



West Sussex County Council

A29 REALIGNMENT PHASE 1

Landscape and Ecological Management Plan





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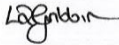
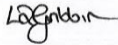
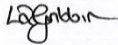
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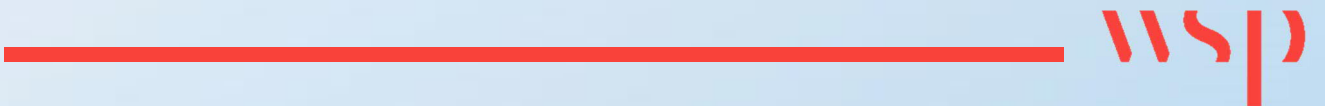
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INTRODUCTION



1 INTRODUCTION

1.1 OVERVIEW

- 1.1.1. WSP Landscape and Urban Design, and WSP Ecology have been commissioned by Jacksons to prepare a Landscape and Ecological Management Plan (hereafter referred to as the 'LEMP'), in support of discharging planning conditions for the A29 Phase 1 realignment development (WSCC/052/20) The Proposed Development and extent of the Site is illustrated on drawings *A29-CAP-EXX-00-DR-L-0066*, *A29-CAP-EXX-00-DR-L-0067*, *A29-CAP-EXX-00-DR-L-0068*, *A29-CAP-EXX-00-DR-L-0069* and *A29-CAP-EXX-00-DR-L-0070* prepared by Capita on behalf of Jacksons. The Site is also described in **Section 2.1**.
- 1.1.2. This LEMP outlines the proposed management of the landscape and ecological elements for the A29 Phase 1 realignment development (hereafter referred to as the 'Proposed Development').
- 1.1.3. The document sets out the preparation and management practices for the periods prior to construction; during construction and throughout the initial 18 months defects liability period. It then outlines the remainder of the 10 year on-going maintenance of the Proposed Development being operational (post practical completion), along with the long-term goals and recommendations for the lifetime of the development.

1.2 OBJECTIVES

- 1.2.1. The key aims of the LEMP are to provide details of the habitat creation, ecological enhancement and management and maintenance of the soft landscaping within the Proposed Development.
- 1.2.2. The key objectives of the landscape and ecology management and maintenance activities outlined in this LEMP are to:
- Ensure the continued health and vigour of the existing trees, shrubs and any retained vegetation on the site;
 - Ensure the successful establishment and continued healthy growth through to maturity of all proposed vegetation;
 - Manage drainage and infiltration areas to ensure they are effective;
 - Achieve a clean, tidy condition and appearance of all external areas;
 - Ensure the continued existence of natural habitat for existing species and promote the environment wherever possible; and
 - Control invasive and injurious weeds within the planting plots and within the scheme boundary.

1.3 APPROACH

- 1.3.1. The LEMP should be read in conjunction with the following drawings and documents:
- *A29-CAP-HPN-00-DR-C-0132 Site Plan Sheet 1 of 5*;
 - *A29-CAP-HPN-00-DR-C-0133 Site Plan Sheet 2 of 5*;
 - *A29-CAP-HPN-00-DR-C-0134 Site Plan Sheet 3 of 5*;
 - *A29-CAP-HPN-00-DR-C-0135 Site Plan Sheet 4 of 5*;
 - *A29-CAP-HPN-00-DR-C-0136 Site Plan Sheet 5 of 5*;
 - *A29-CAP-EXX-00-DR-L-0199 Landscape Planting and Seeding Layout Plant Schedules*;

- *A29-CAP-GEN-00-SP-0039* A29 Realignment Scheme Highway Specification, Landscape and Ecology Appendix 30;
- *70060779_WSP_ARB_REP* Arboricultural Report;
- A29 Ecological Mitigation Plan March 2022
- A29-CAP-HPN-00-DR-C-0258 Fencing Plan Sheet 1 of 5
- A29-CAP-HPN-00-DR-C-0259 Fencing Plan Sheet 2 of 5
- A29-CAP-HPN-00-DR-C-0260 Fencing Plan Sheet 3 of 5
- A29-CAP-HPN-00-DR-C-0261 Fencing Plan Sheet 4 of 5
- A29-CAP-HPN-00-DR-C-0262 Fencing Plan Sheet 5 of 5
- Environmental Statement Chapter 9 (Ecology and Nature Conservation) (WSP, 2021a);
- Environmental Statement Chapter 10 (Landscape and Visual) (WSP, 2021a);
- *A29-JCE-GEN-00-PW-Z-009_S4_P07* Construction Environmental Management Plan which includes:
 - Appendix O - Precautionary Method of Works (Protected and Notable Species) (WSP, 2021b); and
 - Appendix N - Precautionary Method of Works (Building B5) (WSP, 2021c).

1.3.2. The maintenance of the lighting within the scheme is detailed separately from this document within the Lighting Maintenance Strategy (70079718-WSP-A29-XX-RP-LI-0001).

1.3.3. It is understood that Jacksons (the Landscape Contractor/Main Contractor) will be responsible for the management and maintenance of the landscape and ecological elements up to Final Completion and for the following 18 month defects liability period. West Sussex County Council (WSSCC) will then be responsible for a Maintenance Contractor to undertake the management and maintenance of the landscape and ecological elements for the remainder of the 10 years of establishment (i.e. post Practical Completion).

1.3.4. This LEMP is a working document, which intends to guide those responsible for the protection, establishment and management of the landscape and ecology elements in the Proposed Development. As such, the document may be subject to change and improvement as the ecological features / habitats mature. A formal review should take place at the end of Year 1, 3 and 5. This will be used by the Project Ecologist and Project Landscape Architect to determine whether the aims of the LEMP have been met, and to identify any actions or changes to the LEMP that may be required. If the reviews highlight the need for management changes, then remedial measures would be introduced into the LEMP, following agreement with WSSCC.

1.3.5. The LEMP is structured as follows:

- **Section 1** – Introduction: provides an outline of the LEMP approach, purpose and objectives of the Proposed Development’s landscape and ecological design;
- **Section 2** – Baseline: provides details of the Proposed Development and sets out the pre-construction landscape and ecology baseline and proposed design elements;
- **Section 3** – Pre-Construction Management Actions: details landscape / ecological management actions for pre-construction phase;
- **Section 4** – Construction Management Actions: details landscape / ecological management actions for the construction phase;
- **Section 5** – Post-Construction Management Actions: details landscape / ecological management actions for post-construction phase; and



- **Section 6** – Maintenance and Management Schedules: provides detail of the programme of works to be implemented during the establishment phase, and on-going management and maintenance.

2 BASELINE

2.1 SCHEME DESCRIPTION

- 2.1.1. The Phase 1 realignment of the A29 (the 'Proposed Development') is located to the north of Eastergate village and the north-west of Barnham village, both to the north of Bognor Regis.
- 2.1.2. The proposed realignment of the A29 includes a 30 mph, 1.3 km single carriageway with a 3 m wide cycleway and footway, 2.5 m wide central islands, four uncontrolled crossings, three roundabouts, landscaping, noise barriers and other associated works which will be carried out over 2 phases. Phase 1 starts just to the south of Barnham Road but sits largely to the north of Barnham Road connecting up to the far east of Eastergate Lane. Phase 2 will continue from just south of Barnham Road southwards, crossing the railway line and joining Lidsey Road just north of the village of Lidsey.
- 2.1.3. The Proposed Development addresses the first phase only. The Proposed Development will cut through existing countryside between the settlements of Westergate, Eastergate and Barnham. The countryside forms a strategic area of open space and acts as a 'strategic gap' to define and separate the adjacent settlements and maintain their distinctiveness.
- 2.1.4. The Proposed Development consists of:
- A new carriageway and shared use cycle and footways linking Eastergate Lane with Barnham Road;
 - 3 no. new roundabouts;
 - Above ground drainage systems including extensive drainage swales and 3 no. attenuation ponds (2 wet and 1 dry);
 - Segregated Apple orchard;
 - Soft landscaping and screening along the linear route;
 - Ecological mitigation features; and
 - An acoustic barrier with climbing plants on the western side to screen the Scheme from adjacent residential properties.
- 2.1.5. The majority of the soft landscape proposals focus on mitigating the landscape and visual effects of the Proposed Development within the surrounding landscape and nearby receptors (i.e. residential properties) as well as providing for ecological mitigation.
- 2.1.6. The following table shows an indicative programme for the construction of the Phase 1 of the A29 realignment:

Stage	Programme
Compound Construction (Barnham Road to Fontwell Avenue)	Early April 2023
Site Clearance (including Folly House demolition)	Late 2022 to Early 2023
Installation of Ecological Enhancement Measures (outside of site boundary)	Early April 2023

Stage	Programme
Installation of Ecological Enhancement Measures (within site boundary)	Late 2024 – Early 2025
Utilities Diversion	Mid July to Late October 2023
Excavation and Earthworks	Late July 2023 to Early 2025
Construction of Road (including drainage)	Mid 2023 to Early 2025
Installation of New Permanent Acoustic Barrier	Early to Mid 2024
Installation of Street Lighting	Late 2024
Landscaping	Late 2024 – Early 2025
Road Opening	Early 2025

2.2 LANDSCAPE BASELINE

- 2.2.1. The baseline landscape features associated with the Site boundary include a wide variety of planting and associated habitats, including Broadleaved woodland, Semi-natural, Native hedgerows, Native hedgerows with trees, Grassland / scrub, Mature trees, Traditional orchards, Arable farmland, Pasture, and Semi-improved grassland. There are no other landscape designations within the Site boundary.
- 2.2.2. The Site has significant landscape character and quality as well as biodiversity value due to its rural setting. Species-rich hedgerows, with and without trees, are important for the range of species they support and their function as corridors and refuges. Although there are no areas of ancient woodland within the Site boundary, there are small areas of broadleaved woodland cover scattered across it, as well as a large area of traditional orchard to the north of the Site which is a particular feature of the district. Further north of the Site there is a network of small and medium-sized broadleaved woodlands, including ancient and semi-natural woodland, well linked by hedgerows and garden exotics providing an enclosed field framework.
- 2.2.3. There are a number of existing mature trees within the Site boundary, 3 no. of which have Tree Preservation Orders (TPOs) attached to them. Outside the Proposed Development boundary there are also high numbers of additional TPOs, some of which may have extensive root systems which should be considered and protected during the Construction Period.
- 2.2.4. The closest areas of settlement to the Site are residential properties, businesses and farm steadings on the outskirts of Eastergate. Most notably: those on Barnham Road; Chantry Mead / Downview Road; Fontwell Avenue; and Eastergate Lane.
- 2.2.5. There are 2 no. Public Rights of Way (PRoW) within the Site boundary with one PRoW crossing the proposed A29 route. PRoW Eastergate 318-1 is a local walking route, running north to south, connecting Barnham Road with Eastergate Lane.

- 2.2.6. In addition, PRoW Eastergate 321-1 cuts across the countryside at the very southern boundary of the Proposed Development providing an east-to-west off road link between the outskirts of Eastergate and Barnham. Along with a number of other smaller PRoWs and quiet rural roads, this route creates a significant east-to-west connection spanning approximately 3 km from Aldingbourne to Barnham.
- 2.2.7. The Site sits within National Character Area (NCA) 126 South Coast Plain. The NCA profile describes the area as broadly divided into the coastal margins, heavily influenced by the sea; the expansive lower coastal plain which occupies most of the area; and the upper coastal plain which forms the transition between the lower plain and the chalk dip slopes of the South Downs and the South Hampshire Lowlands. The Site sits within the latter.
- 2.2.8. Key and relevant characteristics of the north and east of the NCA, where the Site is located, are flat, regular patterns of large fields. It is a varied landscape, incorporating both open arable farmland and low-density settlements, with some wooded and semi-enclosed (somewhat suburban) character locally.
- 2.2.9. It is a fertile area due to superficial deposits & favourable climatic conditions that support intensive arable farming and horticulture, particularly soft fruit. This has given rise to the use of glasshouses and polytunnels in some areas. The underlying geology of flinty marine and valley gravels also gives rise to deep and well-drained, high quality soils.

2.3 LANDSCAPE ELEMENTS

- 2.3.1. To compensate for the unavoidable loss of landscape features, character and visual amenity during construction and operation, a strategic landscape strategy has been designed. The landscape strategy elements that comprise the soft landscape proposals of the Proposed Development include:
- Retention of existing trees and shrubs;
 - Proposed Woodland Edge planting (SW1);
 - Proposed Scrub planting (SW2);
 - Proposed Individual specimen tree planting (SW3);
 - Proposed Hedgerow planting;
 - Climbing plants to acoustic barrier;
 - Wildflower meadow grass seeding; and
 - Wetland seeding and associated planting to attenuation ponds (submerged and floating plants, marginal plants) and swales (planting in swale).
- 2.3.2. The species composition and locations for the above elements are indicated on the Site Plans Sheets 1 to 5 (A29-CAP-HPN-00-DR-C-0132 to A29-CAP-HPN-00-DR-C-0136 inclusive) and Landscape Planting and Seeding Layout Plant Schedules (A29-CAP-EXX-00-DR-L-0199) prepared by Capita, on behalf of Jacksons and WSCC.
- 2.3.3. The construction and post-construction management of each element noted above will be detailed in **Section 4** and **Section 5**, respectively.

2.4 ECOLOGICAL BASELINE

- 2.4.1. The Site has been subject to numerous ecological assessments and surveys, including the following as detailed in the Ecology and Nature Conservation Chapter of the Environmental Statement (WSP, 2021a):

- Preliminary Ecological Appraisal (including extended Phase 1 habitat survey);
- Roosting bat surveys of buildings and trees;
- Bat activity surveys;
- Badger *Meles meles* surveys;
- Hazel dormouse *Muscardinus avellanarius* surveys;
- Breeding and wintering bird surveys;
- Reptile surveys;
- Great crested newt *Triturus cristatus* surveys; and
- Invertebrate surveys.

2.4.2. As a result of the above survey work and assessment, landscape features within (or in close proximity to) the Site have been identified as suitable habitat for protected and notable species as set out in Table 2-1. The features set out in Table 2-1 are considered to be of particular relevance to this LEMP.

2.4.3. Surveys confirmed the likely absence of great crested newt and hazel dormouse from the Site, and therefore these species are not considered further within this LEMP. Similarly, invasive non-native species have not been identified within the Site to date.

Table 2-1 – Suitable habitat within the Site for protected and notable species

Protected/Notable Species	Suitable habitat / landscape features
Bats (roosting, commuting and foraging)	<p>One building (B5) has been confirmed as a summer/transitional roost for individual soprano pipistrelle <i>Pipistrellus pygmaeus</i> and serotine <i>Eptesicus serotinus</i> bats. A further two buildings were identified with low and moderate bat roosting suitability.</p> <p>In addition, 39 trees with bat roosting suitability have been identified, primarily comprising the aged apple <i>Malus</i> sp. trees present within the existing orchard area.</p> <p>Linear features within the Site (including hedgerows and treelines) were found to support commuting and foraging bats including common pipistrelle <i>Pipistrellus pygmaeus</i>, soprano pipistrelle, noctule <i>Nyctalus noctula</i>, serotine, Nathusius' pipistrelle <i>Pipistrellus nathusii</i>. Low numbers of rarer species, including barbastelle <i>Barbastella barbastellus</i> and greater horseshoe bat <i>Rhinolophus ferrumequinum</i> were also found to use these features. Static detectors were not deployed in open fields, but it is likely these areas of the Site also support some foraging activities by local bat populations.</p>
Badger	<p>The Site supports one badger clan, occupying a main, annexe and subsidiary sett as well as several outlier setts. The open fields and woodland areas provide suitable habitat for badger foraging and sett creation.</p>
Birds (wintering and breeding)	<p>Suitable habitat for wintering birds comprises the open fields and hedgerows, while woodland areas, hedgerows and scrub across the site provide suitable nesting areas for breeding birds.</p> <p>Wintering bird surveys recorded 40 species within the Site (of which 16 receive additional legal protection). Breeding bird survey identified 44 species (of which 15 receive additional legal protection). Barn owl was recorded within the Site incidentally during the breeding bird surveys.</p>

Protected/Notable Species	Suitable habitat / landscape features
Reptiles	<p>Slow worm <i>Anguis fragilis</i> and common lizard <i>Zootoca vivipara</i> were recorded along field margins and woodland edges with the Site, and a low population of grass snake <i>Natrix helvetica</i> may also be present due to the proximity of a record returned during desk-based assessments.</p> <p>Open fields and woodland areas are considered suitable to support reptiles within the Site.</p>
Invertebrates	<p>Stag beetle <i>Lucanus cervus</i> has been incidentally recorded within the Site. Invertebrate species also recorded three nationally scarce invertebrates and three Species of Principal Importance (SPI) as listed under Section 41 of the Natural Environment and Rural Communities Act.</p> <p>Habitats including hedgerows, field margins and woodland areas are considered suitable for notable invertebrate species within the Site.</p>

2.5 ECOLOGICAL ELEMENTS AND DESIGN MEASURES

- 2.5.1. Habitats within the Site have been identified as supporting a number of protected and/or notable species. Woodland/trees, hedgerows, scrub and field margins are considered to be of particular value for such species. Wherever possible, the Proposed Development has been designed to avoid or minimise impacts to these habitats.
- 2.5.2. To compensate for the unavoidable loss of habitat during construction, a strategic landscape strategy has been designed, including the elements set out in Section 2.3 of this LEMP. The landscape strategy includes the creation of new habitats and the enhancement of existing retained habitats to provide greater opportunities for protected and notable species including bats, badger, birds, reptiles and invertebrates.
- 2.5.3. Key ecological features of the landscape strategy include:
- Retention of existing trees and shrubs wherever possible, to ensure continued nesting and roosting opportunities for breeding birds and roosting bats;
 - Creation of new habitats, including specimen tree planting, woodland edge planting, wildflower planting and scrub planting which will provide additional refuge and foraging opportunities for protected and notable species; and
 - New hedgerow planting, which will increase connectivity across the Site for species such as commuting bats and reptiles, as well as providing additional nesting opportunities for breeding birds and shelter for reptiles.
- 2.5.4. In addition, a number of specific ecological mitigation measures and enhancements will be provided as part of the landscaping strategy, including the following:
- Provision of a wildlife underpass and permanent badger fencing to encourage the safe crossing of badgers beneath the new road;
 - Provision of an artificial badger sett, as compensation for sett closure activities;
 - Provision of 17 bat boxes to be installed in areas of suitable habitat across the Site, including areas of retained orchard and treelines along the public right of way;
 - Provision of six bird boxes to be installed in areas of retained woodland and orchard, and along suitable trees on the public right of way;

- Six reptile refugia to be installed in newly created habitats, including wildflower planting, on newly planted scrub edges and along hedgerows; and
- Provision of vertical log poles for stag beetle, obtained from vegetation clearance, to be installed in areas of retained woodland within the Site.

2.5.5. A sensitive lighting strategy has been designed to account for barbastelle bat *Barbastella barbastellus*, amongst other notable species recorded during bat activity surveys. In particular, lighting columns with a dimming regime have been selected to reduce the light spill on key commuting corridors during the bat active season. The maintenance of the lighting within the scheme is detailed separately from this document within the Lighting Maintenance Strategy (70079718-WSP-A29-XX-RP-LI-0001).

3 PRE-CONSTRUCTION MANAGEMENT ACTIONS

3.1 GENERAL MANAGEMENT ACTIONS

- 3.1.1. An approved Construction Environmental Management Plan (CEMP) will be submitted to Jacksons prior to the commencement of the construction. This will be implemented by the Main Contractor (WSP Landscape & Urban Design inputs excluded).

3.2 HABITAT MANAGEMENT ACTIONS

TREE AND HEDGEROW PROTECTION

- 3.2.1. Temporary protective fencing will be erected around retained hedgerows and trees prior to the construction period, as specified within the Arboricultural Report (*70060779_WSP_ARB_REP_Arb Report*). The location and extent of the protective area will be defined by the Project Arboriculturalist in accordance with BS 5837:2012 'Trees in relation to design, demolition and construction – Recommendations' (BSI Standards Publication, 2012 British Standards). Excavations within root protection zones (RPZs) will be avoided to safeguard trees, but should excavations be required in the immediate vicinity of trees / shrubs, these will be carried out by hand under the direction of the Project Arboriculturalist.
- 3.2.2. It is the Contractors responsibility to ensure all fencing around retained trees and hedgerows are installed to BS5837, prior to construction commencing on Site, and maintained throughout the Construction period.

3.3 SPECIES MANAGEMENT ACTIONS

PROTECTED AND NOTABLE SPECIES

- 3.3.1. Precautionary Method of Works (PMOW) have been produced, detailing the required working methods for bats, badgers, breeding birds, reptiles and terrestrial invertebrates (WSP, 2021b). A separate PMOW has also been produced for working practices in relation to the confirmed bat roost in building B5 (WSP, 2021c). Both PMOW documents will be incorporated into the CEMP.
- 3.3.2. Relevant pre-construction measures from the PMOWs are summarised below.
- Bats**
- 3.3.3. Updated surveys of trees within the Site will be undertaken in 2022, prior to tree clearance works. Trees will be assessed from ground level for their potential to support roosting bats. Any trees identified with moderate or high bat roosting suitability from the ground level survey will be subject to further at-height inspection during the active season for bats (May-September inclusive) to determine the presence or likely absence of roosting bats.
- 3.3.4. Where roosting bats are confirmed, designs will be consulted to ensure retention of the roost tree where possible. If retention is not possible, a licence to fell the roost will be sought from Natural England prior to clearance.
- 3.3.5. Trees with low bat roosting suitability, or trees with moderate or high roosting suitability where roosting bats have not been identified, will be subject to clearance under ecological supervision.

Badger

- 3.3.6. A licence to close badger setts will be obtained from Natural England prior to construction activities within 30m of sett entrances. Where necessary, further survey will be undertaken in 2022 to inform the licence application. Construction activities within 30m of sett entrances will not proceed until setts have been closed in accordance with the method statements of the approved licence, once obtained.

4 CONSTRUCTION MANAGEMENT ACTIONS

4.1 RETAINED HABITAT ACTIONS

TREE AND HEDGEROW PROTECTION

- 4.1.1. Temporary protective fencing will be erected around retained hedgerows and trees prior to the construction period, as specified in the Arboricultural Report (*70060779_WSP_ARB_REP_Arb Report*). The location and extent of the protective area will be defined in accordance with an Arboricultural Method Statement in advance of the works and updated by them as required throughout the works. Protective fencing will be maintained throughout the construction period. It is the Contractors responsibility to ensure all fencing around retained trees, hedges and other protected habitats are installed and maintained throughout the Construction period.
- 4.1.2. All works shall be carried out in accordance with BS 3998:2010 *Recommendations for Tree Work*, and BS 5837:2012 *Trees in Relation to Design, Demolition and Construction*, and undertaken by certificated personnel from the Arboricultural Association's list of Registered Contractors. Proof of experience and insurance provision will be required. All work shall be undertaken at the appropriate time and with the consent of the Overseeing Organisation who shall approve a programme of work with the Council.
- 4.1.3. All operations shall be carefully carried out to avoid damage to retained trees on site or neighbouring trees adjacent to the site. No trees to be retained shall be used for anchorage or winching purposes.
- 4.1.4. The trees should be checked annually for signs of deterioration or distress and the appropriate actions undertaken, where a potential safety hazard is identified.
- 4.1.5. The understorey should otherwise remain undisturbed with little pro-active management required other than the severing of ivy stems where crown infestation of the larger trees is evident or where maintenance of grass or planted areas is required. Heavy ivy growth is not recommended in development situations, where wind risk may be a concern. The form of the tree can also be affected, and it is therefore proposed to review the status of ivy growth to determine whether ivy removal is required if identified on site or during maintenance on a case by case basis, noting the resource value of the ivy..
- 4.1.6. All diseased wood, prunings and rubbish should be removed from site to the nearest approved recycling centre and the site left in a clean and tidy condition.
- 4.1.7. Where identified by the Project Arboricultural Consultant or WSCC Tree Officer for health and safety reasons, any heavy branches to be removed should be removed in sections and undercut to avoid tearing the bark, thereafter to be lowered by slings. No branch stumps should be left, and no cuts should be sealed with fungicidal sealant. No cuts should be capable of holding water. Removed wood should be left for a minimum of 24hrs prior to cutting into sections.

TEMPORARY LAND TAKE

- 4.1.8. Within areas of temporary land take, where vegetation clearance is required (i.e. for site compounds / temporary storage of materials and topsoil and car parking), full reinstatement of habitat will take place, to ensure there will be no change to baseline conditions. Topsoil shall be removed and stored in accordance with the Construction Code of Practice for the Sustainable use of Soils on

Construction Sites ([DEFRA 2009](#)) and reinstated in the same place upon completion, once any compaction has been relieved.

4.2 SPECIES MANAGEMENT ACTIONS

4.2.1. Relevant species management actions are detailed within the PMOW documents (WSP, 2021b and 2021c), and are summarised below for reference. All actions detailed within PMOW documents will be briefed to site operatives through toolbox talks at the start of the construction phase.

Bats

- 4.2.2. Upon completion of further survey, trees with low, moderate or high bat roosting suitability will be soft-felled under ecological supervision.
- 4.2.3. Retained trees, including retained trees with bat roosting suitability, will be protected in accordance with the measures set out above in Section 4.1. A sensitive lighting strategy for any temporary construction lighting to minimise light spill onto retained trees and vegetation, to avoid disturbance to roosting, commuting and foraging bats.

Badgers

- 4.2.4. All works relating to sett closure will be completed in advance of the construction programme and in accordance with approved methodologies set out in the licence.
- 4.2.5. Any additional potential mammal burrows encountered during the construction phase will be assessed by an ecologist for their potential to support badgers. The ecologist will advise on further steps, including avoidance of works within a buffer of the sett if possible, or otherwise closure of the sett under licence. Burrows encountered within the works footprint which are not considered to support badger will be dug out sensitively under ecological supervision.
- 4.2.6. Good practice measures will be implemented during the construction phase to minimise impacts to commuting and foraging badgers. This includes fencing off excavations or otherwise providing a means of egress, and avoiding light spill onto retained sett entrances.

Vegetation Clearance (Birds, Reptiles and Badgers)

- 4.2.7. Wherever possible, vegetation clearance will be conducted outside of the breeding bird period (i.e. clearance between September and February inclusive). To avoid conflicts with the reptile winter hibernation period, vegetation clearance will be completed in two-stages:
- Trees, shrubs and scrub are cleared down to 150mm in September-February inclusive, as this falls outside of the breeding bird season and is unlikely to impact reptiles which typically hibernate at ground level or below ground.
 - Remaining vegetation to be cleared to ground level in early spring (March-April inclusive), when reptiles will be active and the habitat has already been rendered unsuitable for breeding birds.
- 4.2.8. Any unavoidable summer clearance of suitable breeding bird habitat will be conducted under an ecological watching brief, whereby an ecologist inspects the vegetation for nests prior to clearance.
- 4.2.9. Any vegetation clearance completed within 30m of a known sett in advance of badger sett closure works must be completed sensitively using hand tools, in agreement with the Scheme ecologist, and should not be completed within 5m of a known sett prior to closure.

- 4.2.10. It is understood that Site clearance activities will not be required within the immediate vicinity of the artificial sett.

4.3 LANDSCAPE FEATURES

- 4.3.1. The following section describes the landscape elements (habitats) that comprise the soft landscape of the Proposed Development. These are described in terms of their function and type. The species composition for the following landscape elements are provided in Landscape Planting and Seeding Layout Plant Schedules (A29-CAP-EXX-00-DR-L-0199). A29 Realignment Scheme Highway Specification, Landscape and Ecology Appendix 30 (A29-CAP-GEN-00-SP-0039) shall include detailed information on suitable ground preparation for each planting type.

CREATION OF WOODLAND EDGE (SW1), NATIVE SCRUB (SW2), INDIVIDUAL SPECIMEN TREE (SW3) AND HEDGES

Aims and Objectives

- 4.3.2. The specimen trees (SW3) proposed within the Site aim to:
- Provide intermittent screening, visual interest and ecological benefit to the Site;
 - Create a more immediate visual impact in certain areas;
 - Enhance habitats, improve wildlife interest and provide future stock of veteran trees;
 - Buffer existing habitats to provide shelter and nesting habitat for birds; and
 - Provide some edible landscapes and create a connection between the historic orchard land use of the area.
- 4.3.3. The woodland edge (SW1), scrub planting (SW2); and hedges proposed within the Site aim to:
- Retain and increase habitat diversity and connectivity across the Site;
 - To connect with existing planting outside of the Scheme boundary;
 - Mitigate visual impact of the Proposed Scheme from the surrounding landscape, in particular to screen the acoustic barrier;
 - Provide suitable ground cover to sloped embankments;
 - Retain and enhance buffer habitat corridors through the Site and mitigate for loss of habitat connectivity;
 - Provide foraging opportunities for birds, mammals, reptiles and invertebrates;
 - Provide visual variety appropriate to the setting;
 - Define boundaries; and
 - Provide some edible landscapes and create a connection between the historic orchard land use of the area.

Planting

- 4.3.4. Any bare rooted plants shall be supplied to Site with their roots having been treated with an approved mycorrhizal inoculant anti-desiccant root dip at the time of lifting in the nursery. Evidence shall be supplied by the Landscape Contractor that the plants have been treated in this way.
- 4.3.5. Any containerised stock shall be checked to ensure even and healthy growth.
- 4.3.6. All native species planting stock shall be grown in the UK from seed sourced in the UK.

- 4.3.7. The Landscape Contractor shall secure the source of nursery stock prior to approval as soon as notice to proceed to construction is issued.
- 4.3.8. Plant handling, packaging, protection, transportation and on-site storage are to be undertaken in accordance with *'The National Plant Specification - Handling and Establishment Landscape Plants'* published by The Committee for Plant Supply and Establishment, 1995.
- 4.3.9. The planting season for bare root, root-balled and cell grown plants shall be 1st November to 31st March inclusive, unless otherwise advised by the Project Manager. Planting shall take place during favourable weather and soil conditions, when soil and weather conditions are most suitable for root establishment. The roots of the plants shall be kept moist prior to planting and protected from wind and frost damage.
- 4.3.10. Trees shall be pit planted into prepared soil and well firmed-in, in accordance with BS 4428:1989 *'Code of practice for general landscape operations'* and BS8545: 2014 *'Trees: from nursery to independence in the landscape – recommendations and Trees, Planning and Development – a guide for delivery'*. (BSI Standards Publication, 2016 British Standards).
- 4.3.11. For further details, refer to the soft landscape design drawings and specification, listed in *Paragraph 1.3.1 above*, for further information on planting and ground preparation.

CREATION OF WILDFLOWER HABITATS

Aims and Objectives

- 4.3.12. The creation of wildflower habitats covers the wildflower grass seeded areas (EM3) and wet wildflower grass seeded areas (EM8) to the attenuation ponds and swales. The key aim of these habitats is to provide enhancement to local biodiversity, perform as part of the Sustainable Drainage System (SuDS) and create aesthetic interest within the Site.

Seeding

- 4.3.13. Existing soils are to be prepared by raking and removing debris and stones to create a suitable seed bed. Cultivation and seeding are to be avoided in wet conditions that may give rise to soil compaction, smearing or other damage.
- 4.3.14. Where there is a significant time gap between soil preparation and sowing of the wildflower grass seed mix, the soil shall be left fallow. If necessary, any weed growth should be removed by hand or by using an appropriate non-residual herbicide, prior to cultivation and in accordance with manufacturer's instructions.
- 4.3.15. The seed mix is to be sown by machine or broadcast by hand at a rate of 4g/m², applied in two equal passes in different directions. Seed beds shall then be lightly raked.
- 4.3.16. The seed mix will be sown in early autumn or spring, once land has drained and there is no likely flooding forecasted. Depending on construction programme and availability of areas, seeding may be undertaken, at risk, outside of this period, if instructed by the Environmental Manager.
- 4.3.17. For further details of ground preparation and sowing, refer to soft landscape design drawings and specification, as listed in *Paragraph 1.3.1 above*. **Note at the time of writing (March 2022) the use of top soil inversion to reduce soil nutrients within the larger areas and top soil mixing within**

the road verges is to be confirmed as the preferred method, subject to further testing and agreement with WSCC.

CREATION OF WETLAND PLANTING TO ATTENUATION PONDS (SUBMERGED AND FLOATING PLANTS, MARGINAL PLANTS) AND SWALES (PLANTING IN SWALE).

Aims and Objectives

- 4.3.18. The creation of wetland planting to some areas of attenuation ponds and swales. The key aim of these habitats is to provide enhancement to local biodiversity, perform as part of the Sustainable Drainage System (SuDS) and create aesthetic interest within the Site.
- 4.3.19. The addition of submerged, floating and marginal plants will maximise wildlife opportunities and provide marginal habitats for invertebrates and small mammals.

Planting

- 4.3.20. Any containerised stock shall be checked to ensure even and healthy growth.
- 4.3.21. All native species planting stock shall be grown in the UK from seed sourced in the UK.
- 4.3.22. The Landscape Contractor shall secure the source of nursery stock as soon as notice to proceed to construction is issued.
- 4.3.23. Plant handling, packaging, protection, transportation and on-site storage are to be undertaken in accordance with '*The National Plant Specification - 'Handling and Establishment' Landscape Plants*' published by The Committee for Plant Supply and Establishment, 1995.
- 4.3.24. For further information on planting refer to soft landscape design drawings and specification, as listed in *Paragraph 1.3.1 above*.

CREATION OF CLIMBER PLANTING

Aims and Objectives

- 4.3.25. The addition of climbing species to the western side of the acoustic barrier primarily aims to improve the aesthetics of the acoustic barrier where space for alternative screening planting is limited. The climbers will also enhance local biodiversity.

Planting

- 4.3.26. Any containerised stock shall be checked to ensure even and healthy growth.
- 4.3.27. All native species planting stock shall be grown in the UK from seed sourced in the UK.
- 4.3.28. The Landscape Contractor shall secure the source of nursery stock for prior approval as soon as notice to proceed to construction is issued.
- 4.3.29. Plant handling, packaging, protection, transportation and on-site storage are to be undertaken in accordance with '*The National Plant Specification - 'Handling and Establishment' Landscape Plants*' published by The Committee for Plant Supply and Establishment, 1995.
- 4.3.30. Plants should be securely attached to training wires.
- 4.3.31. For further information on planting refer to soft landscape design drawings and specification, as listed in *Paragraph 1.3.1 above*.

4.4 ECOLOGY FEATURES

PROVISION OF BADGER FEATURES

Aims and Objectives

- 4.4.1. Permanent badger fencing will be installed on either side of the new road, with an underpass located in the west, close to the current main sett, to allow badgers to forage on either side of the road and to reduce the risk of vehicle collision.
- 4.4.2. An artificial sett has been constructed within the red line boundary as compensation for forthcoming sett closure activities. The details of this artificial sett were agreed through advanced discussions with Natural England.

Installation

- 4.4.3. The badger fencing design will be refined as part of the application of the Natural England sett closure licence, to be submitted in 2022, but will be installed in such a way as to encourage the passage of commuting badgers towards the underpass beneath the road. Fencing will be dug deep to prevent badger tunnelling underneath.
- 4.4.4. The artificial sett has already been constructed in agreement with principals set out by Natural England, and has been shown to be in current use by the local badger population.

PROVISION OF BAT BOXES

Aims and Objectives

- 4.4.5. A total of 17 bat boxes will be installed on retained trees within or in proximity to the Site, to compensate for the loss of trees with bat roosting suitability and to provide additional bat roosting opportunities.

Installation

- 4.4.6. Bat boxes will be installed on retained, mature, established trees within the Site boundary, or in the proximity of the Site where permission is obtained. Examples of suitable bat boxes can include the Schwegler 2F, Schwegler 2FN and Schwegler 1FF models.
- 4.4.7. Bat boxes will be installed at a height of 3-4m above ground to minimise the risk of predation, whilst also ensuring that the boxes are accessible for monitoring checks.
- 4.4.8. Bat boxes will be installed on southerly, south-westerly or south-easterly aspects to ensure optimal roosting conditions.
- 4.4.9. Indicative locations for bat box installation are presented on the Ecological Mitigation Plan (A29 Ecological Mitigation Plan March 2022). Final installation of the bat boxes will be conducted under ecological supervision to confirm that the above conditions relating to height and aspect are adhered to.

PROVISION OF BIRD BOXES

Aims and Objectives

- 4.4.10. A total of six bird nest boxes will be installed on retained trees or within or in proximity to the Site to provide additional nesting opportunities.

Installation

- 4.4.11. Bird boxes will be installed on retained, established trees within the Site boundary, or in the proximity of the Site where permission is obtained. Examples of suitable bird boxes can include the Schwegler 1B nest box with 32mm hole (likely to attract common garden birds recorded incidentally within the Site during breeding bird surveys).
- 4.4.12. Bird boxes will be installed at a minimum height of 3m above ground to minimise the risk of predation or interference.
- 4.4.13. Bird boxes will be installed on southerly, south-westerly or south-easterly aspects to ensure optimal nesting conditions.
- 4.4.14. Indicative locations for bird box installation are presented on the Ecological Mitigation Plan (A29 Ecological Mitigation Plan March 2022). Final installation of the bird boxes will be conducted under ecological supervision to confirm that the above conditions relating to height and aspect are adhered to.

PROVISION OF REPTILE REFUGIA

Aims and Objectives

- 4.4.15. A total of six reptile refugia will be provided within areas of retained or newly-planted suitable habitat, to provide additional shelter, basking and hibernation opportunities for reptiles. It is also expected that such refugia may provide incidental biodiversity benefits, including shelter for small mammals and amphibians.

Installation

- 4.4.16. Reptile refugia will be provided in areas of newly planted wildflower meadow, either on the edge of scrub islands, hedgerow or SuDS features to maximise the connectivity of these refugia to areas of commuting or foraging habitat for reptiles.
- 4.4.17. Reptile refugia will be constructed by creating a small excavation (approximately 0.5m deep), lined with sand or gravel for good draining. The body of the excavation is then filled with material (which can include cut timber, brash, bricks, rocks, building rubble or grubbed up tree roots). Materials likely to decompose (e.g. timber and arisings) should not be placed below heavy components in order to minimise the risk of collapse. The completed excavation should then be topped with soil and turf from the initial excavation and left to establish.
- 4.4.18. Refugia should be installed with a south-facing aspect on well-drained soils. Minimum recommended dimensions for refugia are 2m long x 2m wide x 1m high, though larger refugia can be created where space allows.
- 4.4.19. Indicative locations for refugia installation are presented on the Ecological Mitigation Plan (A29 Ecological Mitigation Plan March 2022). Final installation of the refugia will be conducted under ecological supervision to confirm that the siting, construction and dimensions of the refugia are appropriate.

PROVISION OF DEADWOOD FEATURES FOR STAG BEETLE AND OTHER INVERTEBRATES

Aims and Objectives

- 4.4.20. A minimum of two deadwood features for stag beetle will be provided within areas of retained woodland habitat, to provide additional breeding opportunities.

Installation

- 4.4.21. Deadwood features will take the form of 'log pyramids' (PTES, 2016), installed vertically to mimic the existing deadwood habitat for stag beetle. Features will be installed within the area of retained woodland/orchard habitat.
- 4.4.22. Deadwood features will be constructed by using logs from broadleaved trees felled during site clearance activities. Logs used should be at least the thickness of an adult arm, but larger where possible. Logs of varying heights will be dug approximately 0.5m vertically into the ground, with the top sections protruding at various heights to create a rough pyramid formation.
- 4.4.23. Deadwood features will be constructed in partial shade to prevent drying out and to encourage decomposition of the wood.
- 4.4.24. Indicative locations for deadwood feature installations are presented on the Ecological Mitigation Plan (A29 Ecological Mitigation Plan March 2022). Final installation of the deadwood features will be conducted under ecological supervision to confirm that the siting, construction and dimensions of the features are appropriate.

5 POST CONSTRUCTION MANAGEMENT ACTIONS

5.1 INTRODUCTION

- 5.1.1. This section sets out the general maintenance prescriptions and assumed responsibilities for the soft landscape areas, for the first 10 years following completion of the landscape works (post-Practical Completion). It is assumed the soft landscape works will be completed as a whole, and not in sections, to allow the start of the 10 year aftercare period to be applicable to the whole site.
- 5.1.2. This section also covers the management actions for each landscape element, specifically designed to enable the landscape and ecological objectives to be achieved and allow the successful establishment of a sustainable, healthy landscape, which will implement landscape, visual and ecological mitigation measures.
- 5.1.3. Planting schedules and locations for all landscape features are detailed in the soft landscape design drawings listed in *Paragraph 1.3.1 above*.
- 5.1.4. **Section 6** of this LEMP, comprises a Schedule of Works detailing the landscape and ecological management actions to be carried out by the Maintenance Contractor. This should be read in conjunction with the management prescriptions detailed below. The Maintenance Contractor should use all of the following information and Programme of Landscape Works as a basis for a work schedule.
- 5.1.5. Facilitation pruning will be agreed separately on site with an ecological clerk of works and in accordance with the Arboricultural Report (*70060779_WSP_ARB_REP*).

5.2 GENERAL MANAGEMENT PRESCRIPTIONS

- 5.2.1. The following are considered to be the over-arching requirements for the maintenance that apply to the soft landscape estate as a whole:
- The Maintenance Contractor shall attend quarterly Site inspections with the Project Landscape Architect as indicated in **Section 6**;
 - Management prescriptions shall be adapted as required following findings of the quarterly Site inspections and noted in a Quarterly Site Inspection Report to monitor condition and establishment;
 - The Maintenance Contractor shall be suitably qualified in order to be able to provide appropriate advice on the selection and application of herbicides (if required), and shall be competent at identifying plant species, including those proposed as part of seed and planting mixes, and all undesirable species. Any use of chemicals will first require approval from the Environment Agency;
 - Fertilisers, herbicides and/or lime are not required, unless otherwise stated. Of particular note, neonicotinoids and glyphosate shall **not** be used;
 - Subject to agreement with the Project Manager - grass clippings and other vegetative arisings may be composted on Site in suitable agreed locations (between Project Ecologist, Project Landscape Architect and Project Manager) to minimise visual impact, or alternatively shall be removed from Site to a previously approved licensed recycling or waste disposal centre;
 - Litter shall be removed on a monthly basis, or as necessary across the whole Site where heavy infestation has occurred. A co-ordinated approach to tackling litter problems should be sought with other management agencies and landowners in order to achieve a litter free zone;

- Litter bins shall be emptied monthly throughout the year or as necessary to ensure litter bins don't overflow;
- All weeds shall be removed; should any harmful or invasive weeds be identified, these shall be controlled following 'Guidance note on the methods that can be used to control harmful weeds' (DEFRA 2007); and
- Any trees or shrubs which die within 10 years of planting will be removed and replaced within the next planting season with others of a similar size and of the same species.

WEED CONTROL

- 5.2.2. Advice on weed control is also provided in the project's specification, as listed in *Paragraph 1.3.1 above*.
- 5.2.3. A weed management plan should be submitted for each successive year of maintenance and should include the control of the following notable species:
- Spear Thistle;
 - Creeping Thistle;
 - Broad Leaved Dock; and
 - Common Ragwort.
- 5.2.4. The following methods of treatment may be used:
- Hand removal; or
 - Cutting on grass and wildflower meadow areas.
- 5.2.5. Advice on the methods of weed control is available from several sources, including DEFRA publications, notably 'The Weeds Act 1959' – guidance note on the methods that can be used to control harmful weeds.
- 5.2.6. Weed control to areas of hard standing shall be carried out twice per year or as required to maintain the area in a weed free condition.
- 5.2.7. Unsightly dead weeds should be removed from areas of hard standing.
- 5.2.8. In areas of woodland edge planting and native scrub planting and around specimen tree planting, application of coarse bark mulch to suppress weeds may be used. Apply in spring before weed growth.

WATERING

- 5.2.9. Watering shall be undertaken during dry periods (this being any period without substantial rainfall for 14 days or more).
- 5.2.10. Watering should generally be undertaken early in the morning before the active growing window, particularly during periods of hot weather.
- 5.2.11. The Maintenance Contractor shall be entirely responsible for varying the frequency of visits according to climatic conditions and for contacting Jacksons to agree the timing of any additional watering visits if required.
- 5.2.12. Where restrictions are placed on the use of water, the Maintenance Contractor shall be responsible for the costs of obtaining recycled water.

- 5.2.13. The Maintenance Contractor shall be responsible for any plant failures or excessive die back from drought stress during the management contract period. Any trees or shrubs which die within 10 years of planting will be removed and replaced within the next planting season with others of a similar size and of the same species.

5.3 LANDSCAPE ELEMENTS

EXISTING VEGETATION

- 5.3.1. Existing trees, hedgerows and vegetation immediately adjacent to the Site should be checked during the quarterly Site inspections, for signs of deterioration or distress and the appropriate actions undertaken, where a potential safety hazard is identified.
- 5.3.2. All diseased wood, prunings and rubbish should be removed from Site to the nearest recycling centre and the Site left in a clean and tidy condition. Minor pruning of dead or damaged wood shall be carried out as necessary. Wounds must not be treated with a sealant. On substantial trees, WSCC's Tree Officer must be consulted for any necessary approvals.
- 5.3.3. Heavy branches should be removed in sections and undercut to avoid tearing the bark, then lowered by slings. No branch stumps should be left, and no cuts should be sealed with fungicidal sealant. No cuts should be capable of holding water.
- 5.3.4. Tree works shall be carried out in accordance with BS 3998:1989 '*Recommendations for Tree Work*' (BSI Standards Publication, 2010 British Standards).

WOODLAND EDGE PLANTING (SW1), NATIVE SCRUB PLANTING (SW2) & SPECIMEN SHRUBS

Management Prescriptions

- 5.3.5. Management actions include:
- Whips shall be maintained in their natural shape and pruned as set out in **Section 6**. Any growth which will obscure signs, visibility splays or sight-lines shall be removed;
 - As the planting matures it may be necessary to selectively thin the planted areas at 5 and 10 years to achieve an appropriate canopy and understorey. This cannot be definitive as the importance of biodiversity should be considered when removing species. If thinning work is required it should take place during the dormant months, typically November to January, and out of the wildlife nesting and breeding seasons;
 - Newly planted plants will be inspected annually during the growing season. Check for damaged, dead or diseased plants, remove plants where damage has occurred that would jeopardise long term survival of the plant and replace in the next planting season following identification;
 - Any dead or dying plants shall be replaced with good quality specimens of the same species and size of those already planted, as appropriate to maintain the overall habitat structure. Replacements should be planted within the next suitable planting season;
 - Maintain a weed free area around each whip to a minimum diameter of 500mm. Weeds are to be hand-pulled where feasible following guidance from '*Other options for weed control – technical information note*' (Landscape Institute 2019). Otherwise spot treatment of planted areas with non-residual herbicide to eradicate noxious / notifiable weeds. Other weeds to be removed by hand, where feasible, otherwise spot treat as approved by the Environment Agency;

- Prune to remove any deadwood, retain required form and enhance new growth. Where disease is identified, treat with an appropriate pesticide;
- Any stakes should be checked twice yearly and adjusted, repaired or replaced as necessary. Stakes should be removed by Year 5, or as instructed by the project Landscape Architect. Any plant protectors / shelters should also be removed at Year 5 and be recycled through a tailored scheme, such as Tubex or similar;
- Inspect the depth of mulch and top up annually to achieve an even spread and consistent minimum depth of 75mm. This will ensure that it is effective as a weed suppressant and moisture conserver. Following any maintenance operations and on an annual basis, the mulch shall be supplemented to allow for any material which may have been lost;
- Water as necessary in the first year. Provide artificial irrigation through the use of a Bowser to maintain healthy growth during the establishment period growing season (April – September, inclusive) to ensure establishment and survival of planting;
- Inspect at the beginning of the growing season in Years 4 and 5 to ensure that other adjacent species remain clear and do not stifle growth. If required, strim in Year 5 to control competition. Check for damaged, dead or diseased stock, replace stock when more than 5% of stock is damaged. Maintenance Contractor will report the presence of any diseases or pests to the Project Manager and provide a programme of removal and replacement;
- Some bramble will be allowed to establish through self-seeding, as it is valuable to wildlife but it will be managed so that it does not become dominant; and
- Where appropriate, dead wood will be retained on Site and piled up underneath the main canopy to create invertebrate habitat and shelter for small mammals.

SPECIMEN TREE PLANTING (SW3)

Management Prescriptions

5.3.6. In addition to the maintenance prescriptions for the Woodland Edge Planting, the individual tree planting also requires the actions outlined below.

5.3.7. Management actions include:

- Newly planted trees will require regular watering within the first few weeks of planting. The stakes will need to be monitored every six months and ties loosened as necessary. The area around the trees will be kept clear of vegetation for up to three years after planting using mulch. Apply slow-release fertilizer to the bases of the trees in April for the first two years and hand weed around the trees (1m diameter) on a monthly basis during the main growth period of April to October (inclusive);
- Pruning, where necessary, should be undertaken during January and early February with the aim of achieving a dense structure suitable for nesting birds. Pruning should be avoided between February and September (inclusive) to ensure that nesting birds are not affected by the management works;
- Fruiting trees are proposed within the Proposed Development. A management plan shall be agreed with between WSCC and the Maintenance Contractor regarding picking up fallen fruit from fruiting trees & specialised pruning when dormant in winter to encourage vigorous growth. When pruning fruit trees, aim to create an open goblet shape in the canopy. Only remove about a third of the branches, including those that grow towards the centre of the goblet, crossing, diseased and damaged branches;

- Trees and stakes will be inspected twice yearly during the growing season. Check for damaged, dead or diseased trees, remove trees where damage has occurred that would jeopardise long term survival of the tree and replace in the next planting season following identification. This annual inspection will also re-firm trees where leaning / in uneven soil and check staking and tree ties; replace where necessary;
- Minor pruning of dead or damaged wood shall be carried out as necessary. Wounds must not be treated with a sealant. On substantial trees, WSCC's Tree Officer must be consulted for any necessary approvals;
- Tree stakes should also be inspected for damage after storm events. Where necessary trees to be straightened and stakes / ties to be straightened and tightened or replaced;
- All weeds from around the base of the trees to be removed to a radius of 500mm in wildflower areas. Weeds are to be hand-pulled where feasible following guidance from '*Other options for weed control – technical information note*' (Landscape Institute 2019). Otherwise spot-treated with non-residual herbicide. Care should be taken when carrying out maintenance operations so as not to damage the base of trees with grass cutting machinery;
- Inspect the depth of mulch and top up annually to achieve an even spread and consistent minimum depth of 75mm. This will ensure that it is effective as a weed suppressant and moisture conserver. Following any maintenance operations and on an annual basis, the mulch shall be supplemented to allow for any material which may have been lost;
- Remove stakes and tree ties in Year 3 if trees have reached required establishment. If not, review in Years 4 and 5. Dispose of equipment at the nearest recycling centre or keep in storage for future use; and
- Cut back and remove any epicormic growth annually.

HEDGE MAINTENANCE

Management Prescriptions

5.3.8. Management actions include:

- No hedge maintenance shall take place during bird nesting season, see schedule in **Section 6**. Any growth which will obscure signs, visibility splays or sight-lines shall be removed;
- Newly planted plants will be inspected annually during the growing season. Check for damaged, dead or diseased plants, remove plants where damage has occurred that would jeopardise long term survival of the plant, and replace in the next planting season (during November – February) following identification;
- Hedges to achieve established height of 1.8m. Hedge adjacent to the noise barrier will be allowed to grow freely without maintenance;
- Where growth on established hedge is up to two years old, highway hedgerow planting may be maintained with tractor mounted side arm flails, provided they cut cleanly without leaving ragged ends, a clearing saw must be used on growth older than two years;
- Growth on established hedges shall be reduced slightly above the point of the previous cut (to a maximum height of 1.8m and a maximum width of 1.2m) and on completion, the top shall be level and a slight angle to the base with the base being wider than the top of the hedge (within a tolerance of 100mm);
- All weeds from around the base of the plants to be removed to a radius of 500mm in wildflower areas. Weeds are to be hand-pulled where feasible following guidance from '*Other options for*

weed control – technical information note (Landscape Institute 2019). Otherwise spot-treated with non-residual herbicide. Care should be taken when carrying out maintenance operations so as not to damage the base of trees with grass cutting machinery; and

- Any stakes should be checked twice yearly and adjusted, repaired or replaced as necessary. Stakes should be removed by Year 5, or as instructed by the project Landscape Architect. Any plant protectors / shelters should also be removed at Year 5 and be recycled through a tailored scheme such as Tubex or similar.

WILDFLOWER GRASS SEEDING AND WET WILDFLOWER GRASS SEEDING

Management Prescriptions

5.3.9. Management actions include:

- Monitor success of establishment annually; undertake over-seeding if required during next season, and water and aerate as required;
- First year management: Cut regularly throughout the growing season in establishment year to 40-60mm. Cutting to 40-60mm when height reaches 150mm.
- Second year and on-going management: Cut 2no. times each year, a 'hay cut' between late August and October shall be to 70mm after flowering. Then the grass shall be maintained with a cut of 50mm to remove excess grass, the following March and April. Do not cut from spring through to August, to give sown species an opportunity to flower;
- Cut back with a scythe, petrol trimmer or tractor mower. Leave arisings in situ for 2-7days during dry conditions, then remove from Site or leave in localised heaps for hibernacula (locations agreed between Project Ecologist, Project Manager and Maintenance Contractor);
- Areas within visibility splays should be cut back as necessary to keep splays clear. It is estimated that this will require cuts in June, August and September but cutting should be carried out more frequently if weather conditions vary to ensure visibility splays are kept clear.
- Leave 10% of each seeded area uncut to provide shelter for animals and invertebrates through the winter, cutting a mosaic, with scalloped edges;
- Weeds to be removed by hand or mechanical means in spring where feasible. Spot treatment with non-residual herbicide to eradicate noxious/notifiable weed species if present on Site. Dominant and invasive species will be controlled in the interests of species diversity. Dig out any residual perennial weeds such as docks. Remove all arising from Site after. All arisings will be removed and disposed of responsibly in a licenced green waste facility;
- All instances of damage, compaction or excessive wear should be reported immediately and a proposal for reinstatement / repair should be submitted;
- Watering shall be undertaken in accordance with seed-supplier's recommendations at all times. Once fully established, watering shall only be required during periods of drought, at the discretion of the Maintenance Contractor; and
- Additional care should be exercised when working adjacent to water bodies (i.e. attenuation ponds).

PLANTING TO ATTENUATION PONDS AND SWALES

Management Prescriptions

5.3.10. Management actions include:

- Using stakes, mark out the extents to which the marginal planting will be allowed to spread. Remove any plants that encroach beyond the desired planting area;
- Prevent excessive encroachment into the water body, by hand removal of plants, ensuring that a minimum of 50% open water is maintained at all times to prevent stagnation. This applies to marginal, submerged & floating plants;
- Ensure that the approximate percentages of marginal, submerged and floating plants remain consistent so that no one planting type becomes dominant;
- The best time to carry out more intensive work is between September and November when the impact on wildlife will be minimised (e.g. no newt breeding or young, ground nesting birds are not breeding, impact on water voles is less, etc.);
- Intensive silt and vegetation removal should only be carried out to limited areas at any one time (25% to 30% of the pond area on one occasion each year). This is to minimise the impact on biodiversity;
- Remove any dead plants/material and any undesirable species;
- Remove all arisings from Site; and
- All surface water management and attenuation features including culverts, gullies and drains shall be inspected four times per year during the months of March, June, September and December and any debris or silt causing an obstruction removed. Ensure all inlet and outlet structures are clear and unobstructed by plants.

CLIMBER PLANTING TO ACOUSTIC BARRIER

Management Prescriptions

5.3.11. Management actions include:

- Inspect the depth of mulch and top up annually to achieve a an even spread and consistent minimum depth of 75mm. This will ensure that it is effective as a weed suppressant and moisture conserver. Following any maintenance operations and on an annual basis, the mulch shall be supplemented to allow for any material which may have been lost;
- Maintain a weed free area around each plant to a minimum diameter of 500mm. Weeds are to be hand-pulled where feasible following guidance from '*Other options for weed control – technical information note*' (Landscape Institute 2019). Otherwise spot treatment of planted areas with non-residual herbicide to eradicate noxious / notifiable weeds. Other weeds to be removed by hand, where feasible, otherwise spot treat as approved by the Environment Agency;
- The climbers shall be inspected at regular intervals during the growing season to ensure they are secure and following the supporting mesh or wires, to cover the face of the acoustic barrier evenly;
- Prune to remove any deadwood, retain required form and enhance new growth. Where disease is identified, treat with an appropriate pesticide;
- Water as necessary in the first year. Provide artificial irrigation through the use of a Bowser to maintain healthy growth during the establishment period growing season (April – September, inclusive) to ensure establishment and survival of planting; and
- Any dead or dying plants shall be replaced with good quality specimens of the same species and size of those already planted, as appropriate to maintain the overall habitat structure. Replacements should be planted within the next suitable planting season.

ECOLOGY ELEMENTS

Badger Features Management Prescriptions

5.3.12. Management actions include:

- The length of the permanent badger fencing will be walked in its entirety on an annual basis, to check for condition. This check will be completed by Jacksons or the Maintenance Contractor, depending on the timing of the check (e.g. Jacksons for the initial 18 month defects liability period, or the Maintenance Contractor for the remainder of the 10 year establishment period).
- Where damage to the fence or breaches are observed, a record of the location of these will be noted and photographs taken to inform remedial action. Damage is considered to constitute holes in the wire fencing such that would allow a badger to cross through the fence.
- Wherever possible, temporary remedial action will be provided at the time of discovery during the annual checks, comprising the replacement of wire meshing sections to cover the full extent of the damage.
- Where it is not possible to repair damage during the annual inspection visit, details of the extent and location of the damage will be recorded, and repairs arranged as a priority by Jacksons or the Maintenance Contractor. Repairs should be completed within one month of first identification to minimise the vehicle collision risk of badgers breaching the fence.
- Details of all damage/breaches noted and subsequently repaired will be forwarded on to the Project Ecologist, who will use the information to inform the formal review of the LEMP at the end of Year 1, 3 and 5. Where persistent damage or breaches are recorded, the Project Ecologist will consider the recommendation to update the specifications of the fencing required in any future LEMP updates, following agreement with WSCC.

5.3.13. As the artificial badger sett has now established, there are no specific post-construction management requirements for this feature. Additional monitoring of the artificial sett will be completed if mandated as part of the licence for sett closure, in accordance with any methods set out in the licence. Any required landscaping management measures within the vicinity of the artificial sett should be completed sensitively using hand tools, to minimise the risk of disturbance to badgers which may be occupying the sett. Any such landscaping management required in the vicinity of the artificial sett will be discussed in advance with the Project Ecologist, to discuss the agreed methodologies and actions.

Bat Box Management Prescriptions

5.3.14. As bat boxes are not being provided as compensation for the loss of confirmed bat roosts, there is no requirement to monitor the bat boxes for presence of roosting bats. However, general management actions will include:

- Bat boxes will be installed under ecological supervision by the Project Ecologist. The Project Ecologist will take photographs of the final siting of each bat box as a record of the optimum condition and siting of each box. This record will be passed onto Jacksons and WSCC (who will in turn forward on to the Maintenance Contractor) for reference.
- Jacksons or the Maintenance Contractor (depending on the timing) will undertake annual checks of the external condition of the bat boxes, with reference to the photographic record provided by the Project Ecologist. Annual checks can be completed at any time of year.

- Checks will confirm if the bat boxes remain installed on the trees, and are in good condition (with no observable damage to panels or attachments), with reference to the photographic record provided by the Project Ecologist.
- Where bat boxes have been dislodged from installed trees, these will be re-installed on the same tree (assuming that the condition of the tree allows for this). Where the tree condition is no longer suitable for bat box installation (e.g. due to storm damage or similar), an alternative tree in proximity to the previous location will be sought, in agreement with the Project Ecologist and WSCC.
- Where boxes are identified as damaged during annual checks, replacement boxes of the same or similar specification will be installed under supervision and instruction from the Project Ecologist.
- Due to the risk of encountering bats, internal bat box inspections (if required) must only be completed by a licenced bat surveyor, as advised by the Project Ecologist. Internal inspections may be required if damage is suspected from an external check, but can only be confirmed through internal inspection.
- Information on any damaged or replaced bird boxes will be passed on to the Project Ecologist by Jacksons or the Maintenance Contractor following each annual review, such that the Project Ecologist can factor in the condition and availability of these boxes during the Year 1, Year 3 and Year 5 formal review of the LEMP, and make additional recommendations for more regular inspections, if required.

Bird Box Management Prescriptions

5.3.15. There is no requirement to monitor the bird boxes for presence of nesting birds. However, general management actions will include:

- Bird boxes will be installed under ecological supervision by the Project Ecologist. The Project Ecologist will take photographs of the final siting of each bird box as a record of the optimum condition and siting of each box. This record will be passed onto Jacksons and WSCC (who will in turn forward on to the Maintenance Contractor) for reference.
- Jacksons or the Maintenance Contractor (depending on the timing) will undertake annual checks of the external condition of the bird boxes, with reference to the photographic record provided by the Project Ecologist. Annual checks can be completed at any time of year.
- Checks will confirm if the bird boxes remain installed on the trees, and are in good condition (with no observable damage to panels or attachments), with reference to the photographic record provided by the Project Ecologist.
- Where bird boxes have been dislodged from installed trees, these will be re-installed on the same tree (assuming that the condition of the tree allows for this). Where the tree condition is no longer suitable for bird box installation (e.g. due to storm damage or similar), an alternative tree in proximity to the previous location will be sought, in agreement with the Project Ecologist and WSCC.
- Where bird boxes are identified as damaged during annual checks, replacement boxes of the same or similar specification will be installed under supervision and instruction from the Project Ecologist.
- Checks will be completed outside of the breeding bird season to avoid disturbing active bird nests. Inspections will involve the removal of old nests if present, to encourage use in the following breeding season.
- Information on any damaged or replaced bird boxes will be passed on to the Project Ecologist by Jacksons or the Maintenance Contractor following each annual review, such that the Project

Ecologist can factor in the condition and availability of these boxes during the Year 1, Year 3 and Year 5 formal review of the LEMP, and make additional recommendations for more regular inspections, if required.

Reptile Refugia Management Prescriptions

- 5.3.16. No monitoring is required for reptile refugia, once constructed. However, the following management actions will be adhered to ensure the conservation aims and objectives of the refugia are met.
- All reptile refugia, upon installation, will be photographed by the Project Ecologist. The Project Ecologist will provide a photo record of each refugia in its installed location to Jacksons and WSCC (who will pass on to the Maintenance Contractor). The photographs will serve as a record for the optimal condition and arrangement of the refugia.
 - Each refugia will be subject to an annual inspection by Jacksons or the Maintenance Contractor (depending on the time of the check). The inspection will involve a visual observation of each refugia, to confirm that it remains in place (as per the original photograph) and has not been dismantled by deliberate or natural processes. This check can occur at any time of year.
 - Where the refugia appears to be dismantled or partly damaged, Jacksons or the Maintenance Contractor will consult with the Project Ecologist on the appropriate steps to restore the refugia.
 - Jacksons or the Maintenance Contractor (as appropriate) will also take a photograph of all refugia following each annual inspection, to demonstrate the expected re-establishment of vegetation atop each refugia.
 - Photographs of all refugia, and any records of damage subsequently repaired, following each annual inspection will be passed on to the Project Ecologist, who will factor in the current condition of refugia during the programmed reviews of the LEMP during Year 1, Year 3 and Year 5. The Project Ecologist will make recommendations for any remedial action to restore the function of refugia as required.

Deadwood Feature Management Prescriptions

- 5.3.17. No management prescriptions are required for deadwood features, once constructed. However, the following management actions will be adhered to ensure the conservation aims and objectives of the deadwood features are met.
- All deadwood features, upon installation, will be photographed by the Project Ecologist. The Project Ecologist will provide a photo record of each deadwood feature in its installed location to Jacksons and WSCC (who will pass on to the Maintenance Contractor). The photographs will serve as a record for the optimal condition and arrangement of the deadwood feature.
 - Each deadwood feature will be subject to an annual inspection by Jacksons or the Maintenance Contractor (depending on the time of the check). The inspection will involve a visual observation of each deadwood feature, to confirm that it remains in place (as per the original photograph) and has not been dismantled by deliberate or natural processes. This check can occur at any time of year.
 - Where the deadwood feature appears to be dismantled or partly damaged, Jacksons or the Maintenance Contractor will consult with the Project Ecologist on the appropriate steps to restore the deadwood feature.
 - Jacksons or the Maintenance Contractor (as appropriate) will also take a photograph of all deadwood features following each annual inspection, to demonstrate the current condition of each feature.

- Photographs of all deadwood features, and any records of damage subsequently repaired, following each annual inspection will be passed on to the Project Ecologist, who will factor in the current condition of deadwood features during the programmed reviews of the LEMP during Year 1, Year 3 and Year 5. The Project Ecologist will make recommendations for any remedial action to restore the function of deadwood features as required.

6 MAINTENANCE AND MANAGEMENT SCHEDULES

Table 6-1 – Programme of Landscape Works for 10-year Maintenance Period

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Litter (See Para 5.2.1)												
All hard & soft landscaped areas, every month or as required.	X	X	X	X	X	X	X	X	X	X	X	X
Litter bin collection, every month or as required to ensure bins don't overflow	X	X	X	X	X	X	X	X	X	X	X	X
Inspections (See Para 5.2.1)												
Quarterly Landscape Inspections Includes inspection check of hard and soft landscape establishment, including existing soft landscape.			X			X			X			X
Submission of Annual Landscape Inspection Report									X			
Existing Vegetation (See Para 5.3.1 - 5.3.4)												
Pruning, deadwood removal, thinning as required	X										X	X
Woodland Edge Planting (SW1), Native Scrub Planting (SW2) & Specimen Shrubs (See Para 5.3.5)												
Inspection of all plants, stakes, ties and shelters *Remove equipment once trees have established, likely to be Year 3.			X					X				

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Weed control			X				X					
Top up mulch to consistent 75mm depth			X						X			
Pruning, deadwood removal, thinning as required	X										X	X
Watering until Practical Completion & through out the 18 month liability period				X	X	X	X	X	X			
Individual Tree Planting (See Para 5.3.6 - 5.3.7)												
Inspection of all trees, stakes, mulch mats and ties *Remove equipment once trees have established, likely to be Year 3.			X					X				
Apply fertiliser to the bases of the trees in April for the first two years.				X								
Weed control				X			X					
Pruning, deadwood removal, thinning and crown-lifting as required	X										X	X
Watering until Practical Completion & through out the 18 month liability period				X	X	X	X	X	X			
Hedge (See Para 5.3.8)												
Hedge cutting												X

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Watering until Practical Completion & through out the 18 month liability period				X	X	X	X	X	X			
Wildflower & Wet Wildflower Seeding (See Para 5.3.9)												
Cut & remove arisings – Year 1				X	X	X	X	X	X	X		
Cut & remove arisings – Years 2-10				X					X			
Visibility splays – Years 2-10						X		X		X		
Planting to attenuation ponds and swales (See Para 5.3.10)												
Inspection of all surface water management and attenuation features			X			X			X			X
Removal of vegetation to avoid overcrowding										X		
Climber planting (See Para 5.3.11).												
Watering until Practical Completion & through out the 18 month liability period			X	X	X	X	X	X	X	X		
Tying in climbers to supporting mesh			X		X		X		X			

Table 6-2 – Programme of Ecology Works for 10-year Maintenance Period

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Bat Boxes												
<p>Visual external inspection, and internal clean-out by a licenced bat ecologist, once annually where required. Repair and re-installation undertaken as required, in discussion with Project Ecologist.</p> <p>A record of annual condition and repair actions to be passed to the Project Ecologist each year, to inform LEMP review.</p> <p><i>(Suitable months for inspection and repair marked with X).</i></p>	X	X	X	X	X	X	X	X	X	X	X	X
Bird Boxes												
<p>Visual external inspection and clean out, if required, once annually during wintering period. Repair and re-installation undertaken as required.</p> <p>A record of annual condition and repair actions to be passed to the Project Ecologist each year, to inform LEMP review.</p> <p><i>(Suitable months for inspection and repair marked with X).</i></p>	X	X							X	X	X	X
Badger Features												

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
<p>Visual inspection of badger fencing for signs of damage and repair actions where required, once annually</p> <p>A record of annual condition and repair actions to be passed to the Project Ecologist each year, to inform the LEMP reviews.</p> <p><i>(Suitable months marked with X)</i></p>	X	X	X	X	X	X	X	X	X	X	X	X
Reptile Refugia												
<p>Visual inspection of refugia for signs of damage and habitat re-instatement, once annually, with repairs undertaken as required in discussion with Project Ecologist.</p> <p>A record of annual condition and repair actions to be passed to the Project Ecologist each year, to inform LEMP reviews.</p> <p><i>(Suitable months marked with X)</i></p>	X	X	X	X	X	X	X	X	X	X	X	X
Deadwood Features for Terrestrial Invertebrates												
<p>Visual inspection of deadwood features for signs of damage once annually, with repairs undertaken as required in discussion with Project Ecologist.</p> <p>A record of annual condition and repair actions to be passed to the Project Ecologist each year, to inform LEMP reviews.</p> <p><i>(Suitable months marked with X)</i></p>	X	X	X	X	X	X	X	X	X	X	X	X

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