



Havant Thicket Reservoir Project

Landscape and Ecology Management Plan

Portsmouth Water Ltd

July 2024 Update

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Executive Summary

This Landscape and Ecology Management Plan (LEMP) is a commitment under Schedule 1 Part 1 of the Section 106 Agreement for Havant Thicket Reservoir, a new reservoir development located north of Havant, Hampshire, which secured full planning permission in October 2021. This LEMP forms part of the Biodiversity Mitigation and Compensation Strategy. This version of the LEMP has been updated in 2024 to include changes associated with the developing design and reserved matters.

The Section 73 application (and associated Reserved Matters application) for main embankment, culvert and valve tower were submitted to the Local Planning Authority (LPA) for approval in April 2024.

Post-construction management of landscape and ecology features, as well as requirements for compensation measures, are provided in this LEMP; which covers the Main Reservoir Works (MRW) construction area, Havant Thicket woodland and Bell's Copse (the 'Site'). Mitigation for impacts on landscape and ecology features during construction are included in the Construction Environmental Management Plan (CEMP) produced by the Principal Contractor. Specific compensation areas outside of the Site, including Southleigh Forest and South Holt, have their own management plans, so are not covered by this LEMP. Similarly, this LEMP does not extend to the Bedhampton pipeline route or catchment-area watercourse enhancement outside of the Site. Some specific mitigation requirements under the European Protected Species Mitigation licences for bats and hazel dormice are set out in separate licence documents.

This LEMP provides objectives and management prescriptions as well as details of how management success will be monitored and details of any remedial measures that may be required to ensure objectives are met. It will be adopted by the management organisations: Portsmouth Water, Forestry England (FE), Hampshire County Council (HCC), who will implement the prescriptions included within it; and will be available to the Principal Contractor to inform their CEMP.

It includes a **framework** for the management proposed and is a 'live' document that will be updated regularly to reflect each new phase of the Scheme. The management prescriptions will be updated for subsequent issues of the LEMP to include the latest design details. Prior to finalisation of management prescriptions for later design phases, an outline of management proposals is included. Aftercare and ongoing management activities for new features created will commence on completion of each phase of construction.

This LEMP should be used in combination with the requirements set out in the European Protected Species Mitigation (EPSM) licences for bats and hazel dormouse, including the Habitat Management and Monitoring Plan (HMMT) for bats, which provide specific mitigation and compensation details for these species.

This LEMP is based on mitigation and compensation measures for landscape and ecology set out in the Environmental Statement (ES) submitted with the planning application in 2020 Section 73 application (and associated Reserved Matters application) for main embankment, culvert and valve tower, 2024., and the Biodiversity Mitigation and Compensation Strategy (document reference: HTR-ATK-ZZ-ZZ-RP-Y-0001).

The delivery of this LEMP, including all associated costs, is the responsibility of Portsmouth Water, on the land in its ownership as well as on land under the ownership of FE and HCC. Specific elements may be undertaken by FE or HCC in respect to their land, funded by Portsmouth Water. Funding has been secured in agreement with Ofwat. Supervision and technical audit of the measures set out in this LEMP will be the responsibility of Portsmouth Water.

This LEMP is required for as long as the reservoir remains operational (as long as the reservoir is in-situ and mitigation required). The objectives and management prescriptions shall be periodically reviewed.

Part 1 of document includes the background and purpose to the LEMP, a summary of relevant legislation and policy and a description of the site and its environment. Part 2 provides a summary of the evaluation of important landscape and ecology features identified in the ES and the influencing factors that guide the management decisions to deliver the mitigation and compensation appropriately and ensure long-term success. The objectives are set out in Tables 6-1 and 6-2 in Section 6. Details of the management projects are included in Part 3, and Part 4 provides information on implementation of the LEMP, responsibilities and the review process.

A summary schedule of all the management projects along with their objectives, targets and prescriptions is provided in Table 10-1 in Part 5.

Part 1

1. Background and Purpose

1.1. The Scheme

Portsmouth Water secured planning permission in October 2021 for Havant Thicket Reservoir, a new raw water storage reservoir development located north of Havant, Hampshire ('the **Scheme**'). The new reservoir will have a minimum storage capacity of 8,700 million litres. The extent of the reservoir will be approximately 1.6 km from east to west and 800 m from north to south. The full planning consent included the principle of the reservoir and some aspects of detailed design (Havant Borough Council Reference: APP/20/00990/East Hampshire District Council Reference: 51680/001). Additional design aspects were approved in outline subject to Reserved Matters applications, including a control house, operational slipway, visitor centre, car park, access routes from north and south, wetland area, and recreational access paths. Reserved Matters have been approved for Phase 1 of the Scheme, which includes the Northern Access Route.

A Reserved Matters application has been submitted to the LPA for approval of Phase 2 (Wetlands Embankment) in March 2024. This updated version of the LEMP accords with the details of the application for Phase 2.

A Section 73 application for changes to the main embankment, culvert and valve tower was submitted for approval in April 2024, alongside a Reserved Matters application for Phase 3 (Main Embankment) which accords with the Section 73 application. This updated version of the LEMP accords with the details of the Section 73 and the Phase 3 Reserved Matters application.

The reservoir will be filled with surplus water drawn from springs at the Portsmouth Water Bedhampton Pumping Station when flows are at their highest in winter, via a new pipeline. The reservoir will allow excess water to be stored until needed to supply Portsmouth Water customers. The surplus will be shared with Southern Water customers in west Hampshire, which will go some way to address a forecast deficit in water resources in the Southern Water area due to the reduction of its abstraction licences on the River Test and River Itchen.

The Scheme will help meet the region's water supply challenges in the future, in particular relating to abstraction licence changes, predicted population growth, and climate change that will all place pressure on meeting future water supply demand.

Management works are required to compensate for the effects of the reservoir on important ecological features, such as sites designated for their nature conservation importance, ancient woodlands, habitats and species. The locations for compensation activities will include Havant Thicket woodland, to the north of the reservoir and Bell's Copse to the west. The land required for the reservoir construction along with these adjacent compensation areas are collectively referred to as 'the **Site**'. The Site boundary is shown on Figure A-1 in Appendix A. A construction phasing plan can be found in Table 3-3 in Section 3.1.8 below.

1.2. Purpose of this Document

This Landscape and Ecology Management Plan (LEMP) is a commitment under Schedule 1 Part 1 of the Section 106 Agreement signed on 15th October 2021 by Havant Borough Council (HBC), East Hampshire District Council (EHDC), Hampshire County Council (HCC), Portsmouth Water, and the Secretary of State for Environment, Food and Rural Affairs. The Section 106 Agreement requires Portsmouth Water, as First Owner, to submit a detailed Biodiversity Mitigation and Compensation Strategy for the Scheme ('the **Strategy**') of which this LEMP forms a part, to be approved by the Local Planning Authorities, which are HBC and EHDC.

This LEMP sets out the long-term management of habitat creation and enhancement areas required as compensation for the effects of the Scheme.

The management of important biodiversity features will be coordinated with other site management requirements, especially with the management of landscape features where there is an overlap of objectives. Therefore, this LEMP includes objectives and management prescriptions for important landscape features as well as biodiversity features. Details of how management success will be monitored and details of any remedial measures that may be required to ensure objectives are met are also included.

This LEMP provides the requirements for management of landscape and ecology features provided as part of the Scheme and the plans for implementation of compensation measures that are not intrinsically linked to the construction of the Scheme.

Details of how construction impacts on landscape and ecology features will be mitigated is set out in the Construction Environmental Management Plan (CEMP). The CEMP will include all management of biodiversity mitigation required during the construction of the Scheme.

This LEMP sets out the means for delivery of commitments in the Strategy and sets out the how the management prescriptions will be implemented. It is to be provided to the relevant management organisations who will implement the prescriptions included within it. The detailed design of the Scheme will progress in phases set at the start of construction, and consequently the detailed specifications for the landscape and ecology design elements will be developed over the course of the construction period. The detailed design will follow the Strategy and prescriptions set out in this LEMP. Outline specifications and concept designs are provided in Appendix B which shall form the basis for detailed design.

This LEMP provides a **framework** for the management proposed which will be updated regularly. The management prescriptions will be updated for subsequent issues of the LEMP to include the latest design details. Prior to finalisation of management prescriptions for later design phases, an outline of management proposals is included. The management prescriptions in Section 7 of this LEMP indicate what actions are required to meet the objectives, but do not confirm whether an action has commenced, is ongoing or is complete. For a record of progress against the prescriptions refer to the work programme in Appendix C.

Included in this LEMP are on-site areas within the red line boundary for the Scheme (see Figure A-1 in Appendix A) and all phases of the Scheme once the LEMP is approved for use.

Not included in this LEMP are off-site areas, including the Bedhampton pipeline route and specific off-site compensation for biodiversity, construction mitigation included in the CEMP, or specific mitigation required under the European Protected Species Mitigation licences for bats and hazel dormice. Management of these elements is set out in specific separate documents, such as off-site compensation site management plans, and the protected species licence method statements (see Table 3-2).

This LEMP has been produced in consultation with key stakeholders, including landowners, strategic consultees, and community forums, and will be adopted by Portsmouth Water, the Principal Contractor, and the other management organisations, Forestry England (FE) and Hampshire County Council (HCC).

The Principal Contractor for the Main Reservoir Works (MRW) is Future Water.

1.3. Aims of the Strategy

The Strategy is set out in a separate document (document reference: HTR-ATK-ZZ-ZZ-RP-Y-0001 Rev C01)¹. This LEMP and the CEMP include the detail required to implement the Strategy, which covers all phases of the Scheme, including construction and aftercare. The Strategy document and this LEMP together fulfil Schedule 1 Part 1 of the Section 106 Agreement. Whereas there is a requirement to update the LEMP to reflect new phases of the Scheme, the Strategy document was produced in July 2022 and remains unchanged for the duration of the Scheme.

The Strategy builds upon the Outline Biodiversity Mitigation and Compensation Strategy (BMCS) produced in 2020 as part of the planning submission, which focussed on the important ecological features identified in the Environmental Statement (ES) for the Scheme (Volume 2, Chapter 9 – Biodiversity). It is based on the following core elements for on-site mitigation and compensation initially set out in the Outline BMCS:

- Create an environmentally-led design based on the mitigation hierarchy approach of avoid, minimise, or compensate. As far as practical, compensation will be provided on-site for the key impacts;
- Ensure appropriate mitigation and compensation is implemented for protected and notable species. European Protected Species licences will be obtained where required;
- Create a mosaic of new and high-quality habitats, including a new open waterbody with a retained wetland offering variable water depths, a variety of vegetation types and islands for added habitat complexity, and to provide roosting and nesting sites for birds;
- Long-term management for biodiversity through collaboration with Forestry England and Hampshire County Council; and
- Deliver on-site aquatic habitat mitigation, compensation, and enhancements to ponds and watercourses as part of a catchment-wide approach.

¹ Links to the submitted Strategy: [HBC](#); [EHDC](#). Submitted September 2022.

The mitigation and compensation measures for important landscape and ecological features are set out in Part 3 of this LEMP along with the specific objectives for these features and details of how the objectives will be met.

Aftercare and ongoing management activities for new features created will commence on completion of each phase of construction, therefore there will also be a phased approach to the commencement of management activities.

Mitigation measures will be implemented during construction under the CEMP.

1.4. Definitions

The **LEMP** refers to this document which is the Landscape and Ecology Management Plan.

The **Scheme** refers to the new raw water storage reservoir development located north of Havant, Hampshire that Portsmouth Water secured full planning permission for in October 2021.

The **Site** refers to the land required for the reservoir construction along with adjacent areas required for mitigation, compensation and enhancement works and corresponds to the Application Site boundary for the planning permission granted in October 2021 (shown by the Site boundary on Figure A-1 in Appendix A).

The **Strategy** refers to the detailed Biodiversity Mitigation and Compensation Strategy for the Scheme that includes this LEMP and is a commitment under Schedule 1 Part 1 of the Section 106 Agreement (document reference: HTR-ATK-ZZ-ZZ-RP-Y-0001 Rev C01).

The **CEMP** refers to the Construction Environmental Management Plan produced by the Principal Contractor which sets out how construction impacts on landscape and ecology features will be mitigated during the construction of the Scheme.

The **ES** refers to the Environmental Statement produced for the Scheme and submitted with the planning application in 2020.

An **ES Addendum** (HTR-RHD-ZZ-XX-RP-Z-0005) submitted in April 2024 to support the S73 planning application to consider the proposed changes to the Scheme.

The **Outline BMCS** refers to the Outline Biodiversity Mitigation and Compensation Strategy produced in 2020 as part of the planning submission (document reference: 20.0016.0005.F0), which is superseded by the Strategy.

2. Legislation and Policy

2.1. Nature Conservation Legislation

2.1.1. Legally Protected Species

Due to the protection afforded to certain species by legislation, the management and maintenance activities included in this LEMP needs to consider the requirements of legally protected species present. Protected species surveys have been undertaken for the environmental impact assessment and as required by any approved licences from Natural England. Protected species that are known to be present within the Site include the following:

- Bats²;
- Hazel dormouse²;
- Great crested newt²;
- Reptiles³;
- Breeding birds³; and
- Badger.

The impact on protected species must be taken into consideration when planning management activities. The legislation relevant to protected species includes:

- The Wildlife and Countryside Act 1981, as amended
- The Conservation of Habitats and Species Regulations 2017, as amended
- The Protection of Badgers Act 1992
- The Wild Mammals (Protection) Act, 1996

2.1.2. Habitats and Species of Principal Importance

Priority habitats and species are those listed as being of principal importance for the purpose of conserving biodiversity in England, published by the Secretary of State for the Environment in consultation with Natural England (NE) in response to Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006⁴.

Priority habitats within the Site include Lowland Mixed Deciduous Woodland, Wet Woodland, Purple Moor-grass and Rush Pasture, Lowland Acid Grassland and Ponds.

Numerous Priority species are known to be present at the Site, including white admiral, great crested newt, adder, grass snake, common lizard, slow-worm, skylark, nightjar, Bechstein's bat and hazel dormouse.

2.1.3. Non-statutory Nature Conservation Designations

The Site includes eight non-statutory designated sites wholly or partially within the Site, known as Sites of Importance for Nature Conservation (SINC). These sites are selected for their importance for nature conservation within Hampshire and are afforded some protection under the Local Development Plans for Havant Borough Council and East Hampshire District Council. These are:

- Middle Clearing SINC,
- Thicket Bottom SINC,
- Thicket Bottom Woods and Lake SINC,
- Havant Thicket SINC,
- Havant Thicket (South-West Corner) SINC,

² European Protected Species under the Conservation of Habitats and Species Regulations 2010.

³ Protected under the Wildlife and Countryside Act 1981, including some birds listed under Schedule 1 of the Act, which are afforded extra protection.

⁴ Online at: <https://jncc.gov.uk/our-work/uk-bap-priority-habitats> and <http://publications.naturalengland.org.uk/publication/4958719460769792>. Accessed May 2022.

- Idsworth Common SINC,
- Bell's Copse SINC, and
- Cabbagefield Row SINC.

2.1.4. Ancient Woodland

Ancient woodlands are identified as irreplaceable habitats in the National Planning Policy Framework⁵. They are listed as ancient woodland on the Natural England Inventory of Ancient Woodlands which indicates that it has been continually wooded since 1600 AD. The Site has six ancient woodlands: The Avenue, Round Wood, Middle Clearing, Havant Thicket (including the 'Blendworth Fragment' in the north of Havant Thicket, adjacent to the B2149), Bell's Copse and Cabbagefield Row. A part of Havant Thicket (specifically the Corsican Pine Plantation), The Avenue and Round Wood, and the whole of Middle Clearing have been removed for the construction of the reservoir.

Round Wood, Middle Clearing, and the Corsican Pine Plantation within Havant Thicket are considered to be relatively recent plantations on ancient woodland soils, whereas The Avenue contains ancient woodland replanted around 1870. Havant Thicket woodland has been subject to numerous changes throughout its history, most recently alterations through commercial forestry, but has always been at least partially wooded. Bells Copse contains both semi-natural ancient woodland and plantation on ancient woodland soils. Cabbagefield Row (a part of which is within the Site) is semi-natural ancient woodland.

2.1.5. Invasive Non-native Species

Invasive Non-native Species (INNS) are non-native species considered invasive and subject to legal controls. In England and Wales the control of INNS is subject to the following legislation:

- The Invasive Alien Species (Enforcement and Permitting) Order 2019. Schedule 2 lists invasive alien animal species for which is an offence to release or allow to escape into the wild, and invasive alien plant species for which it is an offence to plant or causes to grow in the wild.
- The Wildlife and Countryside Act 1981 (as amended). Schedule 9 lists animal species for which is an offence to release or allow to escape into the wild, and plant species for which it is an offence to plant or causes to grow in the wild.

The following INNS have been recorded at the Site:

- Parrot's feather – present ponds in the east of Havant Thicket woodland, which is included in Schedule 2 of The Invasive Alien Species (Enforcement and Permitting) Order 2019 and Schedule 9 of The Wildlife and Countryside Act 1981 (as amended);
- Montbretia and rhododendron – reported as present within Havant Thicket woodland, which are included in Schedule 9 of The Wildlife and Countryside Act 1981 (as amended); and
- Mandarin duck – recorded breeding in Upper Lake within the footprint of the reservoir, which is included in Schedule 9 of The Wildlife and Countryside Act 1981 (as amended).

2.1.6. Felling Licences

Other than where tree felling is covered under full planning permission or FE's approved Forest Plan, a felling licence may be required from the Forestry Commission (FC) to undertake woodland management within the Site. FC should be contacted in advance of any felling works to determine if a felling licence is required.

2.1.7. Legislation Relevant to Amenity Provision

Occupiers have duties under the Occupiers Liability Act 1984. This states that the occupier owes a "common law duty of care" to visitors and those who enter his land or premises, and this duty of care extends to trespassers.

Under the Health and Safety at Work etc. Act 1974, all occupiers have responsibilities to ensure the safety of those working on their land, as well as those not in their employment.

Other relevant legislation includes the Equalities Act 2010 which relates to access for all to amenity services.

⁵ Department for Levelling Up, Housing and Communities (2023) *National Planning Policy Framework*. December 2023 update (accessed January 2024).

3. Description

3.1. General Information

3.1.1. Site Location and Extent

The Site is located on the northern edge of Havant in Hampshire, centred on Ordnance Survey (OS) grid reference SU 715 097. The Site covers a total area of approximately 296 ha, with Havant Thicket woodland in the north of the Site consisting of approximately 96 ha of mixed woodland, conifer plantation and scrub. In the west of the Site is Bell's Copse, composed of broadleaved woodland and conifer plantation, approximately 26 ha in size.

The remainder of the Site (approximately 75 ha) includes the embankment slope and surrounding landscape around the reservoir, with open grassland, woodland, and wood-pasture, which is contiguous with Staunton Country Park (approximately 60 ha); and the wetland area with adjacent wet woodland and grassland on the northern shoreline of the reservoir (approximately 15 ha). The reservoir area covers approximately 99 ha not including the wetland, or approximately 106 ha at top water level, including the wetland and flooded wet woodland on the southern edge of Havant Thicket woodland.

The Site is situated within a mixed urban and suburban setting with dense residential development to the south and south-west (Leigh Park and Warren Park) and the A3(M) road approximately 500 m to the west. To the north of the Site, there is a mix of arable, pasture and woodland (The Holt). To the east of the Site lies the low-density residential area of Rowland's Castle.

Three unnamed small watercourses run from north to south issuing from springs in Havant Thicket woodland that will flow into the wetland area and reservoir. A compensation flow channel takes water from the reservoir which flows into the Riders Lane Stream, south of the Site.

3.1.2. Tenure

The land for the reservoir, embankment, operational infrastructure, wetland area, visitor facilities and access routes; as well as grassland, woodland and wood-pasture surrounding the reservoir that is within the Site, are owned by Portsmouth Water.

Havant Thicket woodland and Bell's Copse are owned by FE. A strip of land in the south of the Site is owned by HCC. Land tenure boundaries are shown on Figure A-2 in Appendix A.

3.1.3. Management Areas of the Site

The Site is sub-divided into five Management Areas that include the locations for construction activities, compensation measures and management. These are shown on Figure A-3 in Appendix A. The Management Areas correspond to the zones where operations will be undertaken by different management organisations, and where the land is owned or operated currently or in the future by those organisations.

Table 3-1 below lists the Management Areas that make up the Site and their approximate size. Included are the Management Areas that are within Site boundary. Off-site compensations areas are not included.

Table 3-1 - Management Areas of the Site

Management Area	Approximate size (on reservoir completion)
Reservoir	99 ha (open water) 106 ha (top water level)
Embankment and surrounding landscape	60 ha
Wetland	15 ha
Havant Thicket woodland	96 ha
Bell's Copse	26 ha

For the March 2024 update, the Management Area boundaries have been amended. The updated Management Area boundaries are shown on Figure A-3 (version CO2) in Appendix A. The Embankment and

surrounding landscape Management Area has been amended to include the Northern Access Route (4.5 ha), which is in Portsmouth Water's ownership, previously included as part of Havant Thicket woodland Management Area. In addition, the Wetland Management Area has been enlarged to include grassland (5.1 ha) and conifer plantation (1.2 ha) to the north of the wetland that is in Portsmouth Water's ownership, previously included within the Embankment and surrounding landscape Management Area and the Havant Thicket woodland Management Area. The sections of woodland in Havant Thicket woodland around the headwater streams (1.0 ha) that were included in the Wetland Management Area that are outside Portsmouth Water's ownership boundary (and within Forestry England land), are now included with Havant Thicket woodland Management Area.

3.1.4. History of the Site

Portsmouth Water purchased approximately 160 ha from the Forestry Commission in 1965 and Portsmouth City Council in 1966. Since its purchase, the land has been improved for agricultural use through the removal of tree stumps, installation of drainage and soil improvement.

Plans for the reservoir were originally drawn up in 1964 and then again in 2008, when they were shared during a public consultation. However, following a review of the strategic water management for the region, a decision was made not to progress with the reservoir proposals at that time.

The Site is located within two local authority areas – East Hampshire District and Havant Borough, with the boundary between these areas crossing the Site. In June 2021, East Hampshire District Council's Planning Committee resolved to grant planning permission for the reservoir, following the support given by Havant Borough Council for the reservoir and pipeline in the same month. Full planning permission has been granted and the reservoir is due to be completed and operational by 2029.

A large area of the land purchased for the reservoir was managed by Hampshire County Council as part of Staunton Country Park, a designated country park, for public recreation and enjoyment of the countryside. The area was formerly part of Leigh Park, which included landscaped gardens and a mansion house, built in 1865, located south of the reservoir site. Although the house is no longer present, the gardens remain as a Grade II listed Registered Park and garden and have been redeveloped into a visitor attraction. Staunton Country Park is also used by the local community for walking, cycling, and horse riding, and the open grassland is used for grazing.

3.1.5. Relationship to Other Plans and Strategies

Table 3-2 provides a summary of documents and plans relating to the ecological or landscape mitigation, compensation or enhancements required as part of the Scheme.

Table 3-2 - Summary of other documents and plans referred to in this LEMP

Document title	Description
Detailed Biodiversity Mitigation and Compensation Strategy (BMCS)	The detailed BMCS document has been prepared simultaneously to this LEMP and sets out the overarching Strategy within which this LEMP sits. It is a commitment under the Section 106 Agreement for the planning permission. It is the strategy for delivery of the commitments in the Planning Conditions and Section 106 Agreement and has been provided to the Principal Contractor and approved by the LPAs. The detailed BMCS document details the elements of the Scheme, the location of the important landscape and ecology features, and the mitigation and compensation measures required for each feature. It was submitted to the LPAs along with the LEMP in September 2022.
ES Volume 2 Chapter 9 – Biodiversity	The ES Volume 2, Chapter 9 – Biodiversity includes an assessment of the effects of the Scheme on biodiversity and was completed in September 2020. The ES was prepared to support the planning application for the Scheme. It outlines the baseline conditions at the Site prior to construction; and identifies the value and sensitivity of important ecological features, potential impacts and effects on these features, and mitigation, compensation and enhancement measures. These measures will be incorporated into the design, operation and management of the Scheme. The ES Chapter 9 identifies the important ecological features affected by the Scheme, and the measures to mitigate or compensate for significant adverse effects on these features.

Document title	Description
ES Addendum Chapter 8- Biodiversity	The ES Addendum Chapter 8-Biodiversity submitted as part of the Section 73 application includes an assessment of the proposed changes to the Scheme since 2020. The ES was prepared to support the planning application for the Scheme. It concludes that proposed changes to the Scheme lie wholly within the planning application boundary presented in the 2020 ES. A substantial area of habitat has already been cleared as part of the enabling works. No further land take or direct impact on ecological receptors are anticipated with the proposed changes to the Scheme. Although the Scheme construction period will be extended, the impact on ecological receptors is not likely to change, as the mitigation measures outlined in the 2020 ES are sufficient, and no further mitigation is required.
Outline BMCS	The Outline BMCS was completed in September 2020 and submitted along with the ES as part of the planning application for the Scheme. This document outlined the proposed on-site and off-site habitat and species-specific mitigation and compensation measures and was accepted along with the ES as part of the full planning permission in October 2021. Therefore, the measures included within the Outline BMCS set out the commitments made by Portsmouth Water to mitigate and compensate for the effects of the Scheme on biodiversity. The Outline BMCS provided a framework for the biodiversity mitigation and compensation and the basis for the content that is included in the Strategy and this LEMP, which supersede the Outline BMCS.
ES Volume 4, Appendix 4.2 – Outline Environmental Management Plan (OEMP)	The OEMP was completed in September 2020 and provides an outline plan to manage the environmental effects of the Scheme and to demonstrate compliance with relevant environmental legislation. The OEMP includes a Record of Environmental Actions and Commitments (REAC) that identifies environmental actions and commitments recorded in the ES that are required to mitigate potential environmental effects of the Scheme. The REAC includes the mitigation, compensation, management and monitoring measures for biodiversity to be implemented during the construction and operation of the Scheme that are carried forward within the CEMP (document reference: HTR-RHD-P2-RE-PL-Z-0018, see below), the Strategy and this LEMP.
Construction Environmental Management Plan (CEMP) Ref: HTR-RHD-P2-RE-PL-Z-0018	The CEMP has been prepared for the Scheme by the Principal Contractor and is a 'live' document maintained throughout the construction phases of Scheme. The CEMP includes details of how the following ecological mitigation measures will be implemented during construction: • Protective fencing to prevent accidental encroachment into adjacent habitats; • Protection of trees in accordance with BS5837⁶ and Natural England and the Forestry Commission Standing Advice on ancient woodland, ancient trees and veteran trees⁷; • Control of construction lighting to reduce impacts on bats; • Details of continued ecological monitoring for protected species during construction, including badger activity and nesting birds; • Measures to prevent animals, particularly badgers, becoming trapped in excavations; • Precautions during night construction activities to minimise disturbance to badgers and other animals, including toolbox talks and signage (e.g. for badger crossings of access roads) as necessary; • Avoidance of nesting birds during vegetation clearance;

6 British Standard (2012) BS 5837 *Trees in relation to design, demolition and construction guidance – recommendations*. BSI, London.

7 Natural England and Forestry Commission (2022) *Guidance - Ancient woodland, ancient trees and veteran trees: advice for making planning decisions*. Online at: <https://www.gov.uk/guidance/ancient-woodland-ancient-trees-and-veteran-trees-advice-for-making-planning-decisions>.

Document title	Description
	• Mitigation to prevent harm to reptiles and amphibians (including great crested newts); • Improvements to river substrate and appropriate reinstatement of banks at pipeline crossing locations; • Appointment of an Ecological Clerk of Works (ECoW) with appropriate training and experience; and • Provision of training, information, briefings and toolbox talks for on-site personnel in relation to landscape and ecology features and potential impacts. Where appropriate, the CEMP refers to method statements set out in the European Protected Species Mitigation (EPSM) licences for bats and hazel dormouse. The CEMP includes a Construction Ecological Management Plan (document reference: HTR-RHD-ZZ-ZZ-PL-Z-0001, see below) that detail the measures to avoid or minimise impacts on other legally protected species where licences are not required. The measures included in the CEMP are cross-referenced in this LEMP. On completion of construction the CEMP will be finalised and transferred to a Handover Environmental Management Plan (HEMP) in order to pass crucial information on the environmental actions undertaken, important features, and post-construction management requirements to those bodies responsible for future maintenance and operation of the Scheme.
Construction Traffic Management Plan Temporary Worker Accommodation Ref: HTR-FUW-RZ-RE-HS-W-0513	This plan sets out how construction traffic related to the establishment of the temporary worker accommodation will be managed and how traffic shall be managed and routed once the temporary accommodation site is established. It sets out the parameters in which we will work including hours of operation, traffic routing, safe vehicular access and egress and how the impact of the construction traffic will be mitigated.
Construction Ecological Management Plan (EcoMP) Ref: HTR-RHD-ZZ-ZZ-PL-Z-0001	The EcoMP has been prepared by the Principal Contractor as a supporting document to the CEMP that sets out how construction works will be managed to protect ecological receptors such as habitats and species during the MRW construction.
EPS Mitigation Licences and NERC Act Agreement for bats with associated Habitat Management and Maintenance Plan (HMMP).	EPSM Licences were first issued by Natural England in 2020 for bats (current NE Reference: 2020-50625-EPS-AD2-4) and hazel dormouse (current NE Reference: 2020-50257-EPS-AD2-2). The terms and conditions of these licences set out agreed mitigation and compensation measures within the Site and method statements have been prepared for implementation. The licences allow for the felling of trees and clearance of vegetation that may result in the disturbance of bats and hazel dormouse and loss or roosts and places of shelter. The licences relate to specific on-Site locations where impacts will occur agreed with Natural England. The mitigation and compensation for bats is included in the HMMP as part of the bat licence and secured under the NERC Act Agreement.
Reptile Mitigation Strategy Ref: RHD-ZZ-XX-RP-Z-0001-HTR-RMP	A detailed reptile mitigation strategy has been prepared by the Principal Contractor, as part of the CEMP, that sets out the methods for avoiding and minimising harm to the four reptiles species found at the Site (adder, grass snake, common lizard and slow-worm). This includes a translocation strategy.
Recreation and Access Strategy	A draft Recreation and Access Strategy has been developed by Portsmouth Water that considers the impacts of informal access on biodiversity. It includes measures to manage the potential impacts on protected species, particularly hazel dormouse, such as the creation of marked trails and the introduction of a ranger service. Measures will also be included to encourage dog walking away from sensitive areas, and exclusion areas for dogs, such as along the edge of the new wetland.

Document title	Description
Water Framework Directive (WFD) Article 4.7 Mitigation and Compensation Plan ⁸	A compensation package for the loss of 3.7 km of ephemeral streams to the Scheme was developed in 2021 that includes aquatic habitat creation and enhancements at on-site and off-site locations. This package includes new ponds, restoration of headwater streams and ponds, and river channel enhancements. These are labelled in Section 7 by reach numbers, namely, Reaches 1-3 and 4, which are in Havant Thicket woodland; and Reaches 5 and 8 which are within the MRW construction area. Off-site compensation will be managed under separate management plans and are outside the scope of this LEMP.
WFD Article 4.7 Mitigation Work for Reach 4	An additional Technical Note was produced in 2022 detailing the measures to mitigate/compensate relating to 'Reach 4' – ponds in the east of Havant Thicket woodland for some of the aquatic habitat and species loss that requires delivery prior to construction works starting on Site. The Technical Note provided further detail for mitigation for aquatic macroinvertebrates, aquatic plants (macrophytes), and INNS, and is provided in Appendix B.5.
Wetland Concept and Outline Design	A Technical Note (document reference: HTR-ATK-XX-ZZ-RP-Z-0001) was produced in 2020 that set out the decision-making process behind the development of the wetland Outline Design, and the key wetland design concepts and parameters to form the basis for development of the detailed wetland design.
Advance Planting Aftercare and Management Report	A report has been produced by Portsmouth Water in 2022 which set out details of aftercare and management of tree planting particularly in relation to advance works at Gipsies Plain and Memory Park (at Deerslaugher Plain) within the Site.
Offsite Management Plans	The off-site mitigation areas are detailed in the Implementation Plan for Off Site Biodiversity Mitigation and Compensation produced in April 2021 and submitted as part of the planning application, which sets out the process of how Portsmouth Water will implement off-site compensation following the approach laid out in the Outline BMCS. This implementation plan informed the Section 106 Agreement for the reservoir and pipeline. Off-site compensation will be managed under separate management plans and are outside the scope of this LEMP.
Phase 1 Ecological Mitigation, Compensation and Enhancement Strategy Ref: HTR-ATK-XX-ZZ-RP-Z-005	Produced by Portsmouth Water in June 2022 for the Phase 1 Reserved Matters application, relating to the ecological mitigation, compensation and enhancements applicable to the northern access route design and construction.
Phase 2 Ecological Mitigation, Compensation and Enhancement Strategy Ref: HTR-RHD-P2-XX-RP-Z-0002	This document has been submitted to the LPA by the Principal Contractor for the Phase 2 Reserved Matters application, relating to the ecological mitigation, compensation and enhancements applicable to the wetland design and construction.
Phase 3 Ecological Mitigation, Compensation and Enhancement Strategy	This document is being produced by the Principal Contractor for the Phase 3 Reserved Matters application, relating to the ecological mitigation, compensation and enhancements applicable to this phase.

⁸ Atkins (2021) *Havant Thicket Reservoir Outline Design: WFD - Article 4.7*. Technical Note for Portsmouth Water. Doc. ref: HTR-ATK-XX-XX-RP-Z-0067 Revision P02.1.

Document title	Description
Ref: HTR-RHD-P3-XX-RP-Z-003	
Detailed Phasing Plan for Reserved Matters Applications Ref: HTR-FUW-RZ-RE-DP-W-507	Produced by the Principal Contractor setting out the timetable for each phase Reserved Matters application. This is a 'live' document maintained throughout the construction phases of Scheme. Table 3-3 in Section 3.1.8 below shows the current phases of the Scheme and proposed Reserved Matters application dates.

3.1.6. Management/Organisational Structure

In the long-term, the Site will be managed under a Tripartite Agreement between Portsmouth Water, Hampshire County Council and Forestry England. A Site Management Board will be set up to include representatives from these organisations which will oversee the landscape and ecology management of the Site.

Portsmouth Water will have regular meetings with the Strategic Advisory Group and Community Advisory Group and all sub-groups until the reservoir is operational.

During construction, the Principal Contractor shall be responsible for coordinating the works within the MRW construction area. On completion of the construction phase in an area, the Principal Contractor will maintain the area for an Establishment Period of five years. Following the Establishment Period, the Principal Contractor will hand back responsibility of the area to Portsmouth Water for management under the Tripartite Agreement.

A Site Management Plan will be produced for the Site, which is a requirement of the Section 106 Agreement, to be approved by Havant Borough Council, East Hampshire District Council and Hampshire County Council. The Site Management Plan confirms roles and responsibilities for the management and maintenance of the Site for as long as the Scheme remains open and operational. The Site Management Plan will include the mechanism for implementation of this LEMP. The Site Management Plan will be produced by Portsmouth Water.

The delivery of the HMMP for bats has been secured through the EPS Mitigation Licence NERC Act Agreement. The habitat compensations measures for bats set out in the HMMP are included in this LEMP and provide a wide range of benefits to different species.

Portsmouth Water will in-perpetuity (and for the avoidance of doubt as long as the Reservoir is in situ and mitigation required) fund the implementation, management and maintenance of mitigation and compensation measure set out in the Strategy (including this LEMP). Funding has been secured through Portsmouth Water Economic regulatory framework and has been agreed and signed off by Ofwat. This funding includes both costs to cover the operational assets but also costs required to mitigate the impact of the Havant Thicket Reservoir and Pipeline Scheme.

Portsmouth Water shall be responsible for undertaking and managing the requirements for mitigation and compensation set out in the Strategy (including this LEMP) on the land in its ownership and responsible for its costs. In addition, Portsmouth Water shall be responsible for undertaking and managing (or procuring the undertaking and management) the requirements set out in the Strategy on Forestry England land and Hampshire County Council land, unless Forestry England or Hampshire County Council advise Portsmouth Water that they shall undertake and/or manage any specific element of the requirements in respect to their land, which in all respects shall be at the cost of Portsmouth Water.

Monitoring of the mitigation and compensation measures set out in this LEMP is being undertaken by a Technical Advisor appointed by Portsmouth Water. When it is determined that projects are complete, they are signed off by the Technical Advisor. Completion of annual work schedules are also agreed and signed-off by the Technical Advisor.

3.1.7. Site Infrastructure

The current planning permission includes construction of an earth embankment, viewing area, overflow discharge/spillway, new road junctions to facilitate access, and associated works.

A Reserved Matters application has been approved for Phase 1 of the Scheme, which includes the construction of the Northern Access Route from the B2149 to a temporary site compound which in future will become the site of a visitors' car-park in the north-west corner of the Site.

Outline planning permission has also been granted for the following additional developments to be designed and constructed at later phases of the Scheme and subject to Reserved Matter applications:

- A Control House partially incorporated within landscaped earth mounding adjacent to the reservoir in the south west;
- A visitor centre/café, picnic area and children's play area to the north-west of the reservoir;
- A new visitor car park close to the visitor centre to accommodate over 250 cars, plus spaces for staff, coaches and disabled drivers;
- An access route from the south to the visitor car park;
- A permanent wetland area on the northern side of the reservoir that will include new bird hides and screens;
- A perimeter tracks and a network of bridleways, cycle paths and footpaths;
- An operational slipway on the western bank of the reservoir.

A Reserved Matters application has been submitted to the LPA for approval of Phase 2 (Wetlands Embankment) in March 2024. This updated version of the LEMP accords with the details of the application for Phase 2.

A Section 73 application for changes to the main embankment, culvert and valve tower was submitted for approval in April 2024, along side a Reserved Matters application for Phase 3 (Main Embankment) which accords with the Section 73 application. This updated version of the LEMP accords with the details of the Section 73 and the Phase 3 Reserved Matters application.

3.1.8. Detailed Phasing Plan

The Detailed Phasing Plan has been produced by the Principal Contractor (doc no. HTR-FUW-RZ-RE-DP-W-507). Table 3-3 below shows the current phases of the Scheme and proposed Reserved Matters application dates.

Table 3-3 - Proposed Phasing Plan for Construction of the Reservoir (as of December 2023)

Ref.	Element Covered	Proposed Submission Timing	Additional Information
1	Northern Access Route	July 2022	Approved February 2023
2	Wetland	Q1 2024	Submitted March 2024
3	Main Embankment, Culvert and Valve Tower	Q1 2024	Submitted April 2024
4	Southern Access Road	Q2 2024	
5	Control House and Bi-directional Pipe	Q3 2024	
6	Secondary Means of Access to Outlet Tower	Q1 2025	
7	Spillway	Q4 2025	
8	Hard and Soft Landscaping, Forestry England Track Raising and Culverts	Q2 2026	
9	Visitor Centre	Post 2026	

3.2. Environmental Information

Information in this section has been collated from desk studies and details of surveys undertaken to inform the ES, particularly Volume 2, Chapter 9 – Biodiversity. Full details of the studies and surveys undertaken can be found in the ES.

3.2.1. Climate

The Site lies within Southern England which can be subject to weather influences from continental Europe that bring cold spells in winter and hot, humid weather in summer. However, the Site is 11 km from the English Channel which creates a generally mild climate.

Average temperatures at Havant in winter range from 2 to 8° C (January), and in summer range from 14 to 24° C (August). Extreme maximum temperatures can occur in July or August and are usually associated with heat waves lasting several days.

As with much of Southern England, the Site is distant from the route of many Atlantic depressions and relatively sheltered from rain-bearing south-westerly winds. The South Downs to the north of the Site have an average of over 950 mm per year. Average rainfall for the Site from interpolated climate data (see Table 3-4 below) is 835 mm per year. Rainfall is generally well-distributed throughout the year but with an autumn/early winter maximum.

Mean monthly hours of sunshine range from 60 in December to 255 in July at Havant.

Table 3-4 - Interpolated climate data for Havant Thicket Reservoir⁹

Climate Parameter	Data for SU715101
Average altitude (m)	40
Average annual rainfall (mm)	835
Accumulated temperature above 0°C (January – June)	1505
Field Capacity Days (FCD)	180

3.2.2. Geology and Geomorphology

The reservoir will be situated within a shallow clay valley. The primary bedrock geology of the site is London Clay Formation, with bedrock of the Reading Formation of the Lambeth Group present in the north of the Site close to the north-west and north-eastern boundaries. The geology is formed of sedimentary clay, silt and sand, with sand formation prominent in Havant Thicket woodland and clay, silt and sand found elsewhere on the Site.

The highest point of the Site in elevation is Horsefoot Hill at the northernmost point of the Site, with an altitude of 71 m. The land slopes gently toward the south to a low point of 20 m adjacent to Thicket Lawn, where the planned compensation flow channel drains from the reservoir towards the Riders Lane stream.

3.2.3. Soils and Substrates

The soils are described as slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, with impeded drainage.

3.2.4. Hydrology and Drainage

The impeded drainage caused by the clayey soils results in seasonally wet ground conditions and overland flow draining to streams which flow south from Havant Thicket woodland towards the wetland and reservoir location.

The Site receives moderately high levels of rainfall over the year, with an average annual rainfall of 835 mm, as compared to lowland Central England which receives approximately 750mm per year. The soil is predicted to be at field capacity (i.e. the amount of soil moisture or water content held in the soil after excess water has drained away) for 180 Field Capacity Days (FCD) per year (see Table 3-4).

3.2.5. Habitats and Flora

Habitats Lost to the Scheme

The following habitats are lost to the reservoir construction: grassland used as pasture, broadleaved woodland (including semi-natural ancient woodland and ancient, replanted woodland), conifer plantation on an ancient woodland site, ponds, streams and ditches.

Streams flow across the Site from Havant Thicket woodland to converge and flow into the Riders Lane Stream. Upper Lake, a man-made, shallow pond at the northern end of The Avenue which is lost to the reservoir, is considered of County importance for wetland and aquatic plant species (including marsh pennywort, floating club-rush, marsh St Johns-wort, lesser skullcap and creeping forget-me-not). A second pond lost to the reservoir is a medium sized, completely shaded waterbody with moderate water quality and no macrophyte cover close to the southern edge of Havant Thicket woodland.

⁹ Met Office (1989) *Climatological Data for Agricultural Land Classification* (ALC010) Available online at: <http://publications.naturalengland.org.uk/publication/6493605842649088>. Accessed May 2022.

Woodland

Much of Havant Thicket woodland is ancient, replanted woodland, and has a mix of conifer plantation and broadleaved woodland regeneration on ancient woodland soils. It has been subject to alterations through commercial forestry, including removal of most of the conifer plantations circa 2007. A number of mature and veteran trees are present, particularly yew, pedunculate oak and beech. The Blendworth Fragment is also ancient, replanted woodland.

Bells Copse has both semi-natural ancient woodland, composed of hazel coppice with pedunculate oak standards, and mature plantation on ancient woodland soils. The section of Cabbagefield Row woodland within the Site is semi-natural ancient woodland.

There are two remnant ancient woodlands that were much larger prior to felling for the reservoir construction. These are The Avenue and Round Wood, which remain as blocks of woodland adjacent to the southern boundary of the Site with Staunton Country Park.

The Swanmore Road Shelterbelt is not ancient woodland.

Ancient woodlands are considered to be irreplaceable habitats and Regionally important in the context of the Site. A number of Regionally important veteran trees that are considered irreplaceable features were recorded within The Avenue.

The woodland at the Site is considered a Priority habitat, this includes both Lowland Mixed Deciduous Woodland and Wet Woodland.

Grassland

Grassland Priority habitats at the Site include Purple Moor-grass and Rush Pasture and Lowland Acid Grassland.

Neutral grassland present at the Site that would meet the criteria for selecting SINCs in Hampshire and forms part of an ecological network of habitats, therefore is of County importance.

Ponds and Watercourses

There are several ponds within the Site located within Havant Thicket woodland. These include a series of former brick pits in the east of Havant Thicket woodland, and a single pond in the centre of the woodland. These ponds are considered Priority habitat.

Two new ephemeral ponds have been created within Gipsies Plain as part of pre-enabling works for the Scheme.

The headwater streams of the Riders Lane catchment within the Site are also of County importance for aquatic invertebrate species. These headwaters are small intermittent streams, with varying planforms and habitat availability. The streams flow along narrow, often undefined channels with shallow, slow flowing water. There are reaches that are shaded as a result of flowing through woodland. None of the watercourses within the Site are designated main rivers by the Environment Agency at that point.

3.2.6. Invertebrates

Aquatic Invertebrates

Aquatic invertebrate surveys undertaken for the ES in 2008 and 2020 on the headwater streams identified seven species of at least regional importance, including two Nationally Scarce beetles (*Ochthebius pusillus* and *Hydrochus angustatus*) and one nationally Scarce caddisfly (*Limnephilus bipunctatus*). The watercourses are considered suboptimal for most fish species, except for small, commonly occurring species, such as stickleback (*Gasterosteus* species).

Terrestrial Invertebrates

The terrestrial invertebrate assemblage is of Local importance and includes some Priority species, but species present are relatively common and widespread within Hampshire.

3.2.7. Amphibians and Reptiles

A small population of great crested newts of Local importance is present within ponds in the east of Havant Thicket woodland and there are large areas of suitable terrestrial habitat within range of the ponds. Palmate newt has been recorded in Upper Lake.

The grassland at the Site is considered to be important for reptiles, supporting populations of four species (adder, grass snake, common lizard and slow-worm) and providing suitable foraging, shelter and hibernation habitat for these species.

3.2.8. Birds

An assemblage of breeding birds of County importance has been recorded within the Site including breeding skylark and firecrest, and foraging nightjar. The Site also supports an assemblage of overwintering bird species of Local importance, typical of grassland and woodland habitats.

3.2.9. Mammals

Bats

A Nationally important assemblage of at least 13 species of bats use the Site and surrounding area for roosting, foraging and commuting. These include barbastelle, Bechstein's bat, Brandt's bat, brown long-eared bat, common pipistrelle, Daubenton's bat, Nathusius' pipistrelle, Natterer's bat, noctule, serotine, soprano pipistrelle, whiskered bat and Alcahoie bat. Both barbastelle and Bechstein's bat are qualifying species of Special Areas of Conservation (SAC), internationally-important sites that are within 30 km of the Site.

Bechstein's bat maternity roosts have been recorded adjacent to the Site to the east (on the edge of the Holt), and south (within Staunton Country Park). Brown long-eared bats are also known to have a maternity roost within the Site.

In addition, Bechstein's bat, Natterer's bat and brown long-eared bat are known to have day or night-time roosts within the Site; and as the Site contains extensive areas suitable for roosting bats, there is potential for common pipistrelle, soprano pipistrelle and *Myotis* species bats to also have day or night roosts within the Site, as roosts of all these species have been recorded in the surrounding areas.

Hazel Dormouse

A dormouse population of County importance is present at the Site. Surveys carried out between 2005 and 2009 concluded that hazel dormouse were present. In addition, there are records of the species from woodland to the west and south-west of the Site, with good connectivity. This is a widespread species in Hampshire, but subject to development pressure locally.

Water Vole

Water vole has not been recorded at the Site, but there may be potential for this species to colonise the Site in the future. Water voles have been recorded on the Lavant Stream, which flows into Langstone Harbour 1.3 km east of the Hermitage Stream. A route for colonisation from the Lavant Stream could include the short length of coastline to the Hermitage Stream and tributaries, through the urban area of Havant.

Otter

Otters have not been recorded at the Site, but recent surveys in 2023 identified otter spraint on the Riders Lane Stream 920 m south of the Site. As a wide-ranging species there is potential for otters to colonise the Site in the future. There is suitable secluded habitat within the Site and connectivity with marine habitats via riparian corridors, although no records of otter from within 2 km for the Site are currently known.

Badger

This common species is offered legal protection for welfare reasons and therefore should be taken into consideration during construction. All areas of site are suitable for use by badgers for foraging and the woodland habitat could harbour badger setts. There are known to be a badger present at the Site and they are highly likely to commute through the Site to reach foraging areas within or adjacent to the Site.

Other Mammals

European hedgehog, a Priority species, has been recorded approximately 30 m east of the Site, and there is suitable habitat for this species within the Site.

An active fox earth has been recorded by ECOSA on Deerslaughter Plain in the south-west corner of the Site, and foxes are likely to use the Site for foraging, shelter and commuting to other sites.

3.2.10. Invasive Non-Native Species

The following invasive non-native species (INNS)¹⁰ have been recorded at the Site:

- Parrot's feather is present in two ponds in the east of Havant Thicket woodland;
- Montbretia and rhododendron have been reported as present within Havant Thicket woodland; and
- Mandarin duck was recorded breeding in Upper Lake within the footprint of the reservoir.

Although not currently recorded at the Site, Himalayan balsam is present in the Hermitage Stream catchment, downstream of the Site.

3.3. Cultural and Landscape

3.3.1. Past Land Use

A comprehensive search of historic maps and archive information has shown that the Site is a man-made landscape that has changed significantly through time. Initially the habitat developed from a largely open landscape to what was most likely a grazed heath/grassland with scattered trees and eventually into wood pasture, with glades, rides and open heathland areas, enclosed within a 'park pale'.

From 1800 the area was leased by the owners of the mansion house at Leigh, but copyholders still had the right to graze animals across the Site. As the level of grazing reduced more tree growth occurred, which is likely to have been supplemented by planting undertaken by the new lease holder.

Historic maps indicate that woodland did not become established across the Site until the mid-19th Century. Prior to enclosure in 1870 the Site was part of the 'wastes' of the Manor of Havant and was subsequently incorporated into the Leigh Park Estate when all common grazing rights were removed. The area was planted with oak in compartments. The habitat became a managed woodland for timber, shooting and recreational pursuits.

In 1874 a new avenue was cut through Havant Thicket and a new lake was constructed by damming the existing smaller watercourse to the west of the new ride. The lake had a waterfall (weir), boat house and bathing house. By 1987 these features were labelled on the OS historic mapping as the Avenue and Upper Lake.

In 1953/54 aerial photographs confirm the woodland was cleared on either side of the Avenue, leaving two small recently planted, oak plantations (Middle Clearing and Round Wood) to the west of the Avenue, which were planted as a cash crop prior to 1954.

From 1966 to 1971 the Ministry of Agriculture Food and Fisheries (MAFF) funded scrub and stump clearance work to create agricultural land on either side of the Avenue. This included ripping, rotovating, ploughing, fertiliser spreading and seeding each area as it was cleared to make the land suitable for grazing. In 1973 MAFF funded land drainage works across the Site.

3.3.2. Landscape Features

The Site lies within a shallow valley located between the residential settlements of Leigh Park and Rowlands Castle. Prior to the reservoir construction it comprised predominantly open grassland with some woodland, hedgerows and ditches. Lost to the reservoir is part of an area classified as ancient woodland that ran from north to south known as The Avenue. Three other areas of ancient woodland, Middle Clearing, Round Wood the Corsican Pine Plantation, are wholly or partly lost to the reservoir, and a section of the Blendworth Fragment is lost to the Northern Access Route.

A Public Right of Way (bridleway) route that extends across the Site from east to west will be diverted around the reservoir temporarily to the north during construction, and permanently to the south of the reservoir thereafter.

The residential areas of Warren Park and Leigh Park lie to the west and south-west of the Site, the nearest of which are present on Swanmore Road adjacent the western boundary of the Site. The settlements of Rowlands Castle and Stansted to the east of the Site.

Havant Thicket woodland in the north of the Site and Bell's Copse in the west of the Site, are owned and managed by FE for timber production and are also classified as ancient woodland. Partly within the western

¹⁰ Non-native species considered invasive in England and Wales and subject to legal controls (refer to Section 2.1.5).

boundary of the Site is an area of woodland known as Cabbagefield Row, beyond which is open areas of grassland and woodland. South of this area lies the residential district of Leigh Park.

The Site includes part of Staunton Country Park, a Grade II* Registered Park and Garden, and is partly within the Sir George Staunton Conservation Area. An area of open grassland and woodlands within the Site is managed by HCC as part of Staunton Country Park.

3.4. Access and Public Use

Part of the Site that was managed by HCC as part of Staunton Country Park was publicly accessible land. This linked to Leigh Park Gardens to the south and included land covered by The Avenue and open grassland to the west of The Avenue, up to the edge of Havant Thicket in the north and the edge of Bell's Copse and Cabbagefield Row in the west. Havant Thicket woodland and Bell's Copse are Open Access land.

Bridleway 121 runs along part of the west boundary, running along Swanmore Road heading north along the edge of Cabbagefield Row before meeting Bridleway 120 at right angle just south of Bell's Copse. The route of Bridleway 120 crossed the Site on an east west alignment and has been diverted around the reservoir. In the east of the Site, Bridleway 29 continues east past Gipsies Plain before emerging on Manor Lodge Road adjacent the War Memorial at Rowland Castle.

Staunton Way passes through Leigh Park gardens to the south of the Site, heading north through Hammond's Lands Copse, emerging into the site at Gipsies Plain, following the site boundary running north east before turning 90 degrees and connecting onto Manor Lodge Road.

E9 European long-distance route enters Leigh Park Gardens to the south of the Site. Coming from the south at Great Copse it crosses Middle Park Way, entering the country park and crossing High Lawn. It runs along an alignment in a north east direction through Hammond's Lands Copse to connect with Staunton Way on site at Gipsies Plain.

Part 2

4. Identification and Evaluation of Features

4.1. Identification of Features

This section identifies the important landscape and ecology features present at the Site as defined in the ES, Volume 2.

4.1.1. Ecological Features

Important ecological features include Sites of Importance for Nature Conservation (SINCs), habitats, assemblages of species, or populations of individual species.

Designated Sites

There are eight SINCs, of County importance, selected for their importance for nature conservation within Hampshire, that are wholly or partially within the Site: These are: Middle Clearing SINC, Thicket Bottom SINC, Thicket Bottom Woods and Lake SINC, Havant Thicket SINC, Havant Thicket (South-West Corner) SINC, Idsworth Common SINC, Bell's Copse SINC and Cabbagefield Row SINC. A further seven SINCs are immediately adjacent to the Site.

Ancient Woodland

Ancient Woodland is an irreplaceable habitat. Ancient, replanted woodland is present within Havant Thicket woodland, Blendworth Fragment and the north-east of Bell's Copse. There is also an area of ancient, replanted woodland within the Site to the east of Round Wood. These woodland include Plantations on Ancient Woodland Soils (PAWS).

Semi-natural ancient woodland is present within the remainder of Bell's Copse, Cabbagefield Row, Round Wood and The Avenue as well as the remainder of the woodland at the southern end of The Avenue that is within the Site.

Veteran Trees

A number of veteran trees that are considered irreplaceable features were recorded within The Avenue.

Habitats and Flora

Important habitats include Priority habitats¹¹ as well as other habitats at the Site considered to be important for wildlife on their own, or that act as a component of a wider landscape important for wildlife.

Priority habitats that are of principal importance for the purpose of conserving biodiversity in England in relation to Section 41 of the NERC Act 2006 and are of County importance in the context of the Site. These include lowland mixed deciduous woodland, wet woodland, purple moor-grass and rush pasture, lowland acid grassland and ponds.

Fauna – Important Species

Important species include Priority¹², Red-Listed¹³, legally protected or rare¹⁴ species. The Site has important species, that are either legally protected, Priority species, or both.

Priority or legally protected species may use the Site in the future so such species will be taken into consideration during monitoring of the Site and included within later iterations of the LEMP.

¹¹ Habitats of principal importance listed under Section 41 (S41) of the Natural Environment and Rural Communities (NERC) Act 2006 (<https://jncc.gov.uk/our-work/uk-bap-priority-habitats>) and local Biodiversity Action Plan (BAP) Priority habitats.

¹² Species of principal importance under S41 of the NERC Act 2006 (<http://publications.naturalengland.org.uk/publication/4958719460769792>) and local BAP Priority species.

¹³ Species of conservation concern within the UK listed with the Red Data Book (RDB) species (<http://jncc.defra.gov.uk/page-5335>), and Birds of Conservation Concern.

¹⁴ For example, the macroinvertebrate and macrophyte communities are not legally protected but some Nationally Scarce / Rare species have been recorded.

4.1.2. Recreation and Access Features

The Site benefits from large areas of open access land which can be enjoyed by the public for recreational activities such as walking, running and cycling. There is also a bridleway and long-distance footpaths that cross the area, providing further recreational opportunities.

Recreation and access features will include the visitors centre, marked footpaths/trails, interpretation boards, sign-posts, fencing, outdoor facilities, furniture and infrastructure.

4.2. Evaluation of Features

4.2.1. Ecological Features

Tables 4-1 and 4-2 below list the important ecological features, along with their status which is part of what defines them as important. It also provides an evaluation of the important landscape and ecology features as assessed in the ES Volume 2, Chapter 9 – Biodiversity.

Table 4-1 - Evaluation of habitats and flora

Feature	Status	Value given in ES
Mixed woodland	Includes ancient woodland and Priority habitat, and within SINC	Regionally important
Veteran trees		Regionally important
Wet woodland	Priority habitat included within SINC	County importance
Purple moor-grass and rush pasture	Priority habitat	County importance
Acid grassland	Priority habitat included within SINC	County importance
Ponds	Priority habitat and within SINC	County importance
Headwater streams		County importance
Neutral grassland		County importance

Table 4-2 - Evaluation of important species

Feature	Status	Value given in ES
Bats	Legally protected and includes Priority species	Nationally important
Hazel dormouse	Legally protected and Priority species	County importance
Breeding birds	Legally protected and includes Priority species	County importance
Reptiles (adder, grass snake, common lizard and slow-worm)	Legally protected and Priority species	County importance
Winter birds	Legally protected and includes Priority species	Local importance
Great crested newts	Legally protected and Priority species	Local importance
Aquatic invertebrates	Includes Nationally Scarce species	Not specified
Terrestrial invertebrates	Includes Priority species	Local importance
Badger	Legally protected	Negligible
Other amphibians (e.g. palmate newt)		Not specified

Feature	Status	Value given in ES
Otter	Legally protected and Priority species	Not specified
Water vole	Legally protected and Priority species	Not specified

4.2.2. Recreation and Access Features

The following recreation and access features will be created at the Site, and therefore were not evaluated in the ES, which assessed the value of existing features. However, these features will require management as part of this LEMP following design and construction:

- Fencing and gates;
- Marked footpaths/trails and sign-posts;
- Viewing screens/hides and information/interpretation boards;
- The visitor centre; and
- Outdoor facilities, furniture and infrastructure.

5. Factors Influencing Management

In the preparation of this LEMP, relevant influences, threats, constraints or opportunities (collectively known as 'factors') have been taken into consideration. These factors are important for the following reasons:

- They provide the basis for why appropriate management is required in order to meet the objectives assigned to a feature;
- They include restrictions to the carrying out of management operations which may require deviation from a preferred optimal method of working;
- They include natural and man-made influences and may have an immediate effect or be incremental over time.

5.1. Identification of Factors

The following natural factors have been identified that affect or will affect the features, and will provide a basis for planning management:

- Natural succession – the most important natural factor influencing management, which is the natural change in habitats as vegetation grows and one habitat type is succeeded by another. Natural succession is a key determinant in the requirement for ongoing management measures implemented for biodiversity compensation. Therefore, this is a priority for management.
- Shading – growth of scrub or trees can shade out a grassland habitat, which might result in the loss of target species that require open, sunlit conditions.
- Deer and rabbits – deer browsing and rabbit grazing can cause significant damage to new plants during establishment and therefore must be controlled.
- Dominant species – aggressive and vigorous species that can cause suppression of target species would require control. These can be non-native (such as INNS), or particularly successful native species, where conditions are right, such as bramble and bracken.
- Weather and climate – this natural factor, which includes rainfall patterns and the effects of climate change, should be taken into consideration during design of the wetland and visitor facilities.

The following man-made/human factors have been identified that affect or will affect the features, and will provide a basis for planning management:

- Visitor pressure – the most important human factor, which is a priority for management. The activities of visitors to the Site will shape certain habitats and determine where landscape features are placed. In addition, visitors (and in particular dogs) could disturb sensitive species.
- Public opinion – the opinions of local people and those that access the Site are important in relation to management. General favourable opinion for management works could result in positive community involvement and support, whereas unfavourable opinion might result in objections to specific works.
- Anti-social behaviour – litter, vandalism and damage would require management and maintenance to rectify.
- Domestic pets – pets, particular dogs, if uncontrolled, could disturb wildlife and may also cause spread of INNS (such as parrot's feather in aquatic habitats).
- Picking, hunting or taking of wildlife – the instances of human activity such as hunting or picking wild plants within the Site may be small, but effects of biodiversity could be significant.
- Dumping and rubbish – larger scale dumping of rubbish, such as fly-tipping would require management to rectify.
- Invasive non-native species (INNS) – as described above certain species can suppress natural vegetation through their dominance under certain conditions. INNS is a man-made/human factor as they are introduced species.

5.2. Summary of Factors

Tables 5-1 and 5-2 below provide a summary of the natural and man-made/human factors identified above that will potentially influence the management of important features.

Table 5-1 - Significant factors currently acting on the nature conservation features or likely to act on them in the future

Feature	Natural Factors (in order of priority)	Human Factors (in order of priority)
Mixed woodland	Natural succession Deer browsing Dominant species	Visitor pressure Public opinion Anti-social behaviour Domestic pets Picking, hunting or taking of wildlife Dumping and rubbish Invasive non-native species
Veteran trees	Natural succession Shading Deer browsing Dominant species	Visitor pressure Public opinion
Wet woodland	Variations in water level Rainfall and climate change Natural succession Deer browsing Dominant species	Visitor pressure Public opinion Anti-social behaviour Domestic pets Picking, hunting or taking of wildlife Dumping and rubbish Invasive non-native species
Purple moor-grass and rush pasture	Hydrology Natural succession Shading Deer browsing Dominant species	Input from drainage Visitor pressure Public opinion Anti-social behaviour Domestic pets Picking, hunting or taking of wildlife Dumping and rubbish Invasive non-native species
Acid grassland	Natural succession Shading Deer browsing Dominant species	Visitor pressure Public opinion Anti-social behaviour Picking, hunting or taking of wildlife Dumping and rubbish Invasive non-native species
Ponds	Natural succession Shading Dominant species Rainfall and climate change	Invasive non-native species Visitor pressure Public opinion Anti-social behaviour Domestic pets Picking, hunting or taking of wildlife Dumping and rubbish

Feature	Natural Factors (in order of priority)	Human Factors (in order of priority)
Headwater streams	Natural succession Shading Dominant species Rainfall and climate change	Visitor pressure Public opinion Works to rides and culverts Picking, hunting or taking of wildlife Dumping and rubbish Invasive non-native species
Neutral grassland	Natural succession Shading Dominant species	Visitor pressure Public opinion Anti-social behaviour Domestic pets Picking, hunting or taking of wildlife Dumping and rubbish Invasive non-native species
Bats	Natural succession Shading	Domestic pets Lighting Vehicle movements Visitor pressure Public opinion Picking, hunting or taking of wildlife
Hazel dormouse	Natural succession Shading Deer browsing Dominant species	Visitor pressure Public opinion Anti-social behaviour Domestic pets Picking, hunting or taking of wildlife Dumping and rubbish Invasive non-native species
Breeding birds	Natural succession Shading Deer browsing Dominant species	Visitor pressure Public opinion Anti-social behaviour Domestic pets Picking, hunting or taking of wildlife Dumping and rubbish Invasive non-native species
Winter birds	Natural succession Dominant species	Visitor pressure Public opinion Anti-social behaviour Domestic pets Picking, hunting or taking of wildlife Dumping and rubbish
Reptiles (adder, grass snake, common lizard and slow-worm)	Natural succession Shading Dominant species	Visitor pressure Public opinion Anti-social behaviour Domestic pets Picking, hunting or taking of wildlife

Feature	Natural Factors (in order of priority)	Human Factors (in order of priority)
		Dumping and rubbish
Great crested newts	Natural succession Shading Dominant species	Visitor pressure Public opinion Anti-social behaviour Domestic pets Picking, hunting or taking of wildlife Dumping and rubbish Invasive non-native species
Terrestrial invertebrates	Natural succession Shading Deer browsing Dominant species	Visitor pressure Public opinion Anti-social behaviour Picking, hunting or taking of wildlife Invasive non-native species
Badger	Natural succession	Visitor pressure Public opinion Anti-social behaviour Domestic pets Picking, hunting or taking of wildlife
Other amphibians (e.g. palmate newt)	Natural succession Shading Dominant species	Visitor pressure Public opinion Anti-social behaviour Domestic pets Picking, hunting or taking of wildlife Dumping and rubbish Invasive non-native species
Otter	Natural succession Shading	Visitor pressure Public opinion Anti-social behaviour Domestic pets Picking, hunting or taking of wildlife Dumping and rubbish
Water vole	Natural succession Shading Invasive species (i.e. American mink)	Visitor pressure Public opinion Anti-social behaviour Domestic pets Picking, hunting or taking of wildlife Dumping and rubbish

Table 5-2 - Significant factors likely to act on recreation and access features

Feature	Natural Factors (in order of importance)	Human Factors (in order of importance)
Fencing and gates	Weather and climate	Visitor pressure Anti-social behaviour Public opinion Picking, hunting or taking of wildlife Dumping and rubbish Invasive non-native species
Viewing points/hides and information boards	Weather and climate Natural succession Dominant species	Visitor pressure Anti-social behaviour Public opinion Domestic pets Picking, hunting or taking of wildlife Dumping and rubbish Invasive non-native species
Marked footpaths/trails and sign-posts	Weather and climate Natural succession Dominant species	Visitor pressure Anti-social behaviour Public opinion
Visitor centre	Weather and climate	Visitor pressure Anti-social behaviour Public opinion Domestic pets Picking, hunting or taking of wildlife Dumping and rubbish Invasive non-native species
Outdoor facilities, furniture and infrastructure	Weather and climate Natural succession Shading Dominant species	Visitor pressure Anti-social behaviour Public opinion Domestic pets Picking, hunting or taking of wildlife Dumping and rubbish Invasive non-native species

6. Objectives

The objectives provided in this LEMP form the basis for setting the targets and management prescriptions. The progress of management in relation to its targets will be measured to ensure the objectives will be met. Where progress is hindered and/or an objective becomes difficult to fulfil, then it should be reviewed as part of the review process (see Section 9) and amended if necessary and new targets set. However, the objectives should not be amended as part of the yearly planning of management tasks.

The following Tables 6-1 and 6-2 summarise objectives and targets against each feature, that have been adopted for the Strategy. These objectives originate from the Outline BMCS and have therefore been accepted as part of the planning application and agreed by the Local Planning Authorities and other stakeholders.

In order to achieve delivery, the result of the objective and target setting has been developed for this LEMP into a series of detailed objectives, targets and prescriptions within Management Projects, shown in the right-hand column of Tables 6-1 and 6-2. These projects are defined in more detail in Part 3.

Refer to the work programme in Appendix C for the current timetable and progress for each Management Project.

Table 6-1 - Summary of the agreed management objectives and targets for important ecological features and corresponding management projects

Feature	Objectives and Targets	Management Projects
Mixed woodland	- Provide 0.76 ha broadleaved woodland planting on Gipsies Plain to compensate for the loss of habitat connectivity provided by The Avenue, and 0.74 ha wood pasture/parkland. - Provide 1.38 ha broadleaved woodland planting and 1.1 ha of wood pasture/parkland within Memory Park in the west of the Site by planting of native species blocks to provide a mosaic of habitats. - Provide an additional area of woodland planting on Site totalling 0.3 ha.	Woodland Creation
	- Felling and clearance of pine plantations and subsequent planting of native broadleaved trees, including pedunculate oak, hazel, aspen, alder and black poplar. - Retain suitable mature trees within clear-fell areas as perches for birds.	Conifer Clear Fell and Replanting
	Creation of clearings through birch dominated woodland to encourage existing broadleaved trees through respacing/halos and planting new broadleaved woodland (leaving some unplanted clearings).	Birch Clearings and Replanting
	- Management of Bell's Copse on a long-term coppice rotation. - Management of woodland at base of The Avenue, Cabbagefield Row, Retained area of Round Wood, and Swanmore Road shelterbelt, to increase structural diversity.	Woodland Management
	Management of previous clear fell areas to create rotational glades with graded edges.	Forest Glades
	- Create artificial woodpecker holes, broken branches, artificial damage to trunks, and areas for rot to begin in some non-veteran retained trees. - Ringbark some retained non-native trees to create standing dead wood. - Retain selected existing dead and dying standing trees.	Veteranisation of Retained Trees
	Translocation of felled timber to retained locations to create 'standing monoliths' and other features.	Dead Wood Translocation
Wet woodland	The Corsican Pine Plantation will be felled and suitable areas replanted with alder, aspen, black poplar and willow to create wet woodland.	Wetland/Wet Woodland Creation
Acid grassland	Develop parcels of acid grassland and scrub within Havant Thicket woodland.	Forest Glades
	Rotational management of grassland along wayleave in north-west of Bell's Copse.	Scrub Mosaic Management
Purple moor-grass and rush pasture	Enhance species-poor marshy grassland and neutral grassland habitat to create Purple Moor-grass and Rush Pasture.	Rush-pasture Enhancement
	Develop Purple Moor-grass and Rush Pasture habitat within Havant Thicket woodland.	Forest Glades

Feature	Objectives and Targets	Management Projects
Ponds	Create two ephemeral waterbodies on Gipsies Plain within new woodland.	Pond Creation
	Selective thinning (regeneration felling) of conifers around ponds to open up light levels to encourage aquatic plant growth.	Pond Enhancements
	Protect on-site features (particularly aquatic features) from INNS establishment by eradicating INNS where present and minimising spread.	INNS Biosecurity Plan
	Identify a suitable location and then install a dog dipping pond.	
Headwater streams	- Opening up of stream corridors with graded edge. - Ongoing rotational management. - Provision of woody debris for the streams. - Creation of six small ponds on headwater streams in Havant Thicket woodland for macrophyte translocation, with leaky dams installed to slow flow. - Creation of localised areas of flooding (new ponds) by introducing wood into the stream. - Reduce inputs from sediments, nutrient run-off and pesticides in upper Riders Lane Stream catchment and reservoir. - New track culvert (in reach 2) to reduce flooding along this access point.	Headwater Stream Restoration
Neutral grassland	- Create 36.71 ha of new/enhanced neutral grassland. - Create a large expanse of meadow grassland on the downslope of the reservoir embankment.	Grassland and Rush Pasture Creation/Restoration
	Provide and maintain suitable fencing and gates for grassland management (grazing stock).	Fencing and Gates
	- Management of retained and new grassland (including scrub edge interfaces) to provide varied sward height that will provide suitable habitat for reptiles, new territories for skylark and meadow pipit, and foraging habitat for kestrel. - Increase species diversity - Introduce a grazing regime to deliver long-term stability in grassland quality.	Grassland Enhancement
Scrub	- Retain willow scrub along the north-eastern boundary of the reservoir site and Havant Thicket woodland. - Provide 0.37 ha of new scrub edge habitat.	Scrub Edge Creation
	Develop mosaic of scrub in glades within Havant Thicket woodland.	Forest Glades

Feature	Objectives and Targets	Management Projects
	Provide a mosaic of scrub and grassland along wayleave in north-west of Bell's Copse.	Scrub Mosaic Management
Wetland	- Creation of 10.2 ha of wetland with south-facing margins comprising of a mosaic of grassland, scrub, wet woodland and ephemeral pools. - Wetland will be fed by three headwater streams. - Wetland water level will naturally fluctuate. - Structures will retain water in the wetland when the main reservoir water levels low. - The wetland will have variable water depths and will include a number of islands, and reedbed areas.	Wetland/Wet Woodland Creation
Reservoir/open water	Develop shoreline ephemeral shallow vegetation on the north-east corner of the reservoir.	Shoreline Habitat Creation
Watercourses	- Add new 144m long channel to provide additional habitat diversity to the east of the reservoir footprint. - Add new culvert underneath the track to connect the new habitat to the drain.	New Watercourse Creation – Gipsies Plain
	Creation of a new 250m reach of channel to provide compensation flow channel from reservoir to Riders Lane Stream.	Reservoir Compensation Flow Channel
Aquatic plants (macrophytes)	Translocate a small number of notable plants from on-site standing water, watercourses and ditches to suitable new and enhanced ponds within Havant Thicket woodland. Species will comprise marsh St. John's-wort, floating club-rush, lesser skullcap and creeping forget-me-not from standing water, and ragged robin, marsh pennywort and marsh St. John's-wort from watercourses and ditches.	Aquatic Plant Translocations
	Also objectives for ponds to provide INNS Biosecurity Plan will benefit aquatic plants	
Bats	Bolster hedgerows in the east of the Site with new planting to improve habitat connectivity.	Hedgerow Creation/Restoration
	- Creation of graded edges to existing rides to provide enhanced habitat. - Ongoing rotational management.	Ride Management
	In addition, the objectives for the following projects will benefit bats: Woodland Creation, Grassland and Rush Pasture Creation/Restoration, Scrub Edge Creation, Veteranisation of Retained Trees, Wetland/Wet Woodland Creation, Pond Creation, Conifer Clear Fell and Replanting, Birch Clearings and Replanting, Woodland Management, Forest Glades, Scrub Mosaic Management, and Grassland Enhancement.	
Hazel dormouse	The objectives for the following projects will benefit hazel dormouse: Woodland Creation, Hedgerow Creation/Restoration, Conifer Clear Fell and Replanting, Birch Clearings and Replanting, and Woodland Management.	

Feature	Objectives and Targets	Management Projects
Breeding birds	The objectives for the following projects will benefit breeding birds: Woodland Creation, Grassland and Rush Pasture Creation/Restoration, Scrub Edge Creation, Veteranisation of Retained Trees, Wetland/Wet Woodland Creation, Conifer Clear Fell and Replanting, Birch Clearings and Replanting, Ride Management, Woodland Management, Forest Glades, Scrub Mosaic Management, and Grassland Enhancement.	
Winter birds	The objectives for the following projects will benefit wintering birds: Grassland and Rush Pasture Creation/Restoration, Wetland/Wet Woodland Creation, Grassland Enhancement and Rush-pasture Enhancement.	
Reptiles (adder, grass snake, common lizard and slow-worm)	Provide hibernacula for reptiles around new ponds.	Pond Creation
	- Translocation of reptiles away from the reservoir footprint. - Increase carrying capacity around the edges of the reservoir site through grassland management and installation of hibernacula and log piles. - Increase carrying capacity in new areas of reptile habitat within Havant Thicket woodland, including management of clearings within birch woodland and stream corridors north of the reservoir site, and installation of hibernacula and log piles.	Reptile and Amphibian Translocation
	In addition, the objectives for the following projects will benefit reptiles: Grassland and Rush Pasture Creation/Restoration, Scrub Edge Creation, Wetland/Wet Woodland Creation, Pond Enhancements, Headwater Stream Restoration, Conifer Clear Fell and Replanting, Birch Clearings and Replanting, Ride Management, Forest Glades, Scrub Mosaic Management, Grassland Enhancement and Rush-pasture Enhancement.	
Great crested newts	The objectives for the following projects will benefit great crested newts: Wetland/Wet Woodland Creation, Pond Creation, Pond Enhancements, INNS Biosecurity Plan, Ride Management, Grassland Enhancement and Rush-pasture Enhancement.	
Other amphibians (e.g. palmate newt)	Translocation of amphibian species away from the reservoir footprint	Reptile and Amphibian Translocation
	The objectives for the following projects will benefit other amphibians: Wetland/Wet Woodland Creation, Pond Creation, Pond Enhancements, INNS Biosecurity Plan and Ride Management.	
Terrestrial invertebrates	Deadwood, particularly large limbs, will be moved from woodland within the reservoir footprint to retained woodland to provide habitat for saproxylic invertebrates.	Translocation of Dead Wood
	In addition, the objectives for the following projects will benefit terrestrial invertebrates: Woodland/Wet Woodland Creation, Hedgerow Creation/Restoration, Grassland and Rush Pasture Creation/Restoration, Scrub Edge Creation, Conifer Clear Fell and Replanting, Birch Clearings and Replanting, Ride Management, Woodland Management, Forest Glades, Scrub Mosaic Management, Grassland Enhancement, and Rush-pasture Enhancement.	
Aquatic invertebrates	Translocate aquatic invertebrate communities at locations with some of the highest diversity as part of enabling works to off-site streams in Southleigh Forest.	Aquatic Invertebrate Translocation

Feature	Objectives and Targets	Management Projects
	In addition, the objectives for the following projects will benefit aquatic invertebrates: Wetland/Wet Woodland Creation, Pond Creation, New Watercourse Creation – Gipsies Plain, Reservoir Compensation Flow Channel, Pond Enhancements and Headwater Stream Restoration.	
Badger	The objectives for the following projects will benefit badgers: Grassland and Rush Pasture Creation/Restoration, Ride Management, Forest Glades, Scrub Mosaic Management, and Grassland Enhancement	
Otter	The objectives for the following projects could benefit otters if they colonise the site: Wetland/Wet Woodland Creation, New Watercourse Creation – Gipsies Plain, Reservoir Compensation Flow Channel, and Headwater Stream Restoration.	
Water vole	The objectives for the following projects could benefit water voles if they colonise the site: Wetland/Wet Woodland Creation, New Watercourse Creation – Gipsies Plain, Reservoir Compensation Flow Channel, and Headwater Stream Restoration.	
Invasive non-native species	Objective to provide INNS Biosecurity Plan for ponds and aquatic habitats will cover other INNS.	

Table 6-2 - Summary of the agreed management objectives and targets for recreation/access features and corresponding management projects

Feature	Objectives	Management Projects
Fencing and gates	- Provide and maintain suitable fencing and gates to manage visitor access. Provide fencing around ecologically sensitive areas of the Site which are being managed for wildlife to prevent access by the public and dogs. - Provide and maintain suitable stock-proof fencing where grazing will be undertaken as part of ongoing management of grassland habitat around the reservoir.	Fencing and Gates
Viewing points and information boards	- Wildlife interpretation boards and viewing points are included to encourage community engagement. - Wildlife information boards and viewing points will be provided adjacent to public footpaths.	Viewing Points and Information Boards
	Addition of signs to raise awareness of non-native invasive species.	INNS Biosecurity Plan
Marked footpaths/trails and sign-posts	- Provide public facilities for enjoyment of the reservoir and Site, including access for all and educational provision. - Re-use timber felled on-site where possible.	Management projects will be defined following detailed design of these elements.
Visitor centre		
Outdoor facilities, furniture and infrastructure		

Part 3



7. Projects and Prescriptions

7.1. Woodland/Wood Pasture Creation

7.1.1. Objectives

Compensate for the loss of existing vegetation.

Compensate for the loss of habitat connectivity provided by The Avenue.

Provide nature conservation and biodiversity functions through re-establishing corridors through the selection of local native species.

Assist in landscape integration with the existing woodland in the immediate surrounding area.

Maintain nesting and foraging opportunities for birds.

Provide new foraging habitat for bats and dormice and benefit birds and invertebrates by providing shelter and food sources.

Provide wood pasture (parkland) areas for more open habitat that will benefit invertebrates and provide different foraging opportunities for bats.

Provide new woodland edge habitat to benefit reptiles.

Allow natural regeneration of woodland as an alternative to planting as much as possible.

Provide a location for re-planting salvaged trees from felled woodland.

7.1.2. Locations

Embankment and surrounding landscape Management Area at Gipsies Plain, Memory Park (Deerslaughter Plain), reinstating and reinforcing the retained Havant Thicket edge north of the reservoir, and bolstering Staunton Country Park edge south of the reservoir.

Locations of woodland creation are shown on Figure A-4 in Appendix A.

7.1.3. Mitigation/Compensation Context

The purpose of advance mitigation and compensation works was to carry out native tree and shrub planting as early as possible in the project in order to help this compensation feature to become established. This tree planting was proposed to strengthen the connectivity on the eastern and western sides of the proposed reservoir site, as part of mitigation for the loss of The Avenue, which forms a functioning link between Staunton Country Park in the south and Havant Thicket in the north.

The advance planting areas at Gipsies Plain (see Figure B-1 in Appendix B) include a mosaic of habitats, which will be suitable for roosting and foraging bats, badgers, hazel dormouse, birds, reptiles, great crested newts, terrestrial invertebrates and aquatic ecology. The advance planting areas provide native lowland mixed deciduous woodland species, two surface-water fed ephemeral ponds to provide long term enhancement for great crested newts and other amphibians, and wood pasture (comprising open grassland including clusters of four specimen trees to reflect existing Regency period parkland planting in the adjacent area of Staunton Country Park).

The advance planting within Memory Park (see Figure B-2 in Appendix B) was implemented in 2020 by Portsmouth Water as an on-site woodland and wood pasture. The planting comprises more than 3000 trees and shrubs (including at least 100 oak trees), and was implemented to provide the community with a quiet place for reflection. The planting areas will create native lowland mixed deciduous woodland and wood pasture (comprising open grassland and clumps of four specimen trees to reflect existing Regency period parkland) and are protected by deer fencing.

New woodland creation will contribute to the compensation measures for the loss of broadleaved woodland and woodland edge to the reservoir and the loss of foraging habitat for bats and dormouse. Survey work carried out in 2008 and 2018 demonstrated that Bechstein's bat can spend significant amounts of time foraging in parkland, therefore extending the area of adjacent parkland will provide benefit for this and other bat species that forage in similar habitat.

Additional areas have been identified for woodland creation to compensate for the woodland lost to the reservoir, which will further strengthen habitat connectivity and landscape integration along the woodland edge and retained linear planted features around the perimeter of the reservoir.

The approach to the additional woodland creation would include a combination of block planting as well as natural regeneration and succession around planted clumps. This approach is proposed in order to promote the establishment of structurally diverse habitats with a more semi-natural character than block planting would achieve on its own, as well as facilitating future management. It is intended that the woodland edge will be transitional rather than abrupt. Planting will be used to create a graded profile, extending outwards across an ecotone boundary into the adjacent grassland habitats.

7.1.4. Targets

Provide 0.76 ha broadleaved woodland planting on Gipsies Plain to compensate for the loss of habitat connectivity provided by The Avenue, and 0.74 ha wood pasture/parkland.

Provide 1.38 ha broadleaved woodland planting and 1.1 ha of wood pasture/parkland within Memory Park in the west of the Site by planting of native species blocks to provide a mosaic of habitats.

Provide an additional area of mixed woodland planting on Site totalling 0.3 ha.

Replacement woodland and wood pasture planting has been included to compensate for the loss of existing vegetation. This also assists with providing nature conservation and biodiversity functions through re-establishing corridors through the selection of local native species in keeping with those already present on the site. Including disease-resistant strains of ash and elm should be considered if available.

The trees also assist in landscape integration with the existing woodland in the immediate surrounding area. This planting ensures nesting opportunities for birds are maintained on Site and provides foraging opportunities for a range of species, with fruit-bearing species of tree selected for inclusion. Species mixes will include hazel and honeysuckle which are important food sources for dormice, and species such as rowan and cherry along the woodland edge, which are suitable food species for birds.

Maintenance of trees to ensure successful establishment will be undertaken during the first five years following planting (the 'Establishment Period'). Ongoing management of woodland areas will continue following the Establishment Period.

Management will be timed to avoid bird nesting season.

7.1.5. Prescriptions

An outline specification for woodland creation is provided in Appendix B. This specification is subject to detailed design. The species mix shall be determined based on local knowledge and survey of the existing woodland on Site to provide a species mix that is suitable and appropriate for the area.

The following activities shall be undertaken during the Establishment Period (Years 1 to 4 following planting):

- Removal of injurious weeds by hand pulling or treatment using suitable herbicide shall be undertaken across all planting plots three times per year during the active growing season to prevent dominance of invasive weed species.
- All weeds within 750 mm diameter around each planted shelter/tree shall be controlled with suitable herbicide at least once per year during the active growing season.
- Tree shelters shall be hand weeded and stakes, tree shelters and ties checked twice annually in April and June. Selected shelters shall be removed if necessary.
- Failed stock shall be replaced annually during the planting season (October to February).
- In Years 2 to 5 following planting remaining shelters of established trees shall be removed. Broken branches shall be pruned after shelters have been removed.
- Plants shall be watered as a minimum every 2 weeks between April and September or during periods of drought as required.
- Litter picking within woodland planting areas shall be undertaken on 3 days annually, or as required.
- Inspections shall be undertaken annually during the Establishment Period to determine status of plants, growth of weeds and grass, and to determine management requirements.

After the Establishment Period (Year 5 following planting onward), the following activities will be undertaken:

- Selected stands of uniform habitat shall be coppiced in rotation from Year 5 following planting to introduce multi-layered structure. Cutting shall be as close to ground level as is practical, and all woody growth with branches extending to within 1 m of footpaths or cycleways shall be removed.
- Litter picking within woodland planting areas shall be undertaken on 3 days annually, or as required.
- Inspections shall be undertaken every 10 years from Year 5 following planting onward.

Further details are provided in the Advance Planting Aftercare and Management Report.

7.1.6. Monitoring

Inspections shall be undertaken annually during the Establishment Period to determine status of plants, growth of weeds and grass, and to determine management requirements.

After the Establishment Period (Year 5 following planting onward), inspections shall be undertaken every 10 years.

Any remedial management shall be reported and actioned through review of this LEMP every 5 years after project commencement.

Monitoring criteria include observing the response of the woodland to coppicing, thinning, felling, fencing or other operations; changes in woodland structure or species composition; the amount and type of natural regeneration; success rates of tree planting; success rates of woodland flora planting or sowing and the control of weeds both woody and herbaceous.

7.2. Hedgerow Creation/Restoration

7.2.1. Objectives

Improve habitat connectivity.

Compensate the loss of vegetation on Site.

Provide value for landscape integration and nature conservation and biodiversity.

Existing and newly created hedgerows to be managed.

7.2.2. Locations

Embankment and surrounding landscape Management Area, including restored hedgerow at Gipsies Plain and new hedgerows alongside the Avenue Staircase, and within/around the Visitor Centre car park.

Also along the western boundary of the Northern Access Route and at the junction with the B2149.

Locations of hedgerow creation/restoration are shown on Figure A-4 in Appendix A.

7.2.3. Mitigation/Compensation Context

New hedgerows are of value for landscape integration and nature conservation and biodiversity. Existing and newly created hedgerows are to be managed to increase their value to wildlife, in particular dormice bats which use habitat within the site for foraging and commuting, and to improve connectivity.

New hedgerows have been included in the advance planting works at Gipsies Plain (see Figure B-1 in Appendix B) to improve vegetation connectivity to help this compensation feature to become established as early as possible. They have been designed to provide foraging and commuting for wildlife.

7.2.4. Targets

To improve connectivity.

Maintenance of hedgerow plants to ensure successful establishment will be undertaken during the first five years following planting (the Establishment Period). Ongoing management of hedgerows will continue following the Establishment Period.

Management will be timed to avoid bird nesting season.

7.2.5. Prescriptions

An outline specification for hedgerow creation/restoration is provided in Appendix B. This specification is subject to detailed design at each phase of the Scheme. The species mix shall be determined based on local knowledge and survey of the existing hedgerows on Site to provide a species mix that is suitable and appropriate for the area.

The following activities shall be undertaken for new hedgerow planting during the Establishment Period (Years 1 to 4 following planting):

- Weeds shall be controlled using mulch mats. Mulch mats shall be replaced and/or straightened annually.
- Tree shelters, stakes and ties shall be checked and straightened and selected shelters removed twice annually in April and June. Hand weeding shall be undertaken around shelters.
- Once sufficient growth is obtained, hedgerows shall be cut annually in February to maintain at 1.2 m to 1.3 m in height.
- Plants shall be watered as a minimum every 2 weeks between April and September or as required during periods of drought.
- Failed stock shall be replaced annually during the planting season (October to February).
- In Years 2 to 5 following planting remaining shelters of established trees shall be removed. Broken branches shall be pruned after shelters have been removed.
- Every 2 years a 2 m buffer on path-side of hedgerow shall be mown using a tractor-mounted flail. Arisings shall be removed.
- Litter picking within hedgerow planting areas shall be undertaken on 3 days annually, or as required.

After the Establishment Period the following activities will be undertaken:

- Hedgerows shall be trimmed in Year 5 following planting, and then every 2-3 years between October and February thereafter. A maximum of 50% of each hedgerow shall be trimmed in any year to no less than 1.2 m height.
- Selected established hedgerows shall be laid where appropriate initially in January or February of Year 3 following planting to maintain a dense, continuous structure. This shall be repeated every 8-10 years or when regrowth reaches 4 m in height.

Notes:

1. The species mixes for hedgerows are provided in Appendix B.
2. Bramble outgrowth of the new hedge shall be cut back without damaging the young trees. This can be done with a tractor flail as long as it is done very carefully to ensure that the planted trees and established trees along the fence line are not damaged.
3. Tops of the planted young trees shall be cut and reduced to an appropriate height above the scrub to encourage new growth to take place lower down so that the trees start to bush out more in the spring and form a thicker hedge. Some young trees shall be selected at intervals and left to grow on as full height trees within the managed hedgerow (e.g. planted oaks and cherry trees).
4. Tree guards along the hedge line shall be selectively removed where the trees are taller than the other vegetation and they are already protected by other scrub. Where the trees are free standing in gaps in the hedge or not adequately screened by other vegetation the tree guards shall be left in place for now.
5. At Gipsies Plain the branches of the very large trees growing on the south-east side of Cedar Drive have almost joined up with the taller trees growing on the north side of the boundary ditch providing connectivity for wildlife. This connection should be retained and developed as part of the maintenance.

7.2.6. Monitoring

Inspections shall be undertaken annually during the Establishment Period to determine status of plants, growth of weeds and grass, and to determine management requirements.

After the Establishment Period (Year 5 onward), inspections shall be undertaken every 10 years.

Any remedial management shall be reported and actioned through review of this LEMP every 5 years after project commencement.

Monitoring criteria include observing the response of the hedgerow to coppicing, thinning, felling, fencing or other operations; changes in hedgerow structure or species composition; the amount and type of natural regeneration; success rates of planting; success rates of hedgerow flora planting or sowing and the control of weeds both woody and herbaceous.

7.3. Grassland and Rush Pasture Creation/Restoration

7.3.1. Objectives

- Create a large expanse of species-rich grassland on the downslope of the reservoir embankment.
- Restore areas of neutral grassland temporarily lost during construction.
- Restore species-poor marshy grassland and neutral grassland habitat lost during construction to create Purple Moor-grass and Rush Pasture.
- Provide value for landscape integration and nature conservation and biodiversity.
- Provide a visual link with adjacent vegetation.
- Maintain a species-rich sward of wildflowers and grasses and prevent nutrient build up in the soil.
- Control encroachment of scrub.
- Maintain an absence of injurious weeds/invasive species.
- Create suitable micro-habitats for invertebrates, including varied sward densities, patches of bare substrates, promotion of larval food plants and scattered scrub.
- Long-term management through grazing of the embankment by sheep where appropriate.

7.3.2. Locations

- Embankment and surrounding landscape Management Area, north-east corner, surrounding the reservoir and visitor centre.
- Locations of grassland and rush pasture creation and restoration are shown on Figure A-4 in Appendix A.

7.3.3. Mitigation/Compensation Context

This creation of species-rich grassland will be undertaken on the finished embankment and in areas reinstated following construction. A species-rich sward requires low fertility soil formed on very thin topsoil or sub-soil only. Topsoil on Site is formed of sand and clay with flints, whereas sub-soils are formed of clay with sand and gravels. Topsoil should only be used where the clay sub-soil may present difficulties for establishing seeding. Compaction of the clay sub-soils and overuse of topsoil should be avoided. Species have been chosen appropriate to the conditions.

New Purple Moor-grass and Rush Pasture Priority habitat will be created to compensate for the loss of damp to wet grassland and rush pastures (including Purple Moor-grass and Rush Pastures Priority habitat), and species-poor marshy grassland, to the reservoir. Purple moor-grass is not a target species (see section 7.25), but a key target species may be sharp-flowered rush.

The grassland and rush pasture will be maintained and enhanced by grazing and/or cutting and removal of arisings to steadily reduce soil fertility and promote fine grasses and less competitive herbs, thereby enhancing diversity.

7.3.4. Targets

- Create 36.71 ha of new/enhanced neutral grassland on the reservoir embankment. Restore neutral grassland around the reservoir lost during construction.
- Restore rush pasture lost during construction. New rush pasture to have affinities to Purple Moor-grass and Rush Pasture Priority habitat.
- Due to programme and water quality and quantity challenges in the original location, among other constraints, approximately 50% of the Wet Grassland and Rush Pasture habitat is proposed to be located North East of the reservoir, in compartment zero within the wetlands area. The other 50% will remain in the original location to the South West (Appendix..)
- Protect and re-use site-won low-nutrient and neutral pH soils for species-rich grassland establishment.
- Targets for management shall be as for Grassland Enhancement (section 7.24) and Rush Pasture Enhancement (section 7.25).
- Maintenance of grassland seeding areas to ensure successful establishment will be undertaken during the first five years following seeding (the Establishment Period). Ongoing management of grassland areas will continue following the Establishment Period.

7.3.5. Prescriptions

New species-rich grassland shall be seeded on the embankment following construction. Areas of neutral grassland and rush pasture lost during construction will be restored.

An outline specification for grassland creation is provided in Appendix B. This specification is subject to detailed design. The species mix shall be determined based on local knowledge and survey of the existing grassland and rush pasture habitats on Site to provide a seed mix that is suitable and appropriate for the area and the soil substrate on the finished embankment. Suitable plug plants shall be used if appropriate to introduce target species.

Seed/plant on sub-soil or a very thin layer of site-won topsoil only.

Seed mixes shall be supplemented by locally sourced green hay or harvested seed if available.

The following activities shall be undertaken for new grassland during the Establishment Period (Years 1 to 4 following seeding):

- New grassland shall be cut once annually in September and arisings shall be removed. Mower blades shall be set at 100 mm to avoid impacts to reptiles and amphibians.
- Injurious weeds shall be spot-treated 3 times annually in February, June and October.
- Litter picking shall be undertaken within the grassland area 3 days annually or as required.
- Failed areas shall be re-seeded during suitable weather in late summer or spring.

7.3.6. Monitoring

Inspections shall be undertaken annually during the Establishment Period to determine status of new seeding and plug planting, and to determine management requirements.

A monitoring programme will be established within the areas of grassland and rush pasture with surveys and visual condition assessments completed during Years 1, 3, 5 and every fifth year over the lifespan of the project thereafter (capturing all new grassland/rush pasture habitats as and when they are created).

Any remedial management necessary is to be reported and actioned through review of this document.

7.4. Scrub Edge Creation

7.4.1. Objectives

Retain and manage willow scrub along the south-eastern boundary of Havant Thicket woodland.

Maintain a wide buffer of scrub and tall herb habitat on the adjacent reservoir side of the boundary.

Provide a visual barrier between grassland on the reservoir side and footpaths within Havant Thicket woodland.

Create margins of scrub and tall herbs on the western boundary of the Site and adjacent to retained and newly planted woodland in the south-east of the Site.

Provide woodland edge habitat to benefit invertebrates and reptiles.

Provide a location for re-planting salvaged trees from felled woodland.

7.4.2. Locations

Boundary of Havant Thicket woodland and Wetland Management Areas, on the south-east-boundary of Havant Thicket woodland.

On the western boundary of the Site and adjacent to retained woodland in the south-east of the Site within the Embankment and surrounding landscape Management Area.

Locations of scrub edge creation are shown on Figure A-4 in Appendix A.

7.4.3. Mitigation/Compensation Context

Scrub shall act as the interface between the grassland & woodland. A sinuous edge will maximise the length of edge habitat.

Scrub edge habitat provides habitat for linnet, bullfinch, song thrush, dunnock and kestrel.

7.4.4. Targets

Retain a habitat connectivity between Havant thicket woodland and the hedgerow boundary east of the reservoir.

Enhance 0.5 ha of willow scrub.

Minimum 4 m buffer of scrub edge where created with sinuous edges.

Provide a variety of age ranges of scrub.

Management should take account of protected species including dormice and nesting birds.

7.4.5. Prescriptions

Management of the south-eastern boundary of Havant thicket woodland is included in the detailed wetland design and shall follow the outline specification provided in Appendix B.

Between 20-25% of scrub on south-eastern boundary Havant thicket woodland shall be cut every year on 4-5 year rotation. Scrub shall be cut back to stump level targeting older stands.

Create minimum 4 m buffers with sinuous edges by fencing off grassland margins in the north-east, west and south-east of the Embankment and surrounding landscape Management Area, on the boundary with adjacent woodland.

The buffer strip shall be mown in 50-100m length blocks on rotation, one block cut annually so each block is cut every 2-4 years. Cuttings shall be burnt or composted.

7.4.6. Monitoring

Inspections shall be carried out once per year, consisting of a visual condition assessment of all created scrub to determine the habitat condition and quality with any remedial management reported and actioned through review of this LEMP every 5 years after project commencement.

7.5. Fencing and Gates

7.5.1. Objectives

Provide and maintain suitable fencing and gates for grassland management (grazing stock).

Provide and maintain suitable fencing and gates to manage visitor access.

Provide fencing around ecologically sensitive areas of the Site which are being managed for wildlife to prevent access by the public and dogs.

Provide and maintain suitable fencing and gates for Forestry England boundary in Havant Thicket.

Provide deer exclusion fencing where necessary to allow establishment of woodland planting and regeneration of woodland understorey.

Fences to have connectivity features to allow passage of small mammal species such as badgers and hedgehogs.

7.5.2. Locations

Havant Thicket, Wetland and Embankment and surrounding landscape Management Areas, on the Northern Access Route, wetland and embankment.

Location of fences and gates are shown on Figure A-5 in Appendix A and Figure B-1 in Appendix B. The location of fencing and gates will be subject to detailed design at each phase of the Scheme.

7.5.3. Targets

Fences and gates to be suitable for grazing stock and/or visitor access.

To prevent access for dogs to ecologically sensitive areas and prevent disturbance to grazing stock.

Allow passage of small mammals such as badgers and hedgehogs.

7.5.4. Prescriptions

Fences and gates within or on the boundary of Forestry England land shall meet FE Specifications.

Fences and gates shall be of a suitable specification to meet the objectives and targets above.

Deer exclusion fencing shall be provided around conifer clear fell compartments (see Section 7.18) and around retained woodland where required.

Fences shall be maintained in good condition to prevent access by people and dogs and keep grazing animals in. Repairs shall be carried out at least annually, or as required.

Sensitive areas shall be defined in the Recreation and Access Strategy.

7.5.5. Monitoring

Inspection shall be carried out monthly to ensure any structural damage repaired and fencing remains stock-proof.

7.6. Dead Hedging

7.6.1. Objectives

To be integrated with live hedgerow planting to provide a barrier on the north-western boundary of the Site adjacent to the Northern Access Route.

To utilise site won brash.

Prevent unwanted access and deter public from sensitive wildlife areas.

Provide functional wildlife corridors and improve habitat connectivity.

To be installed around the pond complexes in the east of Havant Thicket woodland to prevent dog entry and spread of INNS.

To be installed at the end of racks within birch woodland (Section 7.19) and around forest glades (Section 7.22) to discourage public access.

7.6.2. Locations

Havant Thicket woodland and Embankment and surrounding landscape Management Areas, including as part of hedgerow creation alongside the Northern Access Route (as shown on Figure A-4 in Appendix A), around the pond complexes and headwater stream clearance areas in Havant Thicket woodland (as shown on Figure A-6 in Appendix A), and as part of the birch racks and forest glade clearings (as shown on Figure A-7 in Appendix A).

7.6.3. Mitigation/Compensation Context

Dead hedging can be designed in various ways, its purpose is to give a corridor of elevated vegetation or 'brash' that hazel dormice can travel along (as they prefer to commute along vegetation rather than on the ground, for protection from predators mainly). The hedgerow planting along the Northern Access Route shall be supplemented with brash piles (in between the 'whips') to form dead hedging. This will improve habitat connectivity, especially for dormice.

Dead hedges installed around the pond complexes in the east of Havant Thicket woodland will prevent dog entry and spread INNS notably parrot's feather.

7.6.4. Targets

Re-use of materials from within Site.

Provide a continuous, unbroken hedge where possible.

Integrate live stems of saplings/shrubs if possible.

Prevent access onto Northern Access Route from west, except for designated access points.

Prevent access by dogs to ponds in east of Havant Thicket woodland.

Discourage public access to birch racks and forest glades.

7.6.5. Prescriptions

Dead hedges shall be created in Years 1 to 4 by infilling site won brash between two rows of stakes 1-2 m apart. Live saplings and shrubs to be laid and integrated into the hedge to provide some live growth.

The dead hedges shall be maintained in a good condition annually or as required, to prevent access by people and provide a functional wildlife corridor.

The live component of hedge shall be re-laid after 8-10 years or once regrowth reaches 4 m.

7.6.6. Monitoring

Inspections shall be carried out once annually for decomposition or structural damage and repair / replace as necessary with site won brash.

Dead hedging around pond complexes shall be monitored for effectiveness of preventing dog access. If dead hedging is not proving effective, fencing shall be upgraded to FE specification post and wire fencing with rabbit-proof netting (priority around Pond 6, see Appendix B).

7.7. Veteranisation of Retained Trees

7.7.1. Objectives

Create artificial woodpecker holes, broken branches, artificial damage to trunks, and areas for rot to begin in some retained non-veteran trees for use by bats or birds.

Ring-bark some retained non-native trees to create standing dead-wood.

Retain existing standing dead-wood and damaged/dying trees within Havant thicket woodland, Bell's Copse and retained woodland around the reservoir.

Translocation of natural bat roosting features from trees lost to the reservoir.

7.7.2. Locations

Havant Thicket woodland Management Area. Trees to be confirmed following initial survey.

7.7.3. Mitigation/Compensation Context

Veteranisation of selected retained non-veteran trees will compensate for the loss of veteran trees, by promoting the formation of features found on veteran trees that could be used by bats or birds for roosting/nesting, or by particular invertebrates species adapted to living in aging and dead wood.

As part of pre-enabling works under the bat licence HMMP, 20 trees in Havant Thicket woodland and 15 trees in Bell's Copse have had enhancements made in 2021. Retention and translocation of bat roosting features is specified under the bat licence.

7.7.4. Targets

Trees shall have artificial veteranisation enhancements made during the first 5 years.

Target species include bats, birds and specialist invertebrates.

7.7.5. Prescriptions

A survey to select suitable locations and trees for artificial roost features, veteranisation and ring-barking away from public areas or commercial forestry stands shall be carried out, in consultation with FE and HCC.

Translocation of artificial roost features shall follow the specifications in the bat licence.

Artificial woodpecker holes, broken branches, artificial damage to trunks, and areas for rot to begin shall be created in selected retained mature native or non-native trees.

Selected retained mature non-native trees, including Turkey oak and conifer species shall be ring-barked. Scots pine shall be avoided.

Works within Havant Thicket woodland and Bell's Copse shall be agreed and authorised by FE and follow UK Forestry Standard on dead wood retention.

Works shall comply with the requirements of protected species licences.

7.7.6. Monitoring

Inspections shall be carried out once annually for target species use and public safety.

7.8. Wetland/Wet Woodland Creation

7.8.1. Objectives

The Corsican Pine Plantation will be felled and where predicted water levels and surface water run off allows, together with appropriate sensitive landform manipulation will be replanted with wet woodland species specific to wet woodland Priority habitat along the northern shoreline between the reservoir and the retained woodland.

A wetland retaining structure will retain water in the wetland when the main reservoir water levels are low. Water levels will naturally fluctuate.

Creation of 10.2 ha of wetland with south-facing margins comprising of a mosaic of grassland, scrub, wet woodland and ephemeral pools. This will form part of the Wetland Management Area that includes adjacent grassland and wet woodland to the north, totalling approximately 15 ha in size.

Wetland to be fed by three headwater streams.

The wetland will have variable water depths and will include a number of islands, and reedbed areas.

7.8.2. Location

The location of the wetland area is shown on Figure A-4 in Appendix A.

7.8.3. Mitigation/Compensation Context

The wetland will provide compensation for loss of wetland habitats due to the Scheme. The wetland will provide semi-natural freshwater habitat on the northern edge of the reservoir and include a mosaic of habitats such as pools with islands and variable water depths, reedbed, marshy grassland, wet woodland, and scrub.

An area of conifer plantation in the south of Havant Thicket woodland will be felled and replanted with alder, aspen, native black poplar and willow prior to the flooding of the area, to form new wet woodland. Whilst the majority of the conifer stumps would be removed some will be retained to form submerged/partially submerged stumps to increase habitat complexity and biodiversity value within the flooded area.

The wetland retaining structure will retain water at natural levels in the wetland when the main reservoir water levels are low, such as during lengthy operations or drought. They will be partially built during the first earthworks season and will include additional, temporary attenuation ponds to retain flows from headwater streams, allowing these to be diverted away from the reservoir construction area. The retained wetland area will be approx. 6.8 hectares when the main reservoir level is low. The wetland area will be approximately 10.2 hectares when the reservoir is full.

The wetland is the subject of detailed design and construction for Phase 2 of the Scheme. The Phase 2 design was submitted for Reserved Matters approval by the LPAs in March 2024. This LEMP has been updated with details of the design for this phase of works.

7.8.4. Targets

To provide 10.2 ha of wetland with south-facing margins and consistent water levels. Target habitats include wet woodland, grassland and scrub mosaic, ephemeral pools with islands, and 3.4 ha of reedbed.

Species planted for wet woodland creation to include alder, aspen, willows and native black poplar.

Scots pine to be retained where present.

7.8.5. Prescriptions

Conifers within Corsican Pine Plantation in the south of Havant thicket woodland will be felled to create wet woodland habitat, retaining selected Scots pine where present. Some stumps from felled trees within the Corsican Pine Plantation shall be left in situ to be flooded by the reservoir as submerged dead-wood features.

Establishment management for wetland habitats are included in the Phase 2 detailed design and this LEMP shall be updated with details of the approved design for the next submission.

A Wetlands Management and Monitoring Plan will be produced by Portsmouth Water in 2030 when the reservoir is anticipated to be filled with water.

7.8.6. Monitoring

7.9. Shoreline Habitat Creation

7.9.1. Objective

Develop shoreline ephemeral shallow vegetation on the north-east corner of the reservoir.

Provide partially submerged dead-wood features (refer to Section 7.27).

7.9.2. Locations

The locations for shoreline habitat creation are shown on Figure A-4 in Appendix A.

7.9.3. Mitigation/Compensation Context

Shallow shoreline will provide habitat suitable for typically ephemeral populations of plant species adapted to the open shallow edges of freshwater lakes.

7.9.4. Targets

Shoreline habitat to be colonised by ephemeral vegetation of target species. Partially submerged dead wood will provide both an aquatic feature that could be utilised by invertebrates and fish as shelter and an above-water perch for birds.

7.9.5. Prescriptions

Detailed design and construction of shoreline habitat shall be undertaken for Phase 2 of the Scheme which is subject to Reserved Matters approval.

Establishment management prescriptions for shoreline habitat are included in the Phase 2 detailed design and this LEMP shall be updated with details of the approved design for the next submission.

Methods will be developed to mitigate for the potential effects on shoreline aquatic species associated with routine reservoir drawdown events.

Some stumps from felled trees shall be left in situ to be flooded by the reservoir as partially submerged dead-wood features.

7.9.6. Monitoring

A Wetlands Management and Monitoring Plan which will include shoreline habitats will be produced by Portsmouth Water in 2030 when the reservoir is anticipated to be filled with water.

7.10. Pond Maintenance (Gipsies Plain)

7.10.1. Objectives

Maintain two ephemeral waterbodies on Gipsies Plain within new woodland plot.

Add a new culvert underneath the right of way, and the eastern access to the Site, to connect the new ponds to the drain on the eastern boundary of the Site.

Enhance area around new waterbodies for reptiles through provision of hibernacula.

7.10.2. Locations

Locations of ponds at Gipsies Plain are shown on Figure A-6 in Appendix A.

7.10.3. Mitigation/Compensation Context

The two new waterbodies created in the south-east of the Site at Gipsies Plain are situated within new woodland planting and have been designed to be ephemeral.

The new culvert will connect the ponds to an existing drain to provide some input from the drain on the eastern boundary of the Site which takes run-off from the grassland and embankment.

7.10.4. Targets

Both ponds should retain water at least 50% of the year.

The margins of the ponds should be vegetated with emergent aquatic plants, such as reeds and sedges, which should occupy approximately 75% of the margin of each pond.

Less than 5% of emergent vegetation (such as bullrush) should occupy the central area of the pond away from margins.

Four reptile hibernacula should be provided, one at each pond, and two on the edge of the woodland planting area. The hibernacula design should follow the guidelines in the Reptile Habitat Management Handbook¹⁵.

7.10.5. Prescriptions

A culvert connection shall be made from the ponds to the existing drain on the eastern boundary of the Site under the right of way and access track (refer to Outline Design on Figure B-3 in Appendix B).

Excessive inundation vegetation (e.g. bulrush) shall be removed from the ponds every 5 years.

Reptile hibernacula shall be created in Years 1 to 3 to provide shelter for reptiles translocated from the construction area.

Reptile hibernacula shall be maintained by topping up with site-won logs or stones every 5 years.

7.10.6. Monitoring

An inspection shall be carried out once annually.

¹⁵ Edgar P, Foster J & Baker J (2010). *Reptile Habitat Management Handbook*. Amphibian and Reptile Conservation, Bournemouth.

7.11. New Watercourse Creation – Gipsies Plain (Reach 5)

7.11.1. Objectives

Add new watercourse to provide additional habitat diversity to the east of the reservoir.

7.11.2. Locations

Embankment and surrounding landscape Management Area, in the east of the Site at Reach 5 of the watercourse mitigation and compensation plan.

The location of the new watercourse at Gipsies Plain is shown on Figure A-6 in Appendix A.

7.11.3. Mitigation/Compensation Context

A new 253 m open channel will be created to the east of the site to connect drains to the north and south. The construction of a channel will provide improved biodiversity value through providing a diverse range of habitats.

7.11.4. Targets

253 m of new open channel to provide additional watercourse habitat.

Contribute to Biodiversity Net Gain (watercourse requirements for the scheme).

7.11.5. Prescriptions

Detailed design and construction of the new watercourse shall follow the Outline Design on Figure B-3 in Appendix B.

Management prescriptions for the new watercourse to be determined following detailed design and included in later versions of LEMP.

7.11.6. Monitoring

Monitoring of vegetation shall take place annually (between June and September) until the communities become established. Adaptive management may be required following the monitoring depending upon findings. This shall include vegetation management and the amendments to the bank profiles if required.

7.12. Reservoir Compensation Flow Channel (Reach 8)

7.12.1. Objectives

Creation of a new 250 m reach of new open channel to provide compensation flow channel from reservoir to Riders Lane Stream.

Provide a naturalised watercourse with benefits to wildlife.

Provide a suitable flow regime.

7.12.2. Locations

Embankment and surrounding landscape Management Area, located downstream of the embankment and will provide a link between the reservoir and the Riders Lane Stream downstream.

The location of the new reservoir compensation flow channel is shown on Figure A-6 in Appendix A.

7.12.3. Mitigation/Compensation Context

The compensation flow channel will connect Havant Thicket reservoir to the Riders Lane Stream. This will be a new channel and thus provide new habitat although the channel is likely to be steeper than existing channel within the Site which is lost during construction. The inclusion of a step pool/pool-riffle sequence along its length will provide a naturalised profile and enable a good quality habitat creation to be achieved.

The channel and embankment drainage will provide some potential for overflow and waterlogging of adjacent restored rush pasture to maintain the hydrology of this habitat.

7.12.4. Targets

Creation of a new 250m reach of channel to provide a compensation flow from reservoir to Riders Lane Stream.

To include a step pool/pool-riffle sequence along its length and will be naturalised as much as possible.

Maintain connection with restored area of rush-pasture to provide damp conditions.

7.12.5. Prescriptions

Detailed design and construction of the new compensation flow channel shall be undertaken at a later stage, estimated to be between 2024 and 2026.

A suitable compensation flow regime shall be agreed with EA.

Flow monitoring equipment shall be provided to monitor flows.

Management prescriptions shall be confirmed following detailed design and included in later versions of LEMP.

7.12.6. Monitoring

Monitoring of vegetation shall take place annually (between June and September) until the communities become established.

Macro-invertebrate monitoring shall take place in spring (March to May, inclusive) and autumn (September to November, inclusive) until a community becomes established.

Flow monitoring shall be undertaken as part of any license agreement with EA.

Monitoring prescriptions shall be confirmed following detailed design and included in later versions of LEMP.

Adaptive management may be required following monitoring depending upon findings. This shall include channel stabilisation and vegetation management.

7.13. Pond Enhancements (Reach 4)

7.13.1. Objective

Selective thinning (regeneration felling) of conifer to open up light levels to encourage aquatic plant growth.

To provide habitat suitable for translocation of acidic macrophyte species from the Upper Lake.

Control and eradication of INNS, particularly parrot's feather, which is present in some ponds within Havant Thicket woodland.

Provide signs at ponds and public entry points to increase awareness of INNS, citing Defra & Plantlife UK 'check-clean-dry' campaigns.

Control access to ponds by the public and dogs through use of dead hedging and fencing.

Install a dog-dipping pond at a suitable location close to the entrances to the Site.

Enhancement of the ponds to benefit great crested newts.

7.13.2. Locations

Havant Thicket Woodland Management Area, in Reach 4 of the watercourse mitigation and compensation plan, in the east of Havant Thicket woodland.

Bell's Copse Management Area, within willow stand around pond in the north-east of Bells Copse.

The location of ponds subject to enhancements are shown on Figure A-6 in Appendix A.

7.13.3. Mitigation/Compensation Context

Each of the ponds identified are heavily shaded and thus selective thinning will enable more sunlight to get into the ponds encouraging the establishment of aquatic plants (macrophytes) already in the pond ('ghost pond principle'). The ponds that could benefit from this work have been identified through botanical surveys and water quality sampling.

Removal of Norway Spruce may help to combat spread of the bark beetle *Ips typographus* across southern England.

Natural regeneration of broadleaf will help to progress Plantation of Ancient Woodland Sites (PAWS) restoration in Havant Thicket in accordance with the Forest Design Plan.

In addition, ponds must be checked for invasive species like parrot's feather (known to occur in these ponds and evidence suggests that it is spreading). Management of any invasives is necessary to ensure no future spread into the wetland and reservoir and these areas maintain their biodiversity value.

Dogs are considered to pose a risk of the spread of parrot's feather or other INNS by transporting fragments of the plants to ponds on Site, the wetland or reservoir, following 'dipping' in contaminated ponds (either on Site or elsewhere). Access to ponds currently clear of INNS will be restricted to prevent dogs dipping in these ponds. The addition of a sacrificial 'dog-dipping' pond close to the entrance to the Site will provide somewhere for dogs that is an alternative to ponds clear of INNS; and this pond can be regularly monitored for INNS and managed as appropriate.

Some of the ponds have been confirmed as supporting great crested newts and therefore the timing and methodology for undertaking these pond enhancements must take account of this protected species. The pond enhancements will also benefit this species.

7.13.4. Targets

Selective thinning of non-native conifers with retention of some Norway spruce and all Scots pine (unless shading the ponds).

Maintain habitat suitability for great crested newts.

Maintain habitat suitable for translocated aquatic plants (macrophytes), including marsh St. John's-wort, floating club-rush and lesser skullcap.

The removal and eradication of INNS (particularly parrot's feather) and an increase of public awareness of INNS.

One pond available for dog-dipping close to FE Forest of Bere car park in east of Havant thicket woodland, and an additional dog-dipping pond close in the west of the Site close to the new visitor car park and facilities.

Increased public awareness of INNS.

7.13.5. Prescriptions

Selective thinning (regeneration felling) of conifers within a 50 m radius on the south, west and eastern sides of pond complexes in Havant Thicket woodland shall be undertaken. Thinning shall be undertaken to a radius of one tree length on the northern side of ponds.

Removal of trees shall be agreed and authorised by FE. Selected Norway spruce shall be removed, but some retained. Scots pine shall be retained.

Ongoing management to coppice selected willows and other species around the ponds shall be undertaken every 10 years.

Removal of leaf litter and sediment shall be undertaken in ponds where required, taking into consideration the presence of great crested newts. Works shall be timed for winter when great crested newts are most likely to be hibernating outside of ponds. NE shall be consulted to agree methodology.

Management of parrot's feather to control spread and lead to eradication shall be undertaken by mechanical removal and chemical treatment in July and August. Follow-up treatment of remaining plants shall be undertaken for 2 subsequent years.

Detailed design and construction of the dog-dipping pond shall be undertaken with the location agreed with FE in Years 3 to 4. The location for an additional dog-dipping pond in the west of the Site shall be considered during the design of the visitor facilities.

Signs shall be installed at ponds and public entry points within the Site to increase awareness of INNS.

Dead hedging and/or fencing shall be provided around the pond complexes in Havant Thicket woodland (see Sections 7.5 and 7.6).

Further details are found in the WFD Article 4.7 Mitigation Work for Reach 4 Technical Note provided in Appendix B.5.

7.13.6. Monitoring

Monitoring of vegetation and INNS shall take place annually (between June and September) until the communities become established. Adaptive management may be required following the monitoring depending upon findings. This could include further vegetation and invasive management. Further details are in Appendix B.5.

7.14. Headwater Stream Restoration (Reaches 1-3)

7.14.1. Objectives

Open up stream corridors to form graded edge, maintained through ongoing rotational management that avoids permanent loss of ancient woodland.

Creation of six small ponds on headwater streams in three headwater stream (labelled 1-3 from west to east) Havant Thicket woodland for macrophyte translocation, with leaky dams installed to slow flow.

Creation of additional localised areas of flooding (new ponds) by introducing woody debris into the streams.

Reduce inputs from sediments, nutrient run-off and pesticides in upper Riders Lane Stream catchment and reservoir.

New track culvert (in Reach 2) to reduce flooding along this access point.

7.14.2. Locations

Havant Thicket woodland Management Area, in three small headwaters named, Reaches 1, 2 and 3 of the watercourse mitigation and compensation plan. The locations of headwater stream restoration in Havant Thicket woodland are shown on Figure A-6 in Appendix A.

7.14.3. Mitigation/Compensation Context

The creation of ponds provides opportunities for translocation of notable aquatic plants (macrophytes) species that will need to be moved as a result of the Upper Lake being lost under the footprint of the scheme. Water quality sampling has been undertaken to determine suitability of habitats and all bar the uppermost sections were deemed suitable. In these reaches considered suitable, aquatic plants will be introduced from translocation.

Through the installation of leaky woody dams at the downstream limit of these features they will also provide a Natural Flood Management (NFM) function slowing the flow downstream. It is however noted that NFM measures in these headwater streams are considered to not provide flood management benefits in context of the Reservoir providing overall flood risk benefits to the Riders Lane Stream catchment, but they will provide permanent, and/or temporary, wetted aquatic habitats and can also support in the management of sediment flowing into the reservoir.

Localised areas of flooding would improve the ecological diversity associated with these systems by creating wetter areas of woodland and would provide habitat that could become suitable for aquatic plant (macrophyte) translocation.

Selective rotational coppicing of the canopy around the channel would enhance the ecological value of the stream corridor while retaining the ancient woodland context. Coppicing would not only provide material for any woody dams but will also allow more light into the channel encouraging instream and marginal vegetation growth allowing some restoration of the form and function of the channel.

Along Reach 2 there is also the opportunity to provide a culvert in the track to prevent flooding of this access area but if installed at a higher level within the track itself it will enable further backing up of water at this location retaining NFM benefits.

7.14.4. Targets

Six new ponds with leaky dams created.

Flooded areas due to woody debris in streams.

Open stream corridors with graded edge.

Reduced sediment and nutrient loads downstream.

Maintain habitat suitable for translocated aquatic plants, including marsh St. John's-wort, floating club-rush and lesser skullcap.

Removal/eradication of INNS.

7.14.5. Prescriptions

Detailed design and construction of six small ponds in Reaches 1, 2 and 3 in Havant Thicket woodland shall be undertaken in consultation with FE in Years 2 to 3.

Woody debris shall be installed at selected locations in the streams in Reaches 1, 2 and 3.

Stream corridors shall be opened up through selective thinning to create a graded edge in Year 3. All scrub and smaller non-native trees (e.g. conifers) shall be removed. All oak and yew trees, and prominent mid-sized birch and other native trees shall be retained.

Ongoing rotational coppicing shall be undertaken every 5 years.

Provide new culvert under track (Reach 2) to reduce flooding along access route.

7.14.6. Monitoring

Monitoring of vegetation should take place annually (between June and September) until the communities become established. Macro-invertebrate monitoring should likewise take place annually in spring (March to May, inclusive) and autumn (September to November, inclusive) until a community becomes established. Further details are in the Technical Note provided in Appendix B.5.

7.15. Aquatic Plant Translocations

7.15.1. Objective

Translocate a small number of notable aquatic plants (macrophytes) from on-Site standing water, watercourses and ditches to enhanced ponds and headwater restoration areas within Havant Thicket woodland.

7.15.2. Locations

From Upper Lake and other on-Site ditches and watercourses lost to the reservoir to enhanced ponds (Reach 4) and headwater restoration ponds (Reaches 1, 2 and 3) in Havant Thicket woodland.

7.15.3. Mitigation/Compensation Context

Translocation of notable aquatic plants from within the construction area to enhanced ponds and headwater restoration areas in Havant Thicket woodland will be carried out by the Principal Contractor.

The Millennium Seed Bank has confirmed these species are in its collection and that growing them from seed in controlled conditions would take 12-18 months.

7.15.4. Targets

Successful translocation and establishment of selected aquatic plants. Species include marsh St. John's-wort, floating club-rush and lesser skullcap.

7.15.5. Prescriptions

The aquatic plant translocations shall follow the methodology provided in the Technical Note in Appendix B.5.

The translocation shall include collecting seeds as well as some adult plants from Upper Lake in late summer and/or autumn 2022 for spreading these across the receptor ponds in Havant Thicket woodland (see Section 7.13 and 7.14).

If translocated aquatic plants do not re-appear after 2 years, then the Kew Millennium Seed Bank shall be contacted with support from Dr Richard Lansdown.

Further details are found in the Technical Note provided in Appendix B.5.

7.15.6. Monitoring

Follow-up monitoring shall be undertaken annually in summer. Further details are in Appendix B.5.

7.16. Aquatic Invertebrate Translocation

7.16.1. Objectives

Translocate aquatic invertebrate communities (especially beetles) from on-Site watercourses with some of the highest diversity to suitable receptor sites.

7.16.2. Locations

From streams lost to the reservoir, notably around a spring near HS1, to receptor sites at: a stream in Southleigh Forest.

7.16.3. Mitigation/Compensation Context

A baseline survey has been carried out of surrounding catchments to identify suitable receptor sites. Translocation of notable aquatic invertebrates from within the construction area to new and enhanced ponds in Havant Thicket woodland will be carried out by the Principal Contractor.

Timing is key as seasonal wetting and drying in the headwater streams will cause inverts to go dormant as groundwater levels and river flows decrease.

7.16.4. Targets

Successful establishment of aquatic invertebrate communities.

7.16.5. Prescriptions

The aquatic invertebrate translocation shall follow the methodology provided in the Technical Note in Appendix B.5.

Hand netting shall be undertaken in spring or early-summer 2022 to collect notable invertebrates from stream within the site, to be transported to receptor sites.

Sediments/gravels shall be mechanically removed in spring/early-summer 2022 and translocated to receptor sites.

Further details are found in the Technical Note provided in Appendix B.5.

7.16.6. Monitoring

Monitoring shall be undertaken annually in spring (March to May, inclusive) and autumn (September to November, inclusive) until a community becomes established. Further details are in Appendix B.5.

7.17. INNS Biosecurity Plan

7.17.1. Objective

Protect on-site features (particularly aquatic features) from INNS establishment by eradicating INNS where present and minimising spread.

Addition of signs to raise awareness of non-native invasive species.

7.17.2. Locations

Whole Site, with particular focus on waterbodies at risk of aquatic INNS, including ponds in Havant Thicket woodland, the wetland and the reservoir.

7.17.3. Mitigation/Compensation Context

Aquatic features, such as the reservoir, ponds and watercourses will be protected from the establishment of INNS, such as parrot's feather, which is present in some ponds in Havant Thicket woodland, by carrying out a policy to eradicate INNS where present, minimise spread, biosecurity measures and public awareness. New ponds will be provided for dog-dipping to prevent spread of INNS to new and enhanced ponds as described in Section 7.13.

The spread of INNS due to construction activities will be prevented through biosecurity measures implemented as part of the CEMP.

7.17.4. Targets

To removal/eradicate INNS from Site and to increase public awareness of INNS.

To prevent aquatic INNS establishment in the reservoir or wetland.

7.17.5. Prescriptions

A programme to eradicate INNS from the Site where known to be present shall be initiated in Year 2 using combination of mechanical removal and herbicide.

All management and maintenance operations within the Site shall routinely follow the Defra & Plantlife UK 'check-clean-dry' campaigns at all times.

A plan shall be prepared in Year 2 to tackle new outbreaks of INNS in the reservoir or wetland to prevent spread and allow early eradication before the scale of an outbreak becomes difficult to manage.

Signs at ponds and visitor centre to increase public awareness of INNS will be maintained annually and as required.

A programme of public awareness on INNS via various media will be produced as required.

Additional details for control of INNS during construction will be provided in the CEMP.

The INNS Biosecurity Plan will be provided to the Environment Agency for information.

7.17.6. Monitoring

Inspections shall be undertaken monthly during growing season.

7.18. Conifer Clear Fell and Replanting

7.18.1. Objective

Felling and clearance of non-native conifer plantations and subsequent re-planting of native trees, including pedunculate oak and hazel.

Natural regeneration of birch, willow and other native species.

7.18.2. Locations

Havant Thicket woodland Management Area Compartments 6507C and 6508C.

The locations of conifer clear fell areas within Havant Thicket woodland are shown on Figure A-7 in Appendix A.

7.18.3. Mitigation/Compensation Context

Felling and clearance of conifer plantation and subsequent planting of native trees will be undertaken as part of habitat compensation works within Havant Thicket woodland. This will provide short term suitability for bat species with a preference for open habitat such as noctule and serotine, and long term suitability for woodland species, including Bechstein's bat and brown long-eared bat. The increase the tree species diversity which will benefit hazel dormouse in the medium to long-term.

There will be short-term suitability for breeding nightjar, which will benefit from the open conditions; and medium and long-term suitability for breeding and wintering woodland species such as marsh tit, stock dove, mistle thrush, tawny owl, song thrush and bullfinch.

The conifer clear-fell areas will provide short-term suitability for reptiles (~10 years) and act as receptor sites for translocated reptiles from habitats lost to the reservoir.

There will be short-term suitability for invertebrate species which rely on open habitats, including glow worm; and long-term suitability for a variety of notable species, especially moth species found in broadleaved woodland habitats.

Retained mature broadleaved and conifer trees will provide perches for birds such as raptors.

7.18.4. Targets

Clear felling of non-native conifers was carried out in Compartments 6507C and 6508C as part of this LEMP by FE in February 2022 and timber extracted.

Table 7-1 below lists the attributes and measurable targets will be monitored for conifer clear fell and replanting.

Table 7-1 - Attributes and targets for conifer clear fell and replanting

Attributes	Targets
Clearance/felling area	4.07 ha of non-native conifer plantation.
Recovery to native species	Establishment of 4.07 ha of native tree species. Protection from deer and grey squirrel damage.
Retained trees	Retain selected mature native broadleaved trees and suitable conifers.
Ground conditions	Protect ground conditions.
Ditches and drainage features	Ditches and drainage features protected from damage.
Cover of bramble and bracken	Maintain <20% cover of bramble and bracken.
Cover of INNS (e.g. rhododendron)	0% cover of rhododendron.
Capacity for reptiles	Maintain short-term (10 years) suitability for reptiles.

Attributes	Targets
Presence of target species	All target species recorded at least once annually. Target species include purple moor-grass, white admiral, silver-washed fritillary, glow worm, nightjar, linnet, stonechat, whitethroat, Bechstein's bat and Natterer's bat. Woodland flora to resemble National Vegetation Classification¹⁶ W10 woodland type.

7.18.5. Prescriptions

Clear fell compartments shall be mulched and scarified following FE standard practice.

Conifer regeneration shall be controlled for the first 10 years following felling.

The boundaries of clear fell compartments shall be fenced with deer-proof fencing.

Native woodland tree species shall be planted at density of 1,100 trees/ha, including pedunculate oak and hazel shall be planted in spring of Year 2. Detailed planting specification shall be produced in consultation with FE following the outline specification provided in Appendix B.

Selective thinning of birch and willow shall be undertaken every 10 years to benefit slower-growing broadleaved species.

Bracken, bramble and rhododendron shall be controlled as required.

Grey squirrel control shall be implemented after 10 years, and earlier if necessary if squirrel damage is having a significant adverse effect on native species regeneration.

7.18.6. Monitoring

Annual surveys shall be undertaken to establish the status of habitats and target species populations (surveys will be undertaken by specialists as necessary), for conifer regeneration, and the for the presence of INNS, such as rhododendron.

General species monitoring surveys at the Site shall include bats, hazel dormouse, breeding birds, reptiles, great crested newt and terrestrial invertebrates. Other species surveys shall be undertaken as required.

¹⁶ Rodwell, J S (ed.) (1991) *British Plant Communities Volume 1: Woodland and scrub*. Cambridge University Press.

7.19. Birch Clearings and Replanting

7.19.1. Objective

Creation of linear clearings (also referred to as 'racks'), specifically for improving biodiversity, through birch dominated woodland to encourage existing broadleaved trees. Creation of clearings to be in a sundial formation to allow sunlight to enter the rack at different times of day and will phased over 8 years from Year 2.

Planting of new broadleaved woodland (leaving some unplanted areas).

Clearance of halos around young broadleaved trees to speed up the development of broadleaved woodland.

7.19.2. Locations

Havant Thicket woodland Management Area Compartments 6503A, 6505A, 6505C and 6509B.

The locations of birch dominated woodland compensation areas within Havant Thicket woodland are shown on Figure A-7 in Appendix A.

Figure B-4 in Appendix B indicates the locations of bat and dormouse boxes installed within Havant Thicket woodland. Avoid disturbance of installed boxes (and translocated natural roost features referred to in Section 7.7) as EPS licence conditions do not allow boxes to be moved.

7.19.3. Mitigation/Compensation Context

Clearings shall be created through birch-dominated woodland to encourage regeneration growth of a greater diversity of broadleaved trees. During clearance, selected native species will be retained.

As there is potential for increased diversity of tree species from planting compared to through natural regeneration, a native mix of tree species will be re-planted, although some clearings will be left unplanted to regenerate naturally.

Birch clearings will provide short, medium and long-term suitability for foraging bats, especially edge feeding species including brown long-eared bat, Bechstein's bat, Natterer's bat and various other species.

In the short-term, improved ground vegetation and development of scrub will mean that more light reaches the woodland floor which will be of benefit to hazel dormouse. The increase in woodland species diversity (including planting hazel) will benefit hazel dormouse in the medium to longer term.

The works will increase suitability for breeding nightjar and other bird species such as bullfinch, linnet, stonechat and whitethroat. There will be short-term (~10 years) increase in suitability for reptiles.

The birch clearings will also provide sheltered, warm and sunny conditions favoured by a variety of invertebrates including white admiral and silver-washed fritillary, hoverflies and bees; and additional suitable habitat for glow worm.

7.19.4. Targets

Table 7-2 below lists the attributes and measurable targets will be monitored for birch racks.

Table 7-2 - Attributes and targets for birch clearance and replanting

Attributes	Targets
Clearance/felling area	Clearance of 27.8 ha of birch-dominated woodland over 8 years between Year 2 and Year 9.
Recovery to native species	Establishment of 27.8 ha of native tree species at 1,100 stems per ha.
Unplanted clearings	Leave 50% of clearings unplanted.
Retained native trees	Retain selected mature native trees including pedunculate oak, hazel, beech, hornbeam, and yew. Retain Scots pine and mature birch trees.
Ground conditions	Protect ground conditions.
Ditches and drainage features	Ditches and drainage features protected from damage.
Cover of bramble and bracken	Maintain <20% cover of bramble and bracken.

Attributes	Targets
Cover of INNS (e.g. rhododendron)	0% cover of rhododendron.
Capacity for reptiles	Maintain short-term (10 years) suitability for reptiles.
Presence of target species	All target species recorded at least once annually. Target species include purple moor-grass, heather, white admiral, silver-washed fritillary, glow worm, nightjar, linnet, stonechat, whitethroat, Bechstein's bat and Natterer's bat.

7.19.5. Prescriptions

Birch and willow species in clearings shall be coppiced from Year 2 to Year 9. Selected trees such as pedunculate oak, hazel, beech, hornbeam, yew, Scots pine and mature birch shall be retained and halos cleared around them.

Clearance and respacing shall be in a sundial formation and follow the 8-year outline Birch Clearings and Replanting Plan provided in Appendix B.6.

Disturbance of installed bat and dormouse boxes (see Figure B-4 in Appendix B) will be avoided as EPSM licence conditions do not allow boxes to be moved.

Wood shall be extracted, if there is a market, or incorporated into dead hedges (see Section 7.6).

Native woodland tree mix to include pedunculate oak, hazel and other native species shall be planted at 1,100 trees/ha in the spring immediately following clearance leaving 50% unplanted clearings.

Bracken, bramble and rhododendron shall be controlled as required.

Dead hedging shall be created at the end of racks where close to exiting paths/tracks to discourage public access and informal use of cleared racks as footpaths (see Section 7.6).

7.19.6. Monitoring

Annual surveys shall be undertaken to establish the status of habitats and target species populations (surveys will be undertaken by specialists as necessary), and for the presence of INNS, such as rhododendron.

Species monitoring surveys shall include bats, hazel dormouse, breeding birds, reptiles, great crested newt and terrestrial invertebrates. Other species surveys shall be undertaken as required.

7.20. Ride Management

7.20.1. Objectives

Creation of 3-zone graded edges to existing rides to provide enhanced habitat.

To encourage structural diversity with heather, gorse and bramble as well as purple moor-grass and acid grassland.

Creation of scalloped edges.

Ongoing rotational management.

7.20.2. Locations

Havant Thicket woodland Management Area at locations shown on Figure A-7 in Appendix A.

7.20.3. Mitigation/Compensation Context

Managed rides will create a more graded edge habitat and provide bramble and a more mixed vegetation structure. Potentially improve condition of rides and access routes by opening them up which will keep the surface drier.

The managed rides will provide habitat for foraging bats, especially edge-feeding species, as compensation for the loss of habitat for Bechstein's bat, Natterer's bat and other commoner bat species.

Improved foraging for hazel dormouse in the short term. Appropriate rotational management will ensure benefits to the species in the medium and longer term. Increased foraging and nesting habitat for a variety of woodland and scrub species.

They will increase in the suitability of habitat within Havant Thicket woodland for badgers; and long-term suitability of the habitat for breeding nightjar, linnet, stonechat and whitethroat will be improved.

Managed ride edges will provide short-term suitable habitat for reptiles with an initial high carrying capacity and will act as receptor areas for reptiles translocated from the reservoir site.

Managed rides will also provide new long-term suitable habitat for various invertebrate species including white admiral and silver-washed fritillary. Scalloped edges will provide sheltered, sunny areas, favoured by invertebrates including various hoverflies and bees. These areas will also provide additional suitable habitat for glow worm. This will compensate for the loss of habitats suitable for a range of invertebrates to the reservoir.

Ride management will provide significant enhancement for purple emperor. The graded edges to many of these habitats will increase the extent of willow, which is particularly important for the species. In the long-term there will also be an increase in the area of oaks within close proximity to the population of purple emperor present within Havant Thicket woodland.

7.20.4. Targets

Table 7-3 below lists the attributes and measurable targets will be monitored for ride management.

Table 7-3 - Attributes and targets for ride management

Attributes	Targets
Length of ride management	Approximately 8.2 km length of rides under management.
Ride width	Provide scalloped edges. Maximum of 16 m clearance width from centre of ride (widest part of scallops). Utilise previously scalloped areas where possible.
Graded edge structure	Maintain 2 or 3-zone graded edge
Retained native trees	Retain mature native trees, such as oak, beech, hazel and hornbeam and yew.
Ground conditions	Protect ground conditions.
Ditches and drainage features	Ditches and drainage features protected from damage.
Cover of bracken	Maintain <20% cover of bracken.

Attributes	Targets
Cover of INNS (e.g. rhododendron)	0% cover of rhododendron.
Capacity for reptiles	Maintain short-term (10 years) suitability for reptiles.
Presence of target species	All target species recorded at least once annually. Target species include purple moor-grass, heather, gorse, bramble, white admiral, silver-washed fritillary, glow worm, nightjar, linnet, stonechat, whitethroat, Bechstein's bat and Natterer's bat.

7.20.5. Prescriptions

Zone 1

All ride verges 2 m either side of path/track shall be mown using tractor mounted flail or mower every 1-2 years. Arisings to be collected and removed or composted on site.

Zone 2

A 5-10 m strip adjacent to Zone 1 shall be cut in 50-100m length blocks or at junctions annually on rotation. One block shall be cut each year per ride, alternating side to side in subsequent years. Therefore, each block should be cut every 2-4 years. Cuttings shall be burnt or composted.

Narrower rides shall be managed on a 2 -zone system with the only Zones 1 and 2 cut on rotation.

Zone 3

Within each ride, 2-4 scallops, 4-16 m in width shall be created, creating one a year for four years. All species shall be coppices during the creation of the scallop, although selected mature native broadleaved trees and yew shall be retained. Cut wood shall be incorporated into dead hedges (see Section 7.6) and left as log piles.

Within each ride, one scallop will be cut every two years on rotation (when vegetation reaches approximately 4 m in height). Each scallop should be cut every 4-8 years. All species shall be coppiced within the scallop but selected mature native broadleaved trees and yew shall be retained. Wood shall be incorporated into dead hedges.

Bracken, bramble and rhododendron shall be controlled as required.

7.20.6. Monitoring

Annual surveys shall be undertaken to establish the status of habitats and target species populations (surveys will be undertaken by specialists as necessary), and the for the presence of INNS, such as rhododendron.

Species monitoring surveys shall include bats, hazel dormouse, breeding birds, reptiles, great crested newt and terrestrial invertebrates. Other species surveys shall be undertaken as required.

7.21. Woodland Management

7.21.1. Objectives

Management of Bell's Copse on a long-term coppice rotation to diversify the age structure of hazel within this area.

Selective management within woodland at base of The Avenue, Cabbagefield Row, retained area of Round Wood, and Swanmore Road shelterbelt to diversify the woodland structure and enhance their value for biodiversity.

7.21.2. Locations

Bell's Copse Management Areas. Rotational coppice will be undertaken at Bell's Copse Compartment 6501B, at the location shown on Figure A-7 in Appendix A.

Figure B-4 in Appendix B shows the locations of bat and dormouse boxes installed within Bell's Copse. Avoid disturbance of installed boxes (and translocated natural roost features referred to in Section 7.7) as EPS licence conditions do not allow boxes to be moved.

Locations of other woodland subject to management including woodland at base of The Avenue, Cabbagefield Row, retained area of Round Wood, and Swanmore Road shelterbelt are shown on Figure A-4 in Appendix A.

7.21.3. Mitigation/Compensation Context

Establishment of long-term coppice management will enhance the species and structural diversity of these woodlands and benefit a range of species. It will provide compensation for the loss of broadleaved woodland to the reservoir.

Coppicing will be of significant benefit to hazel dormouse in the medium to long-term, particularly of hazel, ensuring optimum hazelnut production.

In the medium and long-term the habitat will be improved for brown long-eared bat, Bechstein's bat, Natterer's bat and other woodland bat species.

The habitat will be improved for a range of invertebrate species, which will compensate for loss of woodland habitat to the reservoir.

7.21.4. Targets

Table 7-4 below lists the attributes and measurable targets will be monitored for woodland management.

Table 7-4 - Attributes and targets for woodland management

Attributes	Targets
Area in woodland management	3.87 hectares of Bell's Copse. Area of The Avenue, Round Wood, Cabbagefield Row and Swanmore Road shelterbelt in woodland management to be determined following further survey and consultation.
Structural diversity	Bell's Copse to be divided into series of 10 coupes at varied stages of natural succession. Other woodlands to show a varied woodland structure with recognised canopy, sub-canopy, shrub and ground flora layers.
Underwood species	Retain diversity of underwood species typical of the Site, with >50% hazel.
Standard trees	Retain a variety of standard trees typical of the Site at <75% canopy cover.
Production of wood products	Maintain production of marketable wood products.
Ground conditions	Protect ground conditions.
Ditches and drainage features	Ditches and drainage features protected from damage.

Attributes	Targets
Cover of dense bracken and bramble	Maintain <20% cover of dense bramble and bracken.
Presence of target species	All target species recorded at least once annually. Target species include hazel dormouse, white admiral, silver-washed fritillary, Bechstein's bat and Natterer's bat.

7.21.5. Prescriptions

Bell's Copse shall be divided into 10 coupes. Hazel and other underwood species shall be coppiced from one coupe every 2 years, so each coupe is cut on a 20 year cycle. Standard trees will be retained.

The harvested wood shall be extracted for marketable uses.

Standard timber trees shall be thinned if necessary every 50 years to improve coppice growth.

Bracken and bramble control will be undertaken every 3 years or if necessary.

A survey shall be undertaken to work up the detail of scale & timing of rotational coppicing prior to first year of coppicing. The timing for commencement of coppicing in Bell's Copse shall be determined in consultation with FE following the survey.

A survey shall be undertaken of woodland at The Avenue, Cabbagefield Row, retained area of Round Wood, and Swanmore Road shelterbelt to determine priorities for management, following which a detailed plan for woodland management will be produced in consultation with key stakeholders including landowners, strategic consultees and community forums. Woodland management of the retained area of Round Wood shall commence as soon as plans are agreed.

Management of woodland at base of The Avenue, Cabbagefield Row, and Swanmore Road shelterbelt shall commence in Year 10. Updated prescriptions for management of these woodlands will be included in later versions of this LEMP.

7.21.6. Monitoring

Annual surveys shall be undertaken to establish the status of habitats and target species populations (surveys will be undertaken by specialists as necessary), and the for the presence of INNS.

Species monitoring surveys shall include bats, hazel dormouse, breeding birds, reptiles and terrestrial invertebrates. Other species surveys shall be undertaken as required.

7.22. Forest Glades

7.22.1. Objectives

Management of two locations of previous clear fell areas to create rotational glades with graded edges.

Enhance the biodiversity value of the woodland by providing structural diversity within woodland blocks.

Rotational management to retain the ancient woodland context and to allow glades to regenerate to woodland if desirable in the future.

Develop transitional areas of wet and dry acid grassland and scrub habitat within Havant Thicket woodland.

7.22.2. Locations

Havant Thicket woodland Management Area, at two locations within birch-dominated woodland in Compartments 6502A and 6508A.

The locations of forest glades are shown on Figure A-7 in Appendix A.

Access for management works will be from the Forestry England gate on the B2149 in the east of Havant Thicket woodland and along the surfaced Cat A forestry track. Access points into the glade locations are from the forestry track are through retained woodland.

7.22.3. Mitigation/Compensation Context

The creation of forest glades will provide new parcels of acid grassland and Purple Moor-grass and Rush Pasture Priority habitat. These habitats are to be provided to compensate for the loss of dry neutral to acid grassland, damp to wet grassland and rush pastures (including Purple Moor-grass and Rush Pastures Priority habitat), and species-poor rush pasture lost to the reservoir.

The existing soils and hydrological status of Havant Thicket woodland is conducive to the creation of new Purple Moor-grass and Rush Pasture, and previous forestry clearance has resulted in the development of heath and mire communities that conform to this habitat type.

The forest glades will improve the structural diversity of Havant Thicket woodland and provide habitat for foraging bats, especially edge-feeding species, as compensation for the loss of habitat for Bechstein's bat, Natterer's bat and other commoner bat species.

In the short-term improved ground vegetation and development of scrub will be of benefit to hazel dormouse. The increase in scrub species diversity (including planting hazel) will benefit hazel dormouse in the medium to longer term.

There will be an increase in the suitability of habitat within Havant Thicket woodland for badgers; and long-term suitability of the habitat for breeding nightjar, bullfinch linnet, stonechat and whitethroat will be improved.

Forest meadows will provide short, medium and long-term suitable habitat for reptiles with an initial high carrying capacity and are to be used as receptor areas for reptiles translocated from the reservoir site.

Forest meadows will also provide new long-term suitable habitat for various invertebrate species including white admiral and silver-washed fritillary. The clearings will be sheltered, providing a warm and sunny area, characteristics that are particularly favoured by a variety of invertebrates including various hoverflies and bees. These areas will also provide additional suitable habitat for glow worm, a species known to be present locally. This will compensate for the loss of grassland and woodland/scrub suitable for a range of invertebrates to the reservoir.

7.22.4. Targets

Table 7-5 below lists the attributes and measurable targets will be monitored for forest glades.

Table 7-5 - Attributes and targets for forest glades

Attributes	Targets
Structural diversity	Five glades in different successional states at two locations.
Size of glades	All glades no more than 0.25 ha in size.
Graded edges	Maintain 3-stage graded edge – coppiced trees/scrub and tall grass/short grass.

Attributes	Targets
Scattered scrub	Between 1% and 5% cover of scrub retained in cleared glades
Presence of Acid Grassland Priority habitat	At least 10% acid grassland overall.
Presence of Purple Moor-grass and Rush Pasture Priority habitat	At least 25% purple-moor grass and rush-pasture overall.
Cover of dense bracken	No more than 5% dense bracken
Cover of INNS (e.g. rhododendron)	0% cover of rhododendron.
Capacity for reptiles	Viable populations of reptiles – numbers to be confirmed
Presence of target species	All target species recorded at least once annually. Target species include white admiral, silver-washed fritillary, glow worm, nightjar, linnet, stonechat, whitethroat, Bechstein's bat and Natterer's bat.

7.22.5. Prescriptions

At each of Location 1 and Location 2, in Year 1 a survey shall be undertaken and the central point of each of a series of five glades shall be marked out.

All glades at both locations shall be cleared of young trees in Year 1, leaving selected scattered shrubs such as gorse, hawthorn or grey willow of between 1% and 5% cover. Maximum 0.25 ha size for each glade.

Subsequently, all glades shall be left to regenerate the next year, and then one glade at each location shall be cleared in Year 2 inclusive of the year during which initial clearance was undertaken, and subsequently a new glade shall be cleared every year.

In Year 11, as all five glades will have been cleared once, the first glade of the series at each location shall be cleared again and the process will be repeated. Table 7-6 below illustrates the rotational clearance process.

At each clearance all trees and shrubs (other than those selected to be retained) shall be cut and removed from the glade. The tools for the cutting operation shall include chainsaws or clearing saws, rather than machinery-mounted equipment.

The central area of each glade shall be trimmed to provide short habitat suitable for development of acid grassland.

Where bracken is dominant it shall be treated by cutting twice a year or rolling as required to reduce bracken vigour and maintain the target cover for dense bracken.

Rhododendron shall be removed and treated as necessary if present.

Table 7-6 below provides a schedule of clearance within forest glades.

Table 7-6 - Schedule of clearance within forest glades

Glade no.	Y1	Y2	Y3	Y4	Y5	Y6
1						
2						
3						
4						
5						

Blue cells = clearance years

7.22.6. Monitoring

Annual surveys shall be undertaken to establish the status of habitats and target species populations (surveys will be undertaken by specialists as necessary), and the for the presence of INNS.

Species monitoring surveys shall include bats, hazel dormouse, breeding birds, reptiles and terrestrial invertebrates (including butterflies and glow worm). Other species surveys shall be undertaken as required.

7.23. Scrub Mosaic Management

7.23.1. Objective

Rotational mowing of grassland along pylon wayleave.

Rotational management of scrub along pylon wayleave.

Creation of a mosaic of habitats.

To compensate for the loss of willow tree lines within the Site.

7.23.2. Locations

Bell's Copse Management Area, located in the north-west of Bell's Copse, within compartment 6501A.

The location of scrub mosaic management is shown on Figure A-7 in Appendix A.

7.23.3. Mitigation/Compensation Context

An area of pylon wayleave in Bell's Copse will be managed comprising of regular mowing and rotational scrub management introduced to create a mosaic of habitats. This will compensate for the loss of willow tree lines within the site.

In the medium and long-term the habitat will be improved for brown long-eared bat, Bechstein's bat, Natterer's bat and other woodland bat species.

The habitat will be improved for a range of invertebrate species, which will compensate for loss of woodland habitat to the reservoir.

7.23.4. Targets

Table 7-7 below lists the attributes and measurable targets will be monitored for scrub mosaic management.

Table 7-7 - Attributes and targets for scrub mosaic management

Attributes	Targets
Structural diversity	Series of scrub blocks in different successional states.
Size of scrub mosaic	3.41 ha of scrub/grassland mosaic created.
Scrub cover	Between 20% and 25% cover of scrub.
Presence of acid grassland	At least 25% acid grassland overall
Cover of dense bracken	No more than 10% dense bracken
Presence of target species	All target species recorded at least once annually. Target species includes white admiral, silver-washed fritillary, glow worm, nightjar, linnet, stonechat, whitethroat, Bechstein's bat and Natterer's bat.

7.23.5. Prescriptions

Up to 50% of the grassland within the pylon wayleave shall be mown twice annually in April and September using a tractor mounted flail or mower leaving blocks of scrub such as gorse, hawthorn and grey willow approximately 0.05-0.1 ha in size.

One block of scrub shall be cut each year on rotation. Where possible a block not immediately adjacent to the previously cut block shall be selected. Cuttings shall be burnt or composted. Each block shall therefore be cut every 2-6 years.

Where bracken is dominant it shall be treated cutting twice a year or rolling as required to reduce bracken vigour and maintain the target cover for dense bracken.

The cutting/mowing regime shall be coordinated with Scottish and Southern Energy (SSE), who currently manage the wayleave.

7.23.6. Monitoring

Annual surveys shall be undertaken to establish the status of habitats and target species populations (surveys will be undertaken by specialists as necessary), and the for the presence of INNS.

Species monitoring surveys shall include bats, hazel dormouse, breeding birds, reptiles and terrestrial invertebrates (including butterflies and glow worm). Other species surveys shall be undertaken as required.

7.24. Grassland Enhancement

7.24.1. Objectives

Management of retained and new grassland (including scrub edge interfaces) to provide varied sward height that will provide suitable habitat for reptiles, new territories for skylark and meadow pipit, and foraging habitat for kestrel.

Increase species diversity.

Maintain grazing regime to reduce nutrient enrichment and scrub encroachment and provide long-term sustainable management.

7.24.2. Locations

Embankment and surrounding landscape Management Area, within created and restored grassland around the reservoir.

The location of grassland enhancement is shown on Figure A-4 in Appendix A.

7.24.3. Mitigation/Compensation Context

In total 36.71 ha of new or enhanced open grassland will be created as compensation for loss of dry neutral and acid grassland to the Scheme. A large expanse of species-rich grassland will be created on the slopes of the new main reservoir embankment. In addition, grassland outside of the construction footprint will be retained or reinstated and managed as part of the overall grassland areas.

Management of the new and restored grassland in the wetland embankment will be undertaken to provide a varied sward height that will maintain suitability for ground nesting birds such as skylark and meadow pipit and graded edges where at the interface with scrub and woodland to increase structural and species diversity.

Grassland on the main embankment will be managed long-term as much as possible by grazing with sheep and cattle. Where cutting is more appropriate, small grass compost heaps will provide habitat for invertebrates and in turn foraging for bats, as well as breeding sites for reptiles (e.g grass snake).

7.24.4. Targets

Table 7-8 below lists the attributes and measurable targets will be monitored for grassland enhancement.

Table 7-8 - Attributes and targets for grassland enhancement

Attributes	Targets
Soil fertility	Grass cuttings to be collected and removed from grassland to reduce soil fertility. Small compost heaps to be located at the edge of woodland.
Species richness	More than 15 species recorded in any 1 m ² .
Scattered scrub	Less than 5% cover of scattered scrub retained.
Injurious weeds	Less than 5% cover of Injurious weeds (ragwort, spear thistle, creeping thistle, broad-leaved dock and curled dock).
Cover of INNS	0% cover of INNS.
Presence of target species	All target species recorded at least once annually. Target species include skylark, meadow pipit and kestrel

7.24.5. Prescriptions

As much as possible grassland management shall be continued grazing using sheep, cattle or horses. Sheep shall be used on the new embankment, and sheep, cattle and horses elsewhere within the Site.

Where grazing is not feasible, small areas of grassland shall be cut annually in September and the arisings removed and composted away from the grassland area. Smaller localised compost heaps shall be utilised to minimise vehicle movements to centralised sites. Mower blades shall be set at 100 mm above ground to avoid impacts to reptiles and amphibians.

A part of the retained grassland shall be managed specifically for skylark and meadow pipit, by providing a variety of short and taller sward heights. Compartments will be grazed in rotation to provide this variety.

Injurious weeds shall be removed by hand-pulling three times per year during active growing season – in late March/early April, late May/early June and September.

Scattered scrub shall be cut and removed when necessary. Any INNS shall be removed where seen.

Litter picking shall be undertaken twice per year.

Protection measures for retained grassland shall be set out in the CEMP.

7.24.6. Monitoring

Annual surveys shall be undertaken to establish the status of habitats and target species populations (surveys will be undertaken by specialists as necessary), and the for the presence of INNS.

Species monitoring surveys shall include breeding birds, wintering birds, reptiles and terrestrial invertebrates. Other species surveys shall be undertaken as required.

7.25. Rush Pasture Enhancement

7.25.1. Objectives

Enhancement of species-poor marshy grassland and neutral grassland habitat to create Purple Moor-grass and Rush Pasture Priority habitat.

Increase species diversity.

Maintain grazing regime to reduce nutrient enrichment and scrub encroachment and provide long-term sustainable management.

7.25.2. Locations

Embankment and surrounding landscape Management Area, south of the reservoir site adjacent to Compensation Flow Channel and an area to the North East corner.

The location of rush pasture enhancement is shown on Figure A-4 in Appendix A.

7.25.3. Mitigation/Compensation Context

The creation of new Purple Moor-grass and Rush Pasture Priority habitat will compensate for the loss of damp to wet grassland and rush pastures (including Purple Moor-grass and Rush Pastures Priority habitat), and species-poor marshy grassland lost to the reservoir.

Neutral grassland habitat in the south of the Site will be enhanced through supply of overflow from the reservoir drainage system to create conditions suitable for Purple Moor-grass and Rush Pasture Priority habitat to develop. The mechanism for this overflow system will be determined during detailed design of the Compensation Flow Channel.

Wet Grassland and Rush Pasture south of the new proposed Main Embankment of the Reservoir and how due to a range of influencing factors an alternative location in the North East corner can be provided (earlier within the project delivery) for approximately 50% of this habitat. Measures to ensure a greater supply of water to the original location could also be considered into the wider scheme design.

The alternative habitat creation site, upslope of the reservoir has been appraised to ensure it meets the same design requirements and delivers the necessary mitigation measures to meet the LEMP objectives. The first phase of the mitigation strategy would also provide potential 'lessons learnt' to be considered on the later delivery stages.

Overall, the alteration of the location of habitat will not reduce the total environmental benefit provided as the original location within the South West corner of the site will still be designed to create the right soil, slope and drainage requirements to deliver Wet Grassland and Rush Pasture.

Utilising multiple areas of habitat creation ensures a greater probability of success for the pasture overall and promotes a greater diversity of final habitats.

As purple moor-grass is not present at this location within the Site (although it occurs in Havant Thicket woodland), it is not a target species. As the habitat develops a key target species may be sharp-flowered rush. However, this was not recorded during surveys undertaken for the ES.

7.25.4. Targets

Table 7-9 below lists the attributes and measurable targets will be monitored for rush pasture enhancement.

Table 7-9 - Attributes and targets for rush pasture enhancement

Attributes	Targets
Soil moisture	Wet or seasonally wet conditions, periodically waterlogged or flooded for 1-2 months of the year.
Species richness	More than 9 species recorded in any 1 m ² including rushes.
Scattered scrub	Less than 5% cover of scattered scrub retained.
Injurious weeds	Less than 5% cover of injurious weeds (ragwort, spear thistle, creeping thistle, broad-leaved dock and curled dock).

Attributes	Targets
Cover of INNS	0% cover of INNS.
Presence of target species	All target species recorded at least once annually. Target species include soft rush, compact rush, marsh thistle, lesser spearwort, greater bird's-foot-trefoil, grass snake.

7.25.5. Prescriptions

As much as possible the rush pasture shall be grazed using cattle and horses.

Where grazing is not feasible, small areas of rush pasture shall be mown annually in September and the arisings removed to be composted away from the area. Mower blades shall be set at 100mm above ground to avoid impacts to reptiles and amphibians.

Injurious weeds shall be removed by hand-pulling three times per year during active growing season – in late March/early April, late May/early June and September.

Scattered scrub shall be cut and removed when necessary. Initial clearance of willows within the rush pasture will be undertaken to provide no more than 5% cover. Any INNS shall be removed where seen.

Litter picking shall be undertaken twice per year.

Protection measures for retained rush pasture shall be set out in the CEMP.

7.25.6. Monitoring

Annual surveys shall be undertaken to establish the status of habitats and target species populations (surveys will be undertaken by specialists as necessary), and the for the presence of INNS.

Species monitoring surveys shall include breeding birds, wintering birds, reptiles and terrestrial invertebrates. Other species surveys shall be undertaken as required.

7.26. Reptile and Amphibian Translocation

7.26.1. Objectives

Translocation of reptiles away from the reservoir footprint.

Translocation of amphibian species away from the reservoir footprint.

Increase the carrying capacity around the edges of the reservoir site through grassland management and installation of hibernacula and log piles.

Increase the carrying capacity in new areas of reptile habitat within Havant Thicket woodland, including management of a section birch woodland and stream corridor north of the reservoir site, and installation of hibernacula and log piles.

7.26.2. Locations

From grassland lost to the reservoir and Upper Lake to the Embankment and surrounding landscape and Havant Thicket woodland Management Areas.

7.26.3. Mitigation/Compensation Context

Eight birch-dominated areas (0.25 ha each) within Havant Thicket woodland have been cleared in 2021 to act as reptile receptor areas. Reptile hibernacula have been provided. Additional suitable habitat for reptiles will be present with Conifer Clear-fell areas (Section 7.18), and in areas of Ride Management (Section 7.20).

Translocation of reptiles and amphibians from the construction area will be carried out by the Principal Contractor. Details are provided in the Reptile Management Plan (document reference: RHD-ZZ-XX-RP-Z-0001-HTR-RMP).

7.26.4. Targets

Successful translocation of viable populations of reptile species recorded during surveys undertaken for the ES, which includes adder, grass snake, common lizard and slow-worm, from grassland lost to the reservoir to receptor sites outside of the construction area.

Successful translocation of a viable population of palmate newt and other amphibians from Upper Lake to suitable receptor ponds outside of the construction area.

7.26.5. Prescriptions

Details of the reptile and amphibian translocation are to be provided in the Reptile Management Plan produced by the Principal Contractor.

7.26.6. Monitoring

Monitoring in the form of targeted reptile surveys will be undertaken for two years post habitat creation and translocation to demonstrate that these areas are providing suitable reptile habitat.

Further details of monitoring are provided in Section 5 of the Reptile Management Plan, the EcoMP and the CEMP.

7.27. Translocations of Dead Wood

7.27.1. Objectives

Translocation of felled timber to retained locations to create 'standing monoliths' and other features.

Deadwood, particularly large limbs, will be moved from woodland within the reservoir footprint to retained woodland to provide habitat for saproxylic invertebrates.

Provide perches and nesting sites for birds, particularly raptors.

Deadwood will be translocated to locations where biodiversity benefit is the greatest.

Deadwood provision will not compromise safety.

To protect lichen and invertebrate resource.

7.27.2. Locations

Embankment and surrounding landscape and Havant Thicket woodland Management Areas.

Standing monoliths will be positioned at suitable locations within grassland and wood pasture around the reservoir.

Deadwood limbs will be moved to woodland within the landscape surrounding the embankment, Havant Thicket and Bell's Copse.

Locations for dead wood translocation are shown on Figure A-4 in Appendix A.

7.27.3. Mitigation/Compensation Context

Deadwood, particularly large limbs, will be moved to retained woodland to provide habitat for saproxylic invertebrates.

Tree stumps from The Avenue will be utilised within the wetland habitat.

Wood from felled oak and other species standards if retained and relocated can be sited at strategic locations to weather and rot naturally and provide dead-wood habitat. The approach will be to provide a range of dead wood, including horizontal trunks to standing monoliths, as well as scattered logs and branches. Dead wood will be targeted for translocation to locations where there is a lack of such habitat, to increase biodiversity in those areas.

The translocation of dead wood will also provide integrated mitigation for ecology as well as recreational pressure and landscape value, as dead-wood monoliths can become attractive visual or interactive features, and logs or branches can be used for dead-hedging or to bolster existing hedgerows to deter public access where necessary to protect sensitive habitats.

Saproxylic invertebrates will benefit from a range of different dead wood features, orientations and locations. It is important that this is taken into consideration when selecting the form and location that dead wood will be provided at the translocation site. The range of forms, locations and orientations should include the following to benefit a range of invertebrates with different environmental requirements and lifecycles:

- Whole trunks left complete;
- Standing dead wood in exposed as well as shaded locations;
- Half buried limb sections;
- Lying dead wood in open as well as shaded locations
- Log sections in locations with seasonally wet ground conditions as well locations mostly dry and never waterlogged;
- Log sections used to create dams in headwater streams (see Section 7.14).
- Partially submerged sections on the reservoir shoreline habitat (see Section 7.9).
- Log piles.
- Tree stumps.

Translocated wood requires careful placement to take into account public safety and forestry operations within Havant Thicket woodland, and delivery of other biodiversity compensation measures.

Translocations of dead wood from the construction area will be carried out by the Principal Contractor. Further details are provided in the EcoMP.

7.27.4. Targets

Table 7-10 below lists the attributes and measurable targets will be monitored for dead wood translocation.

Table 7-10 - Attributes and targets for dead wood translocation

Attributes	Targets
Number of dead wood features translocated	Number dead wood features translocated to include (at least): 3 no. standing monoliths 5 no. whole trunks (lying) 10 no. major limb sections 20 no. log piles
Dead wood types	Selection of a variety of dead wood types
Dead wood sizes	Selection of a range of dead wood sizes
Priority receptor locations	Identification of and prioritisation of particularly valuable donor timber and/or receptor locations.
Receptor situations	A diversity of receptor situations attaining all six of the range of forms, locations and orientations listed in 7.23.3 above.
Presence of target species	Target species recorded at least once annually. Target species include saproxylic invertebrates that will be determined by a specialist entomologist and invertebrate surveyor.

7.27.5. Prescriptions

A survey shall be undertaken in Year 1 to select suitable existing dead wood or timber from felled trees to be translocated and potential donor locations. A specialist entomologist shall be consulted for advice.

Selected timber shall be stored on Site following felling until translocation is undertaken.

Selected timber shall be moved to donor locations in Year 3 and secured or fixed in place.

FE shall be consulted on locations for dead wood features in Havant Thicket woodland and Bell's Copse.

Concrete shall not be used for securing timber on FE land without authorisation from FE.

7.27.6. Monitoring

Inspections of dead wood habitats shall be undertaken annually year to review condition and safety aspect of dead wood.

Specialist monitoring surveys shall be undertaken for saproxylic invertebrates every 3 years to determine the presence of target species.

7.28. Viewing Points and Information Boards

7.28.1. Objectives

Provide wildlife interpretation boards and viewing points.

Provide further information and insight into reservoir, wildlife areas, places of interest and visitor attractions.

Entice the visitor's sense of curiosity and discovery and encourages community engagement.

Viewing points to provide adequate screening while allowing public to see into the wetland area.

Re-use site-won timber.

7.28.2. Locations

The Embankment and surrounding landscape, Havant Thicket woodland and Bell's Copse Management Areas.

7.28.3. Mitigation/Compensation Context

Viewing points can be provided during construction for the public to have an overview of the construction works from safe locations. Detailed design and provision of permanent viewing points and information boards shall be undertaken at a later stage, estimated to be 2026.

7.28.4. Targets

Interpretation boards and viewing points to be provided adjacent to public footpaths, at viewing areas and at visitor centre.

Additional targets for viewing points and information boards shall be determined following detailed design and included in later versions of this LEMP.

7.28.5. Prescriptions

Information boards shall be maintained so they are sturdy and readable. Vegetation that may obscure signs will be cut annually or as required.

Viewing points will be maintained so they provide adequate screening while allowing public to see into the wetland area. Planting in front of and alongside the viewpoints should not obscure the views across the wetland.

Additional management or maintenance prescriptions for viewing screens and information boards shall be determined following detailed design and included in later versions of this LEMP.

Viewing points and information boards shall be maintained in good condition. Repairs shall be carried out at least annually, or as required.

Timber from felling operations in 2022 shall be utilised to build viewing screens and information boards where possible.

7.28.6. Monitoring

Inspection of viewing points and information boards shall be undertaken annually or as required.

Additional inspection or monitoring requirements for viewing points and information boards shall be determined following detailed design and included in later versions of this LEMP.

7.29. Bird Nesting Boxes

7.29.1. Objectives

Provide a variety of bird nesting boxes of different sizes and forms.

7.29.2. Locations

The Embankment and surrounding landscape, Havant Thicket woodland and Bell's Copse Management Areas.

7.29.3. Mitigation/Compensation Context

A variety of bird nesting boxes would provide compensation for loss of nesting opportunities in woodland lost to the reservoir.

7.29.4. Targets

Nesting boxes to provide a variety of nesting opportunities for woodland birds, particularly those species recorded on Site, and include owl and kestrel boxes.

7.29.5. Prescriptions

At least 50 no. bird boxes shall be installed in suitable locations. A variety of nest box types shall be used, suitable for common birds as well as more specialist boxes, such as for owls and kestrel. Timber from felling operations in 2022 shall be utilised to make bird nesting boxes as much as possible.

Nest boxes shall be maintained in good condition. Repairs shall be carried out at least annually, or as required.

7.29.6. Monitoring

Inspection of nest boxes shall be undertaken annually or as required.

Based upon information on bird species recorded at the Site, consideration shall be given to providing additional specialist nesting boxes or platforms in future years. In particular, should osprey be recorded at the Site then it may be achievable, following specialist advice, to encourage this species further.

Part 4

8. Implementation

8.1. Site Management Plan

A Site Management Plan will be produced which will confirm roles and responsibilities for the management and maintenance of the Site for as long as the Scheme remains open and operational. The Site Management Plan provides the mechanism for implementation of the LEMP.

A Site Management Board will be set up by Portsmouth Water. The Site Management Board will appoint a Technical Advisor to oversee the work carried out as part of this LEMP.

8.2. Technical Audit

Technical audit of the mitigation and compensation measures carried out during construction and post-construction is being undertaken by a Technical Advisor appointed by Portsmouth Water. When it is determined that projects are complete, this is agreed with the Technical Advisor. Completion of annual work schedules is also agreed with the Technical Advisor.

8.3. Reporting

The Principal Contractor will keep records of monitoring and audits undertaken and (during the construction phases) changes to management methods made during the Plan Period. On completion of all construction phases, the Principal Contractor will handover the records to Portsmouth Water. The Principal Contractor will provide copies of records to Portsmouth Water on request, prior to handover.

8.4. Summary of Key Operations and Timings for Delivery of Mitigation and Compensation

Table 8-1 below provides a summary of the mechanisms for delivery of the on-site and off-site biodiversity mitigation and compensation for the Scheme.

Table 8-1 - Key operations and timings for delivery of mitigation and compensation

Project ref.	Project	Key operations	Management area(s)	Phases of the Scheme in which required
1	Woodland Creation	Planting, aftercare and maintenance	Embankment and Surrounding Landscape	Construction
2	Hedgerow Creation/Restoration	Planting, aftercare and maintenance	Embankment and Surrounding Landscape	Construction Post-construction
3	Grassland and Rush Pasture Creation and Restoration	Seeding, aftercare and maintenance	Embankment and Surrounding Landscape	Construction
4	Scrub Edge Creation	Ongoing management	Embankment and Surrounding Landscape Havant Thicket Woodland	Construction Post-construction
5	Fencing and Gates	Construction and maintenance	Embankment and Surrounding Landscape Havant Thicket Woodland	Construction Post-construction
6	Dead Hedging	Construction and maintenance	Embankment and Surrounding Landscape Havant Thicket Woodland	Construction Post-construction
7	Veteranisation of Trees	Creation	Embankment and Surrounding Landscape Havant Thicket Woodland	Construction

Project ref.	Project	Key operations	Management area(s)	Phases of the Scheme in which required
8	Wetland/Wet Woodland Creation	Construction, monitoring and management	Wetland	Construction Post-construction
9	Shoreline Habitat Creation	Construction, monitoring and management	Wetland	Construction Post-construction
10	Pond Maintenance (Gipsies Plain)	Maintenance	Embankment and Surrounding Landscape	Construction Post-construction
11	New Watercourse Creation (Gipsies Plain)	Construction and Maintenance	Embankment and Surrounding Landscape	Construction Post-construction
12	Reservoir Compensation Flow Channel	Construction and Maintenance	Embankment and Surrounding Landscape	Construction Post-construction
13	Pond Enhancements	Creation and management	Havant Thicket Woodland Bell's Copse	Construction Post-construction
14	Headwater Stream Restoration	Creation and management	Havant Thicket Woodland	Construction Post-construction
15	Aquatic Plant Translocations	Translocation, monitoring and maintenance	Embankment and Surrounding Landscape Havant Thicket Woodland	Construction
16	Aquatic Invertebrate Translocations	Translocation, monitoring and maintenance	Embankment and Surrounding Landscape	Construction
17	INNS Biosecurity Plan	Ongoing maintenance	Whole Site	Construction Post-construction
18	Conifer Clear-fell and Replanting	Clearance and replanting	Havant Thicket Woodland	Pre-construction Construction Post-construction
19	Birch Clearings and Replanting	Clearance and replanting	Havant Thicket Woodland	Construction Post-construction
20	Ride Management	Creation and rotational management	Havant Thicket Woodland	Construction Post-construction
21A	Woodland Management	Rotational management	Bell's Copse	Construction Post-construction
21B	Woodland Management	Rotational management	Embankment and Surrounding Landscape	Construction Post-construction
22	Forest Glades	Creation and rotational management	Havant Thicket Woodland	Construction Post-construction
23	Scrub Mosaic Management	Ongoing management	Bell's Copse	Construction Post-construction
24	Grassland Enhancement	Management	Embankment and Surrounding Landscape	Construction Post-construction
25	Rush Pasture Enhancement	Management	Embankment and Surrounding Landscape	Construction Post-construction

Project ref.	Project	Key operations	Management area(s)	Phases of the Scheme in which required
26	Reptile and Amphibian Translocations	Translocation and monitoring	Havant Thicket Woodland Embankment and Surrounding Landscape	Construction
27	Dead Wood Translocation	Translocation, monitoring and maintenance	Reservoir to Embankment and Surrounding Landscape, Havant Thicket Woodland and Staunton Country Park	Construction Post-construction
28	Viewing Points and Information Boards	Construction and maintenance	Embankment and Surrounding Landscape Havant Thicket woodland Bell's Copse	Construction Post-construction
29	Bird Nesting Boxes	Construction and maintenance	Embankment and Surrounding Landscape Havant Thicket woodland Bell's Copse	Construction Post-construction
30	Reporting and Plan Review	Ongoing management	Whole Site	Construction Post-construction

9. Reporting and Plan Review

During construction the Principal Contractor shall update Portsmouth Water on the works to provide mitigation and compensation measures included in this LEMP through regular progress meetings.

Portsmouth Water shall produce an annual report in January of each year, with input from the Principal Contractor, FE and HCC, that shall summarise the mitigation and compensation works undertaken during the year under this LEMP. The annual report shall be provided to the Strategic Advisory Board, the Community Advisory Board, and all sub-groups.

Portsmouth Water shall. also produce an annual report of mitigation and compensation undertaken that are commitments under the EPSM licences and bat HMMP, which shall be provided to NE.

The annual report and any comments received on the annual report or during interim meetings with stakeholders shall inform an annual review of the mitigation and compensation works undertaken by Portsmouth Water.

A strategic review of this LEMP shall be carried out every five years by Portsmouth Water, the Principal Contractor and the Site Management Board in consultation with the Strategic Advisory Board to ensure that the management projects are meeting their objectives and to agree a new five-year work schedule. During the strategic 5-year review, the reporting and consultation process shall also be reviewed and amended if necessary.

The objectives should not be significantly modified at review, although the review shall be used to determine if there are any significant changes that require modifications to the objectives. Such changes may be due to new important features being discovered or additional factors which influence the management that have to be taken into consideration.

If the monitoring of the management success has reported that a management project will not meet its targets then the management techniques shall be subject to review. The review shall also take into consideration recorded changes that have been made to management methods during the five-year review period.

Part 5

10. Work Schedule

Table 10-1 below provides a work schedule with further details provided in Part 3. Abbreviations used in the Responsibilities column: PW = Portsmouth Water, FE = Forestry England, HCC = Hampshire County Council, C = Principal Contractor.

Note 1: Where responsibility is shared between the Principal Contractor and Portsmouth Water (and other landowners) then, subject to agreement, the Principal Contractor shall have responsibility during construction and Portsmouth Water thereafter.

Table 10-1 - Work schedule

Ref.	Project	Objectives	Locations	Targets	Prescriptions	Timescales (Year 1 = 2022)	Responsibility (See Note 1)
1	Woodland Creation	- Compensate for the loss of existing woodland. - Compensate for the loss of habitat connectivity provided by The Avenue. - Provide nature conservation and biodiversity functions through re-establishing corridors through the selection of local native species. - Assist in landscape integration with the existing woodland in the immediate surrounding area. - Maintain nesting and foraging opportunities for birds. - Provide new foraging habitat for bats and dormice and benefit birds and invertebrates by providing shelter and food sources. - Provide wood pasture (parkland) areas for more open habitat that will benefit invertebrates and provide different foraging opportunities for bats. - Provide new woodland edge habitat to benefit reptiles. - Allow natural regeneration of woodland as an alternative to planting as much as possible. - Provide a location for re-planting salvaged trees from felled woodland.	Gipsies Plain Memory Park Southern edge of Havant Thicket woodland north of the reservoir Staunton Country Park edge south of the reservoir	0.76 ha broadleaved woodland planting on Gipsies Plain and 0.74 ha wood pasture/parkland. 1.38 ha broadleaved woodland planting and 1.1 ha of wood pasture/parkland within Memory Park in the west of the Site by planting of native species blocks to provide a mosaic of habitats. Additional area of woodland planting on Site totalling 0.3 ha. Maintain a habitat corridor. Provide fruit-bearing species. Management timed to avoid bird nesting season.	Inspection to determine status of plants, growth of weeds and grass, and to determine management requirements.	Quarterly April to October during Establishment Period (Years 1-4) then every year (Year 5 onwards)	C, PW
					Hand pull selected injurious weeds across planting plots three times per year during the active growing season to prevent dominance.	Annually in February, June and October during Establishment Period	C
					Control all weeds within 750mm diameter around each planted shelter/tree with suitable herbicide at least once per year during the active growing season.	Annually in late April/early May during Establishment Period	C
					Hand weed tree shelters and check stakes, tree shelters and ties. Remove selected shelters.	Annually in late April/early May during Establishment Period	C
					Replace failed stock.	Annually during October to February during Establishment Period	C
					Remove all remaining shelters. Prune broken branches after shelters have been removed.	Years 2-5 following planting once plants are established	C
					Water plants during periods of drought.	As required during Establishment Period	C
					Selectively coppice dense stands of uniform habitat in rotation to introduce multi-layered structure. Cut as close to ground level as is practical, all woody growth with branches extending to within 1m of footpath or cycleway.	Year 5 following planting then every 5-7 years between October and February to avoid bird nesting season	PW
					Litter picking.	Annually, three times a year	C, PW
2	Hedgerow Creation/ Restoration	- Improve habitat connectivity. - Compensate the loss of vegetation on Site. - Provide value for landscape integration and nature conservation and biodiversity. - Existing and newly created hedgerows to be managed.	Gipsies Plain Northern Access Route Avenue Staircase Visitor Centre car park	Increase value to wildlife, in particular dormice and bats. Improve habitat connectivity. Management timed to avoid bird nesting season.	Inspection to determine status of plants, growth of weeds and grass, and to determine management requirements.	Quarterly April to October during Establishment Period (Years 1-4) then every year (Year 5 onwards)	C, PW
					Weed control using mulch mat.	Annually during Establishment Period	C
					Hand weed tree shelters and check stakes, tree shelters and ties. Remove selected shelters.	Annually in April and June during Establishment Period	C
					Hedgerow cut once per year (except where selected to be laid).	Annually during Establishment Period	C
					Water plants during periods of drought.	As required during Establishment Period	C
					Replace failed stock.	Annually during October to February during Establishment Period	C
					Remove all remaining shelters. Prune broken branches after shelters have been removed.	Years 2-5 following planting once plants are established	C
					Manage hedgerow by cutting maximum 50% of hedgerow in one year to no less than 1.2 m height.	Year 5 following planting then every 2-3 years between October and February	C, PW
					Mow 2 m buffer on path-side of hedgerow using a tractor-mounted flail. Remove arisings.	Every 2-3 years	C, PW

Ref.	Project	Objectives	Locations	Targets	Prescriptions	Timescales (Year 1 = 2022)	Responsibility (See Note 1)
					Litter picking.	Annually, three times a year	C, PW
					Selected established hedges to be laid when growth reached 4 m in height.	Initially in Year 3 following planting, then every 8-10 year as required.	C, PW
3	Grassland and Rush Pasture Creation/ Restoration	- Create a large expanse of species-rich grassland on the downslope of the reservoir embankment. - Restore areas of neutral grassland temporarily lost during construction. - Restore species-poor marshy grassland and neutral grassland habitat lost during construction to create Purple Moor-grass and Rush Pasture. - Provide value for landscape integration and nature conservation and biodiversity. - Provide a visual link with adjacent vegetation. - Maintain a species-rich sward of wildflowers and grasses and prevent nutrient build up in the soil. - Control encroachment of scrub. - Maintain an absence of injurious weeds/invasive species. - Create suitable micro-habitats for invertebrates, including varied sward densities, patches of bare substrates, promotion of larval food plants and scattered scrub. - Long-term management through grazing of the embankment by sheep where appropriate.	Reservoir embankment Areas surrounding the reservoir and visitor centre	36.71 ha of new/enhanced neutral grassland on the reservoir embankment. Restore neutral grassland lost to construction. Restore rush pasture habitat lost during construction. New rush pasture to have affinities to Purple Moor-grass and Rush Pasture Priority habitat. Protect and re-use site-won low-nutrient and neutral pH soils for species-rich grassland establishment. Grass cuttings to be collected and removed from grassland. A species rich sward of native species. Scattered scrub <5% Injurious weeds <5% Removal/eradication of INNS.	Cut grassland and remove arisings to be composted away from the grassland area. Mower blades to be set at 100mm above ground to avoid impacts to reptiles and amphibians.	Annually in September during Establishment Period (Years 1 to 4 following seeding) (continued after under Grassland Enhancement)	C
					Spot treat injurious weeds with suitable herbicide three times per year during active growing season.	Annually in late February, June and October during Establishment Period as required	C
					Litter picking.	Annually, three times a year or as required during Establishment Period (continued after under Grassland Enhancement)	C
					Inspection to be carried out once per year between April and July during main plant growing season.	Annually during Establishment Period (continued after under Grassland Enhancement)	C
4	Scrub Edge Creation	- Retain willow scrub along the south-eastern boundary of Havant Thicket woodland. - Maintain a wide buffer of scrub and tall herb habitat on the reservoir side. - Provide a visual barrier between grassland on the reservoir side and footpaths within Havant Thicket woodland. - Create margins of scrub and tall herbs on the western boundary of the Site and adjacent to retained and newly planted woodland in the south-east of the Site. - Provide woodland edge habitat to benefit invertebrates and reptiles. - Provide a location for re-planting salvaged trees from felled woodland.	South-east boundary of Havant Thicket woodland Western boundary of the Site Adjacent to retained woodland in the south-east of the Site	Retain a habitat connectivity between Havant thicket woodland and the hedgerow boundary east of the reservoir. Enhance 0.50 ha of willow scrub. Minimum 4 m buffer of scrub edge with sinuous edges. Variety of age ranges.	Cut 20-25% scrub every year on 4-5 year rotation. Cut back to stump level targeting older stands.	Annually in January or February	C, FE
					Create minimum 4 m buffer with sinuous edges by fencing off grassland margins with adjacent woodland. Salvaged trees from felled woodland to be planted in this area.	Year 3	C
					Mow buffer strip in 50-100m length blocks on rotation. Cuttings to be burnt or composted.	Annually from Year 3, each block cut every 2-4 years	C, PW
					Inspection to be carried out once per year.	Annually in June	C, PW, FE
5	Fencing and Gates	- Provide and maintain suitable fencing and gates for grassland management (grazing stock). - Provide and maintain suitable fencing and gates to manage visitor access.	Northern Access Route Wetland	Fences and gates to be suitable for grazing stock and/or visitor access. Prevent access for dogs to ecologically sensitive areas. Prevent disturbance to grazing stock.	Maintain fences in a good condition to prevent access by people and dogs and keep grazing animals in.	Annually or as required following installation	C, PW

Ref.	Project	Objectives	Locations	Targets	Prescriptions	Timescales (Year 1 = 2022)	Responsibility (See Note 1)
		- Provide fencing around ecologically sensitive areas to prevent access by the public and dogs (sensitive areas to be defined in Recreation and Access Strategy). - Provide and maintain suitable fencing and gates for Forestry England boundary in Havant Thicket woodland.	Embankment and surrounding landscape		Inspection to be carried out once per year and repair / replace as necessary.	Monthly following installation	C, PW
6	Dead Hedging	- To integrate with live hedgerow planting and provide a physical barrier on north-western boundary of Site. - Utilise site-won brash. - Prevent unwanted access. - Provide wildlife corridors and improve habitat connectivity. - To be Installed around the pond complexes in the east of Havant Thicket woodland to prevent dog entry and spread INNS. - To be installed at the end of birch racks (Section 7.19) and forest glades (Section 7.22) to discourage public access.	Northern Access Route Havant Thicket woodland (Translocations from reservoir site)	Re-use of materials from within Site. Provide a continuous, unbroken hedge where possible. Integrate live stems of saplings/shrubs if possible. Prevent access onto Northern Access Route from north-west, except for designated access points. Prevent access by dogs to ponds in east of Havant Thicket woodland. Discourage public access to birch racks and forest glades.	Dead hedges to be created by infilling site won brash between two rows of stakes 1-2 m apart. Live saplings and shrubs to be laid and integrated into the hedge to provide some live growth	October/November Years 1 to 4	C, FE
					Maintain dead hedge in a good condition to prevent access by people and provide a functional wildlife corridor.	Annually or as required	C, FE
					Inspection to be carried out once per year for decomposition or structural damage and repair / replace as necessary with site won brash.	Annually	C, FE
					Live component of hedge to be re-laid once regrowth reaches 4 m.	After 8-10 years	C, PW
7	Veteranisation of Trees	- Create artificial woodpecker holes, broken branches, artificial damage to trunks, and areas for rot to begin in some retained trees for use by bats or birds. - Ringbark some retained non-native trees to create standing dead-wood habitat. - Retain existing standing dead-wood and damaged/dying trees within Havant thicket woodland, Bell's Copse and retained woodland around the reservoir. - Translocation of natural bat roosting features from trees lost to the reservoir.	Havant Thicket woodland	Trees to have artificial veteranisation enhancements and ring-barking made during first 5 years. Target species: bats, birds, specialist invertebrates	Survey for suitable locations for veteranised and ring-barked trees away from public areas or commercial forestry stands. Select suitable trees in consultation with FE.	Year 1	C FE
					Create artificial woodpecker holes, broken branches, artificial damage to trunks, and areas for rot to begin in some retained mature native or non-native trees.	Every 3-5 years	C FE
					Ringbark retained mature non-native trees (e.g. Turkey oak or conifer species – but not Scots pine).	Every 5 years	C FE
					Translocation of artificial roost features following the specifications in the bat licence.	Year 1	C
					Inspection to be carried out once per year for target species use and public safety.	Annually following works	C, PW
8	Wetland/Wet Woodland Creation	- Fell Corsican Pine Plantation and replant with alder, aspen, black poplar and willow to create wet woodland. - Wetland retaining structures to be constructed to maintain consistent water levels when the main reservoir water levels low. - Wetland to be fed by three headwater streams. - Create a mosaic of grassland, scrub, wet woodland and ephemeral pools. - Variable water depths, islands and reedbed.	Wetland	10.2 ha of wetland. South-facing margins. Consistent water levels. Wet woodland habitat to include alder, aspen, willows and native black poplar. Grassland and scrub mosaic. Ephemeral pools. 3.4 ha reedbed. Islands. Scots pine to be retained where present.	Fell conifers within Corsican Pine Plantation in south of Havant Thicket woodland. Retain selected Scots pine.	Year 1	PW
					Detailed design and construction of wetland retaining structure.	Years 2 to 3	C
					Detailed design and construction of wetland waterbodies and habitats.	Years 2 to 3	C
					Management prescriptions for wetland habitats to be determined following detailed design and included in later versions of LEMP.	Year 4 onwards	C
9	Shoreline Habitat Creation	Develop shoreline ephemeral shallow vegetation on the north-east corner of the reservoir.	Wetland	Colonised by ephemeral vegetation of target species.	Detailed design and construction of shoreline habitat.	Years 2 to 3	C
					Management prescriptions for shoreline habitat to be determined following detailed design and included in later versions of LEMP.	Year 4 onwards	C

Ref.	Project	Objectives	Locations	Targets	Prescriptions	Timescales (Year 1 = 2022)	Responsibility (See Note 1)
		Provide partially submerged dead-wood features (see section 7.27).			Methods will be developed to mitigate for the potential effects on shoreline aquatic species associated with routine reservoir drawdown events. Stumps to be retained as dead wood features.	Years 2 to 3 Following felling in 2022. Stored until use assumed to be Year 3	C C
10	Pond Maintenance (Gipsies Plain)	- Maintain two ephemeral waterbodies on Gipsies Plain within new woodland. - Add new culvert to connect the new ponds to the existing drain on the eastern boundary of the Site. - Enhance area around new ponds for reptiles through provision of hibernacula.	Gipsies Plain	Both ponds retaining water at least 60% of the year. 75% of margin with emergent vegetation (reeds, sedges, etc.) <5% emergent inundation vegetation (e.g. bullrush) in pond away from margins. 4 no. reptile hibernacula.	Create new culvert connection from ponds to existing drain on eastern boundary of the Site. Create reptile hibernacula. Maintain/repair reptile hibernacula by topping up with site-won logs or stone. Remove excessive inundation vegetation (e.g. bullrush). Inspection to be carried out once per year.	Year 3 Years 1 to 3 Every 5 years Every 5 years Annually	PW PW PW PW PW
11	New Watercourse Creation (Gipsies Plain)	Add new watercourse to provide additional habitat diversity to the east of the reservoir.	Gipsies Plain (Reach 5).	Provide a new 253m watercourse. Contribute to the Biodiversity Net Gain (BNG) requirements.	Detailed design and construction of a new 253m reach of new channel habitat. Management prescriptions for the new watercourse to be determined following detailed design and included in later versions of LEMP.	Years 3 to 4 Year 4	C – subject to agreement PW
12	Reservoir Compensation Flow Channel	- Creation of a new 250m reach of open channel to provide compensation flow channel from reservoir to Riders Lane Stream. - Provide a naturalised watercourse with benefits to wildlife. - Provide suitable flow regime.	South of the reservoir between the reservoir and Riders Lane Stream.	Provide a new 250m channel. Maintain compensation flow function. Include a step pool/pool-riffle sequence along its length. Provide natural habitat. Maintain connection with enhanced area of rush-pasture to provide damp conditions.	Detailed design and construction of a new 250 m reach of new compensation flow channel. Agree suitable compensation flow regime with EA. Provide flow monitoring equipment to monitor flows. Monitoring of vegetation after construction until communities become established. Macro-invertebrate monitoring after construction until a community becomes established. Flow monitoring as part of licence agreement with EA. Management and monitoring prescriptions to be confirmed following detailed design and included in later versions of LEMP.	Years 3 to 4 Years 3 to 4 Year 4 Annually between June and September following construction Twice annually following construction during May-May and September-November As agreed with EA - TBC Year 4	C C C C C C C
13	Pond Enhancements (Havant Thicket woodland)	- Selective thinning (regeneration felling) of conifer to open up light levels to encourage aquatic plant growth. - Provide habitat suitable for translocated acidic macrophyte species from the Upper Lake. - Manage/eradicate parrot's feather (INNS). - Provide signs at ponds and public entry points to increase awareness of INNS, citing Defra & Plantlife UK 'check-clean-dry' campaigns. - Install dog dipping ponds at suitable locations close to entrances to the Site. - Enhancement of the ponds to benefit great crested newts.	Havant Thicket woodland (Reach 4)	Retention of some Norway spruce and all Scots pine (unless shading ponds). Maintain habitat suitability for great crested newts. Maintain habitat suitable for translocated aquatic plants (macrophytes) including marsh St. John's-wort, floating club-rush and lesser skullcap. Removal/eradication of INNS. One pond for dog dipping close to car parks within the Site. Increased public awareness of INNS.	Selective thinning of conifers around ponds in Reach 4 in consultation with FE. On-going selective coppicing of willows and other species around ponds. Removal of excess leaf litter and sediment from ponds. Manage INNS plants to control spread and lead to eradication. Detailed design and construction of a sacrificial dog-dipping pond close to Havant Thicket FE car-park. Location to be confirmed and agreed with FE. Additional locations in the west of the Site to be determined during detailed design of the visitor facilities. Install signs at ponds and public entry points to increase awareness of INNS.	Year 2 Every 5-10 years Year 2 in January Annually Years 2 to 4 Years 3 to 4 Year 3	FE FE FE FE PW, FE – subject to agreement PW, FE

Ref.	Project	Objectives	Locations	Targets	Prescriptions	Timescales (Year 1 = 2022)	Responsibility (See Note 1)
					Dead hedging and/or fencing shall be provided around the pond complexes in Havant Thicket woodland (see Sections 7.5 and 7.6).	Year 3	FE
					Survey to establish the status of habitats and target species, and the for the presence of INNS.	Annually	PW
14	Headwater Stream Restoration	- Open up of stream corridors to form graded edge, maintained through ongoing rotational management. - Creation of six small ponds on headwater streams in Havant Thicket woodland for macrophyte translocation, with leaky dams installed to slow flow. - Creation of additional localised areas of flooding (new ponds) by introducing wood into the stream. - Reduce inputs from sediments, nutrient run-off and pesticides in upper Riders Lane Stream catchment and reservoir. - New track culvert (in Reach 2) to reduce flooding along this access point.	Havant Thicket woodland (Reaches 1, 2 and 3)	6 no. new ponds. Flooded areas due to woody debris in streams. Open stream corridors with graded edge. Reduced sediment and nutrient loads downstream. Maintain habitat suitable for translocated aquatic plants (macrophytes), including marsh St. John's-wort, floating club-rush and lesser skullcap. Removal/eradication of INNS.	Detailed design and construction of six small ponds in headwater streams in Havant Thicket woodland.	Autumn/winter Years 2 and 3	PW, FE
					Provide woody debris for the streams to slow flow.	Spring Year 3	FE
					Initial coppicing within stream corridors in Reaches 1, 2 and 3.	Year 3	FE
					Provide new culvert under track (Reach 2) to reduce flooding along access route.	Year 1	FE
					Ongoing rotational management.	Every 5 years	FE
					Ongoing headwater stream pond/dam management.	Every 5 years	FE
15	Aquatic Plant Translocations	Translocate a small number of notable plants from on-site standing water, watercourses and ditches to suitable new and enhanced ponds within Havant Thicket woodland.	Havant Thicket woodland ponds (translocations from Upper Lake)	Successful translocation and establishment of selected aquatic plants (macrophytes), including marsh St. John's-wort, floating club-rush and lesser skullcap.	Translocations shall follow the methodology provided in the Technical Note in Appendix B.5.	Summer/autumn Years 1 and 2	C
					Collect seeds and adult plants from Upper Lake to spread at receptor ponds in Havant Thicket woodland (see Section 7.13 and 7.14).	Summer/autumn Years 1 and 2	C
					Kew Millennium Seed Bank to be used if translocated plants do not re-appear after 2 years.	Summer/autumn Years 3 and 4	C
16	Aquatic Invertebrate Translocations	Translocate aquatic invertebrate communities at locations with some of the highest diversity as part of enabling works to ponds on headwater streams in Havant Thicket woodland and Southleigh Forest.	Southleigh Forest (translocations from on-Site streams)	Successful translocation and establishment of notable aquatic invertebrate species (particularly Nationally Scarce beetles identified at the Site).	The aquatic invertebrate translocation shall follow the methodology provided in the Technical Note in Appendix B.5.	Spring/early-summer Year 1	C
					Hand netting shall be used to collect notable invertebrates from stream within the site, to be transported to receptor sites.	Spring/early-summer Year 1	C
					Sediments/gravels shall be mechanically removed and translocated to receptor sites.	Spring/early-summer Year 1	C
17	INNS Biosecurity	- Protect on-site features (particularly aquatic features) from INNS establishment by eradicating INNS where present and minimising spread. - Provide signs to raise awareness of non-native invasive species.	Whole Site	Increased public awareness of INNS. Removal/eradication of INNS from Site. No aquatic INNS establishment in reservoir or wetland.	Initiate programme to eradicate INNS from Site where known to be present using combination of mechanical removal and herbicide.	Annually Years 2 to 4	C, PW, FE
					Routinely follow Defra & Plantlife UK 'check-clean-dry' campaigns.	At all times	C, PW, FE, HCC
					Prepare plan for tackling new outbreaks of INNS in reservoir or wetland to eradicate early.	Year 2	PW, FE, HCC
					Maintain signs at ponds and visitor centre to increase public awareness of INNS.	Annually and as required	FE
					Provide public awareness media on INNS as required.	Annually following construction	PW, FE, HCC
					Undertake routine inspections monthly during growing season.	Monthly	C, PW
18	Conifer Clear-fell and Replanting	Felling and clearance of non-native conifer plantations and subsequent planting of	Havant Thicket woodland		Mulch and scarify clear fell compartments following FE standard practice.	Year 2	FE

Ref.	Project	Objectives	Locations	Targets	Prescriptions	Timescales (Year 1 = 2022)	Responsibility (See Note 1)
		native trees, including pedunculate oak and hazel. - Allow natural regeneration of birch, willow and other native species. - Retain suitable mature trees within clear-fell areas as perches for birds.	Compartments 6507C and 6508C	4.07 ha of clearance of conifer plantation and broadleaved woodland planting. Establishment of native tree species. Protection from deer and squirrels. Retain selected mature native trees and conifers. Protect ground conditions, ditches and drainage features. Maintain <20% cover of bramble and bracken. Maintain 0% cover of rhododendron. Maintain short-term (10 years) suitability for reptiles. Target species – purple moor-grass, white admiral, silver-washed fritillary, glow worm, nightjar, linnet, stonechat, whitethroat, Bechstein's bat and Natterer's bat.	Control conifer regeneration.	Years 1 to 10	FE
					Install deer fencing around clear fell compartments.	Year 2	FE
					Plant native woodland tree mix of pedunculate oak, hazel and other native species, at 1100 trees/ha density.	Year 2 (spring)	FE
					Selective thinning of birch and willow to benefit slower-growing broadleaved species.	Every 10 years	FE
					Control of bracken, bramble and rhododendron as necessary.	Twice annually	FE
					Grey squirrel control	From Year 10 (earlier if necessary)	FE
					Survey to establish the status of habitats and target species, and the for the presence of INNS.	Annually	PW
19	Birch Clearings and Replanting	- Creation of clearings through birch dominated woodland to encourage existing broadleaved trees. Creation of clearings to be phased over 8 years. - Plant new broadleaved woodland (leaving some unplanted areas). - Clear halos around young broadleaved trees to speed up the development of broadleaved woodland.	Havant Thicket woodland Compartments 6503A, 6505A, 6505C and 6509B	Establishment of 27.8 ha of native tree species 1100 stems per ha. Leave 50% of clearings unplanted. Clearance of 27.8 ha birch and willow species. Retain selected mature native trees and Scots pine. Protect ground conditions, ditches and drainage features. Maintain <20% cover of bramble and bracken. Maintain 0% cover of rhododendron. Maintain short-term (10 years) suitability for reptiles. Target species – purple moor-grass, heather, white admiral, silver-washed fritillary, glow worm, nightjar, linnet, stonechat, whitethroat, Bechstein's bat and Natterer's bat.	Coppice birch and willow species in area of racks in Compartments 6503A, 6505A, 6505C and 6509B. Retain and clear halos around selected trees such pedunculate oak, hazel, beech, hornbeam, yew, Scots pine and mature birch.	Year 2 to Year 9	FE
					Clearance and respacing to follow the outline Birch Clearings and Replanting Plan in Appendix B.6.	Year 2 to Year 9	FE
					Avoid disturbance of bat and dormouse boxes as licence conditions do not allow boxes to be moved.	Year 2 to Year 9	FE
					Wood to be extracted, if there is a market, or incorporated into dead hedges (see Section 7.6) and left as log piles.	Year 2 to Year 9	FE
					Plant native broadleaved woodland tree mix of pedunculate oak, yew, holly and hazel, leaving 50% unplanted clearings.	Year 3 to Year 10	FE
					Control of bracken, bramble and rhododendron as necessary.	Twice annually	FE
					Add dead hedging at the end of racks where close to exiting paths/tracks.	Year 2 to Year 9	FE
					Survey to establish the status of habitats and target species, and the for the presence of INNS.	Annually	PW
20	Ride Management	- Creation of 3-zone graded edges to existing rides to provide enhanced habitat. - Encourage structural diversity with heather, gorse and bramble as well as purple moor-grass and acid grassland. - Create scalloped edges. - Ongoing rotational management.	Havant Thicket woodland	8.2 km length of rides under management. Provide scalloped edges. Maximum of 16 m clearance width from centre of ride (widest part of scallops). Utilise previously scalloped areas where possible. Maintain 2 or 3-zone graded edge. Retain mature native trees. Protect ground conditions, ditches and drainage features. Maintain <20% cover of bracken.	Zone 1: Mow all ride verges 2 m either side of path/track. Arisings to be collected and removed or composted on site.	Annually	FE
					Zone 2: Cut 5-10 m strip adjacent to Zone 1 in 50-100m length blocks or at junctions on rotation. One block per ride, alternating side to side. Cuttings to be burnt or composted.	Annually, each block cut every 2-4 years	FE
					Zone 3: Create 2-4 scallops 4-16 m in width per ride, one a year for 4 years. Coppice all species but retain selected mature native broadleaved trees and yew. Wood to be incorporated into dead hedges (see Section 7.6).	Annually, Years 2 to 5.	FE
					Zone 3: Cut 1 scallop per ride on rotation, when vegetation reaches approximately 4 m in height. Coppice all species within scallops but retain selected mature native	Every 1-2 years from Year 6, each scallop cut every 4-8 years	FE

Ref.	Project	Objectives	Locations	Targets	Prescriptions	Timescales (Year 1 = 2022)	Responsibility (See Note 1)
				Maintain 0% cover of rhododendron. Maintain short-term (10 years) suitability for reptiles. Target species – purple moor-grass, heather, gorse, bramble, white admiral, silver-washed fritillary, glow worm, nightjar, linnet, stonechat, whitethroat, Bechstein's bat and Natterer's bat.	broadleaved trees and yew. Wood to be incorporated into dead hedges (see Section 7.6). Narrower rides will be managed on a 2 -zone system with only Zones 1 and 2 cut on rotation. Control of bracken and rhododendron as necessary. Survey to establish the status of habitats and target species, and the for the presence of INNS.	 Annually Twice annually Annually	 FE FE PW
21	Woodland Management	- Management of Bell's Copse on a long-term coppice rotation. - Management of woodland at base of The Avenue, Cabbagefield Row, Retained area of Round Wood, and Swanmore Road shelterbelt.	Bell's Copse Compartment 6501B Woodland south of The Avenue Round Wood (retained section) Cabbagefield Row Swanmore Road Shelterbelt	3.87 hectares of Bell's Copse to be brought into coppice rotation. Series of coppice coups in varied stages of natural succession. Retain diversity of underwood species, >50% hazel. Retain selected standard trees at <75% canopy cover. Maintain production of marketable wood products. Protect ground conditions, ditches and drainage features. Maintain <20% cover of dense bramble and bracken. Target species – hazel dormouse, white admiral, silver-washed fritillary, Bechstein's bat and Natterer's bat	Coppice hazel and other underwood species in Bell's Copse on 20-year cycle. Retain standard trees. Harvested wood to be extracted for marketable use. Thinning of standard timber trees in Bell's Copse if necessary. Control of bracken and bramble in Bell's Copse as necessary. Survey to work up detail of scale & timing of rotational coppicing in Bell's Copse. Timing to be agreed with FE. Management of woodland at base of The Avenue, Cabbagefield Row, retained area of Round Wood, and Swanmore Road shelterbelt. Survey to establish the status of habitats and target species, and the for the presence of INNS.	Every 2 years Every 2 years Every 50 years Every 3 years Prior to first year of coppicing Year 10 onwards Annually	FE FE FE FE FE C PW
22	Forest Glades	- Management of two locations of previous clear fell areas to create rotational glades with graded edges. - Enhance the biodiversity value of the woodland by providing structural diversity within woodland blocks. - Rotational management to retain the ancient woodland context and to allow glades to regenerate to woodland if desirable in the future. - Develop transitional areas of wet and dry acid grassland and scrub habitat within Havant Thicket woodland.	Havant Thicket woodland Compartments 6502A and 6508A	5 no. glades in different successional states at 2 no. locations. All glades no more than 0.25 ha in size. Maintain 3-zone graded edge. 1%-5% cover of scrub. >10% acid grassland cover. >25% purple-moor grass and rush-pasture cover. <5% dense bracken cover. Maintain 0% cover of rhododendron. Maintain short-term (10 years) suitability for reptiles. Target species – purple moor-grass, white admiral, silver-washed fritillary, glow worm, nightjar, linnet, stonechat, whitethroat, Bechstein's bat and Natterer's bat. All target species recorded at least once within 5-year period.	At each of Location 1 and Location 2, a survey undertaken and central point for each of a series of five glades marked. Clear all glades of young trees leaving selected scattered shrubs such as gorse, hawthorn or grey willow of between 1% and 5% cover. Maximum 0.25 ha for each glade. Clear one glade at each location each year. Continue to next glade in subsequent years in rotation. Once all five glades will have been cleared once, return to first glade and repeat process. The tools for the cutting operation should include chainsaws or clearing saws, rather than machinery-mounted equipment. All cut trees and shrubs (other than those selected to be retained) to be removed. Strim central area of each glade to provide short habitat suitable for development of acid grassland. Mechanically treat bracken as required (cutting or rolling) to maintain the target cover for dense bracken. Control bramble and rhododendron as necessary. Survey to establish the status of habitats and target species, and the for the presence of INNS.	Year 1 Winter Year 1/2 Winter Year 3/4 and subsequently every 2 years All years All years Every 2 years Twice annually Twice annually Annually	FE FE FE FE FE FE FE PW
23					Mow up to 50% of the grassland within the pylon wayleave in April and September leaving blocks of scrub	Twice annually	FE

Ref.	Project	Objectives	Locations	Targets	Prescriptions	Timescales (Year 1 = 2022)	Responsibility (See Note 1)
	Scrub Mosaic Management	- Rotational mowing of grassland along pylon wayleave. - Rotational management of scrub along pylon wayleave. - Create a mosaic of habitats. - Compensate for the loss of willow tree lines within the Site.	Bell's Copse Compartment 6501A	3.41 ha of scrub/grassland mosaic created. 25-50% cover of scrub. >10% acid grassland overall >25% purple-moor grass and rush-pasture overall <10% dense bracken Target species – white admiral, silver-washed fritillary, glow worm, nightjar, linnet, stonechat, whitethroat, Bechstein's bat and Natterer's bat.	approximately 0.05-0.1 ha in size such as gorse, hawthorn and grey willow to be cut on rotation. Cut one block of scrub each year on rotation. Each block cut every 2-6 years. Where possible a block not immediately adjacent to the previously cut block should be selected. Cuttings to be burnt or composted. Co-ordinate with SSE who manage the wayleave. Control of bracken as necessary. Survey to establish the status of habitats and target species, and the for the presence of INNS.	Annually Year 1 Annually Annually	FE FE PW
24	Grassland Enhancement	- Management of retained and new grassland (including scrub edge interfaces) to provide varied sward height that will provide suitable habitat for reptiles, new territories for skylark and meadow pipit, and foraging habitat for kestrel. - Increase species diversity - Maintain grazing regime to provide long-term sustainable management.	Embankment and surrounding landscape	Grass cuttings to be collected and removed from grassland. Small compost heaps to be located at the edge of woodland. Maintain a species-rich sward. Scattered scrub <5%. Injurious weeds <5%. Removal/eradication of INNS. Target species – skylark, meadow pipit and kestrel.	As much as possible grassland shall be grazed using sheep, cattle or horses. In small areas where grazing is not feasible, cut grassland and remove arisings to be composted away from the grassland area. Smaller localised compost heaps shall be utilised to minimise vehicle movements to centralised sites. Mower blades to be set at 100mm above ground to avoid impacts to reptiles and amphibians. Hand pull injurious weeds three times per year during active growing season. Any INNS shall be removed where seen. Scattered scrub shall be cut and removed when necessary. Litter picking. Protection measures for retained grassland to be set out in the CEMP Survey to establish the status of habitats and target species, and the for the presence of INNS.	Annually Annually in September Annually in February, June and October as required Annually in January/February Annually Year 1 Annually	HCC C, PW C, PW C, PW C, PW C PW
25	Rush Pasture Enhancement	- Enhancement of species-poor marshy grassland and neutral grassland habitat through the drainage design in the south-west corner of the Site to create Purple Moor-grass and Rush Pasture. - Maintain grazing regime to provide long-term sustainable management.	South of reservoir adjacent to Compensation Flow Channel	Maintain damp conditions through connection with Reservoir Compensation Flow Channel. Grass cuttings to be collected and removed from habitat. Maintain a sward characteristic of Priority habitat. Scattered scrub <5%. Injurious weeds <5%. Removal/eradication of INNS.	Where possible rush pasture shall be grazed using cattle and horses. In small areas where grazing is not feasible, cut rush pasture and remove arisings to be composted away from the area. Mower blades to be set at 100mm above ground to avoid impacts to reptiles and amphibians. Hand pull injurious weeds three times per year during active growing season. Any INNS shall be removed where seen. Scattered scrub shall be cut and removed when necessary. Initial clearance of willows within the rush pasture will be undertaken to provide no more than 5% cover Litter picking. Protection measures for retained rush pasture to be set out in the CEMP Survey to establish the status of habitats and target species, and the for the presence of INNS.	Annually Annually in September Annually in February, June and October as required Annually in January/February Annually Year 1 Annually	HCC C, PW C, PW C, PW C, PW C PW
26	Reptile and Amphibian Translocations	- Translocation of reptiles away from the reservoir footprint. - Increase carrying capacity around the edges of the reservoir site through grassland management and installation of hibernacula and log piles.	Embankment and surrounding landscape Havant Thicket woodland,	Successful translocation of reptiles species recorded during surveys (adder, grass snake, common lizard and slow-worm) from reservoir site, and common amphibian species	Details of the reptile and amphibian translocations are provided in the CEMP.	Year 1 and 2	C

Ref.	Project	Objectives	Locations	Targets	Prescriptions	Timescales (Year 1 = 2022)	Responsibility (See Note 1)
		- Increase carrying capacity in new areas of reptile habitat within Havant Thicket woodland, including management of a section birch woodland and stream corridor north of the reservoir site, and installation of hibernacula and log piles. - Translocation of amphibian species away from the reservoir footprint	(Translocations from reservoir site)	(including palmate newt) from Upper Lake.			
27	Dead Wood Translocation	- Translocation of felled timber to retained locations to created 'standing monoliths' and other features. - Deadwood, particularly large limbs, will be moved for woodland within the reservoir footprint to retained woodland to provide habitat for saproxylic invertebrates. - Deadwood will be translocated to locations where biodiversity benefit is the greatest. - Deadwood provision will not compromise safety. - To protect lichen and invertebrate resource	Embankment and surrounding landscape Havant Thicket woodland. (Translocations from reservoir site)	No. of features translocated (at least): 3 no. standing monoliths. 5 no. lying whole trunk sections 10 no. major limb sections 20 no. log piles Variety of dead wood types. Range of dead wood sizes. Prioritisation of valuable donor timber Prioritisation of the most suitable receptor locations. Diversity of receptor situations. Presence of target species.	Undertake survey to select suitable existing dead wood or timber from felled trees to be translocated.	Year 1	C, PW
					Consult with specialist entomologist on donor locations for dead wood.	Year 1	C
					Selected timber to be stored on Site following felling until translocation is undertaken.	Following felling in Year 1. Stored until use.	C
					Move to donor locations and secure or fix in place.	Year 3	C, FE
					Inspection to be carried out once per year to review condition and safety aspect of dead wood.	Annually	C, PW, FE
					Undertake specialist invertebrate surveys to determine the presence of target species.	Every 3 years	C, PW
28	Viewing Points/ Hides and Information/ Interpretation Boards	- Provide wildlife interpretation boards and viewing points. - Provide further information and insight into reservoir, wildlife areas, places of interest and visitor attractions. - Entice the visitor's sense of curiosity and discovery and encourages community engagement. - Viewing screens to provide adequate screening while allowing public to see into the wetland area. - Re-use site-won timber.	Embankment and surrounding landscape Havant Thicket woodland, Bell's Copse	Interpretation boards and viewing points to be provided. To be located adjacent to public footpaths, at viewing areas and at visitor centre.	Detailed design and provision of viewing points and information boards.	Estimated Year 4-5	C, PW, FE, HCC
					Maintain information boards so they are sturdy and readable. Cut vegetation that may obscure signs.	Annually or as required	C, PW, FE, HCC
					Maintain viewing points so they provide adequate screening while allowing public to see into the wetland area Ensure planting in front of and alongside viewpoints does not obscure the views across the wetland.	Annually or as required	C, PW, FE, HCC
					Timber from felling operations shall be utilised to build viewing screens and information boards.	Following felling in Year 1. Stored until use.	C, PW
					Inspect viewing screens and information boards once a year.	Annually	C, PW, FE, HCC
29	Bird Nesting Boxes	Provide a variety of bird nesting boxes of different sizes and forms.	The Embankment and surrounding landscape Havant Thicket woodland Bell's Copse	At least 50 no. nesting boxes provided suitable for species recorded on Site, to include specific owl and kestrel boxes. Timber from felling operations in 2022 shall be utilised to make bird nesting boxes as much as possible.	Bird boxes to be constructed and installed in suitable locations.	Year 3	C, PW
					Inspection of nest boxes shall be undertaken annually or as required.	Annually or as required	C, PW
					Nest boxes shall be maintained in good condition. Repairs shall be carried out at least annually, or as required.	Annually or as required	C, PW
30	Reporting and Plan Review	- Portsmouth Water to stay informed on mitigation and compensation measures undertaken under the LEMP through regular updates. - Provide an annual report on actions taken under the LEMP to stakeholders. - Provide an annual report on actions taken under the EPSM licences and bat HMMP to Natural England (NE). - Undertake regular reviews of the LEMP with a strategic review every 5 years.	Whole Site	Annual progress reports. Strategic review every 5 years.	Principal Contractor to update Portsmouth Water on measures taken under the LEMP.	Regularly throughout the construction period	C
					Produce progress report of actions taken for the LEMP with input from the Principal Contractor, FE and HCC.	Annually in January of each year	PW
					Produce report of mitigation and compensation undertaken that are commitments under the EPSM licences and bat HMMP.	Annually	PW
					Review of mitigation and compensation works under the LEMP taking into consideration stakeholder comments.	Annually	PW
					Strategic review of LEMP by Portsmouth Water, the Principal Contractor, and the Site Management Board, in consultation with the Strategic Advisory Board.	Every 5 years	PW

Appendices

Appendix A. Figures

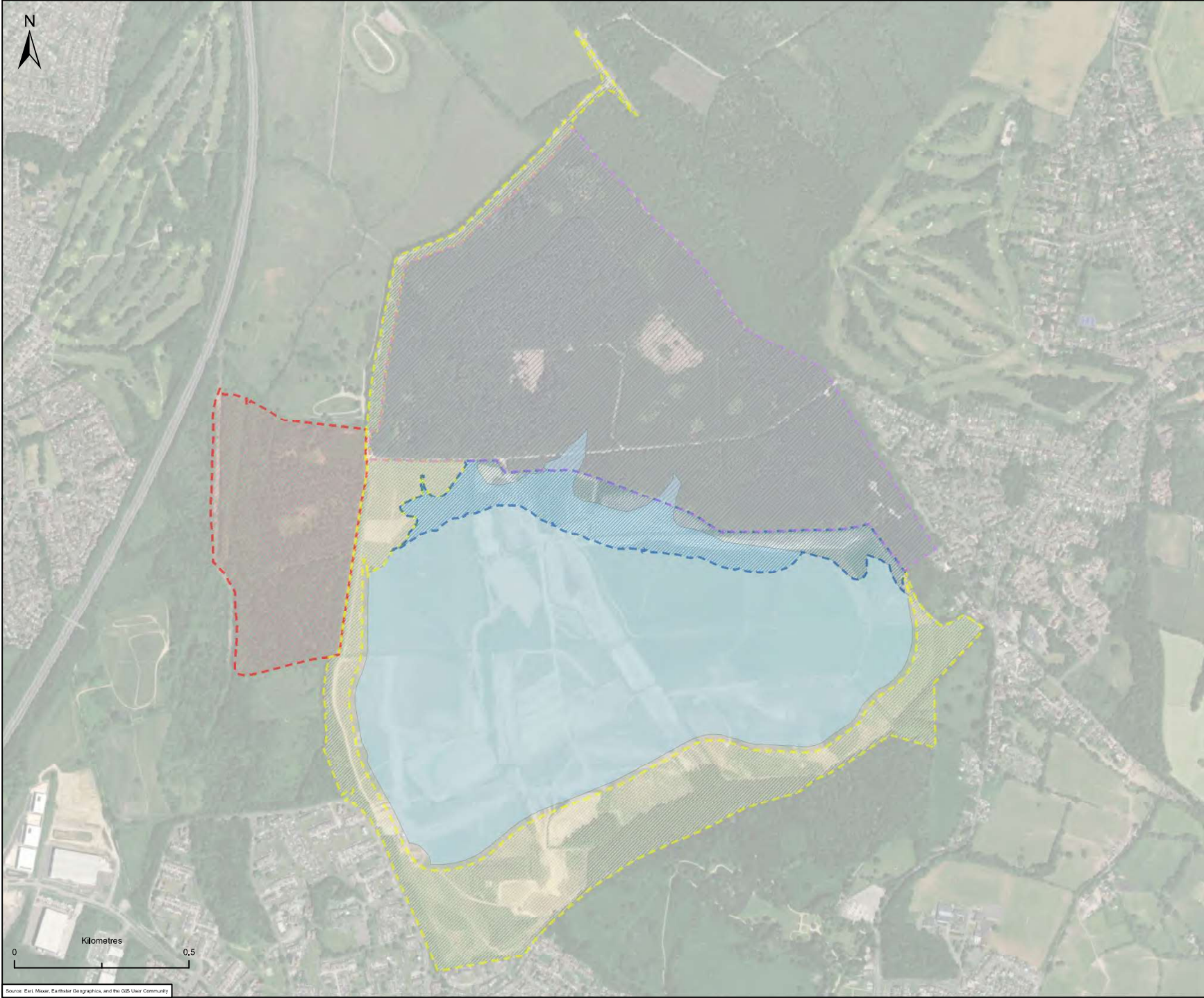
Figure A-1 - Site Location



C01

Figure A-2 - Site Tenure

Figure A-3 - Management Areas



Source: Esri, DeLorme, Earthstar Geographics, and the GIS User Community

**Havant Thicket Woodland Management Area**

**Wetland Management**

**Embankment and Surrounding Landscape Management Area**

**Bells Copse Management**

**Reservoir Top Water**

C02	MMN	NW	MG	JF	PUBLISHED	18/01/2024	
C01	EM	HM	MG	JF	PUBLISHED	07/07/2022	
Rev.	Des. By	Chk. By	Rev. By	Auth. By	Description	Date	



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HAVANT THICKET RESERVOIR

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**LANDSCAPE AND ECOLOGY
MANAGEMENT PLAN - MANAGEMENT AREAS
FIGURE A-3**

Portsmouth Water Drawing Number	Rev
	C02

Figure A-4 - Management Projects - Reservoir Site



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Management

Embankment and Surrounding Landscape Management Area

Translocated Deadwood Features

- Fallen branch
- Horizontal trunk
- Monolith
- Log pile
- Hedgerow Restoration/Creation
- Scrub Edge Creation
- Woodland/Wood Pasture Creation
- Grassland Enhancement

Reservoir and Wetland

- Wetland
- Shoreline Habitat Creation
- Reservoir Top Water Level

C04	NW	FD	MG	JF	PUBLISHED	15/07/2024
C03	NW	FD	MG	JF	PUBLISHED	04/07/2024
C02	MMN	NW	MG	JF	PUBLISHED	10/01/2024
C01	EM	HM	MG	JF	PUBLISHED	07/07/2022
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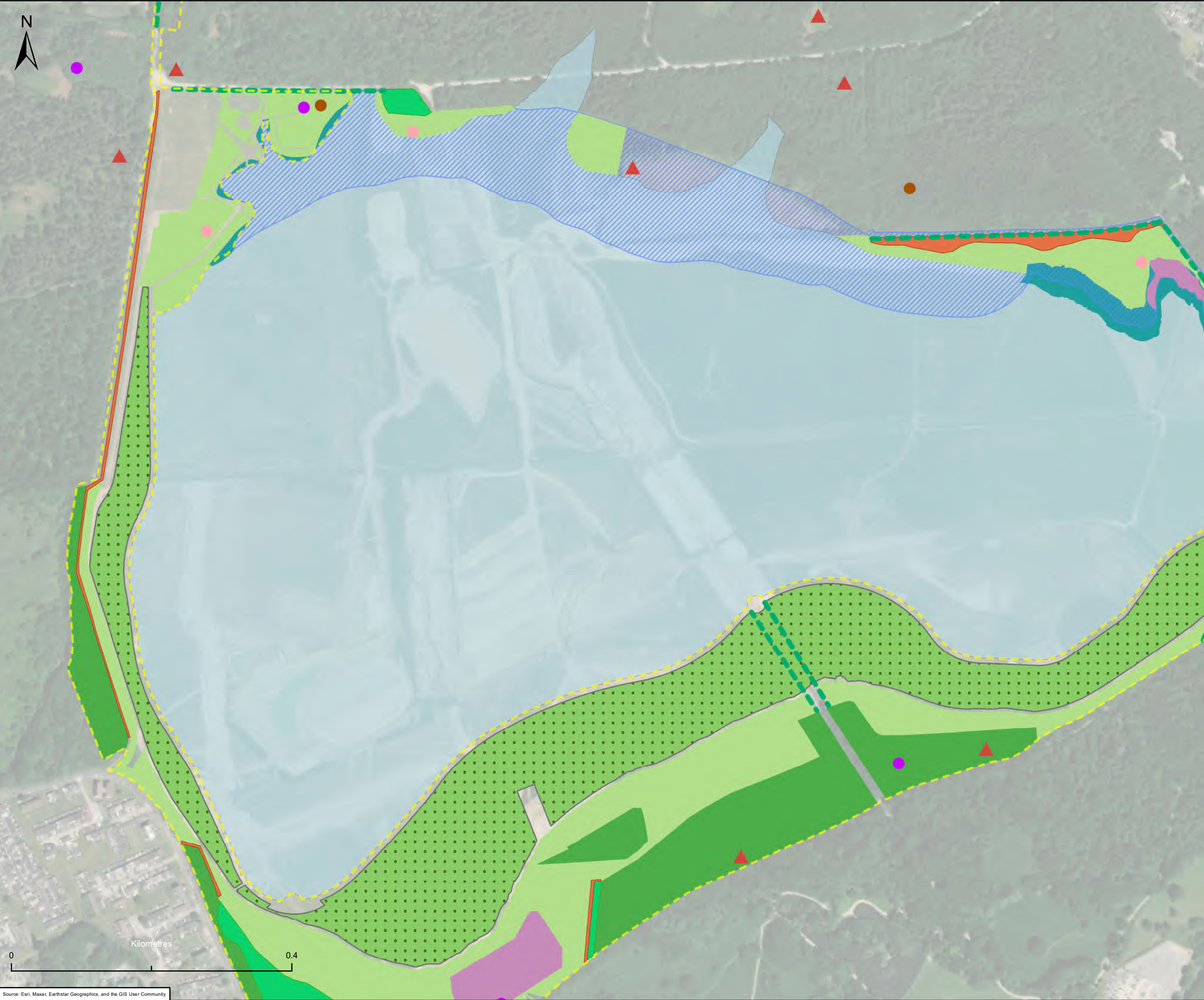


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Project Title
HAVANT THICKET RESERVOIR

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LANDSCAPE AND ECOLOGY MANAGEMENT PLAN - RESERVOIR SITE FIGURE A-4

Portsmouth Water Drawing Number	Rev
	C04



Management

Embankment and Surrounding Landscape Management Area

Translocated Deadwood Features

- Fallen branch
- Horizontal trunk
- Monolith
- Log pile
- Hedgerow Restoration/Creation
- Scrub Edge Creation
- Woodland/Wood Pasture Creation
- Grassland Creation
- Grassland Enhancement
- Rush-pasture Enhancement
- Woodland Management

Reservoir and Wetland

- Wetland
- Shoreline Habitat Creation
- Reservoir Top Water Level

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C03	NW	FD	MG	JF	PUBLISHED	04/07/2024
C02	MMN	NW	MG	JF	PUBLISHED	10/01/2024
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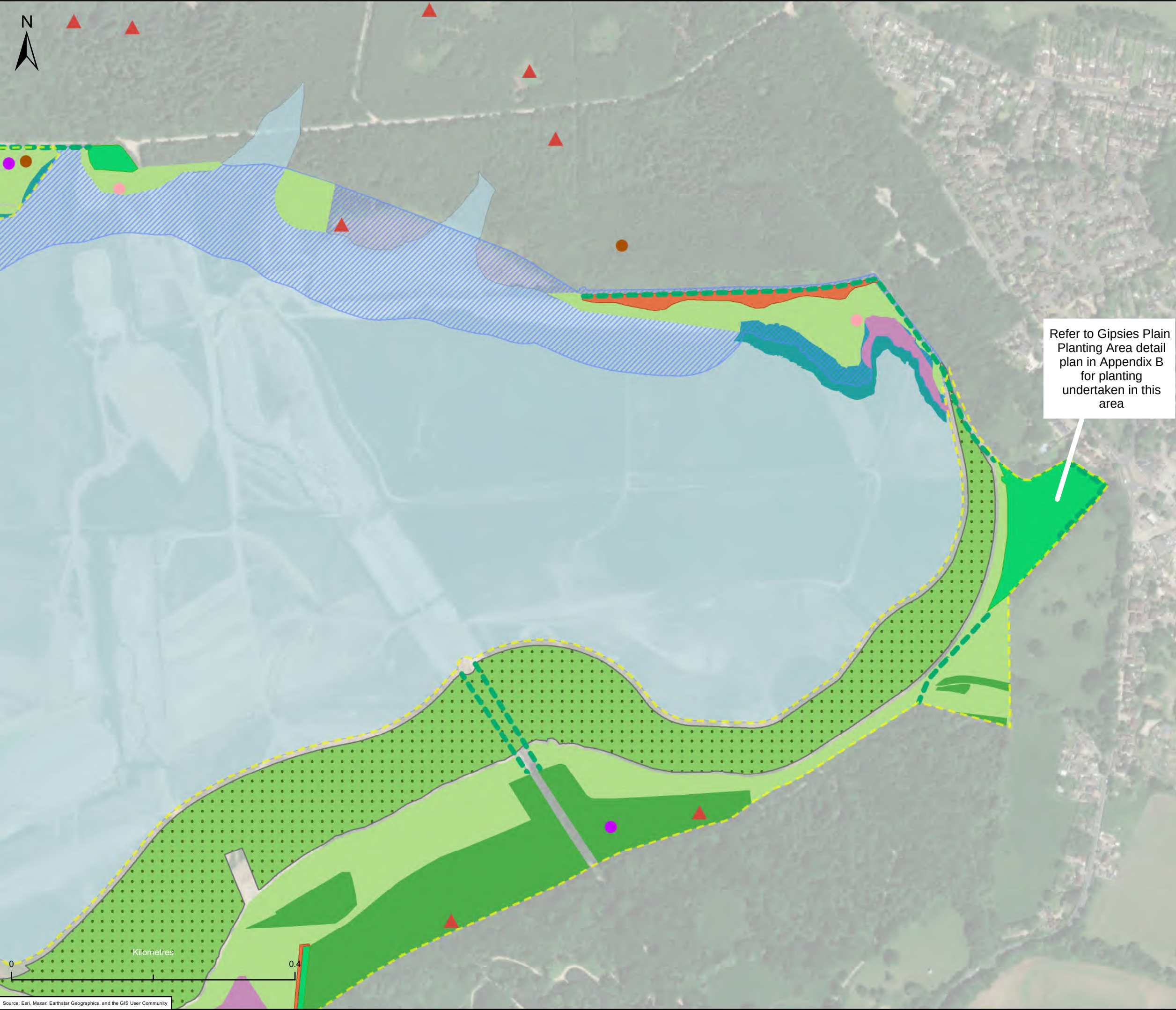


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Drawing Title
**LANDSCAPE AND ECOLOGY
MANAGEMENT PLAN - RESERVOIR SITE
FIGURE A-4**

Portsmouth Water Drawing Number	Rev
	C04



Management

Embankment and Surrounding Landscape Management Area

Translocated Deadwood Features

- Fallen branch
- Horizontal trunk
- Monolith
- Log pile
- Hedgerow Restoration/Creation
- Scrub Edge Creation
- Woodland/Wood Pasture Creation
- Grassland Creation
- Grassland Enhancement
- Rush-pasture Enhancement
- Woodland Management

Reservoir and Wetland

- Wetland
- Shoreline Habitat Creation
- Reservoir Top Water Level

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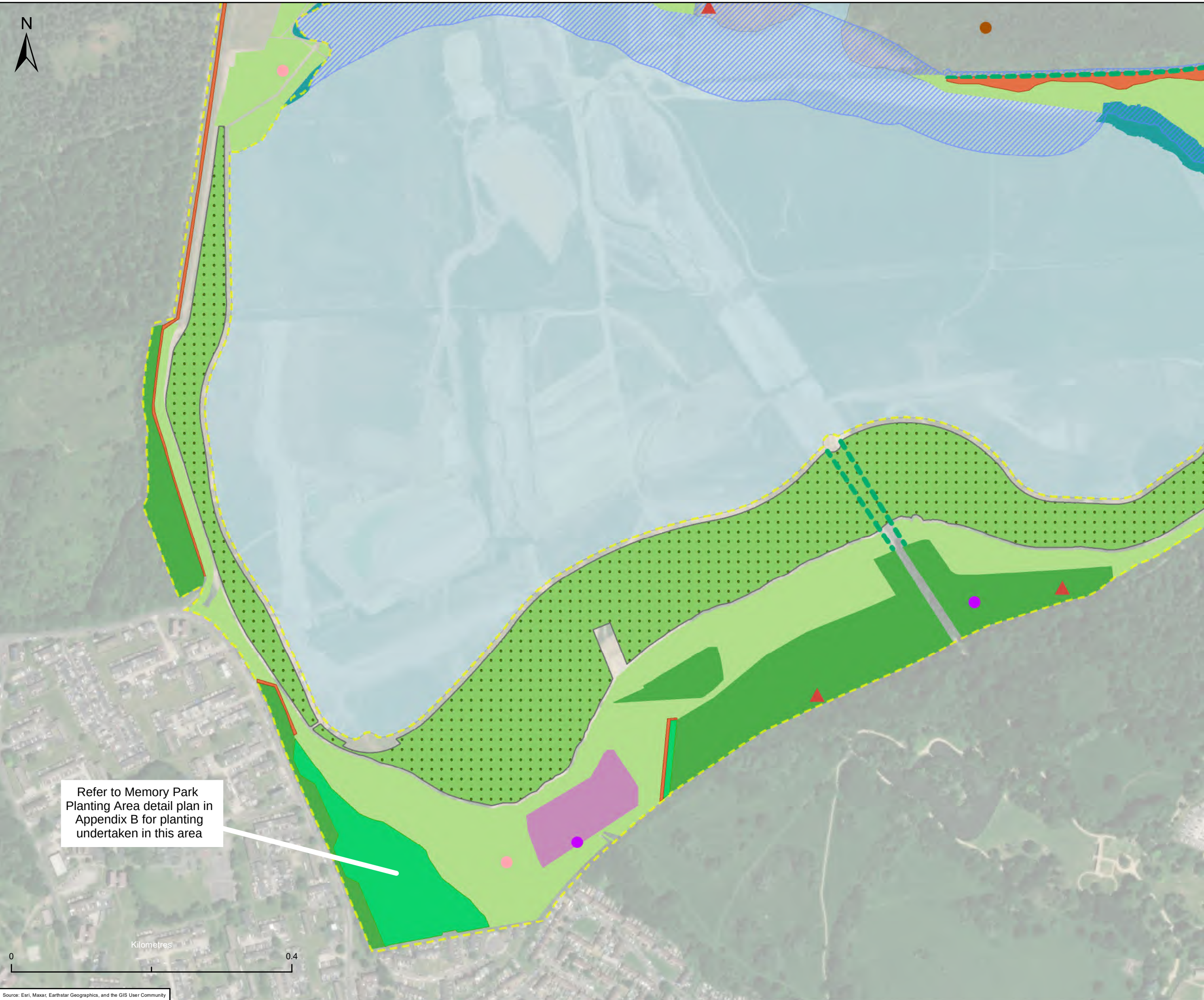


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Project Title
HAVANT THICKET RESERVOIR

Drawing Title
LANDSCAPE AND ECOLOGY MANAGEMENT PLAN - RESERVOIR SITE FIGURE A-4

Portsmouth Water Drawing Number	Rev
	C04



Management

- Embankment and Surrounding Landscape Management Area

Translocated Deadwood Features

- Fallen branch
- Horizontal trunk
- Monolith
- Log pile
- Hedgerow Restoration/Creation
- Scrub Edge Creation
- Woodland/Wood Pasture Creation
- Grassland Creation
- Grassland Enhancement
- Rush-pasture Enhancement
- Woodland Management

Reservoir and Wetland

- Wetland
- Shoreline Habitat Creation
- Reservoir Top Water Level

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LANDSCAPE AND ECOLOGY
MANAGEMENT PLAN - RESERVOIR SITE
FIGURE A-4

Portsmouth Water Drawing Number

Rev

C04

Figure A-5 - Management Projects – Fencing and Gates





▲ Gates

--- New Stockproof Fence

Reservoir and Wetland

 Reservoir Top Water Level

C03	NW	HM	MG	JF	PUBLISHED	15/07/2024
C02	NW	HM	MG	JF	PUBLISHED	04/07/2024
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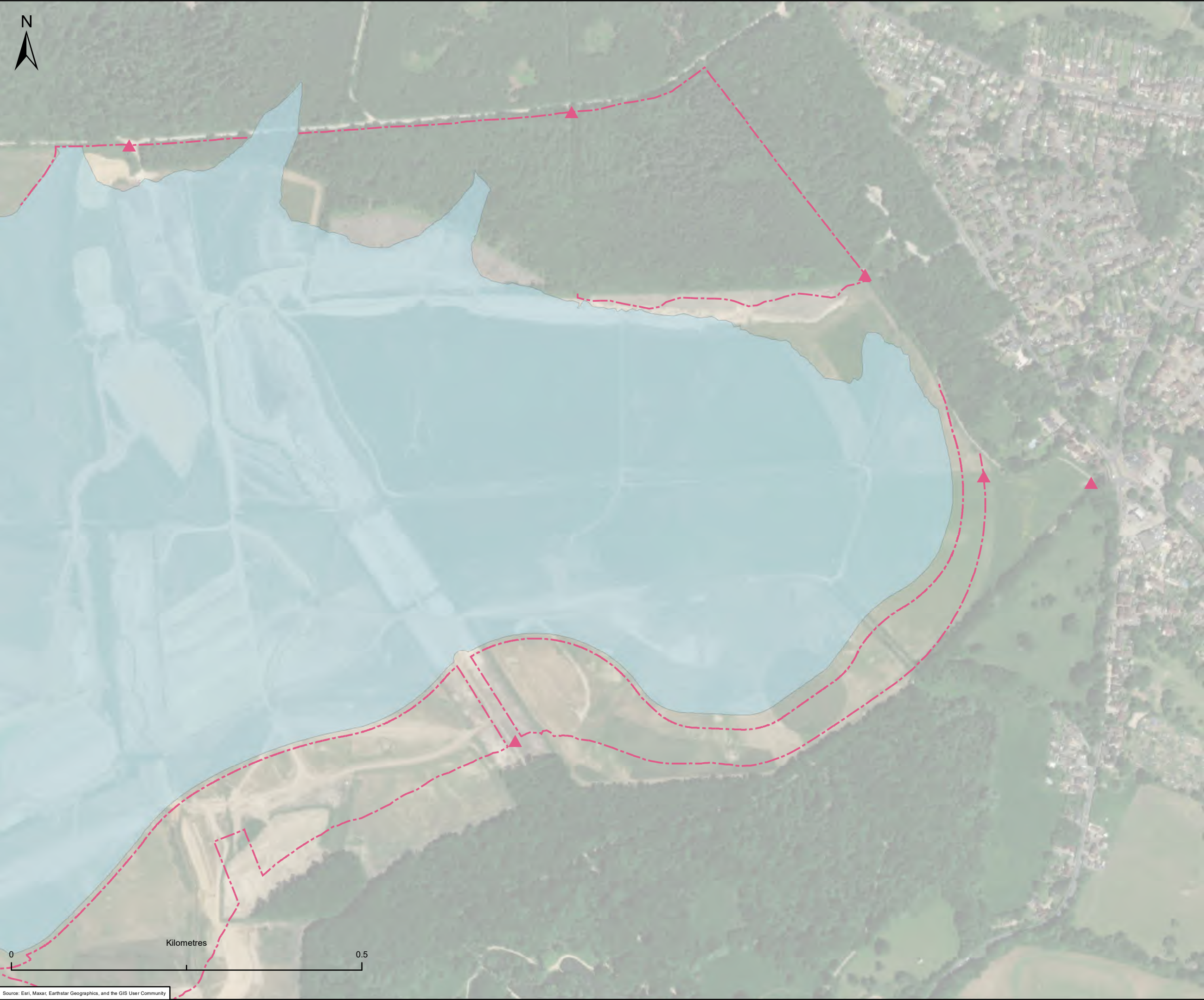
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LANDSCAPE AND ECOLOGY
MANAGEMENT PLAN - FENCES AND GATES
FIGURE A-5

Portsmouth Water Drawing Number

C03

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community





 Gates
 New Stockproof Fence
Reservoir and Wetland
 Reservoir Top Water Level

C03	NW	HM	MG	JF	PUBLISHED	15/07/2024
C02	NW	HM	MG	JF	PUBLISHED	04/07/2024
C01	EM	HM	MG	JF	PUBLISHED	02/01/2024
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Drawing Title
**LANDSCAPE AND ECOLOGY
MANAGEMENT PLAN - FENCES AND GATES
FIGURE A-5**

Portsmouth Water Drawing Number	Rev
	C03



Gates

New Stockproof Fence

Reservoir and Wetland

Reservoir Top Water Level

C03	NW	HM	MG	JF	PUBLISHED	15/07/2024
C02	NW	HM	MG	JF	PUBLISHED	04/07/2024
C01	EM	HM	MG	JF	PUBLISHED	02/01/2024
Rev.	Dm By	Ckd By	Rev By	Auth By	Description	Date

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Drawing Suitability				Status
PUBLISHED				A1

Contractors Drawing Number:
HTR - ATK - ZZ - ZZ - GS - L - 0005

Project | Originator | Volume | Location | Type | Role | Number

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REGISTERED IN ENGLAND No. 2536455

Project Ref. No	Sheet	Scale	Sheet Size
5169117	3 of 3	1:5,000	A3

Project Title

HAVANT THICKET RESERVOIR

Drawing Title

**LANDSCAPE AND ECOLOGY
MANAGEMENT PLAN - FENCES AND GATES
FIGURE A-5**

Portsmouth Water Drawing Number	Rev
	C03

Figure A-6 - Management Projects – Ponds and Watercourses

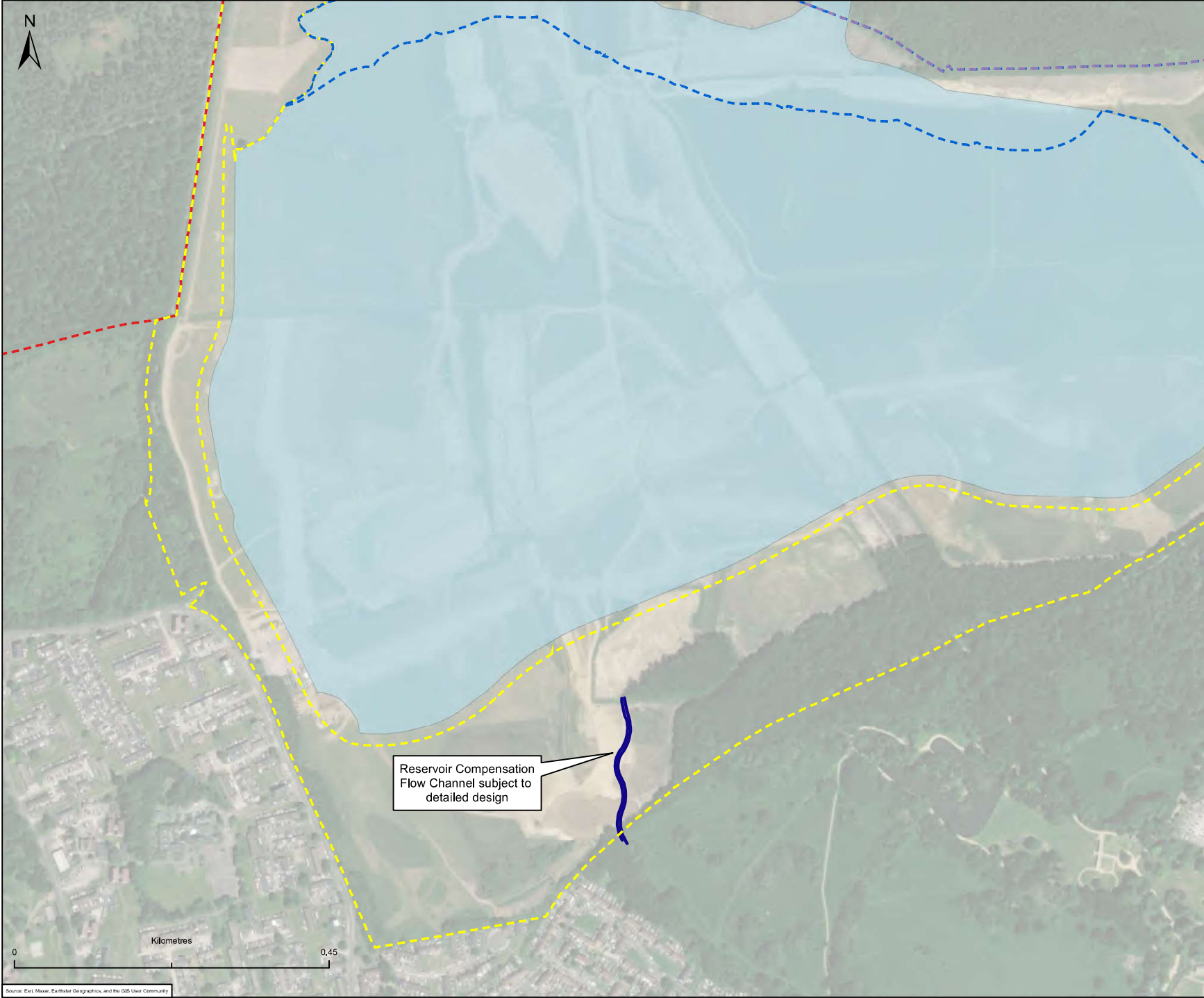
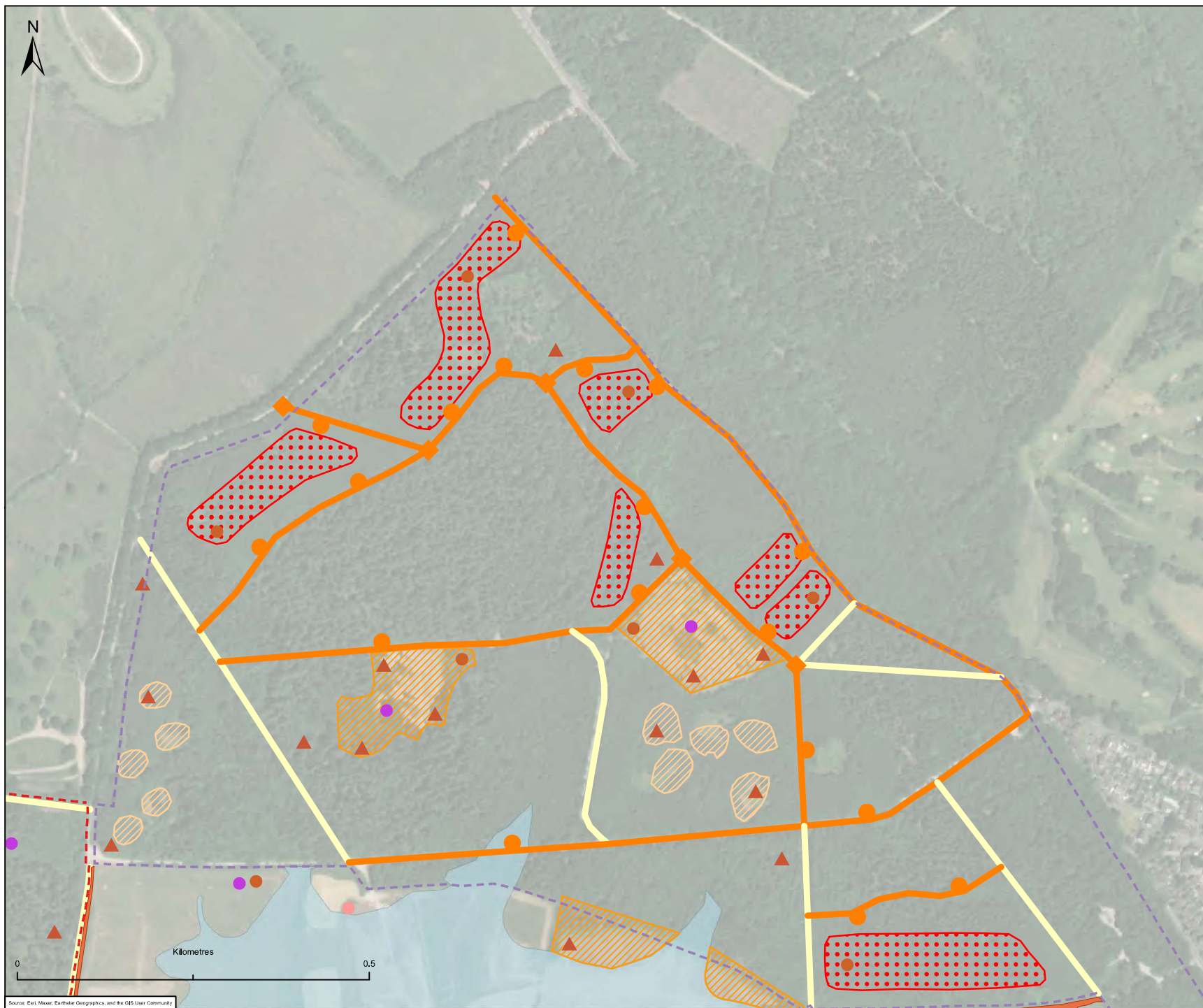


Figure A-7 - Management Projects – Havant Thicket and Bell's Copse



Management Areas

Havant Thicket Woodland Management Area

Bells Copse Management Area

Translocated Deadwood Features

Fallen branch

Horizontal trunk

Monolith

Log Piles

Scrub Edge Creation

Ride Management

Scallop

Junction

Managed Rides

3-zone

2-zone

Birch Dominated Compensation Areas

Birch Clearings & Replanting

Conifer Clear-fell & Replanting

Forest Glades

Reservoir and Wetland

Reservoir Top Water Level

C02	MMN	NW	MG	JF	PUBLISHED	18/01/2024
C01	EM	HM	MG	JF	PUBLISHED	07/07/2022
Rev.	Des. By	Chk. By	Rev. By	Auth. By	Description	Date

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Drawing Suitability	Status
PUBLISHED	A1

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HTR - ATK - ZZ - ZZ - GS - L - 0007

Project	Originator	Volume	Location	Type	Role	Number
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5169117	1 of 2	1:5,000	A3

Project Title

HAVANT THICKET RESERVOIR

Drawing Title

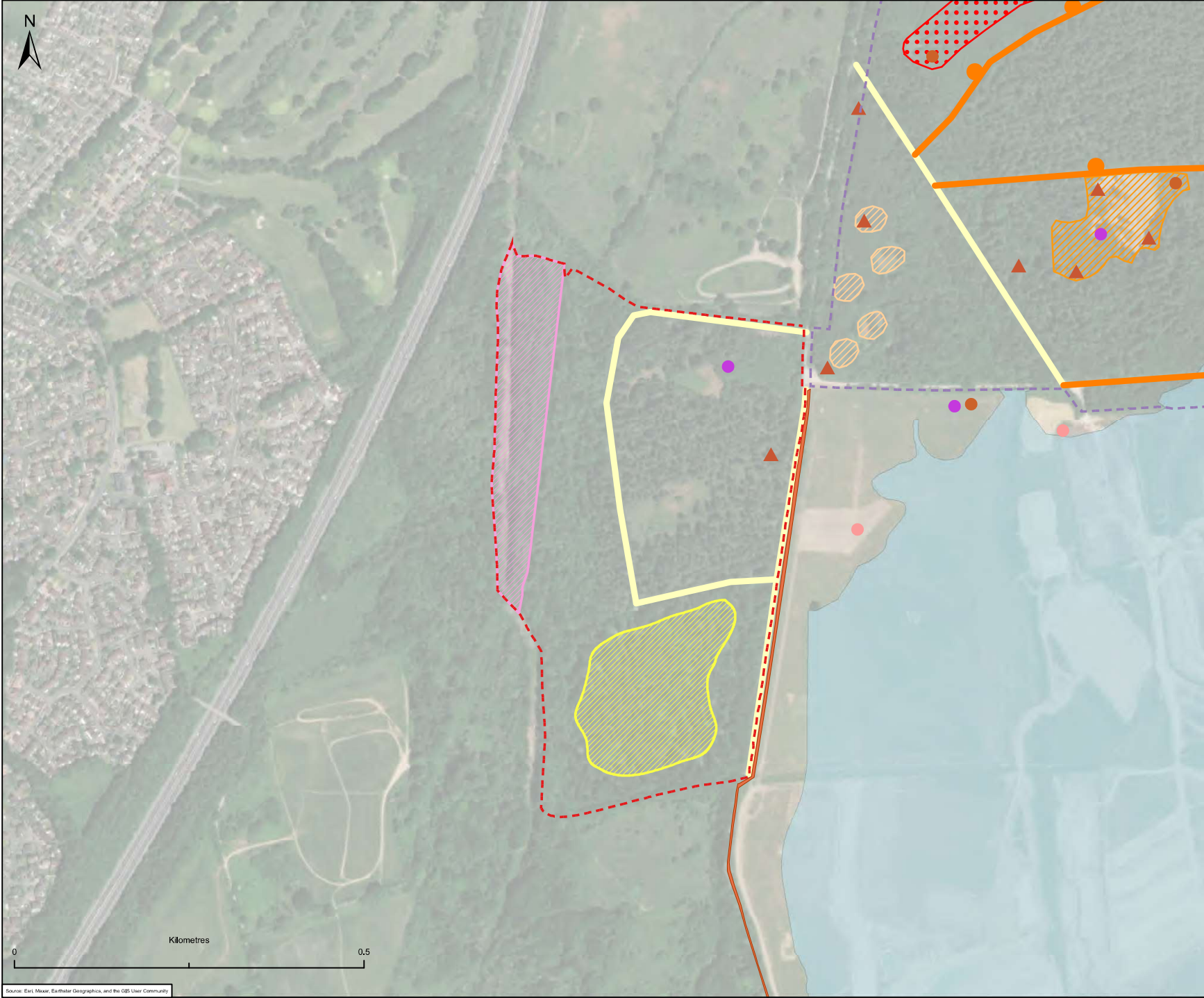
LANDSCAPE AND ECOLOGY
MANAGEMENT PLAN -
HAVANT THICKET AND BELL'S COPSE
FIGURE A-7

Portsmouth Water Drawing Number

Rev

C02

Source: Esri, DeLorme, Earthstar Geographics, and the GIS User Community



Management Areas

- Havant Thicket Woodland Management Area
- Bells Copse Management Area

Translocated Deadwood Features

- Fallen branch
- Horizontal trunk
- Monolith
- Log Piles
- Scrub Edge Creation

Ride Management

- Scallop

Managed Rides

- 3-zone
- 2-zone

Birch Dominated Compensation Areas

- Birch Clearings & Replanting
- Conifer Clear-fell & Replanting
- Forest Glades
- Scrub Mosaic Management
- Coppice Management (Bell's Copse)

Reservoir and Wetland

- Reservoir Top Water Level

C02	MMN	NW	MG	JF	PUBLISHED	18/01/2024	
C01	EM	HM	MG	JF	PUBLISHED	07/07/2022	
Rev.	Drn By	Chk By	Rev By	Auth By	Description	Date	

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Drawing Suitability	Status
PUBLISHED	A1

Contractors Drawing Number:

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Project	Originator	Volume	Location	Type	Role	Number
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Project Ref. No	Sheet	Scale	Sheet Size
5169117	2 of 2	1:5,000	A3

Project Title

HAVANT THICKET RESERVOIR

Drawing Title

LANDSCAPE AND ECOLOGY
MANAGEMENT PLAN -
HAVANT THICKET AND BELL'S COPSE
FIGURE A-7

Portsmouth Water Drawing Number	Rev
	C02

Appendix B. Outline Specifications

Outline specifications are subject to amendments during detailed design.

B.1. Woodland Creation

B.1.1. Woodland Canopy Planting

Table B-1 - Outline specifications for woodland canopy planting (standards)

Latin Name	Common Name	Girth (cm)	Specification
<i>Acer campestre</i>	Field maple	8-10 cm	Standard, Clear stem 175-200cm, 3 breaks
<i>Betula pubescens</i>	Downy birch	8-10 cm	Standard, Clear stem 175-200cm, 3 breaks
<i>Castanea sativa</i>	Sweet chestnut	8-10 cm	Standard, Clear stem 175-200cm, 3 breaks
<i>Carpinus betulus</i>	Hornbeam	8-10 cm	Standard, Clear stem 175-200cm, 3 breaks
<i>Tilia cordata</i>	Small-leaved lime	8-10 cm	Standard, Clear stem 175-200cm, 3 breaks
<i>Quercus robur</i>	Pedunculate oak	8-10 cm	Standard, Clear stem 175-200cm, 3 breaks

B.1.2. Woodland Understorey Planting

Table B-2 - Outline specifications for woodland understorey planting (whips)

Latin Name	Common Name	Height (cm)	Specification
<i>Acer campestre</i>	Field maple	80-100 cm	1+1, Transplant – seed raised
<i>Alnus glutinosa</i>	Alder	80-100 cm	1+1, Transplant – seed raised
<i>Betula pubescens</i>	Downy birch	80-100 cm	1+1, Transplant – seed raised
<i>Corylus avellana</i>	Hazel	80-100 cm	1+1, Transplant – seed raised
<i>Crataegus monogyna</i>	Hawthorn	80-100 cm	1+1, Transplant – seed raised
<i>Ilex aquifolium</i>	Holly	80-100 cm	1+1, Transplant – seed raised
<i>Malus sylvestris</i>	Wild apple		1+2, Transplant – seed raised
<i>Prunus avium</i>	Wild cherry	80-100 cm	1+1, Transplant – seed raised
<i>Quercus robur</i>	Pedunculate oak	80-100 cm	1+1, Transplant – seed raised
<i>Rosa canina</i>	Dog Rose	80-100 cm	1+1, Transplant – seed raised
<i>Salix caprea</i>	Goat willow	80-100 cm	1+1, Transplant – seed raised
<i>Sorbus aucuparia</i>	Rowan	80-100 cm	1+1, Transplant – seed raised
<i>Viburnum opulus</i>	Guelder rose	80-100 cm	1+1, Transplant – seed raised

Woodland creation shall be undertaken through a combination block planting as well as natural regeneration and succession around planted clumps.

8-10cm girth trees planted at 10m spacings and then infilled with 80-100cm whips spaced in accordance with guidance provided by Forestry England (FE). Manage to maintain multi layered structure for integration and biodiversity. Maintain species mix.

Honeysuckle (*Lonicera periclymenum*) shall be planted at base of 3m high standard canopy trees and evenly spaced.

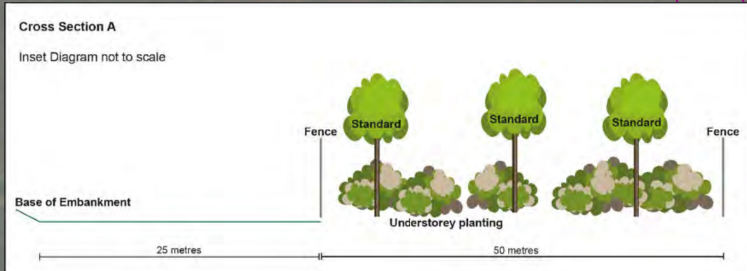
B.2. Hedgerow Creation/Restoration

Table B-3 - Outline specifications for hedgerow planting

Latin Name	Common Name	Height (cm)	Specification
<i>Acer campestre</i>	Field maple	80-100 cm	1+1, Transplant – seed raised
<i>Corylus avellana</i>	Hazel	80-100 cm	1+1, Transplant – seed raised
<i>Crataegus monogyna</i>	Hawthorn	80-100 cm	1+1, Transplant – seed raised
<i>Ilex aquifolium</i>	Holly	80-100 cm	1+1, Transplant – seed raised
<i>Ligustrum vulgare</i>	Wild privet	80-100 cm	Bushy, 9 Breaks
<i>Malus sylvestris</i>	Wild apple		1+2, Transplant – seed raised
<i>Quercus robur</i>	Pedunculate oak	80-100 cm	1+1, Transplant – seed raised
<i>Rosa canina</i>	Dog rose	80-100 cm	1+1, Transplant – seed raised
<i>Sorbus aucuparia</i>	Rowan	80-100 cm	1+1, Transplant – seed raised
<i>Viburnum opulus</i>	Guelder rose	80-100 cm	1+1, Transplant – seed raised

Hedging should be planted in two, staggered rows at a density of not less than 5 per metre with approximately 450 mm between plants in the same row, and 300-400 mm between rows. Maintain species mix.

Figure B-1 - Gipsies Plain Planting Plan



SPECIES COMPOSITION

Wood Pasture (Parkland)

Total 12 Standards at 3 metres in height, planted as three clumps of four trees:

Pedunculate Oak (8)
Common Lime (2)
Sweet Chestnut (2)

Note: Species mix reflects existing Regency period parkland planting.

Woodland Canopy

Total 30 Standards at 3 metres in height:

Pedunculate Oak (9)
Hornbeam (3)
Sweet Chestnut (6)
Common Lime (4)
Field Maple (5)
Downy / Silver Birch (3)

Woodland Understorey Planting

Trees to be spaced in accordance with guidance provided by the Forestry Commission:

Pedunculate Oak (3%)
Field Maple (20%)
Hazel (33%)
Hawthorn (7%)
Guelder Rose (6%)
Holly (5%)
Wild Privet (2%)
Dog Rose (3%)
Downy Birch (6%)
Alder (2% in wet areas)
Grey / Goat Willow (3% in wet areas)
Wild Cherry (4% on edges)
Rowan (3% on edges)
Honeysuckle (Planted throughout x50 specimens)

Hedgerow Bolstering

Field Maple (5%)
Hazel (30%)
Hawthorn (40%)
Guelder Rose (3%)
Holly (5%)
Wild Privet (2%)
Dog Rose (3%)
Downy Birch (2%)
Alder (2% in wet areas)
Grey / Goat Willow (2% in wet areas)
Wild Cherry (2%)
Crab Apple (2%)
Rowan (2%)

Hedge / Scrub Strip (HCC Land)

7m wide. To be planted with mix of:

Hawthorn
Hazel
Crab Apple
Wild Cherry
Blackthorn
Alder (in wetter area)

Gipsies Plain

Woodland Understorey Planting

Woodland Canopy

Stock mesh fence - trees to be planted in tree tubes in these areas.

Wood Pasture (Parkland).
Clumps of trees consist of four trees (3m high) spaced at 4m centres, consistent with existing parkland to south.

Hedgerow Widening and Bolstering
Infill and bolster hedgerow between top of ditch bank and stock mesh fencing to be a typical width of 1.5m (maximum width of 2.5m).

N.B. No new planting within 2m of water main.

Construct chestnut post and rail fence 2m north of the existing metal railings. Plant the gap inbetween the two fence lines with same species as **Hedge / Scrub Strip** in tree tubes.

Hedge / Scrub Strip (HCC Land)
Strip to be 7m wide. Kissing gate to be installed at northern end. Trees to be planted in tubes.

x1 alder

x1 horse chestnut

Clump of 3 standards:
(x2 oak and x1 horse chestnut)

HAVANT THICKET WINTER STORAGE RESERVOIR

ECOLOGICAL MITIGATION AND COMPENSATION STRATEGY

Map 10 - Phase 1 Planting Area

Client: Portsmouth Water

Date: July 2020

Status: Draft

KEY

- Reservoir Site (the site)
- Water Main
- Private Water Main
- Reservoir Embankment
- Embankment Buffer: 25 metres
- Cross Section A (see inset)
- Wood Pasture
- Understorey Planting
- Area of Natural Regeneration (to form a more natural, graded edge / mosaic)
- Pond (ephemeral)
- Hedgerow Bolstering
- Stock Mesh Fencing (trees to be planted in tree tubes)
- Chestnut Post and Rail Fence
- Deer Fencing
- Protection Fencing (to be consistent with HCC lottery funded planting)
- Location of Standard (3 metres in height)
- Gate (to allow passage of livestock)

Scale at A3: 1:1,500

0 5 10 20 30 40
Metres



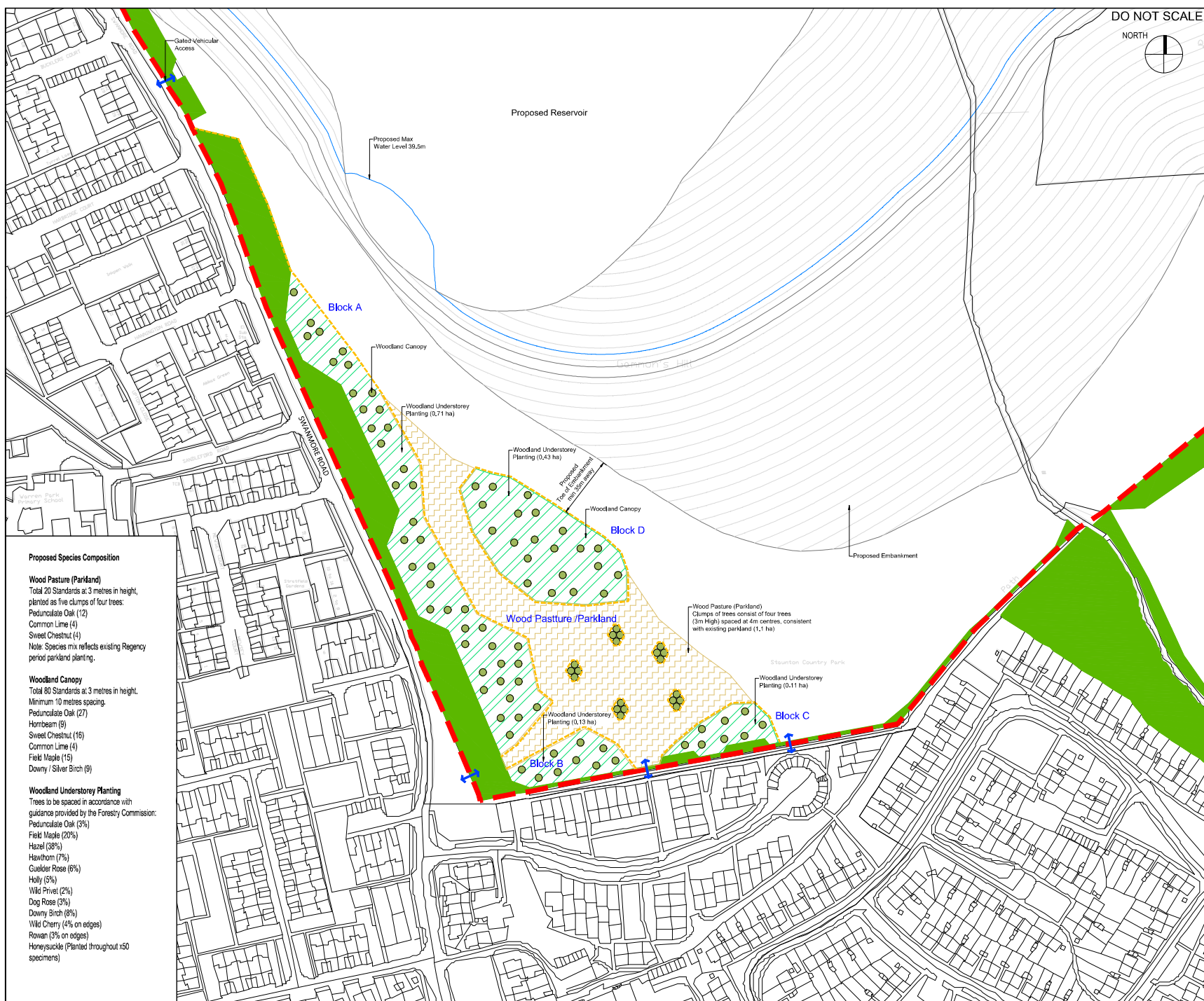
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Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure B-2 - Memory Park Planting Plan

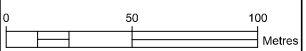


DO NOT SCALE



LEGEND:

- Draft Scheme Boundary
- Proposed Embankment Contours
- Proposed Max Water Level
- Existing Planting
- Proposed Location of Standards (3 Metres in height) Forming Woodland Canopy
- Proposed Wood Pasture
- Proposed Understorey Planting
- Existing Access Point
- Proposed Deer Fencing



OUTLINE ECOLOGICAL MITIGATION AND COMPENSATION STRATEGY

NOTE:
The purpose of plan is to show the preliminary layout for proposed broadleaved woodland and wood pasture creation to inform discussions with the LPA and Natural England. It is noted that the extent of the reservoir and embankment is subject to review and amendment.

Rev.	Date	Description	By	Check	Appr.
P1.2	25/10/19	FIRST ISSUE	JM	LB	BI
P1.1	28/09/19	DRAWN FOR DISCUSSION	JM	LB	

INFORMATION

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Portsmouth Water

HAVANT THICKET WINTER STORAGE RESERVOIR

PHASE 2 BROADLEAVED WOODLAND AND WOOD PASTURE CREATION

Scale:	Designed:	Drawn:	Checked:	Authorised:
1:1000	JM	JM	LB	BI
Original Size:	Date:	Date:	Date:	Date:
A1	24/09/19	25/10/19	25/10/19	25/10/19

HT-ATK-ZZ-ZZ-DR-L-9198 P1.2

Proposed Species Composition

Wood Pasture (Parkland)
Total 20 Standards at 3 metres in height, planted as five clumps of four trees:
Pedunculate Oak (12)
Common Lime (4)
Sweet Chestnut (4)
Note: Species mix reflects existing Regency period parkland planting.

Woodland Canopy
Total 80 Standards at 3 metres in height, Minimum 10 metres spacing.
Pedunculate Oak (27)
Hornbeam (9)
Sweet Chestnut (16)
Common Lime (4)
Field Maple (15)
Downy / Silver Birch (9)

Woodland Understorey Planting
Trees to be spaced in accordance with guidance provided by the Forestry Commission:
Pedunculate Oak (3%)
Field Maple (20%)
Hazel (38%)
Hawthorn (7%)
Guelder Rose (6%)
Holly (5%)
Wild Privet (2%)
Dog Rose (3%)
Downy Birch (8%)
Wild Cherry (4% on edges)
Rowan (3% on edges)
Honeysuckle (Planted throughout x50 specimens)

B.3. Grassland Creation

B.3.1. Wildflowers

Table B-4 - Outline specifications for grassland wildflower seeding

Latin Name	Common Name	%
<i>Achillea millefolium</i>	Yarrow	0.3
<i>Agrimonia eupatoria</i>	Agrimony	1
<i>Betonica officinalis</i>	Betony	0.6
<i>Centaurea nigra</i>	Common knapweed	2.5
<i>Galium album</i>	Hedge bedstraw	1
<i>Galium verum</i>	Lady's bedstraw	1
<i>Lathyrus pratensis</i>	Meadow vetchling	0.2
<i>Knautia arvensis</i>	Field scabious	0.3
<i>Hypochaeris radicata</i>	Cat's ear	0.1
<i>Leucanthemum vulgare</i>	Oxeye daisy	2.5
<i>Lotus corniculatus</i>	Common bird's-foot-trefoil	2.5
<i>Malva moschata</i>	Musk mallow	1
<i>Plantago lanceolata</i>	Ribwort plantain	1
<i>Sanquisorba minor</i>	Salad burnet	0.5
<i>Ranunculus acris</i>	Meadow buttercup	2
<i>Rhinanthus minor</i>	Yellow rattle	0.5
<i>Rumex acetosa</i>	Common sorrel	0.5
<i>Rumex acetosella</i>	Sheep's borrel	1
<i>Silene alba</i>	White Campion	0.5
<i>Trifolium arvense</i>	Hare's-foot clover	1
<i>Trifolium pratense</i>	Red clover	2.5
		20

B.3.2 Grasses

Table B-5 - Outline specifications for grasses seeding

Latin Name	Common Name	%
<u>Agrostis capillaris</u>	<u>Common bent</u>	20
<u>Anthoxanthum odoratum</u>	<u>Sweet vernal-grass</u>	5
<u>Briza media</u>	<u>Quaking grass</u>	2
<u>Cynosurus cristatus</u>	<u>Crested dog's-tail</u>	10
<u>Festuca ovina</u>	<u>Sheep's fescue</u>	20
<u>Festuca rubra</u>	<u>Red fescue</u>	16
<i>Festuca pratensis</i>	Meadow fescue	2
<i>Hordeum secalinum</i>	Meadow barley	2
<i>Alopecurus pratensis</i>	Meadow foxtail	3
		80

Seeding shall be on sub-soil or a very thin layer of site-won topsoil (<10 mm) only. Seed mixes shall be supplemented by locally sourced green hay if available.

B.4. Wetland and Shoreline Creation

Woodland canopy, woodland understorey and hedgerow creation outline specification detailed in sections B.1 and B.2.

B.4.1. Wildflowers

Table B-4 - Outline specifications for grassland wildflower seeding for wetland area.

Latin Name	Common Name	%
<i>Achillea millefolium</i>	Yarrow	1.6
<i>Agrimonia eupatoria</i>	Agrimony	0.4
<i>Betonica officinalis</i>	Betony	0.2
<i>Centaurea nigra</i>	Common knapweed	2.4
<i>Daucus carota</i>	Wild carrot	0.2
<i>Galium verum</i>	Lady's bedstraw	1.2
<i>Lathyrus pratensis</i>	Meadow vetchling	0.4
<i>Knautia arvensis</i>	Field scabious	1.4
<i>Leucanthemum vulgare</i>	Oxeye daisy	1.2
<i>Leontodon hispidus</i>	Rough hawkbit	0.1
<i>Lotus corniculatus</i>	Common bird's-foot-trefoil	0.2
<i>Malva moschata</i>	Musk mallow	3.4
<i>Plantago lanceolata</i>	Ribwort plantain	3
<i>Primula versis</i>	Cowslip	0.2
<i>Ranunculus acris</i>	Meadow buttercup	0.4
<i>Ranunculus bulbosus</i>	Bulbous buttercup	0.6
<i>Rhinanthus minor</i>	Yellow rattle	1.4
<i>Rumex acetosa</i>	Common sorrel	1
<i>Silene vulgaris</i>	Bladder campion	0.3
<i>Vicia cracca</i>	Tufted vetch	0.4
		20

B.4.1 Grasses

Table B-5 - Outline specifications for grasses seeding for wetland area.

Latin Name	Common Name	%
<i>Agrostis capillaris</i>	Common bent	8
<i>Anthoxanthum odoratum</i>	Sweet vernal-grass	1.6
<i>Briza media</i>	Quaking grass	3.2
<i>Cynosurus cristatus</i>	Crested dog's-tail	56
<i>Festuca rubra</i>	Red fescue	10.4
<i>Trisetum flavescens</i>	Yellow oat-grass	0.8
		80

B.4.2. Wildflowers

Table B-6 - Outline specifications for grassland wildflower overseeding on retained grassland.

Latin Name	Common Name	%
<i>Agrostemma githago</i>	Corncockle	45
<i>Centaurea cyanus</i>	Cornflower	20
<i>Cota austriaca</i>	Corn camomile	10
<i>Glebionis segetum</i>	Corn marigold	20
<i>Papaver segetum</i>	Common poppy	5
		100

B.4.3. Wildflowers

Table B-9 - Outline specifications for grassland wildflower seeding on wetland and the waters edge.

Latin Name	Common Name	%
<i>Achillea ptarmica</i>	Sneezewort	0.4
<i>Betonica officinalis</i>	Common hedgenettle (Betony)	0.4
<i>Carex pendula</i>	Pendulous sedge	0.2
<i>Centaurea scabiosa</i>	Greater birdsfoot trefoil	0.6
<i>Centaurea nigra</i>	Common knapweed	1.6
<i>Eupatorium cannabinum</i>	Hemp agrimony	0.4
<i>Filipendula ulmaria</i>	Meadowsweet	1
<i>Genus angelica</i>	Angelica	1.8
<i>Geum rivale</i>	Water avens	0.6
<i>Hypericum perforatum</i>	Square stemmed St John's Wort	0.4
<i>Iris pseudacorus</i>	Yellow flag iris	2.8
<i>Juncus effusus</i>	Soft rush	0.6
<i>Juncus inflexus</i>	Hard rush	0.6
<i>Leucanthemum vulgare</i>	Oxyeye daisy	0.8
<i>Lychnis flos-cucli</i>	Ragged robin	0.4
<i>Lycopus europaeus</i>	Gypsywort	0.4
<i>Lythrum salicaria</i>	Purple loosestrife	0.2
<i>Prunella vulgaris</i>	Self heal	1.2
<i>Pulicaria dysenterica</i>	Fleabane	0.2
<i>Ranunculus acris</i>	Meadow buttercup	1.6
<i>Rhinanthus minor</i>	Yello rattle	2
<i>Sanguisorba officinalis</i>	Great burnet	0.4
<i>Silene dioica</i>	Red campion	0.8
<i>Vicia cracca</i>	Tufted vetch	0.6
		20

B.4.4. Grasses

Table B-10 - Outline specifications for grasses seeding 80% of wetland and waters edge.

Latin Name	Common Name	%
<i>Agrostis capillaris</i>	Common browntop bent	1.4
<i>Anthoxanthum odoratum</i>	Sweet vernal	1.4
<i>Alopecurus pratensis</i>	Meadow foxtail	1.4
<i>Festuca rubra commutata</i>	Chewings fescue	12
<i>Cynosurus cristatus</i>	Crested dogstail	11.2
<i>Deschampsia cespitosa</i>	Tufted hairgrass	5
<i>Festuca rubra litoralis</i>	Slender creeping red fescue	21
<i>Festuca trachyphylla</i>	Hard fescue	21
<i>Phleum bertoloni</i>	Small leaf timothy	3.5
		80

B.4.1 Native Wet Woodland

Table B-11- Outline specifications for native wet woodland planting (standards)

Latin Name	Common Name	Specification
<i>Alnus glutinosa</i>	Common alder	Transplants & cuttings– some standards (8-10cm Girth, Clear stem 175-200cm, 3 breaks) located within the woodland areas.
<i>Betula pubescens</i>	Downy birch	
<i>Cornus sanguinea</i>	Common dogwood	
<i>Populus nigra</i>	Black poplar	
<i>Populus tremula</i>	Aspen	
<i>Rhamnus cathartica</i>	Common buckthorn	
<i>Salix alba</i>	White willow	
<i>Salix caprea</i>	Goat willow	
<i>Salix viminalis</i>	Common osier	

B.4.2 Native Scrub

Table B-12 - Outline specifications for native scrub planting (standards)

Latin Name	Common Name	Specification
<i>Corylus avellana</i>	Common hazel	Transplants & cuttings.
<i>Lonicera perclymenum</i>	Common honeysuckle	
<i>Rhamnus cathartica</i>	Common buckthorn	
<i>Salix cinerea</i>	Grey willow	
<i>Sambucus nigra</i>	Common elder	
<i>Ulex europaeus</i>	Common gorse	

B.4.3 Native Rush and Sedge Plugs

Table B-13- Outline specifications for native rush and sedge plugs

Latin Name	Common Name
<i>Carex acutiformis</i>	Lesser pond sedge
<i>Juncus conglomeratus</i>	Compact rush
<i>Juncus effusus</i>	Soft rush
<i>Phragmites australis</i>	Common reed

B.5. Aquatic Compensation Measures

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Technical Note

Project:	Havant Thicket Reservoir		
Subject:	Article 4.7 Mitigation Work for Reach 4		
Author:	Peter Mulder		
Date:	17/05/2022	Project No.:	5202641
Distribution:	Sam Donovan Caroline Parker Dan Argles Gareth Russell-Hughes Marcus Stroud Adam Cave Laura Lax	Representing:	Portsmouth Water Portsmouth Water Mackley / Future Water JV Agilia Forestry Commission Environment Agency Environment Agency

Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
1.0	First Draft	PMU	SB	-	-	17/05/2022

Client signoff

Client	Portsmouth Water
Project	Havant Thicket Reservoir
Project No.	5202641
Client signature / date	

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1. Background

Portsmouth Water have successfully gained planning permission for the construction of Havant Thicket Reservoir.

As part of the Environmental Impact Assessment (EIA); the Water Framework Directive (WFD) compliance assessment¹ and Article 4.7 Report², a package of aquatic mitigation and compensation measures were agreed with the Environment Agency³. An overview of the 14 agreed reaches is provided in Figure 1-1 and briefly comprises of:

- Reaches 1 to 3 – habitat improvements to three Headwater Streams north of the reservoir
- Reach 4 – aquatic macrophyte and macroinvertebrate mitigation work, including translocation of species
- Reach 5 – construction of a new watercourse on Gipsies Plain
- Reach 7 – water quality improvements in The Lake Stream
- Reach 8 – construction of a new compensation flow channel and a new compensation flow regime
- Reach 16 – habitat improvements in the upper Park Lane Stream at the Waterlooville Golf Course
- Reach 23 – habitat improvements in the upper reaches of the Hermitage Stream in The Queen's Inclosure
- Reaches 26 to 30 – habitat improvements in the middle and lower Hermitage Stream

It has been agreed with the Environment Agency that the aquatic mitigation & compensation plan does not require delivery prior to reservoir construction as most reaches are not on the reservoir site and/or not directly linked to on-site construction activities. A programme for delivery of each of the reaches will need to be agreed between Portsmouth Water and the Environment Agency.

The exception to this is 'Reach 4' as its objective is to mitigate / compensate for some of the aquatic habitat and species loss at the Havant Thicket Reservoir site and thus requires delivery prior to construction works starting on-site. This Technical Note does not provide detail on other reaches, where Atkins have provided outline design drawings and further (detailed) design work is still needed.

This Technical Note provides further detail of the works proposed for Reach 4, split out into the aquatic macroinvertebrate, aquatic macrophyte mitigation and Invasive and Non-Native Species (INNS) work. It is noted that although there are clear overlaps and links between each of these three work streams, that these can be delivered by different contractors. For each, we provide the aims and objectives, delivery scope, monitoring requirements and timescales.

¹ Atkins (2020). Havant Thicket Reservoir Project. WFD Assessment. Appendix to Environmental Statement. Reference: HTR-ATK-ZZ-ZZ-RP-Z-0123

² Atkins (2021). Havant Thicket Outline Design. WFD – Article 4.7. Technical Note for Portsmouth Water. Reference: HTR-ATK-XX-XX-RP-Z-0067

³ Agreement reached 5 March 2021 following a workshop discussion on the mitigation and compensation package options.

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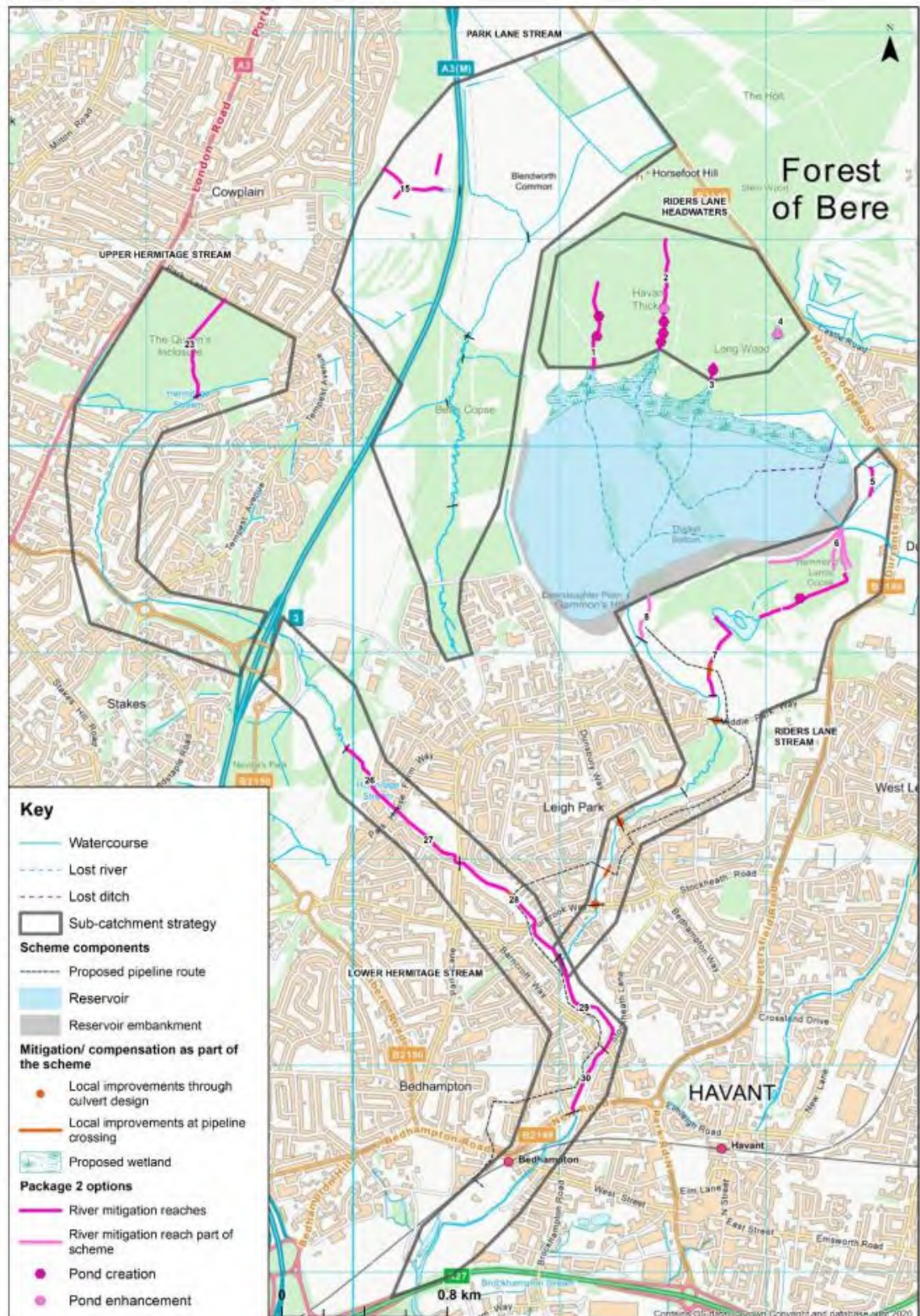


Figure 1-1 - Overview of WFD Article 4.7 mitigation and compensation measures agreed with the Environment Agency

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2. Aquatic macroinvertebrates

2.1. Aims and objectives

The main objective of this work is to translocate notable macroinvertebrate species recorded in Headwater Stream 1 and Headwater Stream 2, with a particular focus around a spring within Havant Thicket (approx. NGR SU 71191 09921), which will be lost as a result of the scheme. Water flows regularly below Upper Lake (marked as Pond 5 on Figure 3-1) and this spring whilst further upstream the streams dry up for about half of the year outside of winter and spring.

2.2. Background

Macroinvertebrate surveys undertaken as part of the scheme's Environmental Impact Assessment recorded assemblages containing nationally important species downstream of the spring and also the Upper Lake. Of particular note are the APEM Spring 2020 results⁴⁵ (as most of the streams were flowing at this point in time) and these recorded:

- On Headwater Stream 1, at APEM Sampling Site 2 (NGR SU7119709915 - downstream main spring) a community with 'high' conservation value, including a Nationally Scarce beetle (*Ochthebius pusillus*), a Nationally Scarce caddis fly (*Limnephilus bipunctatus*) and a relatively uncommon freshwater amphipod (*Niphargus aquilex*) which is associated with wells, interstitial gravels and groundwater upwelling.
- On Headwater Stream 2, at APEM Sampling Site 1 (NGR SU7146910446) a community with 'very high' conservation value including one Nationally Scarce beetle species: *Hydrovatus clypealis* and another uncommon beetle species: *Ilybius chalconatus*.
- On Headwater Stream 2, at APEM Sampling Site 3 (NGR SU7147609961) a community with 'very high' conservation value including two Nationally Notable beetle species: *Ochthebius marinus* and *Hydraena testacea*.
- On Headwater Stream 2, at APEM Sampling Site 5 (NGR SU71451 09632), a community with a 'very high' conservation value including a Near Threatened beetle species: *Hydrochus crenatus*.

Samples were also taken from Headwater Stream 3 as well as the downstream Riders Lane Stream and Hermitage Stream but communities at these sites were of much lower conservation value with no notable species recorded. Because neither the Riders Lane Stream nor the Hermitage Stream are directly affected through habitat loss, therefore species relocation was not considered necessary.

The APEM surveys highlighted that the principal interest of the Headwater Streams is in relation to notable beetle and caddis fly species. Most of the aquatic beetles recorded share a common life strategy trait in that they prefer temporary and semi-permanent watercourses with marginal vegetation. They adapt to this by burrowing into the sediment as water levels recede. It is hypothesized that the beetle community has established in the headwaters of Riders Lane Stream at Havant Thicket compared to the headwaters of Hermitage Stream or the headwaters of Park Lane Stream because they are undeveloped and there are no discharges that can affect water quality.

Work has been undertaken to find suitable receptor site(s) for species relocation. A key criterion for selecting the site(s) was to keep this local. Macroinvertebrate sampling undertaken as part of the EIA revealed that much of the Hermitage Stream catchment has water quality issues, meaning that mitigation assessments also considered nearby catchments, such as the Lavant and Ems.

Macroinvertebrate sampling was undertaken by APEM in autumn 2021 and spring 2022⁶ in a range of nearby watercourses to find suitable habitats and similar beetle communities i.e., also indicative of good water quality and temporary / semi-permanent waterbodies. An overview of the sites visited has been provided in Figure 2-2.

⁴ APEM Ltd (2020). Havant Thicket Reservoir. Freshwater Macroinvertebrate Analysis Report for Spring 2020 samples. APEM Report No. 4971.

⁵ Specialist advice, including specimen verification, was also provided by Dr Garth Foster, one of the UK's most eminent aquatic beetle specialists.

⁶ Only preliminary results were made available at time of writing this note.

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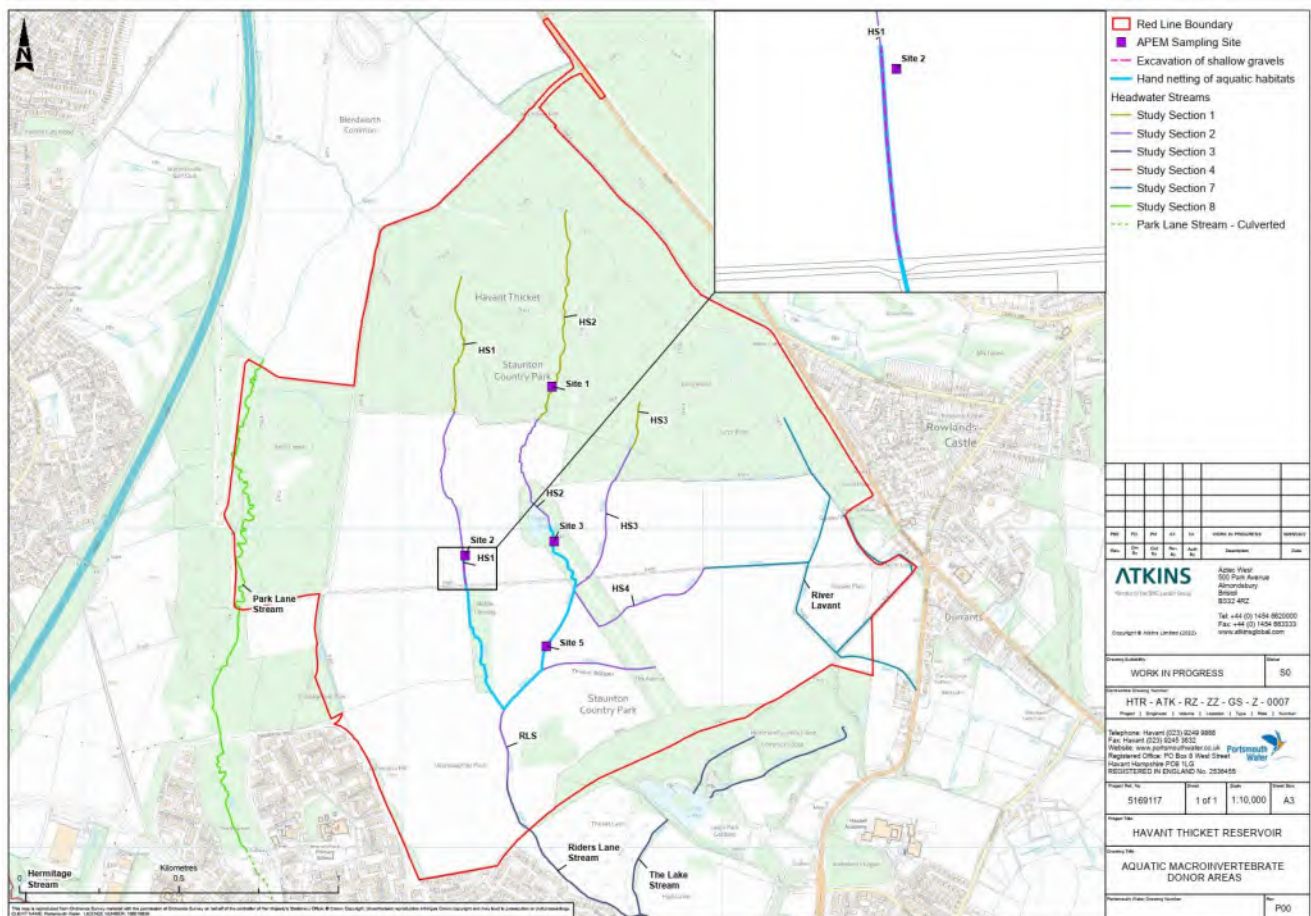


Figure 2-1 - Overview of aquatic macroinvertebrate donor sites

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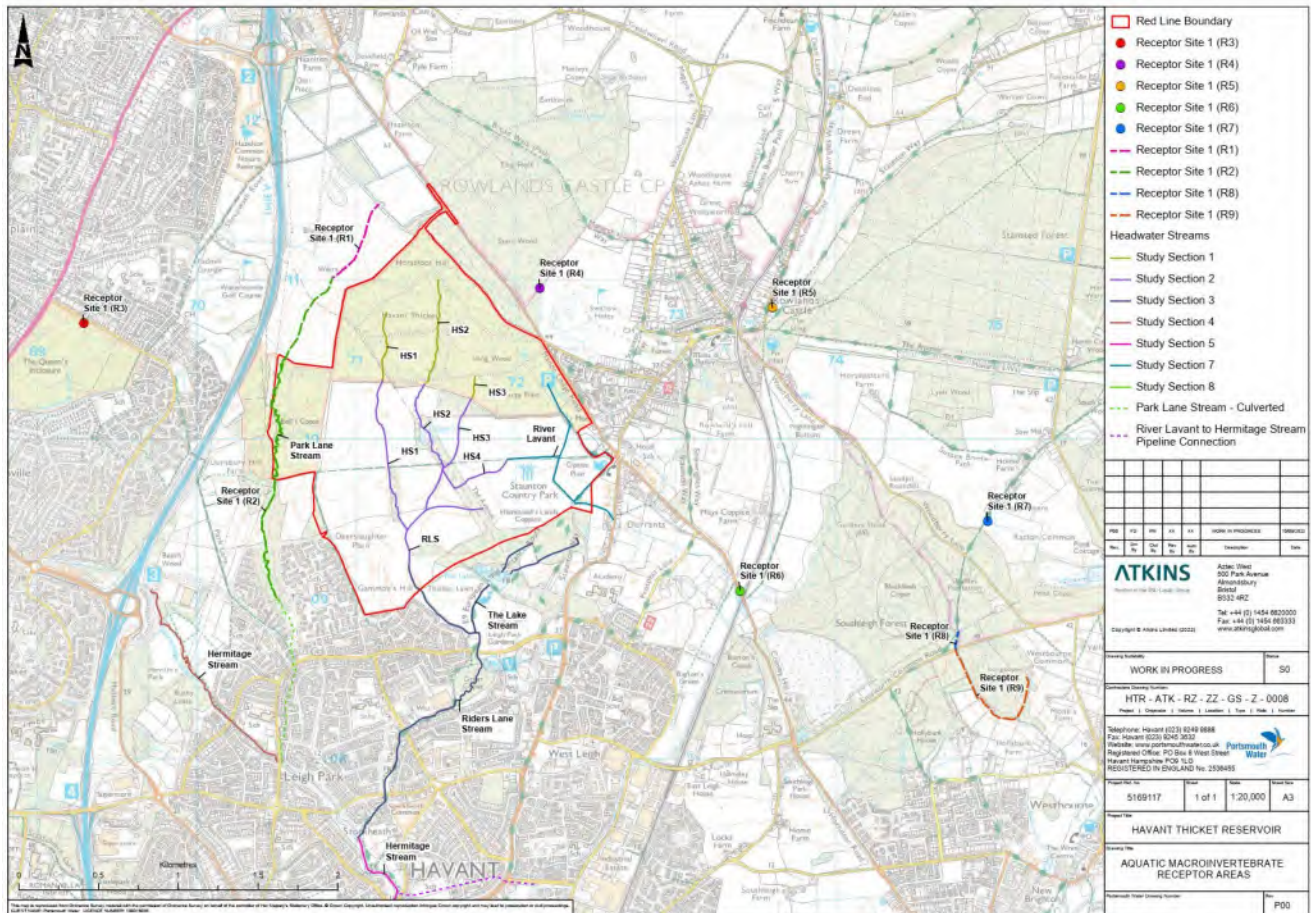


Figure 2-2 – Overview of aquatic macroinvertebrate receptor sites (see Appendix A for description of reaches)

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2.3. Delivery scope

Capturing of macroinvertebrates is split into the following two activities:

- Hand netting of aquatic habitats Headwater Stream 1 & 2 by a suitably qualified aquatic macroinvertebrate specialist⁷. This would cover Headwater Stream 1 from its main spring at NGR SU 71191 09925 and its confluence with Headwater Stream 2 at NGR SU 71321 09436; and Headwater Stream 2 between Upper Lake (NGR SU 71488 10012) and the confluence with Headwater Stream 1 at NGR SU 71321 09436.
- Excavating of shallow gravels (up to approx. 20 cm depth) around the main spring(s) on Headwater Stream 1, between NGR SU 71191 09925 (Figure 2-3) and a tree stump just upstream of the Bridleway (Figure 2-4, SU 71198 09826).

The hand netting should precede the excavation work. Both activities will need to keep the aquatic macroinvertebrates 'wet' between the donor and receptor site. There should also not be too much gravel 'stacked' in each transporting container to avoid crushing of the beetles. They should also be shaded from sunlight during transport to prevent the water from warming up, which will result in a reduction in oxygen levels. It is considered likely that water quality will, nevertheless, reduce quite quickly once the macroinvertebrates are placed in their containers. Recovered specimens and materials should, therefore, be taken as quickly as possible to a suitable donor site. As such it is preferred that the work is spread over multiple trips, and thus it is likely that the translocation will need to be undertaken over multiple days.

In terms of the receptor sites, a review of suitable locations has been undertaken which is documented in Appendix A. There are two receptor reaches identified:

- An unnamed tributary of the River Ems in Southleigh Forest upstream of Emsworth Common Road (Receptor Site R8, see Figure 2-5). This reach contained notable beetle species which have the same life cycle strategy as those recorded in Headwater Streams 1 & 2. This reach already experiences some backing up from the downstream road and has a lower gradient than reach R9. As such, it is recommended that this reach receives the excavated shallow gravels, which can be transported from Woodberry Lane via the Public Bridleway. The gravels need to be spread evenly over the reach and must not be left in one location or deposited so they can result in further backing up of water as the stream is unlikely to have sufficient flow / 'energy' to move a gravel deposit / bar. Although the stream sides could be shaped to make a more natural river channel, additional handling and compaction must be avoided as this would result in crushing of the adult macroinvertebrates or their larvae.
- An unnamed tributary of the River Ems in Southleigh Forest downstream of the Emsworth Common Road (Receptor Site R9, see Figure 2-6). This reach has a slightly steeper gradient than reach R8. Access is not as easy as reach R8 and this reach is therefore not suitable for depositing the shallow gravels without. Pending landowner agreement, it is recommended that the hand netted macroinvertebrates are released into this reach.

It is not recommended that habitat enhancement works are required for the two Receptor Sites (R8 and R9). Habitats are suitable and so does water quality. Instead, on-going management for the streams should avoid any further interventions in this reach such as in-channel habitat work or dredging to prevent disturbance to the macroinvertebrate communities.

⁷ Given specific (beetle) habitats need to be targeted, the experience of the ecologist undertaking this work must extend beyond the standard 3-minute hand netting / kick sampling.

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Figure 2-3 - Photo of main spring, facing upstream, showing start of gravel extraction reach (Photo taken by Peter Mulder, May 2022)



Figure 2-4 - Photo of second spring, facing upstream, showing end of gravel extraction reach as indicated by tree stump (Photo taken by Peter Mulder, May 2022)

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Figure 2-5 - Photo of Receptor Site R8, facing downstream (Photo taken by Peter Mulder, May 2022)

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Figure 2-6 - Photo of Receptor Site R9, facing downstream (Photo taken by Peter Mulder, May 2022)

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2.4. Monitoring

Once the translocation has been completed, it is recommended that a programme of post-translocation environmental monitoring is undertaken for spring & autumn 2023, 2024 and 2025.

2.5. Timescales

The optimal timescales for the two activities (hand netting, excavation) are March to May inclusive. After May, as flows reduce in the tributaries, the beetles and their larvae will enter the gravels and live in these over the duration of the summer until the catchment re-wets in winter. Winter is generally a suboptimal season as although flows are better, colder winter temperatures will mean that macroinvertebrate activity is low and thus capture rates are also considered to be low for the hand netting work in particular.

If the yield of the hand netting is very low in May 2022, a repeat could be considered in 2023.

Any new crossings must be avoided within the Headwater Stream 1 and Headwater Stream 2 donor reaches. Comprehensive pollution control measures (including silt protection) must be put in place by any contractors working in the vicinity or upstream of the donor reaches until this work is completed.

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3. Aquatic macrophytes

3.1. Aims and objectives

The aquatic macrophyte mitigation work is focused on the macrophyte community in Upper Lake, which is a low-nutrient, low pH (i.e., acidic) ephemeral pond located in The Avenue at NGR SU 71436 10018 and is fed by Headwater Stream 2. It is marked as Pond 5 on Figure 3-1 overleaf. Ephemeral ponds like these are quite unusual. As Headwater Stream 2 dries up in summer, so does the flow into Upper Lake and water levels then decrease over time until refill starts in the winter.

3.2. Background

The macrophyte community in Upper Lake was surveyed in 2021 as part of the EIA and also more recently by Dr Richard Lansdown (a Kew Gardens associate, under contract through APEM Ltd⁸). The aquatic macrophyte species recorded were characteristic of standing water, with low nutrients and low pH. Three species of particular note included:

- Bog St. John's-wort (*Hypericum elodes*)
- Floating club-rush (*Isolepis fluitans*)
- Lesser skullcap (*Scutellaria minor*)

These three species are uncommon at a county level, but do not have any protection. They were mainly recorded at the inflow / northern side to Upper Lake. Upper Lake will disappear as part of the reservoir work and these three species are, therefore, considered target species to preserve.

The aim of this work package is to safeguard these populations for the future by improving the condition of the receptor ponds, followed by translocation and/or planting of seedlings. There is a significant risk to the delivery of this work package by the presence of parrot's feather (*Myriophyllum aquaticum*) at some of the ponds, which is considered in further detail in Section 4 below.

⁸ APEM Ltd (2021). Survey of Ponds at Havant Thicket. Report to Portsmouth Water, Reference P7215.

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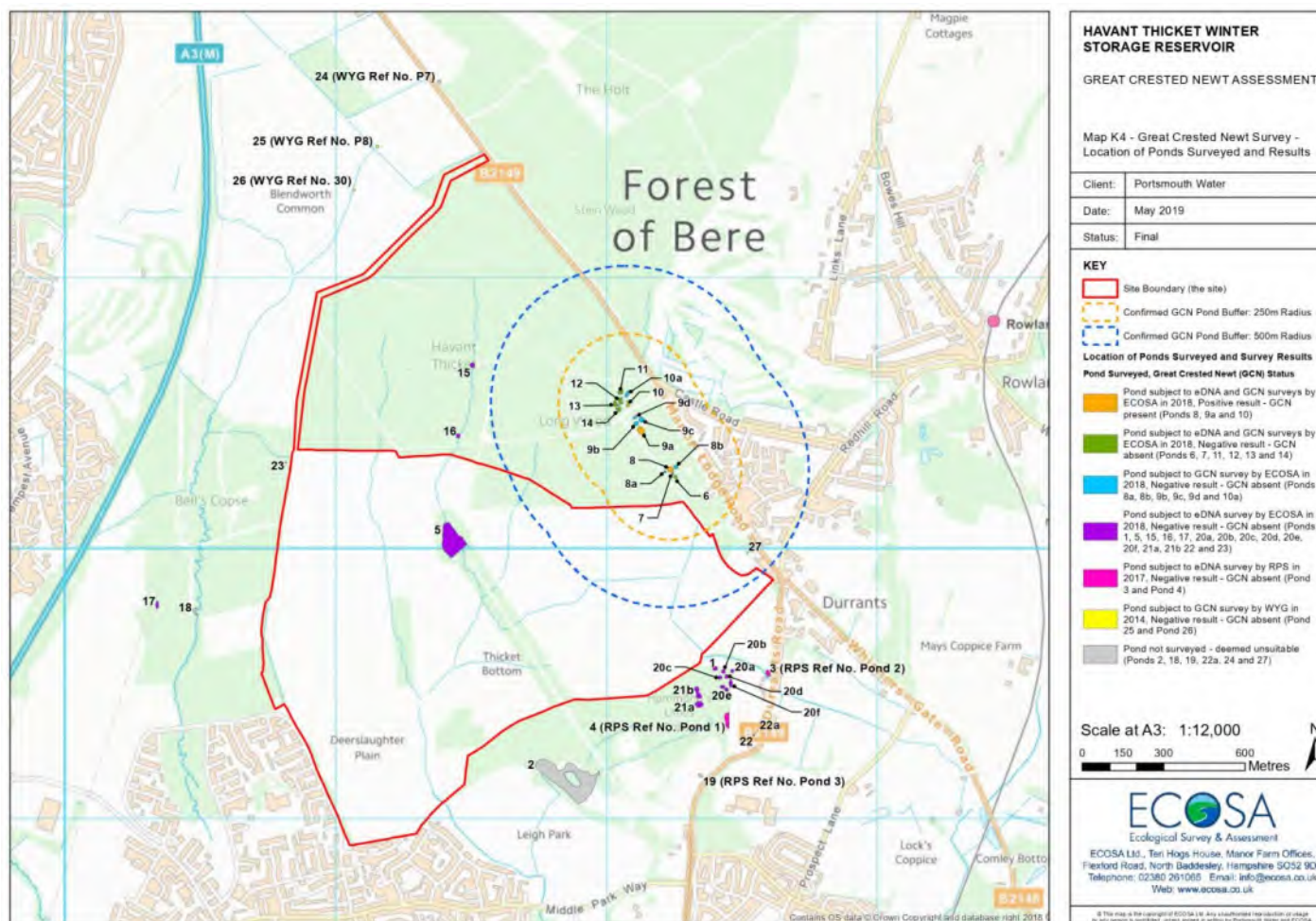


Figure 3-1 – Overview of Pond features around Havant Thicket Reservoir site. Reproduced from ECOSA ‘Map K4 GCN Survey Results. Colours relate to GCN presence/absence (as established through ECOSA surveys) and do NOT indicate any macrophyte results / suitability for translocation. Any advice on the supporting data and presence/absence of GCN needs to be sought from ECOSA.

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3.3. Delivery scope

3.3.1. Overview

APEM's 2021 surveys aimed to identify suitable receptor locations across Havant Thicket and covered the following ponds shown in Figure 3-1: Pond 5, 6, 7, 8b, 9a, 9b, 9c, 10a, 11, 12, 13, 14, 15 and 16. All three target species were recorded in Upper Lake, with only lesser skullcap recorded at one other pond i.e. Pond 9c.

It was concluded that the following ponds would be suitable as receptor locations for the translocation, but that these ponds do need to be improved to become more suitable for the three target plant species:

- Central ponds: Ponds no. 9a, 9b, 9c and 9d
- Northern ponds: Ponds 10, 10a, 11, 12, 13 and 14

Figure 3-2 shows the central and northern pond complexes in greater detail.

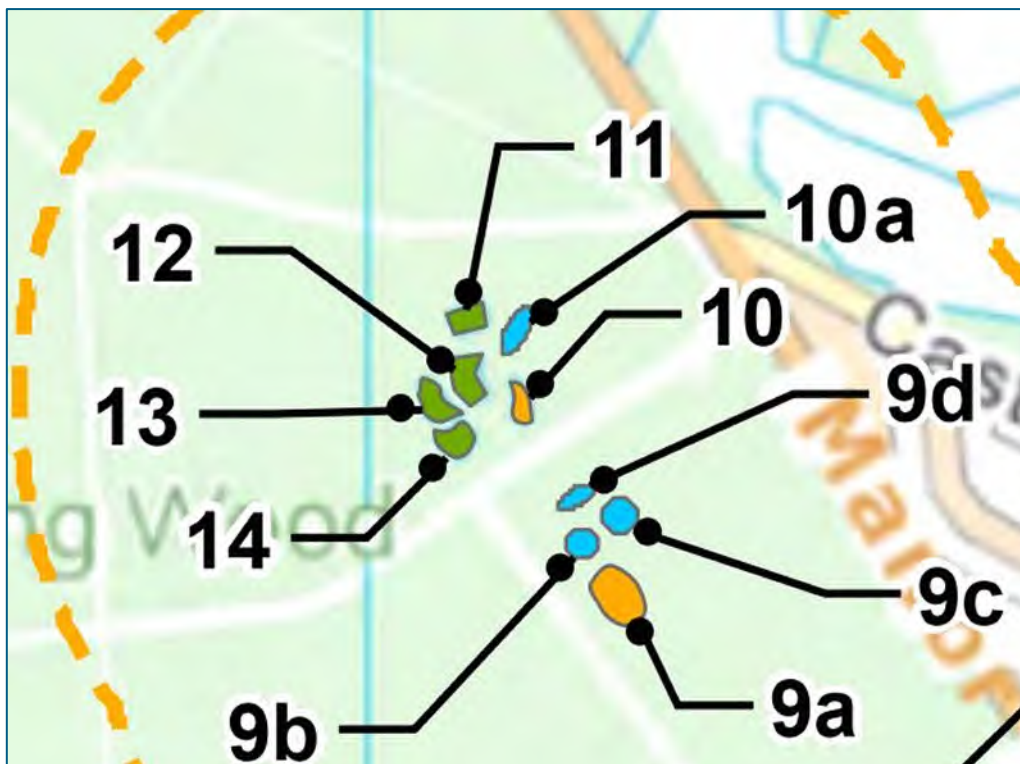


Figure 3-2 – Zoomed in version of Figure 3-1. See Figure 3-1 description for details and disclaimer.

It is considered possible that these ponds may have these target species present, but only very limited cover i.e., so low that it was not possible to detect plants as part of the surveys, and that environmental conditions (notably shallowing of the ponds and limited light) prevent these species from becoming more established – a phenomenon known as ‘ghost ponds’.

Improving the conditions of the ponds would be undertaken by removing all coniferous trees to a distance of 50 m from the two pond complexes. Removing trees must be undertaken without compacting the ground around ponds. Broadleaf trees can be left in-situ.

Forestry Commission (FC) have advised:

- Thinning around Ponds 9a-9d could be considered regeneration felling/thinning and can be delivered as part of the existing Forest Design Plan.
- Thinning around Ponds 10-14 could be considered a clear fell, but if natural regeneration or planting of broadleaf is incorporated into design then this would be acceptable. An amendment to the Forest Design Plan is required to accommodate this.

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- A small clump of Scottish Pines to the North West of ponds 10-14 is retained in context of their value for wider biodiversity.
- A significant component of the Pond 9 canopy is Norway Spruce which FC would support the removal of to help combat the spread of *Ips typographus*. (*Ips typographus* is destructive pest species primarily affecting Norway Spruce spread by the spruce bark beetle - cases have occurred in recent years in Kent and Sussex). There is also Norway Spruce around the Pond 10-14 complex.
- Natural regeneration will be allowed to avoid this being classed as a 'clear felling' of species.
- In future years, the remaining trees around the ponds could be managed in a short rotation to preserve the light levels. This needs to be incorporated in the updated Forest Design Plan.

The resultant area (2 ha) has been estimated by Jane Smith from Corylus Environmental by putting a point in the centre of each pond and then drawing a circle with a 50 m radius around each pond, removing any areas of overlap. This is shown in Figure 3-3 below, with the red shading indicating the 2 ha area. As the overall objective is to remove shading trees, the northernmost area (not shaded in red) does not require removal as it is not in the path of the sun.

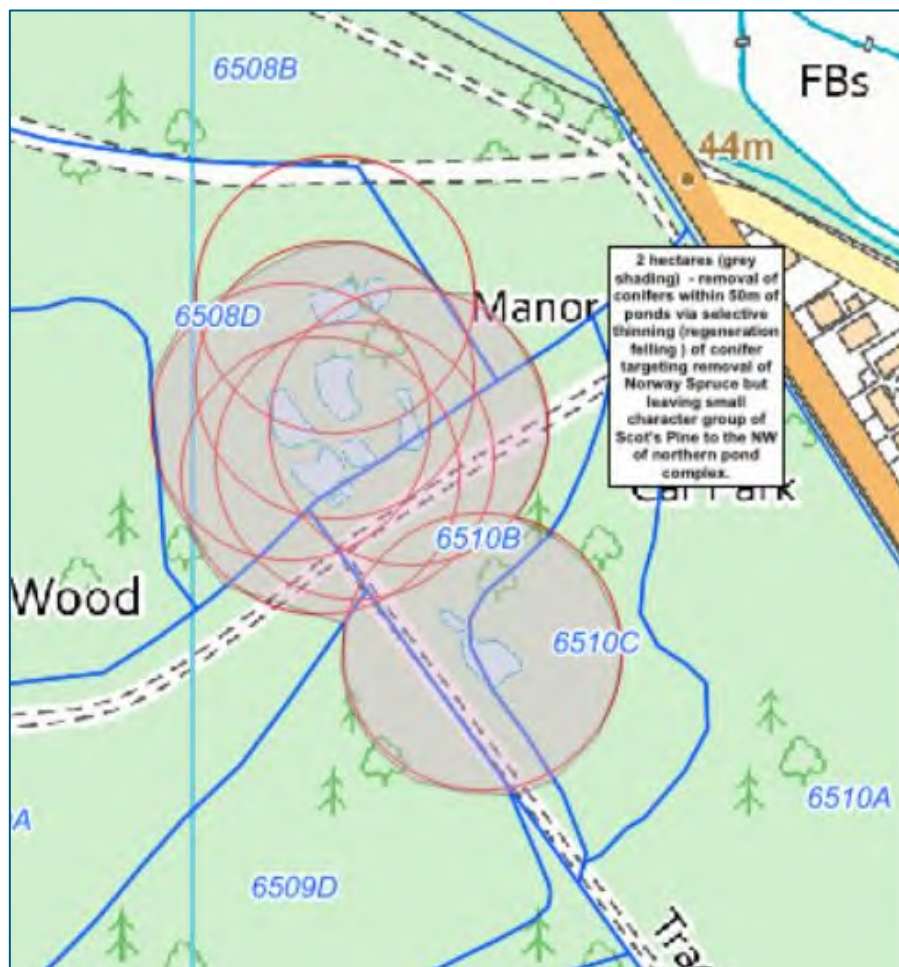


Figure 3-3 - Area estimate for selective thinning of conifer trees. Image provided by Corylus Environmental

3.3.2. Environmental considerations

We note Atkins are not contracted to undertake protected species surveys, mitigation work or providing any type of protected species advice. ECOSA hold all datasets, plans and agreements. As such, Atkins accept no liability in this regard and assistance on the presence of protected species like Great Crested Newts (GNC) and any others needs to be sought from ECOSA or another suitably qualified ecological consultancy.

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It is the contractor's responsibility to provide the necessary safeguards for nesting birds as well as species which have received protection under UK Law. As an example, GCN have been recorded by ECOSA in some of the ponds (see colour coding in Figure 3-1). The ponds also contain a number of very rare aquatic and riparian plant species. Uncommon mosses are also associated with the deadwood in the ponds, which is to be retained.

Forestry England (FE)'s ecologist has provided advice on good practice measures for forestry work which should be considered, including some wider protected species and habitat considerations. Their advice is attached in Appendix B.

3.3.3. Description of thinning works

- Prior to starting the thinning work, trees requiring removal need to be marked around the boundary of the area.
- All conifers, with exception of marked groups of character i.e., Scot's Pine need to be felled from the demarcated felling coup.
- All broadleaf, including deadwood, are to be retained.
- The proposed area of tree removal needs to be agreed with Portsmouth Water and its agents (including FE/FC) prior to the works processing.
- A buffer zone needs to be established around the ponds, using the UK Forestry Standard (UKFS) Guidelines. Most ponds are >2 m wide and thus the buffer should be between 2 and 20 m. Atkins recommend that the upper range, 20 m, is used.
- Within this buffer zone, ground should not be disturbed or driven over by machinery in accordance with the UKFS.
- Ground damage to be kept to a minimum elsewhere and any excessive ground damage reinstated at the Contractor's expense.
- Trees within the buffer zone, beyond the reach of the harvester boom would need to be hand felled using a chainsaw.
- If any fuels and oils are to be stored on-site, then this should be within bunded containers at least 20 m away from the ponds.
- A pollution kit must be kept on site at all sites. This should be readily accessible and contain absorbent sheets, pillows and a boom as a minimum. Staff must be trained in its use.
- We note the northern ponds in particular have very steep slopes leading to the ponds, particularly from the western and northern approaches to the ponds. Any spillages at the top of these slopes will flow down to the pond and so will any sediments. Where there are slopes, sediment protection measures must be put in place to prevent sediments from washing into the ponds.
- Felled timber is to be extracted and stacked in an agreed stacking area.
- Brash should be retained to construct dead hedging on sites around the pond complex by the Contractor. The principal objective of this dead hedging is to prevent access by members of the public and dogs to the ponds and thus would need to be around 75 cm to 100 cm high. As a minimum, the ponds need to have a dead hedge between the access track and the ponds to screen the ponds from dogs, extending this around the ponds as far as possible.
- The Contractor will need to arrange temporary closures / diversions of tracks and surrounding paths during felling operations, especially if a harvester is used.
- There are invasive species around some of the ponds (see below) and exceptional care should be taken to not transfer these across the site, which would constitute an environmental offence in accordance with the Wildlife & Countryside Act.
- Any environmental incidents, including spillages or damage to wildlife, must be reported to the landowner, Portsmouth Water and the appropriate authorities (Environment Agency, Natural England) by the Contractor.

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3.3.4. Macrophyte translocation

Where it is safe to do so, it is recommended that up to 50% of existing populations of the three target species are collected and spread across the receptor ponds, focusing on shallower areas. The remaining 50% will be left in Upper Lake. This would be by hand, using a low-disturbance method (trowels, spades and wheelbarrows) to take species across from Upper Lake to receptor ponds. A tracked vehicle can be used on forestry tracks to reduce manual handling, but any tracking around the ponds must be avoided to prevent rutting and soil compaction.

3.3.5. Growing of seedlings

The success of the thinning needs to be established through a survey in mid-May 2023. If all three of the target species have not appeared or established in the two pond complexes as a result of the pond clearance and translocation, it is proposed that plug plants of the three target species are grown by the Kew Gardens Millennium Seed Bank (MSB) team for planting at a suitable time. The UK Seed Hub staff have been contacted through Dr Richard Lansdown and have confirmed that they will be available for the planting activity and are also happy to undertake the planting with Portsmouth Water staff and other interested parties, such as local volunteers. The planting will be led by both Richard Lansdown and the MSB team with management of the surveys undertaken by Atkins and APEM.

3.4. Ongoing maintenance

The Ponds do suffer from leaf litter build up over time. Ponds should be inspected in future e.g. every 5 years to evaluate if leaf litter build up should be removed.

3.5. Monitoring

The central ponds (9a-9d) and northern ponds (10-14) complexes will need to be monitored in mid-May 2023 to assess whether any of the target species have grown as a result of increased light reaching the ponds.

Surveys should record species present as well as their abundance. The location of notable species (including the three target species and INNS) should be recorded so their extent can be mapped and form a record of how they populate the ponds over time.

Repeat surveys are recommended for 2024, 2025 and 2026.

3.6. Timescales

Translocation work needs to be undertaken mid- to late-summer (July to September) 2022. The success of felling and translocation works are to be evaluated in May 2023, at which point the MSB can be engaged. Once MSB are engaged, the seedlings will likely be ready in 2024 at which point they can be planted out in late spring / early summer (exact timing to be advised by MSB).

Comprehensive pollution control measures (including silt protection) must be put in place by any contractors working in the vicinity or upstream of Upper Lake until all works are completed.

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4. Invasive and Non-Native Species (INNS)

4.1. Aims and objectives

The presence of parrot's feather, an INNS, in Ponds 6 and 9a has the potential to compromise the objectives for the macrophyte enhancement work. The stand in Pond 6 was observed to be particularly large covering approximately 50% of the pond area. The stand in Pond 9a was relatively small but fragments were found along the pond edge suggesting the species is spreading across the pond.

The risk of financial and management burden will also be significant if parrot's feather colonises the reservoir and/or its wetland once constructed. As such, it is considered better to attempt to remove the plant where it occurs as well as prevent a re-introduction. It is noted that removal is an ambitious objective as this plant is very resilient and full removal will only be achieved under well-controlled conditions, notably the prevention of any new introductions and preventing access by members of the public and other vectors, notably dogs. For example, it can grow as a terrestrial plant if fragments are taken out of the pond or if a pond dries out. Only female plants have become established in the UK and it spreads by asexual means. Stems are brittle and the plant can propagate itself by growth of the small fragments of parent plants.

The proposed removal options are either infilling; manual removal and/or spraying. Noting some ponds have GCN present (notably 9a, 10), whilst the Environment Agency prefers infilling, the landowner prefers spraying. More than one spraying event will be needed to remove the species. In accordance with Centre for Ecology and Hydrology (CEH) Guidance⁹, mechanical control is only effective for removing large infestations of this plants if followed by chemical control. As such, Atkins advocate that if infilling is not possible that manual removal and spraying are used.

Manual removal is best timed in spring before biomass increases in summer. In accordance with CEH Guidance, there is an opportunity to spray in spring (using 2,4-D amine as active ingredient) or after this using glyphosate, including late in the season. Appropriate permissions will need to be sought from the Environment Agency, including disposal and spraying licences. Natural England should also be consulted on protected species matters (see Section 3.3.2 above).

During the last Atkins site visits in February and May 2022, parrot's feather was also observed in the soils around Pond 6 as a result of dogs entering and exiting the pond suggesting spread may be much wider. The species was growing terrestrially meaning that it can be spread easily by walkers. Pond 6 is used frequently by dogs but there is also evidence that dogs go in and out other ponds. In the absence of large amounts of wildfowl this may be how it originally colonised the site. As stated above, efforts to remove this species from ponds have only worked where ponds were not accessible by 'vectors' like dogs or livestock¹⁰. Whilst the brash from the aquatic macrophyte mitigation tree felling work can be used to fence off ponds from dogs, the timing of this is not until tree felling is undertaken late 2022. As such, temporary closure of paths may be needed around Pond 6 in particular. Dog walking seems a very popular activity in Havant Thicket and dedicated 'dog-dipping' ponds are proposed to be located at park entrances. It is accepted that these ponds will have greater disturbance and thus their objective is not to promote biodiversity but as a gesture of goodwill to local residents. One of the most obvious locations in the vicinity of the northern and central pond complexes is within the FE car parking area, so this can be monitored more easily.

At a project level, biosecurity measures are needed to prevent INNS arriving at the reservoir or risk them being spread across the site. Any further spread of high-risk INNS like parrot's feather will constitute an offence under the Wildlife & Countryside Act. It will also mean that the Infrastructure Act 2015 requirements for INNS are not met by the site owner / operator.

Biosecurity measures would, as a minimum, need to include signage at all entries to raise awareness and enforce check-clean-dry for walkers and dog owners. It may also need additional measures, such as boot scraping points or mats. Successful implementation of these measures would also prevent the introduction of other invasive plant species. That said, measures specific to parrot's feather or dogs are not available.

⁹ CEH (2004). Information Sheet *Myriophyllum aquaticum* Parrot's Feather. 2pp.

¹⁰ Chatters, C. (2020). The New Forest Non-Native Plants Project. Making a difference: examples of the effectiveness of work undertaken to control invasive non-native plants. Hampshire and Isle of Wight Wildlife Trust.

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Figure 4-1 - Parrot's feather in Pond 6 (photo taken by Peter Mulder, February 2022)



Figure 4-2 - Parrot's feather in Pond 6, close up of parrot's feather in area where dogs enter/leave pond (photo taken by Peter Mulder, February 2022)

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4.2. Delivery scope

The scope is as follows:

- Pond 6 and Pond 9a need to be fenced off immediately until the parrot's feather has been removed successfully to prevent any further spread and dogs entering and exiting the ponds. Pond 6 in particular should be closed to the public immediately.
- Mechanical control is proposed for Pond 6 and Pond 9a in the first instance. For Pond 9a, hand nets with long poles can be used to remove floating vegetation. No fragments can be left on the soil etc. as these will start new colonies. Remaining fragments then need to be treated with an Environment Agency approved herbicide as soon as possible.
- Parrot's feather in soils around Pond 6 need to be dug out selectively and herbicide applied to the areas where they have been dug up. Parrot's feather does not have deep roots so a shallow excavation (10-15 cm) by hand should be sufficient.
- All equipment used for the operations including boots, waders, nets, etc. need to be fully checked and cleaned and treated with herbicide before walking away from Pond 6 or Pond 9a. Small fragments can easily be carried underfoot. A biosecurity protocol needs to be set up ahead of the work starting and the area being treated fenced off from the public. The contractor could consider a 'clean' and 'dirty' area, with 'dirty' referring to the area closest to the pond where parrot's feather fragments are (likely to be) present. There should be no movement between 'clean' and 'dirty' areas without an inspection of all equipment, or a change of equipment.
- Any parrot's feather fragments need to be disposed off appropriately by the Contractor using appropriate environmental transfer and disposal permits (see [How to stop invasive non-native plants from spreading - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/publications/how-to-stop-invasive-non-native-plants-from-spreading)).
- A new pond needs to be dug within the corner of the Forestry England Car Park – so dogs can still have somewhere to swim without spreading parrot's feather across the wildlife ponds, which will be shielded using the brash generated by the aquatic macrophyte mitigation work. This needs to be the same dimensions as Pond 6. It is observed that the green lawn within the Forestry England Car Park is one of the few open spaces in the area for dogs to run around, so it is recommended that the pond is located in a corner.
- Signage will need to be provided at the Forestry England Car Park and all main paths leading to the ponds to alert members of the public of the presence of invasive species (notably parrot's feather) and that dogs have been responsible for the spread of this plant. Reference should be made to the Defra check-clean-dry campaign [404797 InvasiveAquatics A4Poster art \(defra.gov.uk\)](https://www.defra.gov.uk/campaigns/404797-InvasiveAquatics-A4Poster-art).
- Portsmouth Water have further confirmed that the presence of parrot's feather at Havant Thicket has been incorporated within Portsmouth Water's Invasive and Non-Native Species Plan, which was delivered as part of the AMP7 Water Industry National Environment Plan (WINEP). We understand the plan was approved by the Environment Agency in March 2022.

4.3. Monitoring

This work package is ultimately monitoring-led.

Monitoring is required until the parrot's feather has been removed successfully. It is recommended that three rounds of surveys are undertaken each year, covering three pond complexes and up to 50 m around each pond to look for any terrestrial growing parrot's feather (see **Figure 3-1** for location of ponds):

- Ponds 6, 7, 8, 8a 8b
- Ponds 9a, 9b, 9c, 9d
- Ponds 10, 10a, 11, 12, 13, 14

If parrot's feather is recorded, manual removal must be undertaken immediately (as per the approach detailed in Section 4.2). The proposed timing of the monitoring rounds (subject to agreement with the Environment Agency and Natural England) is:

- Early summer (May-June) – monitoring + manual removal
- Summer (July-August) – monitoring + manual removal

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- Autumn (September-October) – monitoring + manual removal + herbicide spraying

Any INNS monitoring plan must be adaptive and the above has been provided as a guide. It is noted at this stage that the work undertaken by the Hampshire and Isle of Wight Wildlife Trust¹¹ in the New Forest highlighted the importance of having multiple eyes on the ground in terms of monitoring, e.g. using Project Managers, contractors and volunteers all looking out for parrot's feather to spot if any part of the population was taken inadvertently to other locations at the site, but also spot any terrestrially growing parrot's feather that can be transferred by walkers. In some cases where parrot's feather was very abundant, monitoring and manual removal was increased to a more frequent basis (weekly or monthly) to nip any further spread in the bud.

At this stage, it is recommended that three clear monitoring visits are needed until removal activities (manual removal, herbicide treatment) are stopped. It is advised that any decision making on stopping removal activities is based on a full year's monitoring. For example, if in 2023 no parrot's feather is found in June, August and October 2023, then the work can be stopped. If parrot's feather is not found in June 2023 but is recorded in August 2023, including any out of pond terrestrial growth, then the earliest the project should be stopped is October 2024.

Any 'dog-dipping' ponds e.g., in the FE car park should initially be monitored at the same time as Ponds 9a-9d; and Ponds 10-14; and also into the future as part of an ongoing routine asset monitoring programme for the reservoir undertaken by Portsmouth Water. As with many INNS, prevention is significantly easier and cost-effective compared to a more reactive removal and spray exercise.

In terms of wider parrot's feather monitoring, given the significant risk any (re)introduction of parrot's feather poses to the main reservoir, it is recommended that Portsmouth Water also consider commissioning a wider parrot's feather study in the East Hampshire and West Sussex area, essentially up to a (say 1-1.5 hr) radius where it is reasonable for someone to travel to Havant Thicket reservoir to go for a walk with their dog. The aim of this would be to determine which ponds in the vicinity of Havant Thicket Reservoir have parrot's feather present and could be a future donor area. There is a significant data gap in this area where online sources like the NBN Species Atlas suggests there is no parrot's feather in the nearby area, whilst personal observations by the author have confirmed populations are present in Queen's Inclosure (SU 69362 10631) and also Aldsworth Pond (SU 76280 08892). This does not need to be undertaken by a consultant perse, but can be research led or volunteer based.

4.4. Timescales

See Section 4.3, removal should start summer 2022 and is not considered complete until three consecutive visits have shown parrot's feather is no longer present.

¹¹ Chatters, C. (2020). The New Forest Non-Native Plants Project. Making a difference: examples of the effectiveness of work undertaken to control invasive non-native plants. Hampshire and Isle of Wight Wildlife Trust.

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Appendix A – Review of macroinvertebrate donor sites

Site no.	Catchment	Receptor site	Advantage	Disadvantage	Photographs
R1	Park Lane Stream	Park Lane Stream between its springs (shown on OS map as a pond, labelled 'Pond 25' on the ECOSA GCN map, NGR SU 71148 11484) and the confluence with an unnamed tributary taking water from Waterloo ville (NGR SU 70853 11013)	Proximity / same hydrological catchment Beetle community similar to Headwater Streams 1 & 2, including notable species such as <i>Hydraena palustris</i> which prefers temporary and semi-permanent watercourses (see Site R8 for more extensive description). Other beetle species recorded include: <i>Agabus melanarius</i> <i>Anacaena globulus</i> <i>Haliphus lineatocollis</i> <i>Hydroporus discretus</i> <i>Hydroporus nigrita</i> <i>Hydroporus tessellatus</i> <i>Helophorus obscurus</i> Although all of these are more common species, it highlights the fact that this is a high quality headwater site. A large number of cased caddis fly larvae (family: limnephilidae) were also recorded	Land has been earmarked for (extensive) housing development and is in independent 3rd party ownership, meaning that future safeguarding cannot be guaranteed. It is therefore not considered a suitable receptor site.	
R2	Park Lane Stream	Park Lane Stream between NGR SU 70853 11013 and SU 70493 09007	Proximity / same hydrological catchment Land ownership known. Reaches through Waterloo ville Golf Course, Forestry England likely to be receptive to	Site observations, habitats and aquatic communities all suggest that there are significant water quality pressures in this reach. These are, in the main, attributed to	-

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Site no.	Catchment	Receptor site	Advantage	Disadvantage	Photographs
			improvement works. Reaches through 3 rd party ownership not suitable.	the variable flow regime from underneath the Waterlooville and Cowplain estates as a result of surface water run-off entering Park Lane Stream at NGR SU 70123 11361, SU 69960 10680 and SU 70026 10020. It is unknown if there are additional inputs from the A3(M). The surface water run-off appears to contain organic pollutants which affects the macroinvertebrate communities. Upper reach (NGR SU 70580 11222 to SU 70549 10526) subject to same development pressure as Reach R1. Unless these issues are resolved, which is not possible within the project timescales, it is therefore not considered a suitable receptor site for macroinvertebrates with a preference for good water quality.	
R3	Hermitage Stream	The Queen's Inclosure (SU 69289 10726 to SU 69240 10240)	Proximity / same hydrological catchment Land ownership known (Forestry England)	Site observations, habitats and aquatic communities all suggest that there are significant water quality pressures in this reach. These are, in the main, attributed to the variable flow regime from underneath the Cowplain estate entering the Hermitage Stream at NGR SU 69289 10726. The surface water run-off also appears to	-

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Site no.	Catchment	Receptor site	Advantage	Disadvantage	Photographs
				contain organic pollutants which affects the macroinvertebrate communities. It is therefore not considered a suitable receptor site for macroinvertebrates that have a preference for good water quality.	
R4	River Lavant	Unnamed Tributary from Stein Wood (SU 72150 10946)	Relatively short drive (5-10 mins)	Most streams are managed by forestry for drainage and not good habitat. No access to the swallow holes and associated streams. Habitats not considered suitable without major interventions.	

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Site no.	Catchment	Receptor site	Advantage	Disadvantage	Photographs
R5	River Lavant	Around Rowlands Castle (SU 73608 10823)	Good substrate (clean gravels), relatively short drive (5-10 mins)	Lavant was dry above Rowlands Castle in autumn 2021. Site not considered suitable due to prominence of very low / no flow periods compared to a better flow regime in Headwater Streams 1 & 2.	

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Site no.	Catchment	Receptor site	Advantage	Disadvantage	Photographs
R6	River Lavant	North of Barton's Copse (SU 73406 09050)	Relatively short drive (5-10 mins). Vehicular access seems feasible. Portsmouth City Council ownership on river left.	Dry during sampling visits. Plant community suggests it is dry for most of the year. Therefore, not considered suitable as a receptor site.	

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Site no.	Catchment	Receptor site	Advantage	Disadvantage	Photographs
R7	River Ems	Pond and stream NE of South Leigh Forest (approx. NGR for spring is SU 74958 09486)	Appears to be a spring fed reach similar to Havant Thicket. Relatively short drive (10-15 mins)	Land ownership unknown. Downstream stream coming out of the pond dry and then flows into Brickkiln Ponds and Aldsworth Pond. Whilst technically a suitable reach, the overall benefit would be over a quite short reach with no opportunity for the macroinvertebrates to disperse downstream.	
R8	River Ems	Unnamed tributary of the River Ems in South Leigh Forest, upstream of the Emsworth Common Road between NGR SU 74775 08798 and SU 74759 08684	Land in Portsmouth Water ownership (Land parcel SH7279 ¹²). Relatively short drive (10-15 mins). Good access for small tracked vehicles via a Bridleway that can be accessed from Woodberry Lane. No discharges observed, suggesting no external pressures on water quality. APEM samples taken at this site in spring 2022 suggest the macroinvertebrate	Notice may need to be given to use the layby and Bridleway for the work. Overall, a suitable reach for both hand netted and shallow gravels, but it not recommended that both are placed here at the same time.	See Figure 2-5

¹² Deriver from: Atkins (2021). Havant Thicket Reservoir. Reservoir Land Owner Information. Drawing HTR-ATK-RZ-ZZ-GS-Z-0005. Dated 04/10/2021.

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Site no.	Catchment	Receptor site	Advantage	Disadvantage	Photographs
			community contains a relatively large community of common Nemouridae stonefly taxa. Although these are relatively common species, the overall habitat availability and diversity is good. Two <i>Hydraena palustris</i> individuals were also recorded. Prof. Garth Foster describes the ecology as follows: <i>"Habitat and ecology H. palustris prefers temporary and semi-permanent, stagnant water, and is confined to areas with well-developed marginal vegetation, especially litter-generating species such as reeds and sedges. It can occur in partial shade in fen carr. Painter (pers. comm.) has noted that it occurs in managed ditches at Wicken Fen with a distinct "drawdown zone" below the marginal vegetation but that it does not occur in the shallowly flooded litter of the surrounding fen. In the Netherlands, it appears to have one generation a year with a peak of adult abundance and breeding in the spring."</i> Key to the find of species the fact that its lifecycle strategy is similar to the species recorded in Headwater Streams 1 & 2.		
R9	River Ems	Unnamed tributary of the River Ems in South Leigh Forest,	Relatively short drive (10-15 mins). APEM samples taken within this reach in Spring 2022 recorded	No access for tracked vehicles meaning depositing gravels is not possible without significant traffic management measures on the	See Figure 2-6

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Site no.	Catchment	Receptor site	Advantage	Disadvantage	Photographs
		<u>downstream</u> of the Emsworth Common Road between NGR SU 74766 08682 and SU 75140 08258. Includes a potential spring-fed tributary starting at NGR SU 75202 08511 and ending SU 75140 08258.		Emsworth Common Road, which is considered undesirable from a Public Relations point of view. Hand netted macroinvertebrates can be introduced in this reach without the requirement for such traffic measures. Land owned by Havant Borough Council on a 999 year lease starting 1996¹³ Water quality likely to be as R8. However, there is a surface water outfall at the road crossing which will likely convey surface water run-off plus sediments, salts and other pollutants into this reach. Whilst the macroinvertebrate community does not suggest that this pressure is highly significant, attenuation of this road run-off could be considered in future. Overall a suitable reach, but for the hand netted macroinvertebrates only.	

¹³ <https://www.woodlandtrust.org.uk/visiting-woods/woods/hollybank-wood/>

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Appendix B – Advice from Forestry England Ecologist on environmental considerations for felling.

Summary of ecological considerations based on ForesterWeb data:

Ancient woodland – protect soils and any ground flora from excessive rutting and damage etc.

- Dormice known in area – risk lower in conifer around ponds so just ensure contractors aware of their potential.
- GCN – see below
- Butterfly site – given the location and conifer dominance, no concern but ensure routes taken for access are taken into consideration. Eg keep off verges etc. Main species on FW are white admiral and purple emperor so honeysuckle and willows are key plants to protect.
- Schedule 1 birds in general area. Inc. those more associated with conifer. Checks prior to works.
- Bats in general area. If conifers low risk of trees being suitable for roosts.
- Non-native invasives species – see below

The draft selective thin memo documents from Atkins covers most aspects, I would add the following points:

- Care to be taken if machinery is used to ensure forest soils aren't damaged. E.g. use of brash to lower risk of rutting/compaction; if signs of rutting occurs works to stop etc
- Parrot feather
 - Ensure best practice biosecurity measures are implemented.
 - Work round ponds with parrot feather last to reduce risk of spreading to uninfected ponds etc
- Newts
 - Suggest use the brash to create connectivity to the pond back to woodland habitat as well as what already proposing in terms of using it as a people/dog barrier. Such connections don't need to be huge, just sufficient to provide some cover as from memory I don't recall much understorey or ground flora. This will also help mitigation for any loss of refuge habitats as a result of the works.
 - If possible retain and avoid existing refuge such as logs etc
 - How and where is the timber being extracted? See below under good practice

As a brief risk assessment of potential for harm/disturbance/damage based on the FC GCN good practice guidance:

- **Distance to pond:** risk is high as it is within 50 m of breeding ponds; ie nearer the pond the greater the risk. **HIGH**
- **Intensity of operation:** risk is low if machinery use is minimised to few passes along a specified, low risk, route. Risk is higher if there is widespread machine movements and/or scarification of ground. **LOW** (I've assumed minimal passes will be used)
- **Nature of habitat:** Ponds not being directly affected means low risk. Terrestrial habitat risk lower as below conifer; from memory it is pretty dark and devoid of understorey and ground flora with few/limited fallen deadwood, dense scrub (incl bramble), so fairly bare forest floor. If this is the case risk **LOW**
- **Timing of works:** newts can use terrestrial habitat all year. If there are limited refugia/resting sites (which there typically are in conifer woods), works when newts are hibernating present a lower risk. If works are carried out March-May the majority of adults will be in the ponds so it could be argued less of the population is at risk if the pond is not affected by the works BUT immature newts and juveniles and a proportion of adults will still be on land and moving around so will inherently be at risk!

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Additionally you could also consider the size of the population – a small population will lower the probability of encountering a newt compared to a high population. But loss of low numbers of newts in a low population, should they get harmed, will have a more significant effect on the future of the population. So risk level is really **neutral** for this!

The GCN survey report submitted with the PW application says there's a low population of GCN in three of our ponds, so 1-10 GCN. However, their 2018 presence/likely absence survey found no newts so I assume they're basing their low population assessment on the fact their eDNA came back positive and our record of a single GCN in 2009 (which doesn't appear to be on FW). Either way, we're not looking at significant or perhaps even viable GCN population!

You can take two views on the above:

1. Risk level is that of highest listed, so High
2. Risk level is a calculated/reviewed average, in which case I would say low-moderate.

If Atkins etc are doing the work for Portsmouth Water, even if it is our land, I would suggest it is their decision to determine risk level and whether they need a licence or not.

A brief review of works in relation to forestry good practice which if applied there should be no need for licence in forestry situations:

- Opening up the ponds will increase their value for newts, so in terms of the future of newts in the area. Opening up will also provide opportunity for better quality terrestrial habitat to establish and cut brash left in the form of people/dog barriers increases refuge habitat. In the "do nothing" approach, newt population is likely to remain and if anything it will decline as the ponds will further succumb to succession. It could be considered that the benefits outweighs the risk at population level.
- Again, from memory I would say that in close proximity to the pond, ie where works are proposed, there is limited suitable foraging and hibernating habitat and therefore newts are likely to be further afield except when dispersing to/from ponds for breeding. Therefore, I would suggest risks resulting from undertaking works nearer the pond compared to ponds with high quality habitat within the 50 m zone are lower.
- In relation to thinning/felling, the good practice suggests works near ponds should be phased over a number of years so only 25% of key habitat is affected each year. Given the general low suitability of habitat it could be argued there is flexibility in this 25% as it is not key habitat. Also retaining brash barriers etc will in part ensure retained habitat despite the works. In terms of habitat suitability I would look at it as, if after felling/thinning the ground habitat (ie below the canopy) is no different or better (ie pre-thin/fell no refuge and post thin/fell the brash provides refuge) then sticking strictly to 25% is less of an issue. Alternatively, is there an option to undertake the thinning over 2-3 years? Obviously this has time and economic efficiency implications.
- Extraction – good practice indicates preference for forwarders and NO skidders.
- Stacking – good practice indicates avoid key habitat and no stacking near ponds (no distance given but based on GCN movements, perhaps assume 100 m?) unless it is removed within a few weeks and certainly before October (ie when GCN start seeking out hibernation sites).

If the above is followed I would say we are adhering to good practice.

Based on all of the above if this was a purely forestry works OSA I wouldn't have any major concerns re GCN. But as I mentioned above I would let PW/Atkins/ECOSA make call given its all wound up with a development which means different subtle considerations!

Equally, from a generic ecology perspective, again if this were a forestry OSA, no concerns if best practice is followed and the proposed works will result in a positive ecological outcome.

Hope that helps but give me a shout if need any extra etc. Thanks,

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Figure B-3 - Outline Design for New Watercourse Creation at Gipsies Plain



- Approximate Course of Culvert
- Approximate Course of New Channel
- Direction of Flow
- Top Water Level
- Embankment Crest
- Inner Embankment
- Outer Embankment

P00	FD	XX	XX	XX	WORK IN PROGRESS	04/04/2022
Rev.	Dwn By	Ckd By	Rev By	Auth By	Description	Date



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Drawing Suitability	Status
WORK IN PROGRESS	S0

Contractors Drawing Number:						
HTR - ATK - XX - XX - XX - X - XXXX						
Project	Originator	Volume	Location	Type	Role	Number

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Project Ref. No	Sheet	Scale	Sheet Size
5169117	1 of 1	1:1,000	A3

Project Title
HAVANT THICKET RESERVOIR

Drawing Title
OPTION 4 - NEW CHANNEL D > F, AVOIDING NEWLY PLANTED WOODLAND AREA

Portsmouth Water Drawing Number	Rev
	P00

B.6. Compensation Measures in Havant Thicket Woodland and Bell's Copse

FE Proposed Specifications for Havant Thicket Woodland and Bells Copse

May 2022

Scrub Edge Creation – Outline Specifications

Restore existing hedgerow to prevent public access into the scrub edge/wetland zone. Create an impenetrable barrier by restoring the existing hedge by a combination of laying & gapping using existing willow stems as the primary matrix. Existing willow is at a good point in its cycle to lay. Proposed prescriptions are as follows:

Hedgerow Laying

Use this technique where the majority of stems are less than 15cm dbh:

- carry out work between 30 September and 31 March when the hedge is still dormant
- remove old fencing and wire
- cut and pull out bramble, clematis or other scrambling or non native plants
- partially cut through stems near ground level, laying the pleachers (cut stems) over at an angle from horizontal to form a stock-proof barrier
- remove the uncut heel from each pleacher
- keep pleachers in position by crooking, staking, or staking and binding
- keep all existing hedgerow trees
- remove all cut material from the immediate site after completion of the work
- control weeds during the first growing season after laying
- prevent livestock and grazing animals from damaging the hedge by setting fencing at least 1.2m from the centre of the hedge or, if there is a bank, as close to the base of the bank as possible
- trim the hedge for 3 years after laying, allowing the hedge to become taller and wider at each cut

To undertake hedge laying successfully:

- only cut using hand-tools (including chainsaws)
- lay the hedge in the regional style
- cut each stem as low as possible (no more than 10cm from the ground)
- choose stems which when laid do not leave large gaps
- protect the newly laid hedge from damage by grazing animals - rabbit fencing may be needed if local populations are high
- leave as much side growth on the branches as possible
- lay stems at an angle of about 35 to 45 degrees from horizontal
- keep any existing trees and leave the occasional 'standard' hawthorn or other species if this fits in with the local landscape
- keep deadwood where possible
- plant up gaps using native species to improve the continuity of the hedge

Gapping

- carry out work between 1 November and 31 March when the hedge is still dormant
- prepare the ground along a 1.5m wide strip to provide good soil conditions and as little competition from other vegetation as possible

- apply any herbicide to the 1.5m strip in the August or September prior to planting
- make sure plants are:
 - 2-year-old transplants
 - at least 450 millimetres (mm) to 600mm high
 - native species, with no one species making up more than 70% of the total
 - planted in a staggered double row 40 centimetres (cm) apart with a minimum of 6 plants per metre
 - kept clear of weeds until they are established
- remove individual guards and tree shelters once the plants are established
- replace all failures in the following planting season
- consider flowering and berry producing hedge plants (Hawthorn, Blackthorn, guelder rose, dogwood etc for bird and insect benefit).

Plant up the gaps with suitable alternative species (as per appendix B2 of the LEMP).

Keep any fences far enough away so the hedgerow can grow at least 1.5m in width.

If there is a known problem with rabbits or hares install rabbit netting, either on its own or with stock fencing.

Avoid using spiral guards as they limit the amount of dense growth at the base of each plant, are unsightly and difficult to remove.

Coppicing

Coppicing would be an alternative restoration technique if the majority of stems are >15cm dbh):

- carry out work between 30 September and 31 March when the hedge is still dormant
- remove old fencing and wire
- cut and pull out bramble, clematis or other scrambling plants or non native plants
- cut out elder plants and prevent re-growth of stumps
- encourage vigorous re-growth from the base of the plant by cutting the stems down to ground level (less than 10cm)
- angle cuts so that water can easily run off
- keep all existing hedgerow trees
- cuttings can be placed over newly coppiced stools to prevent browsing by livestock or wild animals, or to leave dead wood for wildlife; however, they must not prevent new growth
- remove all unused cut branches from the immediate site after completion of the work
- control weeds during the first growing season after laying
- prevent livestock and grazing animals from damaging the hedge by setting fencing at least 1.2m from the centre of the hedge, or, if there is a bank, as close to the base of the bank as possible
- trim the hedge for 3 years after coppicing, allowing the hedge to become taller and wider at each cut

Encourage dense bushy growth of the newly coppiced hedge by:

- trimming lightly for 3 years
- never cutting back to the same point, instead allowing the hedge to gradually increase in height and width by several centimetres at each cut.

Future maintenance

Either enter the path side of the hedge into a regular trimming cycle 3 years after coppicing/laying/gapping

cut hedgerows in **one** of the following ways:

- no more than 1 year in 3 between 1 September and 28 February - leave at least two-thirds of hedges untrimmed each year
- no more than 1 year in 2 between 1 January and 28 February - leave at least one-half of hedges untrimmed each year
- gap up any length of hedge with more than 10% gaps within the first 2 years

or leave them to grow and manage in a laying rotation (estimate 5-7 year rotation):

- lay stems between 5 cm to 15cm in diameter - however, it is possible to cut larger stems with a chainsaw
- if tall enough to lay (at least 2.5m, and ideally 4m)

Headwater Stream Restoration – Outline Specifications

Suitable prescriptions are published in the Countryside Stewardship Options manual for small leaky dams as listed below:

- construct the dam from logs large enough to span the water channel and out on to the floodplain to provide a stable and long-lasting structure
- secure the dam in line with the requirements of the Environment Agency
- align dams at right angles to channel banks to reduce bank scour
- build dams to allow low flows to pass unimpeded at all times
- site dams on slow flowing reaches of the water course that have on average 2m of floodplain on either side
- build dams to a height sufficient to encourage water to spread onto the floodplain upstream of the dam
- build dams in series (minimum 3 dams) at a spacing between dams of about 5 to 7 times the width of the channel
- make sure dams are not installed directly upstream of pinch points such as bridges or culverts that back up flows and are likely to swamp the dam
- check and maintain dams to keep the structure effective

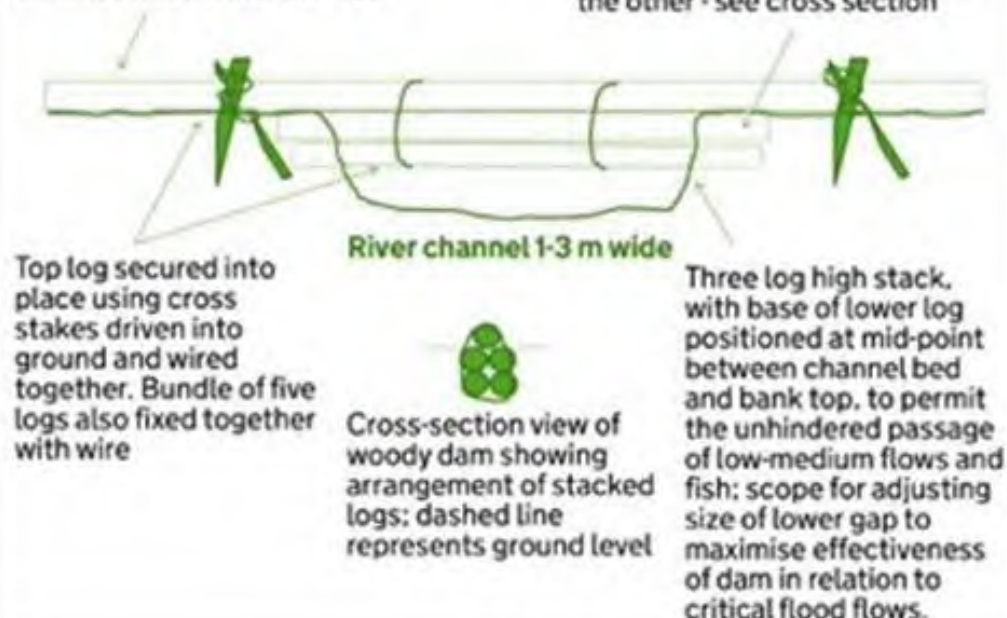
Indicative design for 1 to 3 metres wide, leaky woody dam (see diagram below):

1. A cross section view of a 3 log high woody dam shows the arrangement of the stacked logs – 2 logs at the base with another 2 logs directly on top of them. The final log is at the top of the log stack, positioned in the dip between the 2 logs below it. Ground level is shown as being between the second row of logs from the bottom and the top log.
2. The base of the lower logs is positioned at mid-point between the channel bed and bank top, to permit the unhindered passage of low-medium flows and fish. There is scope for adjusting the size of the lower gap to maximise the effectiveness of the dam in relation to critical flood flows.
3. The lower logs are slotted 50cm into the bank on either side of the channel or braced against a bankside tree or stump. There are 2 rows of logs installed for added strength, one behind the other.
4. The top log is positioned on top of bank and extends 3 to 4 metres out onto either side of the floodplain to enhance flood water storage
5. The top log is secured into place using cross stakes driven into the ground and wired together. Bundle of 5 logs also fixed together with wire.

Indicative design for 1-3 m wide, leaky woody dam

Top log positioned on top of bank and extending 3-4 m out onto either side of the floodplain to enhance flood water storage

Lower logs slotted 50 cm into bank on either side of channel or braced against a bankside tree or stump; two rows of logs installed for added strength, one behind the other - see cross section



Birch Clearings ('Racks') – Outline Specification

- Racks not provided to forestry spec, but as linear clearings for biodiversity in a sundial formation to allow sunlight to enter the rack at different times of day.
- Rack and respace 27.8ha
- Rack placed at 30m intervals, 4 to 10 m wide
- Selectively respace either side of each rack / clearing as appropriate to remove weakest trees, and to create halos around non birch trees to encourage species diversity.
- Retain yew and existing broadleaf species other than birch
- Remove/ringbark any Turkey Oak
- Within racks create *up to 56 X 0.16ha coupe fells for restocking with native broadleaves (2 coupes per ha). Planting of 12,096 trees to be completed across 50% of the coupes following the principles outlined in 'Successful underplanting A Silvicultural Guide'.*
- *Plant in at least 1.5m high tubes*
- In the small coupes, carry out Bracken control where necessary (spot spraying or weed wiping with Azulox (if permitted) rather than deep mulch to minimise the impact on forest floor).
- Racking to take place without needing to disturb or move bat or dormice boxes.
- Direction of the racks to be aligned either to prevent formation of a wind tunnel if the coupe is exposed/at the edge of a site or following the planting line of existing trees or where neither of the two latter factors dominate, at angles to end at the nearest access track/ride.

For a period of 10 years trees planted in the coupes from the restocking:

- must be protected against damage and be adequately weeded.
- Any failure or losses should be replaced as necessary to provide a stocking of not less than 1100 per hectare.

Proposed timing of racking

SCPT	Age (2022)	Proposed Racking Year
6502A	PY2003/29 years old	Form part of Forest Meadows/Glades. Leave remaining birch to screen glades from the public
6503A (south side of scpt)	PY2010/12 years old	2030 – younger birch - avoids disturbing boxes and keeps are undisturbed given activity along northern access road and adjacent rides
6503A (north side of scpt)	PY2010/12 years old	2030 – younger birch - avoids disturbing boxes and

SCPT	Age (2022)	Proposed Racking Year
		keeps are undisturbed given activity along northern access road and adjacent rides
6505A (N)	PY2010/12 years old	2030
6505A (S)	PY2010/12 years old	2027
6504D (was 6504C)	PY1996/26 years old	2027
6505C	PY1990/32 yrs old	2027
6508A	PY2010/12 years old	Form part of Forest Meadows/Glades. Leave remaining birch to screen glades from the public
6507B (was 6507A)	PY1990/32 yrs old	2024 (coincide with stream corridor works)
6507E	PY1990/32 yrs old	2024 (coincide with stream corridor works)
6509B/6509C	PY1990/32 yrs old	2023

Outline Proposals for Management of Retained Woodland around the Reservoir

Environmental Sub-Group - May 2022

Round Wood

Round Wood is a 70 year old single species oak plantation which is not currently suitable for rotational coppicing and glade creation. The remaining area is too small for glade creation and there is no understory to coppice, just a few sparse holly shrubs are present. Proposed enhancement and management of Round Wood:

- Limited thinning of the weakest/ thinnest oaks to the benefit of the remaining oaks. Leave some limbs/ trunks on the woodland floor to provide dead wood for invertebrates).
- Where the oak stems remain too dense preventing light reaching the woodland floor carry out selective ring barking to create standing dead wood, creating space for the remaining oaks to mature more quickly.
- Deer fence the wood to prevent grazing and public access.
- Plant an understorey of trees of the same species found in The Avenue, with a high proportion of hazel. (Trees from The Avenue Sapling Rescue Project can be planted in Round Wood by volunteers using the gene pool from the site).
- Relocate woodland plants removed from The Avenue to the woodland floor (flora currently virtually absent).

All of the above should be completed early in the programme, to speed up the process of woodland diversification from the current oak plantation to mixed deciduous woodland.

After 5 and 10 years, review if any replacement planting is needed.

After 15 years, review the woodland development and whether any selective thinning is needed. Individual hazel trees should be coppiced on a 10-15 year rotation for the benefit of dormice, the area of remaining wood is not large enough for coppice rotation in coups.

Swanmore Road Shelterbelt

Swanmore Road Shelterbelt comprises trapezoid-shaped secondary planting blocks which contain non-native species (most notably oaks) which lack structural diversity. The area is not big enough to create glades. While some hazel is present the structure of the woodland would not lend itself to traditional rotational coppice management.

It is proposed to leave this secondary woodland area unmanaged while the reservoir construction is taking place, to minimise the impact on woodland/ wildlife at the site at a time when other woodland blocks present in the centre of the site are being removed.

Following completion of the reservoir construction a review with a competent ecologist and the stakeholder group should be carried out of what would be appropriate management.

Appropriate management is likely to include:

- Phased thinning or coppicing in strips (not blocks) to improve the age structure of the woodland, without creating large openings/ glades.
- Selective removal or ring barking of non-native species, dependent on good practice guidance at that time.
- Laying appropriate selected trees in lines around the edge of the blocks and within the blocks to create hedge like structures to discourage public access.

Review the management for each block every 10 years as a minimum.

Woodland at the base of The Avenue

This woodland south of the reservoir has limited structural diversity, is fairly densely spaced and as a result there is a limited ground flora. Given the disturbance caused by removal of The Avenue, this remaining area of woodland should remain unmanaged until after the reservoir construction is complete.

The area is small so clearance of glades would not be appropriate.

On completion of the reservoir the age structure of the woodland should be reviewed to identify specimen trees to be brought on as standards, then to halo out trees around these standards to allow more light to encourage the standard to grow.

Selectively thinning and coppicing of other trees should be undertaken to help diversify the age structure of the woodland and allow more light to the woodland floor to encourage more ground flora to establish.

On completion of these actions in the medium to long-term rotational hazel coppicing should be established to enhance the habitat for hazel dormouse and other species. Given the limited area of the woodland very small coppice coups or strips would be most appropriate taking into consideration the hazel coppice rotation in adjacent woodland.

Cabbagefield Row

This is a mature area of ancient woodland which has mature trees and a well-developed understorey and field layer. The small area of the woodland means that opening up glades and rotational coppicing would not be appropriate.

A policy of minimum intervention is proposed, and installation of bat, bird and dormouse nest boxes would be the most appropriate management in the short term.

On completion of the reservoir construction, the area should be surveyed by a competent ecologist to identify any limited actions that may be appropriate such as thinning or haloing to benefit existing or future trees selected as standards.

There should be a review by a competent ecologist every 5 years.

The ditch and scrubby edge to the woodland should be maintained along the footpath/bridleway to minimise opportunities for access, with any material arising from woodland management used to dead hedge to reinforce gaps or desire lines that develop.

Figure B-4 - Location of bat and dormouse boxes

HAVANT THICKET RESERVOIR, HAMPSHIRE

EPSM MITIGATION

Bat and Hazel Dormouse Mitigation Features

Client: Portsmouth Water

Date: January 2022

Status: Draft

KEY

- Site Boundary (wider site)
- Reservoir Site (the site)
- Bat Box
- ▲ Bat Roosting Feature
- ★ Dormouse Box
- Suitable Existing Tree Feature Identified

Scale at A4: 1:14,000

0 140 280 560 Metres



Prepared by: OW

Date: 070122

Last amended by: N/A

Date: N/A

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Appendix C. Five-Year Work Programme

Havant Thicket Reservoir - Main Reservoir Works LEMP Delivery Programme v2				Year 1 to 8		19/03/2024	Author: MG	All activities show number of days over period highlighted Dark grey cells - activities complete Light grey rows - activities not required in period				
Ref.	Year (Year 1 = 2022)			Status Feb 2024	No days	2022 - Year 1			2023 - Year 2			
	Month	Location	Timings			Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	WOODLAND/WOOD PASTURE CREATION (Note: maintenance during establishment period will follow each subsequent woodland planting, starting with Gipsies Plain and Memory Park)											
1.01	Inspection to determine status of plants, growth of weeds and grass, and to determine management requirements.	Gipsies Plain, Memory Park	4 days annually April to October during Establishment Period then every year	Year 1 and 2 complete	28	2	1	1		2	1	1
1.02	Spot treatment of injurious weeds across planting plots.	Gipsies Plain, Memory Park	3 days annually in February, June and October during Establishment Period	Year 1 and 2 complete	21	1		1	1	1		1
1.03	Control all weeds within 750 mm diameter around each tree.	Gipsies Plain, Memory Park	3 days annually in February, June and October during Establishment Period	Year 1 and 2 complete	21	1		1	1	1		1
1.04	Check and straighten tree shelters, stakes and ties. Remove selected shelters. Hand weed shelters.	Gipsies Plain, Memory Park	2 days annually in April and June during Establishment Period	Year 1 and 2 complete	14	2				2		
1.05	Replace failed stock.	Gipsies Plain, Memory Park	1 week annually during October to February during Establishment Period	Year 1 and 2 complete	35			5				
1.06	Remove all remaining shelters once trees are established. Prune broken branches after shelters have been removed.	Gipsies Plain, Memory Park	1 day in Years 2-5 following planting once plants are established	Year 1 and 2 complete	6					1		
1.07	Cut grass between planting.	Gipsies Plain, Memory Park	2 days annually in June and September during Establishment Period	Year 1 and 2 complete	14	1	1			1	1	
1.08	Water plants during periods of drought.	Gipsies Plain, Memory Park	As required 1 day every 2 weeks during dry season during Establishment Period	Year 1 and 2 complete	84	6	6			6	6	
1.09	Selectively coppice dense stands of uniform habitat in rotation to introduce multi-layered structure. Cut as close to ground level as is practical, all woody growth with branches extending to within 1 m of footpath or cycleway.	Gipsies Plain, Memory Park	2 days in Year 5 following planting then every 5-7 years between October and February	Not started	2							
1.10	Litter picking.	Gipsies Plain, Memory Park	3 days annually or as required	Year 1 and 2 complete	21	1		1	1	1		1
1.11	New woodland planting		TBC - likely to be Year 5 onwards									
2	HEDGEROW RESTORATION/CREATION (Note: maintenance during establishment period will follow each subsequent hedgerow planting, starting with Gipsies Plain)											
2.01	Inspection to determine status of plants, growth of weeds and grass, and to determine management requirements.	Gipsies Plain, Eastern Corridor	4 days annually April to October during Establishment Period then every year	Year 1 and 2 complete	28	2	1	1		2	1	1
2.02	Weed control using mulch mat. Replace and/or straighten mulch mats.	Gipsies Plain, Eastern Corridor	1 day annually during Establishment Period	Year 1 and 2 complete	6					1		
2.03	Check and straighten tree shelters, stakes and ties. Remove selected shelters. Hand weed shelters.	Gipsies Plain, Eastern Corridor	2 days annually in April and June during Establishment Period	Year 1 and 2 complete	14	2				2		
2.04	Cut hedgerow to 1200 - 1300 mm in height (expect where selected to be laid)	Gipsies Plain, Eastern Corridor	2 days annually during Establishment Period	Year 1 and 2 complete	14				2			
2.05	Water plants during periods of drought.	Gipsies Plain, Eastern Corridor	As required 1 day every 2 weeks during dry season during Establishment Period	Year 1 and 2 complete	84	6	6			6	6	
2.06	Replace failed stock.	Gipsies Plain, Eastern Corridor	1 week annually during October to February during Establishment Period	Year 1 and 2 complete	35			5				
2.07	Remove all remaining shelters once trees are established. Prune broken branches after shelters have been removed.	Gipsies Plain, Eastern Corridor	1 day in Years 2-5 following planting once plants are established	Year 1 and 2 complete	6					1		
2.08	Manage hedgerow by cutting maximum 50% of hedgerow in one year to no less than 1.2 m height.	Gipsies Plain, Eastern Corridor	2 days in Year 5 following planting then every 2-3 years between October and February	Not started	2							
2.09	Mow 2 m buffer on path-side of hedgerow using a tractor-mounted flail. Remove arisings.	Gipsies Plain, Eastern Corridor	1 day every 2-3 years	Not started	4							
2.10	Litter picking.	Gipsies Plain, Eastern Corridor	3 days annually or as required	Year 1 and 2 complete	17	1		1	1	1		1
2.11	Selected established hedges to be laid, and repeated when regrowth reaches 4 m in height.	Gipsies Plain, Eastern Corridor	1 week initially in January or February of Year 3 following planting, then every 8-10 years as required	Moved to Year 3	10							
3	GRASSLAND AND RUSH PASTURE CREATION / RESTORATION (Note: grassland establishment maintenance will commence following grassland creation, assumed Year 5 but TBC. Ongoing management of grassland and rush pasture included under Project Refs. 24 and 25)											
3.01	Cut grassland and remove arisings. Mower blades to be set at 100mm to avoid impacts to reptiles and amphibians.	Reservoir embankment area	1 week annually in September during Establishment Period	Not started	15							
3.02	Spot treat injurious weeds.	Reservoir embankment area	3 days annually in February, June and October during Establishment Period	Not started	9							
3.03	Litter picking.	Reservoir embankment area	3 days annually or as required during Establishment Period	Not started	10							
3.04	Inspection to determine status of new seeding, growth of weeds, and to determine management requirements.	Reservoir embankment area	1 day annually in June during Establishment Period	Not started	3							
3.05	New grassland and rush pasture seeding	Reservoir embankment area	TBC, assumed Year 5	Not started								
4	SCRUB EDGE CREATION											
4.01	Cut 20-25% scrub every year on 4-5 year rotation. Cut back to stump level targeting older stands. Cut and lay hedgerow incorporating dead wood to create impenetrable barrier.	Boundary of Havant Thicket	1 week annually in January or February	Moved to Year 3	30							
4.02	Fence off minimum 4 m buffer of grassland margins with sinuous edges adjacent to woodland.	Boundary of Havant Thicket	2 weeks in Year 3	Moved to Year 3	10							
4.03	Mow buffer strip in 50-100 m length blocks on rotation. Mown around trees. Cuttings to be burnt or composted.	Boundary of Havant Thicket	1 day annually from Year 3, each block cut every 2-4 years	Moved to Year 3	5							
4.04	Inspection to determine status of plants, growth of scrub, and to determine management requirements.	Boundary of Havant Thicket	1 day annually in June	Year 1 and 2 complete	7	1				1		

Ref.	2024 - Year 3				2025 - Year 4				2026 - Year 5				2027 - Year 6				2028 - Year 7				2029 - Year 8
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
1																					
1.01		2	1	1		2	1	1		2	1	1		2	1	1		2	1	1	
1.02	1	1		1	1	1		1	1	1		1	1	1		1	1	1		1	1
1.03	1	1		1	1	1		1	1	1		1	1	1		1	1	1		1	1
1.04		2				2				2				2				2			
1.05	5			5				5				5				5				5	
1.06		1				1				1				1				1			
1.07		1	1			1	1			1	1			1	1			1	1		
1.08		6	6			6	6			6	6			6	6			6	6		
1.09												2									
1.10	1	1		1	1	1		1	1	1		1	1	1		1	1	1		1	1
1.11																					
2																					
2.01		2	1	1		2	1	1		2	1	1		2	1	1		2	1	1	
2.02		1				1				1				1				1			
2.03		2				2				2				2				2			
2.04	2				2				2				2				2				2
2.05		6	6			6	6			6	6			6	6			6	6		
2.06	5			5				5				5				5				5	
2.07		1				1				1				1				1			
2.08												2									
2.09			1								1				1				1		
2.10	1	1		1	1	1			1	1			1	1			1	1			1
2.11	5												5								
3																					
3.01											5				5				5		
3.02									1	1		1	1	1		1	1	1		1	
3.03									1	1		1	1	1		1	1	1		1	1
3.04										1				1				1			
3.05																					
4																					
4.01	5				5				5				5				5				5
4.02		10																			
4.03			1				1				1				1				1		
4.04		1				1				1				1				1			

Ref.	Year (Year 1 = 2022)			Status Feb 2024	No days	2022 - Year 1			2023 - Year 2			
	Month	Location	Timings			Q2	Q3	Q4	Q1	Q2	Q3	Q4
4.05	Plant salvaged trees in edge habitat.	Boundary of Havant Thicket	1 week during October/November in Year 1	Complete	5			5				
5	FENCING AND GATES (Note: fencing and gates maintenance will commence following installation, assumed to be Year 3 but TBC)											
5.01	Maintain fences in a good condition to prevent access by people and dogs and keep grazing animals in.	Whole Site	1 week annually as required from Year 3	Moved to Year 4	25							
5.02	Inspection to determine status of fences and gates and maintenance requirements.	Whole Site	1 day monthly from Year 3	Moved to Year 3	60							
6	DEAD HEDGING											
6.01	Dead hedges to be created by infilling site won brash between two rows of stakes 1-2 m apart. Live saplings and shrubs to be laid and integrated into the hedge to provide some live growth. Brash to be retained from felling operations.	NW boundary, Havant Thicket	3 weeks in October/November Year 1-4 as required	Year 1 and 2 complete	60			15				15
6.02	Maintain dead hedging in a good condition to prevent access by people and/or provide a functional wildlife corridor.	NW boundary, Havant Thicket	1 week annually or as required	Year 1 and 2 complete	35				5			
6.03	Inspection to be carried out once per year for decomposition or structural damage and repair/replace as necessary with site won brash.	NW boundary, Havant Thicket	1 day annually	Year 1 and 2 complete	7				1			
6.04	Live component of hedge to be trimmed and/or re-laid once regrowth reaches 4 m in height	NW boundary	After 8-10 years	Not started	15							
7	VETERANISATION OF TREES											
7.01	Survey for suitable locations for veteranised and ring-barked trees away from public areas or commercial forestry stands. Select suitable trees in consultation with FE.	Havant Thicket woodland	1 day in Year 1. Note: some trees have already been treated in 2021. Survey to establish additional requirements.	Year 1 and 2 complete	1	1						
7.02	Create artificial woodpecker holes, broken branches, artificial damage to trunks, and areas for rot to begin in some retained mature native or non-native trees.	Havant Thicket woodland	2 days every 3-5 years	Year 1 and 2 complete	4		2					
7.03	Ringbark retained mature non-native trees, e.g. Turkey oak or non-native conifer species (not Scots pine).	Havant Thicket woodland	1 day every 5 years	Year 1 and 2 complete	2		1					
7.04	Translocation of artificial roost features following the specifications in the bat licence.	Havant Thicket woodland	3 days in Year 1	Year 1 and 2 complete	3			3				
7.05	Inspection to be carried out once per year for target species use and public safety.	Havant Thicket woodland	1 day annually	Year 1 and 2 complete	6						1	
8	WETLAND/WET WOODLAND CREATION											
8.01	Clear-fell conifers within Corsican Pine Plantation. Retain Scots pine.	South of Havant Thicket w	3 weeks in Year 1	Complete	15			15				
8.02	Design and construction of wetland retaining structure.	Wetland area	Years 2-3	Ongoing								
8.03	Design and construction of wetland waterbodies and habitats.	Wetland area	Years 2-3	Ongoing								
8.04	Ongoing management of wetland habitats.	Wetland area	TBC - likely to be Year 4 onwards	Brought forward to Year 4								
9	SHORELINE HABITAT CREATION											
9.01	Design and construction of shoreline habitat.	NE shore of reservoir	Years 2-3	Ongoing								
9.02	Ongoing management of shoreline habitat.	NE shore of reservoir	TBC - likely to be Year 4 onwards	Brought forward to Year 4								
9.03	Develop mitigation for reservoir drawdown events.	NE shore of reservoir	Years 2-3 part of wetland design and construction	Ongoing								
9.04	Use of large branches salvaged from site clearance as partly submerged dead wood features.	NE shore of reservoir	During wetland construction Year 3	Brought forward to Year 3								
10	POND MAINTENANCE (GIPSIES PLAIN)											
10.01	Create new culvert connection to ponds from existing drain on eastern boundary	Gipsies Plain	1 week in Year 2	Complete	5				5			
10.02	Create reptile hibernacula.	Gipsies Plain	1 day in Year 3	Moved to Year 3	1							
10.03	Maintain/repair reptile hibernacula by topping up with site-won logs or stone.	Gipsies Plain	1 day every 5 years	Not started	1							
10.04	Remove excessive inundation vegetation (e.g. bullrush).	Gipsies Plain	1 day every 5 years	Not started	1							
10.05	Inspection to be carried out once per year.	Gipsies Plain	1 day annually	Year 1 and 2 complete	7	1				1		
11	NEW WATERCOURSE CREATION (GIPSIES PLAIN)											
11.01	Design and construction of new watercourse.	Gipsies Plain	TBC, assumed Year 3-4	Brought forward to Year 3								
12	RESERVOIR COMPENSATION FLOW CHANNEL											
12.01	Design and construction of compensation flow channel.	SW of Site	TBC, assumed Year 3-4	Brought forward to Year 3								
13	POND ENHANCEMENTS (HAVANT THICKET WOODLAND)											
13.01	Selective thinning of conifers around ponds in Reach 4. Select trees in consultation with FE.	Havant Thicket woodland	1 week in Year 2	Complete	5				5			
13.02	On-going selective thinning.	Havant Thicket woodland	3 days every 5-10 years	Not started	3							
13.03	Removal of excess leaf litter and sediment from ponds	Havant Thicket woodland	3 days in January Year 2	Complete	3				3			
13.04	Mechanical removal and spraying of parrot's feather.	Havant Thicket woodland	3 days annually during growing season Years 2-4	Year 1 and 2 complete	9					1	1	1
13.05	Design and construction of a sacrificial dog-dipping ponds.	Havant Thicket woodland	Design - 1 week in late autumn Year 3, construction - 3 days in winter Year 3/4	Moved to Year 3	8							
13.06	Install INNS awareness signs at ponds and public entry points.	Havant Thicket woodland	1 week in Year 3	Moved to Year 3	5							
13.07	Install dead hedging and/or fencing around pond complexes.	Havant Thicket woodland	2 weeks in Year 3	Moved to Year 3	10							
13.08	Survey to establish the status of habitats and target species, and the for the presence of INNS.	Havant Thicket woodland	1 day annually	Year 1 and 2 complete	7	1				1		
14	HEADWATER STREAM RESTORATION											
14.01	Design and construction of headwater stream ponds in Reaches 1, 2 and 3.	Havant Thicket woodland	Design - 2 weeks in autumn Year 2, construction - 2 weeks in spring Year 3	Moved to Year 3	20							10

	2024 - Year 3				2025 - Year 4				2026 - Year 5				2027 - Year 6				2028 - Year 7				2029 - Year 8
Ref.	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
4.05																					
5																					
5.01					5				5				5				5				5
5.02		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
6																					
6.01				15				15													
6.02	5				5				5				5				5				5
6.03	1				1				1				1				1				1
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13.02																3					
13.03																					
13.04		1	1	1		1	1	1													
13.05				5	3																
13.06		5																			
13.07			10																		
13.08		1				1				1				1				1			
14																					
14.01	10																				

Ref.	Year (Year 1 = 2022)	Location	Timings	Status Feb 2024	No days	2022 - Year 1			2023 - Year 2			
	Month					Q2	Q3	Q4	Q1	Q2	Q3	Q4
14.02	Install woody debris in streams.	Havant Thicket woodland	1 week in spring Year 3	Moved to Year 3	5							
14.03	Initial coppicing within stream corridors in Reaches 1, 2 and 3.	Havant Thicket woodland	3 weeks in early Year 3	Moved to Year 3	15							
14.04	Design and construction of new culvert under track in Reach 2.	Havant Thicket woodland	1 week in Year 1	Complete	5		5					
14.05	Ongoing rotational coppicing.	Havant Thicket woodland	1 week every 5 years	Not started	5							
14.06	Ongoing headwater stream pond/dam management.	Havant Thicket woodland	3 days every 5 years	Not started	3							
15	AQUATIC PLANT TRANSLOCATIONS											
15.01	Collect seeds and adult plants from Upper lake to spread at receptor ponds	Upper Lake to Havant Thicket Woodland	Summer/autumn Year 1	Complete	5		5					
15.02	Kew Millenium Seedbank to be used if translocated plants do not reappear after 2 years	Upper Lake to Havant Thicket Woodland	Details in Technical Note included with CEMP	Only to be used if required	0							
16	AQUATIC INVERTEBRATE TRANSLOCATIONS											
16.01	Collect notable invertebrates from streams on Site by hand netting. Transport to receptor streams.	Reservoir site to Southleigh Forest	Spring/early summer Year 1	Complete	1	1						
16.02	Mechanically remove sediments/gravel and translocate to receptor streams.	Reservoir site to Southleigh Forest	Spring/early summer Year 1	Complete	1	1						
17	INNS BIOSECURITY PLAN											
17.01	Initiate programme to eradicate INNS from Site where known to be present using combination of mechanical removal and herbicide.	Whole Site	3 days annually during growing season Years 2-4	Moved to Years 2-4	9					1	1	1
17.02	Routinely follow Defra & Plantlife UK ‘check-clean-dry’ campaigns.	Whole Site	At all times	Ongoing	0							
17.03	Prepare plan for tackling new outbreaks of INNS in reservoir or wetland to eradicate early.	Whole Site	3 weeks in Year 2/3	Ongoing	15							
17.04	Maintain signs at ponds and visitor centre to increase public awareness of INNS.	Whole Site	2 days annually and as required following installation	Not started	6							
17.05	Provide public awareness media on INNS as required.	Whole Site	2 weeks annually following reservoir and wetland construction	Not started	40							
17.06	Undertake routine inspections during growing season.	Whole Site	1 day monthly (reservoir and wetland following construction), 1 day annually (wider site)	Year 1 and 2 complete	5	1				1		
18	CONIFER CLEAR-FELL AND REPLANTING											
18.01	Mulch and scarify clear fell compartments following FE standard practice.	Havant Thicket woodland	4 days in Year 2	Year 1 and 2 complete	4			4				
18.02	Install deer fencing around clear fell compartments	Havant Thicket woodland	1 week in Year 2	Complete	5				5			
18.03	Plant native broadleaved woodland tree mix.	Havant Thicket woodland	1 week in Year 2 (spring)	Complete	5				5			
18.04	Selective thinning of birch and willow to benefit slower-growing broadleaved species.	Havant Thicket woodland	Every 10 years	Not in this period								
18.05	Control bracken, bramble, rhododendron and conifer re-growth as necessary.	Havant Thicket woodland	2 days twice annually in summer and winter	Year 1 and 2 complete	28		2	2			2	2
18.06	Grey squirrel control	Havant Thicket woodland	From Year 10 (earlier if necessary)	Not in this period								
18.07	Survey to establish the status of habitats and target species, and the for the presence of INNS.	Havant Thicket woodland	1 day annually	Year 1 and 2 complete	7		1			1		
19	BIRCH CLEARINGS AND REPLANTING											
19.01	Coppice birch and willow species in area of racks in Compartments 6503A, 6505A, 6505C and 6509B following outline Plan. Retain and clear halos around selected trees.	Havant Thicket woodland	Year 2 to Year 9	Year 1 and 2 complete	30							
19.02	Wood to be extracted, if there is a market, or incorporated into dead hedges and log piles.	Havant Thicket woodland	Year 3 to Year 10	Moved to start Year 3	12							
19.03	Plant native broadleaved woodland tree mix, leaving unplanted clearings.	Havant Thicket woodland	Year 3 to Year 10	Not started	12							
19.04	Control bracken, bramble and rhododendron as necessary.	Havant Thicket woodland	2 days twice annually in summer and winter	Year 1 and 2 complete	28		2	2			2	2
19.05	Install dead hedging at end of racks where close to paths.	Havant Thicket woodland	Year 3 to Year 10	Moved to Year 3								
19.06	Survey to establish the status of habitats and target species, and the for the presence of INNS.	Havant Thicket woodland	1 day annually	Year 1 and 2 complete	7		1			1		
20	RIDE MANAGEMENT											
20.01	Mow all Zone 1 ride verges either side of path/track. Arisings to be collected and removed or composed on site.	Havant Thicket woodland	2 days annually	Year 1 and 2 complete	12							2
20.02	Mow/cut Zone 2 blocks on rotation. Cuttings to be burnt or composted.	Havant Thicket woodland	3 days annually	Year 1 and 2 complete	18							3
20.03	Create Zone 3 scallops over 4 years. Retain selected trees. Incorporate wood into dead hedges.	Havant Thicket woodland	2 weeks annually, Years 2-5.	Year 2 complete	40				10			
20.04	Coppice scallops on rotation. Retain selected trees. Incorporate wood into dead hedges.	Havant Thicket woodland	2 weeks every 1-2 years from Year 6	Not started								
20.05	Narrower rides managed on a 2-zone system.	Havant Thicket woodland	3 days annually	Year 1 and 2 complete	18							3
20.06	Control bracken and rhododendron as necessary.	Havant Thicket woodland	2 days twice annually in summer and winter	Year 1 and 2 complete	24						2	2
20.07	Survey to establish the status of habitats and target species, and the for the presence of INNS.	Havant Thicket woodland	1 day annually	Year 1 and 2 complete	7		1			1		
21A	COPPICE MANAGEMENT (BELL'S COPSE)											
21.01	Coppice hazel and other underwood species in selected woodlands. Retain standard trees.	Bell's Copse Compartment	Every 2 years on 20 year cycle	Ongoing	15							

Ref.	2024 - Year 3				2025 - Year 4				2026 - Year 5				2027 - Year 6				2028 - Year 7				2029 - Year 8
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
14.02		5																			
14.03	15																				
14.04																					
14.05																					5
14.06																					3
15																					
15.01																					
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16.01																					
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17.01		1	1	1		1	1	1													
17.02																					
17.03	15																				
17.04										2				2				2			
17.05									10				10				10				10
17.06		1				1				1											
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18.01																					
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18.04																					
18.05			2	2			2	2			2	2			2	2			2	2	
18.06																					
18.07			1				1				1				1				1		
19																					
19.01	5			5				5				5				5					5
19.02	2				2				2				2				2				2
19.03	2				2				2				2				2				2
19.04			2	2			2	2			2	2			2	2			2	2	
19.05	2				2				2				2				2				2
19.06			1				1				1				1				1		
20																					
20.01				2				2				2				2				2	
20.02				3				3				3				3				3	
20.03	10				10				10												
20.04													10				10				10
20.05				3				3				3				3				3	
20.06			2	2			2	2			2	2			2	2			2	2	
20.07			1				1				1				1				1		
21A																					
21.01	5							5								5					

Ref.	Year (Year 1 = 2022)	Location	Timings	Status Feb 2024	No days	2022 - Year 1			2023 - Year 2			
	Month					Q2	Q3	Q4	Q1	Q2	Q3	Q4
21.02	Wood to be extracted for marketable use.	Bell's Copse Compartment	Every 2 years	Ongoing	6							
21.03	Thinning of standard timber trees.	Bell's Copse Compartment	Every 50 years	Not in this period	0							
21.04	Control of bracken and bramble as necessary.	Bell's Copse Compartment	Every 3 years	Not started	6							
21.05	Survey to work up detail of scale & timing of rotational coppicing.	Bell's Copse Compartment	Prior to first year of coppicing	Complete	1					1		
21.06	Survey to establish the status of habitats and target species, and the for the presence of INNS.	Bell's Copse Compartment	Annually	Year 1 and 2 complete	6						1	
21B	WOODLAND MANAGEMENT (OTHER WOODLANDS) (Note: management prescriptions to be determined following survey, management of Round Wood to start within first 5 years)											
21.01	Management in selected woodlands. Retain standard trees.	Round Wood, base of The	TBC likely to be from Year 10	Not in this period								
21.02	Wood to be extracted for marketable use.	Round Wood, base of The	TBC likely to be from Year 10	Not in this period								
21.03	Thinning of standard timber trees.	Round Wood, base of The	TBC likely to be from Year 10	Not in this period								
21.04	Control of bracken and bramble as necessary.	Round Wood, base of The	2 days every 3 years	Not started	6							
21.05	Survey to work up detail of scale & timing of management.	Round Wood, base of The	2 days prior to first year of management	Complete	2						2	
21.06	Survey to establish the status of habitats and target species, and the for the presence of INNS.	Round Wood, base of The	1 day annually	Year 1 and 2 complete	6						1	
22	FOREST GLADES											
22.01	Survey to identify central point of each glade.	Havant Thicket woodland	1 day in Year 1	Year 1 and 2 complete	1		1					
22.02	Clear all glades of young trees leaving selected shrubs.	Havant Thicket woodland	4 weeks in winter Year 1/2	Complete	20			20				
22.03	Clear one glade at each location every 2 years on rotation.	Havant Thicket woodland	1 week every 2 years from winter Year 3/4	Not started	15							
22.04	Strim central area of each glade to encourage short grassland habitat.	Havant Thicket woodland	2 days every 2 years	Year 1 and 2 complete	6					2		
22.05	Control bracken, bramble and rhododendron as necessary.	Havant Thicket woodland	1 day twice annually in summer and winter	Year 1 and 2 complete	14		1	1			1	1
22.06	Survey to establish the status of habitats and target species, and the for the presence of INNS.	Havant Thicket woodland	1 day annually	Year 1 and 2 complete	7		1			1		
23	SCRUB MOSAIC MANAGEMENT											
23.01	Mow up to 50% of grassland within the pylon wayleave leaving scrub blocks. Co-ordinate with SSE.	Bell's Copse Compartment	1 day twice annually	Moved to Year 3	10							
23.03	Cut one scrub block each year on rotation. Cuttings to be burnt or composted.	Bell's Copse Compartment	1 day annually	Moved to Year 3	5							
23.04	Control bracken as necessary.	Bell's Copse Compartment	1 day annually	Moved to Year 3	5							
23.05	Survey to establish the status of habitats and target species, and the for the presence of INNS.	Bell's Copse Compartment	1 day annually	Moved to Year 3	5							
24	GRASSLAND ENHANCEMENT											
24.01	Grazing with sheep, cattle and/or horses.	Embankment and retained grassland around the reservoir	To commence following establishment of created/restored grassland. TBC likely to be Year 8-10.	Not started								
24.02	In small areas, where grazing is not undertaken, cut to 100 mm height and remove arisings to be composted away from grassland.	Retained grassland around	3 days annually in September. To commence following establishment of created/restored grassland. TBC likely to be Year 8-10.	Not in this period	0							
24.03	Spot treat injurious weeds. Remove INNS.	Retained grassland around	3 days annually in February, June and October. To commence following establishment of created/restored grassland. TBC likely to be Year 8-10.	Not started	1							
24.04	Control scattered scrub.	Retained grassland around	2 days annually in January/February. To commence following establishment of created/restored grassland. TBC likely to be Year 8-10.	Not started	2							
24.05	Litter picking.	Retained grassland around	3 days annually or as required. To commence following establishment of created/restored grassland. TBC likely to be Year 8-10.	Not started	1							
24.06	Survey to establish the status of habitat and target species, and the for the presence of INNS.	Retained grassland around	1 day annually. To commence following establishment of created/restored grassland. TBC likely to be Year 8-10.	Not in this period	0							
25	RUSH PASTURE ENHANCEMENT											
25.01	Grazing with sheep, cattle and/or horses.	SW of Site	To commence following establishment of created/restored rush pasture. TBC likely to be Year 8-10.	Not started								
25.02	In small areas, where grazing is not undertaken, cut to 100 mm height and remove arisings to be composted away from rush pasture.	SW of Site	1 day annually in September. To commence following establishment of created/restored rush pasture. TBC likely to be Year 8-10.	Not in this period	0							
25.03	Spot treat injurious weeds. Remove INNS.	SW of Site	3 days annually in February, June and October. To commence following establishment of created/restored rush pasture. TBC likely to be Year 8-	Not started	1							
25.04	Control scattered scrub.	SW of Site	2 days annually in January/February. To commence following establishment of created/restored rush pasture. TBC likely to be Year 8-	Not started	2							
25.05	Litter picking.	SW of Site	3 days annually or as required. To commence following establishment of created/restored rush pasture. TBC likely to be Year 8-10.	Not started	1							
25.06	Survey to establish the status of habitat and target species, and the for the presence of INNS.	SW of Site	1 day annually. To commence following establishment of created/restored rush pasture. TBC likely to be Year 8-10.	Not in this period	0							
26	REPTILE AND AMPHIBIAN TRANSLOCATIONS											
26.01	Details of the reptile and amphibian translocations are provided in the CEMP	Reservoir site	Year 1 and 2	Ongoing as required during construction								
27	DEAD WOOD TRANSLOCATION											
27.01	Undertake survey to select suitable existing dead wood or timber from felled trees to be translocated.	Reservoir site	Year 1	Complete	1		1					
27.02	Consult with specialist entomologist on donor locations for dead wood.	Reservoir site	Year 3	Moved to Year 3	1							

Ref.	2024 - Year 3				2025 - Year 4				2026 - Year 5				2027 - Year 6				2028 - Year 7				2029 - Year 8
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
21.02	2							2								2					
21.03																					
21.04							3												3		
21.05																					
21.06			1				1				1				1				1		
21B																					
21.01																					
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21.04							3												3		
21.05																					
21.06			1				1				1				1				1		
22																					
22.01																					
22.02																					
22.03				5								5								5	
22.04					2								2								
22.05			1	1			1	1			1	1			1	1			1	1	
22.06			1				1				1				1				1		
23																					
23.01		1	1			1	1			1	1			1	1			1	1		
23.03				1				1				1				1				1	
23.04			1				1				1				1				1		
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27.01																					
27.02			1																		

Ref.	Year (Year 1 = 2022)	Location	Timings	Status Feb 2024	No days	2022 - Year 1			2023 - Year 2			
	Month					Q2	Q3	Q4	Q1	Q2	Q3	Q4
27.03	Selected timber to be stored on Site following felling until translocation is undertaken.	Reservoir site	Year 1 to 3	Ongoing	0							
27.04	Move to donor locations and secure or fix in place,.	Reservoir site	Year 2/3	Ongoing	30							15
27.05	Inspection to be carried out once per year to review condition and safety aspect of dead wood.	Reservoir site	Annually	Not started	5							
27.06	Undertake specialist invertebrate surveys to determine the presence of target species.	Reservoir site	Every 3 years	Not started	10							
28	VIEWING POINTS AND INFORMATION BOARDS											
28.01	Design and installation of viewing points and information boards.	Whole Site	TBC, assumed Year 4-5	Not started	0							
28.02	Selected timber to be stored on Site following felling for re-use to build viewing points and information boards.	Whole Site	Year 1	Complete	1			1				
28.03	Maintenance of information boards and surrounding vegetation.	Whole Site	1 week annually or as required following installation	Not started	10							
28.04	Maintenance of viewing points and surrounding vegetation.	Whole Site	1 week annually or as required following installation	Not started	10							
28.05	Inspection of viewing points and information boards to determine condition and functionality.	Whole Site	1 day annually following installation	Not started	2							
29	BIRD NESTING BOXES											
29.01	Bird boxes to be constructed and installed in suitable locations	Reservoir site	2 weeks in Year 3	Not started	10							
29.02	Inspection of nest boxes shall be undertaken annually or as required	Reservoir site	1 week annually	Not started	25							
29.03	Nest boxes shall be maintained in good condition. Repairs shall be carried out at least annually, or as required	Reservoir site	1 week annually	Not started	25							
30	REPORTING AND PLAN REVIEW											
30.01	Future Water to update PW on measures taken under the LEMP.	Whole Site	Regularly through the construction period	Ongoing	0							
30.02	Produce progress report of actions taken for the LEMP with input from the Future Water, FE and HCC.	Whole Site	Annually in November	Ongoing	12							2
30.03	Produce report of mitigation and compensation undertaken that are commitments under the EPSM licences and bat HMMP.	Whole Site	Annually	Year 1 and 2 complete	14			2				2
30.04	Review of mitigation and compensation works under the LEMP.	Whole Site	Annually	Ongoing	18							3
30.05	Strategic review	Whole Site	Every 5 years	Not started	2							

Ref.	2024 - Year 3				2025 - Year 4				2026 - Year 5				2027 - Year 6				2028 - Year 7				2029 - Year 8
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
27.03																					
27.04	15																				
27.05		1				1				1				1				1			
27.06		1	1			1	1			1	1			1	1			1	1		
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30.02				2				2				2				2				2	
30.03				2				2				2				2				2	
30.04				3				3				3				3				3	
30.05																	2				

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