this reach; therefore the commentary is based on an interpretation of aerial photographs and the Ordnance Survey map. In addition, Natural England’s Condition Assessment of the Moors River System Site of Special Scientific Interest (SSSI) has been reviewed.</td>
</tr>
<tr>
<td>From aerial photographs, this reach of the Moors River System appears to be a chalk stream and the plan form of the channel appears relatively natural showing some sinuosity. The river corridor supports scattered riparian trees and scrub which may cast shade reducing the extent of riparian vegetation. The adjacent land use is grassland with arable farming in the wider catchment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Issues for Restoration &amp; Management</strong></th>
</tr>
</thead>
</table>
| Natural England indicate that this section of river SSSI (Unit 2) is close to being in favourable condition as a chalk stream type but have highlighted some potential issues (Magic, 2012):
  * Excessive shade cast by riparian trees
  * Possible issues of diffuse pollution and agricultural runoff. |

<table>
<thead>
<tr>
<th><strong>Restoration Suggestions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase 1</strong></td>
</tr>
<tr>
<td><strong>Adaptive Management</strong></td>
</tr>
<tr>
<td>Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora, to diversify vegetation structure and composition and create sunlit patches.</td>
</tr>
<tr>
<td>Land use management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen</td>
</tr>
<tr>
<td>Livestock management– A reduction in stocking density or a rotational grazing system are options that could be considered in order to reduce grazing pressure and establish a more diverse and more extensive riparian flora.</td>
</tr>
<tr>
<td>Note insufficient information to identify further restoration measures that may be required</td>
</tr>
<tr>
<td>Physical rehabilitation</td>
</tr>
<tr>
<td>Install large woody debris and log jams</td>
</tr>
</tbody>
</table>

| **Quantitative estimate** |
| Localised coppicing along 250m of channel length. |
| Install as appropriate along reach e.g. 250m |
Generic measures along whole reach

- Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora, to diversity vegetation structure and composition and create sunlit patches.
- Ensuring adjacent catchment is included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
- Adoption of an extensive grazing regime.
- Install large woody debris as appropriate
**River Moors- Survey Reach 5 (RM5) The River Crane**

### Key Ecological and Geomorphology Features

An almost wholly natural channel, but with significant impoundment of flows in the middle section due to a single sluice/weir.

Through this section the flow is dominated by shallow glides and riffles with the occasional deeper pool. Clean gravels are evident in riffles with fine sediment in areas of slower flow. In the middle section Edmonsham lakes weir causes significant impoundment of flows and ponding of water. This slows flows and results in an almost canal like section of water for approximately 500m upstream of the weir.

Bank side vegetation is dominated by riparian alder trees whilst the adjacent land use is a diverse mixture of alder carr and wet fen or marshy grassland. Where light reaches the river, emergent and aquatic vegetation are diverse. The Magic website indicates that this, Unit 2 of the SSSI is currently unfavourable no change. The reasons for the unfavourable condition being cited as: Inappropriate scrub control, inappropriate weirs dams and other structures, water pollution - agriculture/run off, water pollution – discharge.

### Issues for Restoration & Management

Natural England indicate that this section of river SSSI (Unit 2) is close to being in favourable condition as a chalk stream type but have highlighted some potential issues (Magic, 2012):

- Barriers to migratory fish and ponding of water caused by sluices
- Excessive shade cast by riparian trees
- Possible issues of diffuse pollution and agricultural runoff.

Issues noted by walkover survey:

- Sluice/weir causing ponding and impoundment of flows upstream for 500m
- A bridge with hatches that might act as a barrier to the movement of fish
- Extensive shade cast by riparian trees in some sections
- Some small quantities invasive Rhododendron noted on the banks

### Restoration Suggestions Phase 1

<table>
<thead>
<tr>
<th>Adaptive Management</th>
<th>Physical Rehabilitation</th>
<th>Managing Control Structures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora. This should be localised in discrete patches only aiming to create a mosaic of sunlit and shaded patches.</td>
<td>Install large woody debris to allow the formation of woody debris dams and diversify flow regimes</td>
<td>Removal or lowering of sluices – Investigate the three hatches and sluices highlighted by Solomon (1998) Holwell Lower Mill, Holwell Higher Mill and Edmonsham Lakes Weir. Aim to remove these structures to restore natural river function and remove barriers to fish movement. Further investigation may be required to determine the effects the geomorphological functioning associated with removal</td>
</tr>
<tr>
<td>Land use management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Quantitative estimate

- Localised coppicing along 1000m of channel length.
- Install large woody debris along a 250m length of channel.
- Removal of three structures.
Moors River Survey Reach 5 (RM5)

- Remove, lower or modify sluice
- Remove and treat Rhododendron
- Remove, lower or modify sluice

Install large woody debris to allow the formation of woody debris dams and diversify flow regimes. Target areas of glide flow with few existing sediment accretions

Generic measures along whole reach

- Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora, to diversity vegetation structure and composition and create sunlit patches.
- Ensuring adjacent catchment is included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
| Key Ecological and Geomorphology Features | An almost completely natural section, the river consists of a narrow sinuous channel with shallow graded banks dominated by shallow glide flow, numerous riffles and the occasional deeper pool. Extensive areas of gravel were evident on the river bed with some accumulations of fine silt in areas of slower flow. The banks supported regular riparian alder trees. Upstream of Romford Mill, the east side of the channel is fenced tight to the river bank; this has allowed riparian trees and scrub to develop as an almost continuous belt. Fencing is absent on the other bank resulting in more open banks with sunlit patches. Floodplain connectivity is good with alder carr and marshy grassland habitat present in the adjacent floodplain. At Romford Mill the sluices/weir may act as a barrier to the movement of fish and causes impoundment of water for a short distance. In the field adjacent to the mill is a dry meander indicating historical realignment of the channel. |
| Issues for Restoration & Management | Natural England indicate that this section of river SSSI (Unit 2) is close to being in favourable condition as a chalk stream type but have highlighted some potential issues (Magic, 2012):
  - Excessive shade cast by riparian trees
  - Possible issues of diffuse pollution and agricultural runoff.

Issues noted by walkover survey:
  - Sluices at Romford Mill causing a barrier to the movement of fish and ponding of water for 200m upstream
  - Extensive shade cast by riparian trees in some sections of the channel
  - Investigate the reconnection of historical meander to the channel to create marginal dead water and improve floodplain connectivity |
| Restoration Suggestions | Quantitative estimate |
| **Phase 1** | | |
| **Adaptive Management** | | |
|  - Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora. This should be localised in discrete patches only aiming to create a mosaic of sunlit and shaded patches.
  - Land use management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen | Aim for discrete coppicing along a 1000m length of channel |
| **Physical Rehabilitation** | | |
|  - Install large woody debris to allow the formation of woody debris dams | Reinstall one meander |
| **Managing Control Structures** | | |
|  - Removal or lowering of sluices – Aim to remove Romford Mill sluice to restore natural river function and remove barrier to fish movement. | Install large woody debris along a 250m channel length |
| | | Removal one sluice structure |
Moors River Survey Reach 6 (RM6)
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*Install large woody debris to diversify flow regimes. Target areas of glide flow with few existing sediment accretions.*

*Remove mill sluice*

**Generic measures along whole reach**

- Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora, to diversity vegetation structure and composition and create sunlit patches.
- Ensuring adjacent catchment is included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
### Key Ecological and Geomorphology Features

Access permission was not secured for this reach therefore the commentary is based on an interpretation of aerial photographs and the Ordnance Survey map. In addition Natural England’s Condition Assessment of the Moors River System Site of Special Scientific Interest (SSSI) has been reviewed. This reach is included within the Moors River System SSSI but in this location is designated for its fen, marsh and swamp habitat, and open water for dragonfly/damselfly species as opposed to its river habitat.

### Issues for Restoration & Management

Natural England indicate that this section of river SSSI (Unit 28) is in unfavourable condition with the main reasons for this being: Forestry and woodland management, water pollution – discharge (Magic, 2012). In addition, they have highlighted the following potential issues:

- The lakes margins and the former stream channel are densely shaded, in parts which should be managed to provide a diversity of light and shade conditions.
- The lakes contain much sediment and carpets of filamentous algae are frequent on both the bottom and surface, Nutrient levels and inputs require investigation
- Fish stocking of lakes needs to appropriate to the conservation of the special interest and avoid nutrient enrichment

### Restoration Suggestions

#### Phase 1

### Adaptive Management

- Riparian tree management – Management of riparian trees and scrub along to allow sufficient light to reach the channel and lake margins to benefit riparian flora, to diversity vegetation structure and composition and create sunlit patches
- Investigate nutrient input to the lakes 

Land use management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen.

Note insufficient information to identify further restoration measures that may be required

<table>
<thead>
<tr>
<th>Quantitative estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Localised along entire reach</td>
</tr>
</tbody>
</table>
Generic measures along whole reach

- Riparian tree management – management to allow sufficient light to reach the channel and lake margins to benefit riparian flora
- Investigate nutrient input to the lakes
- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
**River Moors - Survey Reach 8 (RM8) The River Crane**

### Key Ecological and Geomorphology Features

A diverse section of river with a sinuous meandering channel with flows dominated by riffles, glides and occasional deeper pools. Extensive areas of gravel are visible on the river bed with occasional silt deposits in areas of slower flow. Riparian trees are extensive in the upper and lower sections of the reach with the section through the golf course supporting fewer trees. In places the shade cast by the trees is restricting the establishment of a diverse riparian flora.

The management of the golf course greens is intensive with some artificial bank protection and little riparian vegetation present. A footbridge across the River Crane includes a small drop (identified as Doe hatch by Solomon, 1998) which may act as a barrier to the movement of some fish species. In addition the bridge at Bridge Farm had a small sill that may also obstruct fish movements during low flow conditions. Neither structure appeared to impound flows significantly.

### Issues for Restoration & Management

Natural England indicate that this section of river SSSI (Unit 3) is in unfavourable condition and highlight the following points (Magic, 2012):

- Possible issues of diffuse pollution and agricultural runoff
- In parts habitat quality of the riparian zone is limited by extensive and intensive grassland or cultivation. Changes to adjacent land management are required to increase the amount of more natural habitat and wetland features connected with the river.
- The vegetation both in the channel and on the banks achieves a very high quality, though on lengths densely shaded by a bank side fringe of mature trees the floristic diversity vegetation is reduced.

Issues identified during walkover survey:

- Lack of riparian vegetation along the golf course greens
- Artificial bank protection
- Bridge structures that may cause a barrier to migrating fish
- Shade cast by riparian alders trees along some sections of bank limiting the establishment of riparian flora

### Restoration Suggestions

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Quantitative estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adaptive Management</strong></td>
<td>Allow for discrete coppicing over a 1000m length of channel</td>
</tr>
<tr>
<td>- Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora, to diversity vegetation structure and composition and create sunlit patches</td>
<td></td>
</tr>
<tr>
<td>- Land management - Move the golf course back from the edge of the river to enable the development of a riparian buffer strip</td>
<td></td>
</tr>
<tr>
<td>- Land management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen.</td>
<td></td>
</tr>
<tr>
<td><strong>Physical Rehabilitation</strong></td>
<td></td>
</tr>
<tr>
<td>- Bank protection - Removal of artificial bank protection</td>
<td>Removal of 50m of bank protection</td>
</tr>
<tr>
<td>- Diversify channel morphology - Install large woody debris if no flood risk implications</td>
<td>Install large woody debris in discrete locations over a 250m length of channel</td>
</tr>
</tbody>
</table>
Generic measures along whole reach

- Riparian tree management – Removal or thinning of riparian conifers to allow sufficient light to reach the former channel to benefit riparian flora
- Move the golf course back from the river edge to allow a greater extent of riparian vegetation to establish
- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
River Moors - Survey Reach 9 (RM9) The River Crane

| Key Ecological and Geomorphology Features | This is an almost completely natural section of river with a sinuous channel. Flows are dominated by glides interspersed with riffle and pool sequences. Riparian trees are a feature of this reach and form an almost continuous corridor either side of the river, casting considerable shade. Adjacent land use is dominated by wet alder woodland (carr) or fen and marshy grassland which do not appear to have been grazed in the recent past. A sluice and side channel provide water for the Verwood Trout Farm (identified by Solomon 1998 as Trout farm inlet and sluice) and these causes a significant barrier to fish movement as well as impounding flows for a short distance. In this location the main river channel has been historically straightened or realigned. |

| Issues for Restoration & Management | Natural England indicate that this section of river SSSI (Unit 3) in unfavourable condition and highlight the following points (Magic, 2012):  
- Possible issues of diffuse pollution and agricultural runoff.  
- In parts habitat quality of the riparian zone is limited by extensive and intensive grassland or cultivation. Changes to adjacent land management are required to increase the amount of more natural habitat and wetland features connected with the river.  
- The vegetation both in the channel and on the banks achieves a very high quality, though on lengths densely shaded by a bankside fringe of mature trees the floristic diversity of vegetation can be reduced.  
Issues highlighted during walkover survey:  
- Barrier to fish movement and impoundment of water caused by sluices at Verwood Trout Farm  
- Straightening of channel associated with trout farm  
- Extent of riparian vegetation restricted by shade cast by riparian trees  
- Lack of grazing of adjacent marshy grassland and fen |

<table>
<thead>
<tr>
<th>Restoration Suggestions</th>
<th>Quantitative estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td></td>
</tr>
<tr>
<td>Adaptive Management</td>
<td>Allow for discrete coppicing along a 1000m length of channel</td>
</tr>
</tbody>
</table>
- Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora, to diversify vegetation structure and composition and create sunlit patches  
- Consider introduction of appropriate grazing regime for the adjacent marshy grassland and fen  
- Land management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen. |
| Physical rehabilitation | Install large woody debris in locations along 500m length of channel |
- Diversify channel morphology – Investigate the installation of large woody debris but only no significant flood risk |
| Managing Control Structures | Removal of two inlets / sluices |
- Removal or modification of Trout farm inlet and sluice |
Generic measures along whole reach

- Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian
- Consider introduction of appropriate grazing regime for the adjacent marshy grassland and fen
- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff

Install large woody debris to diversify flow regimes and encourage sinuosity. Target areas of glide flow with few existing sediment accretions

Removal or modification of Trout farm inlet and sluice

Removal or modification of Trout farm inlet and sluice

Install large woody debris to diversify flow regimes and encourage sinuosity. Target realigned channel.
### Key Ecological and Geomorphology Features

Set within an extensive country park, this reach is relatively natural, particularly in the upper and lower sections with a sinuous channel with numerous meanders. Flows are a mixture of glides, riffles and deeper pools but the flow velocity is somewhat slower than reaches further upstream. As a consequence, there are extensive fine sediment deposits, although gravels are still extensive on the river bed.

Within the middle section of the reach the channel is notably straighter and has been realigned. This may be in conjunction with the two large lakes (one of the lakes is in reach RM11) that act as a flood balancing facility with a brick built flume structure in the channel diverting flows into the lakes at times of high flows (In addition, there is a sluice structure at the northern end of the southern lake that may act as a barrier to the movement of fish (These were identified by Soloman1998 as Crane lake inlet, flume and outfall and Moors lake inlet, flume and outfall respectively). Despite possible historic straightening the in-channel morphology is relatively divers in comparison to the lower stretches of the river, there is also aquatic vegetation present.

The banks of the river are a mixture of short open sections with abundant riparian alders in other sections. The riparian alders are a source of coarse woody debris in the channel and are key in diverting flows and aiding the deposition of sediment and the creation of berms and side bars. The adjacent habitat is dominated by amenity grassland including a golf course, but there are fragmented areas of semi-natural wetland vegetation and connectivity with the surrounding floodplain is reasonable.

### Issues for Restoration & Management

Natural England indicate that: this section of river SSSI (Unit 4) is in unfavourable condition and highlight the following points (Magic, 2012):
- Possible issues of diffuse pollution and agricultural and urban runoff.
- An old sluice is a major problem to the upstream migration of fish (this is located and addressed in reach RM9).
- In parts habitat quality of the riparian zone is limited by extensive and intensive grassland cultivation. Changes to adjacent land management are required to increase the amount of more natural habitat and wetland features connected with the river.

The vegetation both in the channel and on the banks achieves a very high quality, though on lengths densely shaded by a bankside fringe of mature trees the floristic diversity of vegetation can be reduced.

Issues identified during walkover survey:
- Potential barrier to fish movement due to the brick flumes and hatches diverting water into the lakes
- Historical straightening and realignment of channel
- Riparian vegetation fragmented by amenity grassland
- Lack of marginal back waters
- Excessive shade caused by alder trees in the more wooded sections of channel.

### Restoration Suggestions

#### Phase 1

<table>
<thead>
<tr>
<th>Adaptive Management</th>
<th>Quantitative estimate</th>
<th>Phase 2</th>
<th>Quantitative estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Livestock management</strong> – Ensure a low intensity grazing regime. A reduction in stocking density or a rotational grazing system are options that could be considered in order to reduce grazing pressure and establish a more diverse and more extensive riparian flora. Allow livestock to breakdown steep, trapezoidal graded channel banks into stepped berms providing more structural bank diversity and more extensive habitat for wetland flora.</td>
<td>Allow for discrete coppicing along a 1000m length of channel</td>
<td>Managing Control Structures</td>
<td>Investigate and remediate 2 inlets and sluice</td>
</tr>
<tr>
<td><strong>Riparian tree management</strong> – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora, to diversity vegetation structure</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
- Land management - Consider relaxing of management of amenity grassland to expand the extent of riparian vegetation linking fragmentary patches together.
- Land management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen.  

<table>
<thead>
<tr>
<th>Physical Rehabilitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Increase channel morphology - Consider re-meandering of channel in the areas that have been straightened, or the introduction of flow deflectors (such as large pieces of coarse woody debris) to encourage more sinuosity in the channel.</td>
</tr>
</tbody>
</table>

install large woody debris in locations along 500m length of channel

Note this is a low priority
Generic measures along whole reach

- Riparian tree management – Localised discrete coppicing of riparian trees to benefit riparian flora
- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff

Install large woody debris to diversify flow regimes and encourage sinuosity. Target areas with little existing sediment accretion.

Consider relaxing of management of amenity grassland to expand the extent of riparian vegetation.
### River Moors- Survey Reach 11 (RM11) The Moors River

#### Key Ecological and Geomorphology Features

This reach is diverse with a number of side channels and backwaters and, as such, connectivity with the flood plain is considered to be good. The side channels supported ponded stretches of water and are often choked with vegetation. The main channel has been realigned in the past and is now quite straight, lacking the sinuosity and meanders that are evident elsewhere on the river. The central branch is approximately 5-7m wide and relatively active. Flows are dominated by long glides with the occasional riffle and pool. However, this reach does not show the same diversity of flow patterns as elsewhere on the river which may be a result of historical dredging works deepening the channel. Bed substrate is dominated by fine silt deposits lacking the gravels evident further upstream. The banks are relatively open with scattered riparian alders and as a consequence in-channel and riparian vegetation is more developed than on the more wooded section of the channel. The surrounding land use is stock grazed pasture and there is evidence of poaching on some sections of the banks but this does not appear to be excessive and adds some structural diversity to the riparian zone. However the grazing management should not become more intensive as this would suppress the development of riparian vegetation.

#### Issues for Restoration & Management

Natural England indicate that this section of river SSSI (Unit 5) is in unfavourable condition and highlight the following points (Magic, 2012):

- Issues of diffuse pollution and silt loading from urban, road and agricultural runoff.
- Much of the river section is modified, through past land drainage maintenance activities leaving a legacy of a simplified channel with a degraded habitat quality. Since cessation of these activities there is evidence of a natural recovering trend in channel habitat quality through river processes.
- Declining health and die-back of bank side alder acts to limit recovery in habitat quality, in some lengths the channel habitat almost devoid of woody growth and shade.
- Habitat quality of the bank side and riparian zone is limited by grassland cultivation. Restoration measures are required to achieve favourable condition, focusing on an increase and management of woody habitat features and changes to adjacent land management to increase more natural habitat and wetland features connected with the river

Issues identified during walkover survey:

- Historical realignment
- Lack of flow diversity evident elsewhere on the river
- The sill on Wool bridge may act as a barrier to fish movement during low flow conditions

#### Restoration Suggestions

**Phase 1**

**Adaptive Management**

- Livestock management – Ensure a low intensity grazing regime. A reduction in stocking density or a rotational grazing system are options that could be considered in order to reduce grazing pressure and establish a more diverse and more extensive riparian flora.
- Riparian tree planting – Additional tree planting to ensure a continued supply of coarse woody debris to the channel and create a mosaic of sunlit and shaded patches. Consider native species other than alder such as native black polar to reduce potential to spread alder disease
- Land management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen

**Quantitative estimate**

- Allow for up to 0.25ha additional localised tree planting
<table>
<thead>
<tr>
<th>Physical Rehabilitation</th>
<th>Allow for restoration along a 250m length of channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Increase channel morphology - Installing large woody debris to diversity flow regimes and encourage sinuosity in the channel</td>
<td></td>
</tr>
</tbody>
</table>
Install large woody debris to diversify flow regimes and encourage sinuosity. Target areas with little existing sediment accretion.

**Generic measures along whole reach**
- Livestock management – Ensure a low intensity grazing regime
- Additional riparian tree planting to ensure a continued supply of coarse woody debris to the channel
- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
**River Moors - Survey Reach 12 (RM12) The Moors River**

### Key Ecological and Geomorphology Features

Through the whole of this reach the river looks to have been re-aligned in the past and the flow is dominated by glide flow with an occasional riffle where coarse woody debris narrows the channel and diverts flow. The channel is split in two, the eastern branch being relatively active and the western branch more ponded. The western branch has a large culvert near the confluence to allow farm vehicle access. Floodplain connectivity is good with numerous ditches and other features linked to the main channel. The banks are generally open with the occasional riparian tree with exposed roots, fallen trees and overhanging branches impeding flow in places creating some diversity in the channel. River banks are poached along both channels. The surrounding land use is dominated by improved pasture with grazing right up to the banks of the river. Grazing pressure may be suppressing the extent and development of riparian vegetation, but the survey was undertaken at an inappropriate time of year to fully assess.

The disused railway bridge (identified by Solomon 1998 as railway bridge sill) at the southern end of the reach has a small sill (10cm) on the pad beneath the bridge that may act as a barrier to the movement of some fish species during periods of low flow.

### Issues for Restoration & Management

Natural England indicate that this section of river SSSI (Unit 5) is in unfavourable condition and highlight the following points (Magic, 2012):

- Issues of diffuse pollution and silt loading from urban, road and agricultural runoff.
- Much of the river section is modified, through past land drainage maintenance activities leaving a legacy of a simplified channel with a degraded habitat quality. Since cessation of these activities there is evidence of a natural recovering trend in channel habitat quality through river processes.
- Declining health and die-back of bank side alder acts to limit recovery in habitat quality, in some lengths the channel habitat almost devoid of woody growth and shade.
- Habitat quality of the bank side and riparian zone is limited by grassland cultivation. Restoration measures are required to achieve favourable condition, focusing on an increase and management of woody habitat features and changes to adjacent land management to increase more natural habitat and wetland features connected with the river.

Issues highlighted by walkover survey:

- Realigned and straightened channel
- Paucity of riparian trees and coarse woody debris in channel
- Intensity of surrounding agricultural land use and extent of riparian vegetation
- Potential barrier to fish movement caused by railway bridge

### Restoration Suggestions

#### Phase 1

<table>
<thead>
<tr>
<th>Adaptive Management</th>
<th>Physical Rehabilitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allow for up to 0.25ha additional tree planting</td>
<td>Allow for restoration along a 250m length of channel</td>
</tr>
<tr>
<td>Livestock management – Ensure a low intensity grazing regime, A reduction in stocking density or a rotational grazing system are options that could be considered in order to reduce grazing pressure and establish a more diverse and more extensive riparian flora. Allow livestock to breakdown steep, trapezoidal graded channel banks into stepped berms providing more structural bank diversity and more extensive habitat for wetland flora.</td>
<td>Increase channel morphology - Installing large woody debris to diversity flow regimes and encourage sinuosity in the channel</td>
</tr>
<tr>
<td>Riparian tree planting – Additional tree planting to ensure a continued supply of coarse woody debris to the channel and create a mosaic of sunlit and shaded patches. Consider native species other than alder such as native black polar to reduce potential to spread alder disease</td>
<td></td>
</tr>
<tr>
<td>Land management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen</td>
<td></td>
</tr>
</tbody>
</table>

Quantitative estimate
Install large woody debris to diversify flow regimes and encourage sinuosity. Target areas with little existing sediment accretion.

**Generic measures along whole reach**
- Livestock management – Ensure a low intensity grazing regime with cattle creating additional bank structural diversity
- Additional riparian tree planting to ensure a continued supply of coarse woody debris to the channel
- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
River Moors - Survey Reach 13 (RM13) The Moors River

### Key Ecological and Geomorphology Features
Due to a lack of landowner access only a proportion of this reach was surveyed. The northern section of this reach appears relatively unmodified with a sinuous channel. The southern section, downstream from Oakhill Farm is quite straight and is likely to have been historically realigned and dredged. Flows are dominated by glide flow and the flow velocity is relatively low with numerous fine silt deposits.

The banks are fenced and support a narrow width of riparian vegetation and the occasional riparian alder, but for the most part are open. Extensive riparian Common Reed is present in the southern section of the reach before the A31 crossing. Surrounding land use is dominated by pasture which is less agriculturally improved in the southern portion of the reach. Extensive areas of conifer plantation and lowland heath land are present outside of the immediate floodplain.

### Issues for Restoration & Management
Natural England indicate that this section of river SSSI (Unit 5) is in unfavourable condition and highlight the following points (Magic, 2012):
- Issues of diffuse pollution and silt loading from urban, road and agricultural runoff.
- Much of the river section is modified, through past land drainage maintenance activities leaving a legacy of a simplified channel with a degraded habitat quality. Since cessation of these activities there is evidence of a natural recovering trend in channel habitat quality through river processes.
- Declining health and die-back of bank side alder acts to limit recovery in habitat quality, in some lengths the channel habitat almost devoid of woody growth and shade.
- Habitat quality of the bank side and riparian zone is limited by grassland cultivation. Restoration measures are required to achieve favourable condition, focusing on an increase and management of woody habitat features and changes to adjacent land management to increase more natural habitat and wetland features connected with the river.

Issues highlighted by walkover survey:
- Narrow width of riparian vegetation in central area
- Lack of riparian trees with associated coarse woody debris
- Agricultural improvement of some of the adjacent grasslands
- Historical channel re-alignment

### Restoration Suggestions
**Phase 1**

#### Adaptive Management
- Livestock management – Ensure a low intensity grazing regime. A reduction in stocking density or a rotational grazing system are options that could be considered in order to reduce grazing pressure and establish a more diverse and more extensive riparian flora. Allow livestock to breakdown steep, trapezoidal graded channel banks into stepped berms providing more structural bank diversity and more extensive habitat for wetland flora.
- Riparian tree planting – Additional tree planting to ensure a continued supply of coarse woody debris to the channel and create a mosaic of sunlit and shaded patches. Consider native species other than alder such as native black polar to reduce potential to spread alder disease.
- Land management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen.

Note insufficient information to identify further restoration measures that may be required.

#### Physical Rehabilitation
- Increase channel morphology - Installing large woody debris to diversity flow regimes and encourage sinuosity in the channel.

Note insufficient information to identify further restoration measures that may be required.

**Quantitative estimate**
- Allow for up to 0.25ha additional tree planting.
- Allow for restoration along a 500m length of channel.
Install large woody debris to diversify flow regimes and encourage sinuosity. Target areas with little existing sediment accretion.

Install large woody debris to diversify flow regimes and encourage sinuosity.

Generic measures along whole reach
- Livestock management – Ensure a low intensity grazing regime using stock to diversify bank structure
- Additional riparian tree planting to ensure a continued supply of coarse woody debris to the channel
- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
**River Moors- Survey Reach 14 (RM14) The Moors River**

### Key Ecological and Geomorphology Features

This is a natural section of river situated in the middle of the floodplain, although it is likely to have been heavily dredged in the past. The reach is largely through improved pasture although there are three large caravan parks located just outside the floodplain. The channel is extremely sinuous with scattered riparian trees adding woody debris to the channel. This section has extensive riparian aquatic and emergent vegetation. The flow is varied, glides are caused where vegetation and silt banks narrow the flow, and there are short discrete ponded sections caused by woody debris. Floodplain connectivity is good, in parts, with some back channels and ditches. Downstream of the Water Treatment Works the adjacent fields are grazed by horses this appears quite intensive, reducing the extent of riparian vegetation.

### Issues for Restoration & Management

Natural England indicate that this section of river SSSI (Unit 5) is in unfavourable condition and highlight the following points (Magic, 2012):

- Issues of diffuse pollution and silt loading from urban, road and agricultural runoff.
- Much of the river section is modified, through past land drainage maintenance activities leaving a legacy of a simplified channel with a degraded habitat quality. Since cessation of these activities there is evidence of a natural recovering trend in channel habitat quality through river processes.
- Declining health and die-back of bank side alder acts to limit recovery in habitat quality, in some lengths the channel habitat almost devoid of woody growth and shade.
- Habitat quality of the bank side and riparian zone is limited by grassland cultivation. Restoration measures are required to achieve favourable condition, focusing on an increase and management of woody habitat features and changes to adjacent land management to increase more natural habitat and wetland features connected with the river.

Issues highlighted by walkover survey:

- Intensive horse grazing of some fields restricting extent of riparian vegetation
- Agriculturally improved nature of the surrounding pasture; agricultural runoff may be an issue

### Restoration Suggestions

#### Phase 1

<table>
<thead>
<tr>
<th>Adaptive Management</th>
<th>Physical Rehabilitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Livestock management – Ensure a low intensity grazing regime, A reduction in stocking density or a rotational grazing system are options that could be considered in order to reduce grazing pressure and establish a more diverse and more extensive riparian flora. Allow livestock to breakdown steep, trapezoidal graded channel banks into stepped berms providing more structural bank diversity and more extensive habitat for wetland flora</td>
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</tr>
<tr>
<td>Land management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen</td>
<td></td>
</tr>
</tbody>
</table>

**Quantitative estimate**

- Allow for up to 0.25ha additional tree planting
- Allow for restoration along a 500m length of channel
Install large woody debris to diversify flow regimes and encourage sinuosity. Target areas with little existing sediment accretion.

Install large woody debris to diversify flow regimes and encourage sinuosity.

Generic measures along whole reach
- Livestock management – Ensure a low intensity grazing regime using stock to diversify bank structure
- Additional riparian tree planting to ensure a continued supply of coarse woody debris to the channel
- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
### Key Ecological and Geomorphology Features

A relatively uniform stretch of Uddens Brook sandwiched in a riparian wooded corridor between the A31 and the west moors conurbation. The channel has been realigned and subject to regular maintenance to remove flood debris and other obstructions to flow particularly before flowing underneath the A31 bridge which has a low capacity. Flows are dominated by glide flow, and there are extensive deposits of iron rich silt in the channel due to the heathland that is drained by the Uddens Water.

This reach is extensively wooded on the southern side which has restricted the extent of riparian vegetation.

### Issues for Restoration & Management

- Heavily maintained channel
- Uniform channel with few in channel features
- Excessive shade/lack in riparian vegetation
- Lack of coarse woody debris and in-channel features

### Restoration Suggestions

#### Phase 1

**Adaptive Management**

- Channel maintenance - Reduce in channel maintenance if possible and in channel vegetation to develop and if possible large woody debris should be retained.
- Riparian tree management - Localised discrete coppicing of riparian trees to allow more light to reach the channel and aid the establishment of riparian vegetation.

<table>
<thead>
<tr>
<th>Quantitative estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discrete coppicing along a 250m length</td>
</tr>
</tbody>
</table>
Generic measures along whole reach

- Reduce in channel allow in channel vegetation to develop and if possible large woody debris should be retained.
- Localised discrete coppicing of riparian trees to allow more light to reach the channel and aid the establishment of riparian vegetation
River Moors - Survey Reach 16 (RM16) Uddens Water and lower portion of the Mannington Brook

| Key Ecological and Geomorphology Features | The reach includes a short section of the Uddens Water and then a section of the Mannington Brook tributary. It is a relatively natural stretch exhibiting a typical pool and riffle sequence. The riparian corridor is wooded with a large number of mature trees contributing coarse woody debris to the channel, adding diversity to the flow regime and aiding the trapping of sediment. The bed substrate is dominated by fine silt deposits but there are gravel deposits in the faster sections of riffled flow. The disused railway bridge at the northern end of the reach has a small sill. East Dorset Council manages a linear nature reserve along much of the length of this reach. |

| Issues for Restoration & Management | No major issues identified |

<table>
<thead>
<tr>
<th>Restoration Suggestions</th>
<th>Phase 1</th>
<th>Quantitative estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptive Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Land management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Natural Processes | | |
| • Allow the reach to continue to develop naturally. | | |
Moors River Survey Reach 16 (RM16)

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0 500m

Generic measures along whole reach
- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff

Allow reach to develop naturally with minimum management intervention
River Moors - Survey Reach 17 (RM17) The Mannington Brook

<table>
<thead>
<tr>
<th>Key Ecological and Geomorphology Features</th>
<th>Due to a lack of landowner access only a proportion of this reach was surveyed. This is a relatively natural reach of the Mannington Brook upstream from the confluence with the Uddens water. The channel is highly sinuous with numerous tight meanders. Flow regime is dominated by a series of riffles and pools. Riparian trees are extensive contributing large amounts of coarse woody debris to the channel which diversifies the flow regime. Bed substrates are dominated by silts with gravels in faster reaches of flow. Some limited bank protection was evident in the southern section and an obstruction in the channel was noted that may obstruct passage by fish during low flows. Connectivity to the floodplain was reasonable with a number of ditches and wetland areas close to the river. Surrounding land use includes wet alder woodland and marshy grassland.</th>
</tr>
</thead>
</table>
| Issues for Restoration & Management | • Artificial bank protection  
• Potential barrier to migrating fish due to an obstruction in the channel  
• Shade cast by riparian trees may be limiting the establishment of riparian vegetation |
| Restoration Suggestions | Quantitative estimate |
| Phase 1 | Adaptive Management  
• Riparian tree management - Localised discrete coppicing of riparian trees to allow more light to reach the channel and aid the establishment of riparian vegetation  
• Land management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen  
Note insufficient information to identify further restoration measures that may be required  
Discrete coppicing along a 1000m length of channel |
| Managing Control Structures | Removal of one minor obstruction  
Investigate if obstruction poses a barrier to the movement of certain species of fish (for example bullhead) and remove it.  
Note insufficient information to identify further restoration measures that may be required  
Removal or replacement hard bank protection along a 100m length |
| Physical rehabilitation | Removal or replacement hard bank protection along a 100m length  
• Bank protection - Consider replacement of artificial bank protection with green/bio engineering alternative such as willow spilling  
Note insufficient information to identify further restoration measures that may be required |
Moors River Survey Reach 17 (RM17)
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**Generic measures along whole reach**
- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
- Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora

- Remove barrier to fish movement in channel
- Removal of artificial bank protection and replacement with soft/bio engineering options
### River Moors - Survey Reach 18 (RM18) The Mannington Brook

#### Key Ecological and Geomorphology Features

Access permission was not secured for this reach; therefore the commentary is based on an interpretation of aerial photographs and the Ordnance Survey map.

This section forms the middle reaches of the Mannington Brook.

From aerial photographs this section would appear to be relatively natural.

For the majority of the reach the channel is sinuous, whilst other sections are straight and potentially re-aligned. Riparian trees are prominent features of the river channel acting as a source of coarse woody debris and adding diversity. The surrounding land use appears to be improved grassland with areas of heath land in the wider floodplain.

Solomon (1998) Identified a hatch at Mannington farm but this was derelict and not considered to pose a barrier to fish passage.

#### Issues for Restoration & Management

- Channel realignment in southern section of reach
- Shade cast by riparian trees may reduce the extent of riparian vegetation

#### Restoration Suggestions

**Phase 1**

**Adaptive Management**
- Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora, diversify vegetation structure and composition and create sunlit patches.
- Land management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen

Note insufficient information to identify further restoration measures that may be required

**Physical Rehabilitation**
- Increase channel morphology - Install large woody debris to diversity flow regime and encourage channel sinuosity

Note insufficient information to identify further restoration measures that may be required

**Quantitative estimate**

- Discrete coppicing along a 1000m length of channel
- Allow for restoration along a 250m length of channel
Generic measures along whole reach

- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
- Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora

Install large woody debris to diversify flow regimes and encourage sinuosity. Target areas of realigned channel.
**River Moors - Survey Reach 19 (RM19) The Mannington Brook**

### Key Ecological and Geomorphology Features

Access permission was not secured for this reach; therefore the commentary is based on an interpretation of aerial photographs and the Ordnance Survey map.

This section forms the middle reaches of the Mannington Brook.

From aerial photographs this section would appear to be relatively natural. For the majority of the reach the channel is sinuous, whilst other sections are straight and potentially re aligned. Riparian trees are prominent features of the river channel acting as a source of coarse woody debris and adding diversity. The surrounding land use appears to be improved grassland with areas of heath land in the wider floodplain.

Solomon (1988) identified two amenity weirs at Mannington Farm that may pose a barrier to the movement of fish species such as bullhead.

### Issues for Restoration & Management

- Channel realignment in southern section of reach
- Shade cast by riparian trees may reduce the extent of riparian vegetation
- Potential barrier to fish movement from weirs at Mannington Farm

### Restoration Suggestions

#### Phase 1

#### Quantitative estimate

<table>
<thead>
<tr>
<th>Adaptive Management</th>
<th>Physical Rehabilitation</th>
<th>Managing control structures</th>
</tr>
</thead>
</table>
| • Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora, diversify vegetation structure and composition and create sunlit patches.  
• Land management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen.  
Note insufficient information to identify further restoration measures that may be required. | • Increase channel morphology - Install large woody debris to diversity flow regime and encourage channel sinuosity  
Note insufficient information to identify further restoration measures that may be required. | • Investigate if the weirs at Mannington Farm are a barrier to fish movement and determine appropriate remediation measures  
Note insufficient information to identify further restoration measures that may be required. |

Discrete coppicing along a 1000m length of channel  
Allow for restoration along a 250m length of channel  
Removal or modification to two structures
Generic measures along whole reach

- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
- Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora.

Install large woody debris to diversify flow regimes and encourage sinuosity. Target areas of realigned channel.

Investigate if the weirs at Mannington Farm are a barrier to fish movement and determine appropriate remediation measures.
### River Moors - Survey Reach 20 (RM20) The Mannington Brook

#### Key Ecological and Geomorphology Features
Access permission was not secured for all of this reach; therefore the commentary is partly based on an interpretation of aerial photographs and the Ordnance Survey map.

This section forms the upper reaches of the Mannington Brook, here it is split into two channels the western one being subject to survey.

The western section consists of a small narrow channel (2-3m wide) which has been artificially straightened and dredged. In some sections riparian vegetation is abundant whilst in other sections a hedge along one side of the channel casts shade restricting the establishment of vegetation.

From aerial photographs the eastern channel also appears to be straight in sections whilst the northern end of the reach is more natural.

The bridge at Holt Lodge farm consists of a pipe with a sill approximately 10cm high that may pose a barrier to fish movement during times of low flow.

#### Issues for Restoration & Management
- Over straight uniform channel
- Lack of riparian vegetation in some sections
- Potential barrier to fish migration at Holt Lodge Farm Bridge.

#### Restoration Suggestions

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Quantitative estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adaptive Management</strong></td>
<td>Discrete coppicing along a 1000m length of channel</td>
</tr>
<tr>
<td>- Riparian tree management – Localised discrete coppicing of riparian trees / hedges to allow sufficient light to reach the channel to benefit riparian flora, to diversity vegetation structure and composition and create sunlit patches.</td>
<td></td>
</tr>
<tr>
<td>- Land management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen</td>
<td></td>
</tr>
<tr>
<td>Note insufficient information to identify further restoration measures that may be required</td>
<td></td>
</tr>
<tr>
<td><strong>Physical Rehabilitation</strong></td>
<td>Allow for restoration along a 500m length of channel</td>
</tr>
<tr>
<td>o Diversify channel morphology - Install large woody debris to diversity flow regime and encourage channel sinuosity</td>
<td></td>
</tr>
<tr>
<td>Note insufficient information to identify further restoration measures that may be required</td>
<td></td>
</tr>
<tr>
<td><strong>Managing control structures</strong></td>
<td>Modification to one minor structure</td>
</tr>
<tr>
<td>Investigate if the bridge at Holt Lodge farm is a barrier to fish movement and determine appropriate remediation measures. Note insufficient information to identify further restoration measures that may be required</td>
<td></td>
</tr>
</tbody>
</table>
Generic measures along whole reach

- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
- Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora

Install large woody debris to diversify flow regimes and encourage sinuosity. Target areas of realigned channel

Investigate if the Bridge at Holt Lodge Farm is a barrier to fish movement and determine appropriate remediation measures
### Key Ecological and Geomorphology Features
Access permission was not secured for all of this reach; therefore the commentary is partly based on an interpretation of aerial photographs and the Ordnance Survey map.

The section through Queens Copse is a very small channel (less than 1m wide) which exhibits a diverse natural pool and riffle sequence. The woodland of Queens Copse is dominated by conifers but there is large buffer of semi natural woodland including wet woodland either side of the brook. The section of the reach to the west of the copse appears to have been artificially straightened.

The section through Queens Copse should be allowed to continue to develop naturally.

### Issues for Restoration & Management
- No issues identified

### Restoration Suggestions
**Phase 1**

<table>
<thead>
<tr>
<th>Natural Processes</th>
<th>Quantitative estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allow to develop naturally</td>
<td></td>
</tr>
</tbody>
</table>

Note insufficient information to identify further restoration measures that may be required.
Allow reach to develop naturally with minimum intervention
| Key Ecological and Geomorphology Features | Access permission was not secured for this reach; therefore the commentary is based on an interpretation of aerial photographs and the Ordnance Survey map.  
This reach forms part of the Uddens Water. From aerial photographs this section would appear to be relatively natural with a sinuous channel. Riparian trees are prominent features of the river channel acting as a source of coarse woody debris and adding diversity. The surrounding land use appears to be improved grassland with areas of heathland and coniferous woodland in the wider floodplain. |
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Issues for Restoration &amp; Management</td>
<td>Potential for riparian trees to cast excessive shade restricting the establishment of riparian vegetation</td>
</tr>
<tr>
<td>Restoration Suggestions Phase 1</td>
<td>Quantitative estimate</td>
</tr>
<tr>
<td>Adaptive Management</td>
<td>Allow for discrete coppicing along a 1000m length of channel</td>
</tr>
</tbody>
</table>
| • Riparian tree management – Localised discrete coppicing of riparian trees / hedges to allow sufficient light to reach the channel to benefit riparian flora, to diversity vegetation structure and composition and create sunlit patches 
• Land management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen. Note insufficient information to identify further restoration measures that may be required |
Generic measures along whole reach
- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
- Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora.
| Key Ecological and Geomorphology Features | This reach consists of a short section of the side channel of the Uddens Water along the Castleman Tramway. This is a relatively straight section of channel that may have historically been realigned to drain the tramway but now is a small stream (less than 1m wide) exhibiting a diverse pool and riffle sequence. Surrounding land use is broadleaved woodland and the channel supports a diverse quantity of coarse woody debris. Coarse woody debris is naturally present and this in time may allow the channel to develop some sinuosity. |
| Issues for Restoration & Management | No issues identified |
| Restoration Suggestions | Phase 1 |
| Natural Processes | Allow to develop naturally with minimal intervention |
| | Note insufficient information to identify further restoration measures that may be required |
| | Quantitative estimate |
Allow reach to develop naturally with minimal intervention
| **River Moors- Survey Reach 24 (RM24) Uddens Water** |
| **Date Surveyed- 11/01/2012** |

**Key Ecological and Geomorphology Features**

Access permission was not secured for this reach; therefore the commentary is based on an interpretation of aerial photographs and the Ordnance Survey map.

This reach forms part of the Uddens Water. From aerial photographs this section would appear to be relatively natural with a sinuous channel. Riparian trees are prominent features of the river channel acting as a source of coarse woody debris and adding diversity. The surrounding land use appears to be improved grassland with areas of heath land and coniferous woodland in the wider floodplain.

**Issues for Restoration & Management**

- Riparian trees may cause shade suppressing riparian vegetation establishment

**Restoration Suggestions**

**Phase 1**

<table>
<thead>
<tr>
<th><strong>Adaptive Management</strong></th>
<th><strong>Quantitative estimate</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora, to diversity vegetation structure and composition and create sunlit patches</td>
<td></td>
</tr>
<tr>
<td>- Land management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen.</td>
<td></td>
</tr>
<tr>
<td>Note insufficient information to identify further restoration measures that may be required</td>
<td>Allow for discrete coppicing along a 1000m length of channel</td>
</tr>
</tbody>
</table>
Generic measures along whole reach

- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
- Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora
**River Moors- Survey Reach 25 (RM25) Moors River**

### Key Ecological and Geomorphology Features

A largely natural reach of river performing in a ‘natural’ manner, eroding and creating its own channel with a series of tight meanders and oxbows. Extensive riparian trees and coarse woody debris help to add to the diversity and large log jams cause ponding and slowing of flows. Extensive areas of silt deposition in the form of side berms are present. Connectivity with the floodplain is good with numerous back channels and oxbows. The adjacent grassland appears to be species rich supporting fen and marshy grassland and there are areas of extensive alder and willow wet woodland (carr) in the floodplain. The grassland areas are used for low intensity stock grazing although grazing is quite intensive around Fir Grove Farm.

### Issues for Restoration & Management

Natural England indicate that this section of river SSSI (Unit 7) is in unfavourable condition and highlight the following points (Magic, 2012):

- Issues of diffuse pollution from urban, road and agricultural runoff.
- The river is significantly modified in parts through past land drainage maintenance activities leaving a legacy of a simplified channel with a degraded habitat quality. Since cessation of these activities there is evidence of a natural recovering trend in channel habitat quality through river processes.
- A widespread die-back and death of bank side alder acts to limit recovery in habitat quality and on some lengths the channel habitat has become almost devoid of woody growth and shade.
- By contrast parts of the west bank support dense riparian woodland which is shading much of the bank to the detriment of dragonfly and river plant assemblages.
- Habitat quality of the bank side and riparian zone is limited by extensive and in places intensive grassland cultivation.
- The invasive plant Indian balsam has a localised presence and requires management control
- Some restoration measures are required to achieve favourable condition, focusing on an increase of woody habitat features and changes to adjacent land management to increase the amount of more natural habitat and wetland features connected with the river.

The walk over survey identified the following issues:

- A lack or riparian trees in some sections
- Extensive shading by trees on the west bank
- Intensive grazing in the vicinity of Fir Grove Farm

### Restoration Suggestions

#### Phase 1

<table>
<thead>
<tr>
<th>Adaptive Management</th>
<th>Quantitative estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riparian tree management – Localised coppicing and pollarding of riparian trees and willow scrub to allow sufficient light to reach the channel to benefit riparian flora, to diversity vegetation structure and composition and create sunlit patches</td>
<td>Allow for up to 0.25ha additional tree planting</td>
</tr>
<tr>
<td>Land management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen</td>
<td>Allow for pollarding and coppicing along a 500m length</td>
</tr>
<tr>
<td>Livestock management – Ensure a low intensity grazing regime, A reduction in stocking density or a rotational grazing system are options that could be considered in order to reduce grazing pressure and establish a more diverse and more extensive riparian flora.</td>
<td></td>
</tr>
<tr>
<td>Riparian tree planting – Additional small scale tree planting to ensure a continued supply of coarse woody debris to the channel and create a mosaic of sunlit and shaded patches. Consider native species other than alder such as native black polar to reduce potential to spread alder disease</td>
<td></td>
</tr>
<tr>
<td>Invasive plants - Investigate control of Indian Balsam (see Return of the Natives initiative in main document)</td>
<td></td>
</tr>
</tbody>
</table>

**Physical Rehabilitation**

Aim to restore up to 250m of channel length
|   | Diversify channel morphology - Install large woody debris to diversity flow regime and encourage channel sinuosity, and removal, through the action of the river channel movement, bankside spoil and levees |   |
Install large woody debris to diversify flow regimes and encourage sinuosity. Target areas where these features are not present.

Generic measures along whole reach
- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
- Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora
- Small scale riparian tree planting to increase supply of large woody debris. Target west bank of river.
- Instigate control of Indian Balsam (see Return of the Natives initiative in main document)
- Ensure a low intensity grazing regime, A reduction in stocking density or a rotational grazing system
### Key Ecological and Geomorphology Features

A largely natural section of river. Species-rich meadows/ fen and wet woodland adjacent to the river. Large quantities of large woody debris (large log debris jams) modify the flow creating large sections of ponded flow adding to the diversity of the in-channel habitat. Initially dense riparian wet woodland grades into heath, reed bed and sedge bed (opposite runway of the airport). This then leads on to an intimate mosaic of fen meadows with extensive riparian trees (with wet woodland almost continuous on the right hand bank) with wet ditches and back channels. The shading cast by the riparian trees is limiting the abundance and extent of riparian in-channel vegetation. Dense beds of nettle were noted in places, indicating a source of nutrient enrichment. At the end of the reach the channel splits amongst secondary woodland.

### Issues for Restoration & Management

Natural England indicate that this section of river SSSI (Unit 8) is in unfavourable condition and highlight the following points (Magic, 2012):

- Water quality associated with effluent discharges and runoff from highways, urban and commercial areas in the lower catchment.
- Locally the river bank is inappropriately modified (e.g. by levees) from a legacy of now ceased land drainage management and from bank protection.
- A declining health and die-back of bank side alder is also a concern as this will act over time to degraded river habitat quality.
- Parts of the river remain excessively shaded by other trees, including plantation poplar, to the detriment of the dragonfly interest and in these areas tree and woodland management is required.
- Invasive plants, notably Indian balsam, have a localised presence and require management control

The walkover survey identified the following issues:

- Shade cast by riparian trees limiting the establishment of riparian vegetation
- Dense nettle indicating nutrient enrichment

### Restoration Suggestions

#### Phase 1 (up to 2015)

<table>
<thead>
<tr>
<th>Adaptive Management</th>
<th>Quantitative estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riparian tree management – removal of poplar plantation and coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora, to diversity vegetation structure and composition and create sunlit patches</td>
<td></td>
</tr>
<tr>
<td>Land management - Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce runoff especially silt, phosphate and nitrogen</td>
<td></td>
</tr>
<tr>
<td>Invasive plants - Investigate control of Indian Balsam (see Return of the Natives initiative in main document)</td>
<td></td>
</tr>
<tr>
<td>Remove poplar plantation and allow for discrete coppicing along a 1000m length</td>
<td></td>
</tr>
</tbody>
</table>
Generic measures along whole reach

- Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff
- Riparian tree management – Localised discrete coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora
- Small scale riparian tree planting to increase supply of large woody debris. Target west bank of river.
- Instigate control of Himalayan Balsam (see Return of the Natives initiative in main document)
These reaches were not surveyed during the original walkover survey conducted by the consultants in December 2011/January 2012. Further survey will be undertaken to identify and develop appropriate restoration options to enable the SSSI to reach favourable condition. These restoration options are indicative only.

### River Moors: Survey Reach 27 (RM27)

#### Date Surveyed

#### Key Ecological and Geomorphology Features

A relatively unmodified natural section of the river, exhibiting diverse flow patterns, gravel bars and coarse woody debris, all of which add to the habitat diversity. The surrounding riparian woodland and rough grassland add additional interest. There is a slight impoundment caused by Hurn Gauging Weir and this may act as a barrier to movement of some fish species within the river. Fine silt appears limited with some gravel deposits visible. Riparian vegetation is limited in places due to the shade caused by trees, but some sections are open and a diverse riparian flora has developed. Connectivity to the flood plain seems reasonable with some ditches and back channels.

#### Issues for Restoration & Management

Natural England indicate that this section of river SSSI (Unit 8) is in unfavourable condition and highlight the following points (Magic, 2012):

- Water quality associated with effluent discharges and runoff from highways, urban and commercial areas in the lower catchment.
- Locally the river bank is inappropriately modified (e.g. by levees) from a legacy of now ceased land drainage management and from bank protection.
- A declining health and die-back of bankside alder is also a concern as this will act over time to degraded river habitat quality.
- Parts of the river remain excessively shaded by other trees, including plantation poplar, to the detriment of the dragonfly interest and in these areas tree and woodland management is required.
- Invasive plants, notably Indian balsam, have a localised presence and require management control.

The walkover survey identified the following issues:

- Shade cast by riparian trees limiting the establishment of riparian vegetation
- Dense nettle indicating nutrient enrichment
- Impoundment and barrier to fish movement caused by Hurn gauging weir

#### Restoration Suggestions

<table>
<thead>
<tr>
<th>Adaptive Management</th>
<th>Phase 1</th>
<th>Quantitative estimate</th>
<th>Phase 2</th>
<th>Quantitative estimate</th>
</tr>
</thead>
</table>
| Riparian tree management - Localised discrete coppicing of riparian trees to create sunlit patches and encourage the establishment of a wide margin of riparian vegetation | Allow for coppicing along at least a 500m length | Managing Control Structures  
Further investigation to determine to what extent Hurn gauging weir acts as a significant barrier to the movement of fish and restricting natural river function. Determine appropriate remediation measures. | Removal of one structure |
<table>
<thead>
<tr>
<th>Physical Rehabilitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Aim to restore up to 250m of channel length. Diversify channel morphology - Install large woody debris to diversify flow regime and encourage channel sinuosity, and removal, through the action of the river channel movement, bankside spoil and levees.</td>
</tr>
</tbody>
</table>

Aim to restore up to 250m of channel length.
Ensuring adjacent catchment included within the DEFRA Catchment Sensitive Farming programme to reduce agricultural runoff

Instigate control of Himalayan Balsam (see Return of the Natives initiative in main document)

Install large woody debris as appropriate along reach

Riparian tree management – Localised coppicing of riparian trees to allow sufficient light to reach the channel to benefit riparian flora, to diversity vegetation structure and composition and create sunlit patches along at least a 500m length

Removal or modification of Hurn gauging weir
Appendix 1 – Moors River System SSSI Citation
NOTIFIED TO THE SECRETARY OF STATE ON 9 JULY 1999

COUNTY: DORSET   SITE NAME: MOORS RIVER SYSTEM

DISTRICT: EAST DORSET, CHRISTCHURCH


Environment Agency Area: South Wessex   Water Company: Wessex Water plc
Local Planning Authorities: DORSET COUNTY COUNCIL, East Dorset District Council, Christchurch Borough Council

National Grid Reference: SU 057133 to SZ 131959

Length of River SSSI: 32.3 km Area: 296.57 (ha.)

Ordnance Survey Sheets 1:50,000: 195

Date notified (under 1949 Act): 1954 (part), 1977 (part)


Other Information:
The Moors River is part of a national series of river SSSIs and is a Nature Conservation Review site. This notification includes boundary extensions covering the River Crane and Leaden Stour, incorporates parts of Hurn Common SSSI and amends the list of operations likely to damage the features of special interest.

The site is adjacent to several areas of heathland SSSI. Some areas are managed as nature reserves by the Dorset Wildlife Trust and part lies in the Moors Valley Country Park.

Description and reasons for notification:
Key Features and General Character
The Moors River is a small lowland river which supports an exceptional diversity of aquatic and wetland plants. The vegetation varies from a type characteristic of mixed geology, low gradient rivers in the middle reaches to a type more typical of chalk streams towards the confluence with the River Stour. On the upper reaches, the River Crane exemplifies a small chalk stream with a diverse and substantially natural habitat structure. This part of the river system supports species rich assemblages of aquatic invertebrates, including several rare and uncommon river species. Downstream, the Moors River and associated water features are notable for an outstanding dragonfly fauna. The river system also supports several fish, bird and aquatic mammal species of conservation importance.

The Moors River rises as a winterbourne on the chalk of the South Wessex Downs and is at first known as the River Crane. Below Cranborne, at the head of the river SSSI, the Crane grades into a perennial chalk stream as the flow is augmented by springs and other chalk headwaters. The stream then drains through an area of clays comprising the Reading Beds and London Clay, and near Verwood enters a geology of sands, gravels and clays, and is joined by several tributaries which drain extensive areas of acidic heathland and conifer
plantation. With these changes in geology there is a major transition in the river’s character from a chalk stream to a sluggish, low gradient watercourse, and the name changes to the Moors River. Finally, near Hurn, the river returns to the faster flowing, gravelly nature of a chalk stream.

This geological diversity is unusual for a small lowland river and gives rise to a large range in water chemistry along the river’s length. The headwaters, being fed from the chalk, are strongly calcareous, naturally quite rich in nutrients and have a high water quality. The alkalinity then declines downstream through the progressive influence of lower alkalinity tributaries and, on the Moors River, drops markedly on receiving the base poor flow of the Uddens Water. The mixed geology also creates different flow regimes, the chalk stream on the Crane having a relatively high base flow from groundwater and the Moors River having a tendency to rise and fall rapidly from flashy drainage in the lower catchment, accentuated by runoff from several urban settlements.

Locally the watercourses have been modified over the centuries to provide water heads for mills, small lakes and, on the headwater, places for the cultivation of watercress. Some lengths of the Moors River below Verwood have also been hydraulically improved or realigned for agricultural and urban flood drainage, and until recently there was regular cutting of the river vegetation along the middle reaches to improve drainage conditions. Despite this history of management, much of the river system is characterised by habitat features indicative of a substantially natural channel and this is well exemplified on the chalk stream lengths. The channel substrate is also very diverse, varying from a dominance of gravels and sands along the Crane to mostly clays and silts on the sluggish parts of the Moors River.

Although the character of riparian land along the river system has been extensively modified through conversion to improved grassland, there is a more widespread presence of semi-natural wetland than on many small rivers in lowland situations. The wetland includes habitats such as swamp, tall-herb fen and fen woodland. These often occur in a diverse mosaic with wet, rushy pasture (fen meadow) and partly improved neutral grassland, usually with a network of ditches. The mosaics are extensive for Dorset, locally occupying the entire valley bottom on the Crane and the narrow flood plain on the lower reaches of the Moors River. Some of the vegetation types in these areas are species rich.

Flora of the River and Adjoining Habitats
The river system supports a succession of plant communities along its length, with changes that are more marked than is normal for lowland rivers and particularly for a relatively small river channel.

The River Crane supports a typical assemblage of chalk stream plants, but the vegetation differs from many other chalk streams in the dominance of bank edge trees, especially alder *Alnus glutinosa*. These commonly create root and brash tangles which are important habitat features in a natural stream ecosystem. Further habitat diversity is provided by a varied and, on some sections, a species rich bankside vegetation.

Wooded banks with a wet understorey contain yellow iris *Iris pseudacorus*, sedge *Carex* species and opposite-leaved golden-saxifrage *Chrysosplenium oppositifolium*, canopy gaps are characterised by species of tall-herb fen such as purple-loosestrife *Lythrum salicaria*, and open channel margins support stands of branched bur-reed *Sparganium erectum*. The aquatic vegetation is solely dominated by brook watercrowfoot *Ranunculus penicillatus*.
subsp. *pseudofluitans*, often in a typical chalk stream association with water-starwort *Callitriche* species, lesser water-parsnip *Berula erecta* and marginal fringes containing fool’s water-cress *Apium nodiflorum*, brooklime *Veronica beccabunga* and blue water-speedwell *V. anagallis-aquatica*. Passing downstream the river vegetation changes towards a lowland, mixed geology community, with species of a sluggish flow such as broad-leaved pondweed *Potamogeton natans* and unbranched bur-reed *Sparganium emersum* becoming frequent. Below the confluence with the Uddens Water this community is species rich and luxuriant, and is markedly different from the vegetation on the Crane. Many of the chalk stream plants persist, but additional aquatic species including yellow water-lily *Nuphar lutea* and shining pondweed *Potamogeton lucens* gain dominance. These occur with other additional river plants, notably opposite-leaved pondweed *Groenlandia densa* and river water-dropwort *Oenanthe fluviatilis* which are uncommon and declining aquatic species.

Near Hurn there is a further major change in the river vegetation. The high diversity of habitat features found on the River Crane re-appears and there is a species rich assemblage of characteristic chalk stream plants. These occur with most of the plants found in the lowland, mixed geology community upstream, forming a very diverse river vegetation. The number of aquatic and wetland plant species is among the highest recorded from any section of lowland river in England, and is very exceptional for the relatively small size of the river channel.

The plant diversity is exemplified by the range of narrow and broad-leaved aquatics, floating leaved plants, narrow-leaved emergents, reeds and sedges, marginal species and bankside tall-herbs. This section of the Moors River is also unusual in supporting both brook and river water-crowfoot *Ranunculus fluitans* together with river water-dropwort as a common component of the aquatic vegetation.

The fen habitats adjoining the river system contain a wide range of plant communities, and these differ with the soil water environment, water levels and management regime. Unmanaged areas with permanent waterlogging and frequent flooding, often located immediately alongside the river and ditches, support swamp communities of, for example, sedge species and common reed *Phragmites australis*. These give way to tall herb fen communities where the land is seasonally waterlogged and is mostly ungrazed. Areas with a dominance of reed canary-grass *Phalaris arundinacea* are frequent along the Crane valley. Downstream on the flood plain of the Moors River there are very different communities containing more species rich swards with meadowsweet *Filipendula ulmaria*, marsh valerian *Valeriana dioica* and common meadow-rue *Thalictrum flavum*.

Other areas of wetland have developed naturally, through the invasion of scrub, to types of fen woodland dominated by alder and willow *Salix* species. Some support an understorey rich in wetland plants such as water avens *Geum rivale*, yellow pimpernel *Lysimachia nemorum* and various sedges including greater tussock-sedge *Carex paniculata*. Further examples occur along the edge of the Moors River flood plain where drainage from adjacent heathland and conifer plantation is impeded. These areas are of note for a diverse sedge flora, which includes locally uncommon species such as white sedge *Carex curta* and bladder-sedge *C. vesicaria* and the nationally scarce elongated sedge *C. elongata*, and pools containing the insectivorous bladderwort *Utricularia australis*.

Where there is hay cutting or relatively light livestock grazing and the land is not well drained, the fen vegetation forms various types of fen meadow. This habitat is well represented in
the Crane valley where groundwater seeps out over clays on the lower slopes. The plant communities are characterised by mixes of sharp-flowered rush *Juncus acutiflorus*, purple moor-grass *Molinia caerulea*, yellow iris and meadowsweet, and are often species rich. Locally uncommon plants include corkyfruited water-dropwort *Oenanthe pimpinelloides*, heath spotted-orchid *Dactylorhiza maculata* and tawny sedge *Carex hostiana*. Along the Moors valley some areas of fen meadow and tall-herb fen contain a heath flora component, such as cross-leaved heath *Erica tetralix*, bog myrtle *Myrica gale*, and also marsh gentian *Gentiana pneumonanthe* which is nationally scarce. These provide evidence of past ecological connections with the heaths on adjacent valley slopes and, in places, there remain unbroken transitions from fen habitats to heathland in adjoining SSSIs.

The fen meadow in the Crane valley commonly grades into types of neutral grassland on the better drained slopes. These grasslands have mostly been subject to some agricultural improvement, but some species rich swards occur containing, for example, pepper-saxifrage *Silaum silaus* and quaking grass *Briza media*.

Further areas of relatively little improved neutral grassland occur along the lower reaches of the Moors River, especially where the flood plain merges with that of the River Stour. Here a flood meadow system supports grassland communities containing many species that have declined widely elsewhere through agricultural improvements. These include cowslip *Primula veris*, tubular water-dropwort *Oenanthe fistulosa*, yellow-rattle *Rhinanthus minor* and, on open wet ground, mousetail *Myosurus minimus* which is uncommon.

**Invertebrates**

The Moors River has long been noted for an outstanding dragonfly fauna. Historically, at least 32 species have been recorded, including orange-spotted emerald *Oxygastra curtisi*, which is now extinct in Britain following the loss of the last known breeding population on the lower reaches of the river. Although some other species have also been lost, probably as a consequence of past water pollution and a decline in habitat conditions, the river system and associated water features continue to support breeding populations of many of Britain's dragonfly and damselfly species.

The chalk stream section of the River Crane is widely frequented by a few species, such as golden-ringed dragonfly *Cordulegaster boltonii* and the local banded demoiselle *Calopteryx splendens*.

Further downstream, especially below the confluence with the Uddens Water, the dragonfly fauna is species rich. In addition to the river, the flood plain contains other important dragonfly habitats, for example ditches and pools with different water chemistries and, adjacent to the lower reaches, an artificial leat system fed from the River Stour. The range of breeding species includes the local white-legged damselfly *Platycnemis pennipes*, the nationally scarce hairy dragonfly *Brachytron pratense* and a strong population of scarce chaser *Libellula fulva*, a nationally rare dragonfly. Where pools and wet ditches are filled by base poor drainage from adjacent heathland and conifer plantation, there is a diverse mix of both river species and typical heathland species, such as keeled skimmer *Orthetrum coerulescens* and small red damselfly *Ceriagrion tenellum*, which is nationally scarce.

The aquatic invertebrates are also of significant interest, particularly on the upper reaches above the confluence with the Uddens Water. On these reaches the instream invertebrate fauna has been found to be rich in species and species groups, with nearly all sampled sites supporting an assemblage of above average species richness compared with sites on other
lowland rivers in England with the same type of invertebrate fauna. Some sites are especially rich, holding over 100 species and species groups, indicating a high diversity and quality of instream habitats. The assemblages also differ in species composition at different sites, ranging from types characteristic of small streams to, more commonly, types characteristic of lowland streams and rivers.

The more notable components of the invertebrate fauna include a wide range of trichoptera (caddisflies), ephemeroptera (mayflies), coleoptera (beetles) and gastropoda (snails). There are many local species and some which are nationally scarce, such as the whirligig beetle *Gyrinus urinator* and the cranefly *Thaumastoptera calceata*. On the Crane, near the head of the river SSSI, the invertebrate assemblage is more different, containing some specialized species typically associated with winterbournes. These include the local and rapidly declining watersnail *Aplexa hypnorum* which has a tolerance to occasional dry conditions, and the nationally rare mayfly *Paraleptophlebia werneri* which relies on resistant eggs to overcome a dry period.

The invertebrate fauna supported by the river edge and fen habitats is less well studied. However, the high diversity of wetland features provided by these habitats and records of several local species from a few studied locations indicate the likely presence of a significant interest for several insect groups.

Fish and Other Wildlife

The river system supports a limited diversity of fish, but a high proportion of those recorded from recent surveys are considered native to the catchment. On the Moors River the assemblage is dominated by coarse species including chub *Leuciscus cephalus*, gudgeon *Gobio gobio*, pike *Esox lucius* and, notably, very high densities of dace *L. leuciscus* compared with neighbouring river systems.

In contrast, the River Crane is dominated by brown trout *Salmo trutta*, with the chalk stream habitat supporting one of the principal spawning grounds for this species in the wider Stour catchment area. The population is substantially a wild stock and comprises a high proportion of the anadromous sea trout (marine fish which spawn in rivers). Bullhead *Cottus gobio*, a species of conservation concern in a European context, and eel *Anguilla anguilla* occur extensively along these headwaters, and brook lamprey *Lampetra planeri* is also found.

The assemblage of breeding birds is typical of a small chalk river, being limited to water-edge species such as grey wagtail *Motacilla cinerea* and kingfisher *Alcedo atthis*, and some open water species such as little grebe *Tachybaptus ruficollis*. Areas of adjacent swamp, fen and fen meadow provide valuable breeding habitat for further species including reed warbler *Acrocephalus scirpaceus*, grasshopper warbler *Locustella naevia*, and reed bunting *Emberiza schoeniclus*, the latter two being of conservation concern owing to their decline in Britain. In winter, the lower reaches of the Moors River and flooding on the adjacent meadows attracts waterfowl and waders, particularly teal *Anas crecca* and common snipe *Gallinago gallinago*.

The Moors was formerly noted for breeding otter *Lutra lutra* which, after some years of absence in common with a severe population loss throughout central, southern England, has now re-established a presence. Britain’s two other species of aquatic mammal - water vole *Arvicola terrestris* and water shrew *Neomys fodiens* - also occur, especially on the River Crane.
1Species of European interest listed in Annex II of the EC Habitats and Species Directive.
2Species of European interest listed in Annex IV of the EC Habitats and Species Directive and listed in Schedule 2 of the Habitats Regulations for special protection.
Appendix 2 - Detailed indicative costs
<table>
<thead>
<tr>
<th>Potential Restoration Solution</th>
<th>Details</th>
<th>Indicative Costs (£k) either per area (ha) or length of river channel (Km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced/modified channel maintenance operations</td>
<td>No cost implications from restoration viewpoint</td>
<td></td>
</tr>
<tr>
<td>Riparian tree-planting</td>
<td>Grant rates taken from the woodland grant scheme allow £2k/ha for new planting and £2k/ha for on-going maintenance (over 10 years)</td>
<td>£4k/ha</td>
</tr>
<tr>
<td>Riparian tree management</td>
<td>Cost estimate of £1k/day for a team of two men and chainsaw or £2k/km of river length for discrete felling and coppicing works. This would increase if felled or coppiced material had to be chipped and removed from the river bank and assumes reasonable access.</td>
<td>£2k/km</td>
</tr>
<tr>
<td>Livestock management</td>
<td>New fencing associated with better livestock management £18k/km. Costs will vary with the type of fencing required and access arrangements such as gates and stiles</td>
<td>£18k/km</td>
</tr>
<tr>
<td>Floodplain wetland habitat</td>
<td>The River Restoration Centre Manual of Restoration Techniques suggest costs of £1k for formation of a single small wetland scrape and up to £112k for creation of a complex of ponds/scrapes and other wetland features wetland features over an area 1.5ha. Costs will obviously depend on the extent and scale of the wetland features to be created but it is estimated to be 5-10k/ha for the creation of discrete small areas of ponds and scrapes.</td>
<td>£5-10k/ha</td>
</tr>
<tr>
<td>Increase the diversity and relief of the river channel and bed</td>
<td>Adding current deflectors and other small in stream structures that contribute to channel morphology £59k/km. Costs will vary depending on the type of deflector used and the width/depth of the river. For the cost above it is assumed that current deflectors will be spaced at 20m intervals along the river.</td>
<td>£59k/km</td>
</tr>
<tr>
<td>Narrowing of over-wide channels</td>
<td>Costs will vary depending on the technique used but it has been assumed that it will be similar to adding current deflectors at a cost of £59k/km</td>
<td>£59k/km</td>
</tr>
<tr>
<td>Bank reprofiling</td>
<td>Cross section enhancement, re-profiling and extending banks and creation of 2 stage channels £77k/km. Costs will principally vary with the extent of narrowing required and the depth of river. It is assumed that the narrowing technique does not require material to be imported for backfilling behind the new bank line.</td>
<td>£77k/km</td>
</tr>
<tr>
<td>Re-meandering or meander reconnection</td>
<td>The most significant aspect of re-meandering costs is associated with removal of excavated material. If all of the excavated material can be reused on site then the costs will reduce significantly. Reconnecting old channels that still exist is likely to be significantly cheaper than the cost above, estimated to be £20k per channel reconnection.</td>
<td>£20k/per backwater that is reconnected to the main river</td>
</tr>
<tr>
<td>Reinstatement of coarse bed material</td>
<td>The cost of bed raising varies significantly with the amount of gravel required. For this cost it is assumed that 3.3m$^3$ of gravel are required per metre length of river (based on an average width and depth of Moors River: 11m wide x 0.3m deep).</td>
<td>£197k/km</td>
</tr>
<tr>
<td>Introduction of large woody debris</td>
<td>Costs will vary with the quantity of LWD required per km and the availability of material. For this cost it is assumed that all material is sourced locally and for free.</td>
<td>£26k/km</td>
</tr>
<tr>
<td>Removal/set-back of flood banks</td>
<td>No costs given in report but it is considered costs will be comparable to bank reprofiling. Assume estimated estimate £77k/km.</td>
<td>£77k/km</td>
</tr>
<tr>
<td>Removal of physical bank protection</td>
<td>Assume similar to cross section enhancement reprofiling and extending banks and creation of 2 stage channels estimated at £77k/km.</td>
<td>£77k/km</td>
</tr>
<tr>
<td>Removal/lowering of in-channel control structures</td>
<td>The cost to modify a structure varies with the work required to reduce upstream water levels and to restore the upstream reach. Reducing upstream water levels could involve changing the management of a sluice (very low cost) or removal of a large concrete weir (very high cost). Restoration measures upstream will principally be bed raising and channel narrowing. Most of the costs associated with this measure are for the physical removal of the structure and the material trapped behind it. Actual physical removal – It is estimated that it would cost in the region of £2 million to remove a large weir structures such as that Throop.</td>
<td>£210k/km for structure modification</td>
</tr>
<tr>
<td>Assisted Natural Recovery</td>
<td>No cost implications</td>
<td></td>
</tr>
</tbody>
</table>
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