M25 junction 10/A3 Wisley interchange TR010030
6.5 Environmental Statement: Appendix 7.19 SPA Management and monitoring plan

Regulation 5(2)(a)
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M25 junction 10/A3 Wisley interchange

The M25 junction 10/A3 Wisley interchange Development Consent Order 202[x]

6.5 ENVIRONMENTAL STATEMENT:

APPENDIX 7.19 SPA MANAGEMENT AND MONITORING PLAN

Regulation Number:	Regulation 5(2)(A)
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Rev 2	11 February 2020	Request for change
Rev 1	November 2019	Section 51 Update
Rev 0	June 2019	Development Consent Order application

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SPA Management and Monitoring Plan

7.1 Introduction

7.1.1 Scope of document

7.1.1.1 Atkins Limited (Atkins) has been commissioned by Highways England (HE) to prepare a draft management and monitoring plan for the Thames Basin Heaths Special Protection Area (SPA) compensation and enhancement areas for the proposed M25 junction 10/A3 Wisley interchange scheme (the Scheme). The Scheme consists of two Nationally Significant Infrastructure Projects (NSIPs). This means that a Development Consent Order (DCO) application will be made to the Secretary of State under Section 37 of the Planning Act 2008 to seek authorisation to build the Scheme.

7.1.1.2 The aim of this document is to provide an agreed basis for collaborative working with Surrey County Council (SCC) and RHS Wisley who own the land included within the compensation and enhancement areas, and Surrey Wildlife Trust (SWT) who manage the land on the behalf of SCC.

7.1.1.3 This is a working document and the current draft version provides a snapshot of the work that has been undertaken to date. It does not constitute the final version for implementation at this stage of drafting. It will continue to be updated and added to as ongoing discussions are held with Natural England, SCC, SWT and other relevant stakeholders.

7.1.1.4 The project team are currently considering including within this draft management plan, information on the habitat creation/enhancement works required in the replacement common land parcels also, which are currently contained with the draft Landscape and Ecology Management Plan (LEMP) in Appendix 7.20 of the Environmental Statement (application reference TR010030/APP/6.3).

7.1.1.5 The aims of this draft management plan are to establish (and document) the following key agreements:

- The works which will be carried out to achieve habitat creation and/or enhancement for the SPA/SSSI.
- The duration of management and monitoring required for each habitat parcel.
- Who will carry out the works, who will fund the works and who will monitor progress.
- What are the achievable measures of success that will be used to evaluate whether the management has been/ has not been successful.
- How contingencies and/or remedial action will be identified, agreed and implemented (where required) with feedback to ensure that any remedial action is effective.

7.1.1.6 The document forms Appendix 7.19 of the Environmental Statement (application reference TR010030/APP/6.3).

7.1.1.7 A Construction Environmental Management Plan (CEMP) will be produced to mitigate any impacts during the construction phase of the Scheme. This will broadly follow the Outline Construction Environmental Plan (OCEMP) in 7.2 of the Environmental Statement (application reference TR10030/APP/6.3).

7.1.1.8 Detailed landscape and ecology designs, schedules and specifications will be produced for all works during the detailed design stage.

7.1.1.9 The Scheme covers works around the M25 junction 10/A3 Wisley interchange and its extents, including the SPA compensation land and SPA enhancement areas as illustrated on the Scheme layout plans (TR010030/APP/2.8).

7.1.2 Structure of Document

7.1.2.1 This document is structured as follows:

- Overview of how the management plan will be implemented, including roles and responsibilities of individual parties.
- Draft objectives for each land parcel (separated into habitat creation type and/or activity, temporary land take areas and permanent structures).
- Outline prescriptions for habitat creation and/or management actions including draft timetables for habitat management and monitoring.
- Timetable summary.
- Species monitoring approach.

7.1.2.2 All details are subject to further work and stakeholder engagement. The final SPA Management and Monitoring Plan will be implemented in conjunction with the final version of the LEMP and with additional measures covered by protected species licences and the CEMP.

7.2 Implementation of the SPA Management Plan

7.2.1 Roles and responsibilities

Highways England

7.2.1.1 Highways England have committed to fund the works described within this draft management plan for the durations outlined in Table 1 (durations are dependent on habitat type and/or management activities).

7.2.1.2 Highways England will continue to be responsible for carrying out routine maintenance of any highways assets such as road verges and drainage systems. These have not been included within this draft management plan.

Principal Contractor

7.2.1.3 The appointed principal contractor will be responsible for carrying out all works detailed in the Development Consent Order (DCO), they will have the overall control of delivering the Scheme.

7.2.1.4 The principal contractor will be responsible for reinstating existing habitat in any temporary land take areas and constructing any new structures (e.g. attenuation ponds etc). Refer to the Scheme layout plans (TR010030/APP/2.8) for an overview of the areas/structures.

7.2.1.5 The principal contractor will appoint a landscape contractor. It is imperative that the Landscape Contractor undertaking the management and maintenance works holds a BASIS amenity horticultural products certificate – to ensure that they can provide appropriate advice on the selection and application of herbicides. The Landscape Contractor is to be competent at identifying plant species, including those proposed as part of seeded and planted mixes, as well as any undesirable species, and experienced in the various habitat creation and enhancement works required on this Scheme. Specialist work (such as reed bed translocation) may be carried out by specialist sub-contractors appointed by the principal contractor where particular specific skills, equipment and/or experience are required.

Surrey County Council (SCC)/Surrey Wildlife Trust (SWT)

7.2.1.6 SWT manage Ockham and Wisley Commons on the behalf on SCC. This arrangement was put in place in 2002 and it is a 50-year agreement (i.e. it will be due for renewal around 2052). Highways England are not aware of any reason why this arrangement would change significantly during this time period.

7.2.1.7 There is a possibility that some, or all, of the works involved in the delivery of the suite of compensatory measures will be undertaken by SWT using their approved subcontractors.

RHS Wisley

7.2.1.8 RHS Wisley own an area of compensation land referred to as 'C2 Wisley Compensation Land' south of the M25. This field is currently managed by SWT and it is not envisaged that RHS Wisley will have any responsibility for carrying out the works required in C2 to create or manage wood pasture.

Monitoring Party

7.2.1.9 Monitoring the measures of success are critical. Highways England will appoint a monitoring party to work collaboratively with the steering group and monitor the outcomes of the works carried out at set intervals during the agreed management/monitoring period. The monitoring party will include suitably qualified and experienced ecologists and landscape architects.

7.2.1.10 It is envisaged that an annual monitoring report will be prepared highlighting major works carried out and/or achievements met.

Steering Group

7.2.1.11 A steering group will be set up to help inform decision making throughout the duration of this management plan. It will include a representative from Highways England, Natural England, SCC/SWT, Royal Society for the Protection of Birds (RSPB), Forestry Commission and Highways England's Principal Contractor and Detailed Design ecological consultant.

7.2.1.12 The remit of this steering group will be to discuss when major changes to the management plan (and/or its prescribed management activities) are required, or when successful achievements of targets have been met.

7.2.1.13 Terms of reference for the steering group will be set during the development of this draft management plan and will include details such as the frequency of meetings, how meetings will be administered and how any conflicts will be resolved.

7.2.2 Habitat Management/Monitoring Duration

7.2.2.1 The duration of management/monitoring for each habitat type created or enhanced is provided in Table 7.2.1.

Table 7.2.1: Duration of habitat management/monitoring of habitats created/restored/enhanced

Habitat type	Duration of management / monitoring
Wood pasture (created)	20 years
Heathland (restored)	15 years

Habitat type	Duration of management / monitoring
Woodland enhancements	15 years
Bolder Mere enhancements	15 years
Reinstatement of temporary land take areas	5 years
Permanent structures: green bridge.	10 years
Marginal/emergent planting areas	5 years

7.2.2.2 Monitoring will be carried out to determine:

- Whether measures have been implemented as agreed.
- The success/effectiveness of the measures.
- How to remedy the situation if any signs of failure to achieve the measures are seen.
- If further consultation/approvals/actions are required because proposed measures are not proving effective.

7.2.3 Delivery Mechanisms

7.2.3.1 The mechanisms used to deliver the works described in this draft management plan are complex and different mechanisms will apply in different areas and to different stages of the work. This section outlines those mechanisms in order to give confidence to The Planning Inspectorate that the works can be delivered and managed in the long-term.

Draft DCO requirements

7.2.3.2 At the time of drafting this document[1] there is a requirement (draft DCO requirement 8) contained within the draft DCO which requires all details of the compensatory habitat creation and enhancement measures to be undertaken in respect of the SPA to be submitted to and approved in writing by the Secretary of State, following consultation with SCC and Natural England. There is a separate requirement (draft DCO requirement 10) which requires the same information to be provided for Bolder Mere Mitigation and Enhancement Area, following consultation with the Environment Agency, Natural England and SCC. Draft DCO requirement 16 requires the same information for the restoration and/or landscaping of land used temporarily for construction.

7.2.3.3 This document sets out part of the information which will be required to discharge these requirements and it will form the basis for consultation with SCC/Natural England/Environment Agency. It is envisaged that this document will be supported by detailed landscaping and ecology designs, schedules and specifications prior to submittal to the Secretary of State for approval.

[1] The final version of the relevant DCO requirements will be included in the final management plan.

7.2.3.4 The requirements above will ensure that the commitments made within this document are delivered by the Scheme and the principal contractor.

Adoption of SPA Compensation Land

7.2.3.5 The SPA compensation land parcels (C1 and C2) will become defacto SPA once the Scheme is approved by the Secretary of State. The SPA compensation land will then be adopted by Natural England as part of the Thames Basin Heaths SPA site, and the Multi Agency Geographic Information for the Countryside (MAGIC) SPA boundaries will be updated to include the SPA compensation land (C1 and C2).

Countryside Stewardship Scheme

7.2.3.6 SWT have entered the government-led Countryside Stewardship (CS) scheme, which is an initiative that provides financial incentives for farmers and land managers to conserve and restore wildlife habitats (as well as several other aims)[2]. Their scheme started on the 1 January 2018 and runs until the 31 December 2027. An overview of the areas covered is provided in Appendix A. This includes areas of existing heathland (LH1) in Ockham and Wisley Common SPA and SSSI. There are also three separate grassland areas (GS13) which are covered under the agreement. These do not currently fall within the SPA/SSSI boundary but one of them (C1 Old Lane Compensation Land) will be adopted as part of the SPA once planning for the current Scheme is approved (see Section 7.3 for further details).

7.2.3.7 There are no woodland areas covered by the stewardship agreement.

7.2.3.8 The works described in this draft management plan (specifically in Section 7.4 Restoration of heathland) should complement the work SWT are undertaking as part of their existing CS agreement. The additional areas of heathland created as a result of the Scheme may be added into the next round of the CS scheme (or its equivalent) in future if the programme allows.

[2] https://www.gov.uk/government/collections/countryside-stewardship-get-paid-for-environmental-land-management - accessed 25/04/19

7.3 Wood pasture creation

7.3.1 Overarching aims and objectives

7.3.1.1 To convert two areas of species poor semi-improved grassland into low-maintenance wood pasture. The objective is to add biodiversity value and increase the abundance of invertebrates, whilst retaining an accessible grazed understory, thus providing an improved foraging resource for nightjars (and possibly woodlarks).

7.3.1.2 The aim is to create this valuable habitat and manage it through grazing to promote increased plant species diversity within the grassland understory.

7.3.2 Description of land parcels (where habitat creation is proposed)

C2 Wisley Compensation Land

7.3.2.1 This area is a 6.1 ha grazed grassland field, surrounded by woodland edge and directly adjacent to an area of open heathland habitat within the SPA (and will be directly linked as part of the enhancement area measures)[3].

C1 Old Lane Compensation Land

7.3.2.2 This location consists of a grazed grassland field, 2.0 ha in size, surrounded by woodland edge which is directly adjacent to an area of open heathland habitat within the SPA.

7.3.2.3 This field is currently included within SWT's CS scheme (see Appendix A for a copy) and has been for approximately 10 years. Information will need to be provided to Natural England (via SWT) on the work which will be carried out in this field, and the timescales for which funding will be available for this work to avoid any risk of dual funding.

7.3.3 Background

7.3.3.1 It was agreed during early consultation with Natural England, Forestry Commission, RSPB and SWT[4] that the maximum canopy coverage (not including the existing field boundaries) for C1 and C2 would be 20% (based on the coverage of the canopy once the trees have reached maturity). This is to create a woodland with spaced out trees which are allowed the space and conditions to grow to large open-canopied trees.

[3] HRA Assessment of alternatives, Consideration of IROPI and Compensatory measures – Atkins 2019.
[4] During a meeting and site visit on 30 January 2019.

7.3.3.2 The specific methodology for wood pasture creation will be developed during detailed design. However, the principle will be to plant small groupings of 5-7 feathered trees[5], which will be subject to the typical maintenance (e.g. weeding/watering/replacing failures) period of 5 years. Eventually (after approximately 10 years, unless extensive failures occurred) the best specimens will be selected and the remaining trees will be removed. Robust fencing will be used to protect the new planting from grazing, which will be encouraged within the surrounding grassland.

7.3.3.3 The Wisley Common and Ockham and Chatley Heath Woodland Management Plan[6] states that the dominant woodland species are oak and birch, with less common species including sweet chestnut, sycamore and turkey oak. There is also localised wet woodland which occurs where the water table is high, supporting willow and alder carr. The dominant conifer species is Scots pine, with a few small areas of minor species such as Western Hemlock and Lodgepole pine.

7.3.3.4 One of SCC and SWTs aspirations for the commons 'is to gradually reduce the conifer component in their woodlands to allow the further development of native woodland (W10 & W16) and heathland habitats'[6]. Proposed wood pasture planting will follow species compositions listed for NVC woodland types W10 and W16. See typical species list below:

Table 7.3.1: Wood pasture species (to be decided during detailed design)

NVC group/Species
W10 – lowland mixed broadleaved woodland with bluebell:
Major species – silver birch, common oak, common hawthorn, hazel
Minor species – crab apple, holly, rowan, elder, common gorse, guelder rose
Locally occurring – [additional relevant native species to be added if desired by SCC / SWT]
W16 – lowland oak-birch woodland with bilberry
Major species – silver birch, common oak
Minor species – holly, rowan, common gorse
Locally occurring – [additional relevant native species to be added if desired by SCC / SWT]

7.3.3.5 The increased plant species diversity within the grassland understory will be achieved through grazing, using SWTs existing grazing herd. It is not envisaged that any supplementary seeding or further management interventions for the grassland areas themselves (i.e. mowing/weeding) will be required.

[5] All planting would need to be locally sourced and native to the UK.
[6] Woodland Management Plan: Wisley Common and Ockham and Chatley Heath. Forestry Commission.

7.3.3.6 Introducing additional dead wood habitat[8] is proposed which should diversify the habitats available for invertebrates within these fields and make use of felled trees from the works area (including, potentially, individually translocated veteran trees). In addition, both C1 and C2 are partially surrounded by existing tree belts and any naturally occurring dead wood habitats will be encouraged in these areas. In the long term the new tree stock planted will be allowed to develop dead wood features, where appropriate.

7.3.4 Objectives

7.3.4.1 The following objectives (final version to be agreed between Highways England, Natural England and SCC/SWT) are for both land parcels C1 and C2:

- Objective 1: Establish and maintain standard trees.
- Objective 2: Establish and maintain species-rich grasslands (surrounding trees).
- Objective 3: Introduce dead wood habitats and encourage dead wood habitats to develop.

7.3.5 Prescriptions (outline only)

7.3.5.1 The exact details of work activities will be developed between all parties during the development of the management plan and subsequent work-specific method statements.

Table 7.3.2: Approach to wood pasture creation

Task	Timing	Restrictions/key specifications
Design a final planting plan and specifications in consultation with the steering group.	During detailed design.	
Source tree stock from certified providers.	As soon as the final planting plan is agreed.	
Mark out tree blocks on the ground based on the typical crown spread of species selected (to ensure tree blocks are spaced wide enough to create an open crown).	Autumn 2020	
Prepare the ground for tree planting.	Winter 2020	
Plant small groupings of 5-7 feathered trees in each tree block, and install protection from damage from livestock (e.g. stock fencing around the tree block) and wild animals (rabbit/deer guards).	Winter 2020 (from November) to Spring 2021 (up to late March)	Do not plant trees in regular blocks/rows. Do not plant in frosty weather. Plant during the ideal time for that species (considering soil conditions).

Task	Timing	Restrictions/key specifications
Translocate an agreed amount of dead wood from works area (either standing or fallen).	Winter 2020	There will be mature oaks felled close to C2 for the Clearmount bridge access which can be used. C1 could be supplemented with dead wood from other works areas. Felled tree stems should be retained in large sections (to allow dead wood to form slowly without excess desiccation) these could be introduced as either standing or fallen stems.
Grazing to commence on 'Day 1'	June to November 2020 and each year thereafter	Grazing shouldn't commence (after planting) until the stock fencing surrounding the new planting is complete.

7.3.6 Management and Monitoring

Programme of Works

7.3.6.1 Table 7.3.3 and 7.3.4 below details the programme of works for habitat establishment and initial maintenance (first five years), and then for long term management (20 years in total). Both sites are combined as measures will be identical in both wood pasture creation areas (C1 and C2).

Table 7.3.3: Programme of works for years 0 – 5

Years 0 - 5							
Task	**Responsibility**	**Season**	**1**	**2**	**3**	**4**	**5**
Attendance of quarterly site inspections with the Project Landscape Architect	Landscape contractor (LC) appointed by Principal Contractor (PC)	Quarterly.	Y	Y	Y	Y	Y
Provide artificial irrigation through the use of a Bowser via a combination of surface watering and irrigation tubes sufficient to maintain healthy growth, during the establishment period (year 1) and growing season (April-September) as required.	LC appointed by PC	As required.	Y	Y	Y	Y	Y

Years 0 - 5							
Any dead or damaged trees should be replaced annually with matching species of the same size during the next planting season after failure. Replacement planting only to be undertaken once cause of death has established.	LC appointed by PC	Once yearly (during November - February).	Y	Y	Y	Y	Y
All tree / timber stakes / guards should be checked and adjusted, repaired or replaced as necessary. These should be removed when instructed by the Monitoring Party.	LC appointed by PC	Once yearly (in winter).	Y	Y	Y	Y	Y
Soil around the roots of tree species is to be re-firmed as necessary, to ensure that plants are supported and upright, especially following periods of extreme winds.	LC appointed by PC	As required.	Y	Y	Y	Y	Y
All litter / foreign debris should be removed from planted areas and taken off site. All fallen leaves and branches etc. are to remain in-situ unless removal is otherwise instructed.	LC appointed by PC	As required.	Y	Y	Y	Y	Y
Weed control (non-residual herbicide to planting stations) – 1000mm diameter around each planted shelter / tree.	LC appointed by PC	Three times (Spring, Summer and Winter).	Y	Y	Y	Y	Y
Grazing surrounding grassland	SWT	June to November (based on SWTs grazing strategy)	Y	Y	Y	Y	Y

Table 7.3.4: Programme of works for years 6 – 20

Action			Years 6 – 20													
Task	Responsibility	Season	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Grazing surrounding grassland	SWT	June to November	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Action			Years 6 – 20														
Task	Responsibility	Season	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Selected removal of planted trees to retain the best specimens.	TBA – Possibly SWT	Year 10					Y										
Any remaining tree guards monitored /replaced/ loosened/ removed	TBC – Possibly SWT	Once yearly (in winter)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Removal of fencing	TBC – Possibly SWT	Year 15										Y					

Measures of Success

7.3.6.2 Monitoring targets have been devised to measure the success of the objectives described above.

Table 7.3.5: Monitoring targets/measures of success

Objective	Targets Years 0-5	Targets Years 5-10	Targets Years 10 - 20
Objective 1: Establish and maintain standard trees.	All failures removed and replanted. 95% success rate of new planting by Year 5.	Limited failures and at least 20% of 'best specimens' to select for retention at Year 10.	Retained 'best specimens' developing open canopies
Objective 2: Establish and maintain species-rich grasslands (surrounding trees) [7].	Semi-improved neutral grassland with an average of 12 target species. Non-target species coverage <20%	Semi-improved neutral grassland with an average of 15 target species. Non-target species coverage <10%	Semi-improved neutral grassland with an average of >15 target species. Non-target species coverage <5%
Objective 3: Introduce/encourage dead wood habitats[8] to develop	2/3 dead wood features per hectare (either on the ground or on trees)	4/5 dead wood features per hectare (either on the ground or on trees)	5-10 dead wood features per hectare (either on the ground or on trees)

[7] Targets taken from…Natural England. (2010) Higher Level Stewardship: Farm Environment Plan (FEP) Manual, 3rd Edition.
[8] 'dead wood habitats' could include fallen branches, fallen and standing trunks, dead branches in the crowns of trees, rotten heartwood in standard trees and fallen twigs and fine branches – taken from Kirby, P. (2001) Habitat Management for Invertebrates. Joint Nature Conservation Committee, Natural Power and Royal Society for the Protection of Birds.

Monitoring frequency and methods

7.3.6.3 The aim of the suggested monitoring programme is to ascertain whether the measures of success listed above have been achieved.

7.3.6.4 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group.

7.3.6.5 Frequency of initial monitoring visits will be determined by the success of establishment of planting and the frequency of monitoring outlined in Table 7.3.6 will be adjusted accordingly to ensure relevant follow up operations are undertaken.

Table 7.3.6: Frequency of Monitoring

Action			Years 0 – 5			
Task	Responsibility	Season	1	2	3	5
Periodic checks of new planting/fencing etc	HE's appointed monitoring party (MP)	July	Y	Y	Y	Y

7.3.6.6 The aim of the detailed botanical monitoring is to detect major changes which can be done by surveying at five yearly intervals.

7.3.6.7 The suggested method is NVC surveys with fixed quadrats supplemented with fixed point photography supported with aerial photography.

Table 7.3.7: Frequency of Detailed Botanical Monitoring

Action			Years 5 – 20			
Task	Responsibility	Season	5	10	15	20
Pre-construction NVC monitoring – setting up fixed quadrats and collecting baseline data to compare subsequent surveys to.	HE's appointed monitoring party (MP)	Spring & Summer	Y			
Post-planting/grazing NVC fixed quadrat surveys.	HE's appointed monitoring party (MP)	Spring & Summer	Y	Y	Y	Y

Action			Years 5 – 20			
Fixed point photography supported with aerial photography.	HE's appointed monitoring party (MP)	Summer	Y	Y	Y	Y

7.4 Restoration of heathland

7.4.1 Overarching aims and objectives

7.4.1.1 Restoring heathland areas, connecting a large network of existing heathland to new heathland areas (via Cockcrow green bridge[9]), expanding available habitat for heathland specialists and increasing valuable resources available to those species.

7.4.2 Description of land parcels (where habitat creation is proposed)

7.4.2.1 The following land parcels (referred to as 'SPA enhancement areas') will be converted from existing mixed woodland to heathland:

- E1 Cockcrow Hill
- E2 Ockham Common/Sand Hill
- E3 Ockham Common/Old Lane
- E5 Wisley Common
- E6 Hut Hill South

E1 Cockrow Hill

7.4.2.2 This area is a Scots pine dominated mixed woodland covering 1.9 ha. This area is to the southwest of the main Scheme, starting approximately 100m west of the A3 and is northeast of hut hill. There is open heathland adjacent to this site and clearance works here will allow a continuation of this habitat type.

E2 Ockham Common/Sand Hill

7.4.2.3 This is approximately 17.3 ha in size running north-east from the main Ockham Common car park and reaching close to the junction. It is predominantly mixed woodland dominated by Scots pine. In this area, 9.4 ha of trees are to be cleared to allow for heathland creation (7.9 ha of the woodland will be retained and enhanced and this is described in Section 7.5).

[9] The Scheme includes a 'green bridge' extension to Cockcrow bridge. A separate designated funds application is being made by the project team to secure additional funding from Highways England for the provision of a Green Bridge, as a replacement for the demolition of the existing Footpath 17 Cockcrow overbridge. The green bridge is intended to provide an additional enhancement measure to address historic issues relating to the severance of ecological habitats by the existing A3, including habitats that form part of the Ockham and Wisley Commons Site of Special Scientific Interest.
Highways England is confident that there is a reasonable prospect of the designated funds application being approved and has therefore sought authorisation for these works within the scope of the DCO application. However, the inclusion of the green bridge feature within the DCO does not materially affect the overall extent of order land required for the Scheme or the level of funding that may be needed to compensate any affected land interests. In the unlikely event that designated funds are not forthcoming, this enhancement measure can be omitted from the scheme because it is not essential for the purposes of mitigating the scheme's environmental effects. Its omission would not have any material consequences for land acquisition matters and therefore any concerns about the certainty of funding for this element of the work need not indicate against the granting of development consent.

E3 Ockham Common/Old Lane

7.4.2.4 This area is adjacent to the Ockham car park and reaches out across 4.8ha of land northeast. This is again Scots pine dominated mixed woodland. This woodland is bound on three sides by open heathland and the car park to the south. In this area 3.8ha of trees are to be cleared for heathland creation (1ha of the woodland will be retained and enhanced and this is described in Section 7.5).

E5 Wisley Common Enhancement Area

7.4.2.5 This area is southwest of hut hill and covers 4.5ha of Scots pine dominated mixed woodland. It is approximately 50m west of the A3, south of the main Scheme area. Areas of thinning have already occurred in this location; the remaining trees will be cleared to allow for heathland creation.

E6 Hut Hill South

7.4.2.6 This is a 1.2 ha area of mixed woodland dominated by silver birch. This is located west of the A3 and to the west of hut hill. All trees will be cleared in this area to allow for heathland creation.

7.4.3 Background

7.4.3.1 In order to restore heathland in the enhancement areas listed above, tree felling will be carried out to encourage heathland to return and the heathland will then be allowed to regenerate. This is a widely recognised method of heathland re-creation in areas where woodland (typically coniferous woodland) has been planted on historical heathland. The seed bank typically survives in the soil and as long as needle litter (from coniferous trees) and brash are removed it is considered to be a relatively straight forward process. A case study from Dorset which involved returning 8ha of mixed secondary woodland and rhododendron to dry lowland heath found that heathland vegetation had strongly colonised eight years after tree felling (and removal of the accumulated humus layer)[4] however, it did comment that heather was ‘still at the building phase’ ten years on (with active management of regrowth/regeneration of undesirable species).

7.4.3.2 Trees will be felled using a forestry ‘harvester’ – this cuts the trees at the base, and then places sections of the tree on the ground in defined areas. It ‘grips’ the tree during felling/sectioning which reduces the impact on the woodland floor from dragging/felling. A timber ‘forwarder’ then collects the cut material using a crane rather than dragging the timber along the forest floor.

7.4.3.3 Timber extraction is typically carried out in ‘strips’ and the timber harvester and forwarder generally use the same haul routes (both are typically tracked vehicles) and leave the woodland floor relatively undisturbed.

7.4.3.4 It is important to remove all cut material to avoid the soil becoming nutrient enriched (which can impact on heathland regeneration) so all the tree material will be taken off site and the tree stumps will be taken down as low as possible, unless they have a significant dead-wood value. Tree stump grinding is likely to be carried out using a mechanical stump grinder which will also use rubber tracks to minimize ground pressure. Grinding the stumps will allow for better access for long-term management, particularly as it will allow birch re-growth to be mechanically cut.

7.4.3.5 The area which has been cleared will then need to be 'scraped' to remove the top 15-20cm layer which will contain the needle 'leaf litter' and the 'humus layer' to expose the mineral soil layer.

7.4.3.6 There are two potential methods which may be used to expose the soil, one method is to clear the litter by 'vacuuming' which uses a road brush to loosen the litter down to the mineral layer before vacuuming it up using a tractor-mounted 'Terravac' vacuum system. This sucks up the loosened material and blows it directly onto a trailer to be taken off site. This method isn't suitable for steep areas and the equipment can be damaged by tree stumps so this will be considered.

7.4.3.7 The other method is to clear the litter using mechanical scraping with a long-reach arm excavator which puts the material directly onto a dumper truck to be taken off site.

7.4.3.8 The depth of 'scraping' necessary to facilitate successful heather regrowth in the enhancement areas will vary depending on local conditions. SWT carried out a programme of clear-felling in 2016 and they found that the level of litter/humus around the site was very variable (pers comm. James Adler, SWT). They did not do any specific measurements however they aimed for the 'grey speckled interface between the sand and the humic layer as the best way to reduce the nutrient load whilst allowing the heather seed to germinate'.

7.4.3.9 A long term study carried out by Allison and Ausden[10] found that removal of the litter layer, or both the litter and humic layers resulted in a higher initial establishment of *Calluna vulgaris* (common heather) compared to control plots. The study also found that the benefits of removing the litter and humic layers (rather than just the litter layer) was a long-term reduction in the depth of the humic layer and lower levels of nitrate and total nitrogen compared to in the control plots. The lower levels of total nitrogen achieved are particularly relevant for the current Scheme as the pollution loads for nutrient nitrogen are being exceeded within the Ockham and Wisley Commons currently.

[10] Allison, M. & Ausden, M (2006) Effects of removing the litter and humic layers on heathland establishment following plantation removal. Biological Conservation 127: 177-182.

7.4.3.10 The paper concludes that 'the optimal method for establishing heathland vegetation at a site will depend on: (1) whether there is a viable seedbank of *C. vulgaris* and other desirable heathland species present; (2) the importance of quickly establishing a high cover of desirable heathland species; (3) the likely long-term effects of soil nitrogen levels on the maintenance of *C. vulgaris* dominance; (4) the practicality of removing and disposing of the litter and humus layers.' For the current Scheme it is important to achieve quick establishment of heathland species and to maintain these communities in the long term. Therefore, the aim will be to remove both litter and humic layers across the enhancement areas where practicable.

7.4.3.11 SWT have also confirmed that, if required, a heather cut on the existing heath areas can be carried out and the arisings (sometimes referred to as 'heather clippings') can be spread on parts of the enhancement areas where heather is slow to germinate.

7.4.3.12 There is also recognised lack of naturally occurring gorse plants in Ockham Common (compared to Wisley Common) and SWT have historically transplanted gorse bushes from Wisley Common to Ockham Common (pers comm. James Adler, SWT) with the aim to encourage the growth of this species on Ockham Common (which is especially important for Dartford warblers). SWT have also confirmed that, if required, gorse plants/seeds from Wisley Common can be provided to supplement any low growth rate of gorse in the Ockham Common enhancement areas.

7.4.4 Objectives

7.4.4.1 The following objectives (final version to be agreed between HE, NE and SCC / SWT) are for land parcels E1, E2, E3, E5 and E6:

- Objective 1: Establishment of heathland[11] in previously forested areas across 22.6 ha.
- Objective 2: Encourage mature (5 to 8 years growth) gorse coverage in the established heathland areas (for Dartford warbler).

7.4.5 Prescriptions (outline only)

7.4.5.1 The exact details of work activities will be developed between all parties during the development of the management plan and subsequent work-specific method statements.

[11] Although the dominant plant species of lowland heathland is heather, gorse and cross-leaved heath (in wetter areas), the term heathland often refers to a mosaic of habitats including scattered trees and scrub and areas of bare ground.

Table 7.4.1: Approach to heathland restoration

Task	Timing
Survey woodlands in E1, E2, E3, E5, E6 and identify trees with bat roost potential (BRP), veteran features, or significant value for saprophytic invertebrates[12] (e.g. standing dead wood) and mark trees for retention. E2 only: Mark out area of retained trees at Sand Hill where only tree thinning will occur. E2 and E3 only: Mark out extent of 'wavy edge' between clear-fell areas and woodland enhancement areas.	Prior to tree felling
Fell trees using a forestry harvester, collect all cut material with a timber forwarder and remove.	Winter 2020-2022 (phased approach, see section 7.10 for indicative timetable)
Grind 80% of tree stumps, leaving those which have potential value for saprophytic invertebrates (e.g. a large diameter and/or existing rot).	Winter 2020-2022 (phased approach, see section 7.10 for indicative timetable)
Treat rhododendron, sycamore[13] or birch stumps with herbicide to discourage re-growth (other forms of control may be considered if they are proven to be effective and the steering group approve of their use).	Apply to new growth, ideally 2-3 months after felling.
'Scrape' the top 15-20cm layer which will contain the needle 'leaf litter' and the 'humus layer' to expose the mineral soil layer.	Winter 2020-2022 (phased approach, see section 7.10 for indicative timetable)
Install fire breaks as necessary.	Summer 2020-2022

7.4.6 Management and Monitoring

Programme of Works

7.4.6.1 Tables 7.4.2 and 7.4.3 below details the programme of works for habitat establishment and initial maintenance, and then for long term management (15 years in total) of heathland at E1, E2, E3, E5 and E6.

[12] Saproxylic invertebrates are those invertebrates that are dependent on dead or decaying wood (or dependent on other organisms that are themselves dependent on dead wood). These invertebrates may not be dependent on the wood for their entire life cycle but at least some stage is dependent on wood. Taken from: https://www.amentsoc.org/insects/glossary/terms/saproxylic
[13] In light of the severity of ash dieback consideration may be given to retaining sycamore as it supports many ash-associated species.

Table 7.4.2: Programme of works for years 0 – 5

Action			Years 0 – 5				
Task	Responsibility	Season	1	2	3	4	5
Assess the establishment of heather and consider whether supplementary heather clippings or propagated heather plants are needed.	TBC – possibly HE's appointed MP with SWT	Summer		Y		Y	
Assess distribution of gorse and consider whether supplementary transplants or propagated plants are required (i.e. transplanted from Wisley).	TBA – possibly HE's appointed MP with SWT	Summer		Y		Y	
Opening up areas of bare ground (on rotation)	TBA – possibly SWT	Summer	Y		Y		Y
Scrub management (e.g. spraying of new growth, and/or hand clearance/mechanical clearance)	TBA – possibly SWT	TBA, depending on method to be used	Y	Y	Y	Y	Y
Grazing (E1, E5 and E6).	SWT	June to November	Y	Y	Y	Y	Y

Table 7.4.3: Programme of works for years 6 – 15

Action			Years 6 – 15									
Task	**Responsibility**	**Season**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Opening up areas of bare ground.	TBA – possibly SWT	Summer		Y		Y		Y		Y		Y
Control bracken, scrub and tree saplings.	TBA – possibly SWT	Autumn/ winter		Y		Y		Y		Y		Y
Hand weeding or spot treatment of weeds with herbicide[14].	TBA – possibly SWT	Year round		Y		Y		Y		Y		Y

[14] A list of targeted weed species will be drawn up and added to the management plan to ensure that plants of interest (i.e. food plants of certain invertebrate species) are not targeted for control.

Action			Years 6 – 15									
Task	**Responsibility**	**Season**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Heather cutting to promote regeneration from cut stems/root stock (E2 and E3 as there is no grazing provision in Ockham Common).	TBA – possibly SWT	Early spring (before nesting period ideally)[15]		Y							Y	
Grazing (E1, E5 and E6).	TBA – possibly SWT	June to November	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cut gorse bushes on a 10-12-year rotation.	TBA – possibly SWT	Winter							Y			

Measures of Success

7.4.6.2 Monitoring targets have been devised to measure the success of the objectives described above.

7.4.6.3 All targets apply to areas E1, E2, E3, E5 and E6.

Table 7.4.4: Monitoring targets/measures of success

Objective	Targets Years 0-5	Targets Years 5-10	Targets Years 10-15
Establishment of heathland in previously forested selected areas	Pioneer heather contributing to approximately 10% of vegetation cover.	Heather contributing to <30% of vegetation cover.	Heather contributing to approximately 75% of vegetation cover. Mosaic of heather, acid grassland, gorse and bare ground present.
Objective 2: Encourage mature (5 to 8 years growth) gorse coverage in the established heathland areas (for Dartford warbler).	Young gorse plants establishing.	Gorse plants developing successfully and contributing to approximately 5-10% of vegetation cover.	Mature gorse contributing to approximately 25% of vegetation cover.

[15] Miller G.R. & Miles J. (1970) Regeneration of heather (*Calluna vulgaris* (L.) Hull) at different ages and seasons in north-east Scotland. Journal of Applied Ecology, 7, 51-60

Monitoring frequency and methods

7.4.6.4 The aim of the suggested monitoring programme is to ascertain whether the measures of success listed above have been achieved.

7.4.6.5 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group.

7.4.6.6 The aim of the suggested botanical monitoring programme is to detect major changes which can be done by surveying at five yearly intervals.

7.4.6.7 The suggested method is NVC surveys with fixed quadrats supplemented with fixed point photography supported with aerial photography. The approach is not to carry out a detailed survey following the Common Standards Monitoring (CSM) approach as it is a requirement for all SSSIs to be monitored using this method every six years[16] and therefore this will be carried out by Natural England as part of their commitments.

Table 7.4.5: Frequency of Detailed Botanical Monitoring

Action			Years 0-15			
Task	Responsibility	Season	0	5	10	15
Pre-construction NVC monitoring – setting up fixed quadrats and collecting baseline data to compare subsequent surveys to.	HE's appointed monitoring party (MP)	Late summer	Y			
Post-clearance NVC fixed quadrat surveys.	HE's appointed monitoring party (MP)	Late summer		Y	Y	Y
Fixed point photography supported with aerial photography.	HE's appointed monitoring party (MP)	Late summer		Y	Y	Y

[16] JNCC, (2009), Common Standards Monitoring Guidance for Lowland Heathland, Version February 2009, ISSN 1743-8160

7.5 Woodland enhancement

7.5.1 Overarching aims and objectives

7.5.1.1 Enhance 24.9 ha of woodland to increase foraging opportunities for nightjar and woodlark (by creating wide glades, open areas, and 'wavy' woodland edges), and to increase the invertebrate resource contribution to the SPA and all three qualifying features.

7.5.1.2 Enhance ephemeral watercourses within the Scheme area (namely Pond Farm south and Pond Farm west ditches,) to create additional wetland habitat for a variety of aquatic species including Odonata[17].

7.5.2 Description of land parcels (where habitat creation is proposed)

7.5.2.1 The woodland edge along the southern edge of Bolder Mere is dealt with as part of the wider waterbody enhancement work in Section 7.6. E4. Whereas, the wider parcel of woodland surrounding Bolder Mere, is dealt with in this section.

7.5.2.2 The following land parcels (referred to as 'SPA enhancement areas') will be retained as woodland but works will be carried out to enhance their ecological value:

- E2 Ockham Common/Sand Hill (in part)
- E3 Ockham Common/Old Lane (in part)
- E4 Elm Lane
- E7 Pond Farm South
- E8 Pond Farm West

E2 Ockham Common/Sand Hill

7.5.2.3 This is approximately 17.3 ha is size running north-east from the main Ockham Common car park and reaching close to the junction. It is predominantly mixed woodland dominated by Scots pine. In this area, 9.4 ha of trees are to be cleared to allow for heathland creation (this is described in Section 7.4), and 7.9 ha of woodland will be thinned. Sand Hill is a wooded mound within the site that will undergo thinning on top and felling on the sides.

E3 Ockham Common/Old Lane

7.5.2.4 This area is adjacent to the Ockham car park and reaches out across 4.8 ha of land northeast. This is again Scots pine dominated mixed woodland. This

[17] Dragonflies and damselflies

woodland is bound on three sides by open heathland and the car park to the south. Trees will be cleared in part of this woodland (3.8 ha) for heathland creation, see section 7.4. The remaining trees (1 ha) will be thinned.

E4 Elm Lane

7.5.2.5 This is a mixed woodland area of 11.3 ha adjacent to the Bolder Mere lake enhancement area, north of Elm Lane. Within this area, 1.8 ha of woodland is to be cleared adjacent to Bolder Mere, with an additional 9.5 ha to be thinned in the surrounding land.

E7 Pond Farm South

7.5.2.6 This area is located to the west of the A3, south of the M25 and consists of two pockets of woodland either side of a path, that separate two open areas of heathland. This area is 2.4 ha in total. One section (to the north) consists of mature trees such as oaks, whilst the other section (to the south) contains dense birch growth.

E8 Pond Farm West

7.5.2.7 This is a 4.2 ha area of mixed woodland to the northwest of Pond Farm. This lies south of the C2 Wisley SPA enhancement land parcel on the boundary with the M25.

7.5.3 Background

Thinning

7.5.3.1 The thinning of woodland areas will be divided into two types of thinning: regeneration thinning and selective thinning.

7.5.3.2 Regeneration thinning: this is the selective felling of parts of a woodland (retaining all veteran trees or trees with veteran features, and trees with bat roost potential). This allows regeneration growth in cleared areas, providing a range of age classes and adding resilience to the woodland. This will include measures such as:

- Creating open patches within the woodland some of which will be managed to remain open and some will be allowed to regrow with more diverse woodland, both in age and species diversity;
- increasing the size of existing open areas;
- creating and widening existing glades (some of which may be planted at the edges to provide a shrubby woodland edge habitat, some will be managed as heathland habitat);

- selective fellling of some trees and groups of trees, to allow retained trees to flourish, and encourage a more diverse species assemblage to regrow.

7.5.3.3 Standard thinning: This is a more typical selective thinning, where the number of trees within a woodland is reduced, opening the canopy and allowing the remaining trees to fill it (retaining all veteran trees or trees with veteran features, and trees with bat roost potential), allowing the retained trees to flourish and encouraging a more diverse species assemblage to return. This may include some selective planting, where necessary, to increase the species diversity.

7.5.3.4 Introducing new planting[5] in the thinning areas is an option which will be considered in the long term to increase tree diversity (approximately Year 5 onwards) once the result of initial thinning works is evident. It may be difficult for new planting to establish without protection from grazing pressures on tree saplings so this needs to be carefully considered from a public access perspective.

7.5.3.5 There is also a trade off to be made with allowing natural regeneration of 'open areas/glades' by seedlings which are naturally better adapted to the conditions (and will therefore require less maintenance/management) and trying to introduce new species which can increase tree diversity but may require more intensive management.

Creation of Rides

7.5.3.6 Rides will be created which have a structurally diverse, graduated woodland edge. For the reasons given above, the need to introduce new planting to diversify the rides will be assessed at approximately Year 5.

7.5.3.7 The orientation/position of rides will be selected to maximise direct sunlight. There will be a focus on providing south and south west facing rides with bare soil banks (favoured by sand lizards) and east-west orientated rides mixed with north-south orientated rides.

7.5.3.8 It is not currently proposed to fence off newly created rides (to optimise the natural regeneration of successional habitats by eliminating grazing pressure). However if the desired results were not being achieved this could be considered in the longer term (to be assessed in Year 5).

Wavy Edges

7.5.3.9 In E2 and E3 where thinning areas are adjacent to clear-fell (heathland restoration) areas the aim will be to have a structurally diverse, graduated 'wavy' woodland edge. For the reasons given above, the need to introduce new planting to diversify the edges will be assessed at approximately Year 5.

Rhododendron Control

7.5.3.10 Rhododendron reduction will be part of the enhancements and this can take several years to achieve depending on the size of the seed bank and how extensive the root system is.

7.5.3.11 The approach will be to cut stems and then apply an herbicide treatment on new growth. However new approaches (i.e. stem injection) will be considered if proved successful elsewhere. Further discussions on the removal and disposal of material are also required.

Selective Planting

7.5.3.12 At E4 there is a requirement to retain visual screening between residential properties and the A3. New planting[5] will be introduced here in Year 1 (likely to be holly as it grows well within the conditions of the area and provides year-round screening) and will be subject to the standard five-year maintenance period (i.e. weeding, watering etc). It is not envisaged that any further management/monitoring will be required.

Ephemeral Ditches

7.5.3.13 The ephemeral ditches in E7 and E8 will be 'daylighted' through the selected removal of trees. This will increase the light reaching the ditches and should enhance the quality of the habitat for the wetland invertebrate assemblage. There will also be a number of 'scrapes' created to increase the area of ephemeral ditches available.

7.5.4 Objectives

7.5.4.1 The following objectives (final version to be agreed between Highways England, Natural England and SCC/SWT) are for the above land parcels.

E2 Ockham Common/Sand Hill (woodland enhancement area)

- Objective 1 - Create a 'wavy edge' between the area of 'clear fell' i.e. heathland restoration and woodland enhancement.
- Objective 2 - Create a landscape feature[18] at Sand Hill with selective thinning
- Objective 3 - Regeneration thinning.

E3 Ockham Common/Old Lane (woodland enhancement area)

- Objective 1 - Create a 'wavy edge' between the area of 'clear fell' i.e. heathland restoration and woodland enhancement.

[18] This 'landscape feature' is a naturally occurring mound referred to as Sand Hill where trees will be retained so they provide a wooded feature which can be viewed from the common, similar 'landscape features' are present in Wisley Common.

- Objective 2 – Regeneration thinning.

E4 Elm Lane

- Objective 1 - Selective thinning.
- Objective 2 - Reduce rhododendron coverage[19].
- Objective 3 – Provide screening (through new planting of tree species e.g. holly) between existing properties and the A3.

E7 Pond Farm South

- Objective 1 - Selective thinning
- Objective 2 – A reduction of birch dominated woodland from the southern half.
- Objective 3 – Widen the existing path
- Objective 4 – 'daylight' ephemeral ditch and create 'scrapes'

E8 Pond Farm West

- Objective 1 – Selective thinning
- Objective 2 – Creation of a wide, well established woodland ride with graduated edges.
- Objective 3 – 'daylight' ephemeral ditch and create 'scrapes'

7.5.5 Prescriptions (outline only) and resources

7.5.5.1 The exact details of work activities will be developed between all parties during the development of the management plan and subsequent work-specific method statements. However this are the outline prescriptions of what tasks will be required (and who will carry then out).

Table 7.5.1: Approach to woodland enhancement works

Task	Specific Timing
Regeneration/selective thinning:	
Survey woodlands in E1, E2, E3, E5, E6 and identify trees with bat roost potential (BRP), veteran features, or significant value for saprophytic invertebrates (e.g. standing dead wood) and mark trees for retention.	Before tree felling
Design a 'removals plan' which shows the existing areas of open habitats (to be widened/enlarged), and the proposed areas of new glades, in consultation with the steering group.	Before tree felling
Fell trees using a forestry harvester, collect all cut material with a timber forwarder and remove.	Winter tbc
Creation of rides:	

[19] Removal target to be discussed and agreed with stakeholders.

Task	Specific Timing
Design a 'removals plan' which shows the existing rides (to be widened) or proposed rides including any box junctions in consultation with the steering group.	Before tree felling
Fell trees using a forestry harvester, collect all cut material with a timber forwarder and remove.	Winter tbc
Creation of wavy edges:	
Design a 'removals plan' which shows the wavy edges in consultation with the steering group.	Before tree felling
Fell trees using a forestry harvester, collect all cut material with a timber forwarder and remove.	Winter tbc
Rhododendron Removal:	
Cut rhododendron.	Winter/early spring tbc
Apply herbicide	On new growth.
Ditch enhancement (E7 and E8 only):	
Daylighting around the length of existing ephemeral ditch (where tree thinning is proposed as part of the enhancement package)	Winter tbc
Creating 'scrapes' along the existing ephemeral ditches (where arboricultural restrictions allow)	Autumn tbc

7.5.6 Management and Monitoring

Programme of Works

7.5.6.1 Table 7.5.2 and Table 7.5.3 below detail the programme of works for habitat establishment and initial maintenance, and then for long term management woodland enhancements.

Table 7.5.2: Programme of works for years 0 – 5

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Maintenance of screening planting (i.e. weeding, watering, replacement of failures) in E4.	Landscape contractor (LC) appointed by Principal Contractor (PC)	Once or twice a year	Y	Y	Y	Y	Y
Assess the need for supplementary planting (in all woodland enhancement areas).	HE's appointed monitoring party (MP)	Late summer					Y

Table 7.5.3: Programme of works for years 6 – 15

Action			Years 6 – 15									
Task	Responsibility	Season	6	7	8	9	10	11	12	13	14	15
Selective tree thinning	TBC – possibly SWT	Anytime (with nesting bird checks)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Management of rides and glades and edges– central zones (mowing)	TBC – possibly SWT	Early autumn	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Management of rides and glades and edges – outer edges	TBC – possibly SWT	Early autumn		Y							Y	

Measures of Success

7.5.6.2 Monitoring targets have been devised to measure the success of the objectives described above.

7.5.6.3 The MoS focus mainly on vegetation structure rather than composition as for many species associated with woodland rides/edges this is more important in determining habitat quality[20].

Table 7.5.4: Monitoring targets/measures of success

Objective	Targets Years 0-5	Targets Years 5-10	Targets Years 10-15
E2 – Objective 1 E3 – Objective 1 E7 – Objective 3 E8 – Objective 2	Edge habitats are establishing, and scrub cover is increasing. New 'open habitats' have been created.	Edge habitats are developing with up to 25% scrub cover. 'Open habitats' are being maintained.	A network of edge habitats has been created with approximately 50% scrub cover and a graduated vegetation structure. A net increase in open areas has been achieved.
E2 – Objective 3 E3 – Objective 2 E4 – Objective 1 E7 – Objective 1 E8 – Objective 1	Regeneration growth is evident in 'thinned' areas.	Range of regeneration growth is establishing in 'thinned' areas.	A range of age classes and a diverse structure has been achieved.

[20] Ferris, R. and Carter, Clive. (2000) Managing Rides, Roadsides and Edge Habitats in Lowland Forests. Forestry Commission Bulletin 123.

Objective	Targets Years 0-5	Targets Years 5-10	Targets Years 10-15
E2 Objective 2 – Sand Hill	Create and retain a landscape feature at Sand Hill.	Create and retain a landscape feature at Sand Hill.	Create and retain a landscape feature at Sand Hill.
E7 and E8: Objective 4 and 3 (respectively) - Ephemeral ditches	Increased habitat availability and quality of ephemeral ditches.	Increased habitat availability and quality of ephemeral ditches.	Increased habitat availability and quality of ephemeral ditches.
E4 – Objective 3 - Screening of properties – new planting	New planting provides sufficient screening between existing properties and the A3.	n/a	n/a

Monitoring frequency and methods

7.5.6.4 The aim of the suggested monitoring programme is to ascertain whether the measures of success listed above have been achieved.

7.5.6.5 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group.

7.5.6.6 Fixed point photography supplemented with detailed field notes to document the changes within the woodland parcels (and ephemeral ditches in E7 and E8). The aim of the monitoring programme is to detect major changes however during the initial establishment phase (i.e. first 5 years) monitoring will be carried out annually, at Year 5 this will revert to surveying at five yearly intervals.

Table 7.5.5: Frequency of Monitoring

Action			Years 0-15			
Task	Responsibility	Season	0-5	5	10	15
Fixed point photography supported with aerial photography.	HE's appointed monitoring party (MP)	Late summer	Y (annually)	Y	Y	Y

7.6 Bolder Mere enhancements

7.6.1 Overarching aims and objectives

7.6.1.1 To maintain and potentially improve the conservation value of Bolder Mere, through habitat improvements on the shores of Bolder Mere, with a focus on providing for the needs of species identified within the citation for the wetland elements of Ockham and Wisley Commons SSSI, and in particular the Odonata (dragonflies and damselflies) assemblages.

7.6.1.2 To achieve successful post construction reinstatement of valuable lake shore habitat along the northwest edge of Bolder Mere.

7.6.1.3 To carry out a successful programme of carp and bream removal within Bolder Mere.

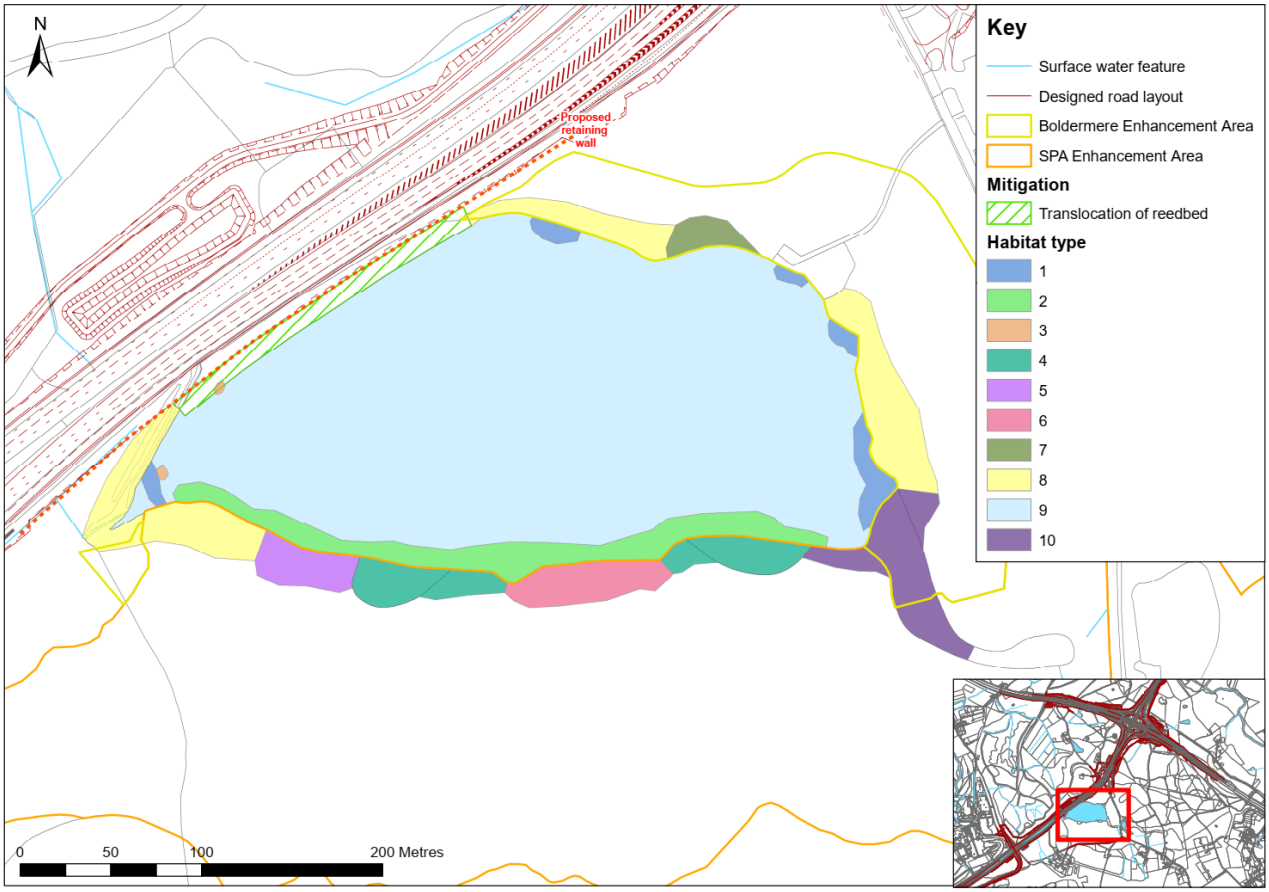
7.6.2 Background/Description of land parcels (where habitat enhancement is proposed)

7.6.2.1 The shore line of Bolder Mere contains a range of habitat types and the enhancements proposed vary according to the habitat conditions. The shoreline has been ‘zoned’ into ten habitat ‘types’ and these are presented in the figure below and proposed enhancements are summarised in this section.

7.6.2.2 The shoreline habitats do not overlap with enhancement area E4. However, the proposed enhancements in E4 will complement the objectives of the work described in this section.

7.6.2.3 Feasibility studies are planned into invasive species management which relate directly to habitat ‘zones’ 3, 7 and 9. Details of potential work would be added to this management plan if feasibility studies indicate works could be beneficial and funding of physical works is then secured. This will be updated once detailed design is complete.

Figure 7.6.1: Bolder Mere habitat 'zones'



Habitat 1

7.6.2.4 These are areas of reed bed which will be retained, with long-term management proposed (for 15 years) with the aim to avoid loss of open water or encroachment into 'dry areas'. The strip of reed bed which is adjacent to the A3 (and will be translocated) is shown separately on Figure 1 (within the green hatched area).

Habitat 4

7.6.2.5 These are two areas of 'acid bog' which scrub species are encroaching into from the woodland to the south. Management is proposed for these areas. The works proposed should have an immediate benefit (by increasing the amount of light reaching the lake edge and maintaining a semi-open structure).

Habitat 5

7.6.2.6 This is an area of dense birch/ willow scrub with a sphagnum understory where management is proposed. The works proposed should have an immediate benefit (by increasing the amount of light reaching the lake edge, allowing acid bog habitats to develop).

Habitat 6

7.6.2.7 This is an area of drier marginal habitat which is reverting to woodland where management is proposed. The works proposed should have an immediate benefit (by encouraging a heath/grassland community to establish).

Habitat 8

7.6.2.8 These are areas of wet woodland, with mature trees, where management is proposed. The works will be carried out on a rotational basis over a long-term (15-year) period to encourage natural regeneration and promote a varied canopy structure.

Habitat 10

7.6.2.9 This is an area of alder carr woodland, with mature trees, where management is proposed to improve its ecological condition and reduce shading on the lake shore. The works will be carried out on a rotational basis over a long-term (15-year) period to promote a transitional zone with a varied canopy structure through a coppicing regime, which will also reduce shading of the lake shore.

Reed Bed and Water Lily Translocations (Habitat 3)

7.6.2.10 The translocation of the existing reedbed and lily pads (lily pads are shown on Figure 1 as 'Habitat 3') alongside the retaining wall will ensure maintenance of valuable marginal habitats within the lake environment in the long-term. A detailed methodology and programme for this work will be developed during detailed design.

7.6.2.11 Common reed grows predominantly from creeping rhizomes (underground stems), which allows it to rapidly colonise newly planted areas. If the existing reedbed rhizome and active growth is translocated (as planned) then it is expected to see a viable habitat created in 2-3 years. If for any reason translocation was not possible and new reed planting[5] was used instead, then 5 years is a more precautionary estimate.

7.6.2.12 Water lilies grow and spread from tuber-like rhizomes. If translocated as tubers with active growth/or as dormant tubers (as planned) then it is expected to see a viable habitat created in 2-3 years. If for any reason translocation was not possible and new water lily planting[5] was used instead, then 5 years is a more precautionary estimate.

Carp/Bream Removal

7.6.2.13 Carp are noted as a potential constraining factor on lake habitat function because they regularly disturb the bed (for instance when feeding), which mixes bed sediments and chemicals (e.g. nutrients) into the water column. A detailed

methodology and programme for this work will be developed during detailed design.

7.6.2.14 Monitoring will be required to measure the success of this Scheme commitment, this is discussed in Section 7.10.

7.6.3 Objectives

7.6.3.1 The following objectives (final version to be agreed between Highways England, Natural England and SCC/SWT) are for the Bolder Mere Enhancement Area:

- Objective 1: To reprofile the north-west edge of the lake (once the new retaining wall is constructed) to replicate the current slope and re-establish the reedbed habitat (through translocation of the existing reedbed and/or new reedbed planting) and marginal aquatic habitat (willow) removed to facilitate construction of the new retaining wall.
- Objective 2: To translocate two areas of lily (Nymphaea sp.) in 'Habitat type 3', noted for their importance to Odonata.
- Objective 3: To improve the shoreline of Bolder Mere for marginal wetland plant communities and Odonata through:
  - Management of reed bed (Habitat 1) to avoid any significant spread into adjacent land or open water over the long term.
  - Clearing encroaching scrub from 'Habitat 4' and setting back larger birch and willow from the edge of 'Habitat 4' to maintain a semi-open structure grading into the woodland behind.
  - Partial clearance of birch and willow from 'Habitat 5' to encourage a low-growing heath/grassland community to develop.
  - Thinning and removal of trees and scrub from 'Habitat 6' to encourage a low-growing heath/grassland community. This will include Rhododendron control to avoid further spread.
  - Carry out occasional removal of larger trees within Habitat 8 (wet woodland) to encourage natural regeneration whist remaining in line with the 30-60% shading target for the margin and 25-30% maximum shading level of open water and the need to limit disturbance to lake wildlife from public access.
  - Improving the ecological condition of the existing alder carr habitat in Habitat 10 through rotational management of alder and birch with the aim to maintain a transitional zone with a varied canopy structure and reduce shading of the lake shore.

7.6.4 Prescriptions (outline only) and resources

7.6.4.1 The exact details of work activities will be developed between all parties during the development of this management plan and subsequent work-specific method statements.

Table 7.6.1: Approach to Bolder Mere Enhancements

Task	Timing
Reed bed/water lily translocation	
Carry out translocations as detailed in the approved method statement developed during detailed design in consultation with the steering group..	tbc
Reed bed management (Habitat zone 1)	
Remove any areas of reedbed which are encroaching adjacent 'dry' habitats.	tbc
Habitat works to zones 4, 5 and 6	
Design a 'removals plan' which details where tree/scrub clearance is required in consultation with the steering group.	tbc
Carry out scrub/tree removals (including any rhododendron).	tbc
Apply herbicide to any new rhododendron growth.	tbc
Wet woodland management (Habitat zones 8 and 10):	
Survey woodlands and identify trees with bat roost potential (BRP), veteran features, or significant value for saprophytic invertebrates (e.g. standing dead wood) and mark trees for retention.	tbc
Design a tree removal/coppicing plan (with transitional zones identified) in consultation with the steering group.	tbc
Carry out selective tree removal/coppicing (year 0/1) and plan subsequent removals/coppicing for years 10 and 15 in a zoned approach to encourage a transitional structure.	tbc

7.6.5 Management and Monitoring

Programme of works

7.6.5.1 Table 7.6.2 and 7.6.3 below details the programme of works for habitat establishment and initial maintenance (first five years), and then for long term management (15 years in total).

Table 7.6.2: Programme of works for years 0 – 5

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Assess establishment of reedbed translocation (or planting)	HE's appointed monitoring party (MP)	May and September	Y	Y	Y	Y (if over 50% is new planting)	Y (if over 50% is new planting)
Assess establishment of water lily	HE's appointed monitoring party (MP)	May and September	Y	Y	Y	Y (if over 50% is	Y (if over 50% is

Action			Years 0-5				
translocation (or planting)						new planting)	new planting)
Assess effectiveness of carp/bream removal programme	HE's appointed monitoring party (MP)	tbc					Y

Table 7.6.3: Programme of works for years 6 – 15

Action			Years 6 – 15									
Task	Responsibility	Season	6	7	8	9	10	11	12	13	14	15
Assess spread of existing reedbed in habitat zone 1, and carry out removal (if required)	TBA – possibly HE's appointed MP with SWT	Winter		Y							Y	
Assess scrub/tree encroachment in habitat zones 4, 5 and 6, and carry out further removal (if required)	TBA – possibly HE's appointed MP with SWT	Winter	Y				Y					Y
Carry out selective tree removals/coppicing in habitat zones 8 and 10 on a rotational basis.	TBA – possibly HE's appointed MP with SWT	Winter					Y					Y

Measures of Success

7.6.5.2 Monitoring targets have been devised to measure the success of the objectives described above.

Table 7.6.4: Monitoring targets / measures of success

Objective	Targets Years 0-5	Targets Years 5-10	Targets Years 10 – 15
Objectives 1 and 2: Reedbed and water lilies re-established along the north west shoreline (adjacent to A3)	Equal area of reedbed/water lily habitat established by year 5 as that impacted by the Scheme.	None	none
Objective 3: No significant spread of reedbed (habitat type 1) into adjacent 'dry areas' or open water.	No increase in area coverage observed.	No increase in area coverage observed.	No increase in area coverage observed.

Objective	Targets Years 0-5	Targets Years 5-10	Targets Years 10 – 15
Objective 3: Southern shoreline of Bolder Mere (incorporating habitat zones 4, 5 and 6) supporting a diverse macrophyte assemblage grading into woodland edge habitats.	Semi-open structure achieved. 30-60% shading target for the margin achieved.	Semi-open structure maintained. Acid bog habitats (4&5) and/or heath/grassland communities (6) establishing. 30-60% shading target for the margin achieved.	Semi-open structure maintained. Acid bog habitats (4&5) and/or heath/grassland communities (6) maintained. 30-60% shading target for the margin achieved.
Objective 3: Varied canopy structure achieved within wet woodland (habitat zones 8 and 10)	Create a transitional zone with a varied canopy structure. 30-60% shading target for the margin achieved.	Develop a transitional zone with a varied canopy structure. 30-60% shading target for the margin achieved.	Maintain a transitional zone with a varied canopy structure. 30-60% shading target for the margin achieved.

Monitoring frequency and methods

7.6.5.3 The aim of the suggested monitoring programme is to ascertain whether the measures of success listed above have been achieved.

7.6.5.4 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group.

7.6.5.5 Fixed point photography, supplemented with detailed field notes to document the changes within the reed bed at the northern shore, and the enhancement works along the south and south eastern shore (including the reedbed in habitat zone 1). The aim of the monitoring programme is to detect major changes however during the initial establishment phase (i.e. first 5 years) monitoring will be carried out annually, at Year 5 this will revert to surveying at five yearly intervals.

7.6.5.6 Monitoring the success of the carp/bream removal programme is detailed in Section 7.11.4.

Table 7.6.5: Frequency of Monitoring

Action			Years 0 – 15			
Task	Responsibility	Season	0-5	5	10	15
Fixed point photography supported with aerial photography.	HE's appointed MP	Late summer	Y (annually)	Y	Y	Y

7.7 Reinstatement of temporary land take areas within the SPA/SSSI

7.7.1 Overarching aims and objectives

7.7.1.1 Land within the SPA/SSSI boundary used temporarily for construction of the Scheme will be reinstated to (as a minimum) the same condition as it was before works commenced. The aim will be to make these areas as valuable as possible for invertebrate populations thereby contributing to the food source of SPA qualifying bird species, and the invertebrate assemblages of the SSSI.

7.7.2 Background/description of land parcels (where reinstatement of SPA/SSSI land is required)

Land adjacent to the highway boundary

7.7.2.1 The approach adopted for temporary land take areas is a mixture of tree and shrub planting (where screening of the road and/or features of interest such as Scheduled Monuments is required) and scrub planting. There will be open grassland (established from seed) applied to the road verges however management of these will be carried out by the appointed specialist highways maintenance contractor as part of their routine duties therefore these areas have been omitted from this draft management plan and are contained with the draft LEMP.

7.7.2.2 Within the planting areas gaps will be left for bare scrapes or mounds to be created. The aim of this is to create a varied structure within these areas, and to provide bare ground features, both of which are extremely valuable for invertebrates.

7.7.2.3 As discussed in Section 7.3.3 the mix of tree species selected for these areas will follow SCC/SWT's aspirations to develop native woodland (W10 and W16) in the commons. See typical species list below (also replicated in Table 7.3.1 in Section 7.3).

Table 7.7.1: Tree species for reinstatement of land adjacent to the highway boundary (exact composition to be decided during detailed design)

NVC group/Species
W10 – lowland mixed broadleaved woodland with bluebell:
Major species – silver birch, common oak, common hawthorn, hazel
Minor species – crab apple, holly, rowan, elder, common gorse, guelder rose
Locally occurring – [additional relevant native species to be added if desired by SCC / SWT]
W16 – lowland oak-birch woodland with bilberry:

NVC group/Species
Major species – silver birch, common oak
Minor species – holly, rowan, common gorse
Locally occurring – [additional relevant native species to be added if desired by SCC / SWT]

7.7.2.4 A selection of shrubs and scrub species to choose from in these areas is provided in Table 7.7.2 also. SWT expressed during consultation that they would wish to see low growing species planted which are easily managed, but in-keeping with what is naturally occurring on the commons, and what is valuable for invertebrate populations.

Table 7.7.2: Shrub/scrub species for reinstatement of land adjacent to the highway boundary (exact composition to be decided during detailed design)

Shrub/Scrub Species
Main species: common gorse, broom, honeysuckle
Supplementary species (i.e. small amounts): bramble, blackthorn, hawthorn
tba, [additional relevant native species to be added if desired by SCC / SWT]

Restoration of Construction Compounds

7.7.2.5 The two construction compound areas within the SPA/SSSI boundary are proposed to the west of the A3 close to the location of the proposed Cockcrow green bridge. One is located on an area of existing hard standing which is currently used by SWT as a timber storage area for their logging activities/management of the commons. As this area is important for their ongoing management work it will be restored back to hardstanding, unless SWT request otherwise.

7.7.2.6 The second area (adjacent to one of the proposed balancing ponds) is currently mixed woodland. This area will be reinstated with tree and shrub planting as per the species listed in Table 7.7.2 with areas of bare ground (scrapes and/or mounds) incorporated.

7.7.3 Objectives

7.7.3.1 The following objectives (final version to be agreed between Highways England, Natural England and SCC/SWT) are for both land adjacent to the highway boundary and construction compounds within the SPA/SSSI:

- Objective 1: Establish and maintain native trees and shrub species, or scrub species, within specified areas adjacent to the highway boundary and within the compound area (next to balancing pond).

- Objective 2: Create areas of bare ground as either scrapes or mounds within planted areas to diversity structure and habitat features.
- Objective 3: Restore the logging compound to the same condition, or better.

7.7.4 Prescriptions (outline only) and resources

7.7.4.1 The exact details of work activities will be developed between all parties during the development of the management plan and subsequent work-specific method statements.

Table 7.7.3: Approach to temporary land take reinstatement

Task	Timing	Restrictions/key specifications
Design a final planting plant and specifications (to include areas for scrapes/mounds) in consultation with the steering group.	During detailed design.	Ensure 'gaps' are left in planting areas to create bare scrapes and mounds.
Source tree stock from certified providers.	As soon as the final planting plan is agreed.	
Prepare the ground for tree/shrub/scrub planting.	Once construction is complete.	
Create bare scrapes and mounds within the planting areas.	Once construction is complete.	Use sandy soil for scrapes/mounds where possible.
Plant trees/shrub/scrub species (around the scrapes and mounds) and install protection from damage from wild animals (rabbit/deer guards).	Winter (from November) to Spring (up to late March)	Do not plant trees in regular blocks/rows. Ensure areas of bare scrapes/mounds are left unplanted. Do not plant in frosty weather. Plant during the ideal time for that species (considering soil conditions). Consider stock-proof fencing within Wisley Common (due to grazing cattle)

7.7.5 Management and Monitoring

Programme of Works

7.7.5.1 The temporary land take areas will be maintained (managed and monitored) during the initial establishment phase (5 years).

7.7.5.2 Table 7.7.4 below details the programme of works for habitat establishment and initial maintenance. Different sections of temporary land take will become available for restoration at different times depending on the construction programme. Year 0 will be taken as the year in which planting was initially installed (or replaced in the case of failures).

Table 7.7.4: Programme of works for years 0 – 5

Action			Years 0 – 5				
Task	Responsibility	Season	1	2	3	4	5
Weeding.	Landscape contractor (LC) appointed by Principal Contractor (PC)	Once or twice a year	Y	Y	Y	Y	Y
Watering.	LC appointed by PC	As required	Y	Y	Y	Y	Y
Replacement of failures.	LC appointed by PC	Once yearly (in winter)	Y	Y	Y	Y	Y
Tree guards monitored/replaced/loosened. These should be removed when instructed by the Monitoring Party.	LC appointed by PC	Once yearly (in winter)	Y	Y	Y	Y	Y
Ensuring bare scrapes/mounds are maintained.	LC appointed by PC	In Years 3 and 5			Y		Y

Measures of Success

7.7.5.3 Monitoring targets have been devised to measure the success of the objectives described above.

Table 7.7.5: Monitoring targets/measures of success

Objective	Targets Years 0-2	Targets Years 2-3	Targets Years 3-5
Establish and maintain native trees and shrub species, or scrub species, within specified area adjacent to the highway boundary and the compound next to the Cockcrow bridge balancing pond.	All failures removed and replanted.	All failures removed and replanted.	All failures removed and replanted. 95% success rate of new planting by Year 5.
Create areas of bare ground as either scrapes or mounds within planted areas to diversity structure and habitat features.	Scrapes and mounds are clearly visible within the new planting areas.	Scrapes and mounds are clearly visible within the new planting areas.	Scrapes and mounds are clearly visible within the new planting areas.

Objective	Targets Years 0-2	Targets Years 2-3	Targets Years 3-5
Restore logging compound to the same condition, or better.	Hardstanding restored across the temporary land take area. Access into the area restored and boundary features as required (i.e. fencing).	n/a	n/a

Monitoring frequency and methods

7.7.5.4 The aim of the suggested monitoring programme is to ascertain whether the measures of success listed above have been achieved.

7.7.5.5 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group.

7.7.5.6 Frequency of monitoring visits will be determined by the success of establishment of planting and the frequency of monitoring outlined in Table 7.7.6 will be adjusted accordingly to ensure relevant follow up operations are undertaken.

Table 7.7.6: Frequency of Monitoring

Action			Years 0-5			
Task	Responsibility	Season	1	2	3	5
Periodic checks of planting and bare scrapes/mounds	HE's appointed MP	July	Y	Y	Y	Y

7.8 Permanent structures

7.8.1 Overarching aims and objectives

7.8.1.1 Ensure that any new structures built within the SPA/SSSI boundary are managed with the objectives of the SPA/SSSI in mind as far as practicable taking their primary function into account.

7.8.1.2 The aim will be to design these structures to enhance the biodiversity value of the SPA/SSSI wherever possible.

7.8.2 Background/ description of land parcels

Cockcrow Green Bridge

7.8.2.1 The replacement Cockcrow bridge[21] will provide a connected 25 m wide 'green corridor'[22] across the A3, with a separated NMU/occasional vehicle access carriageway.

7.8.2.2 The design of the bridge will be confirmed during detailed design however the high-level principals are to create a heathland mosaic within the 'green corridor' incorporating donated heather turfs translocated from Wisley/Ockham Common with shrub planting and a corridor of dead wood/boulders to encourage movement of wildlife across the bridge.

7.8.2.3 The earthworks for the bridge will be sown with a bespoke native species-rich acid grassland seed mix and supplemented with heather brash (supplied from the commons). The aim will be to establish acid grassland/heathland on the approaches to the bridge, connected to the newly created heathland in E1 and E2, to facilitate movement of heathland specialists.

Artificial Badger Sett

7.8.2.4 The location of the artificial badger sett has been omitted from the plans provided the Scheme layout plans (TR010030/APP/2.8), and the design of the structure will be confirmed during the detailed design stage. However, it is likely that the new sett will require shrub planting to provide screening and help incorporate the

[21] The Scheme includes a 'green bridge' extension to Cockcrow bridge. A separate designated funds application is being made by the project team to secure additional funding from Highways England for the provision of a Green Bridge, as a replacement for the demolition of the existing Footpath 17 Cockcrow overbridge. The green bridge is intended to provide an additional enhancement measure to address historic issues relating to the severance of ecological habitats by the existing A3, including habitats that form part of the Ockham and Wisley Commons Site of Special Scientific Interest.
Highways England is confident that there is a reasonable prospect of the designated funds application being approved and has therefore sought authorisation for these works within the scope of the DCO application. However, the inclusion of the green bridge feature within the DCO does not materially affect the overall extent of order land required for the Scheme or the level of funding that may be needed to compensate any affected land interests. In the unlikely event that designated funds are not forthcoming, this enhancement measure can be omitted from the scheme because it is not essential for the purposes of mitigating the scheme's environmental effects. Its omission would not have any material consequences for land acquisition matters and therefore any concerns about the certainty of funding for this element of the work need not indicate against the granting of development consent.

[22] Description of Changes Report (Volume 4109.XX1)

structure into the surrounding landscape. This planting will be maintained (managed and monitored) during the initial establishment phase (5 years).

7.8.2.5 No post construction/long term monitoring of the artificial badger sett is proposed. Monitoring requirements during the sett closure process are described within the draft badger licence and are not included in this draft management plan.

Toad underpasses

7.8.2.6 Bolder Mere Conservation verge (CV005) is located on both verges of Old Lane and is listed as a crossing point for common toad.

7.8.2.7 To address the potential for mortality along Old Lane two toad underpasses will be installed. The underpasses will be supported with permanent wildlife fencing which will be erected along Old Lane~~d~~ to direct the toads to the underpass crossing points. In addition to this, a reduced speed limit from 40 miles per hour to 20 miles per hour and signage to warn vehicle users of the presence of the crossing will be incorporated into the Scheme along Elm Lane.

7.8.3 Objectives

7.8.3.1 The following objectives (final version to be agreed between Highways England, Natural England and SCC/SWT) are for the new structures within the SPA/SSSI:

- Objective 1: Establish and maintain Cockcrow green bridge, providing a wildlife corridor across the new structure which is linked to areas of new heathland creation.
- Objective 2: Establish and maintain shrub planting around the artificial badger sett to incorporate the structure into the surrounding landscape.
- Objective 3: Establish a safe route for toads to cross along Old Lane to address the potential for toad mortality along Old Lane and Elm Lane.

7.8.4 Prescriptions (outline only) and resources

7.8.4.1 The exact details of work activities will be developed between all parties during the development of the management plan and subsequent work-specific method statements.

Table 7.8.1: Approach to creation of permanent structures (habitats only)

Task	Timing	Restrictions/key specifications
Green bridge		
Design a final landscaping outline and specification for the green bridge in consultation with the steering group.	During detailed design, once G.I information is known.	

Task	Timing	Restrictions/key specifications
Source shrub planting and seed mixes from certified providers.	As soon as the final plans are agreed.	
Carry out implementation works: likely to include heather turf translocation, seeding, heather brash 'strewing', shrub planting and incorporating dead wood and boulders where required.	Once the 'grey' elements of the new structures are built (including separate NMU route for the green bridge).	Translocate heather turfs during autumn/early winter. Strew heather when seeds are just about to ripen. Only seed during the ideal time (considering soil conditions). Do not plant shrubs in frosty weather. Plant shrubs during the ideal time for that species (considering soil conditions). Consider protecting new shrub planting from grazing pressures.
Erect fencing to restrict public access (and allow access for management)	Once structures are complete.	
Artificial Sett		
Design a final landscaping outline and specification for the artificial sett.	During detailed design, once G.I information is known.	
Source shrub planting and seed mixes from certified providers.	As soon as the final plans are agreed.	
Carry out implementation works: likely to include shrub planting and possibly fencing.	Once the artificial badger sett is built.	Do not plant shrubs in frosty weather. Plant shrubs during the ideal time for that species (considering soil conditions). Consider protecting new shrub planting from grazing pressures.
Toad underpasses		
Design a final landscaping outline and specification for the two toad underpasses. Agree locations for underpasses, wildlife fencing and signage.	During detailed design, once Ground investigation (GI) information is known.	

Task	Timing	Restrictions/key specifications
Carry out implementation works: likely to include Construction of permanent- wildlife -fencing and installation of signage.	Once the underpasses are complete	Construction work should avoid the core active season (in particular the migration period) for toads and other amphibians.

7.8.5 Monitoring and Management

Programme of Works

7.8.5.1 Possible management/maintenance activities for the green bridge have been proposed below however the measures of success still need to be developed (in consultation with the steering group) once detailed design has been carried out.

7.8.5.2 It is however envisaged that the green bridge will be maintained (managed and monitored) for 10 years.

Indicative Maintenance Activities for the Green Bridge

7.8.5.3 A split of roles between SWT and HE are suggested below:

- SWT roles:
  - Annual grazing or mechanical cutting of the heathland (within the green corridor of bridge).
  - Shrub management every 3-5 years.
  - Rotovation of bare sand areas.
- Highways England roles:
  - Inspection of the drainage system to ensure it remains functional.
  - Inspection of boulders/dead wood for safety purposes.
  - Inspection of the parapets and parapet replacement.
  - Re-waterproofing.

7.8.5.4 The monitoring strategy for Cockcrow green bridge is in Section 7.12.

Artificial Badger Sett

7.8.5.5 Measures of success will be developed (in consultation with the steering group) once detailed design of the artificial sett is completed. The management/ monitoring strategy for the shrub planting will follow the programme detailed in Section 7.7.5.

Toad underpasses

7.8.5.6 Measures of success will be developed (in consultation with the steering group) once detailed design of the underpasses is completed.

7.8.5.7 Maintenance of the underpasses is expected to be carried out at least once a year and will include an inspection of the underpass~~es~~ structures and the connected areas of wildlife fencing (clearing of debris). Toad crossing s~~S~~ignage along Elm Lane~~d~~ will also be checked to ensure these features are still intact.

7.8.5.8 The underpasses will be monitored after installation. Monitoring will involve the installation of camera traps at the entrance and/-exit point of the underpasses that will be monitored during the peak migration periods in late February to early March and September. The toad crossings will be monitored for up to 5 years post construction.

7.9 Marginal/emergent planting areas

7.9.1 Overarching aims and objectives

7.9.1.1 Marginal and emergent planting will be composed of a mixture of aquatic and water's edge planting on the fringes of proposed attenuation ponds.

7.9.1.2 Marginal and emergent planting will integrate the highway (attenuation ponds) with the character of the surrounding landscape, assisting in maintaining local vegetation patterns and softening the appearance of highways infrastructure.

7.9.2 Description of land parcels (where landscape elements are proposed)

Balancing Ponds

7.9.2.1 There are six proposed balancing (attenuation) ponds within the SPA boundary and an additional four within the SSSI boundary. The requirement for these will be confirmed during detailed design, and the design of the balancing ponds will be developed during this time. These features have a primary function relating to highway water management, which will be paramount in design and maintenance.

Soakaways

7.9.2.2 There are four proposed soakaways within the SPA boundary and an additional three within the SSSI boundary. The requirement for these will be confirmed during detailed design, and the design of the soakaways will be developed during this time. These may, or may not, be planted with marginal/emergent species depending on their design. These features have a primary function relating to highway water management, which will be paramount in design and maintenance.

7.9.3 Background

7.9.3.1 The specific methodology for marginal and emergent planting will be developed during detailed design. It is likely that the planting will comprise of a pond edge meadow mix and marginal and emergent plug plants. This planting will be subject to typical landscape maintenance requirements (e.g. weeding / cutting and removal of arisings etc.) for a period of 5 years. After this period of time the ponds will be managed via the Highways England asset management programme.

7.9.3.2 Marginal and emergent species are to be appropriate to the location or as exist already on site, with a species composition and diversity capable of being maintained by an average of one cut per year or less. An indicative list of marginal and emergent planting species are shown in the table below, however, this planting mix is for illustrative purposes only and will be adapted/improved at the detailed design stage.

Table 7.9.1: Illustrative list of marginal and emergent planting species (to be decided during detailed design):

Illustrative Marginal and Emergent Planting Species:
Pond Edge Mixture:
Achillea ptarmica – Sneezewort
Angelica sylvestris – Wild angelica
Caltha palustris – Marsh marigold
Eupatorium cannabinum – Hemp agrimony
Filipendula ulmaria – Meadowsweet
Geum rivale – Water avens
Hypericum tetrapterum – Square-stalked St John's wort
Iris pseudacorus – Yellow iris
Lotus pedunculatus – Greater birdsfoot trefoil
Lycopus europaeus – Gypsywort
Lythrum salicaria – Purple loosestrife
Mentha aquatica – Water mint
Pulicaria dysenterica – Common fleabane
Ranunculus acris – Meadow buttercup
Scrophularia auriculata – Water figwort
Silene flos-cuculi – Ragged robin
Succisa pratensis – Devil's bit scabious
Vicia cracca – Tufted vetch
Agrostis capillaris – Common bent

Illustrative Marginal and Emergent Planting Species:
Alopecurus pratensis – Meadow foxtail
Anthoxanthum odoratum – Sweet vernal-grass
Cynosurus cristatus – Crested dogstail
Deschampsia cespitosa – Tufted hair-grass
Festuca rubra – Slender-creeping red fescue
Hordeum secalinum – Meadow barley
Schedonorus pratensis – Meadow fescue
Plug plants (Marginal):
Angelica sylvestris – Wild angelica
Caltha palustris – Marsh marigold
Carex acuta – Slender tufted sedge
Carex acutiformis – Lesser pond sedge
Carex pendula – Pendulous sedge
Geum rivale – Water avens
Hydrocotyle vulgaris – Marsh pennywort
Iris pseudacorus – Flag iris
Juncus effusus – Soft rush
Lychnis flos-cuculi – Ragged robin
Lysimachia vulgaris – Yellow loosestrife
Myosotis scorpioides – Water forget-me-not
Plug plants (Emergent):
Acorus calamus – Sweet flag
Alisma plantago-aquatica – Water plantain
Apium nodiflorum – Fools watercress
Berula erecta – Lesser water parsnip
Butomus umbellatus – Flowering rush
Glyceria maxia – Reed sweet-grass
Hippuris vulgaris – Marestail
Persicaria amphibia – Amphibious bistort
Ranunculus flammula – Lesser spearwort

7.9.4 Objectives

7.9.4.1 The following objectives (final version to be agreed between Highways England, Natural England and SCC/SWT) are for all areas of marginal/emergent planting:

- Objective 1 – Establish and maintain proposed marginal/emergent planting areas.

7.9.5 Prescriptions (outline only)

7.9.5.1 The exact details of the work activities will be developed between all parties during the development of the management plan and subsequent work-specific method statements.

Table 7.9.2: Approach to marginal /emergent planting

Task	Timing	Restrictions/key specifications
Design a final planting plan and specifications in consultation with the steering group.	During detailed design.	
Source seed mixes and plug plants from certified providers.	As soon as the final planting plan is agreed.	
Mark out areas for planting and ensure that the ground is prepared such that it is not highly fertile and so that all perennial weeds have been removed – a good quality seed bed is to be prepared prior to sowing using repeated cultivation or herbicide.	Spring or Autumn tbc.	Herbicides should only be applied in or near water after permission has been obtained from the Environment Agency.
Sow seeds evenly by machine or broadcast by hand.	Late summer or spring (dependent upon the grounds proneness to Winter flooding).	Do not incorporate or cover the seed.
Plug plants to be planted as per the agreed planting plan and to the locations as shown on the Detailed Areas drawings.	Winter or early spring.	

7.9.6 Management and Monitoring

Programme of Works

7.9.6.1 Table 7.9.3 below details the programme of works for landscape establishment and initial maintenance (for the first five years).

7.9.6.2 After this period of time the attenuation ponds will managed by Highways England through their asset management programme. However due to their eventual location with the SPA/SSSI boundary Highways England's managing agent will be required to consult with Natural England on any proposed works and SSSI assent[23] may be required for certain activities.

Table 7.9.3: Programme of works for years 0 – 5

[23] https://www.gov.uk/government/publications/request-permission-for-works-or-an-activity-on-an-sssi

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Landscape contractor (LC) appointed by Principal Contractor (PC)	Quarterly.	Y	Y	Y	Y	Y
In the first year, annual weed growth is to be cut back to encourage the development of a good perennial cover.	LC appointed by PC	Monthly during the growing season.	Y				
To enhance the habitat value – variation in structure can be achieved by cutting back and removing short sections every 2-3 years in rotation.	LC appointed by PC	Every 2-3 years in rotation.		Y		Y	
Thin dense stands of single species.	LC appointed by PC	As required and during September and November to cause the least disruption to wildlife.	Y	Y	Y	Y	Y
Injurious weeds and undesirable waterbody species are to be eradicated, removed and disposed of off-site, as per the latest DEFRA / Natural England guidance on these matters. All weeding to be carried out by hand,	LC appointed by PC	Between September and January.	Y	Y	Y	Y	Y
All litter / foreign debris should be removed from planted areas and taken off site.	LC appointed by PC	As required.	Y	Y	Y	Y	Y
Pond edge planting to receive one-two cuts at the end of the season.	LC appointed by PC	Twice per year (hay cut after flowering in July / August and mow or graze the re-growth through to late Autumn to c 50mm).		Y	Y	Y	Y
Arisings are to be collected and removed from the site within 72 hours.	LC appointed by PC	Twice per year (as above or during one as per each regular mowing/cutting session).	Y	Y	Y	Y	Y
Regular inspection of hard features, including weirs, silt in chambers, petrol interceptors etc.	PC	Regular inspection as necessary to ensure the continued functioning of the attenuation ponds.	Y	Y	Y	Y	Y

Measures of Success

7.9.6.3 To ensure that the objectives outlined previously are achieved, the following monitoring targets have been devised to measure the success of the works:

Table 7.9.1: Monitoring targets / measures of success

Objective	Targets Years 0-2	Targets Years 2-3	Targets Years 3-5
Establish and maintain marginal / emergent planting areas	Good cover achieved. No single species dominant.	No single species dominant. Injurious weeds totally no more than 20% of the area coverage.	A diversity of species occurring with injurious weeds totally no more than 10% of the area coverage.

Monitoring frequency and methods

7.9.6.4 The aim of the suggested monitoring programme is to ascertain whether the measures of success listed above have been achieved.

7.9.6.5 Monitoring of marginal and emergent planting areas will be carried out in years 1, 3 and 5 by Highways England's appointed monitoring party and fed back to the steering group.

7.9.6.6 Frequency of monitoring visits will be determined by the success of establishment of planting, and the frequency of monitoring outlined in Table 7.9.4, which will be adjusted accordingly to ensure relevant follow-up operations are undertaken.

Table 7.9.2: Frequency of Monitoring

Action			Years 0 – 5			
Task	Responsibility	Season	1	2	3	5
Periodic checks of new planting plots	HE's appointed MP	July	Y		Y	Y

7.10 Timetable summary

7.10.1 Consultation feedback on woodland clearance works

7.10.1.1 Feedback from consultation with Natural England, Forestry Commission, RSPB and SWT suggested that the process of clearing and thinning the enhancement areas should be phased over a number of winters. And that each location should be cleared and/or thinned in one go, as to minimise the period of disturbance.

7.10.1.2 An overall programme of woodland works has therefore been proposed to facilitate this, see Table 7.10.1 below.

7.10.1.3 Wood pasture creation has been included for completeness. It is a discreet piece of work which can be carried out independent of the construction programme. However, at the time of drafting this document it is a requirement of the draft DCO that substantial progress should be made on the habitat creation measures in these areas (C1 and C2) prior to the main body of construction work associated with the scheme.

7.10.1.4 Reinstatement of temporary land take is likely to be phased and will be greatly influenced by the construction programme.

7.10.1.5 The current timings are estimates only.

Table 7.10.1: Proposed timetable for woodland clearance works

Area	Timing	Link to Critical Task
E1 – heathland restoration area (clear-fell)	Winter TBA	It may be prudent to retain this area of woodland until after construction activities for the A3 and the junction are near completion (as it provides an element of visual screening for the highways works).
E2 – heathland restoration area (clear-fell) and woodland enhancement (selective thinning, creation/widening of rides and glades)	Winter TBA	As above.
E3 - heathland restoration area (clear-fell) and woodland enhancement (selective thinning, creation/widening of rides and glades)	Winter TBA	As above.
E4/Bolder Mere Enhancement Area – works to the southern shore, woodland enhancement in E4 (selective thinning, rhododendron removal and subsequent planting)	Winter 2020	Work may be planned to coincide with the work on the A3 retaining wall to minimise disturbance.

Area	Timing	Link to Critical Task
E5 – heathland restoration area (clear-fell)	Winter 2020	
E6 – heathland restoration area (clear-fell)	Winter 2020.	
E7 – woodland enhancement (selective thinning, widening path)	Winter 2021	
E8 – woodland enhancement (selective thinning, ride creation)	Winter 2021	
C1 and C2 wood pasture creation	Autumn/winter 2020	Linked to DCO requirement to have made substantial progress with habitat creation works in C1 and C2 prior to the main body of construction work associated with the scheme.
Reinstatement of temporary land take	Phased between 2020-2023	As sections of the Scheme are completed reinstatement of temporary land take areas will occur.
Creation of new structures	Between 2020 and 2023	

7.11 Species monitoring approach

7.11.1 Introduction

7.11.1.1 Monitoring of habitats (creation and enhancement) is dealt with in the preceding sections. This is to ensure that the measures of success are achieved and any issues with creation, enhancement or reinstatement works are rectified. This section deals with the monitoring approach for species, which will complement the habitat monitoring. Species monitoring cannot be relied upon solely to assess achievement of goals as population dynamics of individual species (especially birds) can be affected by other factors, such as climate, disease, issues during migration, or impacts on their wintering grounds (such as habitat loss, disturbance, hunting and/or climate) which cannot be accurately predicted. Therefore although these species will be monitored they will not be used as key indicators of success, but rather a supporting indicator to the habitat assessments carried out as part of the habitat management and monitoring works.

7.11.1.2 Requirements for protected species monitoring for the M25 junction 10/A3 Wisley interchange scheme (associated with the draft European Protected Species Mitigation licences) are not included in Table 7.11.1 as this is still under discussion with Natural England.

7.11.1.3 Species monitoring will be carried out by Highways England's appointed monitoring party (as per the habitat monitoring). The results of species monitoring will be documented in annual species monitoring reports (in years where surveys have been carried out) based on the frequency of surveys outlined in Table 7.11.1.

7.11.1.4 Reports will document the methods used and results of monitoring, they will also analyse the results with reference to ‘measures of success’ described in this document and include specific habitat management recommendations (where required). A key requirement of the species monitoring is to trigger appropriate management interventions.

7.11.1.5 Each year, the annual report will be submitted to the steering group.

7.11.1.6 On completion of the monitoring programme for a particular species, the annual monitoring report that year, will include a summary of all monitoring results to date for that species and state clearly whether the habitat works have had an impact on the species.

7.11.1.7 The frequency of species monitoring is provided in Table 7.11.1.

Table 7.11.1: Overview of Species Monitoring Programme

Action		Years 1-15														
Task	Responsibility	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Dartford warbler surveys	HE's appointed MP			Y				Y			Y					Y
Nightjar surveys	HE's appointed MP			Y				Y			Y					Y
Woodlark surveys	HE's appointed MP			Y				Y			Y					Y
CSM Invertebrate Monitoring	HE's appointed MP			Y				Y			Y					Y

7.11.2 SPA Birds

7.11.2.1 The monitoring surveys carried out for the species-specific survey methodologies for the qualifying breeding bird species of the Thames Basin Heaths SPA (woodlark, Dartford warbler and nightjar), are taken from Gilbert et al (1998)[24]. The monitoring period for each species is 15 years. The species-specific survey requirements are listed below:

Woodlark

7.11.2.2 The monitoring is to take place in years 3, 7, 10 and 15, after project completion[25].

7.11.2.3 Three early morning visits (Visit 1 between February and March; Visit 2 between March and April; Visit 3 between April and June).

7.11.2.4 This species requires heathland for breeding/foraging. Therefore, it is not expected that there would be an increase in numbers until Years 5 to 10 when heather should have established.

Dartford warbler

7.11.2.5 The monitoring is to take place in years 3, 7, 10 and 15, after project completion[25].

7.11.2.6 Three early morning visits (Visit 1 between beginning of April and mid-May; Visit 2 between mid-May and late-May; Visit 3 during June).

[24] Gilbert et al 1988 Bird Monitoring Methods: A Manual of Techniques for Key UK Species.
[25] With regard to the SPA species monitoring approach only, the date of 'project completion' will be determined by the steering group. However, it is assumed that this would refer to the completion of a significant part of the suite of compensation measures, with the exception of some rotational elements of the woodland enhancement work.

7.11.2.7 This species requires mature gorse[26] (roughly 6-8 years growth) for nesting/foraging. Therefore, it is not expected that there would be an increase in numbers until Years 5 to 10.

Nightjar

7.11.2.8 The monitoring is to take place in years 3, 7, 10 and 15, after project completion[25].

7.11.2.9 Two dusk or pre-dawn visits between June and mid-July.

7.11.2.10 This species prefers 'new' woodland of less than 10 years growth[27][28]. Therefore, an increase in numbers is expected from Year 0 onwards. The long term rotational management of rides, glades and edges proposed should continue provide conditions suitable for this species up to Year 15.

7.11.3 Terrestrial Invertebrates

7.11.3.1 The Common Standards Monitoring (CSM) methodology is used as a simple standardised assessment system for protected sites (SAC, SPA, Ramsar and SSSI) and identified features. Features are the species, habitats, geological and geomorphological characteristics for which site are protected, for example breeding birds, butterflies, woodlands and heathlands.

7.11.3.2 The guidance given within the Common Standards Monitoring for Terrestrial and Freshwater Invertebrates (March 2008) deals with those designated sites, including SSSIs and SACs, that specifically identify invertebrates as a site feature. It provides guidance on the identification of interest features, attributes, targets and methods of assessment.

7.11.3.3 The monitoring consists of presence / likely absence surveys supported by indirect attributes of habitat quality and/or extent; population counts possibly linked to individual locations within a site; and population counts at different sites in a landscape.

7.11.3.4 This system will be used for monitoring invertebrates in a sample of areas subject to different habitat treatments (restoration of heathland, woodland enhancement, and control areas) over a 15-year period. The monitoring is to take place in years 3, 7, 10 and 15, after project completion[25]. By year 3, successional habitats will be established, heather established by year 7 and scrub will be appearing by year 10, and a final check will be carried out in year 15.

[26] Bibby, C. (1979) Foods of the Dartford warbler *Sylvia undata* on southern English heathland. Journal of Zoology, 188 (4). pp. 557-576.
[27] Sharps, K., Henderson, I., Conway, G., Armour-Chelu, N. and Dolman, P. (2015) Home-range size and habitat use of European Nightjars *Caprimulgus europaeus* nesting in a complex plantation-forest landscape. Ibis, 157 (2). pp. 260-272.
[28] Vertsraeten, G., Baeten, L. and Verheyen. K. (2011) Habitat preferences of European Nightjars *Caprimulgus europaeus* in forests on sandy soils. Bird Study Vol 58, Issue 2.

7.11.4 Carp/Bream (Bolder Mere)

7.11.4.1 The requirement for further management of carp/bream populations in Bolder Mere will be confirmed after the initial clearance effort (and based on the numbers and age classes removed and the population depletion rates). However, as a minimum it is anticipated that the removal works may need to be repeated at Year 5.

7.11.5 Bats

7.11.5.1 Monitoring for bats will be included in the final SPA Management and Monitoring Plan and the final LEMP. It will include all monitoring required under the Natural England licence.

7.11.6 Other Species

7.11.6.1 There is no further species monitoring proposed at this stage for the Scheme (other than that described within Appendix 7.20, draft LEMP). However, this will be kept in review during detailed design and if additional monitoring is beneficial to inform adaptive management it will be added.

7.12 Green bridge monitoring strategy

7.12.1 Introduction

7.12.1.1 The proposed green bridge[29] will be an innovative 'new structure' and therefore monitoring the bridge will benefit future design of similar structures elsewhere in the UK and internationally. A monitoring strategy was developed during the green bridge feasibility study (undertaken through funding provided by the Highways England Designated Funds[30]) and this is replicated here for reference. These are subject to further work and stakeholder engagement

7.12.1.2 The monitoring plan should focus on whether the original aims of the bridge have been met. The target species for Cockcrow green bridge is:

- Sand lizard (*Lacerta agilis*).
- Adder *(Vipera berus).*
- Silver-studded blue butterfly (*Plebejus argus argus*) (if reintroductions occur during the life of the bridge).
- Heath tiger beetle (*Cicinela sylvatica*) (if reintroductions occur during the life of the bridge).

7.12.1.3 The success of the green bridge for these species will be highly dependent on the success of habitat creation and/or management of suitable habitat adjacent to the bridge.

7.12.1.4 Monitoring in the early years should therefore focus on more generic monitoring of species groups i.e. invertebrate assemblages and reptiles/amphibians and habitat establishment rather than the target species listed above. The following questions should be considered from the start when monitoring commences:

- How effective is the green bridge in addressing landscape, access and ecological severance.
- How effective is the green bridge at providing habitats in its own right.
- Are there failures in the construction or maintenance that require remedial action.

[29] The Scheme includes a 'green bridge' extension to Cockcrow bridge. A separate designated funds application is being made by the project team to secure additional funding from Highways England for the provision of a Green Bridge, as a replacement for the demolition of the existing Footpath 17 Cockcrow overbridge. The green bridge is intended to provide an additional enhancement measure to address historic issues relating to the severance of ecological habitats by the existing A3, including habitats that form part of the Ockham and Wisley Commons Site of Special Scientific Interest.
Highways England is confident that there is a reasonable prospect of the designated funds application being approved and has therefore sought authorisation for these works within the scope of the DCO application. However, the inclusion of the green bridge feature within the DCO does not materially affect the overall extent of order land required for the Scheme or the level of funding that may be needed to compensate any affected land interests. In the unlikely event that designated funds are not forthcoming, this enhancement measure can be omitted from the scheme because it is not essential for the purposes of mitigating the scheme's environmental effects. Its omission would not have any material consequences for land acquisition matters and therefore any concerns about the certainty of funding for this element of the work need not indicate against the granting of development consent.
[30] The Department for Transport allocated £900 million of funds to Highways England over a 6-year spending period covering 2015 to 2021. This fund, referred to throughout the document as 'Designated Funds', allows Highways England to deliver schemes which are 'beyond business as usual' and can support Regional Investment Plan (RIP) scheme delivery.

7.12.1.5 It is important that a mechanism is put in place to allow the results of the monitoring to influence the maintenance of the green bridge, and to enable remedial action to be undertaken if any problems are identified during the monitoring programme (e.g. watering of heather turfs if signs of drying out are seen). Where species using the bridge have conflicting habitat requirements, consideration of the overall objectives and priorities for the green bridge will need to be given. Further stakeholder engagement is required to agree which species would take priority where conflicts exist.

7.12.1.6 The green bridge will be mixed use and therefore the risks of monitoring equipment being tampered with or stolen will need to be considered. Health and safety issues such as the risk of members of the public being bitten by adders if reptile refugia are in visible locations and accessible to the public, or equipment being blown onto the road below causing a traffic hazard will all need to be taken into consideration.

7.12.1.7 The results of the monitoring should be published to enable lessons learnt to feed into future green bridge designs.

7.12.1.8 The following sections provide a summary of monitoring measures that could be utilised on the green bridge.

7.12.2 Fixed point photography

7.12.2.1 Photographs should be taken from fixed points to monitor vegetation change. A hand-held GPS is used to identify the exact spot for the camera which is set at the widest angle. Fixed points would be chosen either side of the green bridge pointing towards the green bridge. Photos would be taken annually at the same time of year in Years 1, 2, 3, 5 and 10. These surveys can be undertaken in conjunction with the vegetation monitoring discussed below.

7.12.3 Vegetation Monitoring

7.12.3.1 A record should be undertaken of the habitat creation baseline conditions e.g. extent of translocation of heathland turfs and species present. Once the habitat creation has been undertaken, a suitably experienced ecologist should monitor the on-going establishment of plants on the green bridge and recommend further planting or weed control, if required. The monitoring methodology could be adapted from the Common Standards Monitoring Guidance for Lowland Heathland (JNCC, 2009).

7.12.3.2 A map of the habitats present and the following information should be recorded:

- Habitat extent.
- Bare ground.

- Vegetation structure: cover of characteristic woody species and cover of ericaceous species in different growth stages.
- Vegetation composition: frequency of characteristic species (dwarf shrubs, graminoids, forbs), and cover of bryophytes and lichens.
- Indicators of negative trends (percentage of alien or invasive species which may reduce the diversity of the habitat and affect its integrity; soil erosion, trampling; uncontrolled burning; eutrophication).
- The presence of rare species (vascular plants).

7.12.3.3 In addition, at least 5 fixed 2 m^2 vegetation quadrats (number to be confirmed dependant on the width of suitable habitat in finalised bridge design) should be established on each green bridge. A hand-held GPS should be used to identify the exact spot for the quadrats and could be aided by a short marker post inserted on the first visit. The surveyor would record % bare ground, % cover of each species within each quadrat.

7.12.3.4 Surveys should be undertaken annually in July in Years 1, 2, 3, 5 and 10.

7.12.3.5 It is likely the green bridge will be maintained by SWT who manage the adjacent Wisley and Ockham Commons. A record of any habitat management undertaken and details of any grazing (e.g. months and number of cattle) should be kept. It is anticipated that regular use of the bridge by SWT (and its volunteers) would enable feedback on any management required (e.g. watering of heather turfs) in addition to the monitoring visits.

7.12.3.6 During the vegetation surveys it is recommended that any evidence of use of the bridge by wildlife is recorded e.g. footprints in the sand, droppings or reptiles seen basking in the sun.

7.12.4 Camera Traps

7.12.4.1 Mammals known to be present in the local area include badgers, hedgehogs and roe deer and camera traps could be used to identify if these animals are crossing the green bridge. It is also recommended that pre-construction surveys are undertaken to identify if the existing bridges are used as a crossing point by any mammals currently. It may be possible for the surveys to be undertaken in conjunction with the visitor surveys discussed below.

7.12.5 Sand traps

7.12.5.1 The suggested sand strips/banks could be checked for footprints and snake tracks in conjunction with monitoring visits for other species.

7.12.6 Bat crossing point surveys

7.12.6.1 In order to allow comparison with the pre-construction situation the methodology will be consistent with the baseline surveys of bat crossings undertaken for the Environmental Statement. The bat crossing survey methodology was adapted from the report WC1060 Development of a cost-effective method for monitoring the effectiveness of mitigation for bats crossing linear transport infrastructure (Altringham, J. & Berthinussen, A., 2015). A summary is provided below:

7.12.6.2 Visual observations of bats at a mitigation site were undertaken over 60 minute periods at dusk or dawn. Observations consist of counts of all commuting bats, with data on flight height, direction and distance from the linear habitat feature/existing bridge (pre-construction) or mitigation structure, paired with echolocation recordings for species identification. Cockcrow green bridge is not in the exact location of the existing bridge and therefore if visibility of the previous bridge location is not sufficient, additional surveyors may be required to monitor both the new and previous bridge location to ensure bats are not still crossing at the pre-construction crossing point.

7.12.6.3 A minimum of six surveys should be repeated at the same time each year before, during and after construction of the scheme. Post-construction surveys should be undertaken in Years 1, 2, 3, 5 and 10.

7.12.6.4 The total number of bats crossing at each stage of construction are compared, as are the number of bats considered to be using the mitigation structure in question (according to a set definition of 'use'), and the number crossing the scheme at risk of collision with traffic.

7.12.6.5 Report WC1060[31] states that mitigation structures are considered to be effective when bats are commuting across the scheme in similar numbers before and after construction, and at least 90% of crossing bats are using the structure to cross safely (i.e. not crossing at risk of collision mortality).

7.12.7 Reptiles and Amphibians

7.12.7.1 The monitoring methodology will be adapted from the Common Standards Monitoring Guidance for Reptiles and Amphibians (JNCC, 2004)[32]. Reptile monitoring should be undertaken by an experienced surveyor using direct observation survey methods along a transect across the bridge targeting suitable habitat features for reptiles. Four visits per year between March and June and

[31] Department for Environment Food and Rural Affairs. (date unknown). Development of a cost-effective method for monitoring the effectiveness of mitigation for bats crossing linear transport infrastructure – WC1060. Accessed on 02/05/2019. Available at http://sciencesearch.defra.gov.uk/Default.aspx?Module=More&Location=None&ProjectID=18518

[32] Joint Nature Conservation Committee (2004) Common Standards Monitoring Guidance for Reptiles and Amphibians. ISSN 1743-8160. Available at http://jncc.defra.gov.uk/pdf/CSM_reptiles_amphibians1.pdf.

September are recommended and visits must be in good weather conditions, as activity is highly weather-dependent.

7.12.7.2 Artificial refugia may also be distributed along the transect to increase the chances of finding sand lizard, adder, slow worm, grass snake (and smooth snake should this species be re-introduced).

7.12.7.3 Artificial refugia surveys can also be used to detect use of the bridge by amphibians, including the legally protected great crested newt. If artificial refugia are not used natural refugia such as log piles and rocks could be carefully checked for reptiles and amphibians.

7.12.7.4 Post-construction surveys should be undertaken in Years 1, 2, 3, 5 and 10[33].

7.12.8 Invertebrates

7.12.8.1 The citation for Ockham and Wisley Commons SSSI, includes a number of invertebrates (silver-studded blue butterfly (*Plebejus argus*), heath tiger beetle (*Cicindela sylvatica*), bog bush-cricket (*Metrioptera brachyptera*), and the hornet robber fly (*Asilus crabroniformis*)).

7.12.8.2 The silver-studded blue butterfly is no longer present at Ockham Common or Wisley Common but there are aspirations for re-introductions of this species in the future. Should this be undertaken a monitoring programme will need to be designed by the organisations involved in the re-introduction.

7.12.8.3 A non-specific monitoring programme for invertebrates is proposed for the bridge and may detect this species if it does establish in the local area.

7.12.8.4 Monitoring methods for invertebrates may be based on Natural England guidance document, Surveying Terrestrial and Freshwater Invertebrates for Conservation Evaluation. Methods that could be used include:

- Sweep netting.
- Spot sampling - spot sampling is employed to enable close scrutiny of bumblebees and the collection of any other ambiguous specimens that cannot be identified in the field.
- Grubbing - deadwood and piles of rotting timber to be searched for deadwood beetles.
- Beating – vegetation tapped to dislodge any hiding beetles which can be collected from a white sheet held under the branch.

[33] Monitoring for reptiles and amphibians could stop earlier if conclusive evidence has been found that all species (sand lizard, adder, slow worm, grass snake, great crested newt and smooth snake should this species be re-introduced) are crossing the structure.

- Butterfly and other flying invertebrates crossing observation – insects recorded crossing the bridge during one hour survey windows in July and August.

7.12.8.5 This monitoring will provide information on the use of the bridge by pollinating insects also. Post-construction surveys should be undertaken in Years 1, 2, 3, 5 and 10.

7.12.9 Recording of road kills

7.12.9.1 The Highways England managing agent keep a record of animal casualties on the strategic road network. As part of the green bridge monitoring, records of road kills should be requested from the managing agent to identify any crossing hotspots in the vicinity of the green bridge that which may require remedial action, such as improved roadside fencing.

7.12.10 Visitor surveys

7.12.10.1 Visitor surveys can be used to identify how many people are using sites, why they choose the site, how they behave and their views on particular issues. Visitor surveys could help determine the level of disturbance to wildlife on the bridge as a result of the mixed-use design, as well as identifying changes to recreational pressure on the adjacent heathlands. Community surveys have been undertaken to inform the Environmental Statement but it is recommended that these surveys are supplemented with additional pre-construction surveys focussed on the existing bridge.

7.12.10.2 Monitoring could involve surveyors out on site accurately counting and undertaking questionnaires or automated counters, automated cameras and time-lapse cameras.

7.12.10.3 The results of the monitoring surveys could help with the development of a visitor strategy to balance peoples' desire for access to the natural environment and the needs of species and habitats.

7.12.11 Collaboration

7.12.11.1 Consideration should be given to a collaboration with local universities (e.g. Imperial College's Silwood Park campus and University of Surrey) on research projects for BSc, MSc or PhD students. This collaboration could allow for additional monitoring information beyond the objectives that would be covered by Highways England funding and provide opportunities for wider dissemination of outcomes i.e. publication in academic journals.

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7.13.1.18 Sharps, K., Henderson, I., Conway, G., Armour-Chelu, N. and Dolman, P. (2015) Home-range size and habitat use of European Nightjars *Caprimulgus europaeus* nesting in a complex plantation-forest landscape. Ibis, 157 (2). pp. 260-272.

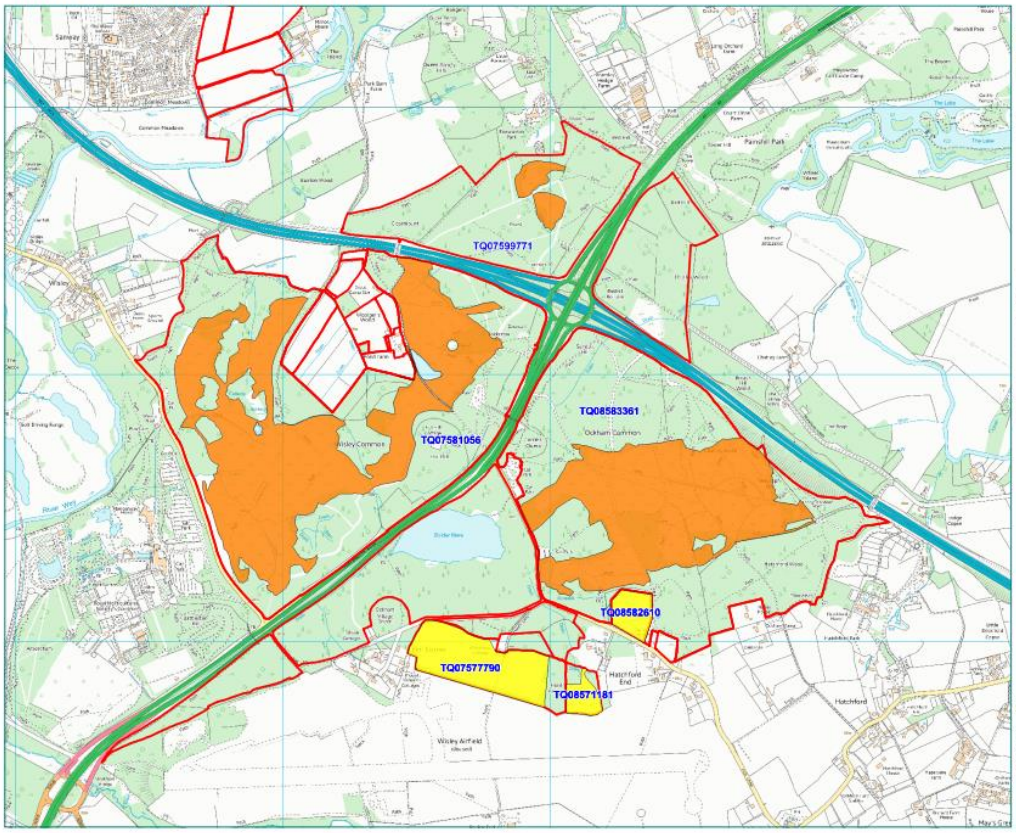
7.13.1.19 Surrey Wildlife Trust (2008) Wisley & Ockham Management Plan 2010-2020.

7.13.1.20 Vertsraeten, G., Baeten, L. and Verheyen. K. (2011) Habitat preferences of European Nightjars *Caprimulgus europaeus* in forests on sandy soils. Bird Study Vol 58, Issue 2.

Appendices

Appendix A. Countryside Stewardship Higher Tier Application: Options Map

AG00475338 : Wisley and Ockham



Countryside Stewardship Higher Tier Application- Options Map

Key

- LH1
- GS13
- WD5
- RLR boundaries

Options Summary

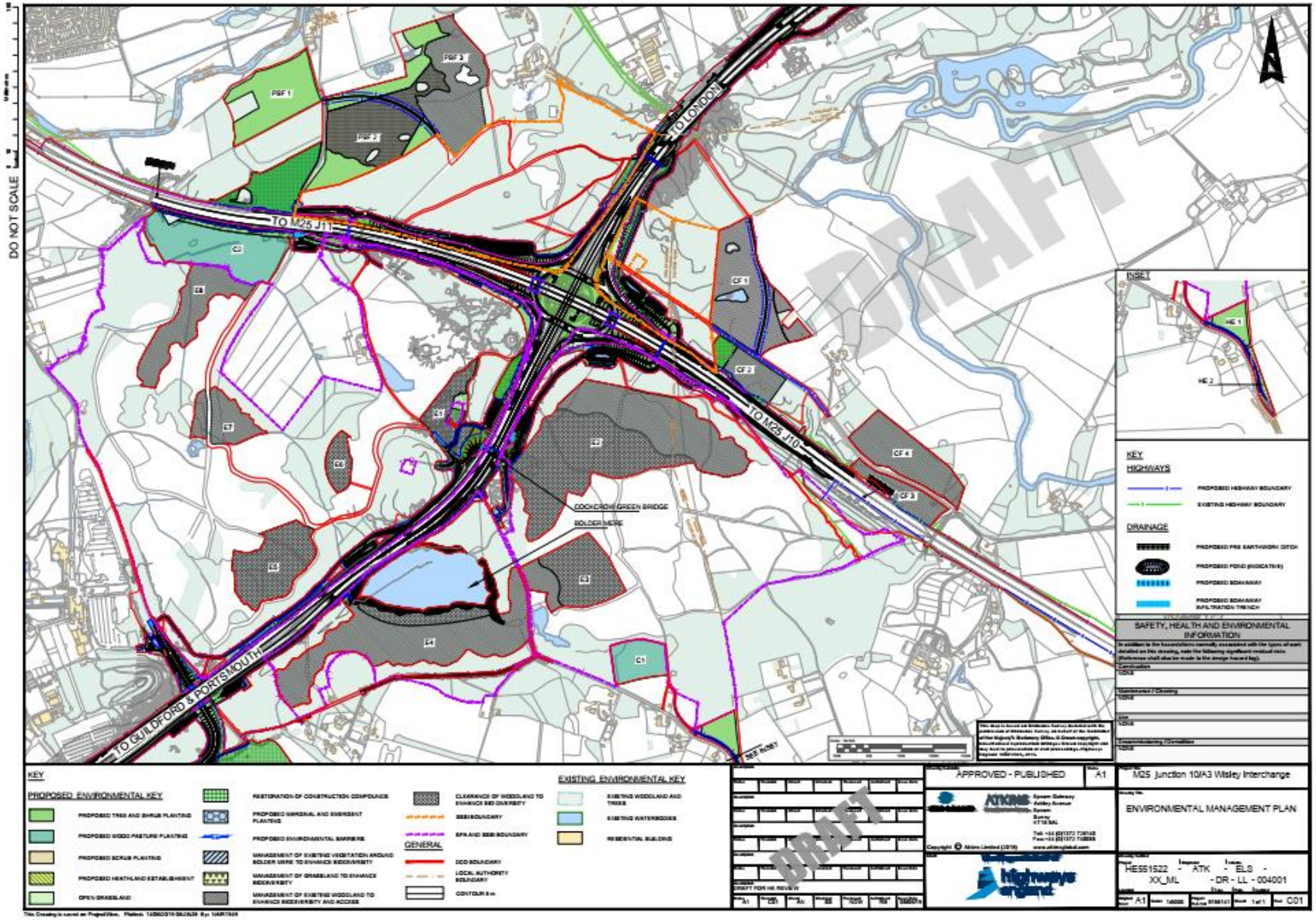
Parcel_#	CS_Option_	Sum(Area_ha)
TQ08582610	GS13	2.2267
TQ08571181	GS13	1.4957
TQ07577790	GS13	9.305
TQ08583361	LH1	36.1827
TQ07581056	LH1	51.6333
TQ07599771	LH1	2.5286

Scale: 1: 10000 (A3)

Prepared by: Surrey Wildlife Trust
Date: 18/04/18
Revision:
File Ref: 180418CS - AG00475338

N

Appendix B. SPA Environmental Management Plan Figure


DO NOT SCALE
TO LONDON
TO M25 J11
TO M25 J10
TO GUILDFORD & PORTSMOUTH
COCKCROW GREEN BRIDGE
BOLDER MERE
PEF 1
PEF 2
PEF 3
CF 1
CF 2
CF 3
CF 4
INSET
HE 1
HE 2
KEY
HIGHWAYS
PROPOSED HIGHWAY BOUNDARY
EXISTING HIGHWAY BOUNDARY
DRAINAGE
SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
KEY
PROPOSED ENVIRONMENTAL KEY
EXISTING ENVIRONMENTAL KEY
GENERAL
APPROVED - PUBLISHED
A1
M25 Junction 10/A3 Wisley Interchange
ENVIRONMENTAL MANAGEMENT PLAN
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